

## **Permitted Research Projects**



## Research Permits Issued by the Florida Keys National Marine Sanctuary: 2002

**Information included below:** Name of principal investigator and contact information, permit number and duration, project title, project summary, and funding source (if provided).

1) Greta Aeby, U.S. Environmental Protection Agency, Gulf Ecology Division ([greta@hawaii.edu](mailto:greta@hawaii.edu)). FKNMS-2001-001, 1/8/2001 to 3/1/2002 and FKNMS-2002-057, 7/8/2002-12/31/2002 (fish predation component). Effect of Fish Predation on the Health of Corals in the Florida Keys and the Relationship between Increased Levels of MAAs and Protection from UV Stress in Perforate and Imperforate Corals. This project will examine two potential ways in which coral-feeding fish might be affecting the health of corals in the Florida Keys. The role of fish as transmission vectors of black band disease and the affect of fish predation on the tolerance of corals to increased water temperature and UV stress will both be examined. The amended research will test whether there is a relationship between increased MAAs in corals and subsequent protection from UV damage. The MAA content of coral pieces will be manipulated to obtain one group of coral with a high MAA content and one group with a low MAA content. The bleaching response of the two groups of coral when exposed to UV will then be compared. Both perforate (*Porites porites*) and imperforate (*Madracis mirabilis*) corals will be used for these experiments. Science Training in Ecology Program (STEP) a joint cooperation between the U.S. EPA and the Center for Environmental Diagnostics and Bioremediation (UWF).

2) Susan Anderson, University of California at Davis, Bodega Marine Laboratory ([susanderson@ucdavis.edu](mailto:susanderson@ucdavis.edu)). FKNMS-2001-024, 5/1/2001 to 4/30/2002. UV Effects and Coral Bleaching. We will evaluate the role that climate change may play in altering penetrance of UV radiation over coral reefs and potentially contributing to coral bleaching. In this study, we have combined the investigation of the molecular effects of UV on corals with a remote sensing component. Funding unknown, assume same as previous permit (FKNMS-99-046), which is EPA, NOAA, and NASA that was funded for three years, through 2002.

3) Andrew Baker, Wildlife Conservation Society and Columbia University ([abaker@wcs.org](mailto:abaker@wcs.org)). FKNMS-2002-073, 9/23/2002 to 8/31/2003. Symbiont Distributions in Reef Corals as Indicators of Recent Environmental History. This research uses molecular techniques to identify the dinoflagellate symbionts (*Symbiodinium* spp.) of reef-building corals from the Florida Keys reef tract (and the National Marine Sanctuary in particular). It tests for differences in the distribution of symbionts that correlate with environment, and tests the stability of these distributions by transplanting coral colonies between different environments, with and without exposure to a bleaching stimulus. National Undersea Research Program, UNCW.

4) Iliana Baums, University of Miami, Rosenstiel School of Marine and Atmospheric Science/MBF ([ibaums@rsmas.miami.edu](mailto:ibaums@rsmas.miami.edu)). FKNMS-2001-009, 3/12/2001 to 12/31/2002. Genetic Status of *Acropora palmata* Populations in the Caribbean. This project will contribute to the status review of Candidate species (under the Endangered Species Act) *Acropora palmata*, by addressing questions relating to species life history and ecology, as well as population status, history and trends. Specifically, we seek to determine the genotypic diversity within local populations of this coral, and the extent to which geographically isolated populations are

genetically similar, information that will be essential for future conservation and recovery efforts. These findings will aid in assessing the degree of genetic bottleneck that already threatens *A. palmata* recovery and the potential for natural dispersal to repopulate areas of extirpation. NOAA NMFS Candidate Species Program, Project #CP-01-SEC02.

5) Carole Bewley, National Institutes of Health ([cb194k@nih.gov](mailto:cb194k@nih.gov)). FKNMS-2002-069, 10/14/2002 to 12/31/2004. Investigations of Carbohydrate-Binding Proteins from Marine Cyanobacteria. Collect cyanobacteria samples from subtropical waters and investigate the presence of carbohydrate binding proteins. If such proteins are present, we will determine their optimal ligands and the source of their natural receptors using biochemical and chemical techniques. National Institutes of Health.

6) Gregory Bodnar, Marine Resources Development Foundation ([gbodnar@hotmail.com](mailto:gbodnar@hotmail.com)). FKNMS-2001-070, 9/17/2001 to 9/30/2002. Implementation of Permanent Research Stakes within the FKNMS to Conduct ReefCheck Methodology. Permanent stakes will be installed at Grecian Dry Rocks and Molasses Reef for monthly data collection using the ReefCheck protocols. Systematic data collection of benthic substrate, fish and invertebrate diversity and abundance will be collected using this non-invasive, tested methodology. Marine Resources Development Foundation.

7) James Bohnsack, National Marine Fisheries Service, Southeast Fisheries Science Center ([jim.bohnsack@noaa.gov](mailto:jim.bohnsack@noaa.gov)). FKNMS-2000-031, 5/15/2000 to 12/31/2002. Non-destructive Visual Census of Reef Fish Populations in the Florida Keys. This research is part of an ongoing project to assess reef fish populations of the Florida Keys, from Fowey Rocks to the Dry Tortugas. This project is also part of the Sanctuary's Marine Zone Monitoring Program to assess reef fish changes inside and outside fully protected zones. NMFS; NURC support for paired benthic & fisheries assessments in Dry Tortugas. [Summary of findings in annual report]

8) Jill Borger, University of Miami, Rosenstiel School for Marine and Atmospheric Sciences ([jborger@rsmas.miami.edu](mailto:jborger@rsmas.miami.edu)). FKNMS-2001-074, 10/17/2001 to 10/16/2001 and FKNMS-2002-064, 11/27/2002 to 12/31/2003. Coral Disease Ecology and the Effects of Disease on Reproduction. This project is an extension of work begun last year. The permit will cover two projects; the first involves a detailed examination of specific reef sites in order to follow the specific incidence, movement and transmission of coral diseases over time. This will involve non-destructive sampling methods, such as transect lines and quadrats, and detailed maps of each site will be constructed. The second project will examine the effects of disease on coral reproduction. A few samples will be taken from both diseased and healthy colonies and total fecundity, or reproductive output, will be measured histologically. The fecundity values for diseased and healthy colonies will be compared and analyzed. Reitmeister Award and anonymous donation to Jill Borger.

9) Joan Browder, NOAA/National Marine Fisheries Service ([joan.browder@noaa.gov](mailto:joan.browder@noaa.gov)). FKNMS-2002-002, 1/3/2002 to 12/31/2003. Post-larval Sampling Project. The purpose of the sampling project is to describe spatial and temporal patterns of postlarval pink shrimp immigration to potential nursery grounds in Florida Bay from offshore spawning grounds. Accessibility of potential nursery grounds to pink shrimp postlarvae (i.e., postlarval ingress rate)

may be an important factor limiting the Bay's capacity to produce pink shrimp recruits to the Tortugas fishing grounds. NOAA/NMFS Southeast Fisheries Science Center.

10) Michael Burton, NOAA/National Marine Fisheries Service ([michael.burton@noaa.gov](mailto:michael.burton@noaa.gov)). FKNMS-2002-034, 5/8/2002 to 3/31/2003. Biological Characterization of Riley's Hump and Identification of Spawning Areas. Visual census transects (SCUBA) will be used to quantify mutton snapper abundance in the vicinity of Riley's Hump and compare it to baseline data. Habitat will be characterized by divers using 0.5 m<sup>2</sup> quadrats. NOAA/NMFS Coral Reef Initiative.

11) Mark Butler, Old Dominion University ([mbutler@odu.edu](mailto:mbutler@odu.edu)). FKNMS-2002-043, 6/5/2002 to 6/4/2003. Characterization of Hardbottom Community Dynamics: Sponges, Octocorals, Lobsters, & Octopus. My research team is currently working on several related projects involving the shallow, hard-bottom communities so common throughout the Florida Keys. In some cases, our research is focused on the ecology of single species of specific ecological or economic importance (e.g., spiny lobster, commercial sponges, octopus). In other cases, our research involves community-level assessment and the influence of environmental (e.g., salinity change) or human factors (e.g., fishing) on the structure of hard-bottom communities over large spatial scales. In both cases, we use a combination of field sampling, field and laboratory experimentation, and computer simulation modeling to test hypotheses of interest. National Science Foundation, OCE-0136894 and NOAA Coastal Ocean Program.

12) Roy Caldwell, University of California, Berkeley ([4roy@socrates.berkeley.edu](mailto:4roy@socrates.berkeley.edu)). FKNMS-2002-062, 10/18/2002 to 12/31/2003. The Biology of Stomatopod Crustaceans. This proposal focuses on stomatopod crustaceans, asking basic biological questions about their distribution and abundance, reproductive behavior, larval dispersal, and how they communicate in a colorful underwater world. NOAA/National Undersea Research Center, Key Largo.

13) Mary Alice Coffroth, State University of New York at Buffalo ([coffroth@buffalo.edu](mailto:coffroth@buffalo.edu)). FKNMS-2000-029, 5/1/2000 to 2/28/2002. Reef Connectivity: A Study of Larval Supply and Source of Recruits to the Florida Keys and the Flower Garden Banks. The level of local dispersal and source of coral recruits to the Florida Keys and the Flower Garden Banks will be examined in order to assess reef interdependence or connectivity. In this study the population genetic structure of coral at two sites that vary in their potential for genetic exchange (i.e., Florida Keys and Flower Garden Banks) will be used to infer present (or recent) gene flow patterns in two scleractinian corals, the broadcasting species *Montastraea cavernosa* and the brooding species *Porites astreoides*. NURC supported.

14) Mary Alice Coffroth, State University of New York at Buffalo ([coffroth@buffalo.edu](mailto:coffroth@buffalo.edu)). FKNMS-2002-011, 3/4/2002 to 6/30/2004. A Study of Population Dynamics of Scleractinians on Conch Reef: A Demographic and Population Genetics Approach. In this study the influence of recruitment in establishing species composition of reefs will be examined using a combined demographic and population genetic approach to record the species composition at two sites on Conch Reef in the Florida Keys. NOAA/National Undersea Research Center.

15) Felicia Coleman, Florida State University ([coleman@bio.fsu.edu](mailto:coleman@bio.fsu.edu)). FKNMS-2001-005, 2/23/2001 to 2/28/2003. Studies in the Ecology of Red Grouper, *Epinephelus morio*, including their Contribution to Habitat Heterogeneity and Community Structure. The aim of this project is to examine the structure and function of the community of organisms that take up residence in holes occupied by red grouper. These holes, for the most part, appear to be excavated and maintained by red grouper. The resultant communities are rich in sessile invertebrates and various species of cleaning fish. Marine Conservation Biology Institute, SeaGrant, and Environmental Defense.

16) Carrollyn Cox, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute ([carrollyn.cox@fwc.state.fl.us](mailto:carrollyn.cox@fwc.state.fl.us)). FKNMS-2001-022, 4/23/2001 to 12/31/2002. Spiny Lobster Spawning Potential and Population Assessment: A Monitoring Program for the South Florida Fishing Region. The proposed study is part of the Sanctuary's Marine Zone Monitoring Program and seeks to investigate the effects of no-take management on this important fishery resource. FMRI. [Summary of findings in annual report]

17) Kerry Davies, Florida State University ([davies@bio.fsu.edu](mailto:davies@bio.fsu.edu)). FKNMS-2001-066, 8/29/2001 to 9/1/2002. The Identification and Characterization of Bacterial Flora Associated with Spiny Lobsters in the Florida Keys and the Etiology of Shell Disease in the Caribbean Spiny Lobster, *Panulirus argus*. The purpose of this project is to isolate and identify culturable bacterial flora associated with crustaceans (specifically, spiny lobsters), sediment, and seawater in the Florida Keys. The aim is to isolate and identify microorganisms that may be specifically associated with the shell of spiny lobsters in an effort to determine the ecological significance of crustacean associated bacterial flora and its possible role in shell disease related symptoms. FSU/Reeves.

18) Alan Duckworth, Harbor Branch Oceanographic Institution ([aduckworth@hboi.edu](mailto:aduckworth@hboi.edu)). FKNMS-2001-049, 7/23/2001 to 9/30/2003. Aquaculture of the Sponge *Forcepia* sp. for the Sustainable Supply of Bioactive Metabolites for Biomedical Research. The sponge *Forcepia* sp. will be farmed for 1 year at a depth of 20-25m near Tennessee Reef to determine if in situ aquaculture can supply sufficient and sustainable quantities of the metabolites lasonolides for biomedical research. The farmed sponges will be harvested at different rates to examine whether regular tissue harvesting can increase overall yield of lasonolide metabolite. Sponges will be farmed in mesh arrays, which will be either pegged flat to the substrate or held upright in the water column. One array will be maintained beyond the 1-year period and will be used as a supply for ongoing, grant-funded research on the lasonolides. HBOI.

19) Peter Edmunds, California State University at Northridge ([peter.edmunds@csun.edu](mailto:peter.edmunds@csun.edu)). FKNMS-2002-021, 6/1/2002 to 12/31/2003. Global Climate Change and Coral Recruitment: The Interactive Effects of Temperature and Ontogeny on the Biology of *Porites astreoides* Larvae. The goal of this project is to carry out a multidisciplinary analysis of the biology, physiology and genetics of coral larvae in order to understand how global climate change will affect the coral population structure of reefs such as those in the Florida Keys. NOAA/National Undersea Research Center.

20) David Eggleston, North Carolina State University ([eggleston@ncsu.edu](mailto:eggleston@ncsu.edu)). FKNMS-2002-061, 7/2/2002 to 12/31/2003. Fish and Caribbean Spiny Lobster Distribution and Abundance in

the Great White Heron National Wildlife Refuge: An Initial Assessment and Comparison with the Key West National Wildlife Refuge. We will use aerial photographs, ground-truthing and GIS computer software to identify and map habitats within the GWHNWR within which to quantify fish and Caribbean spiny lobster. We will use visual surveys conducted by SCUBA divers to quantify fish and lobster, as well as measure specific habitat characteristics. The study will provide baseline data and be used to make research and management recommendations. Grant from The Ocean Conservancy and U.S. Fish and Wildlife Service.

21) Craig Faunce, Audubon of Florida ([cfaunce@audubon.org](mailto:cfaunce@audubon.org)). FKNMS-2001-064, 9/1/2001 to 9/30/2002. Fish Utilization of Mangrove Fringe Habitats in Southeastern Florida. Our research will evaluate the hypothesis that coastal mangrove communities in tropical and subtropical ecosystems directly and indirectly increase the resilience of exploited reef and other fishes by providing critical habitat for juvenile and sub-adult stages. Awards/grants from NOAA/NMFS Coral Reef Initiative, EDF, and USGS.

22) Bill Fitt, University of Georgia, Institute of Ecology ([fitt@sparrow.ecology.uga.edu](mailto:fitt@sparrow.ecology.uga.edu)). FKNMS-2001-007, 3/8/2001 to 12/31/2002. Long Term Monitoring of Tissue Biomass from Five Species of Reef Corals. This project is a continuation of a seasonal monitoring program designed to document the relative physiological health of coral tissue and zooxanthellae for five major coral species in the Keys. Tissue biomass, levels of proteins, carbohydrates and lipids, C:H:N analysis and zooxanthellae photosynthetic potential, densities and chlorophyll content will be determined every 2-3 months for five species of corals living on the Florida Reef Tract. Former support of National Undersea Research Center and University of Georgia. We will be applying to NSF this year to fund the long-term work.

23) Bill Fitt, University of Georgia, Institute of Ecology ([fitt@sparrow.ecology.uga.edu](mailto:fitt@sparrow.ecology.uga.edu)). FKNMS-2001-063, 8/27/2001 to /1/2003. Potential for *Acropora cervicornis* (staghorn coral) and *Acropora palmata* (elkhorn coral) in Coral Reef Restoration: Genetics, Physiology, and Growth. This proposal addresses two major issues concerning populations of *A. cervicornis* and *A. palmata* in the Caribbean: the genetic structure and diversity, and some basic questions concerning transplantation. We will compare populations of both species from two locations: relatively pristine reefs (low human impact) near the Caribbean Marine Research Center on Lee Stocking Island in the Bahamas vs. relatively high human impact sites in the Florida Keys National Marine Sanctuary. NOAA/National Undersea Research Center.

24) Nicole Fogarty, The Nature Conservancy ([nfogarty@tnc.org](mailto:nfogarty@tnc.org)). FKNMS-2001-012, 4/1/2001 to 12/31/2002. Sea Stewards Monitoring Program. The Sea Stewards program is part of the Sanctuary's Level III Monitoring program. Volunteers are recruited to provide long-term monitoring of the Sanctuary Preservation Areas and associated reference sites. [Summary of findings in annual report]

25) Mark Fonseca, NOAA/Center for Coastal Fisheries and Habitat Research (CCFHR) ([mark.fonseca@noaa.gov](mailto:mark.fonseca@noaa.gov)). FKNMS-2001-023, 5/1/2001 to 6/30/2003. Effects of Crab/Lobster Traps to Seagrass Beds of the Florida Keys National Marine Sanctuary (FKNMS): Damage Assessment and Evaluation of Long-Term Recovery. This project will assess the effect (if any) of stationary fishing gear (i.e. crab/lobster traps) to seagrass beds of the FKNMS. Replicate traps

will be randomly placed within randomly selected seagrass beds of varying species composition. Intermittent removal of traps will determine the time it takes to sustain injury to the beds. Injury recovery will be tracked quarterly to semi-annually over the following two years. NOS and NMFS.

26) Mark Fonseca, NOAA/Center for Coastal Fisheries and Habitat Research (CCFHR) ([mark.fonseca@noaa.gov](mailto:mark.fonseca@noaa.gov)). FKNMS-2001-029, 6/11/2001 to 6/30/2003. A Novel Technique for the Restoration of Seagrass Propeller Scars: Does Deployment of Sediment-filled, Biodegradable Fabric Tubes in Propeller Scars Enhance Seagrass Regrowth into These Injured Areas? This project will assess the effectiveness of a new method for propeller scar restoration in the FKNMS. Fabric tubes and bird stakes will be deployed into existing propeller scars in a replicated experiment. Intermittent monitoring of treatments will be tracked quarterly to semi-annually over the following two years. NOS.

27) Mark Fonseca, NOAA/Center for Coastal Fisheries and Habitat Research (CCFHR) ([mark.fonseca@noaa.gov](mailto:mark.fonseca@noaa.gov)). FKNMS-2002-009, 2/15/2002 to 12/31/2003. Characterization and Analysis of Seagrass Injury and Recovery on Shallow Seagrass-Coral Banks in the FKNMS. The objectives of this study are to develop a comprehensive database of the complete range of injury categories and the widest possible range of injury ages and species combinations to be modeled in the Habitat Equivalency Analysis. In addition to these detailed injury sites, we will characterize the current conditions on the entire Red Bay bank system using 1/9600 scale vertical aerial photography integrated with differential global positioning system based ground surveys. We will conduct a replicated experiment to determine the effect of excavation depth on the recovery rate of injured *Thalassia testudinum* meadows. We hypothesize that the severity of injuries to a *Thalassia* meadow will be a function of the depth of sediment excavated by the disturbance. NOAA/National Ocean Service/Office of Coastal Resource Management and National Centers for Coastal Ocean Science/CCFHR. [Summary of findings in annual report]

28) James Fourqurean, Florida International University ([fourqure@fiu.edu](mailto:fourqure@fiu.edu)). FKNMS-2001-035, 8/2/2001 to 12/31/2002. Seagrass Monitoring in the Florida Keys National Marine Sanctuary. This project will provide baseline data on the status, species composition, and distribution of seagrass communities within two of the Sanctuary no-take zones, as well as other sites throughout the Sanctuary. This project is part of the FKNMS and EPA Water Quality Protection Program. U.S. EPA/WQPP, FIU. [Summary of findings in annual report]

29) Robert Glazer, Florida Marine Research Institute, Florida Fish and Wildlife Conservation Commission ([bob.glazer@fwc.state.fl.us](mailto:bob.glazer@fwc.state.fl.us)). FKNMS-2001-055, 8/2/2001 to 8/31/2003. Survey and Rehabilitation of Queen Conch within the Florida Keys National Marine Sanctuary. The surveys include visual surveys of sites where conch are sparse, belt-transects of densely populated conch aggregations in offshore reef flats, tag-recapture sampling of nearshore conch aggregations, and sonic tagging experiments. Many of these surveys will be conducted within the Sanctuary Preservation Areas of the Florida Keys National Marine Sanctuary and are conducted as part of the marine zone monitoring surveys. The secondary goal of this research is to determine the spatial and temporal distribution of queen conch larvae in and around the different regions of the Florida Keys. This information will lead to determining the optimal release location of hatchery-reared or transplanted queen conch based upon the probability that conch



larvae spawned in that location will recolonize the Keys. FMRI/FWC. [Summary of findings in annual report]

30) Robert Glazer, Florida Marine Research Institute, Florida Fish and Wildlife Conservation Commission ([bob.glazer@fwc.state.fl.us](mailto:bob.glazer@fwc.state.fl.us)). FKNMS-2001-056, 8/7/2001 to 8/31/2002. Transplantation of Wild Queen Conch from the Nearshore Zone to Offshore Spawning Aggregations: A Strategy for Restoring Florida's Conch Population. The goal of this project is to evaluate the efficacy of a large-scale transplantation program designed to restore the local queen conch spawning population. We will also assess the ecological impacts of a large-scale transplantation program. To meet these objectives, we will transplant juvenile and adult conch from nearshore areas where conch do not spawn to the offshore zone where spawning aggregations are located. Previous studies have shown that conch transplanted from the nearshore zone to offshore recover their reproductive capabilities. U.S. Fish and Wildlife Service, Partnerships for Wildlife Grant.

31) Walter Goldberg, Florida International University ([goldberg@fiu.edu](mailto:goldberg@fiu.edu)). FKNMS-2001-061, 9/1/2001 to 8/31/2002 and FKNMS-2001-067, 8/29/2001 to 9/1/2003. Ultrastructure of Aggression in Corals of the Genus *Mycetophyllia*. This project will test the hypothesis that specialized regions occur at the tip of *Mycetophyllia lamarckiana* or *M. ferox* mesenterial filaments and are used during aggressive behavior. FIU.

32) Dale Griffin, U.S. Geological Survey, Center for Coastal and Regional Marine Studies. FKNMS-2002-058, 6/27/2002 to 7/31/2002. Microbial Water Quality in Nearshore and Offshore Sites in the Florida Keys. Sediments, coral mucus, and the water column will be screened for the presence of microbial fecal indicators in nearshore and offshore waters in the Florida Keys. Mucus from diseased and healthy corals of the same species will be utilized to create a microbial community DNA fingerprint that may allow the identification of the disease-causing pathogen. USGS, University of Georgia.

33) Pamela Hallock Muller, University of South Florida ([pmuller@marine.usf.edu](mailto:pmuller@marine.usf.edu)). FKNMS-2000-011, 3/2/2000 to 12/31/2002. Long-term Monitoring of Stress in Reef-Dwelling Foraminifera. The reef-dwelling foraminifera, *Amphistegina gibbosa*, have exhibited bleaching and associated symptoms on Florida Keys reefs since summer of 1991. This project will continue long-term monitoring of populations at Conch and Tennessee Reefs, will compare symbiont taxa within *A. gibbosa* between these reefs, and will collect solar insolation data using long-term deployable radiometers. USEPA-ORD-NCERQA grant, 10/1/97 - 9/30/2000 (1 year no-cost extension will be requested). Amendment #2 work done in conjunction with Cheryl Woodley of NOAA and is funded by South Carolina Sea Grant.

34) Heather Ann Halter, Nova Southeastern University, National Coral Reef Institute (NCRI), ([heatherhalter@angelfire.com](mailto:heatherhalter@angelfire.com)). FKNMS-2001-077, 12/1/2001 to 9/30/2002. Comparison of Spatial, Seasonal and Substrate Changes of Net Carbonate Accumulation on Three South Florida Coral Reef Sites. The goal of this study is to differentiate short-term net carbonate accretion/erosion in Ft. Lauderdale versus the Florida Keys according to three variables: location, season, and substrate type. Carbonate tiles will be placed on the hard bottom at two

different depths at three sites: two in Ft. Lauderdale and one in the Florida Keys, the Tennessee Reef Research-Only Area. NSU Thesis Tuition Reimbursement.

35) M. Dennis Hanisak, Harbor Branch Oceanographic Institution ([hanisak@hboi.edu](mailto:hanisak@hboi.edu)). FKNMS-2000-058, 9/1/2000 to 9/30/2002. Long-term Monitoring of Benthic Algal Communities at the *Wellwood* Grounding Site, Molasses Reef, FKNMS. The grounding of the freighter *M/V Wellwood* on Molasses Reef in August 1984 was a catastrophe of unprecedented proportion in the Sanctuary (the damaged area was 4,865 m<sup>2</sup>, with the most severe damage in a flattened area of 1500 m<sup>2</sup>). Previously, this research team monitored recolonization of the benthic reef community, with major emphasis on algae, at the *Wellwood* site on Molasses Reef for four years (1985-88) after the grounding and did additional monitoring 10 years later (1995-96). The proposed sampling will extend the database previously obtained, which has application, both in terms of reef recovery after physical disturbance, but also to document long-term changes in the benthic algal community that appear to be occurring at this site. Limited resources required are being provided by HBOI.

36) Clay Harris, Middle Tennessee State University ([cdharris@mtsu.edu](mailto:cdharris@mtsu.edu)). FKNMS-2001-041, 7/5/2001 to 10/31/2002. The Wreck of the El Lerrri: Is One of America's Oldest "Artificial Reefs" Functioning Ecologically as a Patch Reef or a Hard Bottom Community? We propose to perform a survey of attached benthic inhabitants (coral, sponge, and algae) at (1) a ballast pile (i.e. artificial reef), (2) two patch reef sites (PRS-1 & PRS-2), and (3) two hard-bottom communities (HBS-1 & HBS-2) -- all within 0.25 to 1.5 nautical miles of shore on the ocean side of Lower Matecumbe and Craig Keys. At each of the five sites we will lay out two 25-m transects of contiguous 1 m<sup>2</sup> quadrats and perform a census of attached benthic organisms to (1) assess coral, sponge, and algae abundance, cover, and health using a consecutive quadrat method and at ELAR, (2) using hand-held, U/W video, develop a coral distribution map for future comparison. If time permits, we will also perform general ecological surveys of the quadrats using hand-held, U/W videography. MTSU grant #2-47401 and PADI Foundation.

37) Clay Harris, Middle Tennessee State University ([cdharris@mtsu.edu](mailto:cdharris@mtsu.edu)). FKNMS-2002-003, 1/3/2002 to 12/31/2003. Baseline Assessment of Newfound Harbor Reef System, Big Pine Key, Florida. We propose to perform coral diversity assessments of the 3.8 km long linear reef and patch reefs seaward of the Newfound Harbor Keys, Big Pine Key, and the linear reef of unknown extent seaward of West Summerland Key in the FKNMS. We will investigate coral diversity, abundance, cover, and health using the Atlantic and Gulf Rapid Reef Assessment protocol -- a combined linear transect/random quadrat method -- with more thorough species presence/absence data collected using video transects. Sediment samples will be collected and classified according to grain type and size for comparison with other patch reef sites and existing data for NFHR (Dodd et al., 1973). MTSU grant.

38) Clay Harris, Middle Tennessee State University ([cdharris@mtsu.edu](mailto:cdharris@mtsu.edu)). FKNMS-2002-004, 1/3/2001 to 12/31/2002. Decadal-scale Changes in Coral Distribution on a Shoal in Spanish Harbor, Big Pine Key, Florida. We propose to perform a survey of coral and vegetation distribution and abundance on the NW margin of the SHS and at a currently undetermined site farther offshore (SH-HB). For both sites, we will: (1) assess coral, algae, and sea grass diversity, abundance, cover, and health using a consecutive quadrat method covering an area of 112 m<sup>2</sup> and

(2) using hand-held, U/W video, develop a coral distribution map for future comparison. We will later compare our results for SHS to that of Kissling (1965), and assess the changes in coral abundance and distribution after 37 years. MTSU grant.

39) Mark Hay, Georgia Institute of Technology ([mark.hay@biology.gatech.edu](mailto:mark.hay@biology.gatech.edu)). FKNMS-2002-071, 7/20/2002 to 12/31/2002. Effects of Algal Secondary Metabolites on Feeding by Herbivorous Fishes and on Spatial Competition with Corals. Our objectives are to (1) determine palatability of common algae to specific species of herbivorous fishes, (2) determine the role of microbial gut symbionts in allowing some species to consume toxic seaweeds, (3) determine which seaweeds are most harmful to corals, and (4) understand how interactions of seaweed defenses, herbivore diversity, and coral-seaweed interactions combine to affect reef structure and function. NOAA National Undersea Research Center, NSF, Teasley Endowment.

40) Michael Heithaus, Mote Marine Laboratory ([mheithaus@mote.org](mailto:mheithaus@mote.org)). FKNMS-2002-007, 1/24/2002 to 5/31/2002. Acoustic Monitoring of Bull Shark and Great Hammerhead Shark Residency Periods in a Reef Habitat of the Florida Keys. The overall goal of this project is to determine the habitat use and residency periods of great hammerhead (*Sphyrna mokarran*) and bull (*Carcharhinus leucas*) sharks in both the Florida Keys and Charlotte Harbor, FL. This permit application is to deploy four fixed-site monitoring stations near (but outside) the Looe Key Sanctuary Preservation Area to detect the presence of sharks fitted with acoustic transmitters. Every time a shark with a transmitter passes near a station, its identity and time of arrival and departure will be archived. NMFS grant to Mote Marine Center for Shark Research.

41) John Hunt, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute ([john.hunt@fwc.state.fl.us](mailto:john.hunt@fwc.state.fl.us)). FKNMS-2002-005, 1/7/2002 to 12/31/2004. Spiny Lobster Puerulus Monitoring Program. Influx of postlarval spiny lobsters is monitored using artificial settlement collectors that are placed in the nearshore waters on the Atlantic side of Long Key and Big Munson Key. We will replace the existing cinderblock anchoring systems with permanent, low profile stainless steel mooring eyes cemented into the substrate. FMRI base budget.

42) Claudia Jones, University of Pennsylvania ([impglee@aol.com](mailto:impglee@aol.com)). FKNMS-2002-070, 8/23/2002 to 4/1/2003. The Effect of Climate Change and Rising Nutrient Levels on the Health of Selected Reefs in the Eastern Caribbean. Funding source unknown.

43) Brian Lapointe, Harbor Branch Oceanographic Institution ([lapointe@hboi.edu](mailto:lapointe@hboi.edu)). FKNMS-2001-057, 8/9/2001 to 12/31/2002. A Comparative Study of Water Quality and Coral Reef Status at the Content Keys, Looe Key National Marine Sanctuary, and Biscayne National Park. The objective of this project is to monitor, at monthly frequencies, nutrient concentrations, chlorophyll a, and turbidity at three stations along a spatially large eutrophication gradient. Additional research on remote sensing of algal blooms will be conducted. HBOI.

44) Tom Lee, University of Miami, Rosenstiel School of Marine and Atmospheric Science/MPO ([tlee@rsmas.miami.edu](mailto:tlee@rsmas.miami.edu)). FKNMS-2001-006, 2/23/2001 to 2/28/2003. Florida Keys and Florida Bay Circulation and Exchange Project. This project continues work on current patterns and water circulation in the Florida Keys National Marine Sanctuary and Florida Bay that was initiated in

1989. South Florida Ecosystem Restoration, Prediction, and Modeling program under NOAA/COP (Yeung) and RSMAS/U. Miami (Lee). [Summary of findings in annual report]

45) James Leichter, Scripps Institution of Oceanography ([leichter@coast.ucsd.edu](mailto:leichter@coast.ucsd.edu)). FKNMS-2002-035, 5/13/2002 to 12/31/2003. Responses of Benthic Macroalgae to High Frequency Upwelling on the Florida Keys Reef Tract. The goal of this project is to examine the consequences of high frequency nutrient upwelling for benthic macroalgal populations on and seaward of the Florida Keys reef tract. NOAA/National Undersea Research Center.

46) Niels Lindquist, University of North Carolina at Chapel Hill, Institute of Marine Sciences ([nlindquist@unc.edu](mailto:nlindquist@unc.edu)). FKNMS-2001-010, 3/15/2001 to 12/31/2003. Tracing Marine Sponge Responses to Environmental and Water Quality Gradients and Anti-Predator Defenses Among Marine Hydroids and File Clams. For "Tracing Marine Sponge Responses to Environmental and Water Quality Gradients" we will use natural abundance stable isotope analyses of sponges to provide a unique view of their nutritional ecology, including the contributions of their symbionts to their nutritional needs and to possibly measure the magnitude of symbiont inputs, the effect of water quality on sponge stable isotope values, and the source of bioactive compounds that protect many sponges against predators, competitors and pathogens. For "Anti-Predator Defenses of Marine Hydroids: Alternative Strategies, Biogeographic Patterns, and Ecological Implications", recent studies have demonstrated that hydroids can be defended from predators by two distinctly different mechanisms - stinging nematocysts or distasteful secondary metabolites. Data from our investigations will be used to rigorously test the hypothesis that trade-offs exists among defense systems, particularly in marine organisms. Our studies will also be used to examine the hypothesis that mesofauna abundance and diversity will be lower among nematocyst defended hydroids than among chemically defended hydroids because stinging nematocysts can harm associated mesofauna. For "Evolution of a Chemical Defense Among File Clams (Bivalvia: Limidae) - Relationships Between Bivalve Palatability, Shell Morphology, and Shell Strength", in general, chemically defended organisms lack physically protective structures. We are investigating the robustness of this relationship in using an unlikely group of animals to have a chemical defensive – i.e. bivalve molluscs. The Limidae bivalves are providing an excellent system to test evolutionary relationships among susceptibility to predators and the value of a physical vs. a chemical defense. Furthermore, with the ability to build molecular phylogenies and an excellent fossil record, our data on extant Limidae and other bivalve species may provide a window into ecological and community structure of ancient reef habitats. An additional project, started in September 2002, is a subproject of the above research. Previous studies have shown that small epiphytic algae can alter the palatability of larger macrophyte to various herbivores. Given that marine hydroids are common epibionts on both marine plants and sessile invertebrates, we wish to test that hypothesis that epibiotic hydroids on seaweeds and seagrasses alter their palatability to herbivores. This hypothesis will be tested by offering individual urchins a choice between two pieces of the same seaweed species (mass measured at the beginning of the experiment) one with epibiotic hydroids and one lacking hydroids. The relative rates of herbivory on the two pieces will be statistically compared. This analysis will be run for various combinations of seaweed/seagrass-hydroid combinations. NURC/UNCW #2000-24, NSF (#0002723 and 0082049), and by UNC funding.

47) Diego Lirman, University of Miami, Rosenstiel School of Marine and Atmospheric Science ([dliman@rsmas.miami.edu](mailto:dliman@rsmas.miami.edu)). FKNMS-2001-027, 6/13/2001 to 12/31/2002. Coral Size-Frequency Distributions as Indicators of Reef Health: Monitoring and Modeling Approaches. We propose to implement a demographic approach to assess the condition of coral populations within patch reefs of the FKNMS that will incorporate individual-based parameters such as growth, survivorship, partial mortality, and fragmentation. These measures can reveal sublethal differences among populations that abundance and diversity measures alone may miss. NURC project #UNCW2001-07.

48) Carrie MacKichan, Georgia Southern University ([carrie\\_a\\_mackichan@gasou.edu](mailto:carrie_a_mackichan@gasou.edu)). FKNMS-2002-010, 4/1/2002 to 12/31/2002. Effects of Ultraviolet Radiation on Newly Settled Coral Recruits. This project will investigate the effects of ultraviolet radiation on newly settled coral recruits and determine their ability to protect themselves from damage by this radiation. Information garnered from this study will help explain patterns of distribution and abundance observed in shallow water coral reef communities. Internship at Mote Marine Laboratory Center for Tropical Research, Georgia Southern University Academic Excellence Grant, faculty advisor support at GSU, and other sources of funding where applied for.

49) Kevin Madley, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute ([kevin.madley@fwc.state.fl.us](mailto:kevin.madley@fwc.state.fl.us)). FKNMS-2001-020, 4/16/2001 to 4/15/2003. Florida Inshore Marine Monitoring and Assessment Program (IMAP). The goal of this project is to create a statewide assessment of the environmental quality of inshore habitats by collecting information on various environmental indicators. The project is part of a long-term environmental monitoring program of over two dozen chemical, physical, and biological indicators under the U.S. EPA Coastal 2000 initiative. U.S. EPA Assistance Agreement #CR 827240-01-0.

50) Mikhail Matz, University of Florida ([matz@whitney.ufl.edu](mailto:matz@whitney.ufl.edu)). FKNMS-2002-039, 5/31/2002 to 6/1/2003. Genetics, Ecology and Evolution of Coloration in Great Star Coral, *Montastraea cavernosa*. In reef-building corals each visually perceptible basic color is essentially determined by the sequence of a single protein, homologous to green fluorescent protein (GFP) from jellyfish *Aequorea victoria*. This provides a unique opportunity to address the question of color evolution in the environment directly by applying the tools of molecular phylogenetics designed for sequence analysis and, in addition, to characterize and monitor variations in coloration in terms of expression of individual genes. The ultimate goal of the project is to understand the evolutionary mechanisms and ecological factors that determine the diversity of coloration in reef-building corals. UF/Whitney Laboratory.

51) Paula Mikkelsen, American Museum of Natural History ([mikkel@amnh.org](mailto:mikkel@amnh.org)). FKNMS-2000-036, 6/30/2000 to 6/30/2002. Qualitative Survey of Ocean-side Infaunal Molluscan Diversity off the Florida Keys. This multi-phase project will produce the first baseline survey of mollusks associated with coral reef habitats in the Florida Keys. The work proposed here will fill a critical gap in this survey by facilitating equivalent coverage of the coral reef environments now managed by the Florida Keys National Marine Sanctuary. This proposal seeks to resample several deepwater sites as part of the rigorous sampling program of infaunal molluscan communities of the Florida Keys. Private institution funding.

52) Paula Mikkelsen, American Museum of Natural History ([mikkel@amnh.org](mailto:mikkel@amnh.org)). FKNMS-2002-079, 7/15/2002 to 8/31/2002. International Marine Bivalve Workshop. A 2-wk workshop on marine bivalves with an emphasis on systematics, anatomy, and natural history, will be held to further the scientific knowledge of living marine bivalves of the Florida Keys and to train students in this understudied field of modern malacology. Twelve invited expert scientists from an international set of renowned academic institutions will work one-on-one in research teams with a similarly diverse group of 12 graduate students, supported by an organizing and support team. A series of refereed, publishable manuscripts on selected bivalve species or groups, one from each of the scientist-student teams, will be published in a dedicated issue of a peer-reviewed academic journal. National Science Foundation, Partnerships in Enhancing Expertise in Taxonomy [PEET] Program, award #9978119. Additional support is provided by the Bertha Lebus Charitable Trust, Comer Science & Education Foundation, The Field Museum, and the American Museum of Natural History.

53) Margaret Miller, National Marine Fisheries Service, Southeast Fisheries Science Center ([margaret.w.miller@noaa.gov](mailto:margaret.w.miller@noaa.gov)). FKNMS-2000-050, 7/1/2000 to 12/31/2002. Evaluation of FKNMS Reef Restoration Structures: Elements that Foster Coral Recruitment Success. This project aims to test hypotheses derived from observations of in-situ coral recruitment on the restoration structures at the Elpis and Maitland grounding sites. This study should determine what aspects of structure design account for the observed differences in coral recruitment success, hence providing sound basis for future structure design. NOAA/MSD (Lisa Symons).

54) Margaret Miller, National Marine Fisheries Service, Southeast Fisheries Science Center ([margaret.w.miller@noaa.gov](mailto:margaret.w.miller@noaa.gov)). FKNMS-2000-052, 8/14/2000 to 6/30/2002. Restoration of Coral Reef Fisheries Habitat by Enhancement of Coral Recruitment via Improved Substrate Quality, Larval Seeding, and Sea Urchin Re-introduction. This project aims to develop effective ecological restoration techniques for degraded coral reefs via culturing and re-seeding key hermatypic coral species and keystone grazing urchins. National Sea Grant Fisheries Habitat Program (via North Carolina Sea Grant) award.

55) Steven Miller, NOAA National Undersea Research Center/University of North Carolina at Wilmington ([smiller@gate.net](mailto:smiller@gate.net)). FKNMS-2001-080, 11/6/2001 to 6/30/2002. Fish Tracking, Coral Bleaching, and Coral Growth Studies in the Florida Keys National Marine Sanctuary (Development Projects). Fish will be tagged and tracked from topside and from inside Aquarius using two acoustic telemetry systems and an external tagging program. Three hydrophones will be deployed for 6 months within the Conch Reef Research-Only Area and two hydrophones will be deployed approximately one mile outside the Conch Reef ROA toward Pickles Reef and Davis Reef. Coral studies will also be conducted to evaluate how increasing amounts of carbon dioxide in the atmosphere might affect seawater chemistry and coral calcification. NURC/UNCW.

56) Lisa Monk, Center for Marine Conservation (now The Ocean Conservancy) ([Lmonk@vacmc.org](mailto:Lmonk@vacmc.org)). FKNMS-2001-003, 2/7/2001 to 2/6/2002 and FKNMS-2002-022, 4/19/2002 to 12/31/2003. RECON (Reef Ecosystem Condition) Program. RECON is a low-tech, rapid monitoring protocol for volunteer divers. RECON divers are trained by CMC-certified

RECON instructors to collect information on the condition of coral reef ecosystems. The goals of RECON are to broaden the scope of available information about the benthic organisms on coral reefs, to alert local reef researchers and managers of changing reef conditions (e.g., mass bleaching events, outbreaks of disease, nuisance algal blooms, changes in abundance of key mobile invertebrates), and to increase public understanding of the threats to coral reef ecosystems. U.S. EPA grant.

57) Leonid Moroz, University of Florida ([moroz@whitney.ufl.edu](mailto:moroz@whitney.ufl.edu)). FKNMS-2001-058, 9/10/2001 to 12/31/2003. Coral Screening Project. This project is designed to screen a wide sampling of corals to accomplish two goals from one collection. First, we want to see if any local corals contain yellow or red fluorescing proteins. Second, we want to search for the presence of the enzyme nitric oxide synthase, which generates the gaseous messenger molecule nitric oxide. University of Florida.

58) Alison Moulding, University of Miami, Rosenstiel School of Marine and Atmospheric Science ([amouldin@rsmas.miami.edu](mailto:amouldin@rsmas.miami.edu)). FKNMS-2002-014, 4/1/2002 to 3/31/2003. Coral Recruitment in the Florida Keys and the Relationship Among Adult Abundance, Larval Supply, and Recruitment of *Porites astreoides*. The objectives of this study are to examine coral recruitment along the Florida reef tract and to explore the relationship among presence of adult colonies, fertilization success, and recruitment of juveniles of one species of coral common in the Florida Keys: *Porites astreoides*, a hermaphroditic, brooding coral. By including Florida Keys reefs in this study, a better understanding of the mechanisms of supply and recruitment can be obtained. RSMAS and RSMAS Founders Research Fund award.

59) Erich Mueller, Mote Marine Laboratory ([emueller@mote.org](mailto:emueller@mote.org)). FKNMS-2002-013, 3/1/2002 to 2/28/2003 and FKNMS-2003-005, 3/1/2003 to 2/29/2004. Effect of Mosquito Control Pesticides on *Porites astreoides* Planula Larvae. This study aims to determine how mosquito adulticides affect the survival and viability of planula larvae from the scleractinian coral, *Porites astreoides*. Larval responses will be assessed following exposure to the mosquito adulticides, Naled and Permethrin, individually and combined, to simulate synergistic responses. Larvae will be dosed over a lethal and sublethal concentration range and a variety of endpoints recorded. Mote Marine Laboratory Research Fellowship.

60) Ken Nedimyer, Sea Life, Inc. ([sealife@terranova.net](mailto:sealife@terranova.net)). FKNMS-2001-069, 9/1/2001 to 12/31/2002. Techniques Development for the Reestablishment of Populations of the Long-Spined Sea Urchin, *Diadema antillarum*, on Two Small Patch Reefs in the Upper Florida Keys. The overarching goal of this project is to monitor and track the success of one technique to enhance and restore coral reef areas. Specifically, the transplantation of large numbers of small *Diadema antillarum* from shallow rubble zones to deeper patch reefs will be evaluated. Additionally, the resulting effects of increased densities of *Diadema antillarum* to approximate pre-plague levels on small, isolated patch reefs will be monitored to determine if a reduction of algal overgrowth will enhance coral growth and settlement. Funded by NMSP.

61) David Palandro, University of South Florida, Institute for Marine Remote Sensing ([palandro@seas.marine.usf.edu](mailto:palandro@seas.marine.usf.edu)). FKNMS-2002-067, 7/28/2002 to 8/10/2002. A Multi-Scale and Multi-Sensor Approach to Monitoring the Florida Keys National Marine Sanctuary. This study

aims to form a time series of satellite remote sensing images over the past 18 years to map and monitor coral reef ecosystem change. By ground-truthing current reef conditions and benthic coverage it is possible to calibrate archived satellite data to obtain benthic coverage in the past, which will allow us to complete a change detection study. NASA Fellowship (NGT5-30414).

62) Mark Patterson, Virginia Institute of Marine Science ([mrp@vims.edu](mailto:mrp@vims.edu)). FKNMS-2002-088, 11/4/2002 to 11/22/2002. Flow Modulated Metabolism: Connection with Coral Bleaching and Reef Oxygen Crises? Our previous NURP and NSF sponsored work demonstrated the importance of flow-modulated metabolism in lower invertebrates, in particular reef corals, at the level of the individual organism (colony). We propose to examine HSP expression within a colony during the (asymmetric) bleaching process. The measurement of reef scale oxygen dynamics using an AUV provides an opportunity to connect what occurs at a microscale around individual corals, to the macroscale. NOAA/National Undersea Research Center, Key Largo.

63) Joseph Pawlik, The University of North Carolina at Wilmington ([pawlikj@uncwil.edu](mailto:pawlikj@uncwil.edu)). FKNMS-2001-021, 4/16/2001 to 12/31/2002. Investigations of Chemical and Physical Defenses of Reef and Mangrove Demosponges. This research program represents a continuation of the first systematic investigation of the chemical defenses of Caribbean marine sponges. Recruitment processes, natural and human-caused changes to coral reefs, biodiversity and ecosystem structure and function, and new products from the sea will be the focus projects of this research. National Undersea Research Center/UNCW.

64) Gregory Piniak, NOAA/NOS, Center for Coastal Fisheries and Habitat Research ([gregory.piniak@noaa.gov](mailto:gregory.piniak@noaa.gov)). FKNMS-2002-087, 9/1/2002 to 2/28/2003. Fluorescence as a Tool for Enumerating Coral Recruits. Fluorescence technology is useful in locating coral recruits and other small reef organisms that are difficult to detect with the naked eye. We propose a study to determine the capability of fluorescent technologies to identify and enumerate coral recruits, and to rigorously compare these techniques with current methods used to quantify coral recruitment on natural and artificial substrates. NOS.

65) Patrick Pitts, U.S. Fish and Wildlife Service ([patrick\\_pitts@fws.gov](mailto:patrick_pitts@fws.gov)). FKNMS-2002-036, 5/13/2002 to 5/12/2003. Florida Keys Tidal Restoration. The Florida Keys Tidal Restoration Project, a component of the Comprehensive Everglades Restoration Plan, is designed to restore tidal circulation in the middle Florida Keys in order to improve water quality and the health and composition of flora and fauna in the project area. The U.S. Fish and Wildlife Service (USFWS) will to provide guidance to the U.S. Army Corps of Engineers, the agency in charge of project construction, regarding ecological and environmental concerns, including threatened and endangered species. In order to provide this guidance, the USFWS will need to conduct field surveys to determine fish and wildlife resources in the project area. Fish and Wildlife Coordination Act transfer funding from the U.S. Army Corps of Engineers.

66) Susan Richardson, Smithsonian Marine Station at Fort Pierce ([richardson@sms.si.edu](mailto:richardson@sms.si.edu)). FKNMS-2002-008, 2/11/2002 to 12/31/2003. Diversity, Distribution, and Abundance of Foraminiferans in Seagrass Habitats, Florida Keys. Benthic foraminiferans, both epiphytic and sediment dwelling, will be sampled from seagrass habitats in the Florida Keys. The diversity, distribution, and abundance of foraminiferal faunas will be characterized and compared and



contrasted to similar sites in the Indian River Lagoon and Belize. Smithsonian Institution Postdoctoral Fellowship.

67) Laurie Richardson, Florida International University ([richardl@fiu.edu](mailto:richardl@fiu.edu)). FKNMS-2001-075, 10/17/2001 to 12/31/2002. Distribution and Etiology of Two Coral Diseases in the Florida Keys National Marine Sanctuary: Black Band Disease and White Plague Type II. This research constitutes continuation of our work on coral diseases in the FKNMS, and specifically addresses several hypotheses that have grown out of our work and which directly address both overall and specific objectives outlined in the WQPP. Unknown, previously funded by EPA WQPP Special Studies.

68) Eugene Shinn, U.S. Geological Survey, Center for Coastal Geology ([eshinn@usgs.gov](mailto:eshinn@usgs.gov)). FKNMS-2002-080, 8/5/2002 to 10/1/2002. Health, Growth History, and Microbial Content of Large Head Corals at Looe Key. The purpose of this research is to reoccupy and sample large coral heads sampled during NOAA-funded research in 1982 and 1987. The heads will be core drilled by Harold Hudson of NOAA using a smaller diameter core barrel rather than the 4-inch barrel originally used. All holes will be plugged with cement to allow overgrowth of the sample sites. USGS.

69) Shauna Slingsby, University of North Carolina at Wilmington ([sns3162@uncwil.edu](mailto:sns3162@uncwil.edu)). FKNMS-2001-037, 7/5/2001 to 12/31/2002. Nutrient Cycling and Accumulation Differences between SPA and non-SPA Sites and Nutrient Enrichment and its Effect on Coral/Algal Interactions. This project will test the following hypotheses: 1) Topographic complexity contributes to higher abundances of coral, algae, and herbivorous fish which effects a reef's internal nutrient cycling and processes of nutrient accumulation. 2) Due to increased nutrient input, certain species of macroalgae, like *Dictyota* spp., quickly colonize dead skeletal areas of stony coral colonies, causing recession of live coral tissue. National Center for Caribbean Reef Research (NCORE) - UNCW and RSMAS/U. Miami.

70) Ned Smith, Harbor Branch Oceanographic Institution ([nsmith@hboi.edu](mailto:nsmith@hboi.edu)). FKNMS-2002-063, 9/16/2002 to 9/30/2003. Nutrient Mass Fluxes between Florida Bay and the Florida Keys National Marine Sanctuary through Florida Keys Passes. Current speed/direction and water level will be measured to estimate volume transport through Long Key Channel and Moser Channel. Volume transports will be combined with nutrient concentrations to calculate nutrient transport. Measurements made during a one-year field study will quantify the magnitude and direction of seasonal and long-term net nutrient transport between Florida Bay and Hawk Channel. NOAA/Coastal Ocean Program.

71) Colette St. Mary, University of Florida ([stmary@zoo.ufl.edu](mailto:stmary@zoo.ufl.edu)). FKNMS-2001-019, 5/1/2001 to 5/1/2003. The Effects of Artificial Reef Habitats on Fish Production. The goal of this project is to quantify the net effect of new habitat on fish production, enhance the sustainability of the marine ornamental fishery, and directly test the attraction-production hypotheses. To successfully conduct the critical field experiment, we need to optimize its design, which will depend upon patterns of spatial and temporal variance in settlement and abundance, the strength of density-dependence and the degree of movement between the artificial and natural reefs (as well as diffusion among the natural reef habitat). We will accomplish this by integrating field

studies, quantitative literature syntheses, and mathematical population dynamic models. National SeaGrant Program.

72) Gregg Stanton, Florida State University ([gstanton@res.fsu.edu](mailto:gstanton@res.fsu.edu)). FKNMS-2000-044, 7/28/2000 to 12/31/2002. Investigation of Skin Lesions in Gray Snapper (Neurofibromatosis). This study evaluates gray snapper, bicolor damselfish, and other affected snappers with observable signs of neurofibromatosis and also black spots that are potentially associated with a parasite cyst. This project will address public concern over large numbers of diseased fish, investigate disease processes and potentially provide information that will conserve resources. FSU.

73) Peter Swart, University of Miami, RSMAS ([pswart@rsmas.miami.edu](mailto:pswart@rsmas.miami.edu)). FKNMS-2000-018, 4/3/2000 to 12/31/2003. The Origin and Recycling of Nutrients and an Investigation of Trophic Dynamics. The research proposed here is designed to generate an integrated data set, combining work on the sources of nutrients (Swart), cycling and fates of nitrogen and carbon (Swart and Szmant), nutrient flux and interactions with currents (Lee), the production of organic material by algae (Szmant) and energy flow between trophic levels (Cowen and Sponaugle). National Center of Caribbean Coral Reef Research.

74) Alina Szmant, University of North Carolina at Wilmington ([szmanta@uncwil.edu](mailto:szmanta@uncwil.edu)). FKNMS-2002-054, 6/17/2002 to 6/30/2003. Research on Nutrient Dynamics, Algal Community Structure, and Algal Productivity. Regional coral reef decline is indicated by rapid loss of coral cover and increases in algal cover. It is important to be able to distinguish between increased algal cover being a symptom of coral decline (e.g. algal colonizing substrate vacated by coral killed by one factor or another) vs. a causative factor (algae over-growing and killing the coral), especially if the latter is the result of anthropogenic nutrient enrichment of reef areas. Thus, a major objective of this NCORE subcontract will be to address factors that affect relative algal dominance. These include nutrient availability and cycling, and grazing pressure. National Center for Caribbean Coral Reef Research at the Univ. of Miami, funded by U.S. EPA. Subcontract to UNCW.

75) Florence Thomas, University of South Florida ([ftthomas@chuma1.cas.usf.edu](mailto:ftthomas@chuma1.cas.usf.edu)). FKNMS-2002-041, 6/1/2002 to 12/31/2003. The Effects of Water Velocity/Hydrodynamics on Mass Transfer of Nutrients: a Partnership in Research and Education. This project explores the relationship between water velocity, nutrient uptake, and the morphology of the predominant community members of nearshore benthic communities, including seagrasses (i.e. *Thalassia testudinum*, *Halodule wrightii*) and macroalgae (i.e. *Halimeda* sp.). As the title implies, this NSF-funded project links research in hydrodynamics and biomechanics to public, k-12, undergraduate, and graduate education. Minority participation is encouraged at all levels and is the primary focus of recruitment at the undergraduate level. Supported by a 5-year NSF PECASE award to Dr. Thomas (OCE-9701434).

76) John Valentine, Dauphin Island Sea Lab ([jvalentine@disl.org](mailto:jvalentine@disl.org)). FKNMS-2002-026, 4/29/2002 to 12/31/2002. Trophic Cascades and Spatial Subsidies in a Coral Reef Ecosystem: A Field Test using 'No-Take' Areas in the Florida Keys National Marine Sanctuary. We propose to take advantage of newly created "no-take" protected areas in the Florida Keys to better understand the role of large predatory fishes in controlling the flow of energy between habitats in

subtropical and tropical marine ecosystems. Most fundamentally, we hypothesize that the successful restoration of reef food webs will depend on the size and location of nearby seagrass habitats, which provide both nursery and a foraging ground for reef fishes. We predict that there will be substantial differences in the community structure of fishes and invertebrates not only within the reefs of the FKNMS marine reserves but also in adjacent seagrass habitats. Furthermore, we propose to use the findings from this study to make data-based predictions as to the minimum requirements for the development of effective marine reserves in areas such as the Florida Keys. Andrew Mellon Foundation Ecosystem Research Program 2001-2003. MARFIN grant 2002-2004.

77) John Valentine, Dauphin Island Sea Lab ([jvalentine@disl.org](mailto:jvalentine@disl.org)). FKNMS-2002-027, 4/29/2002 to 12/31/2002. FKNMS-2002-027, 4/29/2002 to 12/31/2002. The Trade-offs of Living in Mangrove Forests: Finding a Balance between Energetic Needs and Protection. This project will investigate the importance of habitat linkages, between mangroves and seagrass beds, in controlling the density and diversity mangrove-associated consumers. To do this we will conduct a series of manipulative field experiments, collect samples of prey and document the composition of consumers along the intersection between mangroves and seagrass beds in the lower Florida Keys. We anticipate that our data will show that while mangroves provide shelter from predators for smaller fishes, these consumers forage into the adjacent seagrass beds to meet their energetic requirements. Put simply the presence of two habitats will allow higher densities of these consumers to exist than would otherwise be possible if they were forced to hide and feed in a single habitat. From this study, we anticipate that we will be able to provide new evidence that there is a need to focus management activities on the importance of habitat diversity as a tool for managing the nation's coastal food webs. Andrew Mellon Foundation Ecosystem Research Program 2001-2003. MARFIN grant 2002-2004.

78) Douglas Weaver, United States Geological Survey, Florida Caribbean Science Center ([doug\\_weaver@usgs.gov](mailto:doug_weaver@usgs.gov)). FKNMS-2001-050, 8/1/2001 to 8/31/2002. Inventory of Deepwater Reef Fishes and Habitat Mapping of Tortugas South Ecological Reserve. This project will assess the relative abundance of large predatory fishes (piscivores and other large carnivores) and identify the relative trophic structure and abundance of the reef fish assemblage (primarily planktivorous fishes) along deep-water areas (50 to ~300m) of Tortugas South Ecological Reserve (TSER). Funds from the National Fish and Wildlife Foundation, Grouper Spawning Aggregation Study #2000-0243 through the University of Florida Department of Fisheries and Aquatic Sciences.

79) Gerard Wellington, University of Houston ([wellington@uh.edu](mailto:wellington@uh.edu)). FKNMS-2002-081, 7/31/2002 to 8/31/2003. Genetic Variation and Phenotypic Response of *Montastraea faveolata*. The first, experimental project will estimate the heritability of metabolic and molecular characters related to stress response of *M. faveolata*. To date, heritability of both metabolic and molecular characters related to stress have not been investigated in any coral species. The purpose of the study will be to investigate the contribution of genetic vs. non-genetic (environmental and symbiont association) effects associated with *M. faveolata* response to stress. The second project will be exploratory in nature. Currently, the genetic population structure for *M. faveolata* has not been investigated. The purpose of my project will be to collect preliminary

data to test for significant genetic variation along the Florida Keys for *M. faveolata*. Houston Coastal Center.

80) David Wethey, University of South Carolina ([wethey@biol.sc.edu](mailto:wethey@biol.sc.edu)). FKNMS-2002-089, 10/1/2002 to 12/31/2002. Decoupling the Effects of Mass Transfer, Water Motion, and Temperature on Reef Health. This project has the interrelated objectives of 1) measuring the effects of flow speed on oxygen transfer by common species of coral of flat, mound-shaped and branching morphology; 2) experimentally determining the effects of O<sub>2</sub> accumulation on corals in field conditions; 3) quantifying the interaction between temperature and flow on photosynthesis under natural field conditions. NOAA/National Undersea Research Center.

81) Jennifer Wheaton, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute ([jennifer.wheaton@FWC.state.fl.us](mailto:jennifer.wheaton@FWC.state.fl.us)). FKNMS-2001-015, 4/16/2001 to 12/31/2003. Coral/Hardbottom Monitoring Project. The coral/hardbottom monitoring project documents status and trends (change) in stony coral species presence and percent cover of selected attached reef benthos. Documentation of degree of bioerosion will be a subset of the project beginning summer 2001. Established in 1995, the project's 43 sampling sites, which include 7 hardbottom, 11 patch, 12 offshore shallow, and 13 offshore deep reef sites are sampled annually. The project's primary goal is to document change in the presence/absence of stony coral species richness and selected disease categories and relative percent cover of corals, octocorals, sponges, macroalgae, and substrate. U.S. EPA, FKNMS. [Summary of findings in annual report]

82) Jennifer Wheaton, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute ([jennifer.wheaton@FWC.state.fl.us](mailto:jennifer.wheaton@FWC.state.fl.us)). FKNMS-2001-016, 4/16/2001 to 4/30/2002. Nitrogen Stable Isotope Records in *Plexaura homomalla* from the Florida Keys. Samples of the axis of a common FKNMS gorgonian (*Plexaura homomalla*) will be analyzed to document the nitrogen stable isotope record in the organic fraction of the skeleton as a measure of surface productivity. Collections conducted under U.S. EPA, FKNMS funding for the CRMP. Analyses and writing funding provided by Dr. Michael Risk, McMaster Univ.

83) Cheryl Woodley, NOAA National Ocean Service, National Centers for Coastal Ocean Science (NCCOS), Center for Coastal Environmental Health & Biomolecular Research ([cheryl.woodley@noaa.gov](mailto:cheryl.woodley@noaa.gov)). FKNMS-2001-008, 4/1/2001 to 4/30/2003. Assessment of Coral Health in the FKNMS Using a Molecular Biomarker System (MBS). We have developed a Molecular Biomarker System (MBS) capable of determining whether corals are stressed and causative agents associated with that stress. The MBS works because the biomarkers respond to stress along biochemical and cellular pathways common to all organisms, from bacteria and protists to plants and higher animals. National Sea Grant Consortium collaborators include NOAA/NOS/NCCOS, Med. Univ. of South Carolina, FKNMS, Biscayne National Park, Univ. of South Florida, Univ. of Charleston, Coral Shores High School, and EnVirion Biotechnologies, Inc. These specific proposed projects are a subset of larger proposed projects to National Sea Grant and U.S. EPA and form a collaboration between the National Marine Sanctuary Program and NCCOS. [Summary of findings in annual report]

## Research Permits Issued by the Florida Keys National Marine Sanctuary: 2003

**Information included below:** Name of principal investigator and contact information, permit number and duration, project title, project summary, and funding source (if provided).

1) Andrew Baker, Wildlife Conservation Society and Columbia University ([abaker@wcs.org](mailto:abaker@wcs.org)). FKNMS-2002-073, 9/23/2002 to 8/31/2003. Symbiont Distributions in Reef Corals as Indicators of Recent Environmental History. This research uses molecular techniques to identify the dinoflagellate symbionts (*Symbiodinium* spp.) of reef-building corals from the Florida Keys reef tract (and the National Marine Sanctuary in particular). It tests for differences in the distribution of symbionts that correlate with environment, and tests the stability of these distributions by transplanting coral colonies between different environments, with and without exposure to a bleaching stimulus. National Undersea Research Program, UNCW.

2) Rodney Bertelsen, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([rod.bertelsen@myfwc.com](mailto:rod.bertelsen@myfwc.com)). FKNMS-2003-069, 11/1/2003 to 10/31/2004. Spillover of Lobsters from the Western Sambo Ecological Reserve and Evaluation of Exchange of Exploited Species Between a Marine Protected Area and an Adjacent Potentially Attractive Unprotected Habitat. There are two projects being undertaken in this research. In the first, we propose to study lobster movement patterns around the patch reef environment in the Western Sambo Ecological Reserve (WSER) using a two-tiered design, tagging lobsters with both traditional antenna tags and sonic tags. Antenna tags will be used to determine abundance and net lobster movement after a one month time interval. Sonic tags will be used to determine fine-scale, inter-patch reef movements on a minute-by-minute basis over the course of a month. We will also use a detailed GIS-based habitat map of the area to determine how benthic habitats may influence lobster movement patterns. In the second study, we propose to monitor and evaluate reproductive migrations and other exchanges of lobsters and fish between the WSER and the adjacent offshore bar by using a combination of diver-based population surveys and monitoring of the movements of tagged individuals using both conventional tags and active and passive ultrasonic telemetry, supplemented by diver and ROV direct observations of the movements and behaviors of tagged individuals. Prior to the initial work with the animals, a habitat map of the study area will be created using a GPS based towable underwater color camera system. Project 1 is funded by the U.S. Environmental Protection Agency. Funding for project 2 is pending from NOAA/National Undersea Research Center, Key Largo.

3) Carole Bewley, National Institutes of Health ([cb194k@nih.gov](mailto:cb194k@nih.gov)). FKNMS-2002-069, 10/14/2002 to 12/31/2004. Investigations of Carbohydrate-Binding Proteins from Marine Cyanobacteria. Collect cyanobacteria samples from subtropical waters and investigate the presence of carbohydrate binding proteins. If such proteins are present, we will determine their optimal ligands and the source of their natural receptors using biochemical and chemical techniques. National Institutes of Health.

4) Jill Borger, University of Miami, Rosenstiel School for Marine and Atmospheric Sciences ([jborger@rsmas.miami.edu](mailto:jborger@rsmas.miami.edu)). FKNMS-2002-064, 11/27/2002 to 12/31/2003. Coral Disease Ecology and the Effects of Disease on Reproduction. This project is an extension of work begun

last year. The permit will cover two projects; the first involves a detailed examination of specific reef sites in order to follow the specific incidence, movement and transmission of coral diseases over time. This will involve non-destructive sampling methods, such as transect lines and quadrats, and detailed maps of each site will be constructed. The second project will examine the effects of disease on coral reproduction. A few samples will be taken from both diseased and healthy colonies and total fecundity, or reproductive output, will be measured histologically. The fecundity values for diseased and healthy colonies will be compared and analyzed. Reitmeister Award and anonymous donation to Jill Borger.

5) Joan Browder, NOAA/National Marine Fisheries Service ([joan.browder@noaa.gov](mailto:joan.browder@noaa.gov)). FKNMS-2002-002, 1/3/2002 to 12/31/2003. Post-larval Sampling Project. The purpose of the sampling project is to describe spatial and temporal patterns of postlarval pink shrimp immigration to potential nursery grounds in Florida Bay from offshore spawning grounds. Accessibility of potential nursery grounds to pink shrimp postlarvae (i.e., postlarval ingress rate) may be an important factor limiting the Bay's capacity to produce pink shrimp recruits to the Tortugas fishing grounds. NOAA/NMFS Southeast Fisheries Science Center.

6) Michael Burton, NOAA/National Marine Fisheries Service ([michael.burton@noaa.gov](mailto:michael.burton@noaa.gov)). FKNMS-2002-034, 5/8/2002 to 3/31/2003. Biological Characterization of Riley's Hump and Identification of Spawning Areas. Visual census transects (SCUBA) will be used to quantify mutton snapper abundance in the vicinity of Riley's Hump and compare it to baseline data. Habitat will be characterized by divers using 0.5 m<sup>2</sup> quadrats. NOAA/NMFS Coral Reef Initiative.

7) Mark Butler, Old Dominion University ([mbutler@odu.edu](mailto:mbutler@odu.edu)). FKNMS-2002-043, 6/5/2002 to 6/4/2003. Characterization of Hardbottom Community Dynamics: Sponges, Octocorals, Lobsters, & Octopus. My research team is currently working on several related projects involving the shallow, hard-bottom communities so common throughout the Florida Keys. In some cases, our research is focused on the ecology of single species of specific ecological or economic importance (e.g., spiny lobster, commercial sponges, and octopus). In other cases, our research involves community-level assessment and the influence of environmental (e.g., salinity change) or human factors (e.g., fishing) on the structure of hard-bottom communities over large spatial scales. In both cases, we use a combination of field sampling, field and laboratory experimentation, and computer simulation modeling to test hypotheses of interest. National Science Foundation, OCE-0136894 and NOAA Coastal Ocean Program.

8) Roy Caldwell, University of California, Berkeley ([4roy@socrates.berkeley.edu](mailto:4roy@socrates.berkeley.edu)). FKNMS-2002-062, 10/18/2002 to 12/31/2003. The Biology of Stomatopod Crustaceans. This proposal focuses on stomatopod crustaceans, asking basic biological questions about their distribution and abundance, reproductive behavior, larval dispersal, and how they communicate in a colorful underwater world. NOAA/National Undersea Research Center, Key Largo.

9) Mary Alice Coffroth, State University of New York at Buffalo ([coffroth@buffalo.edu](mailto:coffroth@buffalo.edu)). FKNMS-2002-011, 3/4/2002 to 6/30/2004. A Study of Population Dynamics of Scleractinians on Conch Reef: A Demographic and Population Genetics Approach. In this study the influence of recruitment in establishing species composition of reefs will be examined using a combined

demographic and population genetic approach to record the species composition at two sites on Conch Reef in the Florida Keys. NOAA/National Undersea Research Center.

10) Felicia Coleman, Florida State University ([coleman@bio.fsu.edu](mailto:coleman@bio.fsu.edu)). FKNMS-2001-005, 2/23/2001 to 2/28/2003. Studies in the Ecology of Red Grouper, *Epinephelus morio*, including their Contribution to Habitat Heterogeneity and Community Structure. The aim of this project is to examine the structure and function of the community of organisms that take up residence in holes occupied by red grouper. These holes, for the most part, appear to be excavated and maintained by red grouper. The resultant communities are rich in sessile invertebrates and various species of cleaning fish. Marine Conservation Biology Institute, SeaGrant, and Environmental Defense.

11) Carrollyn Cox, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([carrollyn.cox@myfwc.com](mailto:carrollyn.cox@myfwc.com)). FKNMS-2001-022, 4/23/2001 to 12/31/2002. Spiny Lobster Spawning Potential and Population Assessment: A Monitoring Program for the South Florida Fishing Region. The proposed study is part of the Sanctuary's Marine Zone Monitoring Program and seeks to investigate the effects of no-take management on this important fishery resource. FWRI. [Summary of findings in annual report]

12) Alan Duckworth, Harbor Branch Oceanographic Institution ([aduckworth@hboi.edu](mailto:aduckworth@hboi.edu)). FKNMS-2001-049, 7/23/2001 to 9/30/2003 and FKNMS-2003-066, 10/1/2003 to 9/30/2004. Aquaculture of the Sponge *Forcepia* sp. for the Sustainable Supply of Bioactive Metabolites for Biomedical Research. The sponge *Forcepia* sp. will be farmed at a depth of 20-25 m near Tennessee Reef to determine if in situ aquaculture can supply sufficient and sustainable quantities of metabolites called lasonolides for biomedical research. The farmed sponges will be harvested at different rates to examine whether regular tissue harvesting can increase overall yield of lasonolides. Sponges will be farmed in mesh arrays, which will be either pegged flat to the substrate or held upright in the water column. One array will be maintained for a longer period and will be used as a supply for ongoing, grant-funded research on the lasonolides. HBOI.

13) Peter Edmunds, California State University at Northridge ([peter.edmunds@csun.edu](mailto:peter.edmunds@csun.edu)). FKNMS-2002-021, 6/1/2002 to 12/31/2003. Global Climate Change and Coral Recruitment: The Interactive Effects of Temperature and Ontogeny on the Biology of *Porites astreoides* Larvae. The goal of this project is to carry out a multidisciplinary analysis of the biology, physiology and genetics of coral larvae in order to understand how global climate change will affect the coral population structure of reefs such as those in the Florida Keys. NOAA/National Undersea Research Center.

14) David Eggleston, North Carolina State University ([eggleston@ncsu.edu](mailto:eggleston@ncsu.edu)). FKNMS-2002-061, 7/2/2002 to 12/31/2003. Fish and Caribbean Spiny Lobster Distribution and Abundance in the Great White Heron National Wildlife Refuge: An Initial Assessment and Comparison with the Key West National Wildlife Refuge. We will use aerial photographs, ground-truthing and GIS computer software to identify and map habitats within the GWHNWR within which to quantify fish and Caribbean spiny lobster. We will use visual surveys conducted by SCUBA divers to quantify fish and lobster, as well as measure specific habitat characteristics. The study

will provide baseline data and be used to make research and management recommendations. Grant from The Ocean Conservancy and U.S. Fish and Wildlife Service.

15) Bill Fitt, University of Georgia, Institute of Ecology ([fitt@sparrow.ecology.uga.edu](mailto:fitt@sparrow.ecology.uga.edu)). FKNMS-2001-063, 8/27/2001 to 1/1/2003. Potential for *Acropora cervicornis* (staghorn coral) and *Acropora palmata* (elkhorn coral) in Coral Reef Restoration: Genetics, Physiology, and Growth. This proposal addresses two major issues concerning populations of *A. cervicornis* and *A. palmata* in the Caribbean: the genetic structure and diversity, and some basic questions concerning transplantation. We will compare populations of both species from two locations: relatively pristine reefs (low human impact) near the Caribbean Marine Research Center on Lee Stocking Island in the Bahamas vs. relatively high human impact sites in the Florida Keys National Marine Sanctuary. NOAA/National Undersea Research Center.

16) Bill Fitt, University of Georgia ([fitt@sparrow.ecology.uga.edu](mailto:fitt@sparrow.ecology.uga.edu)). FKNMS-2003-004, 2/18/2003 to 12/31/2004. Long Term Monitoring of Tissue Biomass from Five Species of Reef Corals. This project is a continuation of a seasonal monitoring program designed to document the relative physiological health of coral tissue and zooxanthellae for five major coral species in the Keys. Tissue biomass, levels of proteins, carbohydrates and lipids, C:H:N analysis and zooxanthellae photosynthetic potential, densities and chlorophyll content will be determined every 3 months for five species of corals living on the Florida Reef Tract. NOAA/NURP funding for tissue biomass research. NSF funding (5 years) for Adaptive Bleaching Hypothesis research.

17) Mark Fonseca, NOAA/Center for Coastal Fisheries and Habitat Research (CCFHR) ([mark.fonseca@noaa.gov](mailto:mark.fonseca@noaa.gov)). FKNMS-2001-023, 5/1/2001 to 6/30/2003. Effects of Crab/Lobster Traps to Seagrass Beds of the Florida Keys National Marine Sanctuary (FKNMS): Damage Assessment and Evaluation of Long-Term Recovery. This project will assess the effect (if any) of stationary fishing gear (i.e. crab/lobster traps) to seagrass beds of the FKNMS. Replicate traps will be randomly placed within randomly selected seagrass beds of varying species composition. Intermittent removal of traps will determine the time it takes to sustain injury to the beds. Injury recovery will be tracked quarterly to semi-annually over the following two years. NOS and NMFS.

18) Mark Fonseca, NOAA/Center for Coastal Fisheries and Habitat Research (CCFHR) ([mark.fonseca@noaa.gov](mailto:mark.fonseca@noaa.gov)). FKNMS-2001-029, 6/11/2001 to 6/30/2003. A Novel Technique for the Restoration of Seagrass Propeller Scars: Does Deployment of Sediment-filled, Biodegradable Fabric Tubes in Propeller Scars Enhance Seagrass Regrowth into These Injured Areas? This project will assess the effectiveness of a new method for propeller scar restoration in the FKNMS. Fabric tubes and bird stakes will be deployed into existing propeller scars in a replicated experiment. Intermittent monitoring of treatments will be tracked quarterly to semi-annually over the following two years. NOS.

19) Mark Fonseca, NOAA/Center for Coastal Fisheries and Habitat Research (CCFHR) ([mark.fonseca@noaa.gov](mailto:mark.fonseca@noaa.gov)). FKNMS-2002-009, 2/15/2002 to 12/31/2003. Characterization and Analysis of Seagrass Injury and Recovery on Shallow Seagrass-Coral Banks in the FKNMS. The objectives of this study are to develop a comprehensive database of the complete range of injury categories and the widest possible range of injury ages and species combinations to be modeled



in the Habitat Equivalency Analysis. In addition to these detailed injury sites, we will characterize the current conditions on the entire Red Bay bank system using 1/9600 scale vertical aerial photography integrated with differential global positioning system based ground surveys. We will conduct a replicated experiment to determine the effect of excavation depth on the recovery rate of injured *Thalassia testudinum* meadows. We hypothesize that the severity of injuries to a *Thalassia* meadow will be a function of the depth of sediment excavated by the disturbance. NOAA/National Ocean Service/Office of Coastal Resource Management and National Centers for Coastal Ocean Science/CCFHR. [Summary of findings in annual report]

20) Steve Gilbert, U.S. Fish and Wildlife Service ([Steve.Gilbert@fws.gov](mailto:Steve.Gilbert@fws.gov)). FKNMS-2003-072, 10/20/2003 to 10/19/2004. Florida Keys Tidal Restoration Study. The goal of this project is to establish baseline conditions to enable detection of positive effects of flushing by potential construction of culverts or a bridge under U.S. Highway 1. U.S. Army Corps of Engineers, South Florida Water Management District.

21) Robert Glazer, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, ([bob.glazer@fwc.state.fl.us](mailto:bob.glazer@fwc.state.fl.us)). FKNMS-2001-055, 8/2/2001 to 8/31/2003. Survey and Rehabilitation of Queen Conch within the Florida Keys National Marine Sanctuary. The surveys include visual surveys of sites where conch are sparse, belt-transects of densely populated conch aggregations in offshore reef flats, tag-recapture sampling of nearshore conch aggregations, and sonic tagging experiments. Many of these surveys will be conducted within the Sanctuary Preservation Areas of the Florida Keys National Marine Sanctuary and are conducted as part of the marine zone monitoring surveys. The secondary goal of this research is to determine the spatial and temporal distribution of queen conch larvae in and around the different regions of the Florida Keys. This information will lead to determining the optimal release location of hatchery-reared or transplanted queen conch based upon the probability that conch larvae spawned in that location will recolonize the Keys. FWRI/FWC.

22) Walter Goldberg, Florida International University ([goldberg@fiu.edu](mailto:goldberg@fiu.edu)). FKNMS-2001-067, 8/29/2001 to 9/1/2003. Ultrastructure of Aggression in Corals of the Genus *Mycetophyllia*. This project will test the hypothesis that specialized regions occur at the tip of *Mycetophyllia lamarckiana* or *M. ferox* mesenterial filaments and are used during aggressive behavior. FIU.

23) Pamela Hallock Muller, University of South Florida ([pmuller@marine.usf.edu](mailto:pmuller@marine.usf.edu)). FKNMS-2003-002, 1/15/2003 to 12/31/2004. Larger Foraminifera as Bioindicators of Coral Reef Health: Continued Monitoring of Bleaching Stress, Comparison with an Integrated Molecular Biomarker System, and Temporal and Spatial Variability in Algal Symbionts. The reef-dwelling foraminifera, particularly *Amphistegina gibbosa*, have exhibited bleaching and associated symptoms on Florida Keys reefs since summer of 1991. This project will a) continue long-term monitoring of bleaching activity and its causes in larger foraminiferal populations of Florida Keys Reefs; b) complete a study that compares physiological responses and bleaching in *A. gibbosa*, to physiological responses in corals (*Montastraea* spp.) and other organisms being studied by Craig Downs, Cheryl Woodley and John Halas under separate permits; and c) determine if seasonal or spatial differences in algal symbiont populations influences bleaching in *A. gibbosa*. South Carolina Sea Grant Program; subcontract to USF.

24) Clay Harris, Middle Tennessee State University ([cdharris@mtsu.edu](mailto:cdharris@mtsu.edu)). FKNMS-2002-003, 1/3/2002 to 12/31/2003. Baseline Assessment of Newfound Harbor Reef System, Big Pine Key, Florida. We propose to perform coral diversity assessments of the 3.8 km long linear reef and patch reefs seaward of the Newfound Harbor Keys, Big Pine Key, and the linear reef of unknown extent seaward of West Summerland Key in the FKNMS. We will investigate coral diversity, abundance, cover, and health using the Atlantic and Gulf Rapid Reef Assessment protocol -- a combined linear transect/random quadrat method -- with more thorough species presence/absence data collected using video transects. Sediment samples will be collected and classified according to grain type and size for comparison with other patch reef sites and existing data for NFHR (Dodd et al., 1973). MTSU grant.

25) John Hunt, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([john.hunt@myfwc.com](mailto:john.hunt@myfwc.com)). FKNMS-2002-005, 1/7/2002 to 12/31/2004. Spiny Lobster Puerulus Monitoring Program. Influx of postlarval spiny lobsters is monitored using artificial settlement collectors that are placed in the nearshore waters on the Atlantic side of Long Key and Big Munson Key. We will replace the existing cinderblock anchoring systems with permanent, low profile stainless steel mooring eyes cemented into the substrate. FWRI base budget.

26) Claudia Jones, University of Pennsylvania ([impglee@aol.com](mailto:impglee@aol.com)). FKNMS-2002-070, 8/23/2002 to 4/1/2003. The Effect of Climate Change and Rising Nutrient Levels on the Health of Selected Reefs in the Eastern Caribbean. Funding source unknown.

27) Sean Kinane, University of South Florida ([skinane@helios.acomp.usf.edu](mailto:skinane@helios.acomp.usf.edu)). FKNMS-2003-009, 2/24/2003 to 12/31/2004. The Effects of Hydrodynamics on Coral Bleaching: Does Increased Flow Reduce Bleaching? Reduced bleaching is expected in high-velocity water flow based on field observations (e.g., Loya et al. 2001) and some experimentation (Nakamura and van Woesik 2001). This hypothesis will be tested in several coral species. The mechanisms of velocity-enhanced bleaching resistance will be explored including increased mass transfer of toxins out of corals in high flow. This research is partially supported by a 5-year NSF PECASE award to Dr. Thomas (OCE-9701434).

28) John Lamkin, NOAA Fisheries/Southeast Fisheries Science Center ([john.lamkin@noaa.gov](mailto:john.lamkin@noaa.gov)). FKNMS-2003-008, 2/24/2003 to 2/23/2004. Use of Geochemical Tracers to Elucidate Life History Trajectories of Gray Snapper within South Florida's Marine Ecosystems. It is our intent to map the source of recruits in the Florida Keys National Marine Sanctuary and the Tortugas Ecological Reserve using recent technological developments that allow us to detect trace elemental "fingerprinting" of fish otoliths. Commercially important snapper and grouper communities are believed to recruit to the reef from other areas, such as seagrass and mangrove habitats of Florida Bay, where they are believed to spend their juvenile phase before migrating to the coral reefs as young adults. We have established tentative "Florida Bay" signatures by collecting settled juveniles from the estuaries and now wish to establish "coral reef" signatures of adult fish taken from or adjacent to the coral reef SPAs and the reefs of the Tortugas Ecological Reserve. Comparing the two groups of otolith signatures will allow us to reconstruct the environmental history of individual fish. NOAA Coral Reef Initiative.

29) Brian Lapointe, Harbor Branch Oceanographic Institution ([lapointe@hboi.edu](mailto:lapointe@hboi.edu)). FKNMS-2003-003, 2/1/2003 to 1/31/2005. ECOHAB: Physiology and Ecology of Macroalgal Blooms on Coral Reefs off SE Florida. We propose to use the suspended line-bioassay, described and utilized previously at Looe Key by Littler et al. (1986) and Paul et al. (1987), to assess the consumption rates by grazing ichthyofauna of resident macroalgae (scarids, acanthurids, etc.). Our interest is in performing these feeding preference studies at the shallow fore reef, reef crest, and rubble zone of the Looe Key “core area” and the patch reefs in Newfound Harbor Sanctuary Preservation Area (SPA), to calibrate the importance of nitrogen biochemistry of macroalgae to palatability by a functional reef ichthyofaunal assemblage. EPA-ECOHAB program.

30) Tom Lee, University of Miami, Rosenstiel School of Marine and Atmospheric Science/MPO ([tlee@rsmas.miami.edu](mailto:tlee@rsmas.miami.edu)). FKNMS-2001-006, 2/23/2001 to 2/28/2003. Florida Keys and Florida Bay Circulation and Exchange Project. This project continues work on current patterns and water circulation in the Florida Keys National Marine Sanctuary and Florida Bay that was initiated in 1989. South Florida Ecosystem Restoration, Prediction, and Modeling program under NOAA/COP (Yeung) and RSMAS/U. Miami (Lee).

31) James Leichter, Scripps Institution of Oceanography ([leichter@coast.ucsd.edu](mailto:leichter@coast.ucsd.edu)). FKNMS-2002-035, 5/13/2002 to 12/31/2003. Responses of Benthic Macroalgae to High Frequency Upwelling on the Florida Keys Reef Tract. The goal of this project is to examine the consequences of high frequency nutrient upwelling for benthic macroalgal populations on and seaward of the Florida Keys reef tract. NOAA/National Undersea Research Center.

32) Niels Lindquist, University of North Carolina at Chapel Hill, Institute of Marine Sciences ([nlindquist@unc.edu](mailto:nlindquist@unc.edu)). FKNMS-2001-010, 3/15/2001 to 12/31/2003. Tracing Marine Sponge Responses to Environmental and Water Quality Gradients and Anti-Predator Defenses Among Marine Hydroids and File Clams. For "Tracing Marine Sponge Responses to Environmental and Water Quality Gradients" we will use natural abundance stable isotope analyses of sponges to provide a unique view of their nutritional ecology, including the contributions of their symbionts to their nutritional needs and to possibly measure the magnitude of symbiont inputs, the effect of water quality on sponge stable isotope values, and the source of bioactive compounds that protect many sponges against predators, competitors and pathogens. For "Anti-Predator Defenses of Marine Hydroids: Alternative Strategies, Biogeographic Patterns, and Ecological Implications", recent studies have demonstrated that hydroids can be defended from predators by two distinctly different mechanisms - stinging nematocysts or distasteful secondary metabolites. Data from our investigations will be used to rigorously test the hypothesis that trade-offs exists among defense systems, particularly in marine organisms. Our studies will also be used to examine the hypothesis that mesofauna abundance and diversity will be lower among nematocyst defended hydroids than among chemically defended hydroids because stinging nematocysts can harm associated mesofauna. For "Evolution of a Chemical Defense Among File Clams (Bivalvia: Limidae) - Relationships Between Bivalve Palatability, Shell Morphology, and Shell Strength", in general, chemically defended organisms lack physically protective structures. We are investigating the robustness of this relationship in using an unlikely group of animals to have a chemical defensive – i.e. bivalve molluscs. The Limidae bivalves are providing an excellent system to test evolutionary relationships among susceptibility to predators and the value of a physical vs. a chemical defense. Furthermore, with the ability to build molecular phylogenies

and an excellent fossil record, our data on extant Limidae and other bivalve species may provide a window into ecological and community structure of ancient reef habitats. An additional project, started in September 2002, is a subproject of the above research. Previous studies have shown that small epiphytic algae can alter the palatability of larger macrophyte to various herbivores. Given that marine hydroids are common epibionts on both marine plants and sessile invertebrates, we wish to test that hypothesis that epibiotic hydroids on seaweeds and seagrasses alter their palatability to herbivores. This hypothesis will be tested by offering individual urchins a choice between two pieces of the same seaweed species (mass measured at the beginning of the experiment) one with epibiotic hydroids and one lacking hydroids. The relative rates of herbivory on the two pieces will be statistically compared. This analysis will be run for various combinations of seaweed/seagrass-hydroid combinations. NURC/UNCW #2000-24, NSF (#0002723 and 0082049), and by UNC funding.

33) Diego Lirman, University of Miami/RSMAS ([dlirman@rsmas.miami.edu](mailto:dlirman@rsmas.miami.edu)). FKNMS-2002-075, 1/1/2003 to 12/31/2004. Coral Size-Frequency Distributions as Indicators of Reef Health: Monitoring and Modeling Approaches. This is the continuation of a previously permitted project that undertakes a demographic approach to assess the condition of coral populations within patch reefs of the FKNMS that incorporates individual-based parameters such as growth, survivorship, partial mortality, and fragmentation. These measures can reveal sublethal differences among populations that abundance and diversity measures alone may miss. Unsure of funding for 2003 and beyond.

34) Kevin Madley, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([kevin.madley@myfwc.com](mailto:kevin.madley@myfwc.com)). FKNMS-2001-020, 4/16/2001 to 4/15/2003. Florida Inshore Marine Monitoring and Assessment Program (IMAP). The goal of this project is to create a state-wide assessment of the environmental quality of inshore habitats by collecting information on various environmental indicators. The project is part of a long-term environmental monitoring program of over two dozen chemical, physical, and biological indicators under the U.S. EPA Coastal 2000 initiative. U.S. EPA Assistance Agreement #CR 827240-01-0.

35) Thomas Matthews, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([tom.matthews@myfwc.com](mailto:tom.matthews@myfwc.com)). FKNMS-2002-076, 1/1/2003 to 3/31/2003. The Evaluation of Marine Reserves as Sanctuaries for Caribbean Spiny Lobster (*Panulirus argus*). We propose to measure the age of spiny lobsters in the Western Sambo Ecological Reserve (WSER) by measuring the concentration of the pigment lipofuscin in the neural tissue of lobsters. This direct aging methodology should help determine the length of time lobsters are afforded protection in the WSER. National Fish and Wildlife Foundation Settlement Grant Agreement, project 1998-0249-005, Marine Reserves (FL) Evaluation for Spiny Lobster.

36) Mikhail Matz, University of Florida ([matz@whitney.ufl.edu](mailto:matz@whitney.ufl.edu)). FKNMS-2002-039, 5/31/2002 to 6/1/2003. Genetics, Ecology and Evolution of Coloration in Great Star Coral, *Montastraea cavernosa*. In reef-building corals each visually perceptible basic color is essentially determined by the sequence of a single protein, homologous to green fluorescent protein (GFP) from jellyfish *Aequorea victoria*. This provides a unique opportunity to address the question of color evolution in the environment directly by applying the tools of molecular phylogenetics designed

for sequence analysis and, in addition, to characterize and monitor variations in coloration in terms of expression of individual genes. The ultimate goal of the project is to understand the evolutionary mechanisms and ecological factors that determine the diversity of coloration in reef-building corals. UF/Whitney Laboratory.

37) Lisa Monk, Center for Marine Conservation (now The Ocean Conservancy) ([Lmonk@vacmc.org](mailto:Lmonk@vacmc.org)). FKNMS-2002-022, 4/19/2002 to 12/31/2003. RECON (Reef Ecosystem Condition) Program. RECON is a low-tech, rapid monitoring protocol for volunteer divers. RECON divers are trained by CMC-certified RECON instructors to collect information on the condition of coral reef ecosystems. The goals of RECON are to broaden the scope of available information about the benthic organisms on coral reefs, to alert local reef researchers and managers of changing reef conditions (e.g., mass bleaching events, outbreaks of disease, nuisance algal blooms, changes in abundance of key mobile invertebrates), and to increase public understanding of the threats to coral reef ecosystems. U.S. EPA grant.

38) Leonid Moroz, University of Florida ([moroz@whitney.ufl.edu](mailto:moroz@whitney.ufl.edu)). FKNMS-2001-058, 9/10/2001 to 12/31/2003. Coral Screening Project. This project is designed to screen a wide sampling of corals to accomplish two goals from one collection. First, we want to see if any local corals contain yellow or red fluorescing proteins. Second, we want to search for the presence of the enzyme nitric oxide synthase, which generates the gaseous messenger molecule nitric oxide. University of Florida.

39) Alison Moulding, University of Miami, Rosenstiel School of Marine and Atmospheric Science ([amouldin@rsmas.miami.edu](mailto:amouldin@rsmas.miami.edu)). FKNMS-2002-014, 4/1/2002 to 3/31/2003. Coral Recruitment in the Florida Keys and the Relationship Among Adult Abundance, Larval Supply, and Recruitment of *Porites astreoides*. The objectives of this study are to examine coral recruitment along the Florida reef tract and to explore the relationship among presence of adult colonies, fertilization success, and recruitment of juveniles of one species of coral common in the Florida Keys: *Porites astreoides*, a hermaphroditic, brooding coral. By including Florida Keys reefs in this study, a better understanding of the mechanisms of supply and recruitment can be obtained. RSMAS and RSMAS Founders Research Fund award.

40) Alison Moulding, University of Miami/RSMAS ([amouldin@rsmas.miami.edu](mailto:amouldin@rsmas.miami.edu)). FKNMS-2002-077, 1/1/2003 to 12/31/2005. The Role of Restoration in the Recovery of Coral Reefs from Vessel Groundings. This study will examine reef sites damaged by boat or ship groundings and control sites. Some of the damaged sites have undergone restoration, and some have been left to recover naturally. Ecological benchmarks, such as coral recruitment, percent cover of major benthic groups, and three-dimensional structural complexity, will be used to evaluate the reef communities present at the sites and the efficacy of restoration efforts. Biscayne National Park, Cooperative Agreement CA 5250-8-9036.

41) Erich Mueller, Mote Marine Laboratory ([emueller@mote.org](mailto:emueller@mote.org)). FKNMS-2002-013, 3/1/2002 to 2/28/2003 and FKNMS-2003-005, 3/1/2003 to 2/29/2004. Effect of Mosquito Control Pesticides on *Porites astreoides* Planula Larvae. This study aims to determine how mosquito adulticides affect the survival and viability of planula larvae from the scleractinian coral, *Porites astreoides*. Larval responses will be assessed following exposure to the mosquito adulticides,

Naled and Permethrin, individually and combined, to simulate synergistic responses. Larvae will be dosed over a lethal and sublethal concentration range and a variety of endpoints recorded. Mote Marine Laboratory Research Fellowship.

42) Gregory Piniak, NOAA/NOS, Center for Coastal Fisheries and Habitat Research ([gregory.piniak@noaa.gov](mailto:gregory.piniak@noaa.gov)). FKNMS-2002-087, 9/1/2002 to 2/28/2003. Fluorescence as a Tool for Enumerating Coral Recruits. Fluorescence technology is useful in locating coral recruits and other small reef organisms that are difficult to detect with the naked eye. We propose a study to determine the capability of fluorescent technologies to identify and enumerate coral recruits, and to rigorously compare these techniques with current methods used to quantify coral recruitment on natural and artificial substrates. NOS.

43) Patrick Pitts, U.S. Fish and Wildlife Service ([patrick\\_pitts@fws.gov](mailto:patrick_pitts@fws.gov)). FKNMS-2002-036, 5/13/2002 to 5/12/2003. Florida Keys Tidal Restoration. The Florida Keys Tidal Restoration Project, a component of the Comprehensive Everglades Restoration Plan, is designed to restore tidal circulation in the middle Florida Keys in order to improve water quality and the health and composition of flora and fauna in the project area. The U.S. Fish and Wildlife Service (USFWS) will provide guidance to the U.S. Army Corps of Engineers, the agency in charge of project construction, regarding ecological and environmental concerns, including threatened and endangered species. In order to provide this guidance, the USFWS will need to conduct field surveys to determine fish and wildlife resources in the project area. Fish and Wildlife Coordination Act transfer funding from the U.S. Army Corps of Engineers.

44) Terrence Quinn, University of South Florida ([quinn@marine.usf.edu](mailto:quinn@marine.usf.edu)). FKNMS-2003-070, 10/16/2003 to 12/31/2003. Coral-Based Reconstruction of Environmental Variability in the Surface Waters of the Dry Tortugas. Our aim is to generate a >100-year environmental record of sea-surface variability from a coral core extracted from a live *Montastraea annularis* from Tortugas Bank. Our ultimate goal is to assess the range of natural climate variability over the past ~ 10,000 yr based on a quantitative comparison between modern and fossil coral-based climate records. The fossil corals have already been collected; it is now time to collect a modern coral so that our study can proceed. National Science Foundation, OCE-0221750.

45) Laurie Richardson, Florida International University ([richardl@fiu.edu](mailto:richardl@fiu.edu)). FKNMS-2003-011, 3/5/2003 to 3/31/2005. Distribution and Etiology of Two Coral Diseases in the Florida Keys National Marine Sanctuary: Black Band Disease and White Plague Type II. This research constitutes continuation of our work on coral diseases in the FKNMS, and specifically addresses several hypotheses which have grown out of our work and which directly address both overall and specific objectives outlined in the Water Quality Protection Program. Unknown.

46) Susan Richardson, Smithsonian Marine Station at Fort Pierce ([richardson@sms.si.edu](mailto:richardson@sms.si.edu)). FKNMS-2002-008, 2/11/2002 to 12/31/2003. Diversity, Distribution, and Abundance of Foraminiferans in Seagrass Habitats, Florida Keys. Benthic foraminiferans, both epiphytic and sediment-dwelling, will be sampled from seagrass habitats in the Florida Keys. The diversity, distribution, and abundance of foraminiferal faunas will be characterized and compared and contrasted to similar sites in the Indian River Lagoon and Belize. Smithsonian Institution Postdoctoral Fellowship.

47) William Sharp, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([bill.sharp@fwc.state.fl.us](mailto:bill.sharp@fwc.state.fl.us)). FKNMS-2003-007, 2/21/2003 to 12/31/2003. The Effect of Sea Urchin Herbivory on a Subtropical Seagrass Community: Experimental Manipulations Within a Manatee Grass-Dominated Meadow in South Florida. In an effort to increase our understanding of the dynamics of urchin herbivory within the Florida Keys National Marine Sanctuary, we propose a series of manipulative field experiments designed to examine the effects of herbivory by *Lytechinus variegatus* on *Syringodium filiforme*. Using cages placed in situ within a large *S. filiforme* meadow, we will manipulate urchin densities and quantitatively assess their effects upon seagrass biomass. Florida Fish and Wildlife Conservation Commission and NOAA/Coastal Ocean Program.

48) Ned Smith, Harbor Branch Oceanographic Institution ([nsmith@hboi.edu](mailto:nsmith@hboi.edu)). FKNMS-2002-063, 9/16/2002 to 9/30/2003 and FKNMS-2003-067, 10/1/2003 to 4/30/2005. Nutrient Mass Fluxes between Florida Bay and the Florida Keys National Marine Sanctuary through Florida Keys Passes. Current speed/direction and water level will be measured to estimate volume transport through Long Key Channel and Moser Channel. Volume transports will be combined with nutrient concentrations to calculate nutrient transport. Measurements made during this field study will quantify the magnitude and direction of seasonal and long-term net nutrient transport between Florida Bay and Hawk Channel. NOAA/Coastal Ocean Program.

49) Keith Spring, Continental Shelf Associates, Inc. ([kspring@conshelf.com](mailto:kspring@conshelf.com)). FKNMS-2003-071, 10/22/2003 to 7/1/2005. Resource Health and Sedimentation Monitoring and Resource Impact Assessment Monitoring for the Key West Maintenance Dredging Project. The proposed monitoring for the Key West Maintenance Dredging Project is being conducted to protect and minimize impacts to marine resources in the vicinity of the project area. Coral and seagrass health measurements will be made at specific locations adjacent to the project area and used as indicators of potential dredging impacts. Repetitive video transects will also be established pre- and post-construction to assess dredging impacts. Sedimentation data will be collected at weekly and monthly intervals. U.S. Navy in association with the dredging contract for the project.

50) Colette St. Mary, University of Florida ([stmary@zoo.ufl.edu](mailto:stmary@zoo.ufl.edu)). FKNMS-2001-019, 5/1/2001 to 5/1/2003. The Effects of Artificial Reef Habitats on Fish Production. The goal of this project is to quantify the net effect of new habitat on fish production, enhance the sustainability of the marine ornamental fishery, and directly test the attraction-production hypotheses. To successfully conduct the critical field experiment, we need to optimize its design, which will depend upon patterns of spatial and temporal variance in settlement and abundance, the strength of density-dependence and the degree of movement between the artificial and natural reefs (as well as diffusion among the natural reef habitat). We will accomplish this by integrating field studies, quantitative literature syntheses, and mathematical population dynamic models. National SeaGrant Program.

51) Peter Swart, University of Miami, RSMAS ([pswart@rsmas.miami.edu](mailto:pswart@rsmas.miami.edu)). FKNMS-2000-018, 4/3/2000 to 12/31/2003. The Origin and Recycling of Nutrients and an Investigation of Trophic Dynamics. The research proposed here is designed to generate an integrated data set, combining work on the sources of nutrients (Swart), cycling and fates of nitrogen and carbon (Swart and

Szmant), nutrient flux and interactions with currents (Lee), the production of organic material by algae (Szmant) and energy flow between trophic levels (Cowen and Sponaugle). National Center of Caribbean Coral Reef Research.

52) Alina Szmant, University of North Carolina at Wilmington ([szmanta@uncwil.edu](mailto:szmanta@uncwil.edu)). FKNMS-2002-054, 6/17/2002 to 6/30/2003. Research on Nutrient Dynamics, Algal Community Structure, and Algal Productivity. Regional coral reef decline is indicated by rapid loss of coral cover and increases in algal cover. It is important to be able to distinguish between increased algal cover being a symptom of coral decline (e.g. algal colonizing substrate vacated by coral killed by one factor or another) vs. a causative factor (algae over-growing and killing the coral), especially if the latter is the result of anthropogenic nutrient enrichment of reef areas. Thus, a major objective of this NCORE subcontract will be to address factors that affect relative algal dominance. These include nutrient availability and cycling, and grazing pressure. National Center for Caribbean Coral Reef Research at the Univ. of Miami, funded by U.S. EPA. Subcontract to UNCW.

53) Florence Thomas, University of South Florida ([fthomas@chuma1.cas.usf.edu](mailto:fthomas@chuma1.cas.usf.edu)). FKNMS-2002-041, 6/1/2002 to 12/31/2003. The Effects of Water Velocity/Hydrodynamics on Mass Transfer of Nutrients: a Partnership in Research and Education. This project explores the relationship between water velocity, nutrient uptake, and the morphology of the predominant community members of nearshore benthic communities, including seagrasses (i.e. *Thalassia testudinum*, *Halodule wrightii*) and macroalgae (i.e. *Halimeda* sp.). As the title implies, this NSF-funded project links research in hydrodynamics and biomechanics to public, k-12, undergraduate, and graduate education. Minority participation is encouraged at all levels and is the primary focus of recruitment at the undergraduate level. Supported by a 5-year NSF PECASE award to Dr. Thomas (OCE-9701434).

54) Linda Walters, University of Central Florida ([ljwalter@pegasus.cc.ucf.edu](mailto:ljwalter@pegasus.cc.ucf.edu)). FKNMS-2003-076, 12/1/2003 to 11/30/2005. Killer Algae: Preventing Florida from Becoming the next Invasion Location of *Caulerpa taxifolia* -- Mediterranean strain. This project strives to determine whether DNA sequences of the native algae *Caulerpa taxifolia* and the invasive Mediterranean strain are significantly different. We will collect *Caulerpa* (green macroalgae) samples for DNA sequencing by Dr. Olsen's lab in the Netherlands. NOAA/National Sea Grant Aquatic Nuisance Species Program, administered by Florida Sea Grant.

55) Gerard Wellington, University of Houston ([wellington@uh.edu](mailto:wellington@uh.edu)). FKNMS-2002-081, 7/31/2002 to 8/31/2003. Genetic Variation and Phenotypic Response of *Montastraea faveolata*. The first, experimental project will estimate the heritability of metabolic and molecular characters related to stress response of *M. faveolata*. To date, heritability of both metabolic and molecular characters related to stress have not been investigated in any coral species. The purpose of the study will be to investigate the contribution of genetic vs. non-genetic (environmental and symbiont association) effects associated with *M. faveolata*'s response to stress. The second project will be exploratory in nature. Currently, the genetic population structure for *M. faveolata* has not been investigated. The purpose of my project will be to collect preliminary data to test for significant genetic variation along the Florida Keys for *M. faveolata*. Houston Coastal Center.



56) Jennifer Wheaton, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute ([jennifer.wheaton@myFWC.com](mailto:jennifer.wheaton@myFWC.com)). FKNMS-2001-015, 4/16/2001 to 12/31/2003. Coral/Hardbottom Monitoring Project. The coral/hardbottom monitoring project documents status and trends (change) in stony coral species presence and percent cover of selected attached reef benthos. Documentation of degree of bioerosion will be a subset of the project beginning summer 2001. Established in 1995, the project's 43 sampling sites, which include 7 hardbottom, 11 patch, 12 offshore shallow, and 13 offshore deep reef sites are sampled annually. The project's primary goal is to document change in the presence/absence of stony coral species richness and selected disease categories and relative percent cover of corals, octocorals, sponges, macroalgae, and substrate. U.S. EPA, FKNMS. [Summary of findings in annual report]

57) Cheryl Woodley, NOAA National Ocean Service, National Centers for Coastal Ocean Science (NCCOS), Center for Coastal Environmental Health & Biomolecular Research ([cheryl.woodley@noaa.gov](mailto:cheryl.woodley@noaa.gov)). FKNMS-2001-008, 4/1/2001 to 4/30/2003. Assessment of Coral Health in the FKNMS Using a Molecular Biomarker System (MBS). We have developed a Molecular Biomarker System (MBS) capable of determining whether corals are stressed and causative agents associated with that stress. The MBS works because the biomarkers respond to stress along biochemical and cellular pathways common to all organisms, from bacteria and protists to plants and higher animals. National Sea Grant Consortium collaborators include NOAA/NOS/NCCOS, Med. Univ. of South Carolina, FKNMS, Biscayne National Park, Univ. of South Florida, Univ. of Charleston, Coral Shores High School, and EnVirion Biotechnologies, Inc. These specific proposed projects are a subset of larger proposed projects to National Sea Grant and U.S. EPA and form a collaboration between the National Marine Sanctuary Program and NCCOS. [Summary of findings in annual report]