

NATIONAL UNDERSEA RESEARCH PROGRAM



INFORMATION
FACTS AND STATISTICS





NATIONAL UNDERSEA RESEARCH PROGRAM

PURPOSE

DEVELOP KNOWLEDGE ABOUT PROCESSES IN BIOLOGICAL, CHEMICAL, AND PHYSICAL SYSTEMS IN THE OCEAN AND GREAT LAKES, AND ACROSS THE BOUNDARIES OF THEIR BASINS IN ORDER TO PROVIDE A SOUND BASIS FOR DECISIONS GOVERNING USES AND RESOURCES OF THE OCEAN AND GREAT LAKES.

MISSION

PROVIDE A COORDINATED, COHERENT PROGRAM WHICH SUPPORTS AND SAFELY CONDUCTS IN SITU MARINE AND LARGE LAKE RESEARCH USING THE MOST MODERN TOOLS AVAILABLE, INCLUDING MANNED SUBMERSIBLES, AIR AND MIXED GAS DIVING, REMOTELY OPERATED VEHICLES, AND UNDERSEA HABITATS.

NATIONAL UNDERSEA RESEARCH PROGRAM

NOAA's National Undersea Research Program (NURP) supports *in situ* investigations in the oceans and large lakes of the world. The program seeks to place investigators safely undersea to conduct manipulative experiments not possible within the limitations of traditional laboratory and ship-based research.

Research activities are aimed at increasing our knowledge of the structure and processes of the global ocean. With an understanding of how physical, chemical, biological, and geological processes control marine environments important to the nation, informed decisions can be made to improve the wise use of our marine resources.

Proposals are received from qualified investigators and peer reviewed through a competitive, national process. Support is awarded to investigators with scientifically meritorious projects. Specific program areas of undersea investigations are: 1) biological productivity and living resources, 2) coastal oceanic and estuarine processes, 3) pathways and fate of material in the ocean, 4) global and oceanic processes, 5) ocean lithosphere and mineral resources, 6) ocean technology, and 7) diving safety and physiology.

As part of the diving safety program, NURP supports research on diving physiology and hyperbaric medicine in cooperation with the U.S. Navy, U.S. Coast Guard, and recognized academic centers of excellence in these fields. Science activities in the ocean technology category include development of the tools required to facilitate undersea research.

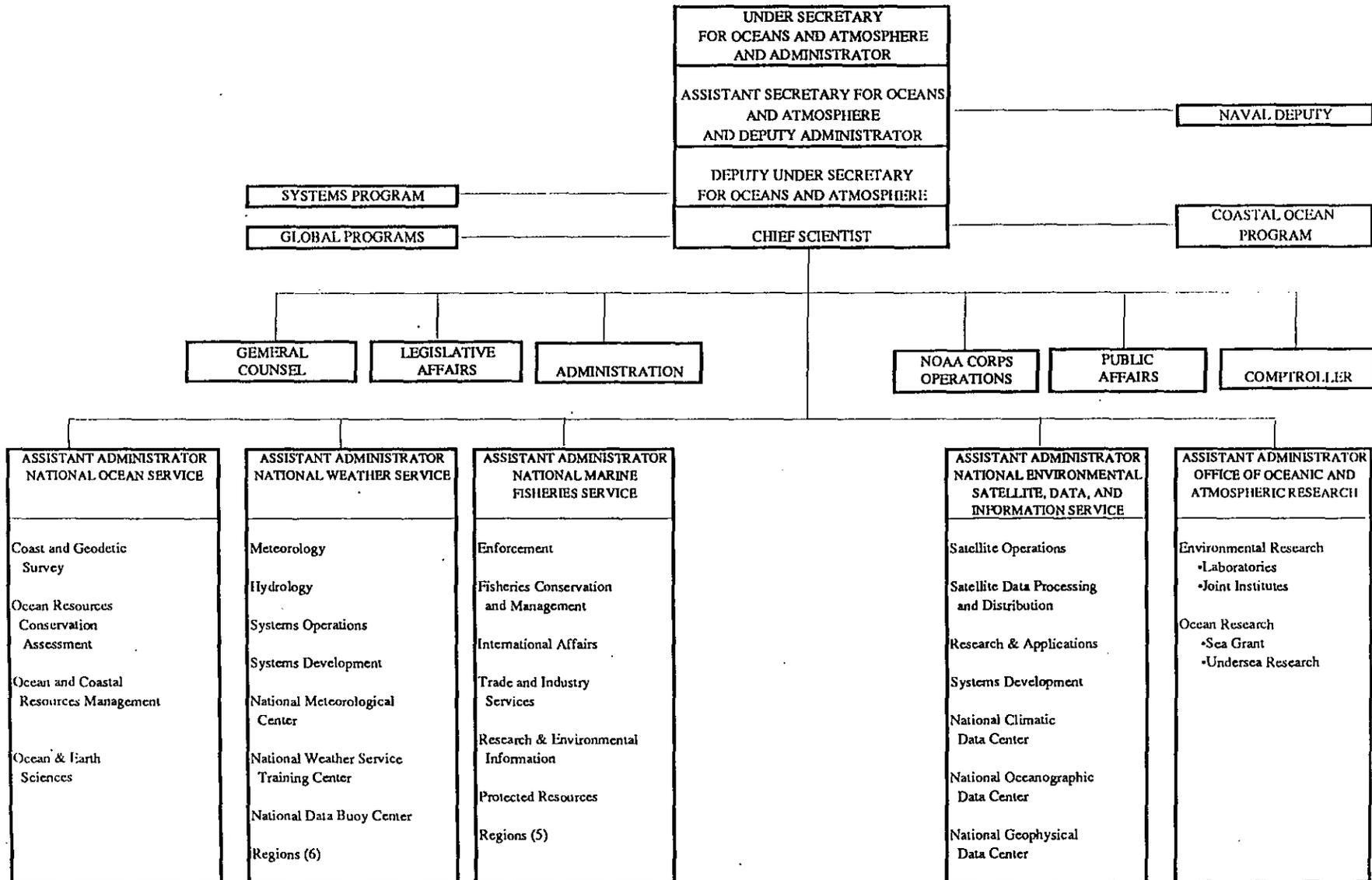
Major, integrated undersea programs now underway in the other five categories listed above include the processes governing seafloor venting, geochemical cycling of pollutants in the Great Lakes, ecology of seamounts, and the factors controlling primary productivity and nutrient cycling in diverse ecosystems ranging from the subarctic to tropical environments.

Program activities are supported with a wide array of advanced undersea sampling and sensing platforms including manned submersibles, remotely operated vehicles, and saturation habitats. Examples of this technology are the "ALVIN" and "PISCES V," two of the deepest diving submersible platforms available to the scientific community today, and the "AQUARIUS," a mobile deep-diving saturation habitat. In December 1991, NURP and the U.S. Navy (OPS-23) entered into a formal Memorandum of Agreement (MOA). Through this MOA, several deep submergence research vehicles will be made available to the U.S. civilian science community. NURP, through its regional centers, will be soliciting proposals for use of Navy assets.

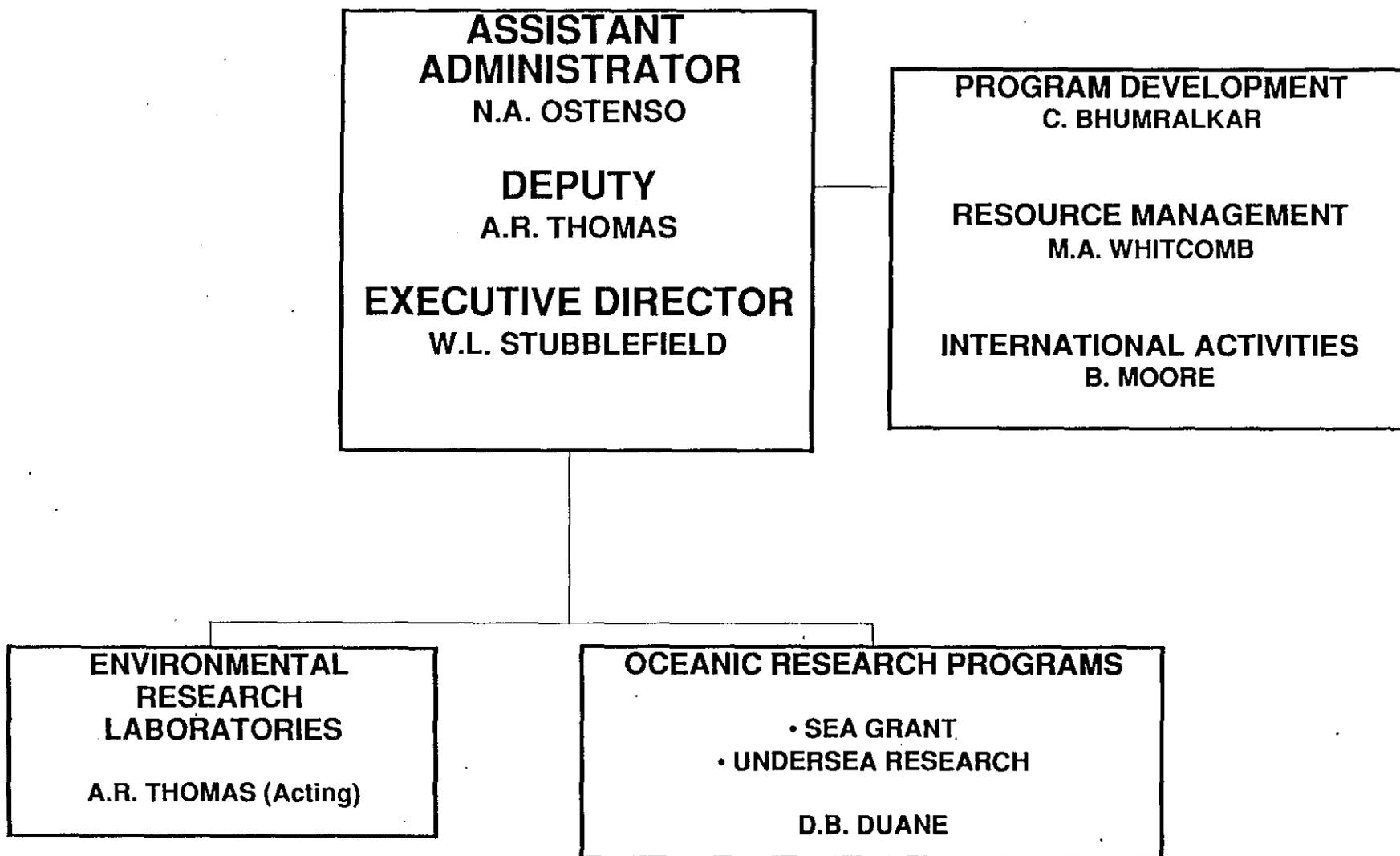
NURP is managed by the Office of Undersea Research in NOAA's Office of Oceanic and Atmospheric Research. The research community gains access to the program through five Undersea Research Centers strategically located around the U.S. Each Center has specific regional responsibilities. Centers are located at the Universities of Connecticut, Hawaii, North Carolina (Wilmington), and Alaska (Fairbanks), the Caribbean Marine Research Center (Vero Beach, FL), and Rutgers University.

NURP provides the focal point for meeting the undersea research requirements of government, academia, and industry. Support provided by the program is generally accompanied by co-funding from traditional granting agencies such as the National Science Foundation, Office of Naval Research, National Sea Grant College Program, and the business community.

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



OCEANIC AND ATMOSPHERIC RESEARCH



NOAA's Undersea Research Program
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Marcia R. Collie
Editor

David B. Duane
Director

Shy Haywood
Secretary

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Senior Engineer

Michael Ledbetter
Physical Scientist

Odysseus Mikalis
Computer Systems Analyst

N. Eugene Smith
General Engineer

David Stein
Biological Scientist

Gregory Stone
Biological Science Associate

Joann Tubbs
Secretary

MARCIA R. COLLIE

Editor

Mrs. Marcia Collie is an editor with the National Undersea Research Program. In this capacity, she edits various publications including science reports, technical reports, symposium proceedings of the NURP-supported research, and papers from NURP-sponsored workshops. At the present time, she is heavily involved in the revision of the NOAA Diving Manual, which is the Government Printing Office's best seller.

She has been with NURP since 1983. Prior to this assignment, she was an editorial assistant with NOAA's Environmental Science Information Center where she worked on publications such as the Monthly Weather Review, a meteorological journal now published by the American Meteorological Society.

She is a graduate of Strayer College in Washington, D.C., and has been extensively involved in editing and preparing government publications since joining the Coast and Geodetic Survey in 1966.

DAVID B. DUANE

Director

Dr. David Duane is a marine geologist, who graduated with a B.A. degree from Dartmouth College and earned a Ph.D. in geology from the University of Kansas.

Prior to his assignment to NURP, he served as Head of the Non-Living Resources Division in the National Sea Grant Office. There, he managed multi-project grants at several of the 29 institutions in the Sea Grant network and helped determine and maintain the quality of the research as well as relevance of the projects to target user communities. In subject area specialties (marine geology and coastal processes), he had similar responsibilities, but throughout the network.

As DOC Science and Technology Fellow in 1979-80, Dr. Duane had a 10-month assignment as legislative assistant for marine related issues to U.S. Senator Lowell Weicker, Jr. (the 96th Congress). Following that assignment, he returned to Sea Grant to resume his previous responsibilities and activities.

Prior to joining NOAA in 1974, Dr. Duane's experience was focused on development of geologic resources, first with the Mobil Oil Company as an exploration geologist (oil and gas) and then with the U.S. Army Corps of Engineers (sand and gravel). As Geology Branch Chief with the Corps, he conducted and managed research on geological processes affecting erosion and deposition along coastlines and on the floor of the Great Lakes and continental shelf. He also helped organize and operate SCUBA groups at the Corps' Lake Survey District (now NOAA's Great Lakes Environmental Research Laboratory) and later at its Coastal Engineering Research Center where he was certified at the advanced scuba level and was diving officer. He currently holds a NOAA certification in diving.

Dr. Duane has more than 30 research publications to his credit as well as several chapters in books. He was an organizer and co-editor of the book Shelf Sediment Transport (1972) and was organizer and editor of a theme issue of the journal Marine Mining: Marine Sand and Gravel Mining (1988). Current research interests are metallogenesis at seafloor spreading centers; mineral resources of the continental shelf; use of the sea floor for disposal of waste materials; sediment movement under the influence of extreme events; and marine geo-political issues.

A. N. KALVAITIS

Senior Engineer

Mr. A. Kalvaitis is senior engineer and operations director for the National Undersea Research Program (NURP). As such, he is responsible for providing technical support and guidance on undersea platforms to the NURP professional staff and the National Undersea Research Centers. A primary goal is to ensure that NOAA's undersea research mission objectives and operations are technically feasible, safe, cost-effective, and efficient.

Prior to joining NURP, Mr. Kalvaitis was a program engineer with NOAA's Special Projects Office. He was responsible for managing several major projects associated with the Ocean Thermal Energy Conversion (OTEC) program that explored the ocean as a renewable power source. One of his OTEC projects was nominated by the American Society of Civil Engineers as an outstanding civil engineering achievement in 1984. Earlier, he was an engineer with NOAA's National Ocean Service where he designed, tested, and evaluated instrumentation systems and platforms for oceanographic and meteorological measurements. Mr. Kalvaitis received his BSME from the University of Maine, Orono.

Mr. Kalvaitis has published articles on undersea science platforms, OTEC developments, data quality assurance and marine instrumentation. He is a member of the Marine Technology Society's Undersea Vehicles/ROV Committee and the Current Measurement Technology Committee of the Institute of Electrical and Electronics Engineers (IEEE). In addition, he is a member of the Engineering Committee on Oceanic Resources (ECOR) Working Group on Marine Resources.

MICHAEL T. LEDBETTER

Program Director for Geological Sciences

Dr. Michael Ledbetter is a Geological Oceanographer. He received his B.A.A.S. in Engineering Geology and M.S. in Geology from Memphis State University and a Ph.D. in Oceanography from the University of Rhode Island.

After receiving his Ph.D. in 1978, Dr. Ledbetter served on the faculty in the Department of Geology at the University of Georgia and, most recently, with the Moss Landing Marine Laboratories of San Jose State University. Two years were spent as an Associate Program Director in the Marine Geology & Geophysics Program of the National Science Foundation.

As a researcher, Dr. Ledbetter has studied deep-sea sedimentary processes and paleoceanography of Antarctic-derived bottom currents, deep-sea fan deposits, and has contributed to the scientific programs of several of the Deep-Sea Drilling Project and Ocean Drilling Program scientific programs. After the 1989 Loma Prieta earthquake in California, he was a co-leader of a series of projects to determine the offshore effects of liquefied soils and slumping of canyon sediments in Monterey Bay. That research has demonstrated that sediments both onshore and offshore are subject to earthquake-induced liquefaction, slumping, and mass movement, and that those processes may play an important role in submarine canyon evolution.

Dr. Ledbetter has published over 60 papers in the reviewed scientific literature. He was a member of the California Sea Grant Committee and has contributed to several books. His current research interests are the role of slumping on submarine canyon formation and paleoclimate-induced changes in bottom-current circulation in the world's ocean.

ODYSSEUS MIKALIS

Computer Systems Analyst

Odysseus Mikalis joins NOAA's National Undersea Research Program as a computer specialist after 5 years of consulting small business on computer applications, marketing, writing, accounting, and finance. He served as regional director of Senator Paul Sarbanes' congressional office in Wheaton, Maryland (1988-89), from which he handled liaison with government and private organizations. From 1984 to 1986, he worked at the National Endowment for the Arts.

Mikalís is a graduate of George Washington University (Political Science, 1979) and Montgomery College (Mathematics-Science, 1976). During his junior year, he interned under Senator Sarbanes, during which time he helped the senator with research on Alaska Lands Bill, Comprehensive Employment and Training Act, and foreign policy issues. Subsequent to graduating from George Washington University, Mikalis attended the University of Baltimore Law School (1982-83).

N. EUGENE SMITH

Operations Director and Program Director for Diving Safety and Physiology

Gene Smith received his B.S. in Mechanical Engineering and M.S. in Environmental Engineering from Kansas State University. He is a registered professional engineer. He has authored several technical papers and book chapters, primarily on diver thermal protection, and has served on technical committees related to diving in the United States and overseas. He is currently on the American Society of Mechanical Engineers main Committee on Pressure Vessels for Human Occupancy.

Gene comes to NOAA from San Diego, California. He has been involved with manned and unmanned undersea activities since 1967. He was with Sub Sea International (SSI) for over 15 years as engineering manager, operations manager, and the manager of an overseas (New Zealand) subsidiary. While with SSI, his major responsibilities were design and fabrication of saturation diving systems, development and implementation of underwater inspection tools and techniques, diving from dynamically positioned support vessels, lock-out submersible operations, remotely operated vehicle operations, and development of an R&D program that included complete revision of the decompression and therapeutic recompression tables and the operation and safety manuals.

Prior to his employment at SSI, Gene spent 7 years at the Westinghouse Ocean Research and Engineering Center in the Life Support Engineering group as a design engineer, project engineer, and project manager on manned submersibles and hyperbaric facilities, and diver-worn saturation diving equipment. He also directed a hyperbaric respiratory heat loss study.

GREGORY STONE

Assistant Program Director for Biological Sciences

Mr. Gregory Stone was the 1989 Sea Grant Fellow assigned to the National Undersea Research Program (NURP). He is involved in many aspects of the national office including proposal reviews, long-range planning, preparing information for congressional briefings, and is specifically working on the Deep Ocean Exploration and Environmental Processes (DEEP) initiative. This fellowship is part of Mr. Stone's Master's Degree program in Marine Affairs at the University of Rhode Island (URI).

Prior to joining NURP, Mr. Stone was a research associate at the College of the Atlantic where he conducted research on whales and taught research diving and marine mammal courses. He has conducted field research on depleted whale species in the Antarctic, Caribbean, and the Gulf of Maine. He has worked for the New England Aquarium as chief scientist of the right whale project and at the Graduate School of Oceanography at URI as a marine research specialist conducting aerial surveys for whales and turtles. He was also principal investigator for cetaceans in the NOAA National Marine Fisheries Service Antarctic Marine Living Resources Program during 1986.

Mr. Stone is a recipient of the 1986 National Science Foundation and U.S. Navy Antarctic Service Medal and the 1989 John A. Knauss Marine Policy Fellowship. He is an instructor with the National Association of Underwater Instructors and has logged over 1,400 hours SCUBA diving. He is a member of the American Academy of Underwater Scientists and the International Society for Marine Mammalogy. He has over 10 scientific publications on whales and numerous other popular articles on marine topics.

During the period January 1990–January 1992, Mr. Stone has been assigned as NOAA's representative to the Japan Marine Science and Technology Center (JAMSTEC) in Yokosuka, Japan. While Mr. Stone has been in Japan and working at JAMSTEC, he has created new opportunities for U.S.–Japanese collaboration in undersea science research.

DAVID L. STEIN

Program Director for Biological Sciences

Dr. David Stein is a Marine Ichthyologist. He received his B.A. degree from California State University at Humboldt, and M.S. and Ph.D. degrees in Fisheries from Oregon State University.

Before joining NURP, Dr. Stein was (successively) an Oceanographic Technician, Research Associate, and Assistant Professor (Senior Research) at Oregon State University College of Oceanography. In those positions, he spent over 3 years total time at sea on about 60 research cruises, mostly as Field Party Chief or Chief Scientist. He is a National Association of Underwater Instructors-certified scuba diver.

As a technician, Dr. Stein worked on the distribution of continental shelf benthic fishes, biology and behavior of deep scattering layer organisms, and taxonomy of fishes of the continental slope and abyssal plain. After receiving his Ph.D. in 1982, he obtained grant and contract support for research on deep-sea fishes down to 6000 m, development of deep sea large net trawling methods, taxonomy of the snailfishes, and fisheries biology of Pacific grenadier. He has also used submersibles for multi-year studies of upper subduction zone methane vents and of deep bank fishes off Oregon.

Dr. Stein has published over 30 research papers and has been an invited author or co-author of several book chapters. His current research interests are the taxonomy and natural history of snailfishes and deep-sea fishes, and the fisheries biology of continental slope fishes.

NATIONAL UNDERSEA RESEARCH PROGRAM OFFICE
SUBJECT AREA AND ADMINISTRATIVE ASSIGNMENT

DAVID B. DUANE

ALVIN and Submersible
Liaison with University National Oceanographic Laboratory System
(UNOLS)
Program Development
Office Administration

A. N. KALVAITIS

Manned Submersibles
Safety and Standards
Habitats
Field Operation Scheduling
Facilities Maintenance and Operations Contracts
Program and Project Monitor
Special Events

MICHAEL LEDBETTER

Geological Sciences
Paleo-oceanography
Program and Project Monitor

ODYSSEUS MIKALIS

Computer Systems Analyst
Data Base Management

EUGENE SMITH

Diving Physiology, Health, and Safety of Aquanauts
Instrumentation Research and Development for All Systems
Operations Safety
Program and Project Monitor
Remotely Operated Vehicles
Operations Liaison with Navy (OPS-23)

DAVID STEIN

Biological Sciences
Environmental Sciences
Project Program Monitor
Science Program Development with Navy (OPS-23)

MARCIA COLLIE

NURP Publications
NURP Manuals
NOAA Diving Manual
Visuals

GREGORY STONE

Biological Science Associate
Marine Mammals
US/JAPAN Cooperative Activities

NATIONAL UNDERSEA RESEARCH PROGRAM PRIORITY FRAMEWORK

STRATEGIC GOALS

- > Describe and Predict Natural Variations in Processes
- > Describe and Predict Human Induced Variations in Processes
- > Support NOAA, U.S., International Science Efforts
- > Share Technology, Techniques, Financial Burdens

INTEGRATING METHODS

- > Measure, Observe, Describe Processes, Through Time, Space
- > Develop and Improve Technology
- > Multi-Disciplinary Studies

SCIENCE & TECHNOLOGY PRIORITIES

I I	I I	I I	I I	I I	I I	I I	I I
Material Flux	Productivity	Habitat Characteristics	Global Change	Recruitment of Marine Organisms	Ocean Lithosphere	Diving Safety	Technology
Carbon Nutrients Particulates Gases	Benthic-Pelagic Coupling Population Physiology	Organism/ Substrate Quantification Anthropogenic Effects	Benthic Effects Monitor Temp. Paleo Climate Paleo Ecology	Population Biology Habitat Specifics Reproductive Behavior	Mid-Ocean Ridges Continental Margins Resources	Polluted Waters Hyperbaric Physiology Communication Tracking	Sampling Hard Bottom Observations Visual Capability Autonomous Underwater Vehicle

Primary Areas of NOAA NURP Research Activities

The ocean can be divided into three major areas of interest:

Coastal Ocean

the ocean overlying the continental shelf from 10 to 100 m bottom depth, the area of man's greatest impact on the ocean.

Transitional Ocean

the ocean over the continental slope from 100 to 1000 m bottom depth, the transition from the Coastal Ocean to the Open Ocean.

Open Ocean

the deep sea where bottom depths exceed 1000 m.

Within this framework, areas of particular emphasis for research activities at NURP are:

Global Change Processes

ocean processes that affect and are affected by long-term climate (e.g., continuous in-situ water temperature monitoring)

Habitat Characteristics

interrelationships between marine organisms and their living space (e.g., preferred bottom type of commercially important species such as rockfish)

Ocean Lithosphere

characteristics of the ocean bottom with respect to their morphology, structural framework, and sediment distribution (e.g., origin and distribution of ferro-manganese crust on Pacific seamounts)

Material Flux

pathways and fate of materials in the ocean and role of submarine venting in the global chemical and thermal budgets of the ocean (e.g., presence and effects of anthropogenic materials on the sea floor, such as the 106-mi dump site)

Productivity

energy transfer through the marine ecosystem (e.g., the effects of methane vents on benthic communities)

Recruitment of Marine Organisms

identification of the causes of natural fluctuations in populations of marine organisms (e.g., dynamics of grouper spawning assemblages)

Other

other marine phenomena that affect our living world (e.g., the causes and effects of coral bleaching on reef communities)

In addition, NURP is responsible for the following areas of marine research:

Diver Safety and Physiology

research to improve the safety of undersea workers and better understand the physiological processes affecting man in the sea (e.g., improvement and validation of decompression tables)

Undersea (Ocean) Technology

develop and improve the capabilities of undersea research tools to better provide information needed by ocean scientist (e.g., precision undersea fluid sampling system for submersibles)

Abbreviations of Research Categories for Program Definition

Coastal Ocean (10 - 100 m)

Global Change	COGC
Habitat	COH
Lithosphere	COL
Material Flux	COMF
Productivity	COP
Recruitment	COR
Other	COO

Transitional Ocean (100 - 1000 m)

Habitat	TOH
Lithosphere	TOL
Material Flux	TOMF
Productivity	TOP
Recruitment	TOR
Other	TOO

Open Ocean (>1000 m)

Lithosphere	OOL
Material Flux	OOMP
Global Change	OOGC
Other	OOO

Diver Safety & Physiology DSP

Undersea (Ocean) Technology OT

Abbreviations for Regional Programs

Great Lakes	GL
Atlantic Ocean	ATL
Northwest	NW
(New England to Mid-Atlantic coast)	
Southwest	SW
(Mid-Atlantic to Florida coast)	
Gulf of Mexico	GMX
Caribbean	CRB
Pacific	PAC
Northeast	NE
(Alaska to Oregon)	
Southeast	SE
(California)	
Central	CTL
(Hawaiian Archipelago)	
Western	WST
(Island Territories)	
AQUARIUS Undersea Habitat	AQU
Office of Undersea Research	OUR
(national or non-specific)	

National Undersea Research Centers

UCAP	University of Connecticut - Avery Point
FDU	Fairleigh Dickinson University (closed in 1990)
UNCW	University of North Carolina - Wilmington
CMRC	Caribbean Marine Research Center
UAKF	University of Alaska - Fairbanks
UHI/M	University of Hawaii - Manoa
	(formerly Hawaii Undersea Research Laboratory(HURL))

NURP PROGRAM FY 1989
RESEARCH - TECHNOLOGY
(Dollars in Thousands)

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
COASTAL OCEAN							
Global Change				390			
Habitat	143	32			446		
Lithosphere	78		31				
Material Flux	723	271			242		
Productivity	759	44	365		77		
Recruitment	61	5	444	575			
Other	1016	37	465	897			338
SUBTOTAL	2780	389	1305	1862	765	0	338
Section Total	7439						

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
TRANSITIONAL OCEAN							
Global Change							
Habitat							
Lithosphere		291					
Material Flux		154			35		
Productivity						551	
Recruitment							
Other							
SUBTOTAL	0	445	0	0	35	551	0
Section Total	1031						

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
OPEN OCEAN							
Global Change							920
Habitat							
Lithosphere						1597	
Material Flux		311				551	
Productivity							
Recruitment							
Other				664		441	
SUBTOTAL	0	311	0	664	0	2589	920
Section Total	4484						

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
OTHER							
Diver Safety/ Physiology		178		288			309
Ocean Technology							60
SUBTOTAL	0	178	0	288	0	0	369
Section Total	835						
CENTER TOTAL	2780	1323	1305	2814	800	3140	1627
APPORTIONED TOTAL	2957	1408	1378	2993	852	3340	1734
GRAND TOTAL	14662						

NURP PROGRAM FY 1990
RESEARCH - TECHNOLOGY
(Dollars in Thousands)

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
COASTAL OCEAN							
Global Change	102*				221		
Habitat	353				220		
Lithosphere			39				
Material Flux	1059	10					
Productivity	428				167		
Recruitment	143		806				
Other	207	239	672		186		479
SUBTOTAL	2292	249	1517	0	794	0	479
Section Total	5331						

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
TRANSITIONAL OCEAN							
Global Change							
Habitat							
Lithosphere		675					
Material Flux	33						
Productivity							
Recruitment							
Other							
SUBTOTAL	33	675	0	0	0	0	0
Section Total	708						

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
OPEN OCEAN							
Global Change							940
Habitat							
Lithosphere						1311	
Material Flux	993					1247	102
Productivity							
Recruitment							
Other						442	35
SUBTOTAL	993	0	0	0	0	3000	1077
Section Total	5070						

	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
OTHER							
Diver Safety/ Physiology		362					346
Ocean Technology				863			250
SUBTOTAL	0	362	0	863	0	0	596
Section Total	1821						
CENTER TOTAL	3318	1286	1517	863	794	3000	2152
APPORTIONED TOTAL	3500	1357	1600	910	837	3165	2270
GRAND TOTAL	13639						

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**NURP PROGRAM FY 1991
RESEARCH-TECHNOLOGY**
(Dollars in Thousands)

COASTAL OCEAN	NY BIGHT	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
Global Change				37				
Habitat	109	38	65			476		
Lithosphere		70	319	50				
Material Flux	313	460	70			12		
Productivity	527	628	697	557		56		
Recruitment		8	206	1317				
Other		245		62	107			
SUBTOTAL	949	1449	1357	2023	107	544	0	0
Section Total	6429							

TRANSITIONAL OCEAN	NY BIGHT	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
Global Change								
Habitat		576	117			181		
Lithosphere			409					
Material Flux	691	801	770					
Productivity		40	829			253		
Recruitment								
Other			121					
SUBTOTAL	691	1417	2246	0	0	434	0	0
Section Total	4788							

OPEN OCEAN	NY BIGHT	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
Global Change							159	
Habitat								
Lithosphere							159	400
Material Flux							788	199
Productivity								
Recruitment								
Other								
SUBTOTAL	0	0	0	0	0	0	1106	599
Section Total	1705							

OTHER	NY BIGHT	GL/ ATL NW	ATL SW/ GMX	CRB	AQU	PAC NE/ SE	PAC CTL/ WST	OUR
Diver Safety/ Physiology			290					290
Ocean Technology			393		122			187
Other			4	50	280		1395	
SUBTOTAL	0	0	687	50	402	0	1395	477
Section Total	3011							
CENTER TOTAL	1640	2866	4290	2073	509	978	2501	1076
APPORTIONED TOTAL	1710	2988	4472	2161	531	1020	2607	1122
GRAND TOTAL	16610							

STAFF MONITORING AND SITE VISIT ASSIGNMENTS

Research Center Programs

Monitor/Alternate

Caribbean Marine Research Center/
Vero Beach, Florida

Stein/Smith

Rutgers University/
New Brunswick, NJ

Stein/Kalvaitis

University of Alaska/Fairbanks

Smith/Stein

University of Connecticut/Avery Point

Stein/Smith

University of Hawaii/Manoa

Kalvaitis/Smith

University of North Carolina/Wilmington

Kalvaitis/Stein

Projects, Programs, Coordination

Monitor/Alternate

ALVIN and UNOLS

Duane/Kalvaitis

Diving Safety and Physiology

Smith/Stein

NOAA Diving Manual

Smith/Collie

U.S. Navy Liaison

Smith/Stein

Marine Resources Development Foundation

Kalvaitis/Stein

Interagency Committee on Search & Rescue

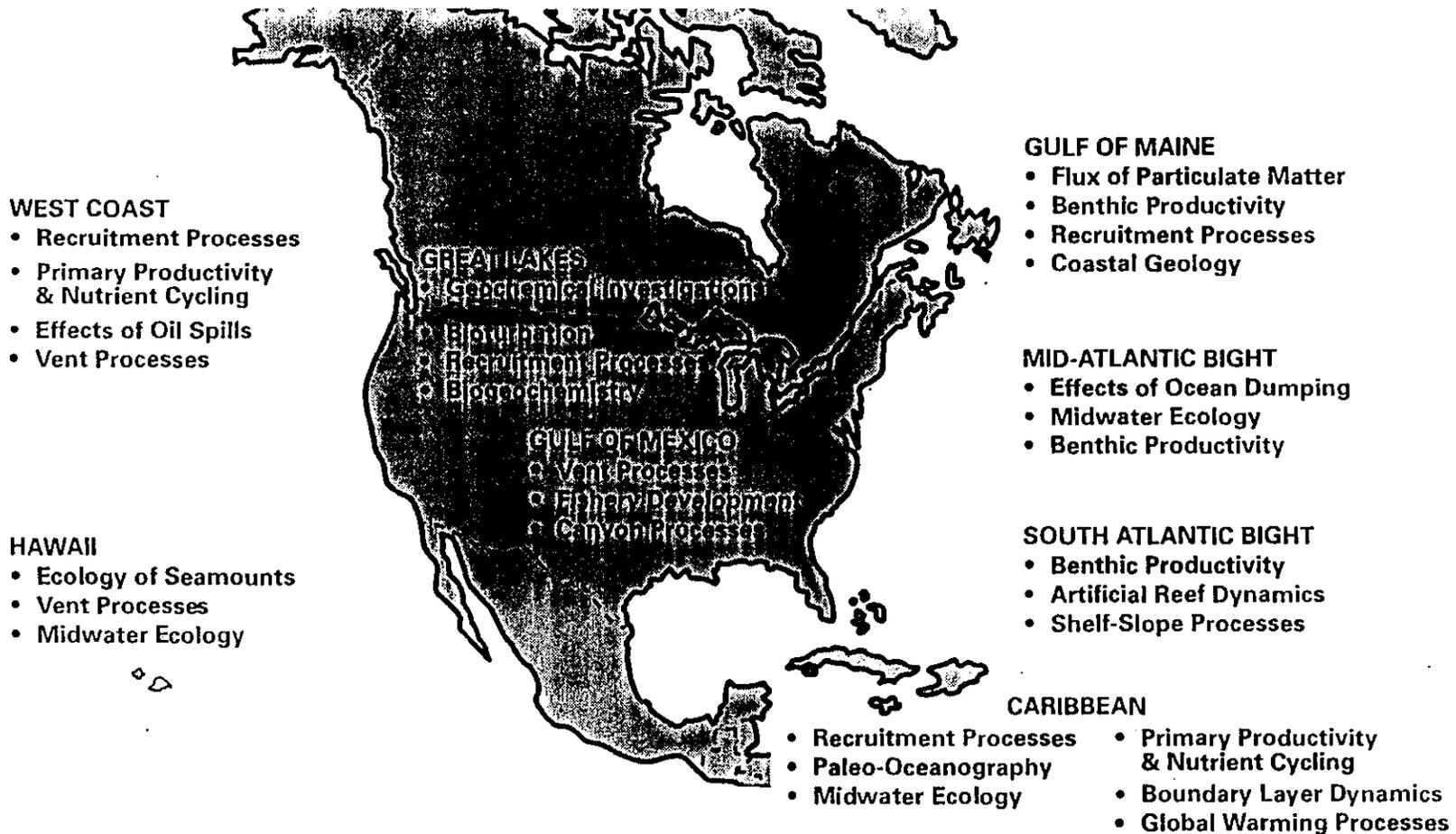
Kalvaitis/Smith

National Science Foundation

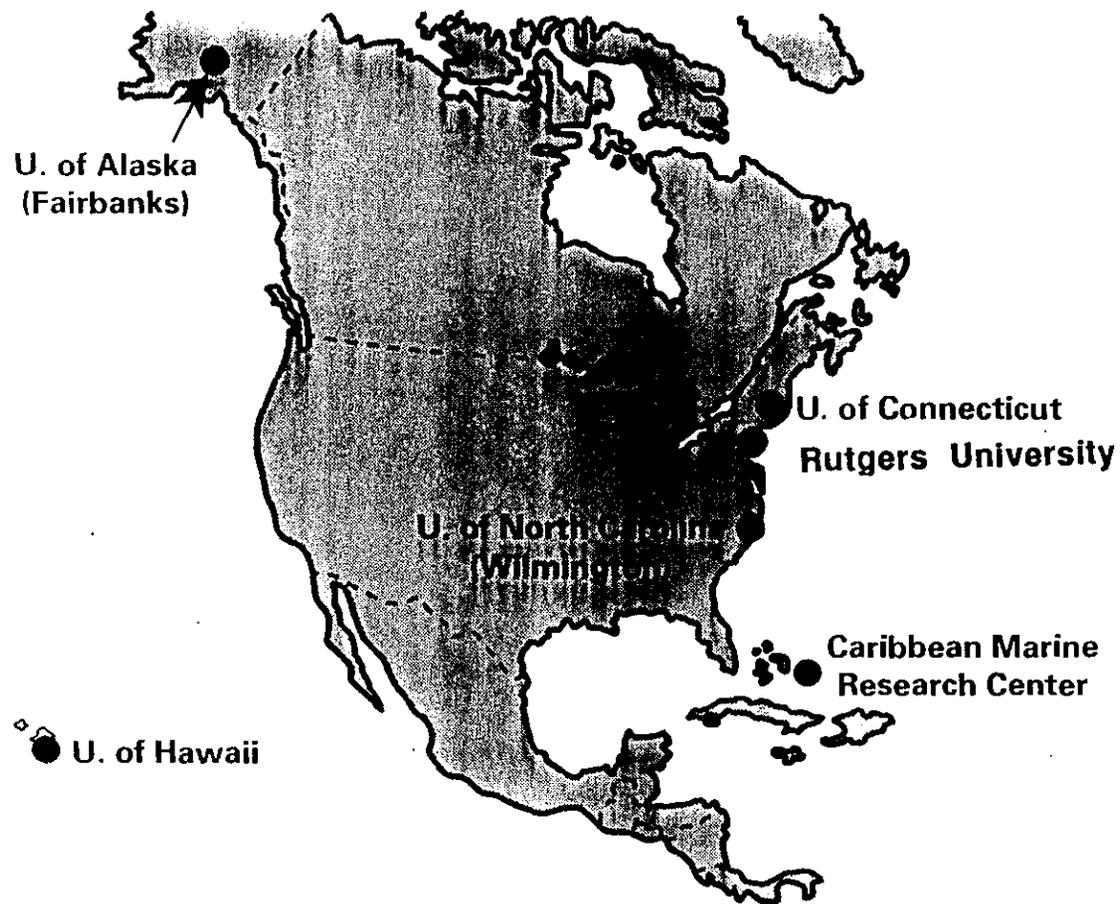
Stein/Kalvaitis

R/OR
2/92
DBD

NATIONAL UNDERSEA RESEARCH PROGRAM PRINCIPAL SCIENCE THEMES BY REGION



NOAA'S OFFICE OF UNDERSEA RESEARCH CENTERS



NOAA'S NATIONAL UNDERSEA RESEARCH PROGRAM

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Silver Spring Metro Center 1
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Silver Spring, MD 20910

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301-713-0799 (Fax)

REGIONAL NATIONAL UNDERSEA RESEARCH CENTERS

**Northeastern U.S., Great Lakes, and
other Large Lakes of the World**

Director
National Undersea Research Center
University of Connecticut - Avery Point
Groton, CT 06340

203-445-4714 (Voice)

203-445-2969 (Fax)

**Southeastern U.S., Gulf of Mexico,
and AQUARIUS habitat**

Director
National Undersea Research Center
Univ. of North Carolina - Wilmington
7205 Wrightsville Avenue
Wilmington, NC 28403

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919-256-8856 (Fax)

Caribbean

Director
Caribbean Marine Research Center
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NATIONAL UNDERSEA RESEARCH PROGRAM SCIENCE DIVE ACTIVITIES

SUMMARY OF 1988

Research Center/ Program	Manned Submersibles/ Habitat*	Remotely Operated Vehicles	SCUBA	Participants	Affiliations
Caribbean Marine Research Center	32	24	750	30	7
University of CT, Avery Point	215	217	709	186	70
University of NC, Wilmington	96	56	410	101	41
University of HI	81	--	--	36	18
Fairleigh Dickinson University	6*	7	523	60	25
West Coast Program	80	13	--	23	10
NOAA - ALVIN	20	--	--	12	9
TOTALS	530	317	2392	448	180

SUMMARY OF 1989

Research Center/ Program	Manned Submersibles/ Habitat*	Remotely Operated Vehicles	SCUBA	Participants	Affiliations
Caribbean Marine Research Center	6	4	6000	50	20
University of CT, Avery Point	177	270	104	240	79
University of NC, Wilmington	38	54	782	125	35
University of HI	10	--	--	5	2
Fairleigh Dickinson University	58/120*	7	511	107	48
West Coast Program	230	15	--	36	9
NOAA - ALVIN	7	--	--	20	9
TOTALS	526/120	350	7397	583	202

*NOTE: AQUARIUS saturation habitat missions average 12 days in length and typically include 5 scientists

NATIONAL UNDERSEA RESEARCH PROGRAM SCIENCE DIVE ACTIVITIES

SUMMARY OF 1990

Research Center/ Program	Manned Submersibles/ Habitat	Remotely Operated Vehicles	Nitrox/ SCUBA	Participants	Affiliations
Caribbean Marine Research Center	--	--	3850	50	20
University of CT, Avery Point	259	282	305	245	39
University of NC, Wilmington	133	34	490	186	56
University of HI	33	--	--	28	7
Fairleigh Dickinson University	--	--	300	25	8
University of AK	109	--	--	35	9
NOAA - ALVIN	47	--	--	47	18
TOTALS	581	316	4945	616	157

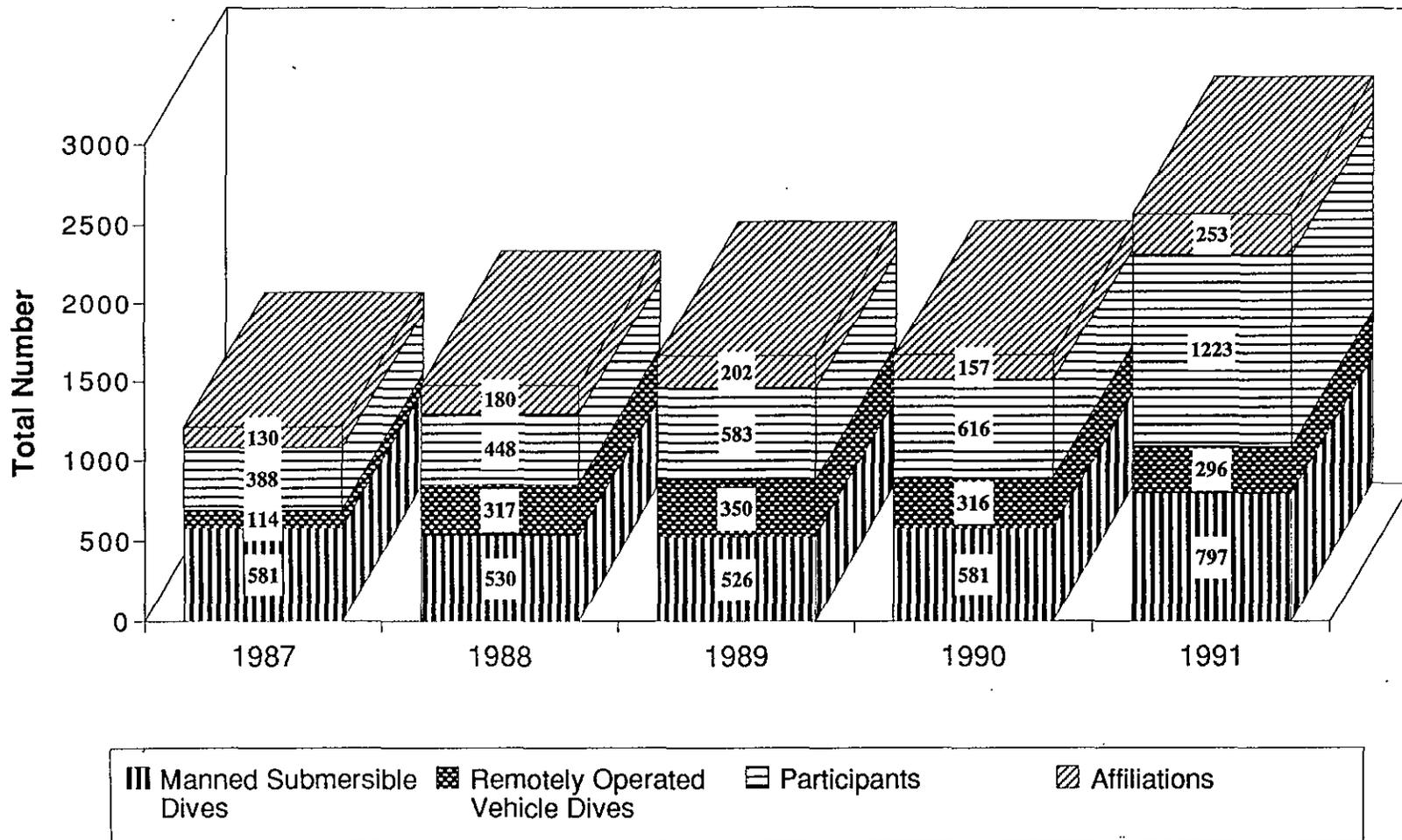
SUMMARY OF 1991

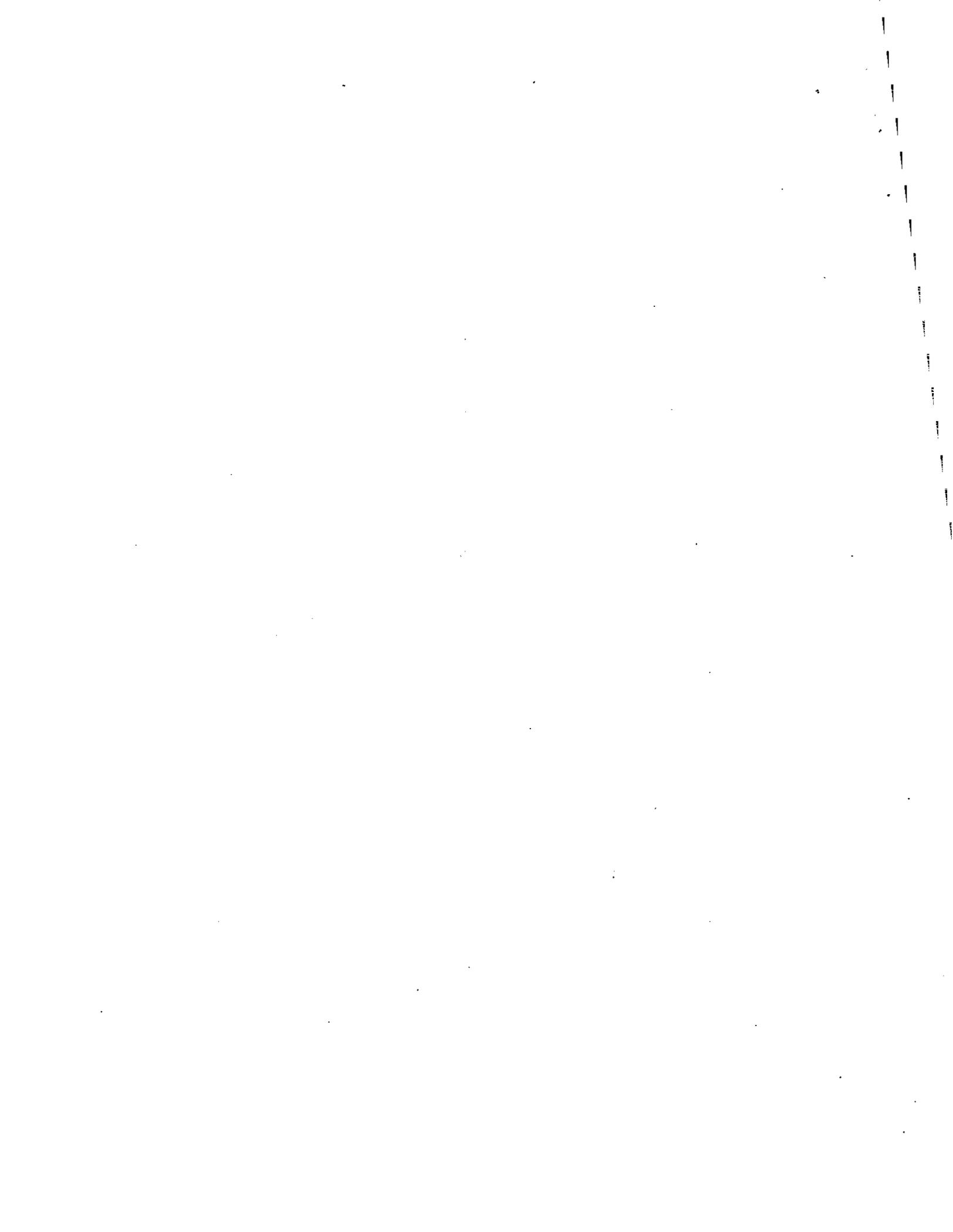
Research Center/ Program	Manned Submersibles/ Habitat	Remotely Operated Vehicles	Nitrox/ SCUBA	Participants	Affiliations
Caribbean Marine Research Center	30	6	3936	192	28
University of CT, Avery Point	232	196	323	338	98
University of NC, Wilmington	126	75	3180	504	61
University of HI	33	--	--	34	8
University of AK	325	15	--	93	34
NOAA-ALVIN	16	--	--	21	7
New York Bight	35	4	30	41	17
TOTALS	797	296	7469	1223	253

**SUMMARY OF 1991
NATIONAL UNDERSEA RESEARCH PROGRAM
SCIENCE DIVE ACTIVITIES**

Research Center/ Program	Manned Submersibles/ Habitat	Remotely Operated Vehicles	Nitrox/ SCUBA	Participants	Affiliations
Caribbean Marine Research Ctr.	30	6	3936	192	28
University of CT, Avery Point	232	196	323	338	98
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NOAA-ALVIN	16	---		21	7
New York Bight	35	4	30	41	17
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NURP STATISTICS







UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC RESEARCH AND GRANTS
1335 East West Highway, Silver Spring, MD 20910

NOAA'S NATIONAL UNDERSEA RESEARCH PROGRAM

AT THE UNIVERSITY OF CONNECTICUT, AVERY POINT

1991

NOAA's National Undersea Research Center at the University of Connecticut, Avery Point (NURC-UCAP) was administratively established in 1983 and conducted its first diving operations in 1984. To date, NURC-UCAP has provided dive system (manned submersible, ROV, and SCUBA/NITROX) support to over 300 diver/scientists from 16 states, 18 universities, 5 government agencies/departments, and 6 countries. A total of 277 research proposals have been submitted and reviewed with about 70% funded; science support (\$) was provided to approximately 25% of these scientists. A total of 1210 manned submersible, 1037 ROV, and 1197 SCUBA (Air and Nitrox) dives have been made in support of our science program (nationally and internationally) and public education.

Results of these diving operations are being published at an increasing rate. To date, there are 69 peer reviewed journal publications, 84 abstracts, 140 technical reports, and 20 completed masters and Ph.D. dissertations. These publications represent research conducted from 1985 through 1991.

The ultimate goal of NURC-UCAP's science program is to better understand the biogeochemical dynamics of our marine and fresh water environments and to predict the impact of stress, natural and man-made, on their living resource productivity and utilization for recreation. Our primary research efforts since 1984 have been directed toward a programmatic blend of "mission" oriented and "basic" research. Much of this research bears directly on some very pressing and serious issues facing NOAA and our coastal and Great Lakes states. These issues deal with (1) management and protection of commercial and recreational fisheries of the Great Lakes and N. W. Atlantic valued annually at over \$6 billion (value includes support industries such as marinas, tackle shops, boat sales, etc.); (2) aquatic pollution/human health issues that are more serious in the northeast U. S. than other regions of the country; and (3) the identification of critical habitats (spawning grounds, nursery grounds) for commercial and recreational fishes, crustaceans, and molluscs and their protection from physical and chemical abuse.

Habitat protection and the assessment of impacts from pollution relate directly to the well being of our living resources and man's ability to utilize these resources and their environments for commerce and recreation. Public perception of seriously polluted coastal environments and the living resources they support is a reality; reference the sewage sludge dumping/medical waste issues on the east coast, summer 1988



(Time and Newsweek Magazine articles, August 1, 1988). Estimates of lost revenues (significant reduction in tourism, reduced property values, reduced tax revenues, etc.) to the states of New Jersey, New York, Connecticut, Rhode Island, and Massachusetts during 1988-1990 are in the range of \$7-10 billion. The issue of human health as regards sewage sludge and medical wastes is not within the purview of NURC-UCAP; their possible deleterious impacts on our aquatic living resources and supportive habitats certainly is a responsibility of NOAA and is a central component of our science program.

NURC-UCAP's science program is comprised of seven (7) Research Themes that are addressed by the specific goals, objectives, and hypotheses presented in the research proposals for NURC-UCAP support in 1991. These research themes, presented below, represent the priority needs of three distinct geographic regions within the U. S.:

- I Assessment and Ecology of Economically Important Resource Populations - In situ research on the ecology of commercially/recreationally important demersal fish and crustacean populations and population assessment. Parameters investigated include, but are not limited to, chemical, physical, and biological factors determining growth, survival, and therefore distribution and abundance of bottom oriented species living on hard and soft substrates in the Gulf of Maine and southern New England Continental Shelf. Proposals included this year are by Robinson; Spanier and Cobb.

- II Environmental and Resource Impact Assessment From Ocean Dumping - Estimate the likely impact(s) of four (4) years of sewage sludge dumping at the "106" dump site off New York/New Jersey. Research is directed toward an assessment of ocean floor animal community structure and species abundance along hypothetical transects leading N.E. and S.W. away from the dump site area, and chemical loading/contamination of bottom sediments and key "indicator species" most likely to demonstrate impact(s). Included is an examination for histological and pathological conditions usually associated with chemical "insult" on these key indicator species of commercial importance (red crab, four spot flounder, tilefish, and ocean quahog). The proposal of Cooper and Stewart addresses this theme.

- III Benthic-Pelagic Coupling and Mid-Water Ecology - Research is directed toward predator-prey relationships, analysis of vertical transport of material by physicochemical and biological means, analysis of prey nutritional quality and taste in structuring predator-prey relationships in mid-water communities, and the production of fecal pellets that settle to the bottom providing a source of food for bottom organisms and a rapid pathway for contaminants. Proposals included in

this category are those of Greene; Kerfoot; Lehman, Hecky, and Bugenyi; Widder; and Wishner and Winn.

- IV Benthic Community Processes and Dynamics - Research includes predator-prey and competitive interactions between epibenthic and infaunal populations, determinants of faunal zonation, and measures of organisms/community metabolism with respect to changing environmental conditions. Proposals included are Cohen and Tercelin; Lee and Hall; Lee and Whitlatch; Whitlatch, Grassle, Zajac, Lopez, and McCall; and Witman.
- V Biogeochemical Processes and Dynamics - Identify and quantify the pathways and processes at the air/water and sediment/water interfaces through which organic pollutants, heavy metals, and nutrients are introduced, circulated, and eventually sequestered in marine and lacustrine systems. The fate and availability of contaminants (trace metals, organics, and hydrocarbons) and nutrients bear directly on the health and productivity of the marine and Great Lakes environment. Research in this category is part of the comparative studies in the "Large Lakes of the World" initiative. Proposals included in this category are those of Baker and Eisenreich; Collier, Dymond, and Larson; Klump, Remsen, and Kipphut; and Klump, Remsen, and Eadie.
- VI Coastal Geologic Processes - This research theme bears directly on the fate of contaminants and the redistribution of nutrients so important to the issues of environmental health and fish production and relates strongly to Research Theme IV. The groundtruthing (calibration) of exposed sedimentary features, first defined by seismic profiling, is included in this theme. No proposals received this year address this theme.
- VII Marine Science Education - Intended to introduce the subject/discipline of underwater research at a variety of educational levels to address the projected U.S. deficit of scientists and engineers within the next 15 years. The goal of this program is to educate students about potential careers in science and engineering and to show graduate students how in situ techniques can help them in their research and careers. This theme is addressed through the proposals by Babb, Dailey, and Cooper; and Mann.

The 1992 NURC-UCAP program will be concentrated in the U.S. Great Lakes and other large lakes of the world. Research will also be supported along the U.S. east coast from the Mid-Atlantic Bight Region (New Jersey and New York) to southern New England (Connecticut, Rhode Island, and Massachusetts) and the Gulf of Maine. A total of 32 research proposals were submitted to NURC-UCAP to both continue and initiate research in these regions. Nineteen of these are supported either fully or partially in this

year's program. In addition, collaborative activities will continue with Israeli and Taiwanese scientists.

The general thrust of the proposed research is given above, grouped by Research Theme. ROV's, manned submersibles, and NITROX diving will be used to conduct this research. Eight (8) proposals will be supported in southern New England and the Gulf of Maine, and nine (9) in freshwater. Of the nineteen funded proposals, ten (10) are in the area of benthic and pelagic ecology and four (4) biogeochemical processes, two (2) in the area of fisheries, two (2) in education, and one (1) in marine pollution.

Several new or relatively new (1990, 1991) research initiatives, treated in the mode of "program development," comprise the remainder of the 1992 program. These components of the NURC-UCAP proposal represent a blend of "comparative-process oriented" research, and technology transfer/public education activities that fall within the rubric of activities supported by NOAA. Briefly stated, they are as follows:

Long-Term Ecological Research (Super Stations)

NURC-UCAP has initiated the establishment of one or more "Super Stations" in the Gulf of Maine to be site(s) for long-term ecological research suitable for in situ study. In particular the studies will contrast temporal variability in on-shore and off-shore biotic and abiotic conditions. In order to study the effects of humans on the biotic environment, it is necessary to distinguish between natural and man-caused perturbations in animal communities. The long-term monitoring of environmental variables at the site will assist in recognition of whether changes occurring in the natural systems are "normal" or anthropogenic in origin.

NURC-UCAP/CT DEP Long Island Sound Cooperative Research Program

NURC-UCAP and the Connecticut Department of Environmental Protection are collaborating on a cooperative program of undersea research in Long Island Sound. The specific goals of the program are: 1. to map habitat using side-scan sonar, grab samples, and ROV imaging; 2. to monitor specific stations over a long time to assess changes in habitat characteristics and faunal composition across pollution/productivity gradients; and 3. public outreach and education through existing funded educational programs. The majority of the funding for this initiative will come from the state of Connecticut and is legislatively mandated.

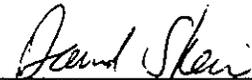
NURC-UCAP / Israeli Cooperative Research Program

A research agenda for 1992 has been deferred until 1993 in order to more effectively solicit and obtain a unified

package of proposals based upon clear research themes. As part of this effort, NURC-UCAP will actively seek to match Israeli investigators with U.S. counterparts. Proposed themes are geological continental terrace and fault zone studies and geology of Dead Sea depth zonation; biological community structure and rhythmic migrations in Mediterranean canyons; biology of gilthead sea bream; and Red Sea coral recruitment and community structure.

NURC-UCAP/NURC-UH/Taiwan Cooperative Research Program

The primary goal of this program is to train Taiwanese scientists in the use of ROV's and other in situ technology. ROV dive research projects will continue from last year, involving Taiwanese from at least three institutions. The majority of the funding for ship time and equipment shipping will be covered by the Taiwan National University, with NURC-UCAP's share being travel costs for four (4) people.



David Stein
Program Monitor
2/92



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC RESEARCH PROGRAMS
1205 East West Highway, Silver Spring, MD 20910

NOAA's NATIONAL UNDERSEA RESEARCH PROGRAM
AT THE UNIVERSITY OF NORTH CAROLINA (WILMINGTON)

1992

The NOAA Research Center at the University of North Carolina at Wilmington (NURC/UNCW) was established to promote, facilitate, and conduct research in the southeastern United States utilizing undersea techniques, including advanced wet diving and both manned and unmanned submersibles. The program is designed to cover a large geographic area including the continental shelf off the coast of the southeastern United States, the southwestern Atlantic ocean and the Gulf of Mexico using mobile platforms to place the scientist in the sea. It provides an array of in-house and leased capabilities to meet the varied scientific needs.

NURC/UNCW retains a dive staff and owns equipment to support a NITROX, wet-diving capability through the use of a portable modular diving system which can be placed upon vessels of opportunity. In addition, NURC/UNCW operates a remotely operated vehicle and will continue to develop the in-house technical expertise in remotely operated vehicles (ROV). Future plans include operation of the AQUARIUS research habitat in the Florida Keys. A major initiative in 1992 will be the continued repair and refurbishment of the AQUARIUS habitat system that was recovered from St. Croix, USVI. In preparation for a future deployment in the Florida Keys, there will be science and technology studies to define research and engineering needs associated with the relocation of the habitat program.

RESEARCH

In 1992, NURC/UNCW emphasizes oceanographic research, marine education and training, and ocean technology. Activities are divided into three types of projects:

Core Projects are the submitted proposals which are the heart of the Center's activities in Oceanographic Research and Ocean Technology. Most other Center activities are devoted to accomplishing and strengthening core research. Core Projects are subjected to an external (mail and science panel) and internal (NURC and OUR) review process.

Development Projects are activities designed to enhance and develop better core research programs. Direct and active contact with the scientific community is not commonly attempted by other funding agencies, except by a passive process of mailings and



research announcements. NURC/UNCW maintains a passive process, but also attempts to more actively generate interest and increase awareness of Center activities. This is done primarily through meetings, workshops and field demonstrations.

Collaborative Projects are co-funded collaborations with other NOAA programs, wherein UNCW usually provide the undersea science expertise and equipment, primarily the ROV and enriched air NITROX systems. In cases of collaboration with other NURP Centers, the projects are core projects (i.e., undergo full peer review) at other Centers. Collaborative projects are planned with CMRC and NURC-UCAP.

For 1992 scientific activities, NURC/UNCW encouraged: interdisciplinary oceanographic research projects studying continental margin processes, particularly the interactions and linkages between estuarine, continental shelf, and slope (including submarine canyon) environments.

OCEANOGRAPHIC RESEARCH

More specific topics related to regional oceanographic research needs include the following:

Living Resources: recruitment and early life history studies, relationship between habitat and productivity (e.g., habitat enhancement), primary production and its control by nutrient input, and coupling of lower and higher tropic level productivity (e.g., determination of sources of primary production, predator-prey interactions).

Non-Living Resources: extent and nature of valuable marine mineral and petroleum reserves (e.g., phosphate, oil, and gas), consequences of exploration and exploitation of resources.

Pathways and Fate of Materials: effects of anthropogenic materials on marine ecosystem (e.g., nitrogen/phosphorus loading, dredge spoils, dumped materials), processes involved in transport of materials.

Coastal Oceanic Processes: fluxes of sediments and nutrients between estuarine, shelf and slope environments, effects of hydrographic conditions (e.g., Gulf Stream frontal events) on continental margin ecosystems, effects of physical disturbance (e.g., fishing gear) on marine ecosystems.

Global Change Processes: atmosphere-hydrosphere exchanges of critical elements (e.g., carbon, nitrogen, phosphate, sulfur), biogeochemical cycling and fates of critical elements in ocean water and sediments, role of cold seeps (e.g., hydrocarbons, groundwater) in determining composition of ocean water, sediments, and biotic communities.

MARINE EDUCATION AND TRAINING

Marine Education and Training programs consist of activities that educate and train the public and science community and are valuable public awareness and service functions of the Center.

OCEAN TECHNOLOGY

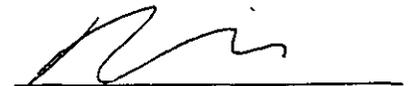
Ocean Technology also includes core and development projects designed to enhance existing technology, primarily undersea sampling systems and tools, as well as promoting development of new and innovative technology. The goal is to increase the scientific effectiveness and productivity of the Center.

EXPANSION OF KEYS SCIENCE PROGRAM AND THE AQUARIUS UNDERWATER LABORATORY

With the acquisition of the AQUARIUS habitat system, NURC-UNCW is developing a comprehensive program in the Keys that addresses the following elements: (1) development of a science program including identification of science needs and coordination with current research programs; (2) an environmental study of potential AQUARIUS deployment sites; (3) initiation of the licensing and permitting clearances associated with the deployment and operations; (4) an assessment and evaluation of the engineering requirements associated with remote offshore operations in the Florida Keys; (5) a cost analysis of conducting a science program.

PROPOSED PROJECTS

The following table lists the proposed projects, PI's, costs, and cofunding for 1992.



A. N. Kalvaitis
Program Monitor
2/92

1992 UNCW APPROVED PROJECTS

Proj. #	PI	Center		Total		Agency	Total
		Fac/Sys \$	Proj. \$	NURC \$	Cofunding		
UNCW92-06	Blake	4,400	5,570	9,970	67,217	NOAA	67,217
UNCW92-07	Clavijo	8,500	5,580	14,080	14,000	University	14,000
UNCW92-08	Hanisak		125,879	125,879	53,500 47,500	NSF NOAA	101,000
UNCW92-09	Hay	28,000	24,943	52,943	133,450 35,000	NSF DOE	168,450
UNCW92-10	Lindquist	13,000	21,803	34,803	35,000	DOE	35,000
UNCW92-11	Lohmann	6,500	16,418	22,918	82,250	University	82,250
UNCW92-12	Posey	19,550	11,496	31,046	42,358 79,200	NOAA/SG University	121,558
UNCW92-13	Reaka-Kudla	13,000	13,827	26,827	124,849	NSF	124,849
UNCW92-14	Richardson	9,750	15,306	25,056			
UNCW 92-15	Sebens	9,750	19,935	29,685			
UNCW92-16	Stancyk		150,344	150,344			
UNCW92-17	Sulak		114,093	114,093			
UNCW92-18	Wilson	6,000	8,463	14,463	71,157 10,800	NOAA/NMFS	81,957
UNCW92-19	Carlson	8,500	5,014	13,514			
UNCW92-20	Cleary	16,865	23,823	40,688	14,000	University	14,000
UNCW92-21	Hallock-Muller	1,950	13,912	15,862	3,663	University	3,663
UNCW92-22	Rabalais	2,500	39,490	41,990	21,000	NOAA/COP	21,000
UNCW92-23	Tisue	4,250	20,683	24,933			
UNCW92-24	Zieman	9,000	21,157	30,157			
UNCW92-25	Hine						
UNCW92-26	Wellington	19,500	20,800	40,300	180,248	NSF	180,248
UNCW92-27	Brooks		163,860	163,860	497,000 157,775 31,427 75,000	MMS NSF NOAA/SG ONR	761,202
UNCW92-28	Pauli		142,344	142,344	97,708	NSF	97,708
UNCW92-29	Riggs	12,750	161,799	174,549			
UNCW92-30	Roberts		141,925	141,925			
TOTALS		193,765	1,288,464	1,482,229			1,874,102



NOAA'S NATIONAL UNDERSEA RESEARCH PROGRAM
AT THE CARIBBEAN MARINE RESEARCH CENTER

1992

BRIEF DESCRIPTION OF THE PROGRAM

This year, CMRC is supporting 17 peer-reviewed research projects. Research at CMRC is organized into two categories: core program (seven projects, submersible, program development, and administration) and the extramural program (ten projects).

These projects include producing a published summary of techniques for raising Tilapia, a fresh and brackish water fish, in salt water, making the species suitable for aquaculture on Caribbean islands. This summary is the culmination of 5 years of work by CMRC personnel supported by NURP and will make the expertise they developed available to a world-wide audience.

Conch are one of the most important commercial species in the Caribbean; their population dynamics and biology are poorly understood. Conch studies will help to improve management and culture of the species.

Overfishing of spiny lobster is a critical problem in Caribbean fisheries. Research is underway to improve juvenile survival and increase management success.

Nassau grouper have been severely overfished in the Caribbean and Bahamas, yet little is known of their early life history. This makes management of the fishery difficult. Recruitment assessment, better knowledge of reproduction, and patterns and determinants of juvenile distributions are needed to improve management.

Studies of the physical oceanography of the Exumas, in conjunction with the above research, will help provide investigators with information on transport mechanisms that move larvae of conch, lobster, and fishes to and away from the research areas and thus help to determine the recruitment patterns and population abundances of those species.

Temperature data has been collected since 1989 for use in projects requiring environmental data, such as coral bleaching and global change studies. The support for data collection continues.

How predation structures coral reef fish communities is poorly known despite intensive study. This project will



investigate the role of predation in determining recruitment and population sizes.

The eastern Bahamas are formed of carbonate rocks. The processes underlying formation, distribution, and causes of such carbonates are poorly known. Results of studies of these topics will be applicable throughout the region.

This year for the first time, a deepsea research submersible will be available for use by scientists who wish to work at depths below SCUBA utility. Availability will be limited because most of the budget will be used for vehicle support and preparation, but next year a full research program will be included.

Program development monies are for discretionary funding of small projects by the center director. These projects consist of ideas that need to be explored, studies requiring preliminary data in order to develop a full proposal, etc. This year they include two projects: geology - to map the bathymetry of the islands and describe their structure; and coral reef biology - to study coral bleaching and biological changes that are associated with it.

Administrative costs are incurred in operating the CMRC. They include salaries and wages of center personnel, office equipment and supplies, travel between the Bahamas and the U.S. and within the U.S., costs of maintaining laboratory facilities, etc.

Extramural projects to be funded this year include the second year of three studies on early life history of fishes (Warner, Sale, and Cowen), coral bleaching studies (Lang, Muscatine), bioerosion (Reaka-Kudla), fish ecology (Colin, Dennis), and a study of coral reef geology (Neumann).

The studies of early life history of fishes are carried over from last year; each was a two-year project. Together they form a package of related investigations that examine the patterns of occurrence and distribution of larvae of coral reef fishes, their recruitment to the reef, and their survival.

Muscatine will investigate the role of temperature in causing coral polyps to lose their commensal zooxanthellae. Reaka-Kudla will study erosional patterns in dead corals using coral blocks deployed at different depths and periodically reexamined.

Colin will continue his family-wide regional studies of reproductive biology and behavior in grouper. Dennis will study the distribution, settlement, and movement of mutton snapper, a commercially exploited Caribbean fish species, in the Exumas.

Neumann will use a barge-mounted rock drill (the SCARID) to obtain relatively short (10-15 m long) cores from the Grand Bahama Bank. He will use these to determine patterns of Holocene

deposition, test hypotheses regarding the origin of unusual topographic features, and describe the processes underlying the evolution of the bank.

EXECUTIVE SUMMARY

Undersea research activities in the Caribbean will be supported by the National Undersea Research Program and the Caribbean Marine Research Center through three theme areas. The majority of the projects supported fit into these themes.

Fisheries Oceanography and Recruitment in the Caribbean and SubTropics (FORCAST)

This is a multidisciplined approach to fisheries oceanography. Three major commercially important species (queen conch, spiny lobster and Nassau grouper) will continue to be studied to determine their early life history, including the influences of physical processes on recruitment to nursery grounds, settlement, and habitat dependency during postlarval stages. In addition to the projects studying these species specifically (Stoner: conch; Lipcius and Eggleston: lobster; Shenker: grouper), other investigators will focus on other important aspects of these species life histories. Hixon and Carr will study the importance of postsettlement predation versus competition in structuring local populations of coral reef fishes that will allow an unequivocal test for postsettlement recruitment limitation. Other projects that will provide data useful in the FORCAST program are studies of patch dynamics of coral reef fishes (Cowen), recruitment versus density-dependant processes in fish populations (Warner), and studies of the spatial scale of larval dispersal in reef fishes (Sale). Finally, Smith will investigate physical oceanographic transport mechanisms that result in exchange of water between Exuma Sound and Exuma Bank to develop a model that can be used to study (and hopefully predict) recruitment over a broad range of environmental conditions.

Marine Geology and Paleo-Oceanography

Three projects are included in this category. Dill will continue studies of facies geometry, cementation, and the role of organisms in producing sediments along the eastern margin of the Bahama Bank. Neumann will use a coral reef drill (the SCARID) to core and study the reef to develop models of cyclic carbonate deposition resulting from climatic changes on the bank. Reaka-Kudla will study bleaching and bioerosion rates on the reef by emplacing coral blocks at selected sites and revisiting them to measure their rate of disappearance.

Coral Bleaching

The problem of coral bleaching in tropical reefs is important to assessing the health and survival of these systems. CMRC is supporting three studies addressing this topic. Wicklund will

continue long-term temperature monitoring throughout the Caribbean; Lang will study the relationship between bleaching occurrence and physical parameters; and Muscatine will investigate the circumstances under which coral polyps expel zooxanthellae, the phenomenon that actually causes bleaching.

New Initiative

The center will lease a small, two-person submersible for use next year. This vehicle will be used around Lee Stocking Island in waters that are too deep for safe SCUBA diving. It will provide a means by which the deep reefs around the island can be studied and is expected to attract considerable interest from the scientific community. With the acquisition of this submersible, it will be possible to study the relationship between the deep reef faunas and those accessible to SCUBA divers. This may yield especially useful information on the biology of species that are comparatively well known at shallower depths.

PROJECTS RECOMMENDED FOR FUNDING

Queen conch ecology and life history (\$200,000)
Principal Investigator: A. Stoner

Saltwater Tilapia aquaculture review (\$30,000)
Principal Investigator: W. Watanabe

Fisheries oceanography of Nassau grouper (\$180,000)
Principal Investigator: J. Shenker

Spiny lobster survival and recruitment (\$135,000)
Principal Investigator: R. Lipcius

Recruitment of coral reef fishes (\$40,000)
Principal Investigator: M. Hixon

Tidal and non-tidal transport processes (\$44,000)
Principal Investigator: N. Smith

Geological processes and carbonate facies (\$18,000)
Principal Investigator: R. Dill

Biological correlates of environmental change (\$22,000)
Principal Investigator: J. Lang

Patch dynamics of larval coral reef fish (\$51,000)
Principal Investigator: R.K. Cowen

Recruitment vs density-dependant process in fish populations
(\$39,000)
Principal Investigator: R.R. Warner

Spatial scale of larval dispersal in reef fishes (\$38,000)
Principal Investigator: P.F. Sale

Bleaching and bioerosion on carbonate coral reefs (\$50,000)
Principal Investigator: M. Reaka-Kudla

Coral bleaching mechanism release of zooxanthellae (\$5,000)
Principal Investigator: L. Muscatine

Factors controlling the origin of submarine topography on Great
Bahamas Bank (\$8,000)
Principal Investigator: A.C. Neumann

Grouper reproductive biology (\$25,000)
Principal Investigator: P. Colin

Distribution, settlement and movement of mutton snapper (\$10,000)
Principal Investigator: G. Dennis

Caribbean temperature survey (\$15,000)
Principal Investigator: R. Wicklund

Program development (\$40,000)
Principal Investigator: R. Wicklund

Deepsea submersible (\$240,000)
Principal Investigator: R. Wicklund

Administration (\$970,760)
Principal Investigator: R. Wicklund



David Stein
Program Monitor
2/92



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC RESEARCH PROGRAMS
1335 East West Highway, Silver Spring, MD 20910

NOAA's NATIONAL UNDERSEA RESEARCH PROGRAM

AT THE UNIVERSITY OF ALASKA-FAIRBANKS

1992

The West Coast National Undersea Research Center was established in 1990 at the University of Alaska, Fairbanks (NURC-UAF), following a competitive process during which UAF submitted the successful proposal. The National Undersea Research Program (NURP) had directly supported undersea projects on the West Coast for a number of years, and the need for establishment of a Center had clearly been demonstrated. This new Center will promote, facilitate, and support undersea research along the West Coast of the United States, including the western Arctic and, because of UAF's commitment to polar research, in Antarctica. The region includes vast areas of continental shelf and shelf slope and contains many seamounts. Because of the tremendous fisheries resources in the west coast region, much of the science supported by the West Coast Center is fisheries related.

Proposals for undersea research in 1991 were solicited by the West Coast Center in 1990, reviewed and selected by NOAA's Office of Undersea Research (OUR). Eleven projects were funded through NURP's grant to the Center. A total of thirteen projects (12 manned submersible and 1 ROV) were completed in 1991. Over the course of the field season, a total of 325 manned submersible dives and 5 days of ROV operations were completed. Research sites extended from the Bering Sea to Monterey Bay. One project (Butler) requiring the use of a deep-diving manned submersible from the Navy's Deep Submergence Unit (DSU), was accepted. Four projects that were originally scheduled for 1990 were moved to 1991, because of scheduling problems. Butler's Deep Submergence Unit dives originally scheduled for 1990 were completed in April 1991 with Deep Submergence Vehicle (DSV) TURTLE. The 1991 DSU dive series was scheduled for the fall, but has been postponed because of unexpected schedule changes and the temporary decertification of DSV SEA CLIFF. As a result of scheduling problems, one 1991 ROV project (Norcross) was moved into 1992. Two of the eleven funded projects were added at the end of the season and consisted of the recovery of a lost current meter mooring off Washington (one day) and a demonstration dive in southern California (one day).

The functional objectives for 1992 include selecting, supporting, and coordinating a number of studies utilizing shallow-diving manned submersibles in Alaska, Oregon, and California. The highly sophisticated ROV developed and operated by the Monterey Bay Aquarium Research Institute will be utilized in Monterey Bay.

The budget for 1992 operations is \$909,540.



PROGRAMMATIC THEMES

The western coastal region of the United States, extending from California northward into the Gulf of Alaska and further north into the Bering, Chukchi, and Beaufort Seas, encompasses unique geological settings of substantial economic and scientific interest and the nation's richest fisheries resources. The Juan de Fuca ridge includes the only known vent systems totally within the U.S. exclusive economic zone and provides a special opportunity to study ridge crest processes. The fisheries extending further north comprise half of the U.S. total resource and are of major economic importance to the nation, as well as to states in the region.

The broad continental shelves of Alaska (74% of the U.S. Continental Shelf area is in Alaska) are rich in both biological and mineral resources and provide many opportunities for gaining new knowledge because of their relatively unstudied nature. At the northern boundary of this region lies the Arctic, a region of recent national policy interest because of its strategic location and resource potential. Because of its enormous size, rich resources, and special scientific interest, the western region has unparalleled opportunities for developing new knowledge through undersea research. As a starting point, several west coast scientists met and identified six programmatic areas of special opportunity for the West Coast Program. The following areas offer priority opportunities for the advancement of our understanding of marine systems and processes and of our knowledge of valuable marine resources in the region.

1. Fisheries Research

Half of the fish harvested from the U.S. exclusive economic zone, including 85% of that allocated to foreign nations, is taken within the western region. To ensure the continued wise management of this valuable resource, it is important that we increase our understanding of the relationship of finfish and shellfish to particular habitats and improve population estimates. One of the major areas of study on the West Coast has been the use of manned submersibles and ROV's to evaluate traditional methods of estimating fish stocks and to relate those stocks to habitat type.

2. Shelf and Slope Ecology

The broad and rich continental shelves along the West Coast provide a special opportunity to study important biological processes and the physical and biogeochemical processes which accompany them. Studies of the allocation, flux, and fate of carbon in the marine environment are fundamental to our understanding of shelf processes. The scientific and economic importance of these continental shelves warrants extension of these studies to important benthic processes. Because the effects

5. Seamounts

Seamount formation is a major geological process on the ocean floor. The seamounts in the northeastern Pacific Ocean are relatively unstudied and provide a valuable location to study the geology of the sea floor and some of the fisheries and ecological problems already mentioned. The fishery potential of these seamounts deserves particular attention. Due to a combination of isolation, bathymetry, and ocean current regime, seamounts have unique biological communities. Investigation of the physical and biological processes occurring on seamounts may yield clues to causes of intra- and inter-annual variability of fish stocks. Geological and geochemical studies of the active seamounts in the area will enhance our understanding of submarine volcanism and its impact on ocean waters associated biological communities.

6. Polar Research

Marine scientists working in both the Arctic and Antarctic are severely limited by vessel capability and other logistical problems. Development of submersible technology, especially ROV's and AUV's, may significantly improve our ability to study and understand the physical and biological processes of the polar seas. The increased U.S. policy interest in the Arctic and the biological and physical data accumulating about it challenge undersea technology. Research using acoustic propagation under the ice where few internal waves seem to exist provides a unique location for physical oceanographic studies. Increasing evidence suggests much higher levels of biological activity under the ice in both the Arctic and Antarctic than previously thought. Light and chlorophyll studies, coupled with studies of the biological communities and ecosystem dynamics under ice and in areas covered seasonally by ice, are topics of urgent interest.

7. International Cooperation

Although not a research theme per se., the West Coast Center is well positioned to promote collaborative studies with scientists and agencies from other Pacific-Rim nations. The improved relationship with the Soviet Union may present special opportunities to work in Soviet waters in the near future. The School of Fisheries and Ocean Sciences has recently signed a cooperative agreement with the Institute of Marine Biology, Far East Branch of the Academy of Sciences of the USSR.



N. Eugene Smith
Program Monitor
2/92

of short- and long-term climate changes are expected to be especially prominent at high latitudes, the northwest provides a major opportunity for this research in the U.S. EEZ. Because research on the slope and shelves in this region is relatively new, the investigation of faunal associations and habitats provides abundant opportunities for new understanding. This work will also complement and enhance fisheries research.

3. Ridge Crest Processes

Modern tectonic theory of ocean crust formation and evolution is only two decades old. Our understanding of ridge crest processes is advancing rapidly, thanks to the parallel advancement of undersea technology. Because the full range of tectonic environments, such as hot spot effects, fracture zones, and propagating rifts occur in the northeast Pacific Ocean, the West Coast region provides a unique opportunity to study these submarine processes. Ridge crests provide further opportunity to study a wide range of ecological processes because the ecology of hydrothermal systems is both different and relatively isolated from the broader biological environment of the ocean. The rock/water chemical processes at ridge crests are not fossil but are occurring in real time. These processes are the same as those that have produced economically important mineral deposits. Studying the geology/geophysics of the region will help us understand the process of sea floor generation, a process responsible for formation of 70% of the earth's surface and the continuous recycling of the ocean's water.

4. Subduction Zone Processes

Underwater technology provides a unique opportunity to study subduction zone processes. The physical, chemical, and biological processes associated with the dewatering of sediments during subduction of the ocean floor is of particular interest and importance. Study of these processes can be done rather rapidly by moving across the subduction zone and sampling appropriately. Manned submersibles provide a unique platform for precisely taking sequential samples. In addition to studying the biogeochemical processes associated with subduction, information on the deformation of sediments and on earthquakes can be gained. Alaska has been the site of many large and destructive subduction earthquakes. The California-Oregon-Washington margin could also be the site of future great earthquakes. Although the effects of the earthquakes are largely felt in onshore communities, they are caused by faulting beneath the shelf and slope of the margins. Historical evidence for these earthquakes and predictive evidence for future events may well exist on the sea floor. Manned submersible technology will play a major role in studying these phenomena and deploying instrumentation for monitoring deformation.

1991 Submersible and ROV Activity for the West Coast Center

Principal Investigators. Project Title	System	Dates	Days
<u>ALASKA</u>			
Fay, F. H.. Use of a remotely operated vehicle to study feeding behavior and prey distribution of humpback whales (<i>Megaptera novaeangliae</i>) in SE Alaska	ROV	Dec.	5
Krieger, K. J.. Distribution of Pacific Ocean perch (<i>Sebastes alutus</i>) in the Gulf of Alaska	Sub	June	11
Norcross, B. L., Recruitment of juvenile flatfish - Kodiak Island	ROV	postponed	7
O'Connell, V. M. & D. C. Carille. Definition of the relationship between demersal shelf rockfish abundance and habitat complexity based on in-situ observations from a submersible in the eastern Gulf of Alaska	Sub	May	8
Stevens, B. G.. Characteristics of mating Tanner crabs, <i>Chionoecetes bairdi</i> , captured in-situ - Kodiak Island	Sub	April	13
Stevens, B. G.. Effects of Kodiak fish waste disposal site on benthic habitat and associated water quality	Sub	May	4
<u>WASHINGTON</u>			
Hickey, B., Recover lost current meter mooring	Sub	Oct.	1
<u>OREGON</u>			
Hlxon, M. A. & R. M. Starr, Inshore-offshore comparison reef-fish associations using integrated submersible and acoustic surveys on the Oregon continental shelf	Sub	Sept.	8
Taghon, G. L. et al., Biology, geology and geochemistry of active methane vents on the Oregon continental shelf	Sub	Sept.	13
<u>CALIFORNIA</u>			
Butler, J. L., Development of habitat-specific stock assessment methodology for West Coast groundfish in Monterey California	Navy Sub	Dec.?	8
Wakefield, W. W., Delta demonstration dive in Southern California	Sub	Oct.	1
*** 1990 Projects Conducted in 1991: ***			
Shirley, T. & C. O'Clair. Estimation of red king crab population size with ROV & submersible	Sub	June	5
Highsmith, R., Benthic food web dynamics and amphipod re-colonization rates in a highly productive community in the Bering Sea	Sub	May	8
Butler, J. L., Habitat-specific stock assessment methodology - Monterey Bay	Navy Sub & ROV		4 & 6
Wourms, J., Reproduction and development of hagfish - in Monterey Bay	Sub	May	7

Research proposals for West Coast NURC support in 1992

Principal Investigators, Project Title	System	Dates	Days
<hr style="border-top: 1px dashed black;"/>			
<u>ALASKA</u>			
O'Connell, V. M. & D. C. Carlile, Depth distribution of lingcod (<i>Ophiodon elongatus</i>) egg-masses in central Southeast Alaska.	Sub	May	6
Stevens, B. G., Aspects of a mating aggregation of Tanner crab, <i>Chionoecetes bairdi</i> .	Sub	May	7
<hr style="border-top: 1px dashed black;"/>			
<u>OREGON</u>			
Collier, R.W. et al., Biology, geology and geochemistry of active methane vents on the Oregon continental shelf	Sub	August	12
Kulm, L.D., Active faulting on the Oregon continental shelf: implications for earthquake potential	Sub	August	8
<hr style="border-top: 1px dashed black;"/>			
<u>CALIFORNIA</u>			
Butler, J.L., Development of habitat specific stock assessment methodology for West Coast groundfish	ROV	August	8
Cailliet, G.M. & M.T. Ledbetter, The importance of small-scale refugia to deepwater rockfishes (<i>Sebastes</i> sp.) - a pilot study in Monterey Bay, CA	Sub	August	6
Wakefield, W. W., Delta demonstration dive in Southern California	Sub	April	2
<hr style="border-top: 1px dashed black;"/>			
*** 1991 Projects To Be Conducted in 1992: ***			
Butler, J. L., Development of habitat-specific stock assessment methodology for West Coast groundfish in Monterey California	Navy Sub	Dec.?	8
Norcross, B. L., Recruitment of juvenile flatfish - Kodiak Island	ROV	postponed	7



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC RESEARCH OPERATIONS
1225 East West Highway, Silver Spring, MD 20910

NOAA'S NATIONAL UNDERSEA RESEARCH PROGRAM

AT THE UNIVERSITY OF HAWAII

1992

BACKGROUND

In July of 1980, the Hawaii Undersea Research Laboratory (HURL) was established by a cooperative agreement between the National Oceanic and Atmospheric Administration (NOAA) and the University of Hawaii. HURL is one of the six national undersea research centers sponsored by NOAA's National Undersea Research Program. HURL is the only undersea facility in the world whose sole mission is to study deep water marine processes of islands in the Pacific Ocean. Its location in Hawaii provides a unique opportunity to study natural resources, oceanic processes, and man's impact upon the submarine environment of Pacific islands.

The major HURL facilities presently consist of the two-person, one-atmosphere submersible MAKALI'I that is currently on a standby status; the three-person, deep-diving (2,000 m) submersible PISCES V; two Launch, Recovery and Transport vehicles (LRT's); the remotely operated vehicle RCV-150; an acoustically navigated, ship-tethered bottom camera system; and, when needed, leased surface support vessels. A new ship is being outfitted and will be available for use as a submersible support vessel in 1993. The research submersibles are used primarily for projects accepted by a national science review panel that approves and ranks solicited proposals. To date, the MAKALI'I has completed 389 NOAA-approved dives. The PISCES V, which became operational in 1987, has completed 196 dives.

PROGRAM

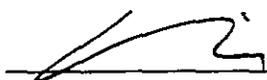
Several major projects will be undertaken in 1992; these include an ocean resources program, the Loihi submarine volcano program, and the modification of a submersible support ship. Specifically, the ocean resources program focuses on ocean lithosphere, mineral resources, and biological resources. The Loihi program consists of in situ studies on the Loihi submarine volcano which represents the southernmost activity of the Hawaiian hot spot. The ship conversion effort represents the redesign and modification of an existing 180-foot seismic vessel into a 220-foot submersible support ship. The ocean resources program focuses on hydrothermal sulfites, manganese crusts, and seamount biological resources. The sulfite part of the program will



concentrate on the Northern Marinas and in Loihi Seamount. The Loihi work consists of detailed mapping chemistry of the vent waters and continuous monitoring through the use of a bottom station. Loihi is becoming a better understood system and may serve as a model for other, analogous submarine and terrestrial deposits. Several missions will concentrate on manganese crust. This work will involve several seamounts and plateau areas in the Hawaiian and, eventually, Johnson Island EEZ's. The NURC-UH marine minerals program will directly address NOAA's national ocean resource goals and attempt to provide background for decisions about future marine minerals developments based on a thorough understanding of the marine benthic environment and the processes of marine minerals formation and minerals enrichment.

The NURC/Hawaii program on Loihi is focused on the study of the dynamic processes of Loihi. These studies include Loihi hydrothermal vent microbiology, Loihi magma injection/seawater interaction processes, temporal observations of hydrothermal vent pulsations, temperature variations and vent longevity, edifice inflation, and hydrothermal plume generation. The unique location of Loihi has allowed the development of a multi-disciplinary program that utilizes the underwater volcano as a laboratory. A self recording instrument package was deployed during 1991. Long term plans include the summer 1992 installation of a 3-km fiber optic cable and observatories on the summit. This will allow the real-time monitoring of visual data, temperature, chemistry, and seismicity of the hydrothermal vents.

A major program element continues to be the ship conversion. The ship is being designed according to similar conversions undertaken by the HBOI submersible support vessels, SEWARD JOHNSON and EDWIN LINK. The 1992 program will concentrate on vessel completion. The anticipated ship construction costs are approximately \$5.5 M.

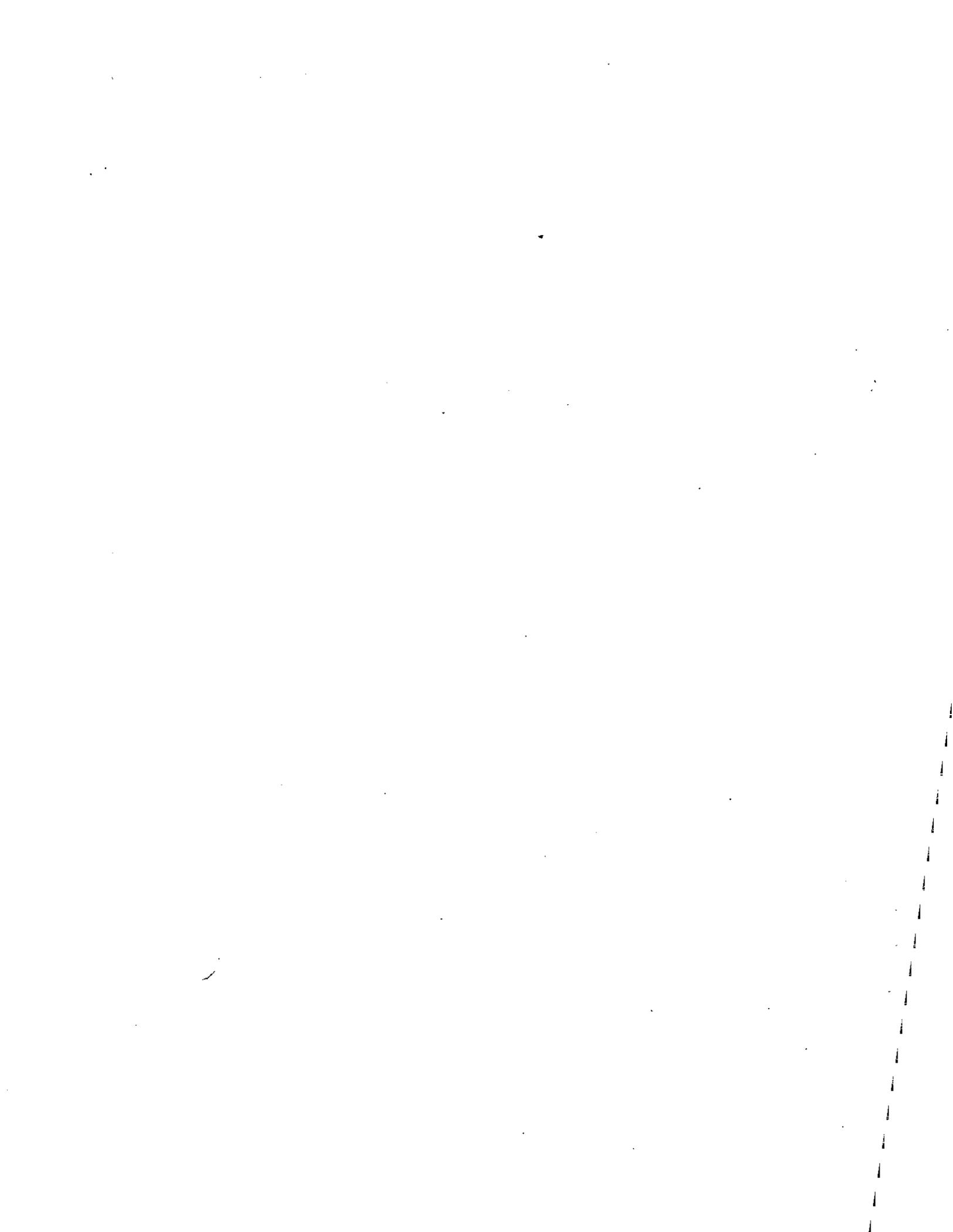


A. N. Kalvaitis
Program Monitor
2/92

1992 UHI APPROVED DIVES

Principal Investigator	Proposal	# of Dives Requested	# of Dives Approved	Facilities Cost	Co-Funding Amount
Alexander Malahoff Professor Dept. of Oceanography University of Hawaii 1000 Pope Road, MSB 318 Honolulu, HI 96822	Hawaii Undersea Geo-Observatory, Loihi Hawaii: Deployment, Retrieval and Fiber-Optic Cable Laying of the Ocean Bottom Observatory	6	3	\$22,500	\$51,772 SG
Gary McMurtry Assoc. Professor Dept. of Oceanography University of Hawaii 1000 Pope Road Honolulu, HI 96822	Geochemistry of Loihi Seamount Hydrothermal System	10	4	\$27,000	\$111,038 SG
Richard E. Young Professor Dept. of Oceanography University of Hawaii 1000 Pope Road Honolulu, HI 96822	Investigation of the Daytime Habitat of the Mesopelagic-Boundary Community in Hawaiian Waters	4	3	\$22,500	\$150,000 NSF
James Moore U.S. Geological Survey 345 Middlefield Rd. Menlo Park, CA 94025	Investigation of Kalaupapa Volcano, Reef Terraces, and Major Slope Change, Offshore from Molokai	10	3	\$18,000	0
Craig M. Young Assoc. Scientist Harbor Branch Oceanographic 5600 Old Dixie Hwy. Fort Pierce, FL 34946	Reproduction, Fertilization, and Development of Abyssal Echinoderms	10	4	\$20,250	\$150,000 NSF
James P. Cowen Asst. Researcher SOEST University of Hawaii 1000 Pope Road Honolulu, HI 96822	The Role of Microorganisms and Microbiogenic Detritus in the Growth and Composition of Ferromanganese Crusts at Cross Seamount	6	2	\$13,500	\$97,000 SG
Fred Mackenzie Professor Dept. of Oceanography University of Hawaii 1000 Pope Road Honolulu, HI 96822	The Fate of Magnesian Calcites Produced on Submerged Platforms; Link to Climate Change	6	2	\$13,500	\$120,000 NSF

TOTAL DIVES FOR 1992 = 21





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC RESEARCH PROGRAMS
1035 East West Highway, Silver Spring, MD 20910

NOAA'S NATIONAL UNDERSEA RESEARCH PROGRAM

AT RUTGERS UNIVERSITY

1992

The New York Bight National Undersea Research Center at Rutgers University will be established in 1992 with a grant from the National Oceanic and Atmospheric Administration's (NOAA) Office of Undersea Research (OUR) which administers the National Undersea Research Program (NURP). Prior to this year, undersea research projects for this region were either administered through NURP's center at the University of Connecticut or directly through the national office.

A workshop was held at Rutgers in February to establish research priorities for the region. Those priorities will be used as the basis for establishing the center's research program. Subsequently, a request for proposals on the research themes suggested by the center will be distributed to the scientific community, and the center's science program will be based on the approved proposals received as a result.

The initial science supported by the center will concern the sewage sludge dumpsite 106 miles offshore of New York. This research will continue studies done by several of the staff of the new center since 1990. More specifically, these investigations concern whether the sludge is reaching the ocean bottom; where it is carried subsequently; and whether the increased carbon from it affects the animal community within the sludge plume.

David Stein
Program Monitor
2/92



PUBLICATIONS

The National Undersea Research Program (NURP) publishes reports generated by its activities in three series, described below.

Research Reports -- NURP sponsors symposia and workshops to disseminate results of past investigations and to possibly guide future research activities. Publication of papers presented at such meetings is intended to provide the marine community with results of program-sponsored activities in a timely fashion. In the majority of instances, participants are reporting on results of NURP-sponsored research so the printing of their papers meets report requirements of grantees to the Office of Undersea Research.

From time to time, NURP will gather together and print as a Research Report reprints of papers from sponsored studies which bring attention to a specific geographic area, issue, or technology. Normally the appropriate staff member with cognizance over the topic will contribute an overview statement which is suited to the situation.

Technical Reports -- The Technical Report series is intended to provide the marine community with results of NURP-sponsored research sooner than is normally possible through professional society journals and in greater detail by presenting all of the relevant data developed in the course of the research. Results reported herein may be preliminary or require further development, refinement, or validation. Accordingly, reports in this series do not carry any endorsement or approbation on the part of NURP, nor can the NURP accept any liability for damage resulting from incomplete or incorrect information.

Program Summary -- On a near annual basis, the NURP office summarizes its activities for the previous year. Reported on are its research missions, technology development, and international activities. Statistics relating to operations and program thrusts are also compiled and reported. The Summary serves to describe to the interested reader the scope and nature of the Office of Undersea Research's activities for the specified period.

NOAA DIVING MANUAL

In addition to the various report series, the NURP also produces the NOAA Diving Manual. Now printed in loose-leaf format, periodic updating of tables, procedures, paragraphs, or even entire chapters of text is made easier. This format also makes possible more timely changes at a much reduced cost.

SYMPOSIUM SERIES FOR UNDERSEA RESEARCH

- Vol. 1, No. 1 The Ecology of Deep and Shallow Coral Reefs. Marjorie Reaka, editor, December 1983. 149 pp. (Only xerox copies are available.)
- Vol. 2, No. 1 Undersea Research and Technology--Scientific Applications and Future Needs--Abstracts Symposium May 22-24, 1984, at Avery Point, Groton, CT, April 1984. 18 pp. (Only xerox copies are available.)
- Vol. 2, No. 2 Scientific Applications of Current Diving Technology on the U.S. Continental Shelf--Results of a Symposium Sponsored by the National Undersea Research Program, University of Connecticut at Avery Point, Groton, Connecticut, May 1984. Richard A. Cooper and Andrew N. Shepard, editors, August 1987. 266 pp.
- Vol. 3, No. 1 The Ecology of Coral Reefs. Marjorie Reaka, editor, September 1985. 208 pp. (Only xerox copies are available.)
- Vol. 4, No. 1 Proceedings of the Eighth Meeting of the United States-Japan Cooperative Program in Natural Resources (UJNR) Panel on Diving Physiology and Technology, Washington, DC, and Honolulu, Hawaii, June 6-17, 1985. 1986. Out of Print.

(The Symposium Series for Undersea Research has been replaced by NURP Research Reports and/or NURP Technical Reports.)

NURP RESEARCH REPORTS

- RR 88-1: Biogeochemical Cycling and Fluxes Between the Deep Euphotic Zone and Other Oceanic Realms. Catherine R. Agegian, editor, May 1988. 176 pp.
- RR 88-2: Mass Bleaching of Coral Reefs in the Caribbean: A Research Strategy. John Ogden and Robert Wicklund, editors, May 1988. 51 pp.
- RR 88-3: Benthic Productivity and Marine Resources of the Gulf of Maine. Ivar Babb and Michael De Luca, editors, May 1988. 276 pp.
- RR 88-4: Global Venting, Midwater, and Benthic Ecological Processes. Michael De Luca and Ivar Babb, editors, July 1988. 442 pp.
- RR 88-5: Results of a Workshop on Coral Reef Research and Management in the Florida Keys: A Blueprint for Action. James W. Miller, editor, September 1988. 49 pp.
- RR 89-1: Workshop on Enriched Air Nitrox Diving. R. W. Hamilton, Dudley J. Crosson, and Alan W. Hulbert, editors, September 1989. 153 pp.
- RR 89-2: North Carolina Coastal Oceanography Symposium. Robert Y. George and Alan W. Hulbert, editors, December 1989. 573 pp.

NURP PROGRAM SUMMARY

A Summary of Research Activities, 1985-1986. May 1988. 144 pp.

R/OR-2
1/91
MRC

NURP TECHNICAL REPORTS

- TR 88-1A: REPEX: Development of Repetitive Excursions, Surfacing Techniques, and Oxygen Procedures for Habitat Diving. R. W. Hamilton, D. J. Kenyon, R. E. Peterson, G. J. Butler, and D. M. Beers, May 1988. (This has a companion report--TR 88-1B.) 161 pp. (This is out of stock and available only through the National Technical Information Service (NTIS), Springfield, VA.)
- TR 88-1B: REPEX Habitat Diving Procedures: Repetitive Vertical Excursions, Oxygen Limits, and Surfacing Techniques. R. W. Hamilton, D. J. Kenyon, and R. E. Peterson, May 1988. (This has a companion report--TR 88-1A.) 125 pp.
- TR 89-2: Guidelines for the Gas-Pressure Management of Decompression Sickness and Gas Embolism Occurring During Nitrox and Air Saturation-Excursion Diving. Russell E. Peterson, May 1989. 23 pp.
- TR 89-3: Bathymetric Comparison of Three Mid-Ocean Ridge Areas With Slow-Spreading Characteristics. Kay L. Miller and Peter A. Rona, November 1989. 41 pp.
- TR 90-1: Chisat I, Extension and Validation of NOAA's REPEX Procedures for Habitat Diving: A Chinese-American Collaboration. R. W. Hamilton and William Schane, October 1990. 95 pp.

R/OR-2
1/91
MRC

Government Agencies Participating in
NOAA's National Undersea Research Program
1971 - 1991

Atomic Energy Administration
Defense Nuclear Agency
Department of Defense
Office of Naval Research

U.S. Army
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Marine Corps
U.S. Navy

Department of Energy
Department of Interior

Bureau of Land Management Minerals Management Service
U.S. Fish and Wildlife Service
U.S. Geological Survey

Department of Transportation
Environmental Protection Agency
Energy Research and Development Administration
Florida Department of Marine Resources
Hawaii Department of Planning and Economic Development
Maine Department of Natural Resources
Massachusetts Department of Marine Resources
National Aeronautics and Space Administration
National Institute of Standards and Technology
(formerly National Bureau of Standards)
National Institutes of Health
National Cancer Institute
National Heart and Lung Institute

National Institute for Occupational Safety and Health
National Science Foundation
Nuclear Regulatory Administration
Occupational Safety and Health Administration
Oregon Division of Fish and Wildlife
South Carolina Department of Wildlife and Marine Resources
Veterans Administration
Virgin Islands Department of Fish and Game

Other Institutions Participating in
NOAA's National Undersea Research Program
1971 - 1991

American Museum of Natural History
Arctic Health Research Center
Battelle Memorial Institute
Battelle Northwest Laboratories
Bishop Museum
California Academy of Sciences
Dauphin Island Sea Laboratory
Flower Garden Ocean Research Center
Harbor Branch Oceanographic Institute
Hawaii Institute of Marine Biology
Institute for Environmental Medicine
International Pacific Halibut Commission
Lamont-Doherty Geological Observatory
Lawrence Livermore National Laboratory
Marine Biomedical Institute
Marine Technology Society
Monterey Bay Aquarium Research Institute
Moss Landing Marine Laboratory
National Academy of Engineering
National Academy of Science
National Aquarium
National Geographic Society
National Research Council
Natural Energy Laboratory
Natural History Museum of Los Angeles County
Naval Medical Research Institute
Perry Foundation
Puerto Rico International Underwater Laboratory
Scripps Institution of Oceanography
Shoals Marine Laboratory
Skidaway Institute of Oceanography
Smithsonian Institution
Tiburon Center for Environmental Studies
Undersea Hyperbaric and Medical Society
Virginia Institute of Marine Science
Virginia Mason Research Center
Woods Hole Oceanographic Institution

Domestic Academic Institutions Participating in
NOAA's National Undersea Research Program
1971 - 1991

Adelphi University
Auburn University
Barnard College
Brigham Young University
Brooklyn College
California State University
Catholic University
Central Michigan University
Clemson University
College of the Virgin Islands

Slippery Rock State University
Southeastern Mass. University
Stanford University
State University of Florida
State University of New York/Buffalo
State University of New York/Stony Brook
Texas A&M
Trenton State University
Trinity College

Columbia University
Cornell University
Duke University
Fairleigh Dickinson University
Florida Institute of Technology
Florida State University
Fordham University
Fresno State University
Georgia institute of Technology
Gaucher College
Harvard University
Humboldt University
Johns Hopkins University
Lamar University
Lehigh University
Loma Linda University
Louisiana State University
Mary Washington College
Marymount Palos Verdes College
MIT

University of Alabama
University of Alaska
University of California/Berkeley
University of California/Davis
University of California/Los Angeles
University of California/San Diego
University of California/Santa Barbara
University of Chicago
University of Cincinnati
University of Colorado
University of Connecticut
University of Delaware
University of Florida
University of Georgia
University of Guam
University of Hawaii
University of Maine
University of Manchester
University of Maryland
University of Massachusetts

Miami-Dade Junior College
Michigan State University
Old Dominion University
Oregon State University
Purdue University
Rice University
Rutgers University
San Diego State University
San Francisco State University
Sarah Lawrence College

University of Miami
University of Michigan
University of Minnesota
University of New Hampshire

University of North Carolina/Chapel Hill
University of North Carolina/Wilmington
University of Northern Colorado
University of Pennsylvania
University of Puerto Rico
University of Rhode Island
University of Rochester
University of South Alabama
University of South Carolina
University of South Florida
University of Southern California
University of Virginia
University of Washington/Seattle
University of West Florida
University of West Indies
University of Wisconsin/Madison
University of Wisconsin/Milwaukee
Utah State University
Vassar College
Virginia Polytechnic and State University
Walla Walla College
Western Washington State University
William and Mary, College of

Foreign Academic Institutions Participating in
NOAA's National Undersea Research Program
1971 - 1991

Australia

University of Sydney

Belgium

University of Liege

Brazil

University of Du Sol

Canada

Dalhousie University

University of British Columbia

University of Toronto

University of Western Ontario

France

University of D'Aix-Marseille

University of Nice

Germany

University of Bochum

University of Kiel

Norway

Trondheim University

Turkey

University of Turkey

United Kingdom

University of Newcastle-upon-Tyne

Other Foreign Institutions Participating in
NOAA's National Undersea Research Program
1971 - 1991

Australia

Australian Institute of Marine Science

Bahamas

Bahamas Undersea Research Foundation

Barbados

Bellairs Research Institute

Bermuda

Bermuda Biological Station

British Virgin Islands

Bitter End Field Station Cuba

Cuban Academy of Sciences

France

Centre d'Etudes et de Recherches Technique Sous-Marine

Center Oceanologique de Bretagne

Institut Francais de Recerche pour l'Exploitation de la Mer

Laboratoire de Biologie et d'Ecologie Marines

Laboratoire de Biologie Generale

Germany

Biologische Anstalt Helgoland

Gesellschaft fuer Kernenergieverwertung in Schiffbau und Schifffahrt

Israel

Israel National Institute of Oceanography

Israel Oceanographic & Limnological Research Ltd.

Kinneret Limnological Laboratory

Jamaica

Discovery Bay Marine Laboratory

Japan

Japanese Marine Science and Technology Agency

Kenya

International Center of Insect Physiology and Ecology

Kenya National Academy of Science

Kuwait

Kuwait Institute for Scientific Research

Poland

Sea Fisheries Institute of Gdynia

United Kingdom

Admiralty Experimental Diving Unit

Institute of Geological Sciences

Institute of Oceanographic Sciences

NUMBERS OF PRINCIPAL INVESTIGATORS AND PARTICIPANTS IN NURP PROGRAMS
1972-91

For 1972-1986, participants were estimated by adding four persons to each principal investigator. For 1987-1991, participant numbers were provided by NURC's.

YEAR	P.I.	PARTICIPANTS
1972	45	180
1973	30	120
1974	20	80
1975	32	128
1976	17	68
1977	13	52
1978	14	56
1979	12	48
1980	12	48
1981	36	144
1982	65	260
1983	66	264
1984	52	208
1985	36	144
1986	39	156
1987	74	388
1988	81	448
1989	96	583
1990	103	616
1991	<u>143</u>	<u>1223</u>
	986	5214