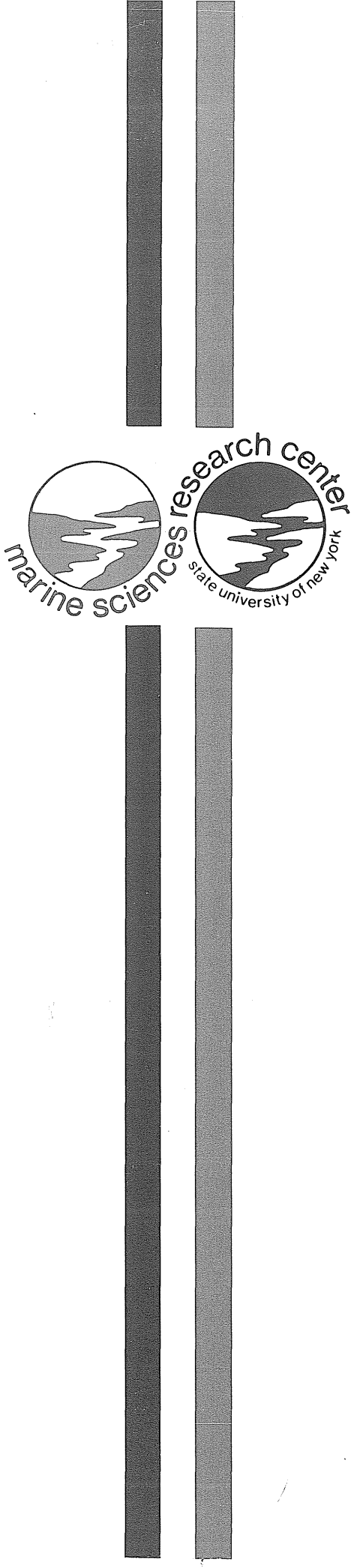
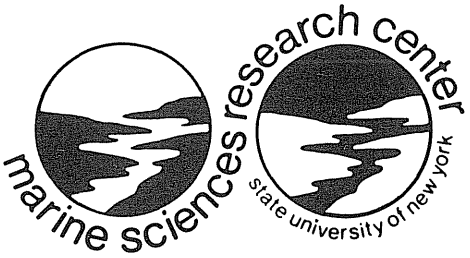


CURRENT RESEARCH ACTIVITIES OF THE MSRC FACULTY, 1979-80

CURRENT RESEARCH ACTIVITIES
OF THE MSRC FACULTY,
1979 - 80

J. R. Schubel, Director

Edited by Sue Risoli



STATE UNIVERSITY OF NEW YORK AT STONY BROOK

As one of four comprehensive University Centers in the 64-campus State University system, Stony Brook provides a broad spectrum of academic, research and public service programs at the undergraduate, graduate and professional levels. The University is now one of Long Island's largest employers and enrolls about 16,500 students from every state in the Union and from 66 countries.

The present 1000-acre campus, which opened in 1962, now includes 83 buildings. Among these are a Computing Center, the new Fine Arts Center, and a Health Sciences Center that contains medical and dental schools and a 540-bed University hospital. In addition, Stony Brook's Frank Melville, Jr. Memorial Library is among the largest academic libraries in the nation and includes the Yeats Archives, the largest collection of original writings of William Butler Yeats outside of Ireland, and the Inst. for Advanced Study of World Relations, which contains the largest collection of Buddhist and Sanskrit materials in the nation.

E. R. Baylor, Professor

I am investigating the physical chemistry of adsorption of viruses and bacteria to air bubbles in the laboratory and in the sea surf. It is well known, for example, that the waxy coat of the tubercle bacillus causes it to adhere to bubbles but the reasons for the adsorption of other organisms are not equally obvious.

To ask whether adsorption is hydrophobic we employ various mutants of the common colon bacillus, Escherichia coli, which have different amounts of fatty acids in their external coats. Our results indicate that it is the orientation and physical location of fatty acids in the bacterial coat rather than their relative abundance that is important.

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Henry Bokuniewicz, Assistant Professor

My research is concerned primarily with the behavior of coastal sedimentary systems. My students and I are doing field work to study the transportation of fine-grained sediments in rivers and estuaries; shore erosion and the partitioning of sediment particles at the shoreline; and the sedimentary evolution and hydrology of coastal environments. This work is being done in several areas around the Northeast. Projects are being done, for example, to study bluff erosion on Long Island's north shore, the flow of ground water into Great South Bay (a large lagoon) and the mode of suspended sediment movement in Long Island Sound and in the Hudson Estuary. Research is also being conducted in New York Harbor and on several beaches and salt marshes of New York and Connecticut.

Much of this research is directly applicable to problems of coastal zone management. I am interested in applying my research to the problems of shore erosion, the dispersion of contaminants, siltation, and the dredging and disposal of dredged sediments. As a result, we are in close contact with federal, state, and local regulatory agencies, such as the U.S. Army Corps of Engineers and the Environmental Protection Agency.

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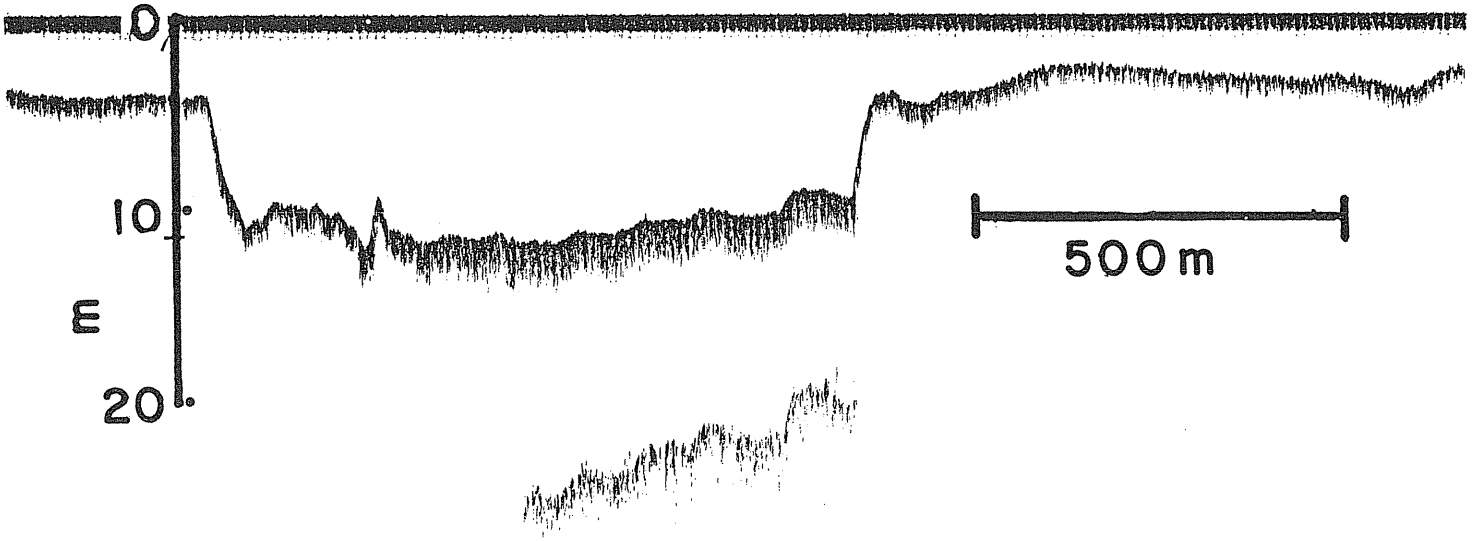

This is a bathymetric section made in New York Harbor. The top horizontal line is the water surface and the bottom line is the Harbor floor. The record shows a deep pit in the Harbor floor that is the result of underwater sand mining. These low frequency seismic records are being used to study the distribution of surficial sediments. The muddy sediments on the pit floor show up as a thick, diffuse line on the record while the ambient sandy sediment is seen as a thin, sharp line. These results will help us to define sediment transport and deposition in the Hudson-Raritan Estuaries and New York Harbor.

M. J. Bowman, Associate Professor

My recent research has been directed towards an interdisciplinary study of tidal and residual circulation, cyclogenesis, mixing, stratification, light attenuation and buoyancy fluxes near and in frontal zones in shallow seas, and to investigate the influences of these physical processes in controlling the distribution and productivity of phytoplankton.

Tidal mixing in continental shelf seas can produce changes from well-stratified to well-mixed conditions within a few kilometers. These boundaries are significant in determining distributions of phytoplankton since the same mixing processes which produce the fronts also determine the availability of light and nutrients necessary for phytoplankton growth.

Exploration of these processes is being acheived through a combination of computer modeling studies of tidal dynamics, oceanographic cruises, and remote sensing experiments.

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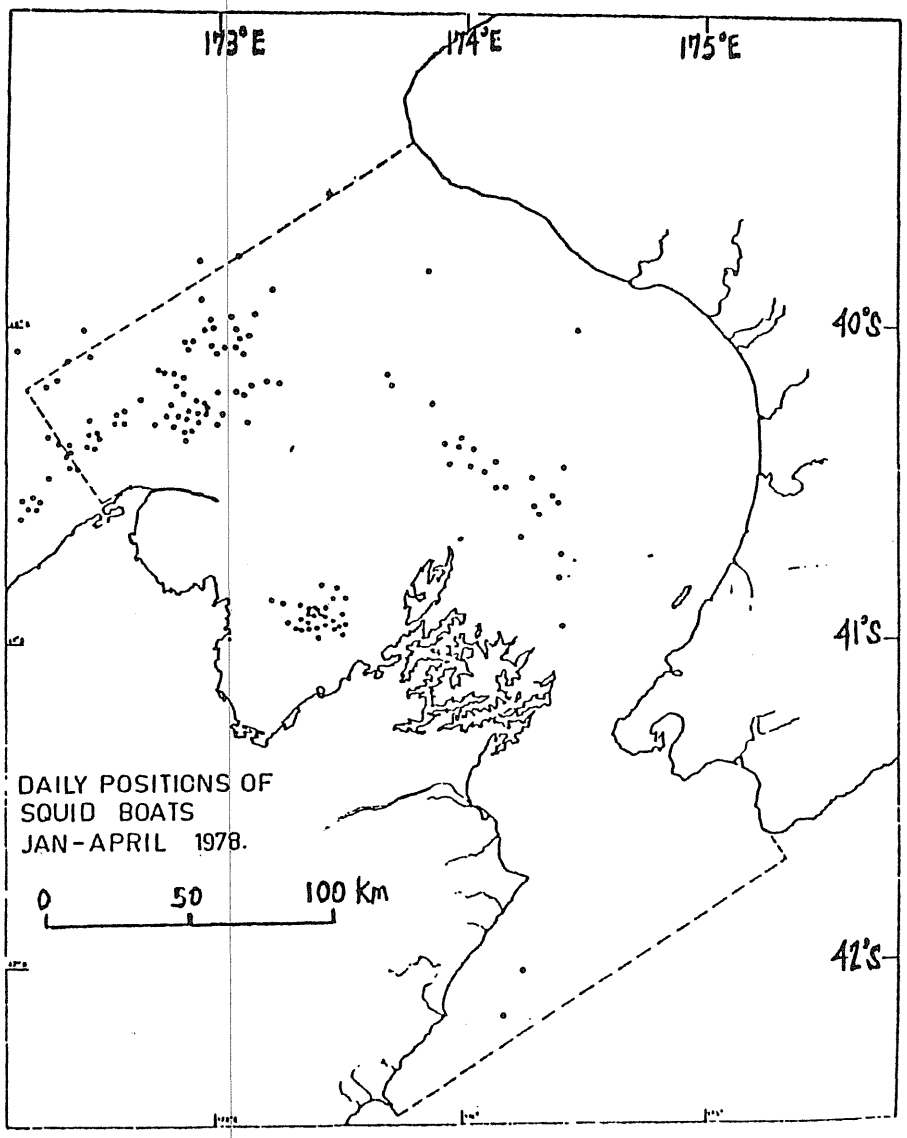
173°E
174°E
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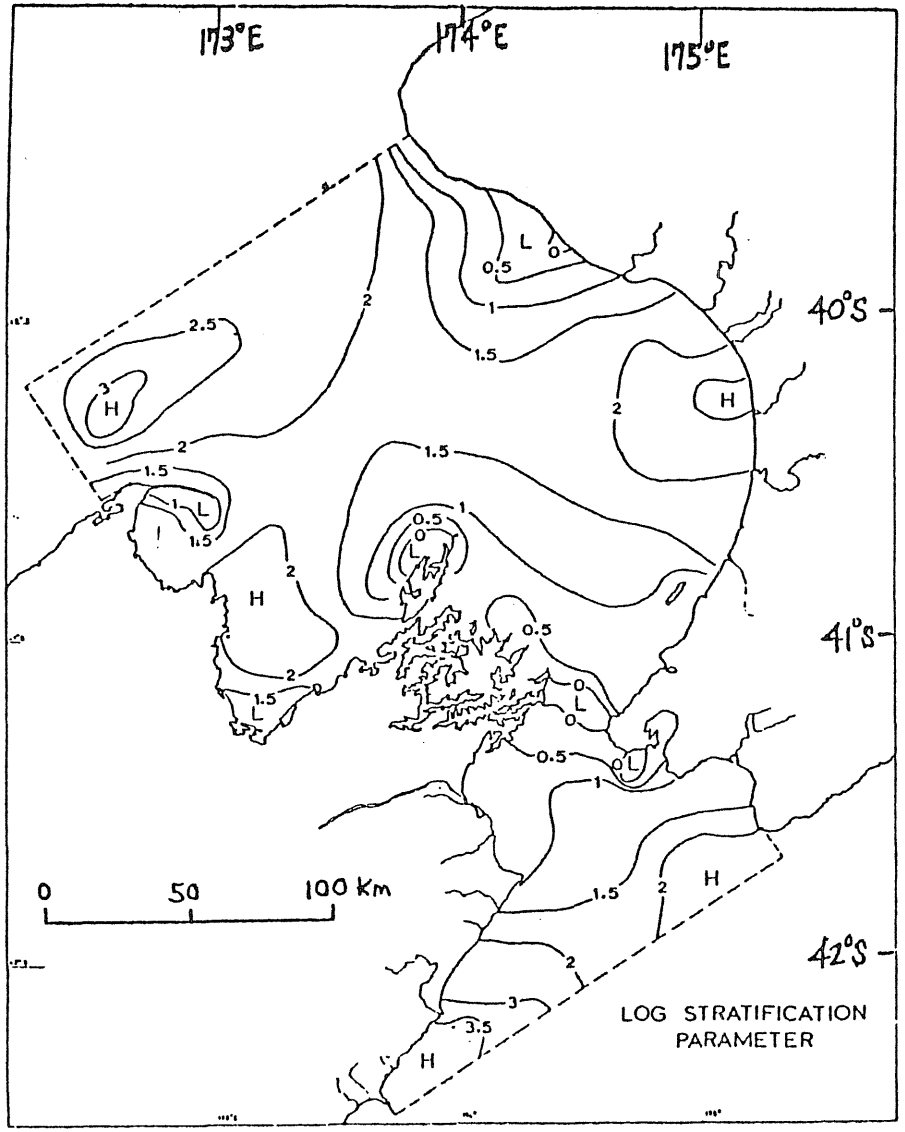
DAILY POSITIONS OF
SQUID BOATS
JAN-APRIL 1978.
0
50
100 Km

Fig. 2


173°E
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LOG STRATIFICATION
PARAMETER

Fig. 1

Fig. 1. Contours of the stratification parameter for greater Cook Strait, New Zealand, derived from a non-linear M_2 tidal model based on a 4 nautical mile grid. S is related to the rate of turbulent dissipation of tidal energy per unit depth. Regions with S values greater than 2 are expected to stratify in summer, while areas with S less than 1 should remain well-mixed. Values of S between 1 and 2 are transition regions where frontal boundaries are expected to develop.

Fig. 2. Reported daily positions of squid boats in January-April 1978. A comparison with Fig. 1 indicates that fishing boats are clustered in stratified areas ($S>2$) or along frontal boundaries ($S\approx1.5$). This is circumstantial evidence of a biophysical correlation between water column stratification and squid population densities, potentially related to their feeding behavior and hence plankton productivity in these favored regions.

B. H. Brinkhuis, Assistant Research Professor

My research interests involve five main areas. First, I am studying primary production in seaweeds. My research in the past showed the importance of primary production by seaweeds in temperate salt marshes to the carbon cycle, and how photosynthesis is affected by seasonal changes in light intensity and temperature. Currently, I am studying seaweed biomass production for input into energy production, namely methanogenesis. Secondly, I am examining the uptake kinetics of heavy metals by seaweeds and seagrasses. Our results show that uptake of metals is plant and metal species specific. Thirdly, I am examining uptake kinetics and translocation of nitrate and ammonia by leaves and roots of seagrasses. Seagrasses appear to be major regulators of nitrogen pools in the water and sediment milieu because they can translocate nitrogen between these pools. Next, I am examining the importance of sulfate reducing bacteria in marine sediments to the decomposition seagrass detritus. Seagrass biomass does not appear to be a major food source as living matter, but may be introduced to the ecosystem by the action of these anaerobic bacteria. Finally, I have been conducting research on the biological effects of sand and gravel mining in New York Harbor. This research has emphasized field studies on (1) the impact of dredge holes on water quality, (2) the effect of dredging on benthic organisms as well as the dispersion of suspended sediments in dredge discharge plumes and (3) the distribution of benthic infauna and epifauna and fishes in the Harbor region.

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D. G. Capone, Assistant Research Professor

My general research interests are in the areas of marine microbiology and biochemistry. More specifically, I am interested in the estimation of microbial activities and biomass in marine ecosystems. The adaptation and application of methodologies currently used in other biological fields (biochemistry, microbiology, soil biology) to marine systems holds promise of yielding a basic understanding of the microbial ecology of these systems.

My present research is focused on the importance of nitrogen cycle bacteria in marine communities. Nitrogen is known to be, most often, the limiting factor in primary productivity in the marine environment. Hence N_2 fixation, nitrification and denitrification, three strictly bacterial activities, may exert considerable control over the basic productivity of these systems. We are currently investigating the interactions of bacteria and macrophytes in seagrass (Thalassia, Zostera) and salt marsh (Spartina) communities. I am further interested in the importance of these activities in other coastal marine ecosystems, such as coral reefs, from both a quantitative and comparative point of view.

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Edward J. Carpenter, Associate Professor

My recent research interesets are rather broad. Basically, I am interested in nitrogenous nutrient transformations in aquatic habitats. However, some of my nitrogen work is in the tropical lowland rainforest in Costa Rica. This concerns N_2 fixation by cyanobacteria on the leaves of rainforest plants and in root nodules. Mostly the aquatic research is concentrated in Great South Bay on the south shore of Long Island. Nitrogen availability is a major factor in affecting the growth of marine phytoplankton in this bay. Research here is concerned with all aspects of the marine nitrogen cycle (N_2 fixation, denitrification, uptake, excretion, etc. and how various factors (e.g. nutrient loading, physical events and toxic substances) affect those processes. Since much of my past work has been with phytoplankton, these organisms receive the bulk of the attention in the Great South Bay work.

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H. H. Carter, Professor

Since 1964 I have been working on methods for measuring thermal plumes associated with heated cooling water discharges from electric generating stations and on models for predicting the distribution in the receiving waters of this heated cooling water. Most recently Schubel, Wilson and I developed a scientifically defensible rationale for evaluating the biological response of organisms to thermal plumes.

However, I do not expect to spend much time in the next few years on problems associated with heated discharges. At present I am working with Wilson and Bokuniewicz on the dynamics, i.e., circulation and mixing, of Great South Bay. Great South Bay is of great importance to New York State inasmuch as it supports a major U.S. hard clam fishery. In addition, I am also working on fundamental problems associated with turbulent diffusion in the coastal waters off Long Island with Pritchard, Wilson and Okubo.

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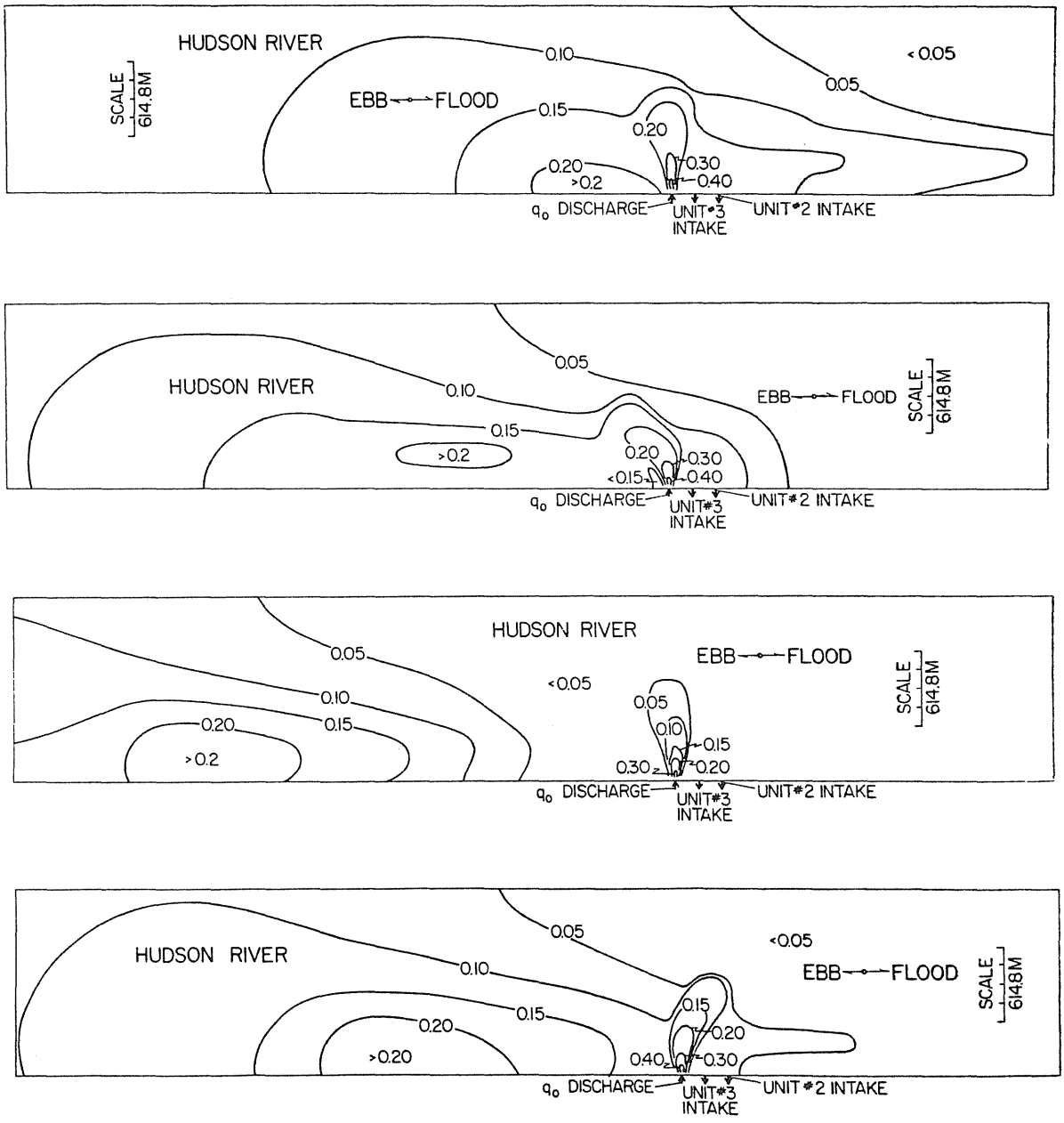

The surface excess temperature field predicted by the MSRC Complete Field Thermal Model for the cooling water discharge from Units 2 and 3 of the Indian Point generating facilities. Top (slack before ebb); second from top (maximum ebb); third from top (slack before flood); bottom (maximum flood).

I. W. Duedall, Associate Professor

I maintain interests in marine geochemistry, and the physical chemistry of seawater and other aqueous systems. I have also studied the behavior of wastes in the marine environment. My recent work involves the behavior of fly ash and scrubber sludge in the ocean. I am presently coordinating an international program concerning the exchange of students and professors between the U.S. and Chile.

References

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B. Kinsman, Visiting Professor

My primary research interests include: waves and wave generation, estuarine circulation and dynamics, micrometeorology, and mathematical and statistical techniques for turbulence.

I recently completed a study on wave energy in the lower New York Harbor, and have written texts on mathematical and statistical techniques for turbulence.

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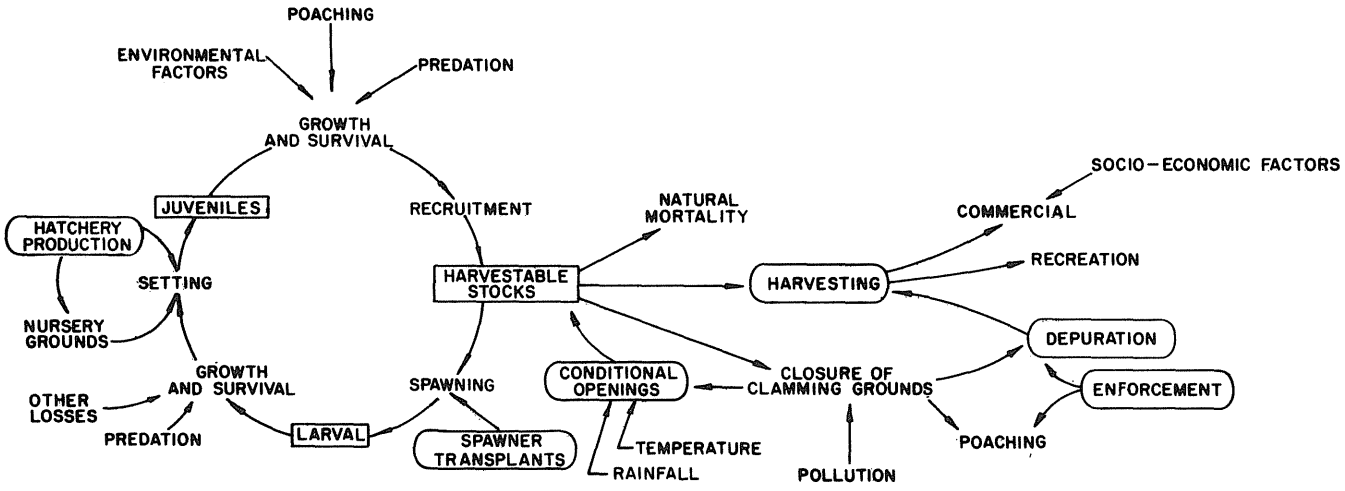
R. E. Malouf, Assistant Professor

The coastal waters of Long Island, particularly Great South Bay, produce more hard clams (Mercenaria mercenaria) than any other area in the world. The fishery has been estimated to contribute $100 million annually to the local economy. It is this huge, but relatively unstudied resource that is the object of my research efforts.

With support primarily from the New York Sea Grant Institute, and with considerable cooperation from local government agencies as well as from the shellfish industry, I have initiated a research program to study a number of different aspects of the biology of the hard clam. These studies to date have included: histological examination of thin sections collected periodically over a two-year period to determine the clams' spawning cycle in local waters; studies of size-specific fecundity in hard clams; and studies of the influence of adult clams of various species on larval hard clams. In addition, a two-year study of the feasibility of enhancing natural reproduction by planting "seed" clams will be initiated in the spring of 1980.

An important part of this developing research program has been the alteration of the Flax Pond sea water lab for use in studies of the reproduction, behavior, and physiology of natural and cultured populations of hard clams. Using this facility in the coming years, studies of factors influencing the growth and survival of juvenile hard clams will receive increased emphasis. These studies will include examination of the energy partitioning of hard clams with the eventual goal of providing a partial explanation for observed differences in growth rates of clams from different sites

within the Bay. Studies of some of the important clam predators, already underway, will also be receiving additional emphasis.



Schematic representation of Great South Bay Clam Fishery.

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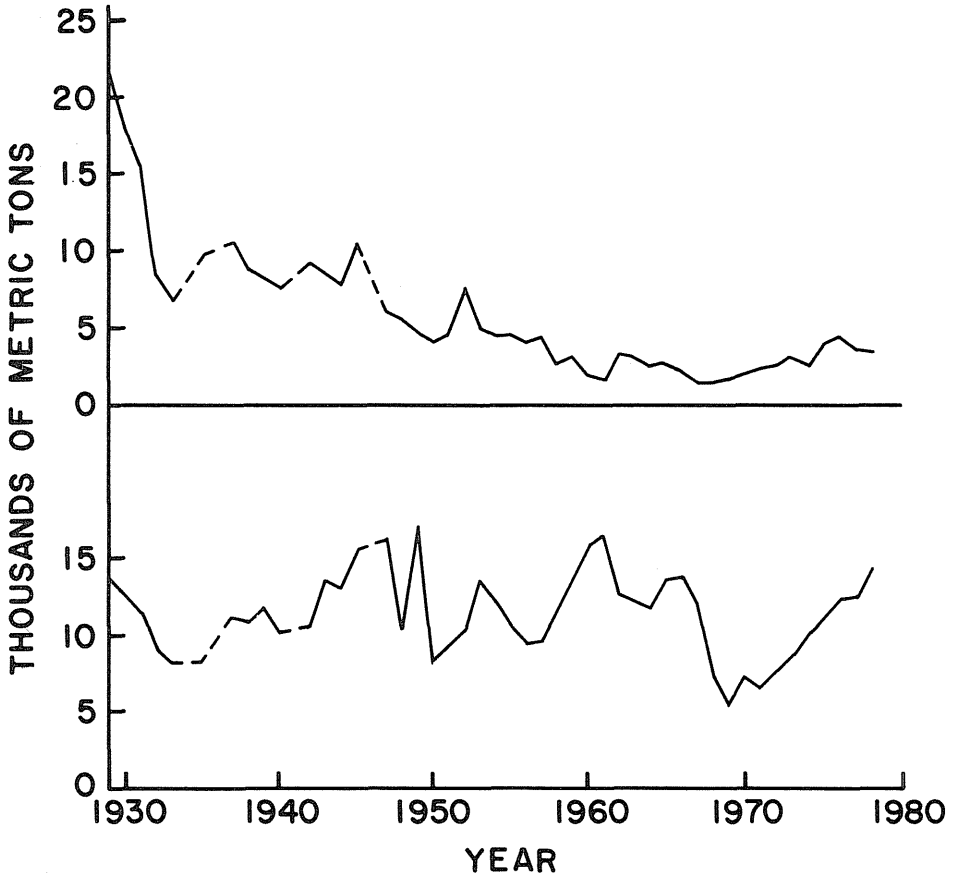

Domestic landings of food finfishes taken only by domestic fishermen

Domestic landings of food finfishes taken by foreign and domestic fishermen

J. L. McHugh, Professor

My present interests lie in three major directions: history of the fisheries of the Middle Atlantic Bight, attempts to manage these fisheries by the Mid-Atlantic Fishery Management Council, and knowledge of all aspects of the biology of the hard clam, Mercenaria mercenaria.

The first set of projects involves a continuing attempt to develop an inventory of all that is known about the fisheries, culled from all sources. Problems of these fisheries, and for that matter all fisheries of the United States, are perceived differently by different people. Many of the commonly-believed facts are not true, or at best only partially true. For example, the belief that all problems of the fisheries were caused by foreign fishing is not true, and this is just dimly beginning to be recognized as the Regional Fishery Management Councils are beginning to develop fishery management plans.

The belief that the 200-mile extension of jurisdiction over fisheries will eliminate foreign fishing and that domestic fishermen will be able to fish freely anywhere in the area is equally untrue, although many domestic fishermen have still not yet grasped that fact. Foreign fishing will continue as long as American fishermen cannot or will not harvest all of the allowable catch. American fishermen will be regulated to ensure optimum yields. This has resulted in a reduction, but by no means a cessation, of foreign fishing off our shores. Certain fisheries are being regulated off our shores for the first time, and American fishermen are not taking kindly to this control.

Performance of the Mid-Atlantic Council is being evaluated with

the object of recommending improved techniques.

For the past four years a search has been made of the literature to list and abstract all titles referring to the hard clam. Over 2,000 titles have been found and abstracted and the study is being completed for publication. Additional titles will be abstracted and published as required.

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Harold O'Connors, Assistant Professor

My research is focused on processes affecting zooplankton herbivory in the coastal ocean. Specifically, I have been investigating the relationship between natural (and man-induced) variations in phytoplankton community species and size composition and food consumption by Temora longicornis (Muller), an important estuarine copepod.

Temora captures phytoplankton, and other suspended particulates, by passing water through its sieve-like mouthparts. The mouthparts behave as a "leaky sieve", therefore particle retention efficiencies measured for Temora indicate lower capture efficiencies for smaller particles.

When Temora were fed several natural phytoplankton assemblages, each dominated by different sized algae, the maximum particle volume ingestion rates increased linearly by a factor of 3.5 as the diameter of the particles forming the peak in the phytoplankton size distribution increased from 5 μm (mostly phytoflagellates) to 30 μm (mostly large diatoms). The reduced consumption of smaller particles resulted from the "leaky-sieve" properties of the filter mechanism.

Significantly, PCB contamination of natural phytoplankton communities can reduce the relative abundance of larger phytoplankton diatoms. Alterations in phytoplankton community composition, resulting from chemical contamination, may be reflected in changes in the zooplankton community and higher trophic levels. The distribution of abundance between harvestable and commercially useless species may be altered, for example.

Presently I am working with a group of faculty and students who are tracing the fates and effects of PCB in estuarine food chains.

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A. Okubo, Professor

My research interests are physical diffusion in natural environments and the diffusional aspect of living organisms. The study of physical diffusion includes mathematical modeling for the dispersion of contaminants in the sea by oceanic diffusion and mixing.

In the diffusional aspect of organisms I am interested in mathematical modeling for animal swarms such as insect swarms, zooplankton swarms, and fish schools. To properly model animal swarming it is necessary to take into account the behavioral effect in addition to the general process of diffusion due to randomness in animal movement.

I am also interested in models of interacting populations in spatially heterogeneous environments, e.g., turbulent sea. In particular, attempts have been directed to model the patchy distribution of plankton in the sea, i.e. "patchiness" in the sea.

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D. W. Pritchard, Associate Director for Research and Professor

My research interests are directed towards an improved understanding of the motion and mixing in estuaries and other coastal tidal water bodies, and in the waters over the continental shelf. In order to attain research activities: (1)analysis and interpretation of field measurements obtained from tide gauges and current meters, and of measurements of the concentration of fluorescent tracer dyes introduced into natural water bodies for the direct measurement of diffusion processes (2)theoretical and numerical investigations, using the results of the field measurements as guides, directed towards explanation and prediction of the circulation and mixing in these water bodies; and (3)studies directed towards improving the tools and methods used to measure circulation and mixing in natural water bodies.

At present I am directing the research activities of several graduate students and research associates who are engaged in the analysis and interpretation of tide gauge and current meter records obtained in the Upper Chesapeake Bay, above the Bay Bridge, and in the middle reaches of the Bay, near the Calvert Cliff Nuclear Power Plant. In these studies an approach called empirical orthogonal analysis is being used to find the strength of the relationship between the time variation in the non-tidal currents and in such external factors as the fresh water inflow to the Bay, the local wind velocity, and the wind velocity over the entire Bay and adjacent continental shelf. I am also participating in the development of a three-dimensional, transient state, coupled hydrodynamic/kinematic numerical model which is intended to predict the distribution of current velocities and of the concentration

of dissolved materials (such as salinity, and introduced contaminants) in an estuary.

I am also working with Mexican scientists in studies of anti-estuaries, or "esteros", along the coasts of Baja California, Mexico. These water bodies have a non-tidal circulation pattern related to evaporation, as distinct from the pattern in estuaries which is related to the inflow of fresh water.

In the New York area I am participating in studies of circulation and mixing in Great South Bay, and of the relationship between certain stocastic properties of water motion as revealed by fixed current meter arrays, and diffusion coefficients as determined from measurements of the time and spatial variations in the concentrations of an introduced fluorescent tracer dye.

The use of fluorescent tracer dyes in the direct measurement of diffusion processes has been of great value over the last 20 years. However, the full potential of this technique cannot now be realized because of time and spatial variations of fluorescent background, caused by the fluorescence of natural substances which mimic the tracer dyes we are using, and which are produced by organisms whose abundance appears to be favored by the inputs to the coastal waters of the products of man. I am currently engaged in research on methods for eliminating the interference of the concentration of artificially introduced tracer fluorescent dyes.

References

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J. R. Schubel, H. H. Carter, D. W. Pritchard, P. K. Weyl, and W. M. Wise, 1979. A conceptual framework for assessing dredging/disposal options in Chesapeake Bay. MSRC Special Rept. 25.

J. R. Schubel, Director and Professor

My current research interests are concentrated in two general areas--coastal sedimentation and coastal zone management. I am involved in a number of studies to characterize geological processes in the coastal ocean, to assess man's impacts on the coastal marine enviroment, and to develop strategies to ensure the continued multiple use of these areas with predictable and acceptable risks to the environment and its biota. With Professor Bokuniewicz, I am studying the sand and gravel deposits of the Lower Bay of New York Harbor. We are assessing the feasibility of combining sand mining with the disposal of contaminated dredged materials in the borrow pits. With David Hirschberg, I am continuing studies of sedimentation in the Chesapeake Bay. We are using Pb-210 and other radioactive tracers to investigate the processes that control sedimentation in the Chesapeake Bay. I am also involved in studies of shore erosion on Long Island, and dredging and dredged material disposal in New York's coastal waters.

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Kastens, K. A., C. T. Fray, and J. R. Schubel, 1978. Environmental effects of sand mining in the Lower Bay of New York Harbor, Phase 1. MSRC Special Rept. 15.

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Carter, H. H., J. R. Schubel, R. E. Wilson and P. M. J. Woodhead, 1979. Thermally induced biological effects caused by once-through cooling systems: A rationale for evaluation. Environmental Management 3(4):353-368. Springer-Verlag, NY.

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J. R. Schubel, W. M. Wise(eds.), 1979. Questions about dredging and dredged material disposal in the Chesapeake Bay. MSRC Special Rept. #20.

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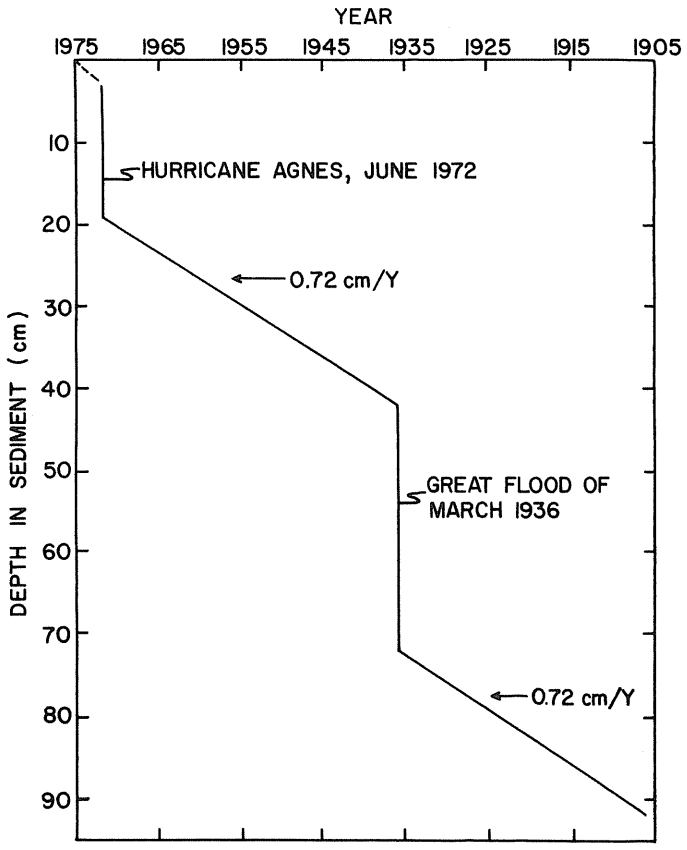

An interpretation of sedimentation at a site in the northern Chesapeake Bay (39°23'N, 76°05'W) based upon the observed distribution of Pb-210 (not shown). The two storm events contributed about one-half of the total sediment accumulation since 1900.

Mary I. Scranton, Assistant Professor

My research interests all lie within the general category of chemical oceanography--that is, the use of chemical tracers to understand processes within the marine environment. More specifically, I have studied the distribution of methane and hydrogen in the ocean with the goal of understanding the interaction between biological production and consumption of these gases. I have also tried to understand the effect of water circulation in controlling gas concentration. Future work in this area will be oriented toward studying the interactions of various bacteria in controlling hydrogen concentration in enviroments where oxygen is absent. Another project under development is a study of sediment distribution patterns in the Hudson River Estuary using analysis of silicones as sediment tracers.

References

Scranton, M. I. and P. G. Brewer, 1977. Occurrence of methane in the near surface waters of the western subtropical North Atlantic. Deep-Sea Research 24:127-138.

Scranton, M.I. and J. W. Farrington, 1977. Methane production in the waters off Walvis Bay. J. Geophysical Research 82:4947-4953.

Scranton, M. I. and P. G. Brewer, 1978. Consumption of dissolved methane in the deep ocean. Limnol. and Oceanog. 23:1207-1213.

Scranton, M.I., W. R. Barger and F. L. Herr. Molecular hydrogen in the urban troposphere: measurement of seas and variability. J. Geophysical Research. In press.

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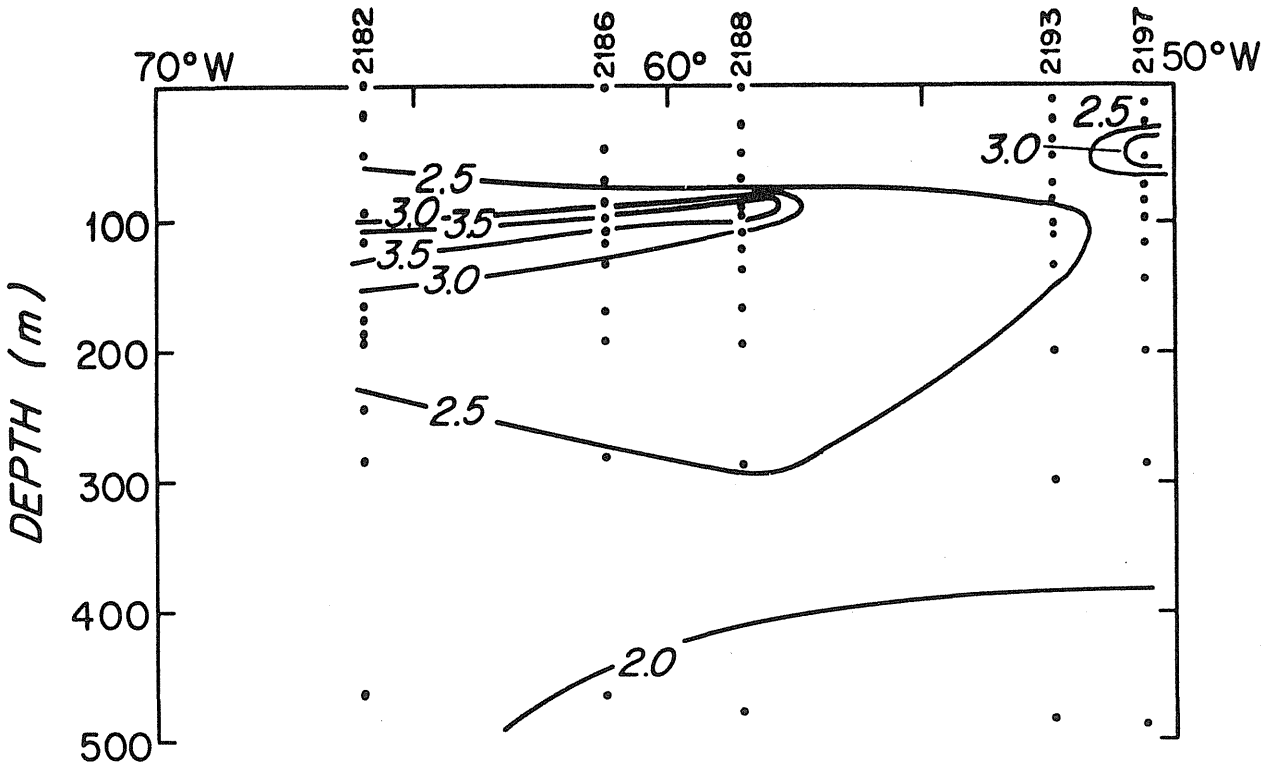

METHANE SECTION FROM AII 86-2 ALONG 19°N
METHANE CONTOURS IN UNITS OF $\frac{\text{n moles}}{\ell}$

Methane section along 19°N in the western subtropical North Atlantic. The maximum in methane concentrations observed at about 100 m is correlated with the sharp increase in the density occurring at the bottom of the mixed layer and is probably due to in situ production of methane by bacteria in the guts of zooplankton or fish.

O. W. Terry, Associate Research Professor

My present research interests are in three general areas, as follows: (1) the ecology and physiology of marine plants, especially those of tidal wetlands. Proposals in preparation on photoperiodic and other rhythmic responses. (2) Coastal zone management; management of marine resources. (3) Marine aquaculture, primarily that of halophytic plants. Proposals in preparation on seaweed culture for biomass and other applications of solar energy to mariculture. Management problems of mariculture.

References:

Terry, O. W., H. F. Udell, and J. D. Zarudsky, 1974. Tidal marsh restoration at Hempstead, Long Island. Shore and Beach 42: 36-39.

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Terry, O. W., 1977. Aquaculture. New York Bight Atlas Monograph #17. Marine Ecosystems Analysis Program, NOAA. N.Y. Sea Grant Inst., Albany, NY.

MESA, 1977. Long Island Beach Pollution:June 1976. U.S. Dept. COmmerce, NOAA, Environmental Research Laboratory, MESA Spec. Rept. 1-75.

Terry, O. W., Chase, D. M. (eds.), 1979. Mariculture in New York State. Proc. 1977 Symposium held at Southampton College. N.Y. Sea Grant Inst. Rept. RP-79-01. 96pp.

P. K. Weyl, Professor

My interests in the marine sciences are broad; covering the basic disciplines of biology, chemistry, geology, and physics. In recent years, I have been particularly concerned with the application of research to the resolution of societal problems of the coastal ocean. At the present time, I am finishing up a book entitled "Society and the Sea", which will be published in 1980 by John Wiley and Sons.

The fall semester of the 1979-80 academic year I was in Chile with two MSRC students. We are working on problems of coastal zone management in the area near Concepcion. The graduate students will write their M.S. theses on this research. I am also involved in studies with members of the N.Y. Department of Environmental Conservation to develop more effective methods of analyzing, presenting, and interpreting coliform data. The aim is to improve our effectiveness in using coliform data in shellfish management in Great South Bay. I have collaborated with J. R. Schubel and other members of the staff in a variety of dredged material management studies.

In addition to these more applied studies, I retain a long-standing interest in paleo-oceanography.

References

Weyl, P. K., 1976. Pollution susceptibility, an environmental parameter for coastal zone management. Coastal Zone Mgmt. Journal 2:327-343.

Weyl, P. K., 1978. Micropaleontology and ocean surface climate. Science 202:475-481

Schubel, J. R., H. H. Carter, D. W. Pritchard, P. K. Weyl and W. M. Wise, 1979. A conceptual framework for assessing dredging/disposal options in Chesapeake Bay. MSRC Special Rept. #25.

Weyl, P. K., 1979. An analysis of shellfish sanitation data. MSRC Special Rept. #30.

R. E. Wilson, Associate Professor

My current research interests include gravitational circulation and low frequency forcing of Great South Bay. I am also interested in Eulerian-Lagrangian representations of flow fields and diffusion parameters in coastal waters, and in simulations of distributions of excess heat discharged from a power plant into an estuary.

References

Schubel, J. R., H. H. Carter and R. E. Wilson, 1978. Field investigations of the nature, degree and extent of turbidity generated by open-water pipeline disposal operations. Technical Report D-78-30, U.S. Army Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Hamilton, A. D. and R. E. Wilson, 1979. Nontidal circulation and mixing processes in the Lower Potomac Estuary. Estuaries 3(1).

Wong, K. and R. E. Wilson, 1979. An assessment of the effects of bathymetric changes associated with sand and gravel mining of tidal circulation in the lower Bay of New York Harbor. MSRC Special Rept. #18.

P. M. J. Woodhead, Research Professor

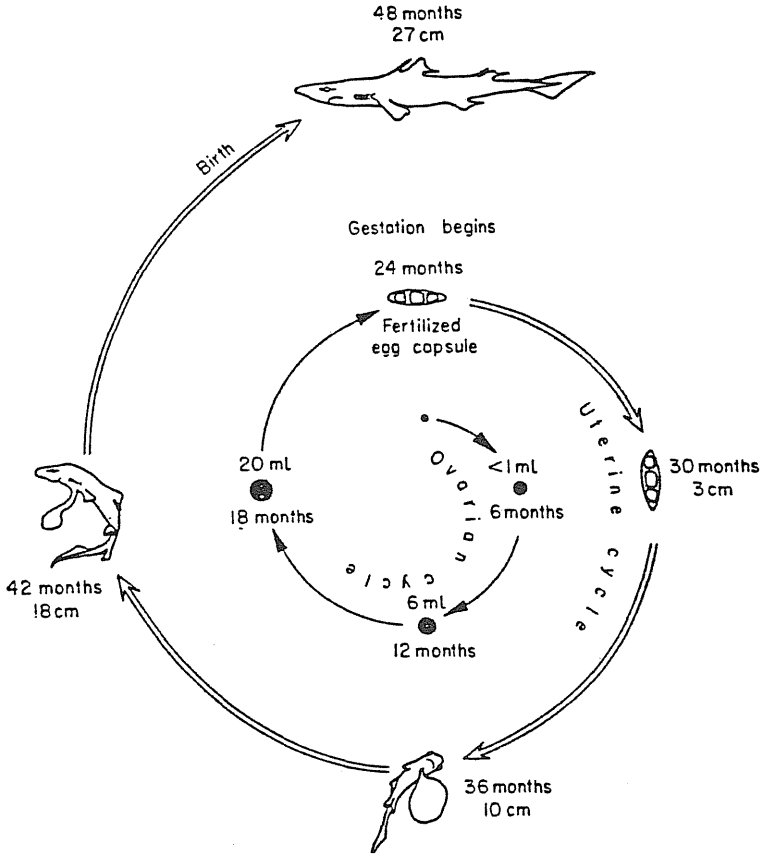
I work with the ecology of reef systems, both natural and man-made. I am presently doing a study of the biology and reproductive ecology of spiny dogfish and black sea bass. I have also studied the effects of climatic change in the ocean.

References

Carter, H. H., J. R. Schubel, R. E. Wilson and P. M. J. Woodhead, 1979. A rationale for evaluating thermally induced biological effects due to once-through cooling systesm. J. Coastal Zone Mgmt. 3(4):353-368.

Duedall, I. W., F. R. Roethel, J. H. Parker, P. M. J. Woodhead, H. B. O'Connors, B. Chezar, B. K. Roberts, and H. Mullen, 1979. Physical and chemical behavior and environmental acceptability of stabilized scrubber sludge and fly ash in seawater. In: The Ecological Assessment of Effluent Impacts on Communities of Aquatic Organisms, C. I. Weber and J. M. Bates(eds.). Am. Soc. Test. Materials and USEPA Symposium. 32 pp.

Itzkowitz, N., J. R. Schubel and P. M. J. Woodhead, 1979. Thermal shock effect on eggs of the summer flounder. MSRC Special Rept. #29.



Reproductive cycle of spiny dogfish.

Charles F. Wurster, Associate Professor

My research has been concerned with the effects of stable chlorinated hydrocarbon pollutants on plankton communities. Focusing on those chemicals found regularly in the environment (polychlorinated biphenyls, DDT, DDE and dieldrin), we have studied the effects on individual species, mixed cultures and natural phytoplankton and zooplankton communities in an attempt to understand the impact of these chemicals on aquatic ecosystems.

These pollutants may aggravate the problems of eutrophication, sometimes leading to "blooms" of undesirable species. The growth of some species of algae is inhibited by chlorinated hydrocarbon concentrations as low as the parts per trillion range. This sensitivity varies with the species, geographic origin of the clone, optimum temperature for the species, and the supply of various nutrients. Selective toxicity may alter the species composition within the community. Recently we have concentrated our efforts on natural plankton communities from Long Island Sound.

At 1 to 10 parts per trillion PCBs reduce average cell size in natural phytoplankton assemblages, producing a community of smaller-sized algae. Whereas large phytoplankton are believed to favor large zooplankton, short food chains and the production of fish, small phytoplankters are thought to lead to smaller zooplankters, longer food chains and jellyfish production. PCB pollution therefore could have important implications for the production of harvestable fish resources.

Since most chlorinated hydrocarbon pollutants in natural waters are found associated with particulates, we are also studying the

dynamics of PCB transfer between various particulates, water and cells.

References:

Wurster, C. F., 1968. DDT reduces photosynthesis by marine phytoplankton. Science 159:1474-1475.

Mosser, J. L., N. S. Fisher and C. F. Wurster, 1972. PCBs and DDT alter species composition in mixed cultures of algae. Science 176:533-535.

O'Connors, H. B., C. F. Wurster, C. D. Powers, D. C. Biggs and R. G. Rowland, 1978. Polychlorinated biphenyls may alter marine trophic pathways by reducing phytoplankton size and production. Science 201:737-739.

Powers, D. C., C. F. Wurster and R. G. Rowland, 1979. DDE inhibition of marine algal cell division and photosynthesis per cell. Pesticide Biochem. Physiol. 10:306-312.

FACULTY HOLDING JOINT AND ADJUNCT APPOINTMENTS

Baylor, M.B., Adjunct Professor-Microbiology; airborne viruses.

Chuecas, L.A.M., Adjunct Professor-Chemical oceanography; descriptive physical oceanography.

Cooley, A.P., Adjunct Associate Professor-Natural history of Long Island.

Dagg, M.J., Adjunct Associate Professor-Zooplankton ecology; continental shelf ecosystems.

Dayal, R., Adjunct Associate Professor-Marine geochemistry.

Esaias, W.E., Adjunct Associate Professor-Phytoplankton ecology; photobiology.

Falkowski, P.G., Adjunct Associate Professor-Marine phytoplankton ecology; phytoplankton physiology.

Herman, H., Professor-Ocean engineering; undersea vehicles; marine materials (joint appointment with College of Engineering and Applied Sciences).

Hopkins, T.S., Adjunct Associate Professor-Coastal current structure; water mass analysis; air-sea interaction.

Judkins, D.C., Adjunct Assistant Professor-Plankton ecology; biogeography of pelagic organisms and controlling environmental factors.

Koppelman, L.E., Adjunct Professor-Coastal zone management; planning; policy studies.

Like, I., Adjunct Professor-Environmental law.

Meade, R.H., Adjunct Professor-Coastal and fluvial sedimentation; ground water.

Meyers, W.J., Assistant Professor-Carbonates; sedimentology (joint appointment with Department of Earth and Space Sciences).

Naidu, J.R., Adjunct Associate Professor-Radioecology; radionuclides in the environment.

Reeburgh, W.S., Adjunct Professor-Chemical oceanography; gases in marine sediments; sediment-water interactions.

Schaeffer, O.A., Professor-Marine geochemistry; lunar studies (joint appointment with Department of Earth and Space Sciences).

Smith, S.L., Adjunct Assistant Professor-Plankton ecology; nutrient regeneration by zooplankton.

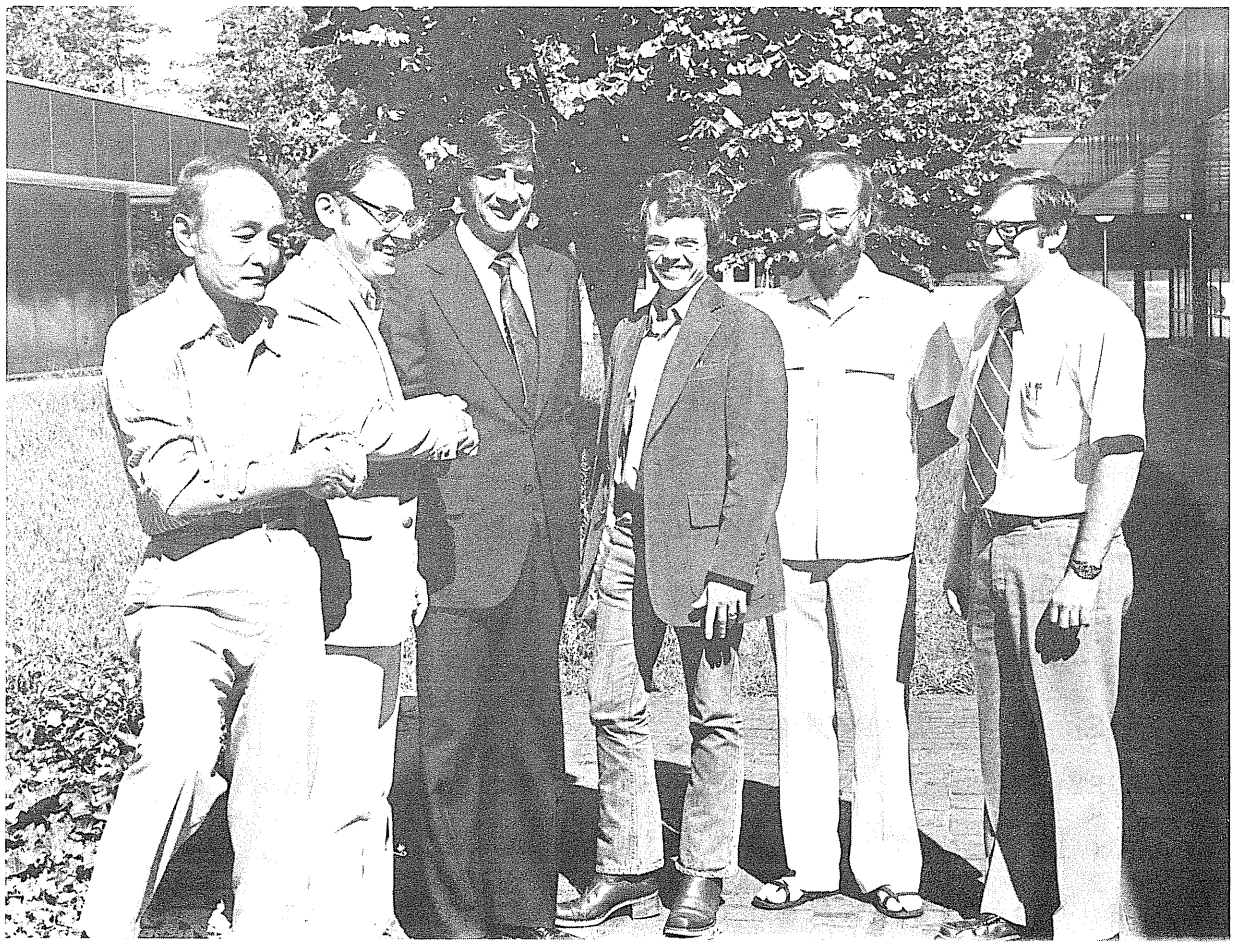
Squires, D.F., Professor-Marine affairs and science policy.

Vaughn, J., Adjunct Associate Professor-Transport, fate and effects of viruses in the aquatic environment.

Walsh, J.J., Adjunct Professor-Upwelling ecosystems; phytoplankton ecology; modeling of continental shelf ecosystems.

Wang, F.F.Y., Professor-Ocean engineering; ocean structurals; energy (joint appointment with College of Engineering and Applied Sciences).

Whitledge, T.E., Adjunct Associate Professor-Nutrients; chemistry of seawater; stimulation of primary productivity by sewage effluent; ecosystem dynamics.



Graduate Student Theses in Progress

Ph.D.

ROETHEL, Frank J., Interactions of Stabilized Power Plant Coal Waste with the Marine Environment(I. W. Duedall)

WYMAN, Kevin D., Implications of Short-Term PCB Uptake by Small Estuarine Copepods (Genus *Acartia*) from PCB Contaminated Water, Inorganic Sediments, and Phytoplankton. (H. B. O'Connors, C. Wurster)

M.S.

ARNOLD, Chester L., Jr., Modes of Fine-Grained Sediment Transport in the Hudson Estuary(H. Bokuniewicz)

BRICELJ, V. Monica, Fecundity and Related Aspects of Hard Clam (*Mercenaria mercenaria*) Reproduction in Great South Bay, New York(R. Malouf)

CASTENEDA, Raoul E., Age and Growth in the Spiny Dogfish, *Squalus acanthias L.* (P.M.J. Woodhead)

CHU, Gordon, A Geochemical Study of Radionuclides in the Peconic River Estuary(R. Dayal, J. Naidu, H. Bokuniewicz)

KELPIN, Geraldine, The Role of Depuration as a Management Technique for the Great South Bay Clam Industry(D. F. Squires)

LIVELY, John S., Annual Phytoplankton Dynamics of Great South Bay, NY(E. Carpenter)

LOUNSBURY, Margaret E., Is Extended Jurisdiction Working? (J. L. McHugh)

McMANUS, George B., Effect of PCBs on the Fecundity of Estuarine Copepods of the Genera *Acartia* and *Temora*(H. O'Connors)

NAU-RITTER, Glynis M., PCB-Particle Sorption and Desorption with Associated Effects on Marine Phytoplankton(C. F. Wurster)

NINIVAGGI, Dominick V., Particle Retention Efficiencies in the Estuarine Copepod Temora longicornis(Muller) (H. O'Connors)

SAROKIN, David, Phytoplankton Ecology of the Carmans River (E. Carpenter)

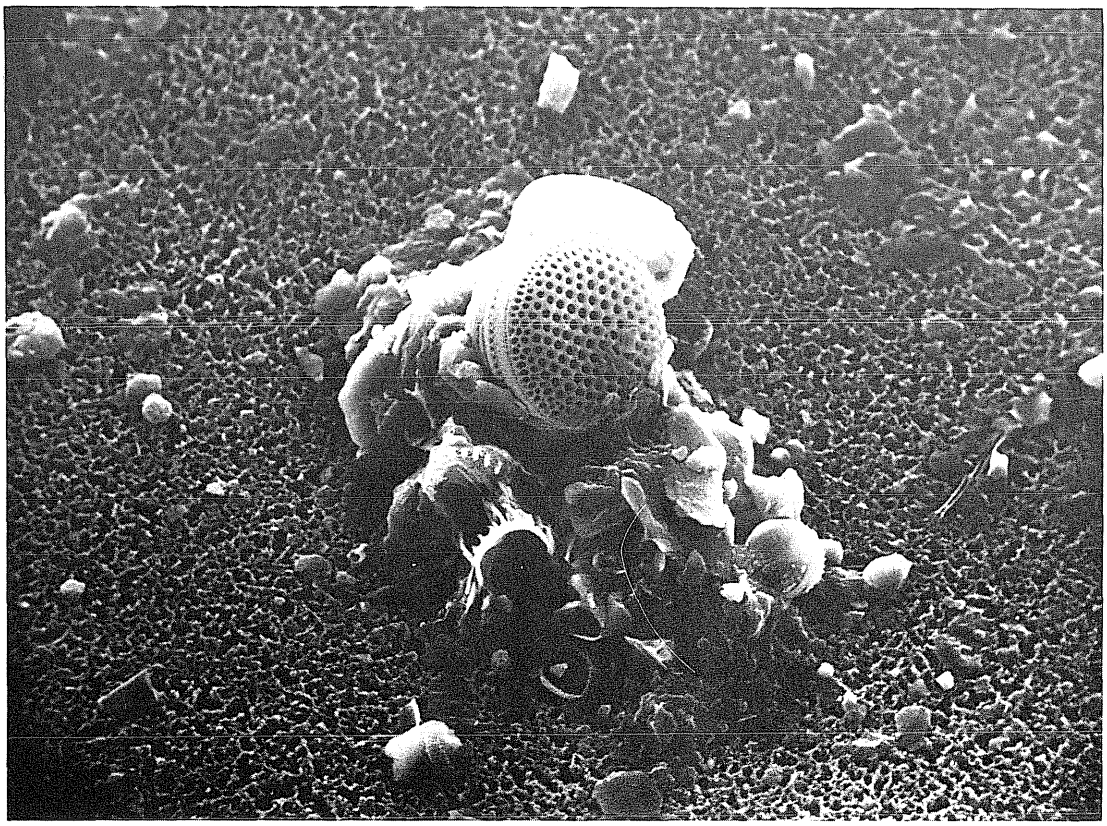
SCHNITZER, Michele, Vertical Stability and the Distribution of Phytoplankton in Long Island Sound(W. Esaias)

ZEITLIN, Michael J., Variability of Groundwater Seepage Within Great South Bay(H. Bokuniewicz)

RESEARCH FACILITIES

The MSRC is located in three buildings on the South Campus of the University. Its 73,600 square feet of space include over 20 research laboratories, a teaching laboratory, a SUNY-wide laboratory, office space, reference room, and chart and publications rooms. In addition, the MSRC houses a graphic arts department and a "mini-computing center".

Research Laboratories - each lab is equipped for specialized studies in microbiology, seawater chemistry, geochemistry, biochemistry, biology, physical oceanography and other allied disciplines. The Center's 15,000 square feet of research space hold such equipment as atomic absorption spectrophotometers, gas chromatograph, CHN analyzer, technicon autoanalyzer, particle counter, and liquid scintillation counter.



SUNY-Wide Laboratory - a 1,600 square foot facility that is available to all State University schools for research and teaching purposes. In addition to standard services, this lab is equipped with drying ovens, incubators, autoclave, centrifuge and a number of balances and stereo microscopes.

Flax Pond Seawater Laboratory - a lab maintained by MSRC on a 142-acre salt marsh near Long Island Sound. The Flax Pond lab contains 28 heavy-duty fiberglass sea tables that are equipped with a continuous seawater flow, and an environmental control chamber used for algal culturing.

Seagoing Facilities - include the R/V ONRUST, a 55-foot steel-hulled ship built specifically for MSRC. The ONRUST has a range of 775 miles at a cruising speed of 10 knots, and is equipped with

a "wet" lab and an electronics dry lab. MSRC also has a number of small boats to support field work in local embayments and near-shore waters. These include two 16 foot Boston Whalers equipped with davits, and a 20 foot Coast Guard surf boat soon to be replaced by a 23 foot Penn-Yan shallow draft boat with cabin.

Computing Facilities - A "mini-computing center" is maintained in "G" building and consists of: two remote entry terminals for direct communication with UNIVAC 1110 housed in the main campus computer center, one CRT (ONTEL OP/1) and one hardcopy high speed DECWRITER II, and two programmable calculater systems (HEWLETT PACKARD 9830A's), each with digital cassette storage, printer and x-y plotter. For high resolution graphic data printout as well as cartagraphic applications, there is a Calcomp 910/563 30 inch drum plotter. For the input of x-y coordinates there is a 48" digitizer. All oceanographic data collected since the Center was founded has been placed in a central data storage bank.