

NEW ENGLAND ESTUARINE RESEARCH SOCIETY ABSTRACTS

Spring - 1987 Boothbay Harbor, Maine

P. F. Larsen Program Chairman



Henry Bigelow

**BIGELOW LABORATORY
for
OCEAN SCIENCES**

Able, K.W., K.L.Heck, Jr., M.R.Fahay and C.T. Roman, (KWA, Marine Field Station, Rutgers University, Tuckerton, N.J.)
JUVENILE LOBSTER HABITAT IN A CAPE COD ESTUARY

The natural habitat of small juvenile lobsters (Homarus americanus) is virtually unknown. We attempted to determine habitats utilized by juveniles in Nauset Marsh, Cape Cod. The smallest juvenile lobsters (X=26.7, 6-72mm CL) were collected from suction samples in peat reef habitats while other sampling methods collected generally larger (X=60.9 15-103mm CL), but fewer lobsters in all other habitats (sand and algal mat substrates, eelgrass beds, and marsh pools). Peat reefs consisted of large blocks of Spartina alterniflora marsh that separated from the marsh surface, fell into adjacent marsh channels, were colonized by invertebrates and algae, and bioeroded by decapod crustaceans and fish. In these habitats juvenile lobster density ranged up to 5.7 individuals/m². These peat reef habitats occur in other salt marshes in northeastern U.S. and may be important nursery habitat for small juvenile lobsters.

Ackleson, S.G. and R.W. Spinrad, Bigelow Laboratory for Ocean Science, West Boothbay Harbor, ME 04575
INVESTIGATING THE OPTICAL PROPERTIES OF MARINE PARTICLES: A FLOW CYTOMETRIC APPROACH

Optical measurements (in situ and remotely sensed) of ocean water used to compute bulk optical properties, estimate ocean productivity, and identify suspended and dissolved constituents are ultimately dependent, to a large extent, upon the inherent optical properties of marine particles. Flow cytometric techniques are presented which enable the researcher to accurately measure single-particle scattering and refractive index. Discussions center around measurements of nanoplankton within the 2-10 um range and conclude with present and planned applications of flow cytometry to marine research.

Allen, Douglas C., Project Engineer, E.C. Jordan Co., Portland, ME THE NEW BEDFORD HARBOR PROJECT: OVERVIEW OF A SUPERFUND SITE

Industrial process wastewaters containing PCBs used in the manufacture of electronic components were discharged into New Bedford Harbor during the years 1947-1978. Subsequent studies have shown PCB concentrations in the sediments of New Bedford Harbor range from below 1 ppm to over 100,000 ppm. Water column and finfish/shellfish concentrations of PCBs have been found in excess of EPA and FDA criteria, respectively. New Bedford Harbor was added to the EPA Superfund National Priority List in 1982. A multi-organization, multi-discipline feasibility study is currently being conducted under the Superfund program. The goal of this study is the selection of remedial alternative(s) to address the cleanup of PCBs in New Bedford Harbor.

Brainard, E.C., and F.T. Short, Jackson Estuarine Laboratory, University of New Hampshire, Durham, NH 03824

NUTRIENT COMPOSITION OF SALT MARSH BIOMASS

We measured biomass and plant tissue nutrient content of the major plant species of the Little River salt marsh in Wells, Maine to assess the nutritional value of marsh plants to higher trophic levels in the marsh ecosystem.

The Little River salt marsh is a high marsh environment with a complex mix of marsh plant species. Plant samples for biomass and nutrient content studies were collected in 1986 at the period of peak standing biomass, and at times of maximum reproduction. Biomass was calculated from dry plant weight. Carbon, nitrogen, and phosphorus content of plant tissue was analyzed. Reproductive plant tissue was analyzed separately; reproductive plant material comprised a significant portion of plant biomass, and had higher nutrient content than vegetative plant material. The often-overlooked reproductive tissue of salt marsh plants thus provides a significant high-quality food resource to inhabitants of the marsh ecosystem.

**Christensen, John P., Bigelow Laboratory for Ocean Sciences,
West Boothbay Harbor, Maine, 04575**

THE IMPORTANCE OF ANAEROBIC SEDIMENT METABOLISM IN THE GULF OF MAINE.

Anaerobic sulfate reduction rates were measured during several years from 14 boxcore sites within the Gulf of Maine. Data are presented and averaged over the Gulf to determine the amount of organic carbon consumed by this process. This organic matter oxidation rate was compared with the primary productivity of the Gulf and showed that much of the annual productivity is consumed within the sediments. Porewater nutrient and oxidant profiles were examined to evaluate the possible extent of other metabolic processes in these sediments.

Churchill, Laurice U., Department of Marine Resources, McKown Pt. : West Boothbay Harbor, Maine 04575.
THE WEST BOOTHBAY HARBOR ENVIRONMENTAL DATA COLLECTION UPDATE.

The new data acquisition system installed at the Department of Marine Resources in January 1986 will be described. The new system's format and an update of the entire climatologic and hydrographic data collection available to the user will be presented.

De Santo, R.S. DeLeuw, Cather & Company. East Hartford. CT
**ACQUACULTURE OF CRASSOSTREA VIRGINICA IN A NEW ENGLAND ESTUARY AND
BIOACUMULATION OF TIN AND HYDROCARBONS ASSOCIATED WITH
ANTHROPOGENIC SOURCES**

Aquaculture of oysters at seven stations in a Clinton, CT estuary were conducted to examine differential growth over one season. Statistically significant differences were found. Tissue burdens of heavy metals, coliform, and hydrocarbons (including DDT, PCB, and fuels), were compared with adult oysters from this and other sites. Some contaminants were ubiquitous while some were absent.

Dettman, E. and J. Paul, U.S. Environmental Protection Agency, ERL-N, South Ferry Road, Narragansett, RI 02882. PHYSICAL CHARACTERIZATION OF AN ESTUARINE COVE FOR RECEIVING WATER TOXICITY STUDIES.

As part of its complex effluent program, the USEPA is conducting field validation of the utility of toxicity tests in an estuarine setting. The study is focused on quantification of receiving water toxicity in the vicinity of a publically owned treatment works (POTW) outfall in Greenwich Cove, RI, and in controlled experiments at mesocosm and microcosm scales. Dye studies were done to assess effluent dilution and residence time in the cove. Mean detention times of 21 hours and 30 hours were measured in December 1985 and July 1986 respectively. Substantial temporal and spatial variability in effluent concentration was found in the receiving waters. This complicates interpretation of associated data on toxicity, which decays at a temperature dependent rate.

Fofonoff, P.W., Graduate School of Oceanography, Univ. of Rhode Island, Narragansett, Rhode Island.
ABUNDANCE, DISTRIBUTION, AND SPECIES COMPOSITION OF MEROPLANKTON IN NARRAGANSETT BAY.

The planktonic larvae of benthic invertebrates were sampled as part of a study of phyto- and zooplankton along a transect from the relatively unpolluted, well-mixed Lower West Passage of Narragansett Bay up-bay into the heavily polluted, stratified Providence River. Samples were taken at seven stations, over a period of sixteen months. Six taxa comprised 90% of the total numbers/m³: the polychaetes Polydora lignii, Streblospio benedicti, and Mediomastus ambiseta, the gastropod Crepidula sp., bivalve larvae (not always identifiable to species), and the barnacle Semibalanus balanoides. Spacial and temporal variation in abundance will be discussed in relation to physical factors and phytoplankton abundance and composition.

Franz, D.R. Dept. Biology, Brooklyn College, City University N.Y.
JAMAICA BAY MACROBENTHOS: SEASONAL AND SPATIAL VARIABILITY

Macrobenthos was sampled at 27 sites at four seasons from October 1982 through November 1982. Cluster analyses and Principal Components Analyses indicated that although spatial and species groupings were weak, an underlying sediment-correlated structure persisted at all seasons. Weak station groupings resulted from great seasonal and local variability in abundance of a few dominant taxa. Species Richness was a persistant station correlate, but SR and Dominance were uncorrelated. Dominance (but not SR) was correlated with % Mud. Species Richness in the mud-bottom community was correlated both with %TOC and heavy metals concentrations.

Gould, D.M., Environmental Science Dept., University of
Massachusetts/Boston, Boston, MA.
EPIPELIC DIATOMS OF SAVIN HILL COVE INTERTIDAL

The intertidal area of Savin Hill Cove, Boston Harbor is characterized by a 90,000 m² mudflat which supports a population of infaunal invertebrates and sediment diatoms. This study in progress proposes to characterize the species composition and population density of the diatom community via biweekly sampling (February 1986 - May 1987) and to measure the in situ production and growth rate of the sediment diatoms via carbon-14 incorporation into chlorophyll a, a method developed for phytoplankton (Redalje and Laws, 1981) and modified in this study for micro-phytobenthos.

Gypson, L.A., Marine Sciences Institute, Univ. of Connecticut, Avery Point, Groton, CT 06340.
THE AUTECOLOGY OF AN ESTUARINE DEPOSIT FEEDER, SACCOGLOSSUS KOWALEWSKYI (HEMICHORDATA: ENTEROPNEUSTA).

Though the acorn worm Saccoglossus kowalewskyi can be a common member of northeastern estuarine and tidal flat infaunal communities, there is little ecological information on the species. Sediment reworking rates and population data were obtained from a population located in a small estuary in southeastern Connecticut. In situ sediment reworking activity appears to be related to water temperature, with maximal activity occurring during the spring and fall. Laboratory data tend to confirm this pattern. Reproductive activity also occurs during the spring and fall. Growth rates of the young worms are slow, and adult population density is remarkably stable.

Hampson, G. R., Biology Department, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.
SUBDIVISION CONTROL LAW IN MASSACHUSETTS AND ITS ULTIMATE NEGATIVE IMPACT ON INSHORE MARINE ECOSYSTEMS.

As a result of the inadequacies and lack of responsiveness of the Massachusetts subdivision control law and related Board of Health regulations, harbors, estuaries and embayments in southern Massachusetts are experiencing environmental stresses and deterioration of our marine water quality without precedence. Views and opinions are derived from the speaker's 11 years served on a planning board in one of these coastal towns. Presentation will explain how these laws have affected the type of science we do and how they have effected our marine resources.

¹Heck, K. L., ²K. W. Able, ³M. P. Fahay and ²C. T. Roman. ¹Marine Env. Sci. Consort./¹Univ. of South Alabama, ²Rutgers Univ., ³NMFS.

First year results of a multi-year study of eelgrass meadows in the Cape Cod National Seashore demonstrate that the mobile macrofauna of these meadows differs qualitatively from that of the better known mid-Atlantic meadows in North America. For example, 10 of the 22 fish species taken at Cape Cod, including the first and sixth most abundant species, were not even recorded in a three year study of Chesapeake Bay eel grass habitats. Regional comparisons indicate that the role of eelgrass is less apparent for economically important species in Cape Cod grass beds than in other Atlantic coast study locations.

Kelley, Joseph, Maine Geological Survey, State House Station #22, Augusta, Maine.
ESTUARINE AND SHELF SURFICIAL SEDIMENT VARIABILITY ALONG THE SOUTHERN MAINE COAST.

Seafloor heterogeneity is assessed on the basis of more than 1000 bottom samples, 1000 kilometers of side-scan sonar and seismic reflection profiles, and 10 submersible dives. Regional variation in surficial sediment texture, carbon, and carbonate content is best understood in the context of sediment redistribution during late Quaternary sea-level changes across a bedrock-framed coastal zone. Bathymetrically-defined regions of differing surficial sediment include Nearshore Ramps, Shelf Valleys, Nearshore Basins, and Outer Basins. Evidence for the transfer of sediment from terrestrial and estuarine regions to the shelf includes beach erosion and ripple-scoured depressions off sandy bays, and landslides and submarine slumps along muddy embayments.

Kipp, Katrina. US EPA Region I, JFK Federal Building, Boston, MA 02203
THE NARRAGANSETT BAY PROJECT: AN UPDATE

In 1985, the National Estuary Program was established by Congress, with the goal of improving the quality of estuaries. Narragansett Bay was designated as one of the estuaries to participate in this EPA program. The purpose of the Narragansett Bay Project is to evaluate the water quality pollution problems *in* Narragansett Bay through research, and to develop a comprehensive management plan in order to protect and improve the estuary. The Narragansett Bay Project, a five year joint project sponsored by the U.S. EPA and the Rhode Island Department of Environmental Management, is starting into its third year of funding. Research projects funded *in* the first year are nearly completed and preliminary results are being evaluated. Presentation of available results to date will be made and implications for management of Narragansett Bay discussed. An overview of current and future research efforts will also be presented.

Langton, R.W., Maine Dept. of Marine Resources, W. Boothbay Harbor, ME 04575
SEA SCALLOP BED STUDIES USING MANNED SUBMERSIBLES.

In 1984 a study of offshore scallop beds was initiated in the Gulf of Maine using manned submersibles. To date, three scallop populations have been surveyed and documented photographically. These populations occur on Jeffreys Ledge, Fippennies Ledge and Platts Bank in 200 to 300 feet of water. The photographic data, together with video and direct observations are being utilized to describe the scallop bed structure. Scallop density and patchiness as well as substrate and associated macrobenthos are being quantified. In one instance, on Jeffreys Ledge, the experimental site was surveyed before and after extensive scallop dragging had occurred. This paper will describe these data, comparing the different scallop beds and the effects of harvesting, as well as discussing allied, ongoing, research on scallop ecology in the Gulf.

Logan, J., Bigelow Laboratory for Ocean Sciences, McKown Point, West Boothbay Harbor, ME 04575, THE LEGACY OF HENRY BRYANT BIGELOW
From 1912 -1924, Henry Bryant Bigelow gathered data on the fishes, plankton, and hydrography of the Gulf of Maine. The three book-length monographs that resulted have been called "the foundation of modern oceanography in the coastal waters of the United States." Bigelow's approach to the study of the sea in the 1920s and 30s is at the root of interdisciplinary studies conducted by oceanographers worldwide today.

Macfarlane, S.L., Town of Orleans Shellfish Department, Orleans, MA.
MARINE RESOURCE MANAGEMENT - A FUNCTION OF LAND USE PRACTICES

More than 3500 acres are closed to shellfishing on Cape Cod due to bacterial contamination with another 1000 acres borderline. Every town is now or has recently been affected. The present closures determine where propagation efforts are feasible and what areas should be monitored as trouble spots. In addition to direct closures, ponds and embayments are experiencing effects of eutrophication and the resulting concomitant habitat degradation. Shellfish managers must try to protect the resources within the constraints imposed by land use practices.

Martin, B., Grad. Sch. Ocean., Univ. of R.I., Narragansett, R.I.
STRANGE ATTRACTORS SUGGEST WE ARE WASTING TIME TRYING TO PREDICT SOME FISH POPULATIONS

Populations exhibiting the characteristics of strange attractors are inherently unpredictable. These populations are governed by deterministic processes yet, paradoxically, appear as if they were controlled by random events. No amount of study can defeat this paradox. Recently developed graphical techniques are applied to two sets of fish population data. Winter flounder in Mount Hope Bay may belong to the strange attractor category. If so, their populations may never yield to prediction. In contrast, Chesapeake Bay striped bass young-of-the-year should be predictable.

McAlice, B.J., Ira C. Darling Center, Univ. of Maine, Walpole, Maine
04573. MICROZOOPLANKTON DISTRIBUTION IN THE SHEEPSCOT RIVER ESTUARY.

Total zooplankton abundance was typically $>10^4 \text{m}^{-3}$; meroplankton were less numerous by 1-2 orders of magnitude. Copepods were dominant year round at the seaward station, but yielded dominance seasonally to rotifers and especially to tintinnids landward. Five genera of copepods, out of 20 which occurred, accounted for $>80\%$ of copepod numbers year round. Acartia was dominant during the warm half of the year, Microsetella in the cool half. At the seaward station, adults alone of Microsetella accounted for $>1/3$ of all zooplankton numbers.

McCrimmon, Donald A., MDI Biological Lab, Salsbury Cove, ME 04672
THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY: INTRODUCTION AND REVIEW.

The MDI Biological Lab is an independent marine and freshwater biological station located on the coast of Maine near the mouth of the Bay of Fundy. The relatively undisturbed ecology of the Mt. Desert area, and its fauna, provide a unique setting to investigate a wide range of fundamental biological questions. MDIBL is recognized worldwide as a center for investigations of renal and osmoregulatory physiology of local species, as well as various aspects of epithelial transport. Recently, the Laboratory has also established a Center for Membrane Toxicity Studies for the critical investigation of the effects of various pollutants, especially heavy metals, on membrane transport. Founded almost 90 years ago, the Laboratory looks to a future of continuing excellence in biomedical and environmental research.

Menzie, C.A., Charles Menzie S. Associates. Westford. MA.
THE GASLIGHT ERA, COAL TARs, PAHS, ESTUARIES, AND RISK
ASSESSMENT - HOW DO THEY FIT TOGETHER?

An overview is provided of a current issue related to historical (19th early 20th century) activities that have resulted in residual contamination at a number of sites throughout the country including some estuaries. This is used as a framework for illustrating how information is being used (wisely or unwisely) to carry out risk assessments associated with estuarine contamination.

Monahan, Rosemary. U.S. Environmental Protection Agency, Region I, J.F.K. Federal Building, Boston, MA 02203. THE LONG ISLAND SOUND STUDY

In 1985, concerns over the health of our coastal environments prompted Congress to establish a National Estuary Program designed to improve the quality of estuaries of national importance. Long Island Sound was selected as one of these estuaries, and the EPA was charged with establishing the study. In the first year of the study, historical data on contaminants in organisms, sediments, and water were examined to look for trends in environmental quality. For some contaminants in some media (e.g., cadmium, copper, and zinc in oysters), levels dropped between 1972-1974 and 1985-1986. In contrast, many other measures show a deterioration in health of the Sound. For example, in the second year of the Study, research on hypoxia in bottom waters revealed that much of the Sound as far east as New Haven was hypoxic in August 1986. Results will be discussed.

Ruber, E. Dept. Biology, Northeastern University, Boston, MA 02115. TEN YEARS OF THE ZOOPLANKTON OF THE ESTUARINE LAKES OF THE CLOUDS, NEW HAMPSHIRE IN THE LAST WEEK OF AUGUST: LONG-TERM SAMPLING WITH A VENGEANCE. Zooplankton was sampled once a year at one station on each lake. This was done for the years 1977 to 1986. In 1986 the lakes were sampled at one station on 4 dates and on one date at 4 stations. These results are compared for trends and for similarities with a previous survey done by Buchanan and Haney in 1974.

Selvin, R.C., T. Skinner and R.R.L. Guillard. Bigelow Laboratory for Ocean Sciences, W. Boothbay Harbor, ME 04575. THE PROVASOLI-GUILLARD CENTER FOR CULTURE OF MARINE PHYTOPLANKTON: STRUCTURE, FUNCTION, AND FUTURE.

The CCMP maintains cultures previously held at other institutions in the U.S. and abroad. Its mandate is to acquire, hold and distribute important marine strains, collect and distribute relevant information, and provide materials and facilities for ancillary research. Governance is by an Advisory Committee (unpaid) and the Director. Present staff is four. Funding through NSF for the "Core Facility" extends into 1990. The staff participates in instruction, ancillary research through grants and collaboration, methods for improving culture maintenance, and undertakes specific tasks for fees. Expansion of the facility to house a polar collection is planned.

Short, P.T., D. Porter, and L.K. Muelhsteln Jackson Estuarine Laboratory, UNH, Durham, NH and Botany Department, University of Georgia, Athens, GA

THE CAUSE OF THE CURRENT EELGRASS WASTING DISEASE

Eelgrass, *Zostera marina*, the submerged marine vascular plant that forms the basis of extensive estuarine and coastal ecosystems, is currently subject to a disease similar in symptomatology to the famous wasting disease of the 1930s. The current disease is found from Nova Scotia to North Carolina along the Atlantic coast of the U.S., and in Puget Sound, Washington, and has resulted in major declines of eelgrass in Great Bay, NH and Cape Ann, MA. As in the 1930s, the disease first occurs as small black-brown lesions on otherwise healthy eelgrass leaves. The lesions coalesce to form large, necrotic areas. Through completion of Koch's postulates, we have shown that the slime-mold-like protozoan *Labyrinthula* is the causal organism of the disease. We have isolated this organism from infected eelgrass from New Hampshire, North Carolina, and Washington. Our studies of the current wasting disease and disease-related eelgrass declines are continuing.

Shumway, S.B.^{1,2}, D.J. Crisp^{1,2} and N.J. Steneck¹, ¹Dept. of Marine Resources and ²Bigelow Laboratory for Ocean Sciences, W. Boothbay Harbor, ME and ³Ira C. Darling Center.

Walpole, NS. SPECIFIC DYNAMIC ACTION AND FOOD PREFERENCES IN PERIWINKLES

Respiration rates of starved periwinkles of the two intertidal species, *Littorina littorea* and *Littorina obtusata* increased by 40% to 60% when fed on their preferred algal food for one hour, or after having been exposed for the same period to an aqueous extract of the alga. *L. littorea* responded to the green alga *Enteromorpha intestinalis* alone but *L. obtusata* responded to the ubiquitous brown alga, *Ascophyllum nodosum*, strongly and to a lesser degree to *Enteromorpha*. By analogy with other molluscs, preprandial energy expenditure is believed to be transient and very small.

In choice experiments with both species of periwinkle present, the relative preference of *L. littorea* over *L. obtusata* for *Enteromorpha* over *Ascophyllum* was repeatedly demonstrated and under various conditions, *L. littorea* chose also the green alga *Ulva lactuca* and micro algae on intertidal stones when offered. *L. obtusata* specifically chose brown algae of several species. Neither gastropod positively chose any of the red algae offered.

The stimulus causing a rise in metabolic rate by algal extracts is thought to be chemical, but in nature it occurs only when the gastropod is in close contact with its verdure of choice, and normally results in feeding activity. Unlike carnivorous gastropods, there is no obvious locomotor stimulus nor any orientation to current or smell. Algae are found by random walk, and the winkles remain to feed on preferred species.

The components of specific dynamic action are thought to be chiefly biosynthetic costs and digestion and assimilation costs. Reasons are given for believing that food searching, feeding movements of the radula, deamination, and excretion are not important contributions.

Stevenson, D.K., Maine Dept. of Marine Resources, W. Boothbay Harbor, ME and R.L. Knowles, Bigelow Laboratory for Ocean Sciences, W. Boothbay Harbor, ME.

PHYSICAL CHARACTERISTICS OF HERRING EGG BEDS ON THE EASTERN MAINE COAST

Two herring egg beds were surveyed on the eastern Maine coast in September 1986 using a small, remotely-operated, underwater vehicle (ROV) equipped with a video camera in combination with SCUBA divers and a benthic grab sampler. Eggs at one site were distributed over 1 km² in depths of 20-35 m on a shell fragment/gravel/sand substrate. A dense egg mat 1-3 cm thick covered a large portion of the egg bed. Where spawning was most intense, eggs were deposited at a density exceeding 300/cc and 7 million/m². Egg mortality and differences in egg development rates at the top and bottom of the egg mat were negligible. The eastern Maine coast appears to provide optimum conditions for herring egg deposition and survival.

Strobel, C.J. and M.A. Heber, Science Applications International Corp. c/o EPA ERL-N, and S.C. Schimmel, U.S. EPA, ERL-N, South Ferry Road, Narragansett, RI 02882.

GREENWICH COVE, RI - A CASE STUDY IN EFFLUENT TOXICITY TESTING.

During 1985 and 1986 a toxicity study was conducted on the effluent from a Rhode Island secondary sewage treatment facility. Toxicity testing was performed during 3 seasons using tests developed by the EPA Effluent Program. The toxicity tests were all rapid, sub-chronic tests utilizing species from 4 different phyla. Tests were performed both on the effluent and the estuarine receiving waters. Concurrent dye studies were conducted in each case to estimate the effluent concentrations of the receiving waters tested. The most sensitive test method indicated toxicity at concentrations of less than 1 % effluent. Using the dye data, the toxicity of the effluent and receiving waters were compared.

Townsend, D.W., Bigelow Laboratory for Ocean Sciences, W. Boothbay Harbor, Me.

PRODUCTION AND MODES OF NUTRIENT SUPPLY TO THE INNER GULF OF MAINE

The annual flux of new nitrate into the Gulf of Maine via the deep water flow through the Northeast Channel is ca. 1.29×10^{12} g N yr⁻¹ (based on 270 days). It is argued that how, where and when this nitrate from deep water makes its way up into the euphotic zone and into phytoplankton can have important consequences for the ensuing trophic dynamics. A first order accounting of those processes is given by assessing the relative importance of: 1) Winter convective overturn, 2) Eastern Gulf of Maine upwelling, 3) Vertical eddy diffusion through the thermocline, 4) Cross-frontal mixing on Georges Bank, 5) Upwelling onto the S.W. Nova Scotian shelf. These processes can account for a vertical nitrate flux of about twice that which enters through the Northeast Channel, and explain a Gulf-wide average primary production (new and recycled) of between 240 and 315gC m⁻²yr⁻¹.

Vandal, G.M., Dept. of Marine Sciences, Univ. of Conn., Groton, CT.

MERCURY IN THE WATERS OF NARRAGANSETT BAY

Total (dissolved and particulate) and dissolved mercury (Hg) concentrations were determined in the estuarine waters of Narragansett Bay during a synoptic survey. Total and dissolved Hg, which decreases in a linear manner with increasing salinity, exhibited conservative behavior in the estuary. The dissolved Hg concentrations ranged from a fresh water value of 4.2 mg/l (volume weighted mean of multiple sources) to 0.4 mg/l in the seawater endmember. Total Hg concentrations ranged from 4.6 mg/l in the estimated fresh water endmember to 1.1 mg/l for seawater. A strong linear correlation was found between total Hg and turbidity, which suggests that particles play a substantial role in the transport of Hg in Narragansett Bay. In addition, the estuarine distribution of Hg was similar to other trace metals measured in this survey.

Wiltse, Wendy. Buzzards Bay Project, US EPA, JFK Bldg., Boston, MA 02203
BUZZARDS BAY PROJECT: AN UPDATE

The Buzzards Bay Project, sponsored by the U.S. Environmental Protection Agency, is beginning its third year of funding. The purpose of the Project is to evaluate the water quality pollution problems in Buzzards Bay through research, monitoring, and review of historical information, then to develop a comprehensive management plan in order to protect and improve the estuary. Available results will be summarized and implications for management of Buzzards Bay discussed. An overview of current and future research and implementation efforts will also be presented.