

New England Estuarine Research Society

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Milford, Ct.*



Auster, P.J., NOAA's National Undersea Research Program, Univ. of Conn. at Avery Point, Groton, CT 06340. RESPONSE OF MEGAFUNAL PREDATORS TO SYNCHRONOUS SETTLEMENT OF SESSILE PREY.

Direct underwater observations by biologist-divers have revealed small scale aggregations of high density prey greatly influence nearfield predator populations. Synchronous and aggregative settlement of benthic prey provide a short term prey pool which requires little or no search time once the patch is located by predators, thus facilitating prey capture. Grasping/crushing predators often forage on aggregative prey laterally along established fronts (the interface between a prey and non-prey area) which presents easier access to individual prey items. Non-grasping predators are not apparently selective to individual prey position within prey aggregations. Predators aggregate in prey patches, rapidly depleting prey densities to nearfield or lower densities. These predation events are highly localized, have short temporal scales, and have profound effects on the distribution and subsequent growth of prey species.

Berounsky, V.M. and S.W. Nixon, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02892-1197
RATES OF NITRIFICATION ALONG AN URBAN ESTUARY AND AN EXAMINATION WITH RESPECT TO ENVIRONMENTAL PARAMETERS.

Measurements of the rate of nitrification have been made along a transect of the Narragansett Bay Estuary. Sampling sites were in the freshwater Blackstone River (high ammonia concentrations), in the upper Providence River (salinity ~22‰, near most anthropogenic ammonia inputs to Narragansett Bay) and in mid-Narragansett Bay (salinity ~30‰, less anthropogenic input, lower nutrient concentrations). Both indirect carbon-14 methods and direct nitrogen-15 methods have been used. Rates are generally higher in the rivers than in the Bay, though there was no trend with salinity. Measurements made during the summer and fall indicate a seasonal trend, with rates decreasing as water temperatures decrease. There also appeared to be an inhibition of nitrification rates at higher oxygen values, a trend found also for weekly nitrification rates calculated from two years of data on nutrient-enriched MERL mesocosms.

Bireley, Linda E., John A. Castleman and Dorothy B. Haggan, Northeast Utilities Environmental Laboratory, Waterford, Connecticut.
AN UNUSUAL DECLINE OF ICHTHYOPLANKTON ABUNDANCE IN EASTERN LONG ISLAND SOUND DURING THE SUMMER OF 1984.

We used a seven-year record of weekly ichthyoplankton data to develop mathematical descriptions of the expected fluctuations in the log-transformed abundances of larval anchovies (Anchoa spp.), Gunner (Tautogolabrus adspersus), and tautog (Tautoga onitis) in the vicinity of the Millstone Nuclear Power Station (MNPS). From these models we projected an 'envelope' of expected log-transformed abundances for 1984. We observed that ichthyoplankton densities increased as expected through June and early July 1984, but that they decreased more rapidly and earlier than projected by the models. We also observed that other zooplankton seemed less abundant and ctenophores seemed more abundant than historical levels and we attributed the decrease to increased predation, although other environmental factors could certainly contribute. These subtle changes in the patterns of fluctuations of ichthyoplankton would have been undetected if no long-term monitoring data were available.

Boothman, Warren S. and Fasching, James L., Science Applications International Corp., c/o U.S. EPA, Narragansett, R.I. CHARACTERIZATION OF TRACE METAL ASSOCIATIONS WITH POLLUTED MARINE SEDIMENTS BY SELECTIVE EXTRACTIONS.

In order to characterize the associations of trace metals with particulate matter in polluted marine sediments, samples from dredged material removed from Black Rock Harbor, Connecticut and sediments from the dredge dumping site in Long Island Sound collected subsequent to the dump have been sequentially extracted with a series of increasingly reactive solutions. The solutions correspond to a range of conditions under which different sediment phases can be solubilized. Variations in the distribution of metals among sediment phases with time and depth in the sediment as determined by this scheme will be presented and results discussed with regard to remobilization of metals from the sediments and redistribution of particulate-bound metals among the sediment phases.

Boucher, J., Graduate School of Oceanography, Univ. of Rhode Island, Narragansett, RI. REMINERALIZATION OF BIOGENIC SILICA IN MESOCOSM TANKS

Recycling rates of biogenic silica in estuaries are poorly known. This is due in part to the difficulty of measuring small amounts of skeletal Si in rapidly accumulating terrigenous sediment. It is also because the time since deposition of biogenic Si is difficult to assess. The amount of Si that is recycled in the water column is also not well known. The on-going silica addition experiment at the Marine Ecosystems Research Lab, Narragansett Bay, is an opportunity to study silica remineralization in a simulated estuarine system with fewer of these problems. During this experiment, daily additions of dissolved Si, N and P are made to eight tanks with four other tanks as controls. Six tanks have no bottom mud. Bottom detritus (floc) was sampled throughout the experiment in tanks without mud and its Si content was measured. The floc in the addition tanks is siliceous (5-20 wt.% SiO₂) and is the major sink for added Si. Over 50% of the floc Si was re-mineralized during fall and early winter. Si/C ratios in the floc reflect inputs of water column particulates with similar ratios.

Bricker Urso, S., Grad. School Oceanography, Univ. R.I., Narragansett, R.I. THE HISTORY OF METALS POLLUTION IN THE PROVIDENCE RIVER AND NARRAGANSETT BAY AS RECORDED IN MARSH SEDIMENTS

The Industrial Revolution in R.I. began in the city of Providence, located at the head of the Providence River. Many of the first manufacturers were metal based and discharged their wastes into the Providence River, as they do today. As a result, heavy metals from industrial wastes have accumulated in Providence River marsh sediments and have been transported down-river into Narragansett Bay marsh sediments as well. This study is designed to examine the impact of the past 200 years of industrialization by analyzing the sedimentary metals record in Providence River and Narragansett Bay marsh cores.

Results of metals analyses and Pb²¹⁰ dating of an upper and mid-Providence River core and an upper Narragansett Bay core show an increase in inputs of Pb, Cu, Zn to the marshes from the 1800s to the mid-1950s. The metal inputs have decreased since then. The metals data correlates well with industrialization and human activity in R.I.

Chinman, R.A.L, Graduate School of Oceanography, URI, Narragansett, RI.
PHOSPHATE FLUX IN AN OXIC-ANOXIC ESTUARINE MICROCOSM.

Phosphate fluxes from two replicate Narragansett Bay sediment cores were monitored over time under a variety of conditions. Both cores were isolated from the atmosphere and until anoxic conditions were reached the flux of PO_4 from the sediment was 0.6 and 0.4 $\mu\text{moles m}^{-2}\text{h}^{-1}$ (all reported fluxes are time weighted averages). After near-anoxic conditions were attained and until a zero flux was reached, the PO_4 flux averaged 1.0 and 3.2 $\mu\text{moles m}^{-2}\text{h}^{-1}$, respectively, in the two cores. The PO_4 supplied from each of the cores came to 2283 and 7004 $\mu\text{moles m}^{-2}$, respectively. Core 1 was then exposed to the atmosphere. As O_2 levels increased (from 0.2 to 4.3 $\text{mg O}_2 \text{L}^{-1}$), PO_4 disappeared from the overlying waters at a rate of 4.5 $\mu\text{moles m}^{-2}\text{h}^{-1}$. Though this loss of PO_4 from the overlying waters was rapid, it accounted for only a small fraction of the PO_4 released from the sediments. As O_2 levels increased further (to 7.7 $\text{mg O}_2 \text{L}^{-1}$), the direction of the flux reversed and PO_4 appeared in the overlying waters at a rate of 4.6 $\mu\text{moles m}^{-2}\text{h}^{-1}$. In Core 2, after the flux of PO_4 from the sediments had reached zero, the high PO_4 , anoxic overlying water was replaced with low PO_4 , anoxic water. PO_4 was then released from the sediments at a rate of 6.5 $\mu\text{moles m}^{-2}\text{h}^{-1}$.

Christian, M. B., Cadet 1/c, U. S. Coast Guard Academy, New London, CT.
06320 OBSERVATION OF NORTH ATLANTIC CURRENTS USING TIROS OCEANOGRAPHIC DRIFTERS.

Tiros Oceanographic Drifters (TOD's) are LaGrangian drifters containing satellite-trackable transmitters which relay some ten position fixes per day. During 1983, 84, and 85, the U. S. Coast Guard deployed TOD's near the Grand Banks, and, as of February 1986, eight of these had reached western Europe. This information was used to determine general circulation patterns and possible explanations for these patterns in the North Atlantic, east of forty degrees west longitude. These same analytical techniques can be applied to estuarine current drogoue studies.

Giblin, A.E. The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA, 02543. PYRITE FORMATION IN SALT MARSH SEDIMENTS.

Large cores were removed from Great Sippewissett salt marsh and allowed to drain to remove pyrite by oxidation. After the cores stopped producing acid the top 5 cm was removed and replicate sub-cores were taken. These sub-cores were placed back in the field in a homogeneous stand of short Spartina during July. Four months later the cores were collected and the concentration of pyrite in the cores was measured. All cores showed an increase in the pyrite concentration, however the increase varied by a factor of five between cores. This experiment shows pyrite can form rapidly under the conditions found in salt marsh sediments. Net pyrite formation in salt marsh sediments can show considerable variability on the scale of just a few meters.

Hughes, J.E., Graduate School of Oceanography, University of Rhode Island, Kingston, RI. BIOGENIC SEDIMENT HABITAT MODIFICATION: CONVEYOR BELTS, CEMENT, AND COMMUNITY DEVELOPMENT.

The surficial benthos in central Narragansett Bay appears to undergo an annual summer decline in abundance and species diversity, followed by a recovery in fall. Mediomastus ambiseta, a small capitellid polychaete, is the numerically dominant macrofaunal species. Its sediment reworking activities are predicted to influence recruitment success of cohabitant fauna, contributing to the seasonal pattern of community change.

Jackson, S.K., Graduate School of Oceanography, Univ. of Rhode Island, Narragansett, Rhode Island. Particulate Carbon and Copper Relationships in an Experimental Mesocosm.

There is evidence in the literature for a correlation between the concentration of trace metals and particulate organic carbon, suggesting the importance of particulate organic matter (POM) as a carrier phase for metals. POM is a composite of many types and sizes of living and detrital particles. The proportion of carbon to nitrogen and chlorophyll will vary depending upon the nature of the particles. There is little information on the importance of different size classes of particles in metal and carbon associations.

A sequential filtration scheme was used to size fractionate suspended particulate matter (spm) and the association of trace metals with carbon, nitrogen, and chlorophyll investigated. Samples were collected from mesocosms in which experiments were being conducted to examine the effect eutrophication in a coastal marine environment. Results to date indicate that the concentration of copper on the particles is a variable function of biological activity with concentrations ranging from .1 to 1.2 nmol_{Cu}/mg spm.

Kelly, S., Marine Sciences Institute, University of Connecticut, Groton, Connecticut. ASPECTS OF THE LIFE HISTORY OF PINNOTHERES MACULATUS.

In samples of the mussel, Mytilus edulis, collected over a fourteen month period from Ram Island Reef (RIR) in eastern Long Island Sound, 98% contained the pea crab, Pinnotheres maculatus. Males and females were frequently found together in the same mussel except during summer months when females are ovigerous. A higher percentage of females than males was always observed. Only 10% of mussels from a nearby site, Latimer Light (LL) contain pea crabs.

The effect of tidal height on crabs was studied using these two stocks of mussels. The RIR group was larger, ranging between 6-8 cm in length while the LL group ranged between 4-6 cm. From September through January, mussels were hung from a dock in cages one foot off the bottom, one foot from the surface of mean high water (12 ft), and halfway between the two. Results indicate an apparent attrition of crabs from mussels held at the high intertidal level. The RIR mussels in the two deeper cages maintained the high prevalence of crabs. However, LL mussels experienced an increase in crab prevalence at the deeper depths October through December and a sharp decrease in January.

*Kerr, M. and J. Yantosh, Roger Ludlowe High School,
Fairfield, CT

OUR INTERNSHIP WITH THE 1985 SHELLFISH SURVEY OF THE COAST AND
TIDAL CREEKS OF FAIRFIELD, CONNECTICUT

McAlicie, B.J. Ira C. Darling Center, University of Maine.
SPECULATION: THE MAINE DIATOM FAILURE IN THE SPRING OF 1985.

The winter-spring diatom bloom in coastal and estuarine waters of Maine was abruptly interdicted in early February, 1985, after a normal start. Phaeocystis poucheti, a prymnesiophyte, which usually has a brief period of dominance in May, constituted more than 95% of the phytoplankton standing crop from February until May. I have no quantitative data, but will speculate that this floristic anomaly was the result of a prolonged drought which began in the summer of 1984.

Merrill, C. L., Boston University Marine Program, Marine Biological Laboratory, Woods Hole, MA. EFFECTS OF CHEMICAL POLLUTANTS ON THE BEHAVIOR OF A MARINE SNAIL.

More detailed knowledge of impacts of chemical pollutants in aquatic systems is needed, particularly in defining environmentally acceptable pollution levels and the ecological significance of changes resulting from perturbation. Alteration of chemically mediated behaviors in marine organisms may provide clues of ecological disruption. The marine predatory snail, Urosalpinx cinerea, uses chemical signals to locate prey from a distance. In the present study, sublethal effects of naphthalene and chlorine were demonstrated using detachment from substrate and alteration of chemically stimulated rheotaxis of U. cinerea as the criteria for impact. Chlorine at 0.14 ppm, 1.4 ppm, and 14 ppm and naphthalene at concentrations greater than or equal to 20 ppm caused snails to detach from the glass assay chamber walls. Naphthalene caused reduced rheotaxis, which would theoretically result_{1p} in reduced predatory efficiency, at concentrations as low as 0.02 ppm.

Podniesinski, G.S., Ira C. Darling Center, University of Maine. Short-term and long-term settlement of larval and juvenile Mytilus edulis L.

The settlement of larval and juvenile mussels was examined over consecutive tide cycles (short-term) and weekly or biweekly from May to October 1984. Experiments were carried out in a small, shallow embayment, Webb Cove, Stonington, Maine. Short-term settlement of larvae and juveniles off the bottom was greatest at mid-ebb and mid-flood. Larval set was concentrated in the middle of the water column (3-4 meters) while juvenile set was greatest at both the surface and middle of the water column (1-4 meters). Recruitment into the water column is probably the result of setting larvae and juveniles being swept off the bottom during periods of increased current velocity. Long-term settlement patterns indicate that settlement is dominated by primary (larval) set in June and most of July. Juvenile settlement becomes important in mid July and remains relatively dominant through October. Results of both short and long-term experiments indicate that juvenile settlement is common and may lead to a significant redistribution larval set.

Podniesinski, G.S. and B.J. McAlice. Ira C. Darling Center, University of Maine SEASONALITY OF BLUE MUSSELL LARVAE (MYTILUS EDULIS L.) IN THE DAMARISCOTTA RIVER ESTUARY, MAINE. 1969-1977.

The seasonal abundance of blue mussel larvae (Mytilus edulis L.) was examined at a station in the Damariscotta River estuary, Maine from October 1969 to September 1977. Occurrences of larvae coincided with temperatures above 10-12 C, suggesting a minimum temperature threshold for spawning. In seven of the eight years spawning occurred near a spring tide. Food availability did not appear to be limiting to either gametogenesis or the development of larvae.

Plugge, J. S., Cadet 1/co, U.S. Coast Guard Academy, New London, CT 06320
CALIBRATION OF REMOTELY SENSED SEA SURFACE TEMPERATURE DATA

Sea Surface Temperature (SST) data from remote sensing satellites are provided by the Fleet Naval Oceanographic Center (FNOC) to the U. S. Coast Guard International Ice Patrol for use in their iceberg decay model. Tiros Oceanographic Drifters are satellite-tracked, LaGrangian drift buoys which are annually deployed near the Grand Banks by the Ice Patrol. These buoys transmit position and in situ SST several times per day. Comparison of this in situ data with the FNOC data has provided a ground-truth calibration of the satellite information. The greatest variability between these data is associated with the Labrador Current and its convergence with the North Atlantic Current. This calibration study has improved the predictability of the iceberg decay model employed by the Ice Patrol and again emphasizes the importance of in situ observations for studies dependent on remotely sensed data.

Schubel, J.R., Marine Sciences Research Center, State University of New York at Stony Brook, Stony Brook, New York. THE NEW ERF.

The Estuarine Research Federation has taken on a new, important and exciting challenge: to transform ERF into the premier organization for estuarine professionals. Since membership now is coupled to subscription to our journal, ESTUARIES must be perceived as an important and high quality journal. It must become a favored outlet by estuarine scientists for their best papers. At present it is not; but the Governing Board is committed to correcting that deficiency. Two new individuals will be appointed as Co-Editors-in-Chief. The editorial board will be expanded in disciplinary scope and in geographical range. The journal format will be redesigned. Not all the changes in ERF will be in our journal. The objective is to make ERF more responsive to the needs and desires of its members and to put it in a position of national leadership in the estuarine arena. In this context, several new Standing Committees and Working Groups have been formed. With your help, ERF can't miss.

Shevenell, T.C. and F.E. Anderson, Dept. of Earth Sciences, University of New Hampshire, Durham, NH.
RAIN AND INTERTIDAL SEDIMENT RESUSPENSION.

Rain falling on the wedge of water, that floods and ebbs across the tidal flat, is an important physical mechanism in resuspending sediments. Results of controlled laboratory and field experiments suggest that estuarine sediment resuspension is proportional to the rainfall kinetic energy flux and drop size. The resuspension mechanism is hypothesized to be drop-formed vortex rings. The rain induced vortex rings serve as a detachment mechanism to resuspend fine-grained cohesive sediments to permit transport by weak intertidal currents.

Tettelbach, S.T., Marine Research Laboratory, University of Connecticut, Noank, CT. CRABS vs BAY SCALLOPS: EFFECTS OF PREDATOR AND PREY SIZE ON FEEDING RATES AND PREDATORY BEHAVIOR.

Laboratory experiments examined the size-specific interactions of 6-60 mm bay scallops, Argopecten irradians irradians, and nine species of crabs. Feeding rates declined as scallop size increased or crab size decreased. Rates of predation were consistently low on individuals larger than 40 mm, but scallops achieved only a partial size refuge from crab predation because even large adults (~60 mm) were sometimes attacked successfully. The sequence of predatory methods (crushing, partial crushing, chipping, prying) employed to subdue scallops of progressively larger shell size was highly consistent among different crab species. Analysis of the relative frequencies with which different scallop sizes were eaten suggested that crabs often selected prey on the basis of how easily their shells could be penetrated.

Wiltse, Wendy, Michael Connor and Katrina Kipp, U.S.
Environmental Protection Agency, Region I, Boston, MA
EPA REGIONAL BAYS PROGRAM: BUZZARDS BAY, NARRAGANSETT BAY,
AND LONG ISLAND SOUND

Zdanowicz, V.S., National Marine Fisheries Service, Sandy Hook
Laboratory, Highlands, N.J., 07732
MAJOR AND TRACE ELEMENTS IN SEDIMENTS OF NORTHEAST U.S. ESTUARIES

NOAA's National Status and Trends Program seeks to establish chemical and biological baselines in over fifty estuaries, harbors and reference sites throughout the U.S. using nationally standardized field and laboratory protocols. Results of determinations of seventeen metals in sediments collected in eleven sites in the Northeast during the first year of the program indicate that trace metal levels are not significantly enriched in most of the sites sampled. However, levels of several metals in samples from Raritan Bay and Boston Harbor are significantly elevated, while Salem Harbor sediments contained cadmium (9.4 ppm) and chromium (3000 ppm) at levels previously observed only at ocean dumpsites.

POSTER SESSION

Cristini, A., Saiff, E., and M. Schneider, Ramapo College of New Jersey, Mahwah, N.J. THE REPRODUCTIVE CYLCE OF MYA ARENARIA FROM LONG ISLAND SOUND AND RARITAN BAY.

The state of the gonads of the bivalve Mya arenaria was monitored in natural populations from Raritan Bay and Long Island Sound and in clams from Long Island Sound caged in Raritan Bay for eleven months. The water temperature, Adenylate Energy Charge (AEC), lipid and glycogen content of tissues was measured and correlated to the condition of the gonad. All of the animals, natural populations as well as caged were observed to spawn in March and in June. The AEC valves were lower for animals from Long Island Sound caged in Raritan Bay, however, their reproductive cycle was not affected by the alteration of their adenylate pools. The concentration of lipids in the tissues of all the clams decreased prior to both spawning periods. The glycogen content in all the animals was high from October-December and exhibited a gradual decline from January-August during gamete development and release.

Species Diversity of Invertebrate Macrobenthos in Jamaica
Bay, New York City - An Urban Estuary

By

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Jamaica Bay is bounded by the New York city boroughs of Brooklyn and Queens. Twenty-seven subtidal stations were sampled at four seasons. Of 121 taxa, 43% were polychaetes, 25% mollusks and 25% arthropods. The amphipod Ampelisca abdita contributed 44-50% of all individuals and dominated community assemblages in the eastern Bay. Twenty-seven ubiquitous species comprised a persistent core of species at most sites at all seasons. Species Diversity (H') ranged from 0.44 to 4.14 with baywide averages of 2.5-2.7. Species Richness and SD in Jamaica Bay appear generally comparable to other large nearby estuaries and densities of macrobenthos are, within the range of reported values for nearby, relatively unpolluted embayments. Biomass at all stations was dominated by mollusks, notably Mercenaria mercenaria and Ilyanassa obsoleta. Community composition varied with substrate and current velocity, but remained constant seasonally. Amphipods played a major role in structuring communities and probably are significant in foodwebs of fish and bird populations. High concentrations of heavy metals, high organic loads, and probably petroleum hydrocarbons are correlated with soft sediment, high-density amphipod assemblages. Further chemical deterioration of Jamaica Bay could reduce deposit-feeding amphipod populations, causing a serious decline in the quality of benthic communities in the Bay.

McAlice, B.J., Ira C. Darling Center, University of Maine.
THE MONSTRILLA MENACE.

Monstrilla helgolandica Claus is a parasitic copepod most of whose life is spent within the host pyramidellid snail. Only first nauplii and adults are free swimming. Since the 1950's, M. helgolandica females have undergone an exponential increase in size. Biological considerations suggest that this trend, if continued, will pose a threat to schooling fishes within the next few decades.