

**NEW ENGLAND ESTUARINE RESEARCH SOCIETY**

**Annual Spring Meeting**

**May 6-8, 1982**

**COLLECTED ABSTRACTS**

**American Legion Hall**

**Old Saybrook, Connecticut**

The Role of Magnetic Bacteria in the Cycling of Nitrogen and Iron.  
D. A. BAZYLINSKI\* and R. P. BLAKEMORE. Univ. of New Hampshire, Durham.

Aquaspirillum magnetotacticum strain MS-1 utilized  $\text{NO}_3^-$  and  $\text{NH}_4^+$  as sole nitrogen sources microaerobically but not anaerobically in a chemically defined growth medium.  $\text{NO}$ ,  $\text{N}_2\text{O}$ , and  $\text{NH}_4^+$  were produced by cells grown with 2 mM  $\text{NO}_3^-$ . Cells in nitrogen deficient medium reduced acetylene to ethylene. This activity was totally inhibited by addition of 0.2 mM  $\text{NH}_4^+$ , 0.2 mM  $\text{NO}_3^-$ , or more than 220 Pa $\text{O}_2$  in the headspace. The data indicate that this bacterium concomitantly carries out assimilatory nitrate reduction while denitrifying and that under nitrogen deficient microaerobic conditions may be able to fix dinitrogen. A. magnetotacticum synthesizes intracellular magnetite ( $\text{Fe}_3\text{O}_4$ ) from soluble (chelated) iron. Iron exists both in the reduced and oxidized states in magnetite. The reduction of ferric iron by dissimilatory nitrate reductase has been postulated. Thus nitrogen metabolism may be linked to iron reduction and magnetite synthesis in this organism. Although magnetic bacteria are common in freshwater and marine sediments, their role (s) in the cycling of nitrogen and iron, while potentially significant, have yet to be elucidated.

Observations Of Winter Predation By Asterias forbesii On Various  
Megabenthos Of Long Island Sound

Peter Auster  
University of Connecticut, Marine Sciences Institute Marine Research  
Laboratory  
P.O. Box 278, Noank, Connecticut, 06340

The literature indicates the common seastar, Asterias forbesii, is a major predator on oyster and mussel beds but also feeds on fish and any other food sources available. No mention is made of seasonal prey variations or prey species in relation to temperature. Diving observations between 1979 and 1982 in Long Island Sound and adjacent waters have revealed A. forbesii opportunistically switching prey species during low temperature regimes ( $-2^\circ\text{C}$  to  $5^\circ\text{C}$ ) to various megabenthic species (e.g., Callinectes sapidus, Cancer irroratus, C. borealis, Libinia emarginata, Argopecten irradians, Pagurus pollicaris). Predator-prey interactions are discussed in terms of prey densities and behavior at low temperatures.

An Evaluation of the Millstone Power Station Monitoring Program.  
I. Shore-zone Seines, 1969-1981.

Linda E. Bireley  
NUSCo Environmental Lab  
c/o Millstone Station  
P.O. Box 128  
Waterford, CT 06385

The Millstone Nuclear Power Station (MNPS) located in Waterford, Connecticut, consists of two operating electric generating plants and a third plant scheduled to begin operation in 1986. Northeast Utilities Service Company (NUSCo) has established an extensive monitoring program administered by the NUSCo Environmental Laboratory (NEL) to assess the impact of construction and operation of the power plants on indigenous fish populations. The seine sampling program, established in 1969 to monitor the shore-zone fish, consists of triplicate collections taken in the two hours preceding high tide at six stations in February, May, June, July, August, September, October and December. An evaluation of this program is currently in progress to determine if the shore-zone finfish assemblages are sampled adequately enough to describe their long term natural fluctuations and to distinguish these from plant induced changes. The analyses so far have indicated that the data base has a highly skewed distribution due to a high frequency of small catches and a low frequency of large catches. In addition, significant autocorrelations exist in the data base as well. These two characteristics limit the application of appropriate normal-theory statistical tests in detecting year to year changes. Further, during three-unit operation on the ebb tide, the thermal plume is expected to encompass nearby shore zones that previously were uninfluenced by this effect. A redistribution of sampling effort is suggested so that potentially impacted areas can be more intensively studied prior to the start-up of Unit 3.

LONG ISLAND SOUND DREDGED MATERIAL CONTAINMENT STUDY  
by

Gilbert L. Chase  
Impact Analysis Branch New England Division  
Army Corps of Engineers

Abstract

Long Island Sound has long posed special problems to marine navigation because of its large, sediment-contributing watershed and its importance as an avenue of water-borne commerce as well as recreational boating area. In the last decade difficulty has been encountered in completing dredging projects required to maintain rivers and harbors and keep them safe for commercial and recreational boat traffic. The major cause of this difficulty has been a growing resistance to the traditional open-water disposal method of dredge material.

In response, the Corps of Engineers, New England Division, has implemented a program to seek alternative ways of hauling dredged material. A priority alternative being considered is the possibility of developing dredged material confinement areas designed to accommodate portions of the Sound's dredged material load for a number of years.

Three types of confinement basins are receiving attention: (1) medium or small structures located along and attached to shorelines; (2) detached containment facilities located in shallow water (35 ft. or less) which, when filled, could become artificial islands; and (3) wetland habitat creation consisting of semi-enclosed areas. A key issue is the chemical and physical nature of the dredged materials which may be used for productive habitat creation or enhancement or which are heavily contaminated and will require complete confinement.

The authority to conduct this study is outlined in resolution of the Committee on Public Works and Transportation, U. S. House of Representatives sponsored jointly by three Connecticut congressmen and adopted 10 May 1977.

Preliminary site identification and screening has been completed for over 300 shoreline and shallow water locations. A series of public workshops at selected locations around Long Island Sound was held 18-21 May 1981 to inform special interest groups and the general public of the study.

Prototype environmental impact studies were initiated in August 1981 at two sites to determine the overall environmental and economic feasibility of the construction of such facilities. One site would represent a 100-180 acre semi-contained marsh creation project with a total land capacity of 971,000 cubic yards of material. The second site is an open-water, rocky shoal area which would require permanent dikes on all four sides to create an artificial island. Ecological, socio-economic and engineering data are discussed for each site and a comparative analysis to open-water disposal operations is made.

Grow-out of Juvenile Oysters (Crassostrea virginica) of Various Lines and Ages in Three Test Environments

J. Choromanski and S. Stiles

National Marine Fisheries Service  
Northeast Fisheries Center  
Milford Laboratory  
Milford, Connecticut 06460-6499

To explore possibilities for improvement of grow-out conditions for juvenile oysters and to compare particular stocks comprised of family and outbred lines of various sizes and ages under such conditions, growth experiments were conducted with the American oyster, Crassostrea virginica, in three test environments. Oysters were placed in lantern nets in an offshore location (1/2 mi offshore; 6-8 m deep), in trays suspended from an inshore dock area, and in tanks in a raceway system. Experiments were conducted for 6-8 months during the natural growing season in two consecutive years. Experimental stocks were counted, weighed, and measured at intermittent intervals for survival, weight, and shell-growth determinations.

Overall, there was acceptable survival (64-97%) at all sites in nearly all groups. However, the offshore site was significantly better ( $P < .05$ ) than the inshore sites for growth in all groups. Oysters from younger year classes (and usually smaller sizes) grew by a greater percentage than those from older year classes. There was a positive correlation between weight and linear measurements. There was no significant difference in growth related to genetic constitution of the lines studied.

GROWTH PERFORMANCE OF CYTOCHALAZIN INDUCED TRIPLOID AMERICAN OYSTERS AND SOFT-SHELLED CLAMS.

HIDU, \*Herbert, ALLEN, Standish, STANLEY, Jon,  
Department of Zoology, University of Maine at Orono,  
Orono, Maine 04469

In 1981 we conducted extensive laboratory and field performance trials with three year old triploid American oysters and yearling soft-shelled clams. With Crassostrea the triploid group which was created at meiosis I grew significantly faster than the within-group diploid animals, whereas those created later in the meiotic cycle showed no advantage over diploids. With Mya we noted no growth advantage with triploidy. Triploidy in either species-did not act to block gametogenesis. Optimal methods for determining the consequences of polyploidy are discussed.

GROUNDWATER INTRUSION INTO ESTUARINE SEDIMENTS: A CONVERSION FROM MARINE TO FRESHWATER MICROBIOLOGY. Mark E. Hines, Carey L. O'Donnell, Scott D. Hamberg, and Joyce B. Tugel. Jackson Estuarine Laboratory, University of New Hampshire, Durham.

Traditionally, sedimentary environments have been divided into horizontal biogeochemical zones depending on the utilization of specific terminal electron acceptors. On a volume basis, fine-grained estuarine sediments are dominated by sulfate reduction due to the abundance of sulfate in seawater. Methanogenesis is dominant in deeper marine sediments and in freshwater sediments. A rise in the groundwater table during the spring significantly dilutes seawater sulfate thereby increasing the importance of methanogenesis. This phenomenon is demonstrated by estuarine sediment depth profiles of sulfate, methane, and salinity, and determinations of the reduction of  $^{35}\text{S-SO}_4$  and the production of methane from  $^{14}\text{C-acetate}$  and  $^{14}\text{C-HCO}_3$ . Intrusion of groundwater into marine sediments not only changes microbial metabolism but may affect microbial distributions and speciation of sedimentary elements.

DOMINANCE AND DISTRIBUTION OF VASCULAR PLANT SPECIES IN  
ONE CONNECTICUT RIVER ESTUARINE MARSH

Marjorie M. Holland and Christine Romanowski  
Department of Biology  
College of New Rochelle  
New Rochelle, New York 10801

Vegetative structure and floristic composition of a brackish marsh in Essex, Connecticut, were assessed in late summer 1981. The marsh, known as Great Meadow, is located on the western bank of a pendant bar, approximately seven river miles upstream from the mouth of the Connecticut River. Successive zones of submergent, emergent, and high marsh vegetation were sampled using 0.25m<sup>2</sup> quadrats. Results indicate an increase in cover from submergent to high marsh zones. High marsh samples were most similar, dominated by Thelypteris palustris and Typha angustifolia in all instances. Several species were prominent in emergent zones, including Typha angustifolia, Mikania scandens, Impatiens capensis, Polygonum arifolium, and Zizania aquatica. Species diversity was lowest in submergent zones, where no single species exhibited prominence. Results suggest vegetational development has been predominantly influenced by an interaction of land use patterns, tidal fluctuations, and the salinity regime.

## Estuarine Circulation in the Lower Connecticut River

Horne, Gregory S., Patton, Peter C., and Sikes, Elisabeth L.,  
Department of Earth & Environmental Sciences,  
Wesleyan University, Middletown, Connecticut, 06457

### ABSTRACT

Tidal influence in the lower Connecticut River was observed through full tidal cycles under various conditions of discharge and tidal range during 1978-80. Under median to low river discharge conditions, tidal stage and flow reversals move upriver more than 70 km as propagating waves, reversal of flow retarded behind stage extreme. Asymmetry of tidal flow increases progressively upriver, ebb flow becoming longer and stronger than flood. Circulation and salinity distribution in the estuary are quite variable and fluctuate through most classes of commonly used estuarine classifications. During very low river discharge and abnormally high tidal range the estuary is nearly sectionally homogeneous, salt transport is dominated by diffusion, and the water column floods and ebbs uniformly. During median to low river discharge the estuary is partially mixed, diluted saline water intrudes some 15 km, and net non-tidal landward flow of bottom water dominates the mouth of the river. During mean to high river discharge the estuary varies from partially mixed, through stratified into three water masses, to typical salt-wedge conditions; advection controls the salt flux. Under higher river discharge conditions during spring freshet, saline water is fully flushed from the mouth of the Connecticut River and mixing occurs in a surface plume within Long Island Sound.



SOME EFFECTS OF DIGGING ON AN INTERTIDAL FLAT  
CONTAINING MYA ARENARIA

Thomas Hruby  
Massachusetts Audubon Society  
159 Main Street, Gloucester, MA 01930

Because of low yields and an increase in the number of commercial clambers, intertidal flats on the North Shore of Massachusetts are being dug more often, sometimes as often as once a week. To determine the effects of such intense digging on the infauna of a soft-shell clam flat (Mya arenaria), experimental plots of 6m<sup>2</sup> were dug at different rates in the Mill and Annisquam Rivers near Gloucester, Massachusetts. Plots were dug with a clam fork once, at monthly intervals, and weekly between May and September 1981, but contrary to regular clamming practice, the large clams (>51mm) were not removed to better measure clam mortality resulting from the digging. Two weeks after the last weekly digging, the clams and other infauna on all plots were sampled using two sample sizes: sediments from large quadrats, 400mm on a side, dug to a depth of 250mm were sieved through a 2.5mm mesh, and smaller cores (128 cm<sup>2</sup> by 200mm deep) were sieved through a 0.5 mm mesh. All dug plots had statistically fewer M. arenaria than the control, and clam survival was correlated with the digging intensity, but independent of clam size. From an initial density of 194 M. arenaria/m<sup>2</sup> (control), 131/m<sup>2</sup> were left in the plot dug once, 73/m<sup>2</sup> in the plot dug monthly, and 25/m<sup>2</sup> in the plot dug weekly. In the plot dug weekly, the only M. arenaria present were less than 8mm long, and do not represent survival, but rather a recruitment from adjacent areas. The smaller samples, which contained Polychaetes, Nemerteans, and Crustaceans as well as molluscs were compared using the Bray-Curtis similarity coefficient after a logarithmic trans-formation of the abundance data. A statistical analysis of the mean similarities between inter- and intra-plot samples indicate that the infaunal population on the plot dug once was the same as that in the undisturbed area, while the populations in the monthly and weekly dug plots were different; mostly due to the absence of the polychaetes, Arabella iricolor and Scolopelus robustus. The total diversity on the more heavily dug plots was about one-half of that found in the undisturbed flat.

Cycles of abundance in the bottom fishes of the Narragansett Bay area. H. P. Jeffries. Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881.

#### ABSTRACT

Winter flounder (Pseudopleuronectes americanus) in Narragansett Bay reached a peak in 1968 and then went into an 8-year decline, dropping to a third of previous abundances, as estimated by standardized, weekly tows. Meanwhile a succession of species peaked in the Bay's offing, Rhode Island Sound: first red hake (Urophycis chuss) in 1973, then ocean pout (Macrozoarces americanus) in 1974 and finally silver hake (Merluccius bilinearis) in 1974-76, but the only coastal migrant to enter the Bay substantially during this period was the scup (Stenotomus chrysops), which by 1976 had increased 13 times over its 1968 abundance, more than making up for the loss in total fishes caused by the demise of the winter flounder population. Since then the winter flounder population recovered sharply to former levels and scup dropped proportionately. The winter flounder's cycle appeared to be initiated by subtle climatic warming; the effect, however, must have been amplified by processes within the benthic community. Predation on larvae at metamorphosis may have accounted for the initiation of a winter flounder cycle that eventually affected all the major populations of demersal fishes in the Narragansett Bay area.

#### An Effective Method for Tagging Marine Worms

Bruce J. Joule  
Maine Department of Marine Resources  
Fisheries Research Laboratory  
West Boothbay Harbor, Maine 04575

Binary coded microwire has been used as a tagging tool with two commercially important marine worm species, Nereis virens and Glycera dibranchiata. Preliminary laboratory results show that there was a small initial loss of tags due to improper placement in the gut. Tags implanted in the coelomic cavity showed high tag retention and extremely low mortality rates. Field experiments will be conducted to assess the feasibility of using these tags for movement and population dynamics studies.

KIVIAT, ERIK. Hudsonia, Bard College, Annandale, New York.  
Marsh graminoids and forbs: different ecological function.

Emergent spermatophytes are grasslike (graminoids) or broad-leaved (forbs). Graminoids are Monocots (grasses, sedges, cattails, rushes, burreeds) and generally taller, creeping or tufted perennials. They have tougher aboveground tissues with higher levels of structural material (cellulose, silica). Forbs are Monocots or Dicots (various families), generally shorter, tufted or single annuals or perennials. They have weaker aboveground tissues with less structural material. Graminoids bear small wind-pollinated flowers but forbs often produce showy insect-pollinated flowers. A literature review suggests that graminoids are more productive, slower-decomposing, and make longer-lasting detritus. Forbs are mostly less productive and faster-decomposing, yielding short-lived detritus and much dissolved organic material, and they nourish different food chains. Animals feed less on living graminoid aboveground parts and more on underground parts; the reverse is true of most forbs. Graminoids are more prominent in more saline marshes. Disturbances, management, and other factors affect forb-graminoid competition and thus influence ecosystem function.

#### Rhythmic Activity Patterns in Fishes from a Boreal Salt Marsh

Peter Lamborghini  
Oceanography Program  
University of Maine at Orono  
Orono, Me. 04469

In order to provide a more complete understanding of the nature and importance of salt marshes as a particular ecological zone within an estuary, the seasonal, diurnal and tidal cycles of movement for a population of fishes in a northern salt marsh were investigated. Fish collections were made with a beach seine at monthly intervals over a one year period. Analysis of seasonal activity indicated fish species present all year round, with the exception of the coldest months; species present for short time periods in specific seasons; and species present only on high tides. Diurnal activity analysis revealed that species present all year round were active both day and night while those species present for shorter time periods were active primarily at night. Tidal activity analysis was less informative but suggested spring and fall as irregular, transitional times of movement into and out of the marsh. The seasonal use of the marsh can be characterized by the following groups: (1) residents, (2) summer periodics, (3) spring/fall periodics, and (4) tidal visitors.

Recent Advances Toward the Development of  
Fundy Tidal Power

Peter F. Larsen and Jerry A. Topinka  
Bigelow Laboratory for Ocean Sciences  
West Boothbay Harbor, Maine 04575

Interest in the generation of electricity by means of tidal power has been increasing at an accelerating rate. In the Gulf of Maine, one plant is under construction and three others are in the planning phase. The largest of these is the Minas Basin project which has the potential for producing 6,000 MW of electricity and a benefit to cost ratio of between 2.5 and 3.0. The economics of such a large project, however, dictate that up to 90% of the output must be sold to U.S. markets.

Construction of the Minas Basin project would have far-reaching environmental consequences which are not generally recognized. Principal among these is a 10% increase in the tidal range over much of the Gulf of Maine. The principal environmental implications of this tidal regime change are discussed briefly.

TRENDS IN POLYCHAETE SYSTEMATICS  
AND  
IMPLICATIONS FOR THE SELECTION OF NAMES FOR GEORGES BANK SPECIES

Charlene D. Long  
TAXON, INC.  
50 Grove Street  
Salem, Mass. 01970

A brief historical review of methods of observing polychaete diagnostic characters for the selection of species names precedes an analysis of the trends in the last 125 years in the use of European names vs regional-specific names for northwestern North Atlantic species. The review is concluded with an outline of the types of morphological characters that are currently of importance in the selection of names for some of the dominant species of polychaetes from Georges Bank, and the implications for the names currently being used in ecological surveys and the names likely to be used in the future.

## ABSTRACT

### The Habitats of New England Hydrobioid Gastropods,

presented by Michael Mazurkiewicz, Department of Biological Sciences,  
University of Southern Maine, Portland, Maine 04103

Four species of hydrobioid gastropods occur in New England estuaries, often in great abundance within shallow subtidal waters, on intertidal flats and in tidal marsh creeks or pools.

Each species occurs within a particular sector along the length of an estuary. These sectors are best characterized by biotic associates rather than physical conditions.

At their extremities, the sectors overlap. In an area of overlap, a pair of hydrobioid species coexist but may be spatially segregated by microhabitat differences. In no instance has more than two species been observed to overlap in distribution.

Salinity tolerances provide only partial clues to the causal mechanisms involved in the spatial patterns of hydrobioid habitats.

### CIRCULATION CHANGE IN AN ESTUARY:

### LIMITED EFFECTS ON ZOOPLANKTON ABUNDANCES

B.J. McAlice  
Department of Botany and Plant Pathology  
University of Maine

G.B. Jaeger, Jr.  
Dodge Cove Marine Farm

A causeway which had restricted tidal flows in a portion of the Sheepscot River estuary was removed late in 1974. This led to a nearly 50% increase in tidal flows in the main channel of the estuary, and to substantial decreases in salinity stratification and in the strength of the gravitational circulation.

Of nearly 500 taxa captured in a monthly zooplankton sampling program from 1970-1978, only 3% showed changes in abundance which might be related to the altered circulation regime. This suggests that the retention of zooplankton in estuaries is not finely tuned to the transport mechanism.

ADAPTIVE ECOLOGY OF SELECTED MACRO-  
INVERTEBRATES ASSOCIATED WITH GREAT MEADOW,  
CONNECTICUT RIVER

John A. Meehan and Patricia O'Brian  
Biology Dept., College of New Rochelle  
New Rochelle, New York 10801

Great Meadow in Essex, Connecticut, represents a transition of marsh habitats from fresh-water to brackish water. In September of 1981, macro-invertebrates were collected along transects at the upper, mid, and lower latitudes of the marsh. Six species were selected for study based on dominance, and distribution and diversity within a unique habitat. The organisms included one gastropod, four crustaceans, and one hydrozoan. Two of the crustaceans and the hydrozoan were identified as salt-water organisms; the other two crustaceans are classified as fresh-water inhabitants. Elevation profiles, of the three transects, and conductivity measurements, along the Connecticut River boundary on the east and along the North Cove boundary on the west, show a habitat and salinity dependence and tolerance within a single community. In order to determine the effects of a euryhaline environment on the selected crustaceans, static salinity bioassays have begun. Initial time-until-death studies will involve fresh-water Gammarus sp. and these organisms are expected to demonstrate salinity tolerance.

RETENTION OF Co-60 BY THE SEDIMENTS  
OF MONTSWEAG BAY, MAINE

by

Susan Murray

Box 113

Mattawamkeg, ME 04459

A sediment inventory for reactor-derived Co-60 revealed that 16 percent of the released Co-60 was retained in the sediments of Montsweag Bay, the effluent site for Maine Yankee Atomic Power Company. 45 percent of that activity was in three coves comprising 13 percent of the area. Probably no more than an additional 12 percent is present in the sediments of the surrounding Sheepscot River estuary, resulting in less than 30 percent retention of Co-60 within the entire estuarine system.

Adsorption of dissolved cobalt by fine grained suspended sediments over the range of pH, salinity, and suspended sediment concentrations reported to occur in the Montsweag Bay area ranged from 10 to 30 percent of a 1.0 ppb cobalt spike.

Adsorption of dissolved cobalt by fine grained suspended sediments coupled with the retention of those suspended sediments by the scour-settling lag reported to occur on mud flats over a tidal cycle (Postma, 1961) is postulated as the mechanism of Co-60 retention and localization in the coves of this estuarine system.

## THE DEVELOPMENT OF THE PATAGAUNSET TIDAL ESTUARINE MARSHES

Richard A. Orson, Department of Botany, Connecticut College  
New London, Connecticut 06320

The historic development of the Patagaunset tidal estuarine marshes, located in Niantic, Connecticut, based on organic and mineralogical sediment analysis has been proposed. This study includes the vegetation and geological changes in this marsh over the past ca. 3000 to 4000 years. A major thrust of this work has been the quantitative estimation of the species composition of roots and rhizomes preserved in peat. The model proposed is the result of analysis of over 100 peat cores representing a combined total of over 250 meters of peat.

## OCEANOGRAPHIC STUDIES OF THE SACO RIVER ESTUARY, BIDDEFORD POOL LAGOON, AND SACO BAY, MAINE

William W. Reynolds and Martha E. Casterlin, Gulf of Maine Marine  
Laboratory, Biothermal Research Institute, P.O. Box 192,  
Biddeford Pool ME 04006

We conducted oceanographic studies over a 2-year period of the Saco River estuary, Biddeford Pool lagoon, and Saco Bay, in order to characterize the seasonal hydrographic regimes and macrofaunal distributions. The estuarine salt wedge was most highly developed during the autumn, at high tide, while fresh water filled the estuary from top to bottom during the spring and at low tide, forming a seasonally and tidally fluctuating salinity regime. In the bay near the mouth of the estuary, seasonal salinities ranged between 10 and 30 ‰, while temperatures spanned a range of 0 to 16°C. Light extinction coefficients decreased seaward in the estuary, with the greatest decrease at about the 17 ‰ isohaline. Dissolved oxygen concentrations exceeded 5 ppm at all sampling locations except some isolated pools of the lagoon salt marsh at low tide. At least twice as many macrofaunal species were found in Saco Bay as in the lagoon or estuary, with the most ubiquitous species being the winter flounder Pseudopleuronectes americanus, the green crab Carcinus maenas, and the sand shrimp Crangon septemspinosa. Salinity and temperature appeared to be the most significant physicochemical factors governing macrofaunal distributions.

Ernest Ruber and Katherine Lafrance, Dept. Biology, Northeastern University, Boston, Mass. 02115. The Effects of the organophosphorus mosquito larvicide ABATE on The Respiratory Rate of a Salt Marsh Amphipod, Gammarus mucronatus.

### ABSTRACT

There is a continuing problem of the relationship of 24 hr. mortality data to longer range effects when studying the possible impact of a larvicide on non-target organisms. We have begun to ask the question whether this problem can be approached by assessing impact parameters other than mortality, in this case oxygen consumption. In this study we were able to detect a respiratory effect of ABATE dosages below those causing any 24 hr. mortalities.



# PATTERNS OF BEDLOAD TRANSPORT IN THE CONNECTICUT RIVER ESTUARY

Scatena, Frederick N., Patton, Peter C., Horne, Gregory S.,  
Department of Earth & Environmental Sciences  
Wesleyan University, Middletown, Connecticut, 06457

## ABSTRACT

Current velocities were measured at forty stations over full perigee-spring tidal cycles in the lower Connecticut River estuary.

Bed shear stress was calculated from the velocity profiles using the Karman-Prandtl velocity-shear stress relationship. Competent stream power was then calculated and integrated over the full tidal cycle to obtain the net non-tidal work on the bed. This provided an index of net bedload transport. This index was then combined with analysis of historic bathymetric charts, grain size data and the distribution of bedforms to determine the patterns of bedload transport.

Under low discharge, perigee-spring tidal conditions at the entrance to the estuary, the net direction of bedload transport is seaward in the thalweg, with no net bedload transport on the shoals. However, with increasing either upstream distance or riverine discharge, the net direction of transport is seaward throughout the channel-cross section. During low discharge conditions, net bed-load transport decreases downstream requiring temporary storage of sediment until higher periods of discharge. The spatial distribution both of bedforms and the sediment transport index suggests that shoals are the temporary repositories of bedload during low flow conditions. The sediment stored on the shoals is mobilized into migrating megaripple trains during high flow conditions. Thus, stored bedload is periodically flushed from the estuary.

The Characterization of Macroalgae  
by Fluorescence Techniques

J.A. Topinka

&

W.A. Korjeff

Bigelow Laboratory for Ocean Sciences

McKown Point

West Boothbay Harbor, ME 04575

Fluorescence resulting from the excitation of major groups of accessory pigments provided a method to distinguish between major macroalgal groups. In a laboratory investigation narrow wavelength light was used to excite major groups of accessory pigments in red, brown and green macroalgae, and fluorescence emission was measured at 685 nm. Fluorescence induced by 540 and 465 nm light gave 540/465 fluorescence ratios very close to  $0.86 \pm 0.10$  for seven brown algae,  $5.32 \pm 0.80$  for seven red algae and  $0.41 \pm 0.11$  for six green algae. These results suggest that the fluorescence signatures of natural seaweed populations are relatively uniform within major divisions, but differ substantially and predictably between groups. A light and nitrate gradient study was also performed to assess the stability of 540/465 fluorescence ratio in *Ectocarpus siliculosus*, a brown alga. Over a large spectrum of light and nitrogen conditions the 540/465 fluorescence ratio remained relatively constant (0.59-0.86) and within the expected range for natural populations of brown algae. It is proposed that the ability to distinguish macroalgae on the basis of fluorescence emission may also allow the type and abundance of subtidal macroalgae to be characterized by existing laser induced fluorescence methodology from low-flying aircraft.