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ABSTRACTS

OF PRESENTED PAPERS

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The Connecticut Sea Grant College Program

Arnofsky, Pamela L. Biology Department, Northeastern University, Boston, MA 02115.

A NEW SPECIES OF THE COPEPOD GENUS APOCYCLOPS

The genus *Apocyclops,* has a worldwide distribution in saline tidal and sometimes nontidal wetlands. The genus possesses a number of neotenic characteristics. In several east coast marshes it has been found to occur in large numbers in association with *Spartina patens*. Three populations representing *Apocyclops dimorphus* (from the Salton Sea in California), *A. spartinus* (from the tidal marshes of Rowley, Massachusetts), and an undetermined species (from San Francisco bay in California) are compared. The unknown is clearly a member of the genus *Apocyclops.* Statistical analysis of the lengths of spines and setae of the endo and exopods of pl-p4, and characteristics of p5 and the caudal furca strongly support the argument that it is a new species. The status of the unknown will be further investigated by attempts at intercolony breeding and electrophoretic comparisons.

Berman, Jody. Zoology Department, University of New Hampshire, Durham, NH 03824

THE ROLE OF SCALE IN DETERMINING THE APPARENT EFFECTS OF BIOLOGICAL INVASIONS: RECRUITMENT PATTERNS OF TWO COLONIAL ASCIDIANS

This research examines the spatial and temporal recruitment patterns of the colonial ascidians *Botryllus schlosseri* and *Botrylloides diegensis* in the Great Bay Estuary, NH. When examined at a large scale, patterns of recruitment varied greatly; patterns present one year were often absent or reversed the next. As these results were often confusing at best, I am reexamining the data to look at small scale patterns of recruitment. In particular, I have tried to address the following questions: Do larvae recruiting to panels at the same time show predictable patterns of either abundance or spatial arrangement? Does species composition affect the observed patterns? Do recruiting larvae alter their abundance or spatial arrangement in response to either fellow recruits or established colonies? If so, does this response vary as a function of the size or species of the neighboring colony? Although results are still preliminary, it appears that patterns observed at smaller scales are more consistent, but not necessarily less confusing.

Borowsky, Betty, and Pamela Aitken-Ander. Osborn Laboratories of Marine Sciences, New York Aquarium, Boardwalk at West 8^{t} Street, Brooklyn, NY 11224 USA 718-265-3424/3428

SUBLETHAL EFFECTS OF POLLUTANTS ON GAMMARID AMPHIPODS IN ESTUARIES

The effects of sublethal concentrations of two major estuarine pollutants (waste crankcase oil [WCCO) and lead) on two species of gammarid amphipods have been studied in the laboratory. Each species exhibits different morphological changes *in* the presence of the contaminants, but both species exhibit a positive correlation between the length of reproductive females' intermolt periods and the concentration of the contaminant. In Melita nitida, the intermolt period was 24.2% longer in 100 ug/g of lead, and 3.1% longer in 100 ppm of WCCO than in controls; in Gammarus dalustris, the intermolt periods were 29.4% longer in WCCO and 13.6% longer in lead at those concentrations. Since the intermolt periods of reproductive females are governed by reproductive hormones, which also govern oogenesis, alterations in their lengths may result in reductions in reproductive output.

Boyer, Joseph N.,Institute of Ecosystem Studies,Millbrook, NY 12545

THE CONTRIBUTION OF BACTERIA TO PLANKTONIC NITROGEN DEMAND OF THE NEUSE RIVER ESTUARY, NORTH CAROLINA.

Significant background (bacterial) NH4 uptake occurred and varied both spatially and seasonally accounting for as much as 95% of light uptake with a median of 33%. Background uptake of NO3 was only 14% of maximum light uptake. In general, NO3 uptake was only 20% of total dissolved inorganic nitrogen (DIN) uptake. For the 4 years measured, annual NH4 and NO3 uptake was 10.00 and 2.58 mol-N m^{-2} yr^{-1}, respectively. Annual DIN demand was more than twice the phytoplankton DIN demand as calculated using the Redfield ratio. Therefore, heterotrophic DIN uptake exceeded balanced phytoplankton DIN demand. Heterotrophic DIN uptake is an important process occurring in the water column and, if omitted in the calculations, will cause serious underestimates of total estuarine nitrogen demand.

Buchsbaum, Robert and Cindy DelPapa. Massachusetts Audubon Society, 346 Grapevine Rd, Wenham, MA 01934

DOES THE EVOLUTIONARY HISTORY OF EELGRASS AS A SUBMERGED PLANT EXPLAIN ITS LACK OF RESISTANCE TO WASTING DISEASE?

Most terrestrial plants respond to infection by mobilizing different types of defense compounds, including both soluble and cell wall constituents. Compounds may be induced in response to cell death at the site of entry of a pathogen. In this paper we speculate that in the course of evolving into a submerged aquatic lant, eelgrass lost the ability to defend itself from Labyrinthula zosterae, the pathogen that causes wasting disease.

Phenolics are typically involved in disease resistence in many different species of plants. in eelgrass, however, we found that soluble phenolics concentrations were much lower in diseased tissue than in healthy tissue, probably because they are leached rapidly from the cells that are killed by the disease. Cell wall bound phenolics occur in very low concentrations in both healthy and diseased eelgrass leaves. In contrast, in terrestrial plants, concentrations of cell wall bound phenolics increase around the site of infection and (as lignin precursors) create a barrier to the spread of the disease. Eelgrass, however, does not synthesize lignins, hence its ability to produce lignin-like compounds that would aid in disease resistence is limited.

Burdick, D.M.[1,2], D. Britton[2], D. Porter[3] and F. T. Short[1,2]. [1]Department of Natural Resources, [2]Jackson Estuarine Lab, University of New Hampshire, Durham, NH 03824 (603) 862 2175 and [3]Botany Dept. University of Georgia, Athens, GA.

SALINITY AND LIGHT EFFECTS ON THE SPREAD OF WASTING DISEASE IN EELGRASS PLANTS

Both salinity and light have been shown to strongly affect susceptibility of eelgrass, *Zostera marina,* to infection and demise from the wasting disease caused by *Labyrinthula zosterae* when cultured in mesocosm tanks. In August 1992, we performed experiments to examine the interaction of light and salinity effects on disease spread rate on eelgrass. Individual shoots were placed in 60 flasks (2 liter volume) with an air bubbler in each flask. Treatments were arranged in a factorial design with five salinity levels (12, 18, 24, 30, and 36 ppt) and three light levels (10, 40, and 70% of outdoor light). Infection of shoots was absent or minor at 12 ppt salinity, but disease spread rates increased in a linear fashion with greater salinities, resulting in plant death for several of the shoots at higher salinity levels. Individual shoots infected with the disease did not exhibit increased spread rates with reduced light. Thus susceptibility of eelgrass to disease under reduced light results from slower eelgrass growth rates at lower light levels. (The same disease spread rates would have a greater impact on slower growing shoots.) Data from our, mesocosms as well as these flask experiments support this hypothesis.

Butler, Mari & H.G. Dam. Dept. Mar. Sci, UCONN, Groton, C T 06340-6097.
FECAL PELLET PRODUCTION RATES AND PELLET CHARACTERISTICS OF ACARTIA TONSA UNDER SIMULATED BLOOM CONDITIONS.

Over the course of a bloom the quantity and quality of algae available for copepods to feed on may vary dramatically. We examined the effects of varying phytoplankton concentration and quality during the progression of a bloom on pellet production rates and pellet characteristics of the calanoid copepod, Acartia tonsa. Bloom conditions were simulated by feeding copepods cells of the diatom Thalassiosira weissflogii, grown in batch cultures. Experiments were run during exponential or log phase and during stationary phase. In each experiment, animals were fed a minimum (200 cells ml^{-1}) and a maximum (2000 cells ml^{-1}) cell concentration. We measured daily pellet production rates, size, density and C:N ratios of pellets. Preliminary results indicate that as the cell concentration increases, pellet production rate and pellet volume increase up to a critical concentration beyond which they level off. The density of pellets ranges from 1.07-1.36 g cm^{-3}. Increasing cell concentration does not appear to change the density of pellets, but animals fed cells in stationary phase produced pellets slightly less dense than animals fed cells in exponential or log phase. How our results may affect material fluxes will be discussed.

Carlson, Noel C. and Frederick T. Short, Department of Natural Resources and Jackson Estuarine Laboratory, University of New Hampshire, Durham, NH 03824. WINTER SURVIVAL OF FALL TRANSPLANTED EELGRASS AND ITS RELATION TO DONOR PLANT CHARACTERISTICS.

Eelgrass was transplanted during September through mid-October, 1992 in five sites proposed for mitigation in the Piscataqua River as part of the NH Port Authority expansion project. The transplants were collected from three distinct donor sources in the coastal waters of New Hampshire. Eelgrass used for transplanting included two sites within Great Bay: subtidal plants from Weeks Point, and intertidal plants from Footman Islands, and also from one intertidal site at the mouth of the Piscataqua River near Fishing Island. Transplants were planted in a 3 m^2 grid on 0.5 m centers using two individual terminal and associated lateral shoots to create each planting unit. Transplants were secured to the sediment using 15 cm, U-shaped, metal anchors. Plots were monitored monthly throughout the winter and spring for percent survival, shoot number, expansion rate, leaf width, and canopy height. Contrary to usual planting procedures, survival rates clearly showed that eelgrass can successfully be transplanted in the temperate waters of New Hampshire during the fall. Donor plants from the intertidal site at the mouth of the Piscataqua River showed remarkable survival of 80-90 percent throughout the winter. Survival of the transplants from the two Great Bay donor sites was much poorer, ranging from 10 to 40 percent survival. These results illustrate the importance of donor sources to the success of a transplant project as the plants from the Piscataqua River created superior transplants. These findings are preliminary but suggest the need to look at genetic or environmentally influenced plant characteristics when selecting donor eelgrass populations for transplanting.

Collins, G.N. Biology Dept., University of Southern California, Los Angeles, CA 90089-0371
ASSESSING UNCERTAINTY OF NITROGEN LOADING ESTIMATES TO COASTAL SYSTEMS

Nitrogen loading to estuaries from their surrounding watersheds is a force driving widespread coastal eutrophication. Accurate estimates of nitrogen inputs from land sources are necessary for management of the coastal zone. Published methods for estimating nitrogen loading have not addressed the uncertainty associated with the single-value result provided by such calculations. Defining this uncertainty is essential for between-watershed comparisons, quantifying precision of results, and for making management decisions. Nitrogen loading was estimated for Waquoit Bay (Cape Cod, MA) and the uncertainty of the estimate was determined, using two methods: propagation of errors of each loading parameter, and by applying a bootstrapping technique. Preliminary results differ for the two methods, both in the mean loading value and in the uncertainty estimate. The bootstrapping method may be more appropriate for analyses when statistical distriubutions of calculation parameters are unknown. This analysis is being incorporated into a tool for use by planners to estimate nitrogen loading under different land-use scenarios.

Porewater Transport in Western Long Island Sound and its Relation to Benthic Community Structure

Edward C DeAngelo, Thomas Torgersen (at: Department of Marine Sciences, The University of Connecticut, Groton, CT 06340; 203-445-3441)

Over one hypoxic summer season (DO 3ppm) Rn^{222}/Ra^{226} disequilibrium was measured, and the benthic community determined in order to assess bioirrigation rates Western Long Island Sound. A numerical model was fit to the Rn-222 sediment profiles to compute rates of enhanced biodiffusion. Rn^{222} fluxes across the sediment-water interface were calculated from model fitted profiles. The decrease of DO in the water column was accompanied by a sharp reduction in benthic infaunal density. As a function of reduced benthos, rates of biodiffusion and Rn^{222} fluxes fall to molecular levels. Following the late summer turnover event, the benthos was recolonized. With recolonization, biodiffusion and Rn^{222} fluxes rose above pre-hypoxic levels.

Fogarty, Katherine A., Charles A. Menzie, Menzie-Cura & Associates, Inc., 1 Courthouse Lane, Suite 2, Chelmsford, MA 01824, and James Goldstein, Tellus Institute, 11 Arlington Street, Boston, MA 02116-3411

DIAGNOSING POLLUTION PROBLEMS IN THE WEYMOUTH FORE RIVER

This study, a Mini-Bays project under the Massachusetts Bays Program, is aimed at demonstrating small-scale innovative, replicable approaches to coastal pollution problems in Massachusetts and Cape Cod Bays. The communities that border the Fore River (Braintree, Quincy, and Weymouth) will coordinate to implement an environmental management plan based on the results. Initial work focused on assessing baseline environmental conditions and beginning to identify sources of contaminants. This included a review of existing information, sampling of bacterial contaminants (total coliform, fecal coliform, and enterococcus) in the water column and bacterial and toxic contaminants in sediments *(Clostridium perfringens,* PAHs, PCBs, pesticides, and metals), and performing a benthic survey. Although a nearby sewage outfall and industrial sources were suspected as sources of bacterial and toxic contaminants at the beginning of the project, initial data suggest other sources such as stormwater runoff contribute a greater portion on contaminants.

Franz, David. R., Biology Department, Brooklyn College LUNY, Brooklyn NY 112107, USA 718-1951-5700

RESOURCE ALLOCATION IN RIBBED MUSSELS (GEUKENSIA DEMISSA)

Increments in shell length and body weight of mussels from monthly field samples from Jamaica Bay, NY, were combined to estimate monthly shell and body growth rates for mussels of all sizes. Reproduction [P(r)] was estimated as the difference between total net production [P(t)] and growth production [P(g).] Seasonal patterns of shell growth were similar for all size classes, but body growth rates peaked earlier in larger mussels. Production is allocated to reproduction [P(r)] beginning in mussels of 10-33 mm. (Gonad development occurs at approx. 20 mm length.) P(g) peaks at 33 mm and declines gradually with increasing length. In mussels with body weights < 1g, P(r) in Geukensia is larger than most Mytilus populations, indicating greater emphasis on early reproduction. Age-specific Reproductive Effort (Pr/Pt) is similar to other estuarine bivalves, e.g.Mytilus edulis and Crassostrea virginia.

Paul Geoghegan. Normandeau Associates Inc., 25 Nashua Road Bedford, NH, 03110. (603)472-5191.

IS DEVELOPMENT IN AQUATIC VEGETATED AREAS ALWAYS DETRIMENTAL TO WATER QUALITY AND FISHERIES RESOURCES? A CASE STUDY.

Water quality and fisheries habitat may be improved by the development of a proposed marina in a water chestnut bed in the Hudson River estuary. Water chestnut is an exotic invasive plant that displaces native species. Temporary anoxic conditions in the water chestnut bed caused fish kills. The existing fish community in the water chestnut bed was dominated by fourspine stickleback and carp; two species that can be considered an energetic dead end and an undesirable exotic species, respectively. The fish community at the edge of the water chestnut bed was dominated by blueback herring, alewife and American shad; three species that contribute to the forage base and with economic importance. The proposed marina would result in a more diverse fish community by increasing edge habitat and would improve water quality by increasing water depths and flushing rates.

Gestring, Kelly and Peter Sale. Center for Marine Biology, University of New Hampshire, Durham. NH 03824

DISTRIBUTION AND ABUNDANCE OF LARVAL AND JUVENILE STAGES OF COASTAL FISHES IN THE GREAT BAY ESTUARY

In an ongoing study of fish utilization of Great Bay Estuary, purse seining and beach seining were used to sample eelgrass beds, open foreshores, and tidal creek habitats. Results indicate that species composition and relative abundance vary substantially during the sampling season as well as between habitats. Variations among habitats interact with those between seasons. A trend exists suggesting fish move to progressively more downstream sites in the fall.

Gleason, Timothy R. and David A. Bengtson. Zoology Department, University of Rhode Island, Kingston, RI 02881.

Size-selective predation of larval and juvenile inland silversides, *Menidia beryllina.*

Larval *Menidia beryllina* are used by U.S.EPA in toxicity testing. Information is needed on the ecological consequences of reduced growth (as measured in laboratory tests) for field populations. Experiments using *in situ* mesocosms (05m^3) to exclude predators indicated good growth and high survival for *M.berullina* in Rhode Island. These results suggested that food was not limiting for growth or survival and therefore, that predation might be the primary source of mortality for YOY *M. benfllina.* Predation experiments were conducted in laboratory aquaria and in *in situ* mesocosms to assess size-selectivity of potential predators. Laboratory-reared striped bass, *Morone saxatilis,* and field collected white perch, *Morone americana,* crevalle jack, *Caranx hippos,* and bluefish, *Pomatomus saltatrix,* were presented with a choice of two or three size classes of laboratory reared *M. beryllina* and allowed to feed for 3-24h. For field collected predators the experimental prey size range was similar to the size range present in the field. Striped bass, white perch, and crevalle jack selectively preyed on the smallest size classes. Bluefish, however, selectively preyed on the largest size class. These results suggest that size-specific survival of YOY *M. beryllina* might vary spatially and temporally depending on the particular suite of predators encountered by individual populations or cohorts.

Kopp, Blaine S. Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882. THE IMPACT OF NUTRIENT ENRICHMENT ON THE TISSUE ANATOMY AND STRUCTURAL INTEGRITY OF EELGRASS, *ZOSTERA MARINA* L.

Recent experiments conducted at the University of Rhode Island Lagoon Mesocosm Facility have had interesting results concerning the mechanisms by which nutrient enrichment is causing declines in regional eelgrass *(Zostera marina* L.) populations. Although the conventional wisdom invokes a light limitation mechanism driven by the stimulated growth of other primary producers, our results suggest that elevated nutrient concentrations may directly alter the tissue anatomy and reduce the material strength of eelgrass leaves. Preliminary results from two experiments will be presented: an N+P enrichment experiment in the URI lagoon mesocosms, and a population-level experiment in growth tanks where light and nutrient (NO3-N) were independently controlled. Examination of tissue anatomy revealed that *Zostera* plants grown under enriched conditions developed leaves which were smaller in cross section, with fewer and relatively smaller gas lacunae and smaller vascular bundles than control plants. Plants from enriched treatments also showed a reduction in leaf tensile strength as determined by sensitive materials-testing instrumentation. Leaf tissue analyses need to be completed before we can determine the portion of these treatment effects attributable to nutrient conditions vs. reduced light. However, the results to date do advance the hypothesis that enrichment may play a direct role in eelgrass loss by reducing structural integrity of the plant, thereby increasing susceptibility to mechanical damage from currents and waves.

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COMPARISON OF DIRECT AND INDIRECT MEASUREMENTS OF DENITRIFICATION IN ESTUARINE SEDIMENTS

Denitrification represents a potentially important sink of available nitrogen in coastal marine systems. Sediment denitrification was quantified from May to December 1992 in three sub-estuaries of Waquoit Bay, (Cape Cod, Ma. USA). Direct measurements were made by measuring the flux of dinitrogen (N) and nitrous oxide (N_20) across the sediment-water interface. N_2 flux ranged from undetectable to 800 μmol/m hr. The lowest flux detected was 25 μmol/m hr. Indirect estimates were based on the stoichiometric ratio of carbon to nitrogen in organic matter. The amount of nutrients predicted to be released from sediments, at a given respiration rate, was compared to measured nutrient fluxes; missing nutrient nitrogen was assumed to have been denitrified. The two methods estimated rates in the same range but there was considerable variation for individual cores.

Liebman, Matthew. US EPA Region 1, JFK Federal Bldg WQE, Boston, MA 02203 (617) 565-4866

DO PARASITIZED SNAILS LIVE LONGER?

Several species of larval trematodes parasitize the mud snail, Ilyanassa obsoleta, an important gastropod inhabiting intertidal mudflats on Long Island, NY. Parasitized individuals usually inhabit the high shore and are usually larger in size than nonparasitized conspecifics. The distribution, dispersal, mobility, growth and feeding biology of I. obsoleta were investigated in field collections and experiments to determine the mechanisms producing these observations. Snails tethered in the high shore suffered less crab predation than snails tethered in the mid shore. Parasitized snails did not exhibit enhanced shell growth. Laboratory experiments indicate that compared to reproduction, larval trematodes may cause little discernable stress to the host. Parasitized snails grow to large size as a result of reduced mortality, not enhanced growth. This is viewed as an adaptation by the parasite to enhance transmission of cercariae to the next host in its life cycle.

Nawojchik, Robert. Mystic Marinelife Aquarium, Mystic, CT 06355
203-536-9631.
MARINE MAMMALS OF LONG ISLAND SOUND

Observations of marine mammals in Long Island Sound are compiled for the last 18 years. Records of cetaceans and pinnipeds are based on stranding events, anecdotal reports, and boat surveys. Despite a general consensus suggesting increasing harbor seal populations, few systematic surveys exist to support this. Boat surveys in Fishers Island Sound from December 1992 to April 1993 provide a rough estimate of the local seal population size. However, survey findings from this past season are preliminary in nature and can not address questions regarding population trends. Several more years of survey work will be required before definitive statements can be made regarding any population changes. Other directions for future investigations include population structure, trophic ecology, seasonal and daily movements, and fisheries interactions.

Orson, Richard A., Najarian Associates, Inc., Eatontown, NJ 07724, R.S. Warren and W.A. Niering, Botany Dept., Connecticut College, New London, CT 06320.
ACCELERATED SEA LEVEL RISE AND TIDAL MARSH DEVELOPMENT AT BARN ISLAND, STONINGTON, CT. - WORK IN PROGRESS

With rates of sea level rise accelerating, Connecticut stands to lose substantial portions of its coastal habitat during the next few centuries. It is imperative, therefore, that we identify basic marsh processes and responses to accelerated sea level rise before we attempt to predict future changes. The objective of this investigation is to determine how accelerated sea level rise during the last 50 years is influencing geomorphic and vegetation development at the Barn Island tidal marshes. A unique set of time line horizon markers coupled with detailed radioisotope analyses, palynological investigations and macrofossil identifications will be utilized in identifying recent developmental trends. Recent trends will be compared to long-term processes and the influences of accelerated sea level rise will be evaluated.

Short, Frederick T. Department of Natural Resources, Jackson Estuarine Laboratory, University of New Hampshire, Durham, NH 03824-3427, 603-862-2175.
Great Bay Estuary: a Pristine Pandora's Box

The ecology of the Great Bay Estuary was examined in the early 1940s by Dr. Floyd Jackson who provided an overview of the system. Intensive monitoring of the water quality in Great Bay began in the mid-1970s and has continued to the present with varying degrees of intensity. The estuary, with seven major tributaries, has a checkered history of pollution impacts. In the 1800s, vast quantities of sawdust were dumped into the estuary from numerous sawmills on all the rivers. In the 1950s, large volumes of untreated sewage were discharged into these rivers, causing the entire estuarine system to be closed to the taking of shellfish. Since the 1800s, numerous industrial operations throughout the estuary, including tanneries up the rivers, Pease Air Force Base in the middle and the Portsmouth Naval Shipyard at the mouth have discharged varying concentrations of heavy metals and other contaminants into the estuary. With improvements in local water treatment systems and stiffer regulations on industrial discharge, the water quality has improved significantly throughout the estuary over the last 30 years. Today, advanced water treatment on sewage discharge has reduced point source pollution into rivers leading directly to Great Bay so that the Bay itself is now open to the collection of shellfish, even though waters upstream and downstream from Great Bay remain closed. Despite improvements in wastewater treatment, the rapid increase in human population in the coastal region appears to be producing an even greater nutrient load to Great Bay Estuary than previously seen, overwhelming efforts to improve the water quality of the estuary. Despite these threats from pollution, Great Bay Estuary maintains a pristine appearance with surprisingly little shoreline development and moderate levels of low-impact recreational use.

Spelke, Jessica and Paul E. Fell. Department of Zoology, Connecticut College, New London, Connecticut 06320

GROWTH AND FECUNDITY OF THE TIDAL MARSH SNAIL, MELAMPUS BIDENTATUS, FROM DIFFERENT REGIONS OF A TIDAL MARSH COMPLEX IN CONNECTICUT

Previous studies have shown that the size of Melampus bidentatus on a restored impounded tidal marsh at Barn Island is substantially greater than on a bayfront marsh in the same system. The objective of the present study was to examine growth and fecundity of Melampus from both marsh regions. Large snails from the restored marsh produce a greater number of larger egg masses compared to small snails from the bayfront marsh. In laboratory experiments, snails from both marsh regions grew more rapidly on turf from the restored marsh than on turf from the bayfront marsh. The rapid growth of Melampus on turf from the restored marsh, together with the large size and high fecundity of snails inhabiting the region, indicate that the marsh has become a favorable habitat for this numerically dominant member of the high marsh community as a result of restoration efforts. In addition, it was found that Melampus from Barn Island exhibits a lunar spawning periodicity instead of a semilunar rhythm as has been described for this snail on Cape Cod.

Welsh, Barbara L. Marine Sciences Department, University of Connecticut, Avery Point, Groton, CT 06340.

LONG ISLAND SOUND ECOSYSTEM: A PARADIGM OF PHYSICAL STRUCTURE AND BIOLOGICAL RESPONSE

Physical oceanography controls stratification and the fate of nutrient and organic carbon distributions in Long Island Sound, which in turn determines the Sound's ecological structure. The interaction between nutrients, organic carbon and summer stratification stimulates pelagic microbial trophic pathways and is manifest by an oxygen surplus close to the surface and oxygen depletion through most of the water column. A paradigm is emerging: during early stages of eutrophication and stratification, production is increased and benthic processes become decoupled from the upper water column, which favors development of a pelagic community dominated by large, predatory holoplankton. As the perturbation increases, competition for diminishing oxygen supplies tips the balance, resulting in virtual shutdown of the benthic community and replacement of the macrofaunal predators by microbes. This sequence does not seem to occur in non-stratified systems which maintain active benthic processors.

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POPULATION BIOLOGY AND ECOLOGY OF *CODIUM FRAGILE* SSP. *TOMENTOSOIDES* AN INVASIVE ALGAL SPECIES OF NEW ENGLAND WATERS

Populations of *Codium fragile* ssp. *tomentosoides(C. fragile)* located in New England waters are reported to be only asexual in their method of reproduction. Our preliminary results obtained through isozyme gel electrophoresis indicate that *C. fragile* may also be reproducing sexually, and be a polyploid. The goals of this study are to determine if *C. fragile is* reproducing sexually, also to assess quantitatively the effects of C. *fragile* upon the shallow benthic and intertidal communities of New England.

Whitten, Jerrard J., Department of Resource Economics and Development and Short, Frederick T., Department of Natural Resources. -- Jackson Estuarine Laboratory, University of New Hampshire, Durham, N.H. 03824 Juvenile lobsters found resident in eelgrass beds may function to identify contaminant sources.

Studies in the Great Bay Estuary have shown that lobsters (*Homarus americanus*) utilize eelgrass (*Zostera marina*) habitats around Seavey Island, Maine during their juvenile stage of life (30mm to 70 mm carapace length). A mark and recapture study was initiated in the fall of 1992 to determine if these organisms are long-term residents in eelgrass beds. Using SCUBA we were able to locate resident juvenile lobster in mud burrows within eelgrass beds. Juvenile lobsters were collected, marked using nondestructive streamer tags, and released to the collection site. Dives made in the spring of 1993 relocated tagged lobsters resident in the same eelgrass beds, indicating resident populations in the area. These newly discovered resident populations of juvenile lobsters in eelgrass beds will now be tested as possible ecological indicators of contamination of estuarine waters near the Portsmouth Naval Shipyard (located on Seavey Island). Through chemical analysis of juvenile lobster tissues, we will investigate a now methodology for locating sources of contaminants in an estuary.

Yarish, Seth M. and Howard M. Weiss. Project Oceanology, Avery Point. Groton, CT 06340 203-445-9007.

OVERVIEW OF PROJECT OCEANOLOGY'S STUDY OF HYPOXIA IN THE THAMES RIVER ESTUARY.

Project Oceanology conducted studies of hypoxia in the Thames River Estuary in the summer of 1989 and seasonally in 1990. Data will be presented on the seasonal changes in dissolved oxygen, salinity, temperature, nutrient distributions and infauna populations (all in 15 minutes!). The data on benthic infauna populations is the first complete data set collected seasonally throughout the entire length of the estuary. The distribution and occurrence of hypoxia is directly related to river flow and water temperature. The rapid decrease in the number of benthic individuals and species in the upper estuary is linked to the seasonal occurrence of hypoxia and periodic flushing with fresh water. After this paper, we will embark on a relaxing cruise up the Thames River aboard Enviro-Lab II to discuss the interaction of the complicated estuarine parameters or to relax and unwind after a long day.

Zajac, Roman. Dept. Biol. & Enviro. Sciences, Univ. New Haven, West Haven, CT 06516

INFAUNAL COMMUNITIES IN LONG ISLAND SOUND: A BENTHOSCAPE APPROACH

A project to determine the characteristics of infaunal communities relative to varying scales of habitat structure in Long Island Sound is described. The work focuses on determining habitat structure at varying scales, but in particular at regional or "benthoscape" scales. Techniques being employed are: collation of available data on spatial distributions of bottom characteristics, acquisition of side scan sonar and video data and more typical bottom grab sampling. A geographical information system (GIS) is being used to organize the data and aid in analyses. Examples of the various methods and analyses performed to date are presented, as well as some thoughts on the application of landscape ecology principles to the study of benthic dynamics.