

NEW ENGLAND ESTUARINE RESEARCH SOCIETY

SPRING MEETING

April 29 – May 1, 1976

**Howard Johnson's Motel
Milford, Connecticut**

hosted by

**National Marine Fisheries Service
Middle Atlantic Coastal Fisheries Center
Milford Laboratory**

ABSTRACTS

[NOTE: The abstracts for the papers presented at this meeting were never printed and made available to participants, and they have never been seen since that time by anyone other than myself. What you will find here is a compilation of the original submissions as mailed by presenters to the Program Chair of the meeting. – NEERS Historian, March 2006]

SOME PHYSIOLOGICAL RESPONSES OF STRIPED BASS
and COHO SALMON to SUBLETHAL LEVELS of Cd.

Among the various approaches to evaluating pollutant effects on marine animals is the determination of their physiological responses to chronic exposure of sublethal levels of the pollutant. Striped bass, Morone saxatilis, and coho salmon, Oncorhynchus kisutch, are being exposed to sublethal levels of Cd⁺⁺ and monitored at 28 day intervals for O₂ consumption, heart rate and ventilation rate.

Oxygen consumption rates at various swimming speeds are determined using a Brett-type cruising speed respirometer. Heart and ventilation rates are measured with implanted stainless steel electrodes coupled to a polygraph recorder.

The results of these exposures will be presented as a work-in-progress report.

35 mm slides will be projected as part of the presentation.

Ries S. Collier
NMFS Laboratory
Milford, Connecticut 06460

Succession and Dominance of Net Phytoplankton in Montsweag Bay, Maine,
1969-1975

B. J. McAlice
Ira C. Darling Center University of Maine at Orono

ABSTRACT

Bi-weekly to monthly samples of net phytoplankton taken over a six year period show a relatively low predictability in the seasonal succession of dominant species. Dominant species may be classed as ubiquitous perennials, euryecious opportunists, stenecious competitive dominants, and where the hell did that come from. Implications for short-term studies of succession are discussed.

Projection Needs

Probably 35 mm projector, but maybe an overhead projector or a big bulletin board, depending on how far I get with drawings.

ABSTRACT

The Calculated Diffusional Input of Cu and Zn from
Long Island Sound Sediments

by

W.B. Lyons, W.F. Fitzgerald, R.J. Szechtman and C.D. Hunt
Marine Sciences Institute
The University of Connecticut
Avery Point, Groton, Connecticut 06340

The Fickian diffusional flux of dissolved copper and zinc out of Long Island Sound sediments into the overlying water is compared to the copper and zinc inputs from other sources. The flux of copper due to diffusion is about 30% of the land runoff value but only 8% of the total dissolved copper entering the Sound, while the calculated diffusional input of zinc is only about 20% of the land runoff and 4% of the total dissolved input of this metal.

Variations in the Growth Indices of Mya arenaria L. in Cold and warm water Environments in the Sheepscot River Estuary.

Abstract

Soft-shelled clams were marked and seeded in three separate locations with similar hydrographic regimes within the Montsweag Bay-Sheepscot River system. One of these sites was under the influence of the effluent of a nuclear powered generating station with the other sites serving as controls.

Relative growth and mortality between the three sites was assessed after a one year period. The concept of a shell weight index, i.e., Shell weight to dry weight (tissue) ratio, was developed to investigate relative growth of M. arenaria historically in an area. Fast growing clams have thinner shells, and thus a lower shell weight/tissue weight ratio, than slow growing clams.

Conclusions: 1) Current and not temperature seems to be the most important environmental parameter in determination of the growth rate of M. arenaria in the Sheepscot River estuary.
2) Salinity in the range observed, 8 to 30 ppt, does not seem to affect growth.
3) The Maine Yankee Atomic Power plant has not had a significant effect on growth and mortality of M. arenaria in Bailey Cove.
4) Width (dorsal-ventral) is statistically as good a measure as length (anterior-posterior) for use in determining growth of M. arenaria.
5) The shell weight index method developed to determine relative growth of M. arenaria historically between areas shows promise and is worthy of further consideration.

Authors: Archambault, T., J. Chalfant, A. West,
MARITEC, South Bristol, Maine

SOFT-SHELL (*MYA ARENARIA*) STOCKS IN
HAMPTON HARBOR, NEW HAMPSHIRE

ABSTRACT

Five years of data on standing crop and size frequency distribution have been compiled for a soft-shell clam population in a small coastal New Hampshire estuary which has been a popular area for recreational clam diggers. Records appear to cover a number of different year classes, permitting an estimation of shell growth rate and impact of human predation. From studies of planktonic larvae distribution, probable sources and long shore movements of seed have been deduced. Factors controlling spatial distribution of soft-shell clam seed on tidal flats will also be discussed.

[Neil Savage, Normandeau Associates, Bedford, New Hampshire]

Larval fish entrainment at Maine Yankee

Paul Lindsay
Darling Center
Walpole, Maine

To determine the abundance, species composition, and mortality rate of larval fish entrained by the Maine Yankee nuclear power plant in Wiscasset, Maine, plankton tows are taken at the plant's intake and discharge and analyzed in the lab. Temperature tolerance experiments are used to evaluate the roles of thermal vs. mechanical stress. The seasonal abundance and the mortality are determined for each species. Increased efforts in certain aspects of this project are projected to fill some of the gaps in the overall picture.

Projection requirement: 35mm transparencies

[Note: This handwritten submission did not scan legibly and was therefore transcribed by the NEERS Historian, March, 2006]

The Structural Reorganization of a Salt Marsh Community
Following a Disturbance. David C. Schneider, S.U.N.Y.
Stony Brook, N.Y.

Most studies of reorganization in benthic communities after a disturbance have been carried out in shallow, temperate-zone waters, where seasonal changes in abundance are strong. A controlled study of community reorganization was carried out to separate seasonal fluctuations from structural changes due to increasing exposure time. The experiment was carried out by setting 100 cm² plots of azoic sediment into the bottom of a salt marsh pool. Plots were set out and collected on a regular schedule so that all plots were classifiable by date of collection and length of exposure. Two components of community structure, number of species and the distributional evenness of organisms among species, were tested for variation due to season and due to length of exposure. There were significant increases in number of species with exposure time; the pattern of increase was independent of season. The number of species did not change significantly with season. Distributional evenness, on the other hand, changed significantly with season but not with exposure time. Thus as a site fills up with species there is no change in the relative abundance of species, once seasonal variation is taken into account. The distributional changes with season resulted from spring population increases and from seasonal patterns of predation.

Notes on the reproductive behavior of Nereis succinea
in Lowes Cove on the Damariscotta River, Maine.

ABSTRACT

Over the past 60 years, conflicting reports have appeared in the literature concerning the breeding season and behavior of this Nereid polychaete. Lillie and Just (1913) found N. succinea swarming only at night during the summer months, and in synchrony with a lunar period. Other workers have reported swarming during the day and with no distinguishable rhythmicity. This study was conducted on a unique population of worms that is almost entirely intertidal and lies at the northern boundary of its geographic range. Results deal with the breeding behavior of these worms on an annual and monthly basis and in relationship to water temperature, lunar and tidal influences, ambient light conditions and weather.

Photographs and figures are on 35mm slides.

[Rob Foster, Ira Darling Center, Walpole, Maine]

Effects of thermal pollution on benthic algae in Oyster Creek
Barnegat Bay, New Jersey

A study was conducted to determine the effects of thermal pollution on benthic algae in Oyster Creek, New Jersey which functions as a discharge canal for water used to cool condensers in a nuclear electric generating plant.

Two additional sites were used and studied as controls. Forked River maybe affected by the thermal plume from Oyster Creek but Stouts Creek should be unaffected. Temperatures measured in August, 1971, were: Oyster Creek 32C, Forked River 29C, and Stouts Creek 28C. Temperatures in January, 1972, were: Oyster Creek 16C, Forked River 5C and Stout Creek 30.

The study was conducted for one year. White pine boards were placed at each sampling station for analysis of settling, colonization and survival of attached benthic algae. Four boards from each station were collected approximately every 4 - 6 weeks. Boards were analyzed for algae composition and relative abundance.

Results indicate a reduction in species diversity in Oyster Creek when compared to Stouts Creek and Forked River. Red and brown algae were affected the most. Polysiphonia harveyii, a dominant species in Forked River and Stouts Creek, is not found in Oyster Creek. Polysiphonia subtilissima is abundant in Oyster Creek, but absent in the other two creeks.

[Christine Evans, National Marine Fisheries Service, Highlands, New Jersey]

Changes in Rock Crab (Cancer irroratus) Populations
in Montsweag Bay After Removal of a Causeway

John Ewart, David Dean, and Barnaby Porter

Ira C. Darling Center
University of Maine
Walpole, Maine 04573

As part of a survey of commercially important species in the vicinity of the Maine Yankee Atomic Power Plant, rock crab (Cancer irroratus) populations were sampled quarterly at eight stations in Montsweag Bay and the Sheepscot River. Crab populations observed in the northern section of Montsweag Bay following causeway removal increased nearly 6,000% at some locations, whereas sampling stations in other areas of the Bay showed relatively little change in normal seasonal fluctuations. Increases in crab numbers at the northern stations are believed to have resulted from the combined effects of increased tidal activity and easier entrance into Montsweag Bay. Catches of crabs per sampling period since the causeway was taken out have been consistently higher than earlier totals, and represent the highest catches since the study's initiation in 1969. Marked changes in male to female ratios have also been observed.

A Study of Mechanical Damage to Fish Larvae Entrained at
Millstone Nuclear Power Plant

Sandra S. Nawrocki
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02138

Abstract

An eight month study was carried out to determine the effects of mechanical damage on fish larvae which had passed through the cooling system of a nuclear power plant. The control samples taken in Long Island Sound had a background damage ratio of .081 while the larvae collected at the plant sites showed an overall ratio of .278 - a definite increase. Significant differences between the ratios at the three plant sites sampled (Intake, Discharge and Cut) were established. The discharge (the immediate site where water from the cooling system was dumped back into the quarry) showed the highest larval damage ratio (.317 as compared to .264 for both the intake and cut). No significant differences in larval damage ratios were found to exist between the seasons. Comparisons of larval damage incurred in day and night samples also showed no significant differences.

The most frequently occurring larval species were analyzed for type of damage (eight categories were utilized), frequency of damage with respect to species, and damage in relation to size. Of the eight damage categories; type A, (head missing or damaged) and type G (the body completely damaged) were the most prominent. Of all the species analyzed, Clupeid larvae were the most vulnerable to injuries from entrainment with 67.5 % of the collected larvae from the plant sites damaged. The frequency of damage to yolk-sac and post yolk-sac stage larvae (1-10 mm) decreased with size. The increases in damage ratios at the plant as compared to the controls, and the analyses of damage ratios with respect to size, species and types of damage, indicate that mechanical damage, a result of the entrainment process, is an important factor in assessing the total effects of nuclear power plants on the environment.

Projection needs: Slide projector

RECIPROCAL TRANSPLANT OF THE SEAGRASS ZOSTERA MARINA L.

Effect of Substrate on Growth

submitted by

Mark Fonseca and W. Judson Kenworthy

College of Resource Development
University of Rhode Island
Kingston, Rhode Island

ABSTRACT

The seagrass Zostera marina L. is an important component of the temperate coastal ecosystem. The desirable qualities of this plant have made it a candidate for reforestation and transplantation. Quantitative data is needed to actualize such programs. In this investigation, the effect of different substrate types on Zostera, growth was studied utilizing transplantation of individual turions. Data analysis showed that new leaves produced was the most reliable parameter for relative production. Results indicate that transplants originating from a natural silt environment displayed best all around growth. Plants grown in a silt substrate continually afforded better growth. However, on a low statistical significance. The biological quality of the sediment was also examined and the results indicate that plants grown in undisturbed (biologically active) sediments were more successful than plants in sediments which were biologically deactivated. Aspects of the physiology and ecology of Zostera are discussed with reference to the substrate. More work is needed on quantitative measurements of Zostera substrates in order to develop a transplantation program.

Population Establishment in Estuarine
Invertebrates Related to
Intertidal Exposure

Herbert Hidu
Ira C. Darling Center
University of Maine
Walpole, Maine

Differential setting exerts a dominant influence on the intertidal-subtidal distribution of eight groups of estuarine invertebrate species investigated. Setting substrate was presented in 3-dimensional array along a 1-mile transect. In all species, setting was very predictable with respect to location and seasonal occurrence. Subtidal on-bottom patterns were obtained with Sabellaria vulgaris, whereas subtidal off-bottom patterns were associated with Caprella linearis, Tubularia crocea and the gammarid Stenothoe cypris. All of these species were strongly restricted from the intertidal zone. Intertidal setting was obtained with Crepidula sp. and Balanus sp. Crassostrea virginica showed a disjunct intertidal-subtidal pattern and the intertidal fraction appears to result from a highly non-adaptive response north of the Mid-Atlantic region. The relevance of these findings to aquaculture in the intertidal zone is discussed.

TITLE: HEAVY METAL CONTRIBUTIONS FROM A PAPER MILL EFFLUENT
IN THE ST. CROIX ESTUARY, MAINE

AUTHORS: FINK, L.K., JR., POPE, D.M., AND SCHICK, L.L.

SPEAKER: DAVID M. POPE

Heavy Metal Contributions from a Paper Mill Effluent in the St. Croix
Estuary, Maine

Samples of sediments, suspended particulates, and the biota from 31 locations along the St. Croix River were analyzed for nine heavy metals to determine the concentration levels and distribution-pattern relative to a pulp and paper mill effluent. In our dynamic equilibrium model, the various compartments of the estuary are classified as carriers or reservoirs, on the basis of the relative ease with which a compartment makes its metal concentration available to the other compartments. The reservoirs, sediments and biota, give the clearer indication of relatively longer term effects.

The results from a carrier compartment, the suspended particulates, indicate Cr, Zn, and some of the Cu are being introduced through the paper mill effluent. Additional sources are suggested for Cr and Cu.

Analyses of the biota do not reveal any clear gradient of concentrations with increasing distance from the source, but do show a definite concentration by the biota of metals not found in measurable quantities in the carrier compartments. Compared to other areas, it is clear that elevated concentrations of heavy metals occur in the biota of the St. Croix River.

The core analyses make it clear that the sediments are reservoirs of elevated levels of heavy metals and are sensitive indicators of probable sources in addition to the paper mill effluent for observed levels of Pb, Cu, Cd, and Zn at downstream core sites. All metals are

present in high concentrations in the core taken near the paper mill effluent relative to cores from above and below the mill site with the singular exception of Fe. A composite plot of concentration against core depth reveals an envelope of expected element concentration values for the estuary. Values outside this envelope can be linked with specific metal sources, such as high Pb and Zn concentrations associated with the International Bridge across the St. Croix. These patterns in sediment cores suggest a means by which the impact of an industrial activity can be assessed even after operation for some period of years.

ABSTRACT

The Use Of Nutrient and Salinity Data For
Water Mass Identification
In The Great Bay Estuary,
New Hampshire

by

Patricia M. Glibert and Theodore C. Loder,
Woods Hole Oceanographic Institution, Woods
Hole, Massachusetts 02543 and Department of
Earth Sciences, University of New Hampshire,
Durham, New Hampshire 03824.

The purpose of this study was to investigate some of the processes controlling the distribution of nutrients in the Great Bay Estuary, New Hampshire. Detailed measurements of nutrients and salinity were made in the Great Bay over a tidal cycle at nine sampling stations during the late summer. Based on the resulting data several water masses could be identified within the system. Whereas phosphate and silicate only defined two water masses, nitrate and nitrite showed the existence of three water masses. The major process controlling the distribution of these nutrients was shown to be conservative mixing. Very precise salinity data (± 0.01) and data for all the major nutrients were required to accurately describe the distribution and mixing of these estuarine water masses. Thus, it should be possible in future sampling to describe the distribution of nutrients in this system with only a minimal number of sampling stations chosen on the basis of tides and data obtained from previous mixing curves to define future mixing relationships.

PRODUCTION AND POPULATION DYNAMICS OF
CHIRONOMID INSECTS IN AN ESTUARINE
LITTORAL AREA

Charles A. Menzie

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Productivity and population dynamics of the chironomid insect fauna in a littoral area of Haverstraw Bay (Hudson River) were studied from January 1975 through January 1976. Chironomid productivity estimates were obtained by combining field standing crop measurements and laboratory growth studies. The effects of predation, recruitment and available living space on production were examined.

Chironomid densities were one to three orders of magnitude higher in the littoral than in the sublittoral areas. The highest densities were observed in association with aquatic vegetation. In addition, species characteristic of the littoral zone had short generation times (two to four weeks) during the summer and coupled with the high standing crops this resulted in high production.

Chironomid insects are an important food source of juvenile fish of such Hudson River species as white perch, striped bass, pumpkinseeds, killifish and shiners. Therefore, although the littoral areas comprise only a small portion of the river they may be extremely important in the trophic dynamics of the system by virtue of their high secondary production.

Lead and Copper in the Waters
of Raritan and Lower New York Bays

Ruth Waldhauer, Albert Matte and Robert K. Tucker

Historically, Raritan Bay has been an important fisheries center from which recreational and commercial fin- and shellfish of significant value are taken. Increased municipal and industrial pollution considerably reduced this resource. Heavy metals are a most insidious and dangerous category of pollutant because of their persistence in the environment. The form in which the metals exist affects both their availability and toxicity to marine organisms. Therefore, it is essential to know the concentration and distribution of the various forms in order to assess their effects as pollutants.

Our project using anodic stripping voltammetry is ongoing. Thus far we have determined that:

1. Lead and copper concentrations found here are significantly higher than values reported for other estuarine waters.
2. More than half of the lead and copper in low salinity water seems to be transported in a strongly bound form.
3. The Hudson River adds 3.5 times as much lead and 1.7 times as much copper to the system as does the Raritan River.

DISSOLVED ORGANIC MATTER PRODUCTIVITY IN RARITAN-LOWER HUDSON ESTUARY.

Jay E. O'Reilly, James P. Thomas, Christine A. Evans.

National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center,
Sandy Hook Laboratory, Highlands, N. J.

Sixteen monthly cruises were made in the highly eutrophic Raritan-Lower Hudson Estuary (New Jersey-New York) between November '73 and April '75 to measure three components of total primary productivity (dissolved organic matter, nanoplankton, netplankton) as well as photosynthetically active radiation, light extinction, nutrients, salinity, temperature, dissolved oxygen, pH, chlorophyll, phytoplankton species composition and abundance. The annual total primary production ranged between 750 and 1,053 grams C/m²/yr depending on location within the estuary. These values are among the highest reported in the literature for comparable areas. Dissolved organic matter productivity, its significance, and its relationship to nanoplankton - netplankton productivities and environmental characteristics of the estuary will be presented. Percent of photoassimilated carbon re-leased as dissolved organic matter (DOM) ranged from 0% to 71.2% (averaged 12.4%, n=1308) during the study. The quantity of DOM released ranged from 0 to 155 mg C m⁻³ hr⁻¹. DOM productivity is positively correlated with total productivity (particulate and dissolved). DOM productivity, net-plankton and nanoplankton productivity decreased and percent of photo-assimilated carbon released as DOM increased toward the mouth of the estuary. Surprisingly, percents of DOM released were uniform with depth (100, 47, 30, 11 and 40% surface light). DOM percent of total productivity was highest in August - September when the nanno-netplankton productivity ratio was 35 and lowest in March when the ratio was 0.4.

NORTHEASTERN UNIVERSITY
BOSTON, MASSACHUSETTS 02115

Dear Mr. Chanley,

I am enclosing the particulars of a paper that I would like to present at this spring's N.E.E.R.S. meeting. This work is part of the data that I gathered while doing the research for my M.S. degree at Northeastern. This work has been completed' (I hope) and I am now in the process of writing it up.

The pictures I intend to use are the standard 2 by 2 inch color slides.

A title and abstract of my proposed talk are given below:

The Effects of H₂S Containing Sea Water on the Morphology of the Ocean Quahog, Arctica islandica, with Emphasis on the Ctenidia.

Quantities of H₂S are often released into the water mass as the result of the actions of Mother Nature and her most precocious offspring - Man. The toxicity of this gas, as well as its modes of action, have been documented by others. It was the purpose of this study to determine how these detrimental effects are manifested morphologically, using the ctenidia as the primary organ of interest.

It was found that the general condition of the animal, as a whole, changed markedly as denoted by: (1)changes in flesh color (2)changes in the kidney (3)changes in muscular responsiveness to stimulation (4)changes in the appearance of the ctenidia (5)ability of the ctenidia to transport particles.

Histologically, concomittant changes are seen in the ctenidia. These appear as (1)changes in filament shape (2)increased secretion of mucus (3)increase in the number of amebocytes in the filamentar blood spaces and their migration (4) edema and the coagulation of blood proteins (5) decrease in the interfilamentar space (6)delamination of the frontal epithelium.

Some of the possible causatives and implications of these observations will be discussed.

Thank you for your consideration of my proposed talk. I will be looking forward to hear from you.

Sincerely,

Richard Traverse
52 Amagansett Dr.
Sound Beach, N.Y.11789

Seabed Oxygen Consumption - Lower Hudson Estuary to Outer New York Bight,
U. S. A. James P. Thomas, William Phoel, Jay O'Reilly, Christine A.
Evans,
U. S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Middle
Atlantic Coastal Fisheries Center, Sandy Hook Laboratory, Highlands, New
Jersey 07732

Seabed oxygen consumption rates, temperature, salinity, and dissolved oxygen were measured along a transect from the Lower Hudson River-Estuary to the outer New York Bight during February and August 1975. Samples for seabed oxygen consumption were collected with a Pamatmat multiple corer and incubated on shipboard at in situ temperature.

Rates of total oxygen consumption by the seabed in the river (Spaten Dyvil to Verrazano Narrows) ranged from 12.6 to 41.5 ml O₂ m⁻² hr⁻¹. An average of 33.6 x 10⁶ litres O₂ (13.55 metric tons carbon) are estimated to be consumed by this section (66.7 Km²) of seabed each day. The values range from 29.9 x 10⁶ litres O₂ per day in February to 37.3 x 10⁶ litres O₂ per day in August.

The values represent 90% and 10%, respectively, of the primary productivity in that portion of the river. Generally rates were highest in the river and decreased offshore. Hot spots were found in the apex and Hudson Shelf Valley. The Hudson Shelf Valley generally has higher oxygen uptake rates than adjacent areas on the shelf. The extent of man's influence on the seabed will be discussed.

Seasonal Maturation and Site Specificity of Dichelyne bullocki
Stromberg and Crites 1972, a Nematode Parasite of Fundulus
heteroclitus, the Common Killifish

Edward J. Kuzia
Department of Zoology
Spaulding Building
University of New
Hampshire Durham,
N.H. 03824

Fundulus heteroclitus, collected from Johnson Creek Durham, N.H., were examined monthly (June 1974-September 1975) for incidence and intensity of the nematode parasite Dichelyne bullocki. Four developmental stages of D. bullocki occurred in F. heteroclitus. These were the third and fourth larval stages, and immature and mature adults. The third and fourth larval stages were recovered from the anterior intestinal wall. Immature and mature adults were observed in the posterior third of the intestinal lumen and the rectal lumen. A distinct seasonal periodicity of the developmental stages of D. bullocki was evident. The third stage larvae were present in greatest intensity: in July and August. Most third stage larvae molted into fourth stage larvae in September. Fourth stage larvae were the dominant form in winter. Fourth stage larvae molted into adult worms in May. Adult worms were present in significant numbers from May to July. Seasonal maturation appears to correspond to the rise in temperature in the spring.

Carbon:chlorophyll ratios in varying light/nutrient regimes

The carbon:chlorophyll ratio was examined in outdoor continuous cultures of Chaetoceros curvisetus in an attempt to find a predictive equation for different light and nutrient regimes. Such an equation would be valuable in linking photosynthesis-light models, which often have chlorophyll parameters, to ecosystem models, which usually have carbon parameters. Carbon and chlorophyll were found to co-vary spirally with respect to either nutrients or light. The spirals resulted from differing responses of carbon and chlorophyll to environmental factors: carbon was hyperbolically related to light or nutrients whereas chlorophyll was related by a different second-order function. The resulting carbon:chlorophyll ratio could not distinguish different nutrient regimes in light-limited cultures but could distinguish light-limited from nutrient-limited regimes.

by Mary Farmer
Department of Biology
City College
New York, N.Y. 10031

TITLE:

Stability and Fluctuation of Intertidal and Subtidal Invertebrate Populations during a Five-Year Study in the Piscataqua River-Great Bay Estuary, New Hampshire

ABSTRACT

Biological investigations of the same habitat over long continuous periods of time have been rare. With impact assessments becoming critical programs in industrial management, the investigation of long term populations and community cycles are essential for discerning natural fluctuation and man-induced point-source perturbations.

This study was part of an ongoing monitoring program designed to assess the biological impact of a fossil fuel electrical generating station located on the Piscataqua River-Great Bay estuary, in New Hampshire. Since 1971 ten soft substrate intertidal stations and nine adjacent subtidal stations were sampled semi-annually. One hundred five species were identified in the intertidal and 214 species in the subtidal samples. Concurrent sediment samples were taken. Sediment types ranged from rock-sand mixtures to fine sandy mud. Station affinities and faunal similarities were generally a function of sediment type.

Throughout the five year study, the intertidal habitat was dominated by *Nereis diversicolor*, *Clymenella torquata*, and *Macoma balthica*. The subtidal was dominated by *Ampelisca abdita*, *Tellina agilis*, *Lumbrineris tenuis* and *Nephtys caeca*. Species diversities (H) were stable at most stations while faunal densities varied inconsistently with time. In the intertidal, population densities dominant polychaete species were the most stable. Bivalves showed a distinct decline from 1972-1975. Population of the polychaete *Tharyx* sp. and *Streblospio benedicti* were found only in spring 1975 samples. Subtidal populations of polychaetes and amphitods except *Ampelisca abdita* were stable. Bivalve populations except *Tellina agilis* generally declined from 1972-1975. Possible reasons for population fluctuations are discussed.

After a year of intermittent operation there have been no indications as yet of detectable population stress at stations in proximity of the plant's heated effluent canal.

Seasonal changes in the size distribution of particle concentration, chlorophyll-a, organic carbon and nitrogen in suspended matter in Buzzards Bay, Massachusetts.

Michael R. Roman*, University of New Hampshire

Abstract

Seasonal variations in the size distribution of chlorophyll-a, particulate organic carbon and particulate organic nitrogen were studied by fractional sieve filtration. Results indicated that the spring phytoplankton bloom was dominated by nanoplankton whereas the fall bloom consisted primarily of net plankton. Particulate organic carbon was comprised primarily of material less than 10 microns except during the fall bloom. High carbon-nitrogen ratios in the bottom waters of Buzzards Bay during the winter suggest that large amounts of detritus are present.

Woods Hole Oceanographic Institute, Woods Hole, Mass. 02543

Abstract: Retinomotor Movements in the Yellow and Silver Phases of the American Eel, Anguilla rostrata.
Mahan, Kieran T. Biology Dept., University of Bridgeport, Bridgeport, Connecticut, 06602.

Retinomotor movements are common in the retinas of teleosts. Yellow and silver phase American eels, Anguilla rostrata, were light or dark-adapted. In dark-adapted eels, the retinal epithelial pigment is concentrated near the choroid, the rods are contracted towards the external limiting membrane and the cones are stationary. In light-adapted eels, the retinal epithelial pigment is dispersed over the visual cell layer, the rods are elongated and the cones are stationary. Silver phase eels show a greater tendency to dark-adapt than yellow eels. The significance of this is discussed with respect to the silver eel's migratory journey. Retinomotor movements in Anguilla anguilla and Anguilla rostrata are compared and discussed with respect to the one-species versus two-species concepts of the North Atlantic eel.

Projection needs: 2'' by 2' sLDes

Phylogenetic trends demonstrated by the New England species of
Coryphella (Gastropods: Opisthobranchia).

ABSTRACT

The seven species of the genus Coryphella found in New England waters demonstrate a significant phylogenetic progression. This progression to more evolutionarily advanced forms can be traced through changes in their general body shape, radula morphology and reproductive anatomy. Concurrent changes in reproductive strategies and food sources are also demonstrated. Taken as a whole, the New England Coryphellidae lend the greatest support to the proposed theory that this group gave rise to a significant portion of the Aeolidacea.

Projection Requirements: for 2 X 2" slides

[Alan Kuzirian, University of New Hampshire, Durham, New Hampshire]

(STANDY PAPER -- WITHDRAWN)