

New England Estuarine Research Society

A n n u a l S p r i n g M e e t i n g

APRIL 30-MAY 2, 1981

A B S T R A C T S

Jointly hosted by

EPA-Environmental Research Laboratory

Graduate School of Oceanography, URI

**Dutch Inn
Galilee, Rhode Island**

TITLE: Effects of Benzene on Molting and Osmoregulation in Juvenile Callinectes sapidus.

A.C. Cantelmo, L.H. Mantel, S. Goldberg and R. Lazell, Ramapo College of New Jersey and City College of New York.

ABSTRACT:

Benzene is a product of refinery operations and a widely used solvent in industry. It is an important contaminant in highly industrialized estuaries such as Raritan Bay. The effects of sublethal concentrations of benzene were measured on limb regeneration, molting, and hydromineral balance in juvenile C. sapidus. Animals were collected from Barnegat Bay, N.J. and maintained in a static system. The time to complete one intermolt cycle was increased on exposure to benzene. The growth at ecdysis and the rate of limb regeneration were retarded in crabs exposed to benzene. Osmotic regulation was not impaired in exposed crabs acclimated to a salinity of 300 mOsm. Levels of NA.K-ATPASE in posterior gills of benzene treated animals are higher than those of controls at the same salinity. Benzene acts on several physiological processes in C. sapidus. The primary effects may be neurally mediated, metabolic or both. Supported by the Department of Environmental Protection, State of New Jersey.

TEMPERATURE--SALINITY TOLERANCES FOR A HERMIT CRAB SPECIES COLLECTED FROM DIFFERENT GEOGRAPHIC AREAS

Alan M. Young, Biology Department, Nason College, Springvale, Maine

Specimens of Pagurus longicarpus were collected from North Inlet, Georgetown, South Carolina and from Menauhant Harbor, East Falmouth, Massachusetts. Both geographic groups were treated exactly the same. Crabs were removed from their shells, acclimated to either 15°C or 25°C and 25‰ salinity and then subjected to various test combinations of temperature and salinity. The 48-hour cumulative percentage, mortalities were transformed using the arc sine square root procedure and computer-fitted with regression coefficients to generate response surfaces. The optimum values of temperature and salinity were very similar for each geographic group within acclimation condition. However, the range of temperature and salinity over which mortality did not exceed 10% was much greater for the Massachusetts crabs than for those collected in South Carolina. These data may indicate the presence of different physiological races for this species.

ABSTRACT

The Compatibility of Copper With The American Oyster, (Crassostrea virginica)

by Terence Hammer

In this experiment, the effects of various concentrations of copper are evaluated. Five concentrations were used; 0, 4, 8, 17, and 25 PPB above background level. Time delays of 0, 100, and 1000 seconds were used to show the effectiveness of delaying the copper treated water before allowing it to pass to the oysters. The lack of any significant differences between starting the experiment with "clean" or pre-leached copper was shown at 8 PPB above background. An in situ experiment showing the feasibility of using copper as a construction material for shellfish culture trays was also conducted. Mortality, growth, coloration, and tissue copper concentration were used to show the significant differences in the effect of copper or delay time on the animals.

THE REMOVAL OF COPPER AND IRON IN THE MERRIMACK RIVER ESTUARY

by
J. Kim* and T. Loder

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ABSTRACT

Copper and iron measurements along the Merrimack River estuary, Mass., exhibit non-conservative behavior with salinity for both the total and dissolved forms. The auxiliary suspended load and chlorophyll-a data also exhibit similar non-conservative behavior. To distinguish between removal mechanisms affecting these chemical constituents, a biogeochemical model can be fitted to the data. The modeling indicates that copper and iron are removed at a slower rate than the suspended load and chlorophyll-a, which suggests that two different removal mechanisms are affecting these constituents. Flocculation of the metals with colloidal matter and gravitational settling of the suspended load and chlorophyll-a are the suspected controlling mechanisms. However, further study is needed to discriminate between such removal mechanisms.

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THE PHYSIOLOGICAL STATE OF PLANKTONIC BACTERIA IN ESTUARINE,
SHELF AND OCEANIC WATERS AS INDICATED BY CARBON TO ATP RATIOS
AND FREQUENCY OF DIVIDING CELLS OF IN-SITU POPULATIONS.

ABSTRACT

The numbers and ATP content of free living planktonic bacteria and the concentrations of dissolved organic carbon and carbohydrate declined by only one order of magnitude or less along estuarine to open ocean transects along the East Coast of the United States. This is in marked contrast to the much smaller populations of bacteria attached to particles (epibacteria) which decreased seaward over two and a half orders of magnitude as did the chlorophyll a content of the filterable plankton. The distribution of cell volume, morphological types and the frequency of dividing cells (FDC) were determined from electron micrographs of positively stained bacteria passing 2 μm Nuclepore filters. Large rods were only numerically important in Narragansett Bay while the horseshoe-sigmoid forms (comprising a mean 42% of the populations) had a FDC ranging from 0 to 8.8 with a mean of 3.9% and the coccobacillary forms (53%) had a FDC ranging from 6.7 to 14.4 with a mean of 10.4%. There was no systematic decline of either carbon to ATP ratio (C:ATP) or FDC with increasing distance from land (1 to 574 km), suggesting that the ATP pools and division rates of estuarine and Sargasso Sea bacteria may be similar. There was an inverse relationship between the C:ATP and FDC of the planktonic bacteria from both subsurface samples as well as from the surface microlayer. Nine samples with C:ATP between 100 and 300 had FDC between 7 and 10%, indicating active growth, while three samples with higher C:ATP between 400 and 800 had lower FDC between 3 and 6% suggestive of a less active physiological state. These data indicate that there is a direct association between the size of the ATP pool and growth rate and that C:ATP and FDC appear to be useful indicators of the physiological state of planktonic bacteria which even when undergoing environmental stress are far from the dormant or extremely low metabolic state reported in the literature, especially for the open sea.

Deason, E.E. and T.J. Smayda, Graduate School of Oceanography,
University of Rhode Island, Kingston, R.I.
INTERRELATION BETWEEN SUMMER PULSES OF THE CTENOPHORE MNEMIOPSIS LEIDYI
AND DIATOM BLOOMS IN NARRAGANSETT BAY

Plankton dynamics in lower Narragansett Bay are compared for six summer and fall seasons (1972-1977). In four years, the initiation of a summer ctenophore pulse was accompanied by a rapid decline in zooplankton abundance and the initiation of the summer phytoplankton bloom. Termination of the phytoplankton bloom coincided with a depleted ctenophore abundance and increased zooplankton biomass in two years. Yearly variations in the summer abundance of the diatom Skeletonema costatum were positively related to the magnitude of the ctenophore pulse. Predation rates estimated for M. leidyi were inversely related to the zooplankton biomass during the pulse. These relationships in timing and magnitude of plankton events suggest that M. leidyi regulated summer phytoplankton and zooplankton dynamics. The interactions were examined further in microcosm studies using combinations of phytoplankton, zooplankton and ctenophores. Shifts in phytoplankton abundance and species composition and an effect on nutrient concentrations were observed.

Projection needs: slide projector

The effects of tide and photoperiod on the structure of a summer estuarine Peracarid plankton assemblage.

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Numerical classification was used to examine the interactions of tide, photoperiod, collection depth and sample date on the structure of a summer Peracarid plankton assemblage from a mesohaline area of the Patapsco River, Maryland. Peracarids, in general, showed increased activity at night, with some species migrating to shallower depths (e.g., Neomysis americana). Preliminary investigations have suggested that tide may affect the activity of at least two of the 13 species (the amphipods Leptocheirus plumulosus and Corophium lacustre) in this assemblage. The effects of lunar cycles on activity patterns and community structure is also discussed.

Projection Needs: 35-mm slides

SOME EFFECTS OF THE NEW ENGLAND RED
TIDE DINOFLAGELLATE ON AN ESTUARINE
COPEPOD, EURYTEMORA AFFINIS

ABSTRACT

Red tide blooms have been recorded in the bays and estuaries along the Massachusetts coastline south of Cape Ann since 1972. The organism responsible, Gonyaulax tamarensis var. excavata, has been shown to be of a toxic nature by various criteria, including mouse bioassays, chemical analyses, and shellfish assays. However, susceptibility of potential planktonic grazers to G. tamarensis var. excavata toxins is not well documented.

Possible effects of the New England red tide dinoflagellate on the survival, swimming rate, and egg production of an estuarine copepod were investigated in three feeding experiments with Eurytemora affinis. These experiments utilized both a toxic and a non-toxic variety of G. tamarensis. The copepods did graze on the dinoflagellates and, in the presence of toxic G. tamarensis, evidence of decreased swimming rate (i.e., mean linear velocity), survival, and possibly egg production was found. These results suggest that toxicity may help reduce grazing pressure on dinoflagellate populations and thus contribute to initiation and continuation of dinoflagellate blooms.

Lesley J. Mills
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March 3, 1981

Utilization of Macrotidal Estuaries in the Upper Bay of Fundy by Shad
(Alosa sapadissima) from Eastern North America

Mike Dadswell, Department of Fisheries and Oceans
Biological Station, St. Andrews, N.B. Canada

Large concentrations of shad utilize macrotidal estuarine embayments of the Upper Bay of Fundy (Minas Basin, Chignecto Bay) during summer and autumn. The shad consist of juveniles and adults engaged in their annual northern feeding migration. Highly turbid water (Secchi $x = 30$ cm) and summer temperatures in the 13–18°C range create a habitat exploited almost solely by shad. Tagging results indicate the shad are representatives of riverine populations from the entire east coast of North America, but the majority originate from United States rivers. Proposed tidal power sites are situated in the major feeding areas and if constructed will alter the habitat considerably, thereby posing a serious threat to shad production on the North American east coast.

Abstract for NEERS Spring 81' Meeting

Title - Tidal restriction: Its impact on the vegetation of six Connecticut coastal marshes

Authors -Charles T. Roman (presenting author), College of Marine Studies, Univ. of Delaware, Lewes, DE 19958

William A. Niering, Department of Botany, Connecticut College, New London, CT 06320

R. Scott Warren, Department of Botany, Connecticut College, New London, CT 06320

Thomas Steinke, Fairfield Conservation Commission, Fairfield, CT 06430

Abstract -

The impact of tidal restriction, imposed by tide gates with associated causeways and dikes, on the vegetation of six Connecticut tidal marsh systems was documented. The study sites were tide gated for purposes of flood protection, mosquito control and/or salt hay farming. The data indicate that with tidal restriction there is a substantial reduction in soil water salinity, a lowering of the water table in the peat and a decrease in tidal flushing. These factors are considered to favor the establishment and spread of Phragmites australis, and other species, most noticeably Iva frutescens, with an attendant loss of Spartina - dominated marsh. This change in the floristic composition of restricted marshes is clearly documented through peat core analysis.

Re-introduction of tidal flow is probably the most outstanding factor contributing to the rehabilitation of these degraded marshes. At one study site, dominated by Phragmites, tidal flow was re-introduced after nearly two decades of continuous restriction. This resulted in a marked reduction in Phragmites height and the establishment of typical salt marsh vegetation along creekbanks. It is proposed that legislation be adopted to protect marshes from the impact of tidal restriction and aid in the restoration of marshes currently dominated by Phragmites.

Projection Needs - Slide Projector

March 1. 1981

The Half-Moon Cove Tidal Power Project: An Introduction

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ABSTRACT

Passamaquoddy and Cobscook Bays, on the U.S.-Canadian border have historically been a focal point for tidal power development interests in the United States. Proposals for this region have ranged from large binational developments to privately backed, single cove projects. The project which is most advanced in the pre-construction phase is the Half Moon Cove project being proposed by the Passamaquoddy Tribe at the Pleasant Point Reservation. Half-Moon Cove, a 322 hectare arm of Cobscook Bay, has the potential for providing a regional source of electricity. It's major value, however, is probably in its role as a demonstration project both in terms of engineering development and environmental impact assessment. Engineering studies have determined that the most efficient design involves operation in a single-pool, single-effect mode. Two turbines, with an installed capacity of 12,000 KW, could produce power on a periodic, but intermittent schedule, with an annual yield of 3.7×10^7 Kwh. Major engineering features and methods of operation are described as background for a consideration of environmental consequences. Potential environmental impacts are principally those associated with the modified, tidal regime in the impoundment. These include changes in water quality, loss of intertidal habitat and restricted passage between the cove and the sea. It is important that these potential environmental alterations be fully discussed so that they can be mitigated to the extent possible in the design phase and properly researched at this demonstration site before the numerous other tidal power proposals become reality.

DIEGO GARCIA - AN ATOLL ESTUARY

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EG&G, Environmental Consultants
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Diego Garcia, a coral atoll in the Indian Ocean, is being developed as a base for U.S. Naval operations. During 1980, personnel from EG&G visited the island to examine the physical, chemical, and biological features of oceanic and lagoon waters. The atoll is almost completely enclosed by its land rim and is opened to the ocean only at its northern most point. As a result, there are obvious spatial gradients in biological and chemical characteristics from the northern to the southern regions of the lagoon. The more northerly regions of the lagoon were characterized by clearer, saltier waters, prolific growth of corals (especially Acropora reticulata) and an abundance of fish species including many larger individuals (snappers, jacks, sharks). The more southerly regions were characterized by sea grass beds, backwater areas and mud flats. These areas also were frequented by turtles. The southerly regions and backwater areas also appeared to serve as nursery grounds for a variety of fish species. Annual rainfall on Diego Garcia is high (1,648-3,805 mm/yr), and this is believed to have important effects on salinity in the more enclosed regions of the atoll. The above features are suggestive of estuarine conditions.

Ecological Characteristics of the Coastal Islands of Maine

Report of Work in Progress

by Philip W. Conkling
and Dr. Raymond E.

Leonard

Abstract

There are 3,000 islands off the coast of Maine, 1700 of which are vegetated, and perhaps 170 of which are inhabited. Though at one time intensively used for fishing, farming, lumbering and quarrying, Maine's uninhabited islands represent a prime area for recreational and commercial development near to the great centers of population on the Eastern seaboard. Many of these islands are refugia for rare species of plants and animals.

The United States Forest Service has initiated a research project to establish baseline data plots on a dozen Maine islands to characterize and study:

1. Undisturbed old growth forest communities and the undisturbed heath type vegetation of outer islands.
2. The effects of fire and sheep grazing on the soils and vegetation of disturbed islands.
3. The effects of dispersed recreational hiking and camping on Maine islands.

We have put together a slide show which relates Maine islands to other island ecosystems on the east coast and describes the research in progress.

Projection Needs: White screen.

A Dietary Study of the Predatory Seastar Astropecten americanus from Nantucket Shoals

ABSTRACT

The diet of Astropecten americanus was determined by analysis of stomach contents in May and November, from a location off Nantucket Shoals, MA. Mollusks, followed by crustaceans, dominated stomach contents. The proportion of molluscan species differed significantly from the benthos. Juvenile Arctica islandica dominated stomachs in May, but declined sharply in November, probably due in part to predation by Astropecten. Other mollusks, not prevalent in the benthos, were important in stomach contents. Crustaceans in stomachs increased in November, especially peracarids, reflecting seasonal recruitment of the dominant amphipod Ampelisca agassizi. Although, as in other astropectens, A. americanus favors mollusks, crustaceans comprise an important component of the diet of A. americanus - greater than in other species.

Frequency distributions of counts of prey species in a sample of seastar stomachs indicate that some seastars ingest unusually large numbers of certain prey species. This probably reflects patchiness of prey populations in the benthos, as well as the tendency for Astropecten to continue foraging within a favorable prey patch.

A. americanus predominantly ingests small prey individuals (1.4 mm) although larger prey are consumed opportunistically, especially in November. Relatively high selectivity; seasonal shifts in the diversity of stomach contents; evidence for patch-specific foraging: all of these characteristics are consistent with general predictions of optimum diet models. The restriction in the daily foraging time in Astropecten spp., which is probably due to the lengthy periods required for killing and digesting prey in the stomach, may constitute a powerful factor in selecting for optimal foraging in Astropecten.

David R. Franz & Elizabeth Worley
Brooklyn College/CUNY

Invas:i;ation of the Food Habits of the Cunner
(Tautogolabrus adspersus); A Preliminary Report

by Robert Sand, URI

In Narragansett Bay one of the most common fishes encountered in the rocky nearshore environment is a small cold water labrid, the cunner. To date the role of this organism in the ecosystem has not been investigated. The purpose of my study was to investigate this role by performing a standard food habits study, quantifying and qualifying the cunner's diet.

Based on the amount of food present in the gut of the fish at the time of capture, results indicate a difference in food habits in respect to location, seasonality, tidal cycle, and size of fish. No difference was apparent in respect to sex or time of capture. Interpretation of the biological significance of these results awaits the analysis of the qualitative data.

Behavioral Competition Between Lobsters and Cancer Crabs in the
Rocky Subtidal Habitat

by Denis Wang, Dept. of Zoology,

URI

Laboratory and field experiments were made to determine if competition for shelter space occurs between Homarus americans and Cancer borealis and C. irroratus. Laboratory tests showed that behavioral displays and combat occurred among the three species in competition for limiting shelter space. Animal size, species identity, and animal density were important factors influencing competitive dominance. In two 30m² quadrats in the rocky subtidal habitat lobsters were continually removed by SCUBA divers; in two other quadrats artificial shelters were added, while two other quadrats were held as controls. Census counts of the numbers and sizes of both lobsters and crabs were made in all six quadrats to test the hypotheses that reduced presence of lobsters or increased shelter resource increases crab density. Daily removal of lobsters in the test quadrat caused increased density of crabs, but the addition of shelters only slightly increased animal density.

Movement Patterns of a Salt Marsh Population of the
Meadow Vole, Microtus pennsylvanicus

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ABSTRACT

Movement patterns of the meadow vole, Microtus pennsylvanicus, in Canary Creek salt marsh, Lewes, Delaware were studied from July through November 1979-Capture-recapture techniques were employed over a 3.1 ha grid to identify the species composition of the small mammals within the study site and to gather data necessary for home range and population determinations. Spatial utilization was considered by examining movements within an established home range and animal trappability with respect to four recognizable habitat types.

The small mammal population revealed by the trapping effort was comprised of five species: least shrew (Cryptotis parva), masked shrew (Sorex cinereus), rice rat (Oryzomys palustris), white-footed mouse (Peromyscus leucopus) and meadow vole (Microtus pennsylvanicus). Population estimates for M. pennsylvanicus, which dominated the fauna, ranged from 175/ha in July to 108/ha in October. Voles were most abundant in habitats where grasses dominated and total coverage provided by the herbaceous layer of the plant canopy exceeded 80%.

No significant differences between adult male and female movements were found on either a monthly or cumulative basis. Juvenile movements, however, were significantly smaller than those of adults. Home ranges of juvenile animals ranged from .03 to .44 ha, with a mean value of $.08 \pm .01$ ha. Adult values ranged from .04 to .91 ha, with a mean value of $.23 \pm .05$ ha.

Estimates of home ranges from this study were, on the average, five times greater than those reported for M. pennsylvanicus inhabiting freshwater wetland and grassland environments. Assuming that the size of an animal's home range reflects its living requirements, the large home ranges I observed suggest that individuals must use more space to maintain themselves in marine wetland than in inland systems.

Seaward Winter Migration of the Atlantic Silverside: Export of Biomass From
Salt Marsh to Offshore Communities

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Steven A. Murawski
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Woods Hole Laboratory
Woods Hole, MA

In terms of both numbers and biomass, the Atlantic silverside, Menidia menidia, is an important member of salt marsh and estuarine communities of the eastern North American coast and is considered to be a year-round resident of the shore zone. Our analysis of the occurrence of M. menidia in catch records of the offshore bottom-trawl survey program of the National Marine Fisheries Service, Northeast Fisheries Center over a 13 year period revealed that Atlantic silversides undergo an offshore migration in winter. The majority of all catches occurred in waters less than 50 m deep and within 50 km of the shoreline. Surface and bottom temperatures at time of capture averaged 5.0°C. Diel variations in capture times indicated that Atlantic silversides are vertical migrators while at sea, occurring closer to the bottom during daylight hours. In association with recent studies indicating that Atlantic silversides suffer high winter mortality (90-99%) while at sea, our data suggest that Menidia populations are net exporters of biomass from salt marsh and estuarine to offshore communities and could be an important forage fish over the inner continental shelf in mid winter.

Development of a larval fish identification manual for Gulf of Maine estuaries:
why and how.

B. Paul Lindsay¹ and Richard F. Shaw²

A laboratory manual is being prepared to aid in the identification of larval fishes found in Gulf of Maine estuaries. The available information is incomplete and widely scattered in the literature, it largely lacks keys or analyses of similar species, and published drawings are often unclear or inaccurate. This manual compiles published information and extends it using observations and data from specimens collected over several years. Emphasis is placed on comparison of look-alike species. A uniform style and technique was developed for the drawings to facilitate comparison between species and between different authors.

Projection Needs: 35-mm slides

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²University of Maine. Oceanography Department. Ira C. Darling Center, Walpole, Maine 04573.

Diel Vertical Migration of Selected Species of Fish Larvae from the Hampton-Seabrook Area of N.H., during May 1979 and 1980.

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A study was designed to assess diel vertical distribution of fish larvae in the vicinity of Hampton, N.H. Larval fishes were collected four times during a 24-hour period (sunrise, noon, sunset, midnight) at three relative depths (surface, mid-depth, bottom) utilizing a 1-meter diameter 505-um mesh plankton net. This study investigated vertical distribution patterns of different species and explored biotic and abiotic factors which may affect these patterns. Abundances varied greatly between times of the day and sampling depths suggesting that some species undergo diel vertical migrations. Particular attention is paid to winter flounder (Pseudopleuronectes americanus), sea snail (Liparis atlanticus), sand lance (Ammodytes americanus) and radiated shanny (Ulvaria subbifurcata).

Projection Needs:

35-mm slides

Observations on Lobster Populations in Coastal Harbors
and Channels of Maine.

Gib Chase
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Abstract

A pre-dredging scuba survey conducted in Cape Porpoise Harbor, Maine, July 1975, by Corps biologists revealed a large resident lobster-population. Subsequently, the Corps and the Maine Department of Marine Resources Coordinated the development of a survey program to better determine the seasonal movements and population density of lobsters in the harbor. During June 1976 divers collected a total of 4,316 lobsters from a portion of the inner channel at the head of the harbor. Another 1,081 lobsters were trapped from the same area over a 12-day period. The lobsters were sexed, measured and later released offshore.

The majority of the lobsters caught were shedders and sublegal size. However, it was determined that from 50% to 60% of the population would attain legal size following molting and be recruited into the annual harvest. A statistical comparison is made of the efficiency of traps versus divers in the capture of lobsters. The combined methods were successful in reducing the lobster density from 4/10m² to 1.6/10m² during six days of sampling. This action enabled the completion of maintenance dredging operations. Subsequent scuba surveys revealed that the population overwintered in the channel with individual lobsters burrowed as deep as one meter into the clay-mud bottom.

Similar observations on dense concentrations of young lobsters have been identified for York, Winter, Corea and Jonesport Harbors. In a recent survey, 9 October 1980, lobsters were found in relatively high numbers at six out of twelve stations surveyed in the Kennebunk River. Concentrations of the animals coincided with those areas characterized by Mytilus beds and sunken logs.

The location of these populations make them easily accessible to survey by scuba technique. Such surveys could assist the assessment of the year-to-year status of the recruitment population(s). This information would provide resource managers with the data needed for decisions relevant to size and catch limitation as well as other conservation measures necessary to protect the lobster stocks. Research possibilities also abound for graduate students to study the day-night and seasonal behavior of lobsters and predator-prey relationships of animals in sublegal populations.

SCALLOPS IN PLEASANT BAY: A QUESTION OF LARGE SEED

Sandra Libby

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Orleans, Ma. 02653

David Chadwick

Mass. Division of Marine Fisheries Sandwich,
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W.E. Wehling, W.E. Robinson, and Dr. M.P. Morse
Marine Science Institute
Northeastern University
Nahant, Ma. 01908

Abstract:

A Three tiered study by Municipal and State government and also Northeastern University was conducted in 1979/80 to answer environmental and biological questions surrounding the occurrence of large Bay Scallops (Argopecten irradians) throughout Pleasant Bay that did not possess a well defined raised annual growth ring as mandated for legal harvest by Mass. Isw. Commercial fishermen questioned the age and survivability of these scallops and the inflexibility of the law suggesting an amendment to include a size and/or ring. Field data was collected in a shallow guzzle and a deeper channel. Samples of each size range were sectioned for histological analysis and the condition of the gonads were noted. Histological information corroborated visual observation with respect to time and duration of spawning and well defined rings were detected in June. Natural mortality accounted for 30%; the majority survived to be harvested in the fall/winter of 1980/81.

NEERS Abstract

R.S. Appeldoorn & Theodoric of York: Medieval Malacologist

A Review of Man's Past Shellfishing Practices, Their Effects,
and a Suggested Alteration of Management Policies.

The harvesting of shellfish for human consumption has occurred since prehistoric times. Throughout history shellfish management policies have tried increase production with an emphasis on growth. The history of man's harvesting techniques and practices is reviewed. Preliminary analysis indicated that recent intensive fishing effort leading to depressed stock sizes have resulted in altered growth rates. Substantially higher growth rates may alter the relationship between man and shellfish. It is suggested that new management goals be considered: not to maximize growth but to control it.

STAND-BY PAPERS

TITLE: Trace metals in the mussel Mytilus edulis: Natural fluctuations and response to disposal activities.

AUTHORS: John K. Watson and S.Y. Feng, Marine Sciences Institute, University of Connecticut, Groton, CT.

ABSTRACT: Mussels deployed near a disposal site and those from several reference sites in eastern Long Island Sound were monitored for soft tissue concentrations of Cd, Cu, Ni, and Zn before, during, and after disposal of dredge spoils from the channel of the Thames River, Connecticut. During the winter and spring of 1977-1978, elevated levels of these metals coincided with a period of heightened disposal activity and river runoff. Similar increases were observed during the second year when there was little or no dredging. The cyclic nature of these fluctuations suggest that the uptake of trace metals by mussels associated with dredge spoil disposal was relatively short-lived and of limited magnitude relative to intrinsic and extrinsic factors such as size and condition of the animal, temperature, runoff, and other variables.

Vozarik, J.M., and F.C. Dobbs

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STORM-ASSOCIATED MOVEMENT OF BENTHIC MACROFAUNA INTO THE WATER COLUMN

Storms are presumed to be of major importance in structuring coastal soft-substrate communities, yet there are few instances in which storm effects have been shown. At Millstone Power Plant, the cooling water effluent provides a convenient qualitative sample of organisms drawn in by the plant's intake pumps. By sampling immediately before and after a storm, we demonstrated significant storm-associated mobilization of benthic infauna into the water column. We suggest that disturbance by storms permits wide post-larval dispersal of ostensibly obligate infauna.

STAND-BY PAPERS – cont.

DYNAMIC PATTERNS OF SUSPENDED PARTICULATES IN A MARSH-MUDFLAT ECOSYSTEM

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ABSTRACT

Concentrations of suspended particulate matter varied widely across a marsh, mudflat and adjacent channel in Branford Harbor on the northern shore of Long Island Sound. Covariance analysis and multiple regression techniques were used to hierarchically-decompose the variability of organic and inorganic components with respect to sets of tidally-related and seasonally-related parameters. The ranked hierarchies of presumably responsible parameters showed no concordance between the three areas when tested with Kendall's W. The ranked hierarchies for individual areas showed no correlation between flood and ebb phases when tested with Kendall's T. What did occur was a distinct shift between flood and ebb tides from dominance by seasonally-related parameters to dominance by tidally-related parameters for organic components. Inorganic components were only marginally affected by seasonal parameters. The shifting behavior of particulates between areas and over time within the tidal sequence could be shown to favor import and trapping of both organics and inorganics within the system. These patterns are discussed with respect to the unusually high primary and secondary productivity of the Branford system. Although this study was limited to the June-October period, considerations of the physical characteristics of this system and related ones make it highly unlikely that significant export can occur between marsh and estuary at any time of the year.

35 mm slides
overhead transparencies