NEW ENGLAND ESTUARINE RESEARCH SOCIETY

SPRING MEETING

May 4-6, 1972

University of Connecticut
Southeastern Branch at Avery point, Groton
and the
Marine Research Lab at Noank

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]

FISHERY PRODUCTION AND THE FLOW OF ORGANIC CARBON IN AN ESTUARINE ECOSYSTEM

Richard B. Williams

Atlantic Estuarine Fisheries Center
National Marine Fisheries Service
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Estuarine fishery production at Beaufort, N. C. was evaluated in terms of its role and importance in the flow of energy and materials in the estuarine ecosystem. The estuarine system examined, Bogue Sound, Back Sound, Core Sound, Newport River, North River and their interconnections, had an area 532 km^2 at half tide, a mean depth of 1.1 m at low water, and yielded annually about 23 million pounds of fish. The stress which this harvest--equivalent to 2.0 g C/m^2 -- placed on the ecosystem was estimated from the trophic position of species composing the catch. Estimates of annual primary production required to sustain the catch ranged from 50 g C/m^2 with a mean net growth efficiency of 20% to 271 g C/m^2 with a mean net growth efficiency of 10%. Average annual net photosynthesis for the estuarine system was estimated to be 187 g C/m^2 and to be derived 65% from submerged grasses, 28% from phytoplankton and 7% from salt marsh. This suggested that the still widely quoted value of 10% for average growth efficiency was too low to be feasible. Data on fishery and primary production was combined with other ecological information and a number of educated guesses to construct a possible model for the flow of organic carbon in the estuarine ecosystem.

Distribution and reproduction of the sexually dimorphic archiannelid Dinophilus gyrociliatus in Maine

The archiannelid Dinophilus gyrociliatus is widely distributed in western Europe but has previously been recorded in North America only from New Jersey. Recently, however, this archiannelid has been encountered in Maine. The reproduction of D. gyrociliatus is especially noteworthy since the species shows marked sexual dimorphism and a unique mode of fertilization. In this account the distribution and reproduction of D. gyrociliatus is de-scribed and compared with other dinophilid species from New England.

[Michael Mazurkiewicz, Ira C. Darling Center, Walpole, Maine]

NUSC AERIAL REMOTE SENSING FOR OCEANOGRAPHIC AND WATER QUALITY APPLICATIONS

James Gallagher David Giuliano Neil Kelly

New London Laboratory
Naval Underwater Systems Center

ABSTRACT

The capability to detect and identify water borne pollutants and to monitor their distributions is being attempted initially via aerial surveillance using an infrared radiation thermometer and multi-spectral photography. Initial emphasis is being placed on monitoring sea surface features such as surface temperature, color, slick and trash-line patterns. The Rhode Island Air National Guard is providing a STOL type HELIO-COURIER under a long term cooperative agreement.

The primary areas of interest include Narragansett Bay, Block Island Sound, Eastern Long Island Sound, and the mouths of the Thames and Connecticut Rivers.

The NUSC Shallow Water Oceanography Project is provided with pertinent surface temperature data collected during these weekly flights. In addition, the generation of a cooperative ground-truth data collection and analysis program has commenced, with the University of Connecticut, New York Ocean Science Laboratory, the U. S. Department of Agriculture and the Federal Environmental Protection Agency participating thus far.

In October 1971, NUSC participated in a NASA medium altitude flight by coordinating the ground-truth data collection network, and by providing low-altitude reference data.

Airborne scanning imagery devices and corresponding signal processing, including computer analysis, are being considered.

Aerial photographic tests to evaluate different types of film/filter combinations and aerial cameras for coastal marine environmental investigations is underway. Image enhancement and false color enhancement techniques are being developed. Development of this aerial remote sensing capability will enhance the present military oriented program, and will also be available for associated government non-DOD environmental quality studies in this geographic region.

TITLE: Spatial and temporal distribution of zooplankton in a New Hampshire estuary

ABSTRACT:

Plankton samples were collected bimonthly from the surface and at eight meters depth at four stations in the Piscataqua River channel and Great Bay estuary complex from April through November, 1971. Samples were collected on both flood and ebb tides with submersible pumps.

A total of 108 categories of zooplankton were identified. Of these 49 were holoplankton, 45 meroplankton and 12 dislodged benthic organisms. The zooplankton showed definite temporal patterns with peaks in summer and fall. Holoplankton had highest population densities between June and September; whereas, meroplankton were most abundant between May and August.

Surface and near-bottom trends in species diversity and individual densities were essentially the same at lower estuarine stations, with similar peaks and troughs on both flood and ebb tides. Apart from the station at the mouth of the estuary, the surface-bottom differential was less on flood tide than on ebb. In general, zooplankton diversity and density was greater on the flood tide for al-most all sampling dates and stations. This difference decreased markedly at Great Bay where the marine influence is reduced.

Species diversity and individual densities decreased upriver, except for high numbers of certain brackish water species which occurred at the Great Bay station.

[Donna D. Turgeon, University of New Hampshire, Durham, New Hampshire]

Gregarious Setting in Oysters - Surface Chemistry or Waterborne Pheromones?

Hidu, H., W.G. Valeau, F.P. Veitch, and K. Allen

Cole and Knight-Jones in 1949 originally observed gregarious setting in European oysters Ostrea edulis and speculated that the setting larvae responded to waterborne materials emitted by the post-metamorphic oysters. Since that time, all British workers have insisted that European oyster larvae set in response to surface-bound chemicals. Work here with the American oyster Crassostrea virginica has indicated that their larvae set in response to waterborne pheromones.

Our experiments in progress with both species indicate that both are stimulated to set in response to waterborne pheromones. Moreover, the response is interspecific to some degree. The biochemical nature of the setting compound and the possible sensory basis of response are discussed.

Palaemonetes pugio, Resident Farmer and Miller to the Salt Marsh.

Barbara Lathrop Welsh
Graduate School of Oceanography
University of Rhode Island, Kingston, R.I. 02851

Abstract.

The grass shrimp, Palaemonetes pugio, appears to exert a significant influence on the trophic dynamics of the marsh ecosystem, not only as a stimulator to the detrital cycle, but as an integrator of the primary and secondary aspects of production. The shrimp appear to provide an effective mechanism in the preparation of the detrital food base by breaking up the marsh grass into particles small enough to be sustained in the water column. Such particles are readily exported by the tides out into the estuary where they are available to seston consumers such as menhaden and copepods. Within the marsh, the shrimp appear to stimulate a luxurient growth of benthic diatoms with-in the cavities of the plucked grass particles. Such growth may be more significant than that of bacteria in the replenishment of nutrients to the detrital particles.

Evidence for these hypotheses comes from current experiments with laboratory microcosms. Electron microscopy of detritus particles subjected to shrimp grazing showed plucked leaf surfaces and empty plant cells, tightly packed with diatoms. In detritus not exposed to the shrimp, the surface tissue was intact and diatom growth very sparse. Bacteria were not evident in either treatment. Nutrient analyses indicated much larger increases in dissolved phosphate and nitrate for microcosms containing the shrimp as compared to microcosms containing detritus only, suggesting fertilization of the detritus by the shrimp for a more nutritious harvest.

Particulate car¯en in the water column of those microcosms containing shrimp plus detritus increased dramatically in the absence of any agitation. Microscopic examination revealed that tiny fragments of grass, rather than a planktonic bloom, was the source of this carbon. Considering Palaemonetes pugio itself as a consumer of the detrital grass, the fecal pellets into which it processes a large fraction of the ingested detritus, the diatom growth which it stimulates, and finally the tiny suspended fragments it produces, the ecological role of resident farmer and miller to the tidal marsh appears to be a significant one at many different trophic levels.

15 min.
35 mm slides

ABSTRACT

Relatively high diversity in a bryozoan fauna of 29 species is attributed to the stable oceanic character of the water masses of Block Island Sonnd. Throughout an annual temperature range of 1.8°-18.2°C nine encrusting cheilostomate species function vegetatively, and two of them, *Cribrilina punctata* and *Hippoporina* cf. *H. verrilli*, reproduce sexually as well.

Somewhat lower winter diversity (H = 2.62-2.97 cf. 3.05-3.60 in summer) reflects a smaller total number rather than a less equitable distribution of species, owing to the reduction *in* the number of cellulariform and stolonate species which either require or prefer the soft substrates more abundant in summer.

Density, which averages 235 colonies/0.1m^2 but varies extremely, appears dependent more on the character and availability of hard and soft substrate than directly on temperature.

The known ranges of two species, *Chorizopora brongniartii* and *Porella reduplicata*, are extended northward and southward, respectively.

[Density and Diversity in Bryozoan Populations of Block Island Sound.
Marie B. Abbott,Marine Biological Laboratory, Woods Hole]

Some Aspects of Movement and Feeding Activity

Of the Rock Crab, Cancer irroratus

A study is underway to investigate some aspects of rock crab behavior in the areas of movement and feeding activity. A short-term tagging program (tags not designed to survive a molt) in Montsweag Bay, Maine, has detected movements of up to half a mile in a period of six weeks, of an apparently non-migratory nature. A trapping experiment in the Damariscotta River (Maine) to determine the effects of tidal currant and light on feeding activity is being used to compare the frequency of rock crabs entering a baited trap during the various phases of the tidal cycle in both daylight and darkness. So far it appears that the frequency in daytime is about 3Oa higher than at night, and there is no observable difference between the frequency during different stages of the tide.

time: 15 minutes plus 5 min (?) for discussion (total: 20 min)

projection: 2" x 2" (35 am) slides and possibly 3 " x 4" slides

[Paul Lindsay, Ira C. Darling Center, Walpole, Maine]

TITLE: Effects of small quantities of cornstarch and dextrose on the oyster, Crassostrea virginica (Gmelin)

ABSTRACT:

Effects of small quantities of cornstarch and dextrose on oysters were evaluated. Parameters measured during summer, fall and spring were glycogen, tissue weight and shell size. Cornstarch had a significantly positive influence on glycogen content, tissue weight and shell size, while effect of dextrose in solution and adsorbed on montmorillonite was limited to glycogen content. Effect of cornstarch was greatest in early fall and late spring, periods when oysters would normally accumulate glycogen. At these seasons high glycogen levels produced by cornstarch were accompanied by significant increases in wet tissue weight and shell size. A correlation between glycogen content and wet tissue weight was demonstrated.

[Kenneth W. Turgeon, University of New Hampshire, Durham, NH]

THE ESTUARINE CRISIS - ECOLOGY

A review of recent and current "ecology movements" and studies suggests that the major danger to our estuaries may not be industrial and sewage pollution.

Some suggestions are made to help save "ecology".

Paul Chailey
Shelter Island Oyster Co.
Greenport, N. Y. 11944

TITLE Nutritional Studies of the Hard Shell Clam *Mercenaria mercenaria*.

PRINCIPAL INVESTIGATOR James E. Rychwalski
State Univ. of New York at Stony Brook

ABSTRACT

Feeding experiments with *Mercenaria mercenaria* Linne' have not defined, even roughly, the nutritional requirements of the species.

Experiments are underway to help define, grossly what nutritive compositions foods must have to produce optimal growth.

Feeding experiments were set up utilizing larval clams since they have a quick evaluation of the particular food being tested. Foods included both dissolved and particulate organic matter and phytoplankton cultures. Algal species which have proven previously to be of good food value were used. In culturing these an attempt was made to improve their nutritional value through alteration of environmental conditions.

Results indicate that dissolved substances have little food value while particulates have some nutritive value, being surpassed by nannoplankton. Additives to the culture media may further enhance the food value of algae.

The ultimate goal of this research is the production of a synthetic diet with high nutritional value.

SEASONAL AND TIDAL VARIATIONS OF TEMPERATURE IN BLOCK ISLAND SOUND, JUNE 1967 - OCTOBER 1968

Robert G. Williams and James E. Lamoureux
New London Laboratory
Naval Underwater Systems Center

Thomas R. Azarovitz
Middle Atlantic Coastal Fisheries Center
Sandy Hook Laboratory

Abstract

Seasonal variations in temperature in Block Island Sound are analyzed for the period June 1967 - October 1968. Charts of surface isotherms contoured from aerial radiometer data, and vertical profiles and sections of temperature vs depth are presented, including results from the SANDS hydrographic cruise of July - August 1967. The effects of tidal variation of hydrographic parameters are discussed and examples given for a 4 day anchor station occupied from 2 August 1967 to 5 August 1967. Methods of acquiring synoptic oceanographic data are compared, and recommendations given for minimizing the error due to tidal and other short term variations in the data.

Factors Affecting Pearl Incidence in *Mytilus edulis* L.

Abstract

Experiments have shown a mean low water population of 2-3 in. mussels (*Mytilus edulis*) to be relatively homogeneous with regards to pearl incidence. When such mussels are compared with rafted ones of similar length, the frequency of pearl infestation is found to be considerably lower in raft-based individuals. In addition, pearls are seldom found with diameters greater than 0.5 mm in rafted individuals while such pearls are relatively common in mussels taken at mean low water.

Various workers have shown that a digenetic trematode, *Gymnophallus bursicola* is responsible for the initiation of pearl formation in *Mytilus*. An alternate definitive host for this trematode is suggested and the possibility that all pearls may not be formed as a reaction to trematode infection is explored.

Richard A. Lutz
Ira C. Darling Center

A preliminary report on research into the population dynamics and ecology of small mammal populations in New England salt marsh ecosystems.

Abstract: The composition and ecology of small mammal populations in New England salt marshes and the adjoining mainland area in Stonington, Connecticut and Duxbury, Mass. is being studied using live capture-marking-release techniques and kill trapping. Present plan include incorporation of telemetry. Peromyscus leucopus appears to be the most abundant species on the mainland and on upland areas (islands) within the marsh, in the bayberry-briar portion. Utilization of the tidal marshes appears to be predominantly by Microtus pennsylvanicus which has been recorded to range 500 feet or more into the marshes at low tide away from the grassy areas of the island and into the Juncus zone of the marsh. No evidence has as yet been obtained on the utilization of the marsh by other species. Blarina brevicauda has been found to be concentrated chiefly on the mainland and in the oak thickets on the island areas, while Zapus hudsonius and Sorex cinereus seem to be restricted to the grassy portions. Clethrionomys gapperi has only been found in a brushy swamp on the mainland adjacent to the Connecticut Marsh, no records for this species have occured in the Mass. marsh. The differences so far apparent between mainland (adjacent) and marsh or island populations include: 1) Greater number of the smallest sized species of mammals were on the island, yet the highest populations of a single species (Peromyscus) occurred on the mainland, area in the Connecticut study plot, followed by (or perhaps equaled) by Microtus in the upper tidal zones and grass areas around the islands. 2) Significant morphological differences (body-tail length rations and greatest skull lengths) between the Peromyscus populations in Connecticut area. Data on this from the Mass. area is not yet completed but seems to indicate a similar trend. This may indicate that character displacement and at least partial genetic isolation has occurred in the coastal island populations.

Submitted by: Dr. John C. Jahoda, Bridgewater State College, Bridgewater, Mass.

Time requirements: 10 minutes presentation, 5-10 minutes discussion.

Require: 35 slide projector- If cannot be supplied please notify.
Also please indicate if slide projector is Carosel or another type.

UNVERSITY OF RHODE ISLAND KINGSTON • R. I. 02881

Graduate School of Oceanography • Narragansett Bay Campus

April 20, 1972

Dr. Donald B. Horton
Secretary/Treasurer, NEERS
TRIGOM
96 Falmouth Street
Portland, Maine 04103

Dear Dr. Horton:

We would like to submit the following paper for the upcoming NEERS Conference.

Authors: S.W. Nixon, C.A. Oviatt, J.N. Kremer[1]

Title: A Simulation Model of Diurnal Dissolved Oxygen Patterns in a Saltmarsh Embayment.

Abstract: Earlier oxygen models have been successful in long term simulation of systems in which high sewage loads and reaeration are dominant. In contrast, a biologically-dominated natural system changes rapidly over the diurnal cycle, and provides a special modeling challenge. An oxygen model of a salt marsh embayment has been developed which produces a diurnal curve of oxygen levels based on observed physical environmental data and metabolism values. Statistical regressions of production on solar radiation, and respiration on temperature were determined for the major compartments of the cove system -- plankton, detritus, macrophytes, benthic micro-algae, fish and shrimp. The relative importance of these compartments seasonally, as well as some interesting insights into the cove system, are evident from the results. Further, some pertinent manipulations of the model can be made, such as the heating of adjacent bay waters. The response of the model, though necessarily restricted to the short term, indicates that the cove may be relatively stable to such perterbations.

[1]Speaker

Sincerely,

Jim N. Kremer