

New England Estuarine Research Society



NEW ENGLAND ESTUARINE RESEARCH SOCIETY

FALL MEETING

October 14-16, 1982

Boston, Massachusetts

Sponsors

NEW ENGLAND AQUARIUM
AND
NORTHEASTERN UNIVERSITY

THE EFFECTS OF ALTOSID ON VARIOUS LIFE CYCLE STAGES OF THE
SALT MARSH COPEPOD APOCYCLOPS SPARTINUS WITH A CORRELATION
TO DOSAGE EFFECTIVENESS AGAINST AEDES MOSQUITOS

Laddawan Yamali Bircher and Ernest Ruber, Biology Department,
Northeastern University, Boston, Massachusetts 02115

This study assesses the possibility of side-effects on micro-crustacea from the use of the synthetic juvenile hormone Altosid SR-10 against the salt marsh Aedes.

Sensitivity of mosquito larvae to altosid was cross-correlated with sensitivities of all stages of the life cycle of the clycopoid Apocyclops spartinus.

GROWTH AND POPULATION DYNAMICS OF THE BLOOD WORM,
GLYCERA DIBRANCHIATA IN MAINE

Glen Bristow, Department of Zoology,
University of Maine, Orono, Maine 04469

An unharvested population of Glycera dibranchiata, a commercially important marine polychaete, was sampled near the species center of distribution in the Gulf of Maine. Comparison of several commonly used parameters revealed wet weight to be the only accurate reflection of growth. Six prespawning age classes were found. Evidence suggests a 2-5% survival beyond the sixth year. Coelomic inspection revealed a 1:1, male to female sex ration in mature prespawners. Approximately 50% of specimens approaching their fifth year were sexually mature. Specific growth rate, r , ranged from 8.35 for the first year class to 0.50 for 5-6 year olds.

BEHAVIOR MODIFICATION IN THE COMMON ESTUARINE COPEPOD
ACARTIA HUDSONICA BY SIMULATED DINOFLAGELLATE BIOLUMINESCENCE

E.J. Buskey and E. Swift, Narragansett Bay Campus,
University of Rhode Island, Narragansett, Rhode Island 02882

The horizontal swimming patterns of groups of the copepod Acartia hudsonica were tracked and described using a video-computer system. An artificial light source was used to mimic the characteristics of dinoflagellate bioluminescence and to test its effects on the swimming behavior of A. hudsonica. Single flashes of light caused a "startle" response consisting of a rapid burst of swimming speed. Repeated flashes of light resulted in higher than average swimming speeds, more swimming speed bursts and reduced turning behavior. These behavioral changes disrupt the slower speed swimming patterns characteristic of grazing behavior in A. hudsonica and may tend to move copepods away from bioluminescent dinoflagellates in nature. The consequences of these behavioral modifications to dinoflagellate bloom dynamics will also be explored.

LONG ISLAND SOUND DREDGED MATERIAL CONTAINMENT STUDY

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

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

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

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

The authority to conduct this study is outlined in a resolution of the Committee on Public Works and Transportation, U.S. House of Representatives sponsored jointly three Connecticut congressmen and adopted 10 May 1977. Preliminary site identification and screening has been completed for over 300 shoreline and shall, w water locations. A series of public workshops at selected locations around Long Island Sound was held 18-21 May 1981 to inform special interest groups and the general public of the study.

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

GROW-OUT OF JUVENILE OYSTERS (CRASSOSTREA VIRGINICA) OF
VARIOUS LINES AND AGES IN THREE TEST ENVIRONMENTS

J. Choromanski and S. Stiles, National Marine Fisheries Service,
Northeast Fisheries Center, Milford, Connecticut 06460-6499

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

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

COPEPOD COLONIZATION OF DECAYING SPARTINA ALTERNIFLORA IN A
MASSACHUSETTS SALT MARSH: SOME PRELIMINARY DATA

Eileen Cummings and Ernest Ruber, Biology Department,
Northeastern University, Boston, Massachusetts 02115

The objective of this study is to determine whether copepod colonization of salt marsh pool substrates depends on the season or the quality and quantity of the substrate.

Enough plastic mesh bags to cover 40 sampling dates (160) containing 15 grams of grass and an equal number of bags containing polypropylene plastic twine were placed in the pool in July of 1981. Four bags of each material of increasing age are removed each sampling date. Each week fresh grass which has been stored in the freezer is placed at the site, this is collected on the subsequent sampling date. Replicate water column samples are taken to determine ambient populations. The copepods from all samples taken are identified and counted. Nitrogen content of the old grass samples is determined by the Kjeldahl method. Data for the months of July 1981 through March 1982 will be presented.

ROLE OF WRACK (ASCOPHYLLUM NODOSUM) IN THE
DETRITAL FOOD WEB OF THE FUNDIAN ESTUARY

M.J. Dadswell, Brenda Blanchard and G.J. Parsons,
Fisheries and Oceans, Biological Station,
Saint Andrews, New Brunswick, Canada E0G 2X0

Wrack (Ascophyllum nodosum) in the lower Bay of Fundy exhibits an annual cycle of growth, detachment, pelagic existence and shoreline decomposition. At each stage it is the major factor in the formation of animal communities and breakdown products from its decomposition may be a major route for movement of primary production to higher trophic levels.

ZONATION OF PLANTS IN MARSHES:
IS HERBIVORY AN OVERLOOKED FACTOR?

Charlene D'Avanzo-Van Raalte and Marjorie Holland,
Hampshire College, Amherst, Massachusetts 01002 and
College of New Rochelle, New Rochelle, New York 10801

Studies of vegetational zones in both salt and freshwater marshes can be categorized as descriptive (where zones are correlated to, e.g., hydrologic factors) or experimental (transplant and physiological experiments). These studies show that several hydrologic and edaphic parameters determine the success of a plant in a particular zone. Herbivory is another possible determinant of plant zonation in marshes. Herbivory in salt marshes has been examined to a limited extent while similar studies in freshwater marshes are even fewer. In both cases herbivores have hardly been considered as contributors to plant zonation. We report early findings of work on insect herbivory in a young, low species diversity freshwater marsh and a complex, high diversity freshwater marsh on the Connecticut River. In the former marsh where Pontederia cordata, Sagittaria latifolia and Leersia oryzoides grow in distinct concentric zones, transplant experiments showed that herbivory, along with competition, contributed to mortality of Sagittaria planted into the Leersia zone.

THE ROLE OF HERBIVORES IN ONE CONNECTICUT RIVER ESTUARINE MARSH

Marjorie M. Holland and Charlene D'Avanzo-Van Raalte
College of New Rochelle, New Rochelle, New York 10801 and
Hampshire College, Amherst, Massachusetts 01002

Great Meadow is a 77 hectare tidal estuarine marsh and alluvial floodplain near the mouth of the Connecticut River at Long Island Sound, and as such occupies a unique transitional inter-face between brackish and freshwater habitats.

Removal of living aboveground plant tissue by herbivores is documented in this marsh for various vascular macrophytes. Generally, herbivores appear to prefer broad-leaved forbs (such as Peltandra virginica, Sagittaria latifolia and Polygonum scandens) and avoid marsh graminoids (such as Typha angustifolia and Zizania aquatica).

Twelve months of field observations suggest that herbivores may exert an important influence on plant community dynamics at Great Meadow, Essex, CT.

CONSIDERATION OF SPECIES DOMINANCE, DIVERSITY AND SECONDARY PRODUCTION FOR TWO BENTHIC COMMUNITIES OF COASTAL DELAWARE

Stavros Howe and Wayne Leathem, College of Marine Studies,
University of Delaware, Lewes, Delaware 19958

For two benthic communities of the coastal Delaware region, estimates of secondary production are 20.62 g ash-free dry weight/m²/yr in sediments of silt-clay/fine sand and 3.82 g ash-free dry weight/m²/yr in sediments of medium-coarse sand. Species dominance is defined in terms of persistence through time and relative contribution to total community production. Comparative methods for assessing dominance are discussed. The diversity of change indice, $\Delta H'$ (Cornell et.al., 1976) indicates high compensatory changes in species densities through time at both stations. Preliminary estimates of secondary production during a second successive year are lower and inversely related to species diversity.

HARVESTING SUBTIDAL CLAMS WITH A PUMP - THE EFFECTS ON THE
SEED

Sandra Libby, Town of Orleans Shellfish Department,
Orleans, Massachusetts 02653

The lack of intertidal soft shell clams (Mya arenaria) and the proliferation of legal sized subtidal clams, prompted the town of Orleans to open two small salt ponds for the pumping of sub-tidal clams using hydraulic clamming procedures. Many studies have shown the efficiency of this method of harvest and the lack of breakage to the clams but not the effect of this type of harvesting, in the summer, on the setting behavior of clams. Commercial activity was allowed to proceed unimpeded by our survey work and sampling was conducted in the fall, after the new set of clams had become established and clamming had subsided. We found that fewer clams set in pumped versus non pumped areas but that even fewer clams set in areas harvested by traditional hand methods (forking) under water. We also found that predation was a serious problem affecting 1.5-2" sublegal clams. However, over 3000 bushels were harvested at a whole-sale value of \$170,000 making future management of this resource difficult.

CAPITELLIDAE (ANNELIDA:POLYCHAETA): SYSTEMATICS MORPHOLOGICAL
VARIATION, AND GENETIC PURITY

Charlene D. Long, Judith P. Grassle, and Ruth D. Turner,
Marine Biological Laboratory, Woods hole Massachusetts 02543

For those attempting to sort capitellids to species, the morphological variation found in field populations often causes great problems. These variations can be such that it appears that several genera, as well as species, of capitellids were collected in the same sample. In some instances, the variation across genus and species lines can be explained by the presence of juvenile specimens, which alter their morphology, particularly the placement of setae, as they mature.

Examination of capitellids from an estuary (Puerto Rico), North Atlantic shallow waters (Georges Bank) and deep waters (ALVIN stations), and from cultures that have been inbred for 30 generations from a single female, has indicated that some lots of capitellids probably cannot be sorted to species on the basis of external morphology, i.e., examination with dissecting and compound microscopes. The impact of this implication on the design and interpretation of ecological surveys is discussed, as is the validity of research tools, such as species diversity indices, that include data from the identification of specimens of capitellids.

POLLUTION CASE STUDIES IN NORTHEAST ESTUARIES

Charles A. Menzie, EG&G Environmental Consultants,
300 Bear Hill Road, Waltham, MA 02154

Pollution case studies in northeast estuaries are discussed in terms of level and nature of contamination. The potential environmental and public health risks are considered. Pollution abatement programs and options for remedial action are presented within the framework for a cross-media risk assessment.

MARINE STUDIES AT THE COBSCOOK BAY LABORATORY

Carl L. Merrill and Arthur J. West, 41 Temple Street,
Beacon Hill, Boston, Massachusetts 02114

The Robert S. Friedman Cobscook Bay Laboratory of Suffolk University is a teaching laboratory on the northern coast of the State of Maine. The forty-acre site is located on the shores of Cobscook Bay in the rural community of Edmunds.

The facility is organized primarily to provide field experience to undergraduate students and in-service secondary school science teachers in a marine environment. Students from Suffolk University and other institutions are invited to participate in field-oriented courses offered during the academic year and in the summer. Among the various programs offered at the laboratory in recent times have been: 1) an Elder hostel session in which 25 participants partook of courses including Art for Enjoyment, The Marine Animals of the Maine Coast, and Terrestrial vertebrates of the Moosehorn Area; 2) a series of one-week, field oriented courses for undergraduate and graduate students covering a variety of marine study topics; 3) field oriented undergraduate research projects (funded by the National Science Foundation) designed to introduce undergraduates to the principles of research; and 4) week-long field studies for in-service high school faculty.

CIRCULATION IN WESTERN LONG ISLAND SOUND

Robert Radulski, Dept. of Earth Sciences, Southern
Connecticut State College, New Haven, Connecticut

No Abstract

THE ROLE OF AN ESTUARINE BIOLOGIST IN AN ENGINEERING FIRM

Robert J. Reimold, Metcalf & Eddy, Inc.,
50 Staniford Street, Boston, MA 02114

Engineers have certain perceptions about estuaries which generally require any description to be in the form of equations. With the advent of modern regulatory systems based on findings of environmental science and technology, engineering decisions have gained a significant reliance on biological studies. This paper will describe the diversity of relationships between the estuarine biologist and the engineer in problem solving. Case histories involving the federal, state and private sector will be used to characterize this evolving "mutualistic" relationship between the biologist and the engineer, and hopefully highlight future employment opportunities for estuarine biologists interested in application of the latest findings of science and technology.

FORMS OF SEDIMENT ACCUMULATION ON THOMPSONS ISLAND, BOSTON HARBOR, MASSACHUSETTS

P.S. Rosen, K. Leach, M. Berman and J. Simpson, Department
of Geology, Northeastern University, Boston, Massachusetts
02115

Processes forming spits from the eroding glacial materials of Thompsons Island are dominated by low wave energy, complex refraction and drift patterns, minimal aeolian activity, and unsorted source materials. Longshore sediment transport trends, when identifiable, show an increase in size with transport; while shore-normal sorting is by shape. An erosional, round cobble lag dominates the lower foreshore which can be traced seaward beneath recent nearshore muds to identify former beach positions. Flat cobbles accumulate as storm ridges, which form the supratidal portion of most spits in lieu of dunes. South spit consists of two geomorphically distinct regions. Updrift, the spit flanks Spartina patens marsh which forms a topographic high for the spit to transgress onto. The supra-tidal beach is composed of a continuous cobble ridge which migrates landward by overtopping. At one location, an overwash throat exists which has been a permanent feature for several years. The overwash takes place during normal spring tides. During storm events, this overwash throat has migrated down-drift, resulting in a continuous overwash fan blanket similar to flood tidal delta deposits from a migrating sand inlet. The downdrift end of the spit has not emerged above the high water line. The landward face consists of a 2.5 m height slipface. Trenches show an absence of steep, landward-dipping beds normally associated with slipfaces. Downslope movement is apparently controlled by water-level lines resulting from small (2-4 cm ht) waves generated within the lagoon. These small waves result in a downslope transport of material and the formation of a microscarp. On a falling tide, the plunge point

and hence microscarps periodically jump over the deposits, resulting in a series of parallel features spaced about 10 cm., while on a rising tide the microscarp migrates continuously upslope, transferring sediment downward.

A PRELIMINARY ANALYSIS OF SOME SOCIOECONOMIC AND ENVIRONMENTAL
CONSEQUENCES OF FUNDY TIDAL POWER DEVELOPMENT ON
NEW ENGLAND COASTAL COMMUNITIES

Robert. W. Rudolph, Peter F. Larsen and Jerry A. Topinka

No Abstract

FACTORS INFLUENCING ACCUMULATION OF IRON SULFIDE MINERALS IN
MAINE ESTUARIES

J.H. Waugh and L.M. Mayer, University of Maine at Orono
I.C. Darling Center, Walpole, Maine 04573

Organic carbon, protein, iron and sulfur concentrations were measured on sediment cores taken from transects along the Damariscotta and Sheepscot estuaries in an effort to determine which factors were important in iron sulfide mineral formation. Results to date suggest that either temperature or the openness of the system to exchange with overlying waters is the major factor influencing the amount of iron sulfide accumulated. Iron concentration could be limiting under some circumstances as at low levels there was a positive correlation between total iron and sulfur. The temperature and amount of iron also seemed to influence the degree of pyritization, possibly by influencing the kinetics of the transformation.