New England Estuarine Research Society

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SPRING MEETING

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JOINTLY HOSTED BY

OCEAN PROCESS ANALYSIS LABORATORY
UNIVERSITY OF NEW HAMPSHIRE

AND

BIGELOW LABORATORY FOR OCEAN SCIENCES

Aitken-Ander, Pamela, Biology Dept., Brooklyn College (CUNY), Brooklyn, N.Y. 11210.

EFFECTS Of THE TREMATODE PROCTOECES MACULATUS ON THE FECUNDITY OF CREPIDULA CONVEXA (SAY)

Dissection of hundreds of Crepidula convexa collected from Jamaica Bay, New York and Quisset Harbor, Massachusetts revealed an infection by the digenetic trematode Proctoeces maculatus (Loose, 1901) Odhner, 1911. Although species of Proctoeces have been reported in a few bivalves and gastropods, this is the first report of the parasite in Crepidula. The gonad, pericardium and kidney of the gastropod were the major sites of infection. Developmental stages of the trematode from cercaria to adult are present in C. convexa, proving that a vertebrate host is not required for completion of its life-cycle. From 7-60% of C. convexa may be infected, but the incidence of parasitism is highest among females. The impact of the infection appears to be directly related to host size and parasite load. Large females infected with one or two parasites can produce one or two normal egg masses. If individuals infected with more than three parasites do succeed in producing a brood, the embryos are usually abnormal and the egg mass is rejected. Heavily infected females do not produce broods and have a high mortality rate. Since C. convexa in Jamaica Bay can brood 5-6 egg masses each season, infection by Proctoeces maculates can result in as much as a 66% reduction of fecundity in 50-60% of females.

Auster, P.J.[1] and P. Pendoley[2], University of Connecticut, Marine Research Laboratory, Noank, CT[1] and Schooner Inc., New Haven, CT[2]

INCIDENCE OF FIN NECROSIS IN WINTER FLOUNDER, PSEUDOPLEURONECTES AMERICANUS (WALBAUM), FROM NEW HAVEN HARBOR.

New Haven Harbor, Connecticut, supports a large stock of juvenile winter flounder. Surveys conducted between April and November, 1980, indicate a high percentage of individuals with necrotic fins at an inner harbor station while relatively few individuals are affected at outer harbor stations. Preliminary analysis indicates the necrotic condition is site specific and related to degraded environmental conditions. Smaller size classes of winter flounder seem to be more susceptible to the condition. Trends in seasonal peaks of abundance and incidence of the necrotic condition are discussed in relation to temperature, behavior and catchability.

Biksey, Thomas, Battelle New England Marine Research Laboratory, Duxbury, MA.
THE NEED FOR AN INTERCALIBRATION PROGRAM IN THE NORTHEAST.

Assessing the effects of pollutants on marine invertebrate communities usually involves a benthic survey to determine the structure of the community. These surveys can produce individual faunal lists totalling several hundred species. Temporal and spatial comparisons are often made with historical data to determine the impact of the pollutants. If different taxonomists identified the fauna for each survey, differences will be significant when they include dominant, keystone or indicator species and will result In erroneous conclusions about the pollutant's effect on the marine invertebrate community. There is, therefore, a need to establish regional intercalibration programs for groups conducting such surveys. SCAMIT (Southern California Association of Marine Invertebrate Taxonomist) has such a program and is producing a regionally intercaibrated list of species with voucher specimens. A specimen exchange enables members to examine species and meet monthly to discuss differences in species identification. An in-house intercalibration program has been initiated by the author (a charter member of SCAMIT) at Battelle New England Marine Research Laboratory. There has been interest expressed by a few regional taxonomists in the creation of an intercalibration program in the Northeast. SCAMIT represents one of the first efforts to act on recommendations from a suite of federal-regional workshops on marine pollution monitoring. Those recommendations viewed national marine pollution monitoring as a suite of regionally coordinated efforts with emphasis on enhancing intra-regional communication, data exchange and intercalibration. Thus, a Northeast intercallbratlon program can only further these goals.

Blott, A.J. and J.F. Kenney, NMFS/URI Fisheries Engineering Group, Narragansett, RI.
ISAACS-KIDD MIDWATER TRAWL PERFORMANCE STUDY.

Results of an ongoing study to determine some hydrodynamic and geometric characteristics of the Isaacs-Kidd Midwater Trawl will be presented. Measurements on the full scale trawl include trawl speed and depth, warp length, tension, and angle at the vessel, warp angle at the trawl, and bridle and depressor angles. Flow rates in and around the mouth of the net have also been measured. Tow tank tests on two scale models have been conducted in order to observe flow streams through the netting. Future testing will be discussed.

IS ASSIMILATORY NITRATE REDUCTION IMPORTANT IN MARSH SEDIMENTS? William B. Bowden. School of Forestry and Environmental Studies. Yale University. New Haven, CT 06511.

Extensive field and laboratory data indicate that nitrate uptake is unlikely in the presence of such ammonium. One explanation for this observation is that nitrate must be reduced intracellularly (with an expenditure of energy) to ammonium, before it can be incorporated into proteins. In contrast, ammonium may be used directly without this energy expenditure. Therefore, in anaerobic marsh sediments, where ammonium is abundant, assimilatory nitrate reduction should be negligible. However, nitrate production in North River (Mass) marsh sediments appeared to exceed measured rates of nitrate consumption or loss. A possible explanation is that assimilatory nitrate reduction was not negligible, as assumed. If assimilatory nitrate reduction in marsh sediments is not negligible then it may be an important mechanism for nitrogen recycling.

Brown, Gail S. Dept. Biology, Acadia University, Wolfville, Nova Scotia.
PRODUCTION OF *EURYTEMORA HERDMANI* IN THE CORNWALLIS RIVER, NOVA SCOTIA.

Abundance of the copepod *Eurytemora herdmani* was examined in plankton samples collected from the Cornwallis River, Nova Scotia at approximately biweekly intervals between December, 1980 and May, 1982. The Cornwallis River is a macrotidal estuary in which extreme turbidity resulting from strong tidal currents (4 to 5 kt.) and extensive vertical mixing severely restricts primary production. Despite the limited primary production, *Eurytemora* appears to thrive in the river occurring in high densities at certain times of the year. Numbers of the copepod rise to a peak (>18,000 m^{-3}) in May but maximum abundance occurs in mid-December (<12000 m^{-3}). *E. herdmani* is captured infrequently after early July when water temperatures rise above 18^0C and predators such as hydroid medusas, *Labidocera aestiva,* mysids and Atlantic silversides become abundant. It does not become common in the Cornwallis River plankton again until October, although it persists in deeper waters of Minas Basin.

Changes in densities of copepodites and adult females carrying egg sacs indicate that as many as 6 generations may be produced annually. Production of *E. herdmani* and its trophic status in this turbid estuary will be discussed.

Brown, John, Dept. of Biology, Acadia University, Wolfville, Nova Scotia.
THE ECOLOGY OF *FUNDULUS HETEROCLITUS* IN A MINAS BASIN SALT MARSH.

The life history of *F. heteroclitus* was studied from July 1981 to December 1982 in a salt marsh of the Minas Basin. Four age classes were determined: 0 (<39 mm TL): 1+ (40-55 mm); 2+ (56-67 mm); and 3+ (65-104 mm). Size differences between sexes were constituting the major component of the diet in the spring (April-June) and summer (July-August). In the fall (September-November) and winter (December-March), diet switched to detritus, diatoms, plant material and small crustaceans. Feeding habits also changed with the size of the animals. Egg counts were conducted and three stages of egg development were obvious: recruitment ova (<0.25 mm in diameter), ripe ova (>72 mm in diameter) and atietic or arrested ova (various ages). Maximum number of eggs in the ovary was 16.11. Age 2+ females produce more ripe ova per unit ovary weight. Spawning peaked in July through to the first week of August for both 1981-1982. *F. heteroclitus* migrate on a seasonal or tidal basis.

Carlson, Q.J. and M.L. Carlson. Code 4330, Naval Res. Lab., Wash, D.C. 20375
REASSESSMENT OF MACROALGAL EXUDATION.

Fucoid macroalgae exudates influence coastal water color characteristics, organic chemistry of receiving waters, and air-sea interfacial phenomena; reassessment of the nature and release of those materials was needed. Minimally-disruptive quantitive in-situ measurements were made of DOC, UV absorbance, and phenolic reactivity. Variability was found in amounts of materials exuded by individual plants, by different fronds of one plant, and by plants on different days. Exudation rates were highest in the first several minutes of reimmersion, and amounts released were greatest on warm dry days. However, observed desiccation characteristics were not associated with high exudation. Exudation rates at night, during immersion, and in rain were much lower than those observed during initial reimmersion. Exudation by plants in exposed areas was less than those in protected areas. Exudation may have been quantitatively overestimated previously, but qualitatively underestimated.

Carlson, D.J., D.W. Townsend, A.L. Hillyard and J. Eaton. Naval Research Laboratory, Washington, D.C., Bigelow Laboratory for Ocean Sciences, W. Boothbay Hbr., ME and Ira C. Darling Center, Univ. Maine, Walpole, ME.
THE INFLUENCE OF MUDFLATS ON THE PHYTOPLANKTON AND ZOOPLANKTON OF THE OVERLYING WATER.

The influence of mudflats on plankton in overlying waters was investigated by sampling flooding and ebbing waters of a small tidal mudflat. The mudflat was found to have a grazing impact on the plankton during spring and summer. Removal of phytoplankton increased with increasing water temperatures, indicating consumption as a function of activity of benthic suspension feeders. Zooplankton were also removed from flooding waters in a similar seasonal pattern. The work demonstrated input of planktonic carbon to mudflats and indicated that mudflat organisms may consume significant portions of both primary and secondary planktonic production.

J.P. Christensen, Bigelow Laboratory for Ocean Sciences, Boothbay Harbor, Maine

Nitrification and Oxygen consumption by sediments.

Nitrification is the autotrophic process that oxidizes ammonium to nitrite and nitrate at the expense of oxygen. Thus it may be important in oxygen consumption by marine sediments. Here, nitrification rates were estimated from porewater nitrate profiles using the best fit to an analytical model of nitrate including diffusion, sedimentation, nitrification, and denitrification. Comparison of model-estimated nitrification rates with measured belljar oxygen consumption rates at the same stations indicates that about 40% of the oxygen is consumed by nitrification.

Cogswell, C.M., Bio. Sci. Group, Univ. of Conn., Storrs, CT.
THE ROLE OF HERBIVORY AND PLANT COMPETITION IN DETERMINING PLANT COMMUNITY STRUCTURE IN A NEW ENGLAND SALT MARSH.

Primarily abiotic factors have been sited as controlling plant species distributions and abundances in salt marshes. This study investigated the role of the biotic factors, herbivory and competition, in structuring low marsh vegetation in both natural and experimentally eutrophied plots dominated by Spartina alterniflora and Salicornia europaea. Analyses of % survivorship data, and estimates of biomass and fecundity from removal-competition and herbivore exclusion experiments revealed that increased herbivory on S. alterniflora in high nutrient sites may delay its replacement of S. europaea thereby affecting the distributional and successional patterns of these marsh species. This study provides perspective on the role that biotic interactions play in plant community structure and organization in general, as well as, an assessment of the impact of urban eutrophication on estuarine plant communities.

Crawford, Peggy, Dept. of Biology, Acadia University, Wolfville, Nova Scotia.
ASPECTS OF REPRODUCTION OF *EURYTEMORA HERDMANI* (CALANOIDA) IN THE CORNWALLIS ESTUARY.

Eurytemora herdmani is the most consistently abundant zooplankter in lower reaches of the Cornwallis Estuary. Reproducing adults were present from late February through July, and from September through November. Nearly 600 adult females were examined from samples taken between December 1980 and May 1982, and clutch size, body length, body width and egg diameter were recorded. Peak egg production occurred in late May and early June (<119 eggs per clutch), when females were largest. Minimum body and clutch sizes were recorded in July. Clutch size was positively correlated with body length and width. Significant negative correlations were obtained between body length, width and clutch size and the mean temperature of the previous month. Egg diameter was also negatively correlated with temperature.

Craig Doremus, Graduate School of Oceanography, Univ. of Rhode Island, Narragansett, RI.
PRELIMINARY OBSERVATIONS ON PLANKTONIC AMMONIA UPTAKE IN ARTIFICIALLY EUTROPHIED ESTUARINE MESOCOSMS: PHYSIOLOGICAL VERSUS ECOLOGICAL CONTROL.

Measurements of ammonia uptake were done utilizing ^{15}N during May and June of 1982 in mesocosms (13,000 l) that have been receiving varying amounts of nutrient (N, P, Si) inputs since June 1981. Four mesocosms (including one control with no nutrients) were sampled in early May while seven mesocosms (2 controls) were sampled in late June. Preliminary data shows that during low ammonia uptake periods (<~100ng at/1/hr), the specific uptake (uptake rate per unit particulate nitrogen) is the major influence on uptake rate. This corresponds to periods where most of the uptake is immediately assimilated into macromolecular (cold TCA insoluble) intracellular pools. Uptake at these low rates appears to be a consequence of the physiological state of the phytoplankton with respect to nitrogen limitation.

Ammonia uptake at high uptake rates(> ~l00ng at/1/hr) appears to be controlled by the particulate nitrogen concentration. High particulate nitrogen concentrations are a function of ecological processes operating on longer time scales including seasonal silicon limitation and suppressed grazing pressure during May where most of the high ammonia uptake rates were measured.

Franz, D.R., Biology Department, Brooklyn College/CUNY, Brooklyn, NY 11210
THE SEASONAL GONAD/CAECAL REPRODUCTIVE CYCLE OF ASTERIAS FORBESI - A PROGRESS REPORT

The interrelationships between the gonad and the pyloric caeca during the seasonal cycle have not been adequately investigated in the seastar Asterias forbesi. We report on the seasonal gonad/caecal cycle of a population from New York (Long Island, South Shore). A Fall and Spring phase of gonad development is separated by a mid-winter pause. Spawning begins in mid-June and continues through July (16-21°C). Gonad reorganization continues until November when gonad growth is renewed. Weights of pyloric caeca decline from April to August. Energy for gametogenesis is probably not stored in the caeca. The large caecal biomass in A^{p}ril may be used in respiration during the warm summer months following spawning, when feeding is minimal. The seasonal cycle seems relatively well adapted to the extreme thermal regime of the Northwest Atlantic inner shelf in which winter and summer tem^{p}erature extremes may reduce feeding activities for significant periods of time.

Graham, J.J., Fisheries Research Laboratory, W. Boothbay Harbor, Maine, 04575
WHERE ARE THE BODIES?

Larval herring, Clupea harengus, display an abrupt and extensive decrease in abundance after their autumn movement into the estuaries and embayments of the Maine coast. This decrease is caused by mortality, but few dead larvae are captured in our sampling nets. Evidence on the distribution of macrozooplankters and small fishes is presented indicating that predation on the larvae may be moderate. Some of the large macroplankters feed on the larvae in the cod ends of nets and in laboratory trays. However, their distribution in the estuary is often not coincident with that of the larvae because of their differing behaviors. Can someone suggest what might happen to the millions of larva herring cadavers de-posited in the water column?

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Joseph J. Graham
Northeastern Representative ELHS
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One or two posters will display photographs of larval fish contributed by scientists of the Northeast Region. Each larvae will be identified by scientific and common names; whether its habitat is freshwater, estuarine, saltwater or a combination; the name, title and program of each contributor. Associated with the display will be information concerning the activities of the Early Life History Section of the American Fisheries Society.

Gratto,G.W.,Biology Dept.,Univ. of New Brunswick(Saint John),Saint John, N.B
FOOD HABITS OF FISH ON AN INTERTIDAL MUDFLAT IN THE BAY OF FUNDY.

Fish were collected in a trap net in an intertidal cove at the mouth of the Musquash River, N.B. In the summer the common species could be divided into three groups based on diet. Smelt, tomcod, hake and pollack fed primarily on the amphipods Corophium volutator and Gammarus lawrencianus. Tubicolous polychaetes formed the bulk of the diet of young smooth flounder. Juvenile herring, blueback herring and silverside ate copepods and small amphipods. Changes in diet appeared to be primarily related to either growth of the fish or differences in the relative availability of the prey species. Although there is much similarity in the diets of individual species, the overall fish community differed greatly in relative abundance of species from intertidal areas at the head of the Bay of Fundy.

Hartman, J.M. Biological Sciences Group, University of Connecticut, Storrs, CT.
SPARTINA ALTERNIFLORA STEM DEMOGRAPHY IN A NEW ENGLAND SALT MARSH

During November 1981 plots were established in four areas of Great Sippewissett Salt Marsh, Cape Cod, MA. The plots include four treatments: short-form or tall-form Spartina alterniflora in natural or experimentally eutrophied marsh. All S. alterniflora stems in the plots were tagged and their heights measured. Growth and mortality were followed by re-measuring the stems seven times during the 1982 growing season. Recruitment of new stems was highest in the natural, short-form plots. Growth rates differed significantly in the eutrophied vs. natural plots for both forms of S. alterniflora. Mortality rates were highest in the eutrophic, short-form plots, while mortality curves were very similar for the other three treatments. This difference may be due to grazing by voles (Microtus pennsylvanicus).

Hines, M.E., M.J. Spencer, J.B. Tugel, R. Chormann, M.B. Lyons, and G.E. Jones, Departments of Microbiology and Earth Sciences, Univ. of New Hampshire, Durham, NH 03824. SEDIMENTARY BIOGEOCHEMISTRY IN THE GULF OF MAINE.

Sediment gravity cores collected from the Gulf of Maine continental shelf, slope, and rise were analyzed to delineate interactions between pore water chemistry and microbial activity. Denitrification was slightly more rapid than sulfate reduction and both processes occurred within the same sediment layers in the upper sections of the cores. Sulfate reduction was 10 to 100 times slower than in shallow water near shore sediments. Turnover rates of glucose, glutamate and acetate, measured using 14c, were slow and decreased with depth. Dissolved organic carbon and monosaccharide concentrations displayed similar depth profiles which were the inverse of organic turnover rates. Hence, glucose uptake rates corrected for monosaccharide concentrations showed little vertical or horizontal variation. Other parameters such as alkalinity, Fe, Mn, and nutrients were also measured in the pore waters. These results indicated that the shelf stations were more reducing than typical deep sea sediments and had chemistries intermediate between the sub-oxic deep sea sediments and the more reducing coastal sediments.

Loder, T.C., Dept. of Earth Sciences, Univ. of New Hampshire, Durham, NH. Liss, P.S., School of Environmental Sciences, University of East Anglia, Norwich, NR4 7TJ, U.K.
THE ROLE OF ORGANIC MATTER IN DETERMINING THE SURFACE CHARGE OF SUSPENDED PARTICLES IN ESTUARINE WATERS.

Particle electrophoretic mobilities have been measured on samples from two estuaries including a hard-water river (River Orwell, England) and an iron rich stream (Keithing Burn, Scotland).

The results from the Orwell estuary confirm the importance of both absorbed organic coatings and divalent cations in controlling particle mobilities. In Keithing Burn the particles are intrinsically positively charged but these charges are changed radically to normal negative values by formation of organic coatings. For particles formed during oxidation of sample water, absorption of organic matter from estuarine waters and a change in charge occurred within minutes after resuspension.

Lyons, W.B. and H.E. Gaudette, Dept. of Earth Sciences, Univ. of New Hampshire, Durham, NH 03824.
TRACE METAL PROFILES FROM MAINE AND NEW HAMPSHIRE NEARSHORE SEDIMENTS.

Box cores were taken in five Northern New England estuaries and the sediments analyzed for acid leachable Fe, Cu, Cr, Pb and Zn as well as organic carbon and total phosphorus. This was done to establish historic records of trace metal inputs into these areas. The data from Machias and Penobscot Bay, Maine, and Seabrook, N.H. show low concentrations of these metals and little to no surficial enrichments in the top 13-17 cm of sediments. The Saco River and Kennebec River, Maine, sediments show higher concentrations of Cu, Cr, Pb, and Zn, and surficial enrichments of Cr. These higher concentrations may be due to increased anthropogenic metal inputs in these locations.

McKenna, J.E.,Jr., Graduate School of Oceanography, University of Rhode Island, Narragansett, R.I.
GUANO POWERED PRODUCTION

During the breeding season, seabirds are required to congregate in dense colonies to nest. At this time of year the flux of nutrients from the sea to the land, through the birds, can be large.

Data were collected from rock pools and seawater, in three different seabird island communities. The results show that significant differences in production and nutrient concentrations exist between rockpools and the seawater adjacent to the islands. The concentrations of nutrients, such as NH3 and DIP, in rainpools, reach values as high as 923uM and 209uM, respectively.

These results compare well with those of other studies on similar conditions and indicate that the biochemical consequences of the seabirds being on the island has a strong influence over the rockpool communities. Experimentally controlled laboratory and field work may now be conducted to gain a better understanding of the relationships within these communities.

Menzie, C. and R.Gillmor (EG&G Environmental Consultants) and C. Bryden (USGS).
Diurnal behavior in the starfish Astropecten americanus on the outer continental shelf.

T.V. and still bottom camera surveys over a four-year period have revealed a diurnal behavior pattern in the starfish A. americanus. This species appears to forage at night and bury itself beneath the sand during the day. Although other species of this genus have been observed to exhibit similar behavior patterns in shallow water, our observations were made at depths of 87-120 m where light was presumably very low. The adaptive significance of this behavior is considered.

Rines, J.E.B. and B.E. Hargraves, Graduate School of Oceanography, University of Rhode Island, Kingston, R.I. 02881.

ADDITIONS TO THE CHAETOCEROS FLORA OF NARRAGANSETT HAY.

The genus Chaetoceros is one of the largest and most complex genera of marine plank-tonic diatoms. It is notoriously difficult to identify at the species level, thus its distribution has not often been well documented. Of the 175 described species, approximately 55 have been recorded along the Northeastern coast of the United States, but only about 15 species have been reported from Narragansett Bay. Recent investigations on the planktonic flora of the Bay have greatly increased this number, and the current list includes about 40 species. One of these has not previously been reported anywhere along the Northeastern U.S. coast.

Jon A. Schmidt, Dept. of Biology, University of Bridgeport, Bpt, CT 06604

GROWTH AND MORTALITY OF ARBACIA PUNCTULATA IN LONG ISLAND SOUND

Rate of growth and mortality for Arbacia punctulata (Echinodermata: Echinoidea) from Long Island Sound was examined from November, 1981 through February, 1983. Using SCUBA, random monthly samples (m^2) of urchins were collected and the test diameter measured. A computer program, utilizing maximum likelihood statistics, was used to analyze cohort parameters in the size-frequency distributions. Grpahical cumulative probability techniques provided starting values for the program. The decrease of area under the normal curves describing each cohort (converted to numbers per m^2) and regression of log numbers versus time, was used to estimate cohort mortality. Estimated parameters of the Richards growth function will be used to describe the growth function for this population. Preliminary results show a growth increment in mm/mo. of 0.797 for juveniles and 1.88 for adults. The interrelationships between temperature, growth and reproduction will be evaluated.

Scully, Brian, Dept. of Biology, Acadia University, Wolfville, Nova Scotia.
UTILIZATION OF A MINAS BASIN SALTMARSH-MUD FLAT SYSTEM BY JUVENILE SMOOTH FLOUNDER, *LIOPSETTA PUTNAMI* GILL.

From May through August 1981 0 and 1+ age group smooth flounder were taken from a creek that drained a salt marsh-mudflat system in the southern bight of Minas Basin, Nova Scotia. Smooth flounder were primarily diurnal feeders, but migration onto the marsh occurred both at night and during daylight hours, in accordance with tidal flows. Flounder fed mainly on benthic organisms such as the polychaetes *Fabricia sabella, Streblospio benedicti* and *Eteone longa,* and the amphipod *Corophium volutator,* but young-of-the-year fish also fed extensively on the copepod *Eurytemora herdmani* in spring when it was abundant. Capture records indicated that peak utilization of the marsh by this species was in July, whereas the winter flounder *Pseudopleuronectes americana* became most abundant in late summer and early fall months.

Welsh, B. L., Marine Sciences Department, University of CT, Avery Point, Groton, CT and Welsh, R. I., Naval Underwater Systems Center, New London, CT
ESTUARINE SCIENCE IN THE PEOPLE'S REPUBLIC OF CHINA

We will report highlights of a technical exchange mission of estuarine scientists to the People's Republic of China between 21 March and 11 April 1983. The delegation, under sponsorship of People-to-People, will visit 6-8 research institutions and academic facilities along the Chinese coastline from Bejing (Peking) to Guangzhou (Canton). The purpose is to meet with Chinese scientists on the subject of estuaries, their science and their management, and to participate in the spring meetings of the Chinese Society for Oceanology and Limnology. Our theme will be estuarine dynamics, and our interests will be comparing the east coast here with the Chinese coastline, which is the only other western ocean margin in the northern hemisphere, and hence the only other comparable coastline from the global systems aspect.

Williams, P. J., Dept. of Biology, Acadia University, Wolfville, Nova Scotia.
STOCK CHARACTERISATION OF MIGRANT SHAD *(ALOSA SAPIDISSIMA)* IN UPPER WATERS OF THE BAY OF FUNDY.

American shad from U.S. spawning populations undertake a feeding migration into the upper waters of the Bay of Fundy during the marine phase of the life cycle. As part of a broad study of spatial and temporal characteristics of this summer migration, the feasibility of using morphological characteristics of otoliths to identify rivers of origin is being explored. Samples of shad otoliths from 13 rivers of the east coast of Canada and the U.S. are being examined to try and "fingerprint" spawning populations on the basis of otolith shape. It is anticipated that otolith characteristics may provide a rapid and more economical means of stock identification than traditional tagging techniques.