THE COAST OF MARYLAND 1759 - 2007:

A SELECTIVE ANNOTATED BIBLIOGRAPHY OF THE LITERATURE CONCERNING THE BIOLOGY, GEOLOGY, HISTORY, AND PUBLIC AFFAIRS OF MARYLAND'S COASTAL BAYS

Compiled by

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INTRODUCTION

After several years of conducting our own research and directing that of students in the coastal bays of Maryland, we have come to the realization that there is no updated, centralized source for the literature describing activities on the coast. Several bibliographies (both complete and partial) have been published. These were usually devoted to the biology of a species found on the Maryland coast (e.g., Cronin et al., 1957; Pfitzenmeyer and Shuster, 1960; or Yancey and Welch, 1968), concerned work in estuaries over a broad geographic region (e.g. Livingstone, 1965); covered broad topics such as fisheries (Schwartz, 1960); or were bibliographies published in obscure places that are not readily accessible (Mansueti, 1955). The bibliography of J. Mark Odell (1970) was the last attempt to summarize the literature for the scientific and historical literature (most of it from primary sources) concerning events in these spheres of interest for our coastal environment. His work also included citations of publications that detailed historical and political affairs of the Maryland coast (particular the establishment of Assateague Island National Seashore) as well a publications concerning the biology and ecology of organisms that occur in Maryland waters. More recently, Boynton et al. (1993) have produced an annotated bibliography with many references.

We have preserved some of the features of Odell's literature survey by including works, particularly those of scientific interest, that, while they may not have been intended to address the Maryland coast specifically, do discuss the identification, biology, distribution and ecology of organisms found within the coastal zone of the state. This is especially so of works that addressed the biology of the coasts of New Jersey, Delaware, and Virginia. Some works discussing Chesapeake Bay have also been included because of similar applicability to the Atlantic Coast of the Delmarva Peninsula.

This document contains an alphabetical list, by authors, of scientific and historical documents related to the Atlantic coast and coastal bay systems of Maryland. Included are geological works for the coast specifically and the Delmarva Peninsula generally; biological-ecological works for adjacent bays and coasts (Delaware Bay, Chesapeake Bay, Delaware's coastal bays; biological works on species that occur on the Maryland coast but not necessarily reported by the work as occurring in Maryland waters; works on pollution biology and ecology – particularly indicator species – which also occur on the Maryland coast; newspaper accounts – tourism, general interest stories on science and ecology of the coast but excluding crime and obituary reporting.

The publications' titles and abstracts were obtained using several search engines and searches of print abstracting services including: BioOne (bioone.org) – searchable data base for the past five years of many biological journals; JSTOR; the websites of several scientific societies which publish journals of interest, several of which put the entire contents of past years of the journal on line; BIOSIS – Biological Abstracts; Zoological Record; Geological Abstracts; Lexus-Nexus; and the U.S. Geological Survey Bibliography of North American Geology (1785-1949, 1968). Search key words for these databases were: Assawoman Bay; Assateague Island; Isle of Wight Bay;

Sinepuxent Bay; St. Martins River; Chincoteague Bay; Ocean City, Maryland; Ocean City Inlet; Worcester County, Maryland; and Fenwick Island.

Publications, abstracts and documents were located from several repositories: Frederick Douglass Library, University of Maryland Eastern Shore; Blackwell Library, Salisbury University; Morris Library, University of Delaware; University of Delaware Graduate College of Marine Studies Library, Lewes; and the reports and publication files of the Maryland Coastal Bays Program and the Natural Resources Division of Assateague Island National Seashore. For those who may wish to see the documents listed herein, the libraries in the University of Delaware and the University System of Maryland are referenced for the paper. These sources are listed for publications and are coded as follows:

- BSU – Bowie State University
- CBL – University of Maryland Center for Environmental and Estuarine Studies, Chesapeake Bay Laboratory, Solomons
- FSU – Frostburg State University
- HPL - University of Maryland Center for Environmental and Estuarine Studies, Horn Point Laboratory, Cambridge
- MCBP – Maryland Coastal Bays Program Offices, Berlin, Maryland
- MSU – Morgan State University
- SMC – Saint Marys College
- SU - Blackwell Library, Salisbury University
- TU - Towson University
- UD-Ag – University of Delaware Department of Agriculture Library
- UD-GCMES – University of Delaware Graduate College of Marine and Earth Sciences, Lewes
- UD-Morris – University of Delaware Morris Library, Newark [or in the Library Annex]
- UMAB – University of Baltimore
- UMBC – University of Maryland Baltimore County
- UMCP-McKelden – McKelden Library, University of Maryland College Park [although some publications may be located in subcollections at other locations on campus]
- UMES – Frederick Douglass Library, University of Maryland Eastern Shore

The presence of journals in these repositories are indicated by the library acronym alone. In the case of books, pamphlets, maps, or government documents, the library acronym is followed by the catalogue number.

We wish to thank Drs. Christopher Briand and William L. Grogan, Salisbury University, for their respective assistance in identifying older works and systematic studies of Insecta of the Maryland coast. Thanks are also due to David Brinker, Maryland Department of Natural Resources for his review of the ornithology papers and Carl Zimmerman, Chief of Natural Resources Division, Assateague Island National Seashore, for making his reports and publications files available to us. We also thank

David Blazer, Director of the Maryland Coastal Bays Program for his encouragement and support of the project. We also thank Kartina F. Bolek, Dave Spielman and Stephanie Hill of Salisbury University for their assistance in the searches for documents.

Abbe, C., Jr., O. L. Fassig and F. J. Walz. 1899. Report on the meteorology of Maryland. *Maryland Weather Service Special Report Publication* 1(3):1-551.

Library: CBL, FSU, UMCP

Abbot, J. M. 1977. Arctic loon at Assateague Island, Virginia in April 1976. *The Raven, Journal of the Virginia Society of Ornithologists* 48(1):25-26.

Abbott, P. L. 1999. *Natural Disasters*, Second Edition. WCB McGraw-Hill (Boston). xiii + 397 pp.

Library: UMBC [GB5014 .A24 2002]

Abbott, R. T. 1974. *American Seashells*, Second Edition. Van Nostrand Reinhold (New York). vi+663 pp.

Library: CBL, MSU, SMC, SU, TU, UMCP[all are QL411.A19 1974]; UD-Morris, UD-GCMES [all are QL414.A2]

Abbott, R. T. 1986. *Seashells of North America*, Revised Edition. Golden Press (New York). 280 pp.

Library: FSU, MSU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES [all QL404.A2]

Abele, L. G. 1972. A reevaluation of the *Neopanope texana-sayi* complex with notes on *N. packardii* (Crustacea: Decapoda: Xanthidae) in the northwestern Atlantic. *Chesapeake Science* 13:263-271.

Abstract: The status of mud crabs of the family Xanthidae previously referenced to *Neopanope texana texana* (Stimpson, 1859) and *N. texana sayi* (Smith, 1869) is reviewed. It is concluded, based on the examination of types and other material, that both are distinct species allopatric in distribution: *N. texana* occurring in the Gulf of Mexico and *N. sayi* occurring along the east coast of North America. Both species are compared to *N. packardii* (Kingsley, 1879) and a key to the genus Neopanope in the western Atlantic is presented. Diagnostic characters of the species are illustrated.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Abernathy, D. 2003. Nose-to-nose with “wild ponies” on Assateague Island; Thrilling: Trip offers moments to share. *Telegraph Herald* (Dubuque, Iowa), 20 April, p. E8.

Achmad, G. and J. M. Wilson. 1993. *Hydrogeologic Framework and the Distribution and Movement of Brackish Water in the Ocean City – Manokin Aquifer System at Ocean City, Maryland.* Maryland Geological Survey, Report of Investigation RI57. 125 pp.

Abstract: Ocean City, Maryland, is a coastal resort on the Atlantic Ocean. The town's public-water supply is provided by the Ocean City-Manokin aquifer system. The uppermost aquifer at Ocean City is the unconfined to semiconfined Columbia aquifer. The Columbia aquifer is comprised of the Beaverdam Sand and overlying superficial units. Underlying the Columbia aquifer in order of increasing depth are the Pocomoke, Ocean City, Manokin, and Choptank aquifers. The Ocean City and Pocomoke aquifers contain only freshwater. Brackish waters occur in parts of the Columbia and Manokin aquifers at Ocean City although both these aquifers are predominantly fresh. The Choptank aquifer contains only brackish water. A groundwater flow model was constructed to determine the effects of increased pumpage on the ground-water flow system at Ocean City. Increased pumpage, approximately 1.6 times the 1990 pumpage, expanded and deepened the cones of depression in the Manokin, Ocean City, and Pocomoke aquifers. A cross-sectional solute-transport model was developed for the 44th Street and Gorman Avenue well fields in order to simulate chloride distributions in the coastal aquifers. The simulation produced and offshore plume of fresh to brackish water in the Ocean City – Manokin aquifer system that extended over 13 miles offshore. Using that result as an initial condition the model simulated annual average pumping rates at the 44th Street well field of 2.6, 3.3, and 4.4 Mgal/d; chloride concentrations in the pumping cell in 2010 were about 230, 235, and 243 mg/L, respectively. Simulated annual average pumping rates of 4.5 and 9.0 Mgal/d at the Gorman Avenue well field results in chloride concentrations in the pumping cells of about 170 and 185 mg/L, respectively in 2010.

Ackerman, C. 1995. Pure horse play: Wild ponies have their run of the beach on Assateague Island. *The Boston Herald*, 30 July, Travel, p. 67.

Adkins, L.C. 1975. Contributions of habitat selection, inter-specific competition and tidal flooding to small mammal species diversity in Assateague salt marsh. Master of Science Thesis, University of Virginia (Charlottesville).

Aiosa, J. 1998. *Today's Treasures for Tomorrow*. Maryland Coastal Bays Program (Berlin).

Aiosa, J. 1998. *Maryland's Coastal Bays Program, Base Program Analysis: An Analysis of Existing Authorities Affecting Maryland's Coastal Bays*. Maryland Coastal Bays Program (Berlin) MCBP 98-01.

Albright, J. B. 1974. [untitled notice concerning Chincoteague pony roundup]. *The New York Times*, 21 July, Section 10, p. 26.

Allee, W. C. 1923. Studies in marine ecology III. Some physical factors related to the distribution of littoral invertebrates. *Biological Bulletin* 44(5):205-253.

Summary: The present paper deals with the results of an intensive study of some of the localities considered in the preceding sections, which was carried on in August and early September of 1920, with some additional data from records taken the following summer. In addition to considering the direct effects of different types of bottom and shores, currents, tides and vegetation, this study is particularly concerned with the possible correlation of temperature, salinity, oxygen content and pH with the intertidal and upper adtidal animal associations of the region immediately around Woods Hole.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Allen, R. C., E. Gavish, G. M. Friedman and J. E. Sanders. 1969. Aragonite-cemented sandstone from outer continental shelf off Delaware Bay. *Journal of Sedimentary Petrology* 39(1):136-149.

Abstract: A shelly sandstone was obtained from the outer shelf off Delaware Bay at a depth of 43 fathoms (79 m). The fauna suggests cooler water than exists in the region today. A C-14 date of 4390 ± 120 B.P. was obtained from the shells while the cement gave a data of 15,000 ± 250 B.P. It is suggested that the carbon of the cement originated earlier than the date of cementation, but was not introduced immediately into the sandstone.

Library: CBL, FSU, SMC, TU, UD-Morris, UMBC, UMCP

Allison, J.T. 1973. Cape Isle of Wight survey, an evaluation of water quality of water quality in man-made canals and adjacent receiving waters(embayment and natural marsh gut), Water Resource Administration, Water Quality Section. Maryland Department of Natural Resources, Annapolis, MD

Abstract: A comparison of temperature, oxygen and salinity and salinity was made between two artificial (man-made) canals and a natural marsh gut. While stratification occurred in the artificial canals, no stratification occurred in the natural marsh gut. Some bottom oxygen samples were hypoxic (<4.0 ppm) while surface samples at the upper reaches of the older canals were supersaturated due to algal blooms. Total inorganic phosphorus and nitrogen concentrations were uniform throughout the systems. Turbidity was lowest in the new less developed artificial system. Three stations in the older developed artificial canals exceeded the standards for coliform bacteria. Benthic samples revealed little to no organisms except for twenty oligochaete worms in the upper part of the older more developed man-made canal. A visual dye study estimated a water replacement time to be 6.5 days. Poor water quality in the artificial canals was attributed to impeded flushing, especially of bottom water, due to sills at the canal mouth. (abs from Boynton et al. 1993)

Allison, J. T. 1974. Maryland Coastal Bays (02-13-01) existing water quality conditions. Water Resources Administration, Maryland Department of Natural Resources (Annapolis).

Allison, J.T., 1974 (revised March 1975). Maryland Coastal Basin (02-13-01) existing water quality conditions. Water Resources Administration. Draft Report. Maryland Department of Natural Resources, Annapolis, MD

Abstract: This report involved a detailed literature search of published and unpublished reports prior to 1973. General physical characteristics were given for each of the bays (size, boundaries, temperature and salinity conditions), as well as water quality characteristics (*dissolved nutrient, dissolved oxygen and chlorophyll-a concentrations), and biota inventories for each coastal bay system (based on Benthic surveys, fish trawls, plankton counts and clam surveys) The search was followed by a short intensive survey of the water quality to in fill in knowledge gaps (29 stations total). During the survey sixteen water quality parameters were studied including pH, salinity, temperature, dissolved oxygen (DO), nutrients, chlorophyll-a, total iron, turbidity, coliform and fecal coliform bacteria were also taken and analyzed for six heavy metals. Plankton, Benthic biota and submerged aquatic vegetation sampling was also conducted.

Although nutrient level were low (inorganic N = 0.04 –0.05 mg/L N and orthophosphate = 0.05-0.12 mg/L PO4-P) in Assawoman Bay, chlorophyll-a concentrations were high (average of 50 µg/L), suggesting some enrichment in the area. There were no water quality violations found in the region studied. Eelgrass, *Zostera marina*, was the predominant attached vegetation along

the eastern side of the bay. Nearly one fourth of the marshes have been lost to development since 1967. The bay was shown to have a moderate clam density bottom.

Water quality standards were in violation at 10 of 17 stations in Isle of Wight Bay. Most of the violations were high coliform and fecal coliform levels, and some were due to low DO levels (0.0 – 1.6 mg/L in smaller tributaries) "Large increases in organic loading were noted below Bishopville Processing Co. and H and H Poultry Co. in Maryland and DE, respectively, with accompanying low DO values of 0.0 – 3/0 mg/L". Nutrient levels in Manklin Creek were "high enough to encourage eutrophication (inorganic N level of 0.97-2.57 mg/L and total phosphorus levels of 00.11-0.28 mg/L). There are 18.8 miles of man-made canals in this sub basin which have been shown to degrade water quality and promote eutrophication. Open bay samples indicate excellent water quality. Nutrient levels showed 0.04-0.09 mg/L inorganic N and 0/04-0.0-8 mg/L orthophosphate, while DO levels ranged from 5.9 –7.4 mg/L and chlorophyll –a concentration ranged from 2ew-38 ug/L. This sub basin showed a 36% loss of marshes since 1967.

Heavy metal and pesticide concentration analysis of water samples collected from Sinepuxent bay gave the following results: Copper (0.04-0.08 mg l^{-1}), chromium (0.04-0.10 mg I^{-1}), lead (0.2-0.4 mg l^{-1}), zinc (0.05-0.08 mg l^{-1}), cadmium (0.03-0.04 mg I^{-1}), magnesium (1200 mg I^{-1}), Aldrin (<0.005 ug l^{-1}), Chlordane (<0.01-0.02 ug I^{-1}), DDD (<0.01 ug I^{-1}), DDE (0.02-0.50 ug I^{-1}), DDT (<0.02-2.45 ug I^{-1}), Dieldrin (<0.01 ug I^{-1}) and Heptachlor (<0.005 ug I^{-1}). Marginal DO levels (5.5-5.9 mg I^{-1}), high orthophosphate levels (0.04-0.29 mg I^{-1} P04-P) and coliform samples that exceeded the standard limits were noted in West Ocean City Harbor. Within the main bay water quality was excellent with inorganic nitrogen levels of 0.03 to 0.10 mg l^{-1} N, orthophosphate levels of 0.01 to 0.12 mg l^{-1} P04-P, chlorophyll-a ranged from 15-38 ug I^{-1} and total iron ranged from <0.05-0.60 mg I^{-1}. Eelgrass and widgeon grass (*Ruppia maritima*) were the most dominant submersed macrophytes. Approximately 28% of marshes were lost since 1967.

The Newport bay sub-basin showed extreme water quality degradation due to large wastewater and non-point source pollution. High nutrient levels, organic inputs, chlorophyll-a levels, low oxygen levels and poor flushing inherent to the bay indicated eutrophication of the system Chincoteague Bay waters were prime shellfish waters; therefore, water quality was very important. This report showed that Chincoteague Bay system had excellent water quality; however, there was significant industrial discharges from seafood and poultry processors and a tomato cannery within some of the tributaries. Sampling in the main bay showed good water quality with turbidity generally being high, sufficient oxygen levels, and pH on the alkaline side (8.1-8.2). However, within the tributaries there were coliform violations (Scarboro Creek (Tributary to Johnson Bay), Pikes Creek, Riley Creek, Powell Creek, and Swansgut Creek) and one violation of DO standards (Swansgut Creek). Pikes Creek discharges most of the waste load into the bay and this creek and its receiving waters showed signs of enrichment. Overall, "nutrients were not found to be limiting, in fact, dissolved phosphate appeared to be available in excess." Within the main bay DO ranged from 6.4 - 7.7 mg I^{-1}, chlorophyll-a averaged 30.3 ug I^{-1} and there were no sanitary violations in terms of coliform bacteria. There were no high concentrations of heavy metals detected in the sediment samples. Transect sampling found healthy stands of widgeon grass and eelgrass along the eastern side of the bay. Eight square miles were defined as moderate clam density bottom and 0.9 square miles were defined as high clam density bottom. There were 16.8 square miles that constituted important oyster grounds and 0.7 square miles that were defined as blue crab wintering grounds.

Allison, J.T. 1980. Trappe Creek: A biological assessment of water quality and waste discharge impact, year 1977. Maryland Department of Natural Resources, Water Resources Administration, Annapolis, MD.

Abstract: This study evaluated the water quality from collected data and available historic data to determine the effects of wastewater discharge (municipal and industrial) on the aquatic biota. Sampling of phytoplankton and macroinvertebrates included dredge and surface grab data. Finfish and marsh studies showed declines upstream. Results of the study showed that current stream use was effecting(*sic*) the biota of the ecosystem (decreasing diversity) by reducing the water quality from "marginally good" to "fair", and even "poor" in areas. Anaerobic conditions, phytoplankton

blooms and other symptoms of eutrophication were also evident. Sewage fungus was observed in the upper portions of Trappe Creek. Recommendations included the establishment of monitoring stations and more benthic surveys (abs from Boynton et al. 1993).

Allision, J.T. 1989. St. Martin River water quality conditions. Maryland Department of the Environment, Water Quality Monitoring Division, Baltimore, MD

Abstract: A general overview of the water quality I the St. Martins river from data collected during the 1973, 1974, 1975, 1983 and 1988 surveys was the topic of this report. Mean DO concentration ranged from 6.4 mg/L in the lower St Martin's River to 8-10 mg/L in Bishopville Prong, and decreased to 2.8-3.1 mg I^{-1} in the headwaters. Shingle Landing Prong exhibited a similar pattern. The range of DO in the two creeks was from 0.1 to 21.8 mg I^{-1}. The pH ranged from 6.2 to 10.2 in the creeks. Sediment oxygen demand at the mouth of St Martin River was 2.8 mg I^{-1} and 19.3 mg I^{-1} in Bishopville Prong. "Maximum nutrient levels occurred in the Bishopville Prong headwaters with the exception of nitrite and total Kjeldahl nitrogen which reached maximum levels in the Shingle Landing Prong headwaters." Ammonia concentrations ranged from 0.02 to 34.3 mg I-^{1}. Nitrate values ranged from 0.002 to 0.091 mg I^{-1}. Phytoplankton cell counts reflected enriched conditions in the upper river. Chlorophyll-a values ranged from 15.8 ug I^{-1} at the mouth of the St. Martin's River to 128.3 ug I^{-1} in Bishopville Prong. Reduced diversity in benthic taxa and fish taxa occurred from the river mouth to the headwaters.

Allison, J.T. and W. Butler. 1973. Sinepuxent Bay - Snug Harbor; Water quality, benthic invertebrate, plant, and plankton evaluations of man-made canals and a natural marsh gut. Water Resources Administration, Technical Services, Water Quality Services. Maryland Department of Natural Resources, Annapolis, MD.

Abstract: The study examined physical parameters (temperature/ salinity, pH/ oxygen, nutrients) and ecological parameters (benthic invertebrates/ phytoplankton/ plant fauna/ bottom configuration) on December 8, 1972 within two man-made canals and a natural marsh gut. Water quality in all systems was generally good. Temperatures ranged from 7.6 - 8.8 °C; DO ranged from 8.8 - 12.2 mg I-^{1}; and salinity ranged from 25.4 - 28.4 ppt. However, differences were seen between the natural and man-made systems. A slight algal bloom was noted in the headwaters of the man-made canal. The only benthic invertebrates found in the upper stations of the man-made canal were oligochaete worms. "Total Kjeldahl nitrogen and total organic carbon levels were highest in the bottom muds from the upper reaches of the man-made canals." The presence of sea lettuce (*Ulva* sp.), fragments of eel grass (*Zostera marina*) and a branched filamentous red algae were also noted.

Altig, R. 1970. A key to the tadpoles of the continental United States and Canada. *Herpetologica* 26:180-207.

Library: FSU, SMC, SU, TU, UMBC, UMCP

Amos, W. H. 1985. *Assateague Island **: a** guide to Assateague Island National Seashore**,** Maryland **and** Virginia*. Division of Publications, U.S. National Park Service, U.S. Department of the Interior (Washington, D.C.). 127 pp.

Library: MSU [29.9/5:106]; SMC, SU, UMBC {all are 1980 edition, F187.A84 U53 1980]; UMAB [I29.9/5:106]

Amrhein, J. L., Jr. 1986. *The Ancient Seacoast of Maryland including part of Delaware and Virginia*. Ryan and Black Publishers (Salisbury, Maryland) [24 x 36 chart]

Library: LOC, Hagley Mus & Lib.

Anders, F. J. and M. Hansen. 1990. Beach and borrow site sediment investigation for a beach nourishment at Ocean City, Maryland. Technical Report CERC/TR-90-5, U.S. Army Coastal Engineering Research Center (Vicksburg, Mississippi). [NTIS Order No.: AD-A222 251/1/GAR] 103 pp

Abstract: Native beach sediment and sediment from 9 potential borrow sites were investigated in 1986-87. The project, as finally completed, constructed a beach 8 miles long with a 100-ft-wide berm. A total of 2.7 million cu yd was removed from two borrow sites and placed on the beach. This report discusses the method used in sampling and analyzing sediment from the native beach and each borrow site.

Anders, F. J., M. Hansen and N. McLellan. 1987. Atlantic coast beach protection project: Ocean City, Maryland – Draft Final Report. U.S. Army Corps of Engineers, CERC-WES (Vicksburg, Mississippi). 60 pp + appendices.

Anders, F. J., W. J. Lillycrop and J. Gebert. 1990. Effects of natural and man-made changes at Indian River Inlet, Delaware. **IN:** *Proceedings of the 3rd Annual National Beach Preservation Technology Conference*, L. S. Tait, Ed. Florida Shore and Beach Preservation Association (Tallahassee). pp. 280-294.

Library: US Army Eng Res Dev Ctr Vicksburg

Anderson, R. 1990. Blue crab distribution in vegetated and unvegetated areas of Chincoteague Bay. Unpublished data. MS Thesis in prep. University of Maryland/ CEES, Cambridge, Md.

Abstract: The density (crabs m^{-2}) of juvenile blue crabs at Ferry Landing, Bayside North and Bayside South were reported for the months of July-March for 1989-1990 and June-July for 1990. A benthic pushnet was used for sampling; however, this gear underestimates first and second stage crabs. Seagrass bed dimensions and average depth were reported along with live above-ground plant biomass in August (57.69 g m^{-2}), September (203.90 g m^{-2}), and December (1.99 g m^{-2}) 1989. Also, monthly notes on the condition (percent cover and epiphytic growth) of the beds were reported. Mean water temperatures and salinities were given.

Anderson, R. and T. Holleran. 2003. The submerged aquatic plants of Chincoteague Bay, Section 2. [on file at ASIS]

Anderson,R., and -- McFadden. 1975. Application of remotely sensed data to acquisition of National Park resources inventory information: 2nd interim report. Report

Anderson, R. D. and W. F. Van Heukelem. 1995. Recruitment, habitat use, and growth of juvenile blue crabs in a Maryland coastal embayment. *Bulletin of Marine Science* 57(3):917.

Abstract: Juvenile blue crabs were sampled from two habitats in Sinepuxent Bay, Maryland from July through November, 1989. The two habitats studied were a *Ruppia maritima* sea grass bed and a salt marsh embayment. Crabs were collected at depths less than 0.4 m using a 0.8 m wide push net. More crabs were found in the sea grass bed than in the salt marsh embayment on all but two sampling dates. Size frequency analysis of the samples indicated that there were 15 settlement events during the study period. Growth of crabs in the field was correlated with temperature but not salinity. A laboratory study of growth at 13, 18 and 28 degrees C was used to help determine when settlement of new recruits occurred. Data from the laboratory growth study also showed that crabs grew faster with increasing temperature and that size increase per molt was larger at high temperatures.

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Anderson, R. R. 1970. The submerged vegetation of Chincoteague Bay. In: Natural Resources Institute, University of Maryland. Assateague ecological studies. Part I: Environmental information. Contribution No. 446. Chesapeake Biological Lab, Solomons, MD

Abstract: Two species of seagrasses (*Zostera marina* and *Ruppia maritima*) were reported in Chincoteague Bay. The distribution was concentrated on the eastern shoreline of the bay, with *Z marina* in the deeper portions and *R. maritima* in the shallow areas. The major centers of occurrence were located in West Bay and Green Run Bay and around Tingles Island and Goose Point. Samples were collected from 12 stations for biomass analysis. Z. marina biomass ranged from 172-308 g m^{-2} and *R. maritima* ranged from 100-284 m^{-2} . Growth estimates for *Z. marina* were made too late for proper analysis, but growth estimates for *R. maritima* reached a maximum of 60 cm for the month of July. Growth to dry weight plant ratios were estimated at 2.0 mg dw per cm stem for *R. maritima* and 2.8 mg dw per cm stem for *Z. marina*.

Andres, A. S. 1992. *Estimate of Nitrate Flux to Rehoboth and Indian River Bays, Delaware, Through Direct Discharge of Ground Water*. Delaware Geological Survey.

Abstract: This report provides estimates of the potential flux of nitrate by direct ground-water discharge into Rehoboth and Indian River bays. The report provides general discussions of the computational methods used in the study. More detail is provided on model construction and limitations so readers can make informed decisions regarding the results.

Andrews, E. A. 1892. Report upon the Annelida (Polychaeta) of Beaufort, North Carolina. *Proceedings of the United States National Museum* 14, 1891 (1892):277-302.

Library: CBL, TU, UD-Morris, UMCP

Andrews, J. D. 1955. Setting of oysters in Virginia. *Proceedings of the National Shellfish Association* 45:38-46.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Andrews, J. D. 1956. Trapping oyster drills in Virginia. I. The effect of migration and other factors on the catch. *Proceedings of the National Shellfish Association* 46(1955):140-154.

Abstract: One-year trapping on a 3-acre plot on abandoned public oyster grounds suggested that considerable migration occurred. *Eupleura* was much more abundant than *Urosalpinx* in the catches. The greatest catches of *Urosalpinx* were in late May immediately before egg deposition, and *Eupleura* were most available during the warm months of June, July, and August.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Andrews, J. D. 1973. Effects of tropical storm Agnes on epifaunal invertebrates in Virginia estuaries. *Chesapeake Science* 14(4):223-234.

Abstract: The low salinity regimes in Chesapeake Bay that followed the passage of Tropical Storm Agnes produced unprecedented changes in distributions and abundances of estuarine biota. After the initial surge of fresh water from the Virginia river basins, a second larger flow from the Susquehanna River basin cut off supplies of salt water from the Chesapeake Bay and ocean sumps. This later surge prolonged epifaunal exposure to low salinities of 10 ppt to 9 days at the mouth of the James River and about 50 days in the Rappahannock River.

The lower sectors of the Virginia rivers, where mesohaline species normally live, were most affected. Oligohaline species such as oysters, barnacles, and hooked mussels were severely stressed and many individuals died, but eradication did not occur. Mesohaline species including all sponges, tunicates, echinoderms, many molluscs, and many predators and scavengers, oyster drills, spider crabs, etc., were eliminated from large areas including whole rivers. Recovery of some species, e.g., sea squirts and red sponge, is progressing rapidly but others, colonial tunicates, yellow sponges, oyster drills, etc., may require years. The slowest will be those without pelagic larvae, and those where breeding populations were greatly reduced or eliminated. Oyster drills are an important example.

Certain hydroid and bryozoan species with oligohaline affinities extended their distributions and abundances dramatically. The most prominent eruptive species were in the genera *Acanthodesia*, *Garveia,* and *Anguinella*.

This report begins with a description of established communities and follows changes of faunal groups due to freshwater and low-salinity exposure. By contrast, most fouling studies of the past began with clean surfaces. After the initial mortalities, open niches were quickly colonized by opportunistic species, thereby initiating new estuarine successions for continuing observations.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Andrews, J. D. and W. G. Hewatt. 1957. Oyster mortality studies in Virginia. II. The fungus disease caused by Dermocystidium marinum in oysters of Chesapeake Bay. *Ecological Monographs* 27(1):1-25.

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Abstract: In undisturbed areas along the coast a unique and extremely rich habitat can develop behind the dunes. Chincoteague National Wildlife Refuge on Assateague Island and Seashore Park are good examples of these unusual ecosystems.

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Abstract: One of the ways in which dredging is beneficial to the environment is in the preservation of human communities. Such an act of preservation is on-going at the 110-year-old beach community of Ocean City, Maryland. It is the second phase of an extensive beach nourishment/storm protection project.

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Anonymous. 1995. Assateague Island. Federal reserve and home to a rich assortment of animals and birds. *Virginia Marine Resource Bulletin* 27-28(3-1):14-17.

Abstract: Even though the tidal creeks studied were only a few miles distant from each other, they belong to very different physical systems. An estuary, like the Chesapeake Bay, is an enclosed body of water that is unique in this sense: it is where salt water and fresh water meet. Ocean water intrudes from the Bay mouth; substantial amounts of fresh water enter the Bay from tributaries and from the land. Many factors influence this mix of waters, including the intensity of the tides or storm events which bring water into the Bay and the amount of rainfall in any one year. Many gradients of salinity, turbidity and water temperature exist in the system. A coastal lagoon complex (CLC), like the one which fringes the Virginia's Eastern Shore, is like an estuary in the sense that it has a connection with the open sea. However, the interchange can be far more rapid. An apt description of Virginia's CLC is "restricted" and "leaky." It is restricted in the sense that the system is somewhat isolated from the ocean by barrier islands; and it is leaky since, through deep inlets between the islands, there is a ready exchange of water with the ocean.

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Summary: Tyson Foods Inc. agreed Friday to a $6 million pollution settlement, the largest in Maryland history, for dumping ammonia, phosphorous and other pollutants into a river that drains into the Chincoteague Bay.Tyson will pay the federal government $4 million for the violations, which occurred at Hudson Foods plants near Berlin, Md., from 1993-97, before Tyson bought the company, said U.S. Attorney Lynne Battaglia.The Arkansas-based company also pledged to spend $2 million to prevent runoff into the Chesapeake Bay watershed at its plant in New Holland and at plants and farms in Maryland, Virginia and Delaware, according to an agreement filed in U.S. District Court.

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Summary: In an effort to allay fears of pollution in the Chesapeake Bay, the Federal Government announced today that it had settled a lawsuit with a major food-processing company that imposes a record penalty and requires the company to reduce the runoff from its plants in four states.

Anonymous. 2000. Travel Advisory: Beaches in 7 states are certified as clean. *The New York Times*, 18 June, Section 5, Travel Desk., p. 3.

Summary: But the Clean Beaches Council, a nonprofit organization established in 1998, is trying to ease beachgoers' worries with its Blue Wave Campaign, which certifies environmental cleanliness and public safety along the shore. This summer, the council has certified 30 beaches in 7 states as meeting its criteria for water quality, cleanliness, public safety, habitat conservation and erosion management. The organization works with state and local environmental authorities to verify each beach's compliance.

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Abstract: Biologists monitoring Maryland waters have found widespread traces of a toxic algae along with several kinds of algae that could seriously harm life in the Chesapeake Bay. The State Department of Natural Resources directed the biologists to begin regularly checking for the toxic algae, Pfiesteria, after it killed fish and sickened people on some Eastern Shore rivers in 1997.

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Abstract: This island and its birds were reported in The Post as well as in National Geographic. Workers from the Patuxent Wildlife Research Center determined that DDT runoff into the Chesapeake had been ingested by menhaden, a sardine-like fish that is the principal food of the pelican. After ingestion by the pelicans, these poisoned fish released the DDT, leading to soft, deformed pelican eggs. The setting mother pelican crushed these eggs, few survived and the pelican population plummeted. With the removal of DDT, the population gradually rebounded.

Anonymous. 2002. Record striper. *Sunday News* (Lancaster, Pennsylvania), 8 December, Sports, Currents Afloat, p. C-9.

Anonymous. 2003. Marinas awarded money to help improve water quality. Associated Press wire service story, 21 December.

Anonymous. 2003. Flounder stock rebounding; state may loosen regulation. Associated Press wire service story, 4 January.

Anonymous. 2003. County leads Maryland with high unemployment rate. Associated Press wire service story, 19 January.

Anonymous. 2003. Watermen to honor Mikulski. *The Capital* (Annapolis, Maryland, 26 January, Announcements, p. D-6.

Anonymous. 2003. If you go to Assateague Island. Associated Press dispatch, 13 April, *Desert News* (Salt Lake City, Utah), Travel, T5.

Anonymous. 2003. Maryland gets one bid to pick up bridge toll tab. *The Sun* (Baltimore, Maryland), 23 April.

Anonymous. 2005. Legionnaires disease associated with potable water in a hotel--Ocean City, Maryland, October 2003-February 2004. Centers for Disease Control, *MMWR. Morbidity and Mortality Weekly Report*, 2005 Feb 25, 54(7):165-168.

Abstract: During October 2003-February 2004, eight cases (seven confirmed cases and one possible) of Legionnaires disease (LD) were identified among guests at a hotel in Ocean City, Maryland. This report summarizes the subsequent investigation conducted by the Worcester County Health Department (WCHD), Maryland Department of Health and Mental Hygiene (DHMH), and CDC, which implicated the potable hot water system of the hotel as the most likely source of infection. The detection of this outbreak underscores the importance of enhanced, state-based surveillance for timely detection of travel-associated LD and implementation of control measures.

Library: Online

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Arve, J. 1960. Preliminary report on attracting fish by oyster-shell plantings in Chincoteague Bay, Maryland. *Chesapeake Science* 1(1):58-65.

Abstract: Oyster shell plants were made on formerly productive bottom to determine the practicability of securing an oyster set in this area and to test the hypothesis that the availability of game fish could be improved by artificially modifying the habitat in Chincoteague Bay, Maryland. Fish populations were trapped over planted and unplanted control areas with the same effort from August to November in 1958 and 1959. Fourteen species of saltwater fish were recorded in the planted and control areas, of which the black sea bass, *Centropristes striatus*, was the dominant

species. The planted areas yielded about three times as many fish as the controls during the two years. Black sea bass numbers were much greater on planted areas than on control areas. The planted area also produced more species than the unplanted areas. More fish were caught over both planted and control bottoms during 1959 than in 1958, due partially to improved trap design. There is some evidence of improvement in the availability of fish over a planted area that has aged for a year. It is concluded that the oyster-shell plantings significantly concentrated and increased numbers of fish over restricted areas, when compared to unplanted areas.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

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Ault, B. M. 2000. Editorial perpetuates watercraft stereotype. *Intelligencer Journal* (Lancaster, Pennsylvania), Letter, 17 May, p. A-15.

Summary: I am writing in response to the "On the Water" editorial (Intell, May 8). The negative and misleading wording of this editorial only perpetuates an untrue stereotype about personal watercraft, or PWCs. The use of phrases such as "churned the area (around Shad Island) into a froth" and "(Assateague) Island has been invaded by jet skis" would naturally sway the average person who has little knowledge on the subject.

Avery, A. L. 2003. Hard work brings results at Chincoteague. *Endangered Species Bulletin* 28(1):38-39.

Abstract: Following the 1986 listing of the piping plover (*Charadrius melodus*) as a threatened species, Chincoteague National Wildlife Refuge, like other Atlantic coast refuges, developed an intensive monitoring and management plan for this beach-dwelling species. The results from the plans implementation are presented and discussed.

Library: FSU, MSU, SU, UD-Morris, UMCP

Ayres, J. C. 1956. Population dynamics of the marine clam, *Mya arenaria*. *Limnology and Oceanography* 1(1):26-34.

Abstract: from present spawning and survival data, it is calculated that stable local populations of *Mya arenaria* require and average annual production, per spawning pair, of 40 spat which both survive and remain in the spawning area. The sizes of larva populations which survive and remain in the area under various flushing rates and mortalities are calculated. From this and the 40 spat/pair/year level the suitability of estuaries or embayments as sites for *M. arenaria* cultivation may be judged when local flushing rates and mortality coefficients are known. A formula for estimating the harvestable fraction of the existing population under local flushing rate and mortality conditions has been derived. The method, combined with the local oceanography, adequately explains the anomalous history of *M. arenaria* production in the harbor at Barnstable, Massachusetts.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Ayres, H. 1965. 50 million tab seen on Assateague park. *The Evening Sun*, 22 March (Baltimore, Maryland).

Bachman, C. M., R. A. Fusina and T. F. Donato. 2001. Effects of time-series imagery on automated classifications of coastal wetland environments using projection pursuit methods. *International Geoscience and Remote Sensing Symposium 2001* 4:1868-1870.

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Bachman, L. J. 1984. Nitrate in the Columbia Aquifer, Central Delmarva Peninsula, Maryland. U.S. Department of the Interior, U.S. Geological Survey Water Resources Investigations WRI 84-4322. (Reston, Virginia) 51 pp.

Abstract: The relationships between nitrate concentration and depth and nitrate and the chemical environment were discussed. In addition, the effect of soils, land use and geologic conditions on input of nitrate to groundwater were considered. Supplemental data from a study by the USGS included results from tests on "major ions, pH, conductivity, dissolved iron, silica, and the nitrogen species."

Bachman, L. J. 1984. *The Columbia Aquifer of the Eastern Shore of Maryland. Part 1: Hydrogeolog*y. Report of Investigation RI 40(1). 34 pp.

Bachman, L. Joseph and L. D. Zynjuk. 1992. The significance of hydrologic landscapes in estimating nitrogen loads in base flow to estuarine tributaries of Chesapeake Bay. *EOS*.

Abstract: A regional survey of nitrogen concentrations in base flow of streams on the Delmarva Peninsula. The results were compared with data from a long term fixed-station monitoring a site to evaluate the relation of hydrologic landscapes to the variability of nitrogen load from base flow to estuarine tributaries of Chesapeake Bay.

Library: UD-Morris

Bachman, L. J., R. J. Shedlock, and P. J. Phillips. 1987. Groundwater-quality assessment of the Delmarva Peninsula, Delaware, Maryland, and Virginia: Project Description. U.S. Geological Survey. Open-file report 87-112. (Reston, Virginia).

Abstract: This report described the ground-water pilot project and ground-water resources of the Delmarva Peninsula. Water samples were analyzed for trace elements and manmade organic compounds.

Bachman, L. J. and J. M. Wilson. 1984. *The Columbia Aquifer of the Eastern Shore of Maryland. Part 1: Hydrogeology; Part 2: Selected Water Well Records, Chemical Analysis, Water-Level Measurements, Lithologic Logs, and Geophysical Logs*. Maryland Geological Survey Report of Investigations No. 40.

Abstract: The first part of the report is an investigation of the Columbia aquifer in the Maryland portion of the Delmarva Peninsula. The purpose of the study was to locate thick deposits of sand and gravel, characterize the natural chemical quality of the water and evaluate the threat of pollution. The second part of the report catalogs the data from the well records, chemical analyses, water-level measurements, lithologic logs and geophysical logs.

Badger, C. 2002. On Occasion, visitors get to see Assateague's wild side. *The Virginian-Pilot* (Norfolk, Virginia), 19 December, Daily Break, p. E10.

Badger, C. J. and R. Kellam. 1989. *The Barrier Islands: A Photographic History of Life on Hog, Cobb, Smith, Cedar, Parramore, Metompkin, and Assateague*. Stackpole Books (Harrisburg, Pennsylvania). ix + 146 pp.

Library: UD-Morris [F227 .B33 1989]

Bagur, J. D. 1978. *Barrier Islands of the Atlantic and Gulf Coasts of the United States: An Annotated Bibliography*. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Biological Services Program FNS/OBSS-77/56.

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Bailey, V. 1937. The Maryland muskrat marshes. *Journal of Mammalogy* 18:350-354.

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Baird, J. and I. C. T. Nisbet. 1960. Northward fall migration on the Atlantic coast and its relation to offshore drift. *The Auk* 77(2):119-149.

Abstract: Recent observations on Nantucket Island, Massachusetts, and Block Island, Rhode Island, off the southeastern coast of New England, have shown that many of the night migrants which occur there each fall remain for very short periods only, and then fly off to the north or northwest during daylight hours. Similar movements have been noted at many other outlying points on the Atlantic coast, but southward movements of the same species appear to be rare there. These reversed movements cannot all be attributed to the effects of lines of diversion, as has been attempted in the past; they show instead that many of the birds involved have been drifted south of their preferred migration routes, to which they are attempting to return. The various manifestations of wind-drift in eastern North America are reviewed and compared with studies of analogous phenomena in Europe.

Library: FSU, SMC, SU, TU, UD-Morris, UMBC, UMCP

Baker, B. B. 1951. Interesting shells from the Delmarva Peninsula. *The Nautilus* 64(3):73-77.

Abstract: A list of 59 species and subspecies collected is provided. Two new subspecies, *Urosalpinx cinereus follyensis* and *Eupleura caudata etterae* are described.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Baker, H. 1759. A thermometrical account of the weather, for three years, beginning September 1754 as observed in Maryland by Mr. Richard Brooke. *Philosophical Transactions of the Royal Society* 51:70-82.

Abstract: A report of the temperatures and weather from Prince George's County, Maryland, is presented along with a discussion of canine distemper among dogs and fox on both the Eastern and Western shore of the state.

Baker, M. C. and A. E. M. Baker. 1973. Niche relationships among six *species of shorebirds on their wintering and breeding ranges. Ecological Monographs* 43(2):193-212.

Abstract: The dynamics of the organization of a community of six species of migrant predatory shorebirds (Least Sandpiper, Semipalmated Sandpiper, Dunlin, Short-billed Dowitcher, Lesser Yellowlegs, and Semipalmated Plover) was appraised by studying foraging behavior and habitat use under winter conditions in southern Florida and under summer conditions in the eastern Canadian Arctic. The catalog of behavior patterns used was developed by observations made at Assateague Island, Maryland. during the summer of 1968. The foraging methods, defined primarily on the basis of how the bill is used and the pattern of locomotion, constitute the behavioral repertoire of the species. Each foraging method is correlated with a particular rate of locomotion (distance/time) and rate of feeding (pecking or probing/time). Feeding and locomotion rates seem independent of air temperature, number of conspecifics, and total number of shorebirds foraging nearby. Instead, the seasonal changes in these rates are probably related to food density. On the basis of these findings and of differences in rates of feeding and locomotion between species the most reasonable hypothesis is that food density is higher in summer on the breeding grounds and foraging is more selective. Each foraging method in combination with a particular microhabitat defines a statistically different resource. During the winter, on intertidal habitats of southern Florida, shorebirds on the whole exhibit a low behavioral and microhabitat diversity and low resource overlap between species. The small niche breadth in winter is probably a response to food limitation, and each species exists in its exclusive niche where it is optimally adapted and therefore has high foraging efficiency. In summer, tundra and taiga habitats of the Arctic, shorebirds generally have a higher behavioral and microhabitat diversity (broader niche) and higher overlap between species. Exceptions to these general patters exist among the study species. Seasonal differences in prey density, prey behavior, time available for foraging, feeding and locomotion rates, and the pattern of resource partitioning imply that shorebird populations are regulated through competitive processes occurring on their wintering habitats. Conclusions concerning coexistence mechanisms in migratory bird species and residents in seasonal environments may be erroneous if populations are studied only in the breeding season.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Barker, A. K. and J. W. Ropes. 1971. The Atlantic surf clam fishery - 1969. *Commercial Fisheries Review* 33(6):35-42.

Abstract: The 1969 surf-clam fishery produced record landings of 49.6 million pounds of meats - 9.7 million pounds more than in 1968. The New Jersey catch of 38.8 million pounds, an increase of 7.0 million pounds, almost equaled the total landings for 1968. Maryland and New York landings increased by 7.1 and 3.7 million pounds respectively. The number of vessels decreased at Point Pleasant, New Jersey, but increased at Cape May-Wildwood, New Jersey and at Ocean City, Maryland.

Library: CBL, FSU, UD-Morris, UD-GCMES, UMCP

Barlow, P. M. 2001. Geoscience information to support ground-water-resources management decisions in the Atlantic coastal zone; recent activities of the U.S.

Geological Survey Ground-Water Resources Program. *Abstracts of Papers, 2001 annual meeting, Geological Society of America*, 33(6):42.

Abstract: Ground water is an important natural resource that provides water supply for coastal communities and freshwater discharge for coastal ecosystems. Aquifers along the Atlantic coastal zone of the United States, for example, are among the most productive in the United States, supplying drinking water to an estimated 30 million people from Maine to Florida. Saltwater intrusion caused by groundwater pumping, however, can contaminate coastal ground-water supplies and make ground-water unfit for public consumption. Saltwater intrusion has been documented throughout the Atlantic coastal zone, but the degree and mechanisms of saltwater intrusion vary widely among localities and hydrogeologic settings. Moreover, coastal ecosystems are vulnerable to ground-water contamination caused by human activities, such as by nutrients and toxic compounds. Discharge of nutrient-contaminated ground-water to coastal waters, for example, can trigger dense algal blooms that result in habitat changes and oxygen depletion, ultimately affecting the structure and function of coastal ecosystems. During the past year, the U.S. Geological Survey Ground-Water Resources Program has begun to work collaboratively with other water resource agencies and research programs to provide geoscience data and information to support ground-water resource management decisions in the Atlantic coastal zone. The overall objectives of this work are (1) to collect data that will provide improved understanding of the Hydrogeologic controls on coastal ground-water systems at local and regional scales and (2) to develop and apply new geophysical, geochemical, and numerical-modeling methods for analysis of subsurface freshwater-saltwater interactions. Current activities include development and testing of new geophysical methods for monitoring saltwater intrusion and ground-water discharge to coastal bays in Massachusetts, Maryland, and Delaware, and data collection and model development for saltwater intrusion in Virginia, North and South Carolina, Georgia, and Florida.

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Abstract: *Balanus balanoides* is a northern species. Its southern limits are about 48^{o}N in the eastern Atlantic, 38^{o}N in the western Atlantic, and 57^{o}N in the eastern Pacific. The relationship of temperature to distribution is discussed. Temperature of the water alone is insufficient to explain the distribution as described. It is thought that there is an upper temperature limit, around 10^{o}C, above which maturation of the gametes will not occur (although the gonads may develop fully at warmer temperatures). This imposes a limit on southerly distribution. However, in the eastern pacific, and to a lesser degree in the western Atlantic, competition by warm-water species of *Balanus* is thought to play an important part.

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Abstract: The patterns of infection of American eels, *Anguilla rostrata*, with the introduced swimbladder nematode, *Anguillicola crassus*, in tributaries of middle and upper Chesapeake Bay are described. A total of 423 subadult eels was collected from 8 bay tributaries from spring 1998 to fall 1999. Also, 30 elvers were collected from Ocean City, Maryland, in spring 1998. The numbers of juvenile and adult specimens of *A. crassus* in the swimbladder wall and lumen were counted. No elvers were infected. In subadult eels, prevalence of adult and juvenile stages combined ranged from 13% to 82%; mean intensity ranged from 2.6 to 9.0 worms per eel. Infection levels were highest for Susquehanna River eels (northernmost river) and lowest in the southernmost sites, St. Jerome's Creek and the Pocomoke River. Although eels from these two localities were larger, the low infection rates there are most likely due to reduced transmission in higher salinity water and not to eel size. Eels with both adult and juvenile stages of *A. crassus* were more common than expected by chance. This might be explained by inhibition of juveniles migrating into the swimbladder lumen when adults are already present there.

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Abstract: "Textural parameters of bottom sediments in Chincoteague Bay are used to define sediment sources and patterns of dispersal." Sediment is supplied to the bay from land erosion and through ocean inlets. "Annual contribution of mud from shore erosion is approximately eight times that introduced by streams." Sediment contribution from the ocean is limited to the vicinity of the inlets and has decreased recently due to the closing of old ocean inlets. Overall, "the average sedimentation rate in the bay over the past 5,000 years, estimated from sediment thickness in borings, is five times the present rate of 0.29 mm/year." The primary source of sand to the bay is from storm overwash on Assateague Island. "Sand content and maximum grain size of bottom sediments decrease abruptly near a water depth of 1.5 m, presumably indicating that at greater depths, waves are not effective in moving sand.

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Abstract: Chincoteague Bay receives an estimated 90,000 m3 of sediment annually, of which roughly half is sand and half mud. Sand is derived principally from the barrier Assateague Island, with storm overwash being twice as effective as eolian transport in supplying sand to the bay. The mainland of Delmarva Peninsula is the primary source of mud-size sediment for the bay. Annual contribution of mud from shore erosion is approximately eight times that introduced by streams. Sediment transport from the Atlantic Ocean through the two active tidal inlets is important only in the immediate vicinity of the inlets.

Present average rate of sedimentation in Chincoteague Bay estimated from annual sediment supply is 0.3 mm/yr. This is far less than the rate of 1.5 mm/yr obtained from sediment thickness in borings in the bay and believed to represent average conditions over the past 5,000 years. The present anomalously low sedimentation rate and accompanying decline in salt-marsh growth are attributed to a decrease in ocean-derived sediment caused by the closing of the former tidal inlets through Assateague Island. If this interpretation is correct, it underscores the wisdom of a recent decision against dune stabilization for prevention of storm overwash on Assateague Island. Overwash is a major means of providing sediment for landward accretion of barrier islands in response to relative sea-level rise. Elimination of storm overwash in the absence of sediment influx from the sea via tidal inlets almost certainly would have resulted in long-term net erosion on the lagoonal shore of Assateague Island.

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Abstract: A map of sediment distribution indicated that the sediments located on the eastern shore of the Bay and continuing 1-2 miles into the Bay were composed of 90% sand. Most of Sinepuxent Bay consisted of similar sandy sediments. Sandy sediments were also found in shallow pockets along the western shore. Deeper areas tended to accumulate the finer grained sediments. It was reported that there is a gain in sediments on the eastern shore of Sinepuxent and Chincoteague Bays, but a loss on the western shores and a net annual loss of 25,653 m3 yr^{-1}. The major source of sediments was from Assateague Island from washover events and aeolian transport and from sediment runoff, which was estimated at 17,450 kg mi^{-2} yr^{-1}. Streams had little sediment inputs into the bays; it was estimated that the sedimentation rate from streams was 50 tons mi^{-2} yr^{-1}. Calculations based on erosion statistics indicated there was a net accretion for the eastern shores of approximately 0.57 acre yr^{-1}. There was a net loss of soil from the western shore; the greatest erosion occurred on the islands and the west coastline of Chincoteague Bay. Erosion rates varied from 0.13 to 0.26 acre yr^{-1}.

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Abstract: An aerial census of feral horses on Assateague Island National Seashore was compared to a comprehensive ground count during April of 1988. Three low-level fixed-wing flights resulted in a mean count of 125 horses, while the ground census produced 147 horses. The census was subdivided among three sections of the island with differing types and amounts of vegetation, and aerial counts decreased in accuracy from a high of 97.7% of the ground count at the north end of the island where woodland and shrub-succession vegetation was minimal, to a low of 60.8% at the southern end of the island, where these two vegetation types were more common and abundant. Two additional aerial counts conducted in June, after vegetation leafed out resulted in a significant decrease in accuracy. The correction factor for the three April aerial counts ranged from 1.0 in the north to 1.4 in the south, with a mean of 1.17 overall.

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Abstract: Sewage effluent and outfall confluence samples were collected at the Barceloneta Regional Treatment Plant in Barceloneta, Puerto Rico; outfall confluence samples at Ocean City, Md., were also collected. Samples from uncontaminated open ocean areas served as clean-water controls. Bacteria were enriched in marine broth 2216 amended with 1 mu g of one of a set of chemicals selected for study per ml: nitrobenzene, dibutyl phthalate, m-cresol, o-cresol, 4-nitroaniline, bis(tributyltin) oxide, and quinone. MICs of the chemicals were determined individually for all isolates. Bacterial isolates were evaluated for resistance to nine different antibiotics and for the presence of plasmid DNA. Treated sewage was found to contain large numbers of bacteria simultaneously possessing antibiotic resistance, chemical resistance, and multiple bands of plasmid DNA. It is concluded that bacterial isolates derived from toxic chemical wastes more frequently contain plasmid DNA and demonstrate antimicrobial resistance than do bacterial isolates from domestic sewage-impacted waters or from uncontaminated open ocean sites.

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Abstract: The report contains general information concerning Assateague Island from the 16th Century to the late 1960s. The history of the island is traced from explorations off the coast by Giovanni da Verrazzano through the period of the first settlements, to modern-day agricultural activities, which have supported the economic life of the region in the county. The area's historic sites are identified, evaluated, and plotted on the Historical Base Map. All lands and resources found to be of historic significance are identified for addition to the National List of Classified Structures so their preservation is assured. Of related interest are the lists of vessels lost off the island by natural cause or by submarine action during World War I.

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sparrow of the Prairie Provinces and southward, and the James Bay race – evidently could have followed marine shorelines lying just south of the ice front inland from the Atlantic. These marine invasions rapidly disappeared as the weight of the glacier diminished, but the inland races, adjusted to freshwater marshes, still persist.

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Abstract: On March 8-9 1996, 269 people attended the Delmarva Coastal Bay Watersheds Conference in Ocean City, Maryland. The purpose of the conference was to provide a forum for citizens, elected and appointed officials and other decision-makers, and special interest representatives to discuss the economic and environmental state of the Delmarva coastal watersheds and to determine further continuing actions and activities. The design of the conference provided a unique opportunity for citizens in the Delmarva region to express their ideas and to apply their collective wisdom to begin to formulate strategies that will integrate economic, environmental, scientific and social considerations toward achieving a sustainable future.

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Abstract: A new local curve of relative sea-level change for the Delaware coastal area is based on 88 radiocarbon dates. The curve is smooth with relatively narrow potential limits of variation in amplitude. It has a somewhat steeper slope than published eustatic sea-level curves and other local relative sea-level curves. Holocene radiocarbon isochrons in Delaware marsh sections are horizontal. Interpretations strongly support the concept that Holocene sea-level rose slowly and continuously relative to the Delaware coast; the favored hypothesis is that the rise of sea-level was responsible. No seaward tilting is indicated for the Delaware segment of the Atlantic coastal plain or inner shelf. However, radiocarbon-dated shallow-water samples of comparable age suggest a strong seaward tilt of the outer continental shelf. The outer shelf over the Baltimore Canyon through geosyncline has subsided approximately 40 m in the last 10,000 years.

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Abstract: A description of the geological history was reported based on theories of barrier island formation and on borings made on the islands. It was-estimated that 20,000 years ago sea level was 100 m below present and the shoreline off the Delmarva peninsula was 100 km east of present. Since that time sea level has been rising, resulting in the drowning of former fastland. Forests and freshwater ponds existed 13,500 years ago on the present oceanic shelf 80 km offshore. The sea was 90 km offshore 9,500 years ago, and an estuary existed 80 km offshore. For the last 5,000 years barrier islands have sheltered the mainland, but first formed seaward of the present islands. Assateague Island is believed to have coalesced from smaller islands and was two islands as late as 1900 when the Green Run inlet was closed (Note: Other sources place the closing variously between 1883 and 1880.)

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Abstract: Rocks of the Price and Rockwell formations comprise the uppermost Devonian-Lower Mississippian deltaic complex in the central Appalachians. The Price Formation is dominantly marine and refers to all uppermost Devonian-Lower Mississippian rocks above either Hampshire Group red beds or the marine Greenland Gap Formation and below either the Greenbrier Limestone Group or Maccrady Formation red beds in the central Appalachians. The Rockwell Formation is dominantly non-marine and refers to equivalent rocks in south-central Pennsylvania and the Maryland-West Virginia panhandle region.

Members of the Price Formation are generally equivalent to discrete genetic events. Price deposition was initiated in latest Devonian time when a regional transgression covered delta and alluvial plain facies of the Catskill deltaic complex with protected-bay and strandline facies of the Oswayo Member in West Virginia, Pennsylvania and western Maryland. Farther south, these transgressive facies overlie the Cloyd Conglomerate Member, a thin regressive-transgressive sedimentary wedge, and occur in the lower part of the Sunbury Shale Member.

Subsurface Berea Sandstone deposition corresponded to regional exposure and erosion in the outcrop belt. This unconformable surface was overstepped in earliest Mississippian time by a major transgression that deposited a variably thick but persistent basal transgressive sandstone during shoreface retreat. Sandstones that have been referred to the “Cussewago Sandstone” in

northern West Virginia and southwest Pennsylvania are part of this basal sandstone. Eastward, these sandstones thicken, coarsen and interbed with a polymictic diamictite at the base of the Rockwell Formation.

Shaly facies of the earliest Mississippian transgression overlie the basal sandstone. The Riddlesburg Shale preserves offshore and open-bay facies in West Virginia that grade eastward to estuarine and restricted, back-bar lagoon and marsh facies of a barred-bay complex in south-central Pennsylvania and the Maryland-West Virginia panhandle. From central West Virginia, Riddlesburg facies grade southward into basinal facies of the Sunbury Shale Member.

Syndepositionally active basement features, the West Virginia Dome and "Tri-State Block", were structurally positive areas in the foreland basin. The "Tri-State Block" caused truncation of Lower Mississippian marine facies in western Maryland and large-scale westward erosional overlap of channel-fill sandstones in the upper Rockwell Formation. The West Virginia Dome was also structurally positive and the basal transgressive sandstone contains phosphatic omission surfaces on the dome crest. Lack of subsidence caused scour and incision of Riddlesburg facies by overlying deltaic facies.

Progradation ensued with fluvial-dominant, shallow-water deltaic systems (Price Rockwell Member) in northern West Virginia and marine-dominant deep-water deltaic facies farther south. A 150 m minimum paleodepth estimate in the foreland basin is based on stratigraphic thickness in southern West Virginia. Following a transgression near the Kinderhookian-Osagean boundary. Price marine-deltaic facies form a coarsening-upward sequence to delta plain coals and coastal-alluvial plain red beds. A 35 m estimate for average storm wave base utilized tempestite proximal-distal trends.

Library: TU, UD-Morris, UMBC, UMCP,

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Abstract: The surfclam fishery, managed by individual transferable quotas, is a valuable and well-managed exclusive economic zone (EEZ) fishery on the northeast U.S. coast. Through 1999, surfclam stock biomass was fairly stable throughout the mid-Atlantic region. The 2002 National Marine Fisheries Service (NMFS) surfclam survey revealed a reduction in surfclam abundance in the Delmarva region, near the southern limit of the species range. The Delmarva population had not been over-fished, and commercial landings were not high enough there to account for the decline. In 2004, the surfclam industry funded a surfclam survey in partnership with academia and government. NMFS assisted with design of the survey, fieldwork, data management, and final analysis. Academia assisted with survey design, fieldwork, and data analysis. Funding for the survey, fishing vessel, and crew was provided by the surfclam industry. Study objectives were to estimate temporal changes in mid-Atlantic surfclam biomass, to evaluate recruitment into the fishery, and to assess changes in the bathymetric distribution of surfclams. Survey results indicate that the mortality event (1999-2002 period) seems to have run its course. Data collected from this cooperative survey will be used by the Mid-Atlantic Fishery Management Council and NMFS to help determine future surfclam quotas for the EEZ and in planning future NMFS surfclam surveys.

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Abstract: The history and fate of groundwater nitrate (NO_3^-) contamination were compared in 2 small adjacent agricultural watersheds in the Atlantic coastal plain by combined use of chronologic (CCl_2F_2, H-3) chemical (dissolved solids, gases), and isotopi (δN-15, δC-13, δS-34) analyses of recharging groundwaters, discharging groundwaters, and surface waters. The results demonstrate the interactive effects of changing agricultural practices, groundwater residence times, and lcoal geological features on the tranfer of NO_3^- through local flow systems. Recharge dates of groundwaters taken in 1990-1992 from the surficial aquifer in the Chesterville Branch and Morgan Creek watersheds near Locust Grove, maryland, ranged from pre-1940 to the late 1980s. When corrected for localized denitrification by use of dissolved gas concentrations, the dated waters provide a 40-year record of the recharge rate of NO_3^-, which increased in both watersheds by a factor of 3-6 most rapidly in the 1970s. The increase in groundwater NO_3^- over time was approximately proportional to the documented increase in regional N fertilizer use, and could be accounted for by oxidation and leaching of about 20-35% of the fertilizer N. Groundwaters discharging upward beneath streams in both watersheds had measured recharge dates from pre-1940 to 1975, while chemical data for second-order reaches of the streams indicated average groundwater residence times in the order of 20+ years. At the time of the study, NO_3^- discharge rates were less than NO_3^- recharge rates for at least two reasons: 1) discharge of relatively old waters with low initial NO_3^- concentrations, and 2) local denitrification. In the Chesterville Branch watershed, groundwaters remained oxic throughout much of the surficial aquifer and discharged relatively unaltered to the stream, which had a relatively high NO_3^- concentration (9-10 mg/L as N). In the Morgan Creek watershed, groundwaters were largely reduced and denitrified before discharging to the stream, which had a relatively low NO_3^- concentration (2-3 mg/L as N). Chemical and isotopic data indicate that quantitative denitrification occurred within buried calcareous glauconitic marine sediments that are present at relatively shallow depths beneath the Morgan Creek watershed. NO_3^- removal by forests, wetlands, and shallow organic-rich soils in near-stream environments was largely avoided by groundwaters that followed relatively deep flow paths before converging and ischarging rapidly upward to the streams.

Library: CBL, HPL, FSU, TU, UD-Morris, UMBC, UMCP

Bohme, L. S., F. Henderson and E. C. Keller, Jr. 1977. Biomass and numbers of dominant phytoplankton species from the ocean into Chincoteague Bay. *Proceedings of the West Virginia Academy of Science* 49(1):17.

Abstract: The characteristics of masses of water in the Chincoteague Bay area on the Maryland-Virginia line was done by estimates of the biomass and numbers of dominant phytoplankton species present. During one tidal cycle of tidal excursion at Chincoteague Channel marker No. 21, it was observed that there was greater biomass and a greater number of organisms of the dominant species in the waters ebbing from the Bay than there were in flood waters from the ocean. Samples from an ocean to Bay transect showed that the pattern was not as clear and tended to indicate a more even distribution during slack water periods. This later sampling can be explained, in part, by the appearance of a predominantly oceanic species in the dominants and the appearance of a partial phytoplankton bloom of two of the species in the ocean sites.

Library: UD-Morris, UMCP

Bolyard, T. H., G. M. Hornberger, R. Dolan and B. P. Hayden. 1979. Freshwater reserves of Mid-Atlantic coast barrier islands. *Environmental Geology* 13(1):1-11.

Abstract: A multiple regression model was constructed for the purpose of predicting barrier island hydrology from easily measurable island characteristics. The model was developed using data obtained from 17 sites on the Outer Banks of North Carolina. The accuracy of the model for predicting key hydrologic variables was evaluated by statistical and graphic procedures. In general, agreement between observed and predicted values of the hydrologic variables was very good, suggesting that the quantity of potable water at various island sites can be estimated without resorting to extensive field investigations. The model was then applied to Assateague Island, a barrier island located off the coasts of Maryland and Virginia. Results indicate that the original model developed for the Outer Banks may be applied to other barrier islands but that errors involved may necessitate corrections in detailed studies. Correction for bias in predictions for Assateague was shown to be possible with limited field data from surface resistivity surveys.

Library: FSU, TU, UD-Morris, UMCP

Bond, G. M. and R. E. Stewart. 1951. A new swamp sparrow from the Maryland coastal plain. *The Wilson Bulletin* 63(1):38-40.

Abstract: The coastal swamp sparrow, *Melospiza georgiana nigrescens*, is newly described from a holotype (USNM 418565, Fish and Wildlife Service Collection) from Wicomico County along the Nanticoke River marshes opposite Vienna, Maryland.

Library: FSU, SMC, TU, UD-Morris, UMCP

Boruff, B. J., C. Emrich and S. L. Cutter. 2005. Erosion hazard vulnerability of U.S. coastal counties. *Journal of Coastal Research* 21(5):932-942.

Abstract: The vulnerability of U.S. coastal counties to erosion is examined by combining a socioeconomic vulnerability index with the U. S. Geological Survey's physically based coastal vulnerability index. The end product is a county-based index of overall coastal place vulnerability. The results indicate that place vulnerability along the coast is highly differentiated and influenced by a range of social, economic, and physical indicators. Regionally, Gulf Coast vulnerability is more of a product of social characteristics rather than physical attributes. The opposite is true of Pacific and Atlantic coastal counties, where physical characteristics are more influential in

determining erosion-hazard vulnerability. It is clear that overall vulnerability of coastal counties cannot be determined without the union of social, economic, built-environment, and physical characteristics. Yet the methods for combining these components are not widely used at present by coastal scientists and policy makers, rendering hazards assessments incomplete and mitigation plans untenable for many places.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Botton, M. L. and R. E. Loveland. 1992. Body size, morphological constraints, and mated pair formation in four populations of horseshoe crams (*Limulus polyphemus*) along a geographic cline. *Marine Biology* 112(3):409-415.

Abstract: Crabs of both sexes from Great Bay, New Hampshire, were significantly smaller than crabs from Sandy Hook Bay and Delaware Bay, New Jersey, and Chincoteague Bay, Virginia. Formation of mated pairs was independent of body size in each population; there were no significant differences between mated and single individuals, and size assortive mating did not occur. The ratios of male to female prosoma width within amplexed mated pairs averaged from 0.78 – 0.80 in each population, despite the large difference in absolute size between southern and northern populations. This may suggest a role for natural selection in regulating the relative sizes of each sex.

Library: CBL, HPL, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Boule, M. E. 1979. The vegetation of Fisherman Island, Virginia. *Castanea* 44:98-108.

Library: FSU, TU, UD-Morris, UMBC, UMCP

Bourn, W. S. and C. Cottam. 1950. Some biological effects of ditching tidewater marshes. U.S. Department of the Interior, *U.S. Fish and Wildlife Service Research Report* 19:1-30.

Abstract: As the result of studies conducted over a twelve year period, 1935-1947, of the biological effects of ditching tide-water marshes in Delaware for mosquito control, it was found that marked ecological changes occurred in the floral cover and in the invertebrate fauna of the areas after ditching. Shrubby growths of groundselbush and marsh elder largely replaced the marshes' natural grass associations, and the invertebrate populations so important as food items for waterfowl, shore birds, and fish were appreciably reduced as the result of drainage. In the *Spartina alterniflora* zone, the lowest with respect to elevation above mean sea level, the reductions in all forms of invertebrates on drained areas drained areas ranged from 39.3 – 82.2%, depending on the season. Their reductions in the succeeding plant zones with relation to elevation ranged as follows: *Distichlis spicata* zone, 63.7 – 87.9%; *Spartina patens* zone, 41.2 – 97.3%; and *Scirpus robustus* zone, 49.6 – 97%. More significant from the standpoint of wildlife conservation, however, were the losses in populations of molluscs and crustaceans, which are important items in the diet of the clapper rail, the greater yellowlegs, and many marine animals. The losses of molluscs and crustaceans as a result of mosquito-control drainage varied in *Spartina alterniflora* associations from 31.6 – 95.2%, depending on seasonal conditions, in *Distichlis spicata* associations from 82.4 – 94.3%, in *Spartina patens* associations from 54.6 – 99.9%, and in *Scirpus robustus* associations from 57.6 – 98%. These reductions in invertebrate populations are serious when it is considered that by the end of 1938 some 90%, or 562,000 acres, of the total original acreage of tidewater marshland along the Atlantic coast from Maine to Virginia had been ditched.

Bousfield, E. L. 1973. *Shallow-water Gammaridean Amphipoda of New England.* Comstock Publishing Associates (Ithaca, New York). xii + 312 pp.

Bovee, E. C. 1979. A preliminary report on amebas found in marine coastal waters of Virginia, New Jersey and Massachusetts. *Journal of Protozoology* 26(3, part 1):26A.

Abstract: A survey of amebas found in collections from Chincoteague and Assateague Bays in Virginia, Sandy Hook Bay in New Jersey and Buzzard's Bay, Eel Pond, Salt Pond at Woods Hole, Massachusetts, produced the following: *Pelomyxa* sp.; *Saccamoeba sphaerarum*, *S. gumia* 4 other *Saccamoeba* spp.; 2 *Vahlkampfia* spp.; *Mayorella conipes*; *M. corlissi*; *M. smalli*, 5 other *Mayorella* spp.; *Oscillosignum* sp.; *Vexillifera telmathalassa*, *V. ottoi*, *V. browni*, *V. pagei*, 2 other *Vexillifera* spp.; *Acanthamoeba gigantea*, *Acanthamoeba* sp.; *Striolatus tardus*; Triaenamoeba jachowskii; *Flabellula hoguei*, *Flabellula* sp.; *Vanella sensilis*, *V. mira*, *Vanella* sp.; *Lingulamoeba leei*; *Platyamoeba langae*, *P. murchelanoi*, *P. weinsteini*; *Clydonella rosenfieldi*, *C. wardi*, *Clydonella* sp.; Unda maris, *U. schaefferi*, *Unda* spp.; 3 unidentified spp. of *Striamoeba*; *Mastigamoeba schultzei*, an unidentified sp. of M*astigamoeba*. All the *Mavorella* spp. (except *M. conipes*), the *Vexillifera* spp., the *Oscillosignum* sp., the *Acanthamoeba* spp., *Triaenamoeba jachowskii* and the *Matigamoeba* spp. were found only from Chincoteague or Assateague bays, suggesting adaptation to warmer waters. The other genera and most species of them are distributed at all three locales.

Bovee, E. C. and T. K. Sawyer. 1979. Protozoa: Sarcodina: Amoebae. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 419* 56 pp.

Abstract: This manual contains a key to 15 families of fresh-water and marine amoebae, of which only one, the Echinamoebidae, does not contain a known marine species. Diagnostic features for 49 general, of which 34 include marine species, also are given. Descriptions and illustrations for 76 species of marine amoebae and an annotated systematic list are provided. The basic key is designed to assist the user in the identification of recognized species of marine amoebae that have been described from the waters of the northeastern United States. However, certain well-known families and genera of freshwater forms are included to assist in their identification should they be discovered in seawater in future investigations. Information also is provided which includes comments on the general biology of the Amoebida, and techniques for microscopic observations and laboratory cultivation of many species. Most of the amoebae described in the key are free-living, but a few are parasitic and known to be of considerable economic importance. One new free-living species, *Vexillifera minutissima*, was discovered in Chincoteague Bay, Virginia, and is described herin for the first time.

Bowman, Thomas E. 1955. The isopod genus *Chiridotea* Harger, with a description of a new species from brackish waters. *Journal of the Washington Academy of Science* 45:224-229.

Bowman, Thomas E. 1964. Order Isopoda. **IN:** *Keys to Marine Invertebrates of the Woods Hole Region*, Ralph I. Smith, Ed. Systematics-Ecology Program, Marine Biological Laboratory (Woods Hole, Massachusetts), Contribution No. 11. pp. 105-111.

Library: CBL, FSU, HPL, UD-GCMES, UD-Morris [all are QL183 .S6]

Boyce, M. A. 1978. Climatic variability and body size variation in the muskrats (*Ondatra zibethicus*) of North America. *Oecologica* 36:1-19.

Abstract: Patterns of geographic variation in nine morphological characters of adult muskrats (*Odonatra zibethicus*) are investigated by multiple regression and canonical analysis. Three variables describing the annual precipitation regimen account for 16 to 33% of the variance in each of the skeletal measurements. Highly variable precipitation patterns result in low rates of germination and survivorship for preferred aquatic food plants which in turn reduces average total food availability for muskrats. In large individuals nutritive demands may exceed supply, thus selection favors smaller body size in areas of low food availability.

After removing the variation attributable to three precipitation variables, the residual variation in the morphological variables is exposed to canonical correlation analysis with a set of 10 environmental and geographical variables. A canonical variate loaded for climatic seasonality accounted for 60% of the variance in a canonical variate of the morphological residuals which load as a general body size variate. It is argued that seasonality is a major factor selecting for large body size in muskrats and other organisms. During seasonal periods of resource abundance natural selection favors individuals with rapid growth to a large size, while concurrently enhancing survivorship through oncoming periods of resource shortage.

Library: UD-Morris

Boyer, T., S. Levitus, J. Antonov, R. Locarnini, A. Mishonov, H. Garcia and S. A. Josey. 2007. Changes in freshwater content in the North Atlantic Ocean 1955-2006. *Geophysical Research Letters* 34(16):np.

Abstract: Freshwater content changes (FW) for the North Atlantic Ocean (NA) are calculated from in situ salinity profiles for the period 1955-2006 from the surface to 2,000 meters. Heat content (HC) is also calculated from in situ temperature profiles for comparison. A decrease in FW between 1955 and 2006 of similar to 30,000 km^3 is found for the NA, despite an increase in FW of similar to 16,000 km^3 in the subpolar North Atlantic (SNA) and Nordic Seas between the late 1960s and the early 1990s. Over the last two decades there is a pattern of decreasing FW in the upper 400 meters and increasing FW below 1,300 meters for the NA. FW and HC are strongly negatively correlated for both the SNA (r = - 0.93) and the NA (r = -0.79). Net precipitation, from NCEP/NCAR, is found to have a strong influence on FW changes in the SNA but this relation is weaker elsewhere.

Library: UD-Morris, UD-GCMES, UMBC, UMCP

Boylard, T. H., G. M. Hornberger, R. Dolan and B. P. Hayden. 1979. Fresh water reserve of mid-Atlantic coast barrier islands. *Environmental Geology* 3:1-11.

Abstract: A multiple regression model was constructed for the purpose of predicting barrier island hydrology from easily measureable island characteristics. The model was developed using data obtained from 17 sites on the Outer Banks of North Carolina. The accuracy of the model for predicting key hydrologic variables was evaluated by statistical and graphic procedures. In general, agreement between observed and predicted values of the hydrologic variables was very good, suggesting that the quantity of potable water at various island sites can be estimated without resorting to extensive field investigations. The model was then applied to Assateague Island, a barrier island locate off the coasts of Maryland and Virginia. Results indicate that the original model developed for the Outer Banks may be applied to other barrier islands but that errors involved may necessitate

corrections in detailed studies. Correction for bias in predictions for Assateague was shown to be possible with limited field data from surface resistivity surveys.

Library: FSU, TU, UD-Morris, UMCP

Boynton, W. 1970. Phytoplanktonic primary production in Chincoteague Bay. **IN:** *Assateague Ecological Studies, Part I. Environmental Information*. Natural Resources Institute, University of Maryland (College Park), Contribution No, 446, pp. 91-133.

Boynton, W. 1970. The commercial fisheries of Chincoteague Bay - past, present and future. **IN:** *Assateague Ecological Studies, Part I. Environmental Information*. Natural Resources Institute, University of Maryland (College Park), Contribution No, 446, pp. 357-388.

Abstract: This report contains some information on commercial fisheries catches and describes a few of the natural and economic features of the region that have impacted on the fisheries.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

Boynton, W. R. 1973. *Phytoplankton production in Chincoteague Bay, Maryland-Virginia*. Master of Science Thesis. University of North Carolina, Chapel Hill.

Abstract: "Three aspects of phytoplankton ecology in Chincoteague Bay/ Maryland-Virginia were investigated in a one year study: 1) the seasonal cycle of phytoplankton production; 2) consideration of seasonal nutrient cycles and possible factors limiting production; and 3) an evaluation of the standing crop of organic matter in the bay. Photosynthesis and standing crop had a pronounced seasonal cycle with high and low values in the warm and cold seasons/ respectively. Average daily net and gross production rates were 0.49 and 1.11 g C m^{-1} day^{-1}/ respectively. All phosphorus fractions were low during the cold seasons and increased sharply during the summer. Ammonia was the most abundant form of available nitrogen at all times of the year. Inorganic nitrogen concentrations did not show large seasonal changes. Available nitrogen and light were suggested as factors limiting phytoplankton production for limited parts of the year. The standing crop of organic carbon appeared to be primarily derived from phytoplankton activity."

Boynton, W. R., L. Murray, W.M. Kemp, J.D. Hagy, C. Stokes, F. Jacobs, J. Bower, S. Souza, B. Krisky, & J. Seibel. 1993. *Maryland's Coastal Bays: An Assessment of Aquatic Ecosystems, Pollutant Loadings, and Management Options*. Prepared by the University of Maryland System Center for Environmental and Estuarine Studies for the Department of the Environment, Maryland.

Boynton, W. R., J. D. Hagy, L. Murray, C. Stokes and C. Kemp. 1996. A comparative analysis of eutrophication patterns in a temperate coastal lagoon. *Estuaries* 19(2B):408-421.

Abstract: The coastal bays and lagoons of Maryland extend the full length of the state's Atlantic coast and compose a substantial ecosystem at the land-sea margin that is characterized by shallow depth, a well-mixed water column, slow exchange with the coastal ocean, and minimal freshwater input from the land. For at least 25 years, various types of measurements have been made intermittently in these systems, but almost no effort has been made to determine if water quality or habitat conditions have changed over the years or if distinctive spatial gradients in these

features have developed in response to changing land uses. The purpose of this work was to examine this fragmented database and determine if such patterns have emerged and how they may be related to land uses. Turbidity, dissolved inorganic phosphate, algal biomass, and primary production rates in most areas of the coastal bays followed a regular seasonal pattern, which was well correlated with water temperature. Nitrate concentrations were low (<5 μM), and only modestly higher in tributary creeks <20 μM). Additionally, there was little indication of the spring bloom typical of river-dominated systems. There does appear to be a strong spatial gradient in water quality conditions (more eutrophic in the upper bays, especially in tributary creeks). Comparisons of water quality data collected between 1970 and 1991 indicate little temporal change in most areas and some small improvements in a few areas, probably related to decreases in point-source discharges. Seagrass communities were once extensive in these systems but at present are restricted to the eastern portion of the lower bays where water clarity is sufficient to support plant survival. Even in these areas, seagrass densities have recently decreased. Examination of diel dissolved oxygen data collected in the summer indicates progressively larger diel excursions from lower to upper bays and from open bays to tributary subsystems; however, hypoxic conditions <2 mg/l) were rarely observed in any location. Nitrogen input data (point, surface runoff, groundwater, and atmospheric deposition to surface waters) were assembled for seven regions of the coastal bay system; annual loading rates ranged from 2.4 g $N/m^2/yr$ to 39.7 g $n/m^2/yr$. Compared with a sampling of loading rates to other coastal systems, those to the upper and lower bays were low while those to tributaries were moderate to high. Regression analysis indicated significant relationships between annual nitrogen loading rates and average annual total nitrogen and chlorophyll a concentrations in the water column. Similar analyses also indicated significant relationships between chlorophyll a and the magnitude of diel dissolved oxygen changes in the water column. It is concluded that these simple models, which could be improved with a well-designed monitoring program, could be used as quantitative management tools to relate habitat conditions to nutrient loading rates.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Boynton, W. R., W. M. Kemp, and C. W. Keefe. 1982. A comparative analysis of nutrients and other factors influencing estuarine phytoplankton production. **IN:** *Estuarine Comparisons*, V. S. Kennedy, Ed. Academic Press (New York). pp. 69-90.

Library: UD-GCMES [GC96.5 .I57 1981]

Boynton, W. R., L. Murray, J. D. Hagy, C. Stokes and W. M. Kemp. 1996. A comparative analysis of eutrophication patterns in a temperate coastal lagoon. *Estuaries* 19(2b):408-421.

Abstract -- The coastal bays and lagoons of Maryland extend the full length of the state's Atlantic coast and compose a substantial ecosystem at the land-sea margin that is characterized by shallow depth, a well-mixed water column, slow exchange with the coastal ocean, and minimal freshwater input from the land. For at least 25 years, various types of measurements have been made intermittently in these systems, but almost no effort has been made to determine if water quality or habitat conditions have changed over the years or if distinctive spatial gradients in these features have developed in response to changing land uses. The purpose of this work was to examine this fragmented database and determine if such patterns have emerged and how they may be related to land uses. Turbidity, dissolved inorganic phosphate, algal biomass, and primary production rates in most areas of the coastal bays followed a regular seasonal pattern, which was well correlated with water temperature. Nitrate concentrations were low (<5 microM), and only modestly higher in tributary creeks (<20 microM). Additionally, there was little indication of the spring bloom typical of river-dominated systems. There does appear to be a strong spatial gradient in water quality conditions (more eutrophic in the upper bays, especially in tributary creeks). Comparisons of water quality data collected between 1970 and 1991 indicate little temporal change in most areas and some small improvements in a few areas, probably related to decreases in point-source discharges. Seagrass communities were once extensive in these systems but at present are restricted to the eastern portion of the lower bays where water clarity is sufficient to support plant survival. Even in these areas, seagrass densities have recently decreased. Examination of diel dissolved oxygen data collected in the summer indicates progressively larger diel excursions from lower to upper bays and from open bays to tributary subsystems; however, hypoxic conditions (<2 mg l^{-1}) were rarely observed in any location. Nitrogen input data (point, surface runoff, groundwater, and atmospheric deposition to surface waters) were assembled for seven regions of the coastal bay system; annual loading rates ranged from 2.4 g N m^{-2} yr^{-1} to 39.7 g N m^{-2} yr^{-1}. Compared with a sampling of loading rates to other coastal systems, those to the upper and lower bays were low while those to tributaries were moderate to high. Regression analysis indicated significant relationships between annual nitrogen loading rates and average annual total nitrogen and chlorophyll a concentrations in the water column. Similar analyses also indicated significant relationships between chlorophyll a and the magnitude of diel dissolved oxygen changes in the water column. It is concluded that these simple models, which could be improved with a well-designed monitoring program, could be used as quantitative management tools to relate habitat conditions to nutrient loading rates.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Boynton, W. R., L. Murray, W. M. Kemp, J. D. Hagy, C. Stokes, F. Jacobs, J. Bower, S. Souza, B. Krisky and J. Seibel. 1993. *Maryland's Coastal Bays: An Assessment of Aquatic Ecolosystems, Pollutant Loadings, and Management Options*. University of Maryland System Center for Environmental and Estuarine Studies for Maryland Department of the Environment (Annapolis).

Bradley, J. 1994. Spellbound at Chincoteague. *The Literary Review* 37(4):591.

Library: CSU, TU, UD-Morris, UMBC, UMCP

Breidt, J. F., D. C. Boes, J. I. Wagner, and M. D. Flora. 1991. Anti-degradation water quality criteria for the Delaware river: A distribution-free statistical approach. *Water Resources Bulletin, American Resources Association*. 27(5): 849-858.

Abstract: "Existing water quality for the Middle Delaware Scenic and Recreational River is significantly better than is required by current standards, leaving a potential for degradation. A method is presented for deriving candidate anti-degradation water quality criteria for this segment of the Delaware River using statistical analysis of historic (ambient) water quality data. Data for 34 water quality parameters are first evaluated for data density/ serial correlation, trend, seasonality, and other factors. These preliminary analyses are based on observation of data plots and application of distribution-free statistical techniques that are insensitive to out-lyers and are robust to relatively mild violations of basic assumptions. Data for 12 of the parameters have sufficient density for further analysis and can reasonably be modeled as independent and identically distributed over time (either seasonally or for the entire data sets). For these 12 parameters, distribution-free statistical methods are developed and used to derive intervals within which there is high confidence (usually greater than 95 percent) that the quantities with potential use as anti-degradation criteria (the 0.85 th, 0.90 th, and 0.95 th quantities in this study) for a particular parameter lie."

Library: FSU, TU, UD-Morris, UMBC, UMCP

Brenum, G. 1976. *A Comparative Study of Benthic Communities of Dredged Lagoons, Tidal Creeks, and Areas of Open Bays in Little Assawoman, Indian River, and Rehoboth Bays, Delaware*. Master of Science Thesis, College of Marine Studies, University of Delaware (Newark).

Briand, C. H., E. A. Venso, and M. F. Frana. 2002. The earliest reports of canine distemper in Maryland – 1759. *The Maryland Naturalist* 45:23-28.

Abstract: A discussion of the history of canine distemper, along with a review of its etiology, pathology, signs and symptoms, and prognosis, is presented beginning with the observations of Dr. Richard Brooke reported by Henry Baker to the Royal Society in London dated 1759 concerning the disease on the Eastern and Western shores of Maryland.

Library: CBL, FSU, SU, TU, UMBC, UMCP

Brinker, D. F. N.D. Bird colony sites in the Coastal Bays region. Historical data (1975-1977) of the Maryland Department of Natural Resources. Unpublished data. Annapolis, MD.

Abstract: Colonial bird counts were presented by number of pairs and number of colonies. Similar data from 1985-1988 were included. Total number of pairs increased from 8/866 in 1975 to 19,981 in 1988. The data are not complete enough to make such a comparison for number of colonies. A composition and estimate of population size for Maryland colonial water birds yielded mixed results/ with some colonies declining and others expanding.

Brinker, D. R., L. A. Byrne, P. J. Tango and G. D. Therres. 1996. *Population Trends of Colonial Nesting Waterbirds on Maryland's Coastal Plain*. Final Report. Maryland Department of Natural Resources (Annapolis).

Brinker, D. R., L. E. Gill and L. A. Byrne. 1994. *Maryland Colonial Waterbird Project 1993 Annual Report.* Maryland Department of Natural Resources (Annapolis). 41 pp.

Brock, J. C., W. B. Krabill and A. H. Sallenger. 2004. Barrier island morphodynamic classification based in LIDAR metrics for north Assateague Island, Maryland. *Journal of Coastal Research* 29(2):498-509.

Abstract: In order to reap the potential of airborne lidar surveys to provide geological information useful in understanding coastal sedimentary processes acting on various time scales, a new set of analysis methods are needed. This paper presents a multi-temporal lidar analysis of north Assateague Island, Maryland, and demonstrates the calculation of lidar metrics that condense barrier island morphology and morphological change into attributed linear features that may be used to analyze trends in coastal evolution. The new methods proposed in this paper are also of significant practical value, because lidar metric analysis reduces large volumes of point elevations into linear features attributed with essential morphological variables that are ideally suited for inclusion in Geographic Information Systems.

A morphodynamic classification of north Assategue Island for a recent 10 month time period that is based on the recognition of simple patterns described by lidar change metrics is presented. Such morphodynamic classification reveals the relative magnitude and the fine scale alongshore variation in the importance of coastal changes over the study area during a defined time period. More generally, through the presentation of this morphodynamic classification of

north Assateague Island, the value of lidar metrics in both examining large lidar data sets for coherent trends and in building hypotheses regarding processes driving barrier evolution is demonstrated.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Brooks, W. K. and R. P. Cowles. 1905. *Phoronis architecta*; its life history and breeding habits. *Memoirs of the National Academy of Science* 10:71-148.

Library: UD-Morris, UMCP

Brown, M. L. and R. G. Brown. 1984. *Herbaceous Plants of Maryland*. Port City Press (Baltimore, Maryland). 1127 pp.

Library: UD-Morris [QK165 .B758 1984]

Brown, P. M. and M. S. Ried. 1975. Geologic evaluation of waste storage potential in selected segments of the Mesozoic aquifer system below the zone of fresh-water Atlantic coastal plain, North Carolina through New Jersey. U.S. Department of the Interior, *U.S. Geological Survey Professional Paper No.* 881.

Library: UD-Morris

Brown, R. 2003. The Flora and Ecology of Assateague Island. *University of Maryland Bulletin* A-172.

Brumbaugh, R. D. 1996. *Recruitment of Blue Crab, Callinectes sapidus, Postlarvae to the Back-Barrier Lagoons of Virginia's Eastern Shore*. Ph.D. Dissertation, Old Dominion University (Norfolk, Virginia). 171 pp.

Library: Old Dominion Univ.

Bruner, K. R. and R. A. Smosna. 1989. The movement and stabilization of beach sand on transverse bars, Assateague Island, Virginia. *Journal of Coastal Research* 5(3):593-601.

Abstract: Transverse bars on the leeward beaches of Assateague Island were studied to understand the processes responsible for their development. It is thought that they originated by storm activity when sand was eroded from the berm and redeposited in the foreshore. Although connected to the upper shoreface, bars seem to be migrating parallel to the shoreline under the influence of slight longshore transport. On quieter stretches of the beach, transverse bars have been colonized by salt cordgrass. Cordgrass binds the sand, thus helping to build the bars upward and retard their migration. With time, the grass stabilized sediment of the intervening channels and may eventually overgrow the entire beach.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Brush, G. S., C. Lenk and J. Smith. 1980. The natural forests of Maryland: an explanation of the vegetation map of Maryland. *Ecological Monographs* 50:77-92.

Abstract: The forests of Maryland have been mapped at a scale of 1:250 000 on the basis of 15 regional associations: (1) tamarack, (2) bald cypress, (3) hemlock-yellow birch-black birch, (4) river birch-sycamore (5) sycamore-green ash-box elder-silver maple, (6) shingle oak, (7) chestnut oak-post oak-blackjack oak, (8) chestnut oak-bear oak, (9) chestnut oak, (10) loblolly pine, (11) basket oak-loblolly pine, (12) willow oak-loblolly pine, (13) basket oak, (14) sugar maple-basswood, and (15) tulip poplar. The associations differ from each other in species composition and in abundances of species common to many associations. Each was identified in the field by the presence of relatively few common discontinuous tree species referred to as "characteristic species." Correlations between forest associations and geologic, topographic, and soils units mapped at a similar scale suggest that patterns of available water are important in controlling dist

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Bryant, N. 1975. [Debate over development on Assateague Island]. *The New York Times*, 10 February, Section 5, p. 7.

Buckelew, J. H. 1948. The 1948 nesting season for the gulls, terns, and skimmers on the Del-Mar-Va Peninsula. *Wood Thrush* 4(2):42-45.

Abstract: The season was almost a failure for the members of these groups of birds in this area. Most of the damage was done by unusually high tides.

Library: UMCP

Buckelew, J. H. 1949. Del-Mar-Va shore birds. *Maryland Conservationist* 26(1):14-15, 29.

Library: FSU, HPL, SMC, SU, TU, UMBC, UMCP, UMES

Buckelew, J. H. 1950. Records from the Del-Mar-Va Peninsula. *Auk* 67:250-252.

Abstract: A study of the birds of Delaware and coastal counties of Maryland and Virginia is reported. A sooty shearwater(*Puffinus griseus*) at Chincoteague constitutes the second record for the area. The golden eagle (*Aquila chrysaetos*), the belted piping plover (*Charadrius melodus circumcincta*), the British lesser black-backed gull (*Larus fuscus graellsii*), and the pine grosbeak (*Pinicola enucleator leucura*) are reported as first records for Maryland. *Larus fuscus graellsii* is also a first record for North America. The Atlantic kittiwake (*Rissa tridactyla tridactyla*), The chuck-will's widow (*Caprimulgus carlinensis*), and Bicknell's thrush (*Hylocichla minima minima*) are reported as a first record for Delaware. The buff-breasted sandpiper (*Tryngites subruficollus*) is reported for the second time in Virginia. The razor-billed auk (*Alca torda*) is reported as the third record of the species for the area. The hoary redpoll (*Acanthis hornemanni exilipes*) is reported for the first time south of New York City. Four saw-whet owls (*Cryptoglaux acadia acadia*) were also recorded from Delaware.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Buckelew, J. H. 1951. European cormorant observed at Ocean City, Maryland. *Maryland Birdlife* 7:17.

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Burbanck, W. D. 1959. The distribution of the estuarine isopod, *Cyathura* sp., along the eastern coast of the United States. *Ecology* 40:507-511.

Abstract: Ecological, zoogeographic, and systematic notes on various species of the isopod *Cyathura* sp. are given for Atlantic coast populations. Included in these remarks are *Cyathura polita* and *C. carinata*.

Burbanck, W. D. 1961. The biology of *Cyathura* sp., an estuarine isopod of eastern North America. *Verh. Intern. Verein. Limnol*. 14:968-971.

Burbanck, W. D. 1967. Evolutionary and ecological implications of the zoogeography, physiology, and morphology of *Cyathura* (Isopoda). **IN:** *Estuaries*, American Association for the Advancement of Science Publication No. 83:564-573.

Burbrink, F. T. 2001. Systematics of the eastern rat snake complex (*Elaphe obsoleta*). *Herpetological Monographs* 15:1-53.

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Burke, M. K., W. C. Dennison and K. A. Moore. 1996. Non-structural carbohydrate reserves of eelgrass *Zostera marina*. *Marine Ecology Progress Series* 137(1-3):195-201.

Abstract: The high minimum light requirement of eelgrass *Zostera marina* suggests that this species has difficulty in maintaining a positive carbon balance except under high light conditions. The carbon balance of Z. marina can be studied by following seasonal changes in non-structural carbohydrate (NSC) reserves, however, little is known about the seasonal variation in NSC reserves in seagrasses or the influence of shading on NSC reserve content and distribution. Seasonal changes in eelgrass NSC reserves were measured in a shallow coastal lagoon, Chincoteague Bay, Maryland/Virginia, USA, near the southern edge of this species' distributional range. Concentrations of sugar varied seasonally in leaves, rhizomes and roots, with maximum concentrations occurring in the rhizomes. In contrast, starch concentrations did not vary with the season, but were highest in the roots. Seasonal peaks in rhizome NSC reserves parallel the spring and fall bimodal growth patterns observed for Z. marina in the region. Total NSC reserves change from an estimated 52 to 73 g/m super(2) in June to 4 to 18 g/m super(2) in January, or a decrease of 75 to 92%. Experimental shading for 3 wk in the spring reduced ($p < 0.05$) than availability, whereas that of upland, subtidal water, and open water was less than availability. Tidal flat, stream, and shrub wetland were used in proportion to availability. Monitored ducks used refuge pools and impoundments during the day and saltmarsh habitats at night. Subtidal water was used during periods of icing. Juvenile females used range and core areas 2-3x larger ($P < 0.02$) than adults. Adults used 1 core area, whereas juveniles normally used > 1.

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Burton, B. 2002. Rockfish look to be heading toward the bay. *The Capital* (Annapolis, Maryland), 31 October, Sports, p. D-5.

Burton, B. 2002. Hunters should set own ethics. *The Maryland Gazette* (Annapolis, Maryland), 16 November, Sports, p. C-6.

Burton, B. 2002. Outdoors; Oh deer, striped bass action on bay turns into biggest draw. *The Capital* (Annapolis, Maryland), 21 November, Sports, p. D6.

Burton, B. 2003. Outdoors: Striper season starts strong. *The Maryland Gazette* (Annapolis, Maryland), 26 April, Sports, p. C-6.

Busenberg, E. and L. N. Plummer. 1992. Use of chlorofluorocarbons (CCl_3F and CCl_2F_2) as hydrologic tracers and age—dating tools: Example–The alluvium and terrace system of central Oklahoma. *Water Resources Research* 28(9):2257–2284.

Abstract: The use of chloroflurocarbons (CFCs) as an age-dating tool and tracer in shallow groundwaters has been investigated. New Methodology for field sampling and preserving groundwater containing parts per trillion concentrations of the CFCs, F-11 and F-12, is presented. Samples are analyzed by pourge-and-trap gas chromatography with an electron capture detector. Physical and chemical processes that can alter natural concentrations (air water equilibrium) of CFCs were investigated to assess dating uncertainties. CFC model recharge ages appear to be defined within 2 years under optimum conditions. The method was applied to central Oklahoma to demonstrate usefulness of CFCs as 1) an age-dating tool of shallow groundwaters, 2) a tracer of sewage effluent in surface and shallow groundwaters, and 3) a tracer of shallow groundwater. Results of dating indicate two primary recharge periods in central Oklahoma over the past 45 years that correspond to the wet periods 1945-1960 and 1967-1975.

Library: UD-Morris

Busenberg, E. and L. N. Plummer. 1997. Use of sulfur hexafluoride as a dating tool and as a tracer of igneous and volcanic fluids in ground water. Abstracts of Papers, Geological Society of America, Salt Lake City, 1997, Abstracts and Programs 29(6):A-78.

Busenberg, E., L. N. Plummer, R. C. Bartholomay and J. E. Wayland. 1999. Chlorofluorocarbons, sulfur hexafluoride, and dissolved permanent gases in ground water from selected sites in and near the Idaho National Engineering and Environmental Laboratory, Idaho, 1994–97. *U.S. Geological Survey Open-File Report* 98-274. 72 p.

Library: LOC, US Dept. of Interior, USGS

Busenberg, E., E. P. Weeks, L. N. Plummer and R. C. Bartholomay. 1993. Age dating ground water by use of chlorofluorocarbons (CCl_3F and CCl_2F_2), and distribution of chlorofluorocarbons in the unsaturated zone, Snake River Plain aquifer, Idaho National Engineering Laboratory, Idaho. *U.S. Geological Survey Water-Resources Investigations Report* 93-4054. 47 p.

Library: UMCP

Bush, L. F. 1981. Turbellaria: Acoela and Nemertodermatida. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 440.* 71 pp.

Abstract: This manual contains an introduction to the general biology, an illustrated key to the genera, and an annotated systematic list of the orders Acoela and Nemertodermatida. The key facilitates identification of 16 families and 75 genera of Acoela and includes 3 genera of the order Nemertodermatida. The systematic list includes 173 species which have been described from the North Atlantic, including some more southern species that might be encountered here, and gives the habitat and known distribution for each species.

Butcher, R. D. 1999. *Guide to National Parks. Northeast Region*. Globe Pequot Press (Guilford, Connecticut). 102 pp.

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Butler, M. J., A. P. Teaschner, W. B. Ballard and B. K. McGee. 2005. Wildlife ranching in North America—arguments, issues, and perspectives. *Wildlife Society Bulletin* 33(1):381-389.

Abstract: The term "wildlife ranching" has been used to describe many commercial activities associated with wildlife recreation and products. We discuss the advantages and drawbacks of 2 of those activities: fee-hunting and wildlife farming and husbandry. Perhaps the greatest advantage of fee-hunting programs is economic return to the private landowner, which, in turn, provides the landowner incentive and resources to conserve wildlife and wildlife habitat. The greatest drawback is privatization of the North American wildlife resource. Many individuals from the general public as well as professional wildlife biologists fear that commercial activities associated with wildlife recreation and products ultimately will allow a shift from public to private ownership of wildlife, resulting in diminished public interest in wildlife. The advantages of wildlife farming and husbandry include greater productivity of food animals, healthy alternative food sources, product diversification, and economic gains to private landowners. Because wildlife farming and husbandry activities typically focus on exotic big game, many drawbacks have been suggested. Drawbacks include disease introduction, competition and hybridization with native wildlife, range degradation, and pest problems. However, adequate research in many of those areas is lacking. Ultimately, wildlife is a product of the land, subsidized at the expense of the private landowner. Perhaps revenues from wildlife ranching can provide positive incentives to private landowners, resulting in increased wildlife and wildlife habitat conservation and preservation.

Library: FSU, SMC, SU, TU, UD-A, UMBC, UMCP, UMES

Bynum, K. H. 1978. Reproductive biology of *Caprella penantis* Leach, 1814 (Amphipoda: Caprellidae) in North Carolina, U.S.A. *Estuarine and Coastal Marine Science* 7(5):473-485.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Caggiano, J. 2003. Running with the ponies; Photographer captures the spirit of Chincoteague. *Richmond Times Dispatch* (Virginia), 5 January, Flair, p. F-1.

Cairns, S. D. 1981. Scleractinia. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 438.* 15 pp.

Abstract: This manual discusses the 14 species of scleractinian corals known from the northeastern United States coast from Virginia to Nova Scotia. Following a brief introduction to the general biology and morphology of Scleractinia, an illustrated dichotomous key and two tabular keys are given for these species. An annotated systematic list includes complete geographic and bathymetric ranges, references to pertinent literature, and, for some species, ecological and taxonomic notes. Zoogeographic affinities of the fauna are briefly discussed. A selected bibliography is provided.

Calder, D. R. 1971. Nematocysts of polyps of *Aurelia*, *Chrysaora*, and *Cyanea*, and their utility in identification. *Transactions of the American Microscopical Society* 90(3):269-274.

Abstract: Nematocysts in known scyphistomae of *Aurelia aurita*, *Chrysaora quinquecirrha*, and *Cyanea capillata* were examined to determine possible specific differences in cnidome or in morphology of a given nematocyst type. Two categories of nematocysts were common to the three species, atrichous isorhizas and microbasic heterotrichous euryteles. The isorhizas were of one type in *Chrysaora* ("a" atrichs), two types in both *Aurelia* ("a" atrichs and polyspiras) and *Cyanea* ("a" atrichs and "α" atrichs). The newly designated "α" atrichs, varying from ellipsoidal tom pyriform to reniform in outline, were smaller (5.3-8.8 X 2.0-3.0 µthan the oviform polyspiras of Aurelia (8.8-12.9 X 4.4-5.9 µ). The "a" atrichs and microbasic euryteles of the three species were similar in shape. Both tended to be largest in *Cyanea* and smallest in *Aurelia*, but an overlap in size was observed. A third nematocyst category, holotrichous haplonemes, were found in occasional specimens of *Chrysaora*, evidently appearing in advance of strobilization. The utility and limitations of the nematocysts in distinguishing scyphistomae of the three species are discussed.

Library: CBL, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Calman, W. T. 1912. The Crustacea of the order Cumacea in the collection of the United States National Museum. *Proceedings of the U.S. National Museum* 41:603-676.

Library: CBL, TU, UD-Morris, UMCP

Calvo, L. M. R., J. G. Walker and E. M. Burreson. 1998. Prevalence and distribution of QPX, Quahog Parasite Unknown, in hard clams *Mercenaria mercenaria* in Virginia. *Diseases of Aquatic Organisms* 33(3):209-219.

Abstract: In July 1996, the Virginia Institute of Marine Science initiated a sampling program to examine wild and cultured hard clams *Mercenaria mercenaria* for QPX, Quahog Parasite Unknown, a protestant parasite associated with severe mortalities of hard clams in localized areas in maritime Canada and Massachusetts, USA. The sampling program set out to seasonally monitor wild clams from one site, James River, Virginia, and cultured clams from 2 sites, Chincoteague Bay and Matt woman Creek, Virginia. Histological examination of initial samples revealed 8% prevalence of the parasite in 1-2 yr old cultured clams in Chincoteague Bay. This is the first documentation of QPX in Virginia. To ascertain the distribution of the parasite in Virginia, the survey was expanded between August 1996 and July 1997 to include 16 additional sites. A total of 1305 wild and cultured clam was sampled from Chesapeake Bay tributaries and coastal areas where harvest and culture occur. QPX was not found in Chesapeake Bay, but was present in cultured clams from 3 coastal embayments - the original Chincoteague Bay site, Burton Bay and Quincy Inlet. The parasite was found in Chincoteague Bay at each sample period at prevalence's ranging from 8 to 48%. Infections were generally light to moderate intensity and were most often observed in mantle and gill tissues. The maximum prevalence was observed in May 1997 and coincided with notable clam mortalities. QPX prevalences at the other sites were low, ranging from 4 to 15%. To date QPX has not had a significant impact on Virginia's hard clam fishery and aquaculture industry; however, the presence of the pathogen in 3 of the state's most productive hard clam grow out areas warrants continued monitoring and research.

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Capp, R. B. 1982. *Marine Birds of the Southeastern United States and Gulf of Mexico, Part 1. Gavuformes through Pelecaniformes.* U.S. Department of the Interior, U.S. Fish and Wildlife Service, Bureau of Land Management.

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Cargo, D. C. 1954. Blue crabs tagged in Chincoteague Bay. *Maryland Tidewater News* 11(3):1, 4.

Library: CBL, FSU, SMC, UMCP

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Library: CBL, FSU, SMC, UMCP

Cargo, D. C. 1959. The migration of adult female blue crabs, *Callinectes sapidus* Rathbun, in Chincoteague Bay and adjacent waters. *Journal of Marine Research* 16(3):180-191.

Abstract: "A total of 392 adult female blue crabs were tagged at four different points in the Chincoteague Bay area from 31 July to 7 September 1953. Over a period including June 1954, about 25% were recaptured, mostly south of the release points. Only three had moved northward, and only two we recaptured outside the area; one in Delaware Bay and one at Oyster, Virginia. Factors that may influence their movements and ecological considerations are discussed."

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMCP

Cargo, D. C. and L. E. Cronin. 1951. The Maryland crab industry, 1950. *Maryland Department of Research and Education Publication* No. 92:1-23.

Carpenter, D.H. and Hayes, D.C. 1996. Low-flow characteristics of streams in Maryland and Delaware: U.S. Geological Survey Water-Resources Investigations Report 94-4020, 113 p.

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Carpenter, S. J., W. W. Middlekauff and R. W. Chamberlain. 1946. The mosquitoes of the southern United States, east of Oklahoma and Texas. *American Midland Naturalist Monograph* 3:1-292. [Also found in *Entomological News* 57(5):139-140. 1946]

Abstract: A book concerning the larval and adult stages of mosquitoes occurring in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Virginia. With rare exceptions the work is also applicable to the species found in bordering areas, particularly the eastern sections of Texas, Oklahoma, and Kansas, and the southern portion of Illinois, Indiana, Ohio, West Virginia, and Maryland. Am introduction includes the bionomics and an account of the medical importance of mosquitoes, techniques for the capture and preparation of specimens, and a section on the characters used for identification of the species. Description and keys for the larvae and adults of the 69 species native to the southeastern states constitute the major portion of the work. With but one exception, there are detailed figures of both stages of all the species under consideration. The 11 genera treated are: *Anopheles* (8 species, and 2 varieties), *Megathins* (2 species), *Wyeomyia* (3 species), *Uranotaenia* (2 species), *Culiseta* (2 species), *Orthopodomyia* (2 species), *Mansonia* (3 species), *Psorophora* (11 species), *Aedes* (23 species), *Culex* (12 species), and *Deinocerites* (1 species). No new species are described. Distribution data include all stages both northern and southern. Synonymy is given in exceptional cases where misunderstanding might otherwise arise. A bibliography of 188 titles is provided.

Library: UMCP [QL536.C3]

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Library: FSU, MSU, SMC, UD-Morris, UMCP, UMES [all are QL666.C5 C34]; TU [QL666.C5 C28]

Carr, A. F., Jr. 1987. New perspectives on the pelagic stage of sea turtle development. *Conservation Biology* 1:103-121.

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Carr, A. F., Jr. and A. B. Meylan. 1980. Evidence of passive migration of green turtle hatchlings in Sargassum. *Copeia* 1980:366-368.

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Carriker, M. R. 1951. Ecological observations on the distribution of oyster larvae in New Jersey estuaries. *Ecological Monographs* 21:19-28.

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Carriker, M. R. 1953. Preliminary studies on the field culture, behavior, and trapping of the larvae of the hard clam *Venus* (= *Mercenaria*) *mercenaria* L. *Proceedings of the National Shellfisheries Association* 1952:70-73.

Abstract: In the summer of 1951 at Little Egg Harbor, Delaware Bay, New Jersey, a field study of the behavior of larval hard clams was conducted from a floating laboratory. Best results in growing larvae were obtained by feeding *Chlorella*-inoculated culture, heavily fertilized (10 g/L) with 6-3-6 organic fertilizer alkalinized with marble chips. Both filtrate and whole culture were nutritious. Larval cultures were aerated by a plunger jar apparatus. About one million clams (four broods) were raised to post-setting size. A running-water, microculture dish was developed to observe single larva. Different substrata were provided; larvae appeared to prefer setting on a sediment-covered solid substratum. The name *pedoveliger* is proposed for older larvae (116-218 µm) with the foot extended seeking contact with the substratum. The name *crawler* is proposed for larvae alternating between crawling and byssal attachment. Larvae showed a strong response to contact (thigmokinetic), and crawlers in the open reacted strongly to light. A bottle-top type of trap proved most successful. In August 483 larvae were obtained in 5 traps suspended on a vertical pole in water about 2.2 m deep at low water.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Carriker, M. R. 1955. Critical review of biology and control of oyster drills *Urosalpinx* and *Eupleura*. U.S. Department of the Interior, *U.S. Fish and Wildlife Service Special Scientific Reports Fisheries No.* 148:1-150.

Abstract: Earliest fossil shells of *Urosalpinx cinerea* were collected in North Carolina and in Maryland in Miocene deposits approximately 28 million years old. The species is common along the Atlantic coastal plain of the United States in Pleistocene deposits approximately 1 million years old in a range extending from Florida to Massachusetts. Man has accelerated unintentionally mixing and dispersal of *U. cinerea* so that today it is broadly distributed along the coast of North America from Canada to Florida, and along the western coast from Canada to California, and on the eastern coast of the British Isles. Its occurrence on the west coast of North America and in Great Britain represents introductions by man. Centers of maximum density appear to extend along the east coast of the United States from Chesapeake Bay to Narragansett Bay. Bathymetrically, it ranges from mid-intertidal zone to a depth of at least 120 ft (ca 40 m). Noticeable variation in onset of spawning of drills may reflect annual differences in spring water temperature, physiological races, and/or incomplete information. Average number of egg cases oviposited per season varied from a few to 96 per drill, the number being larger in older drills. The average number of eggs per case varies from 8 to 12. The actual numbers range from 0 tom 29, older drills ovipositing more than young sexually mature drills. U. cinerea lacks a free-swimming larval stage. Development occurs in the egg capsule. A pre-hatching mortality of 14 to 50% is reported. Duration of incubation is markedly influenced by temperature and may vary from 18 to 56 days. Newly hatched drills are fully shelled and capable of drilling small prey. Growth rate data are incomplete. In America it is assumed that drills reach a height of 8 to 19 mm during the first growing season. In England drills are thought to attain a height of 10 to 20 mm in the first year and to live to a maximum age of 13 to 14 years during which males may reach a height of 39 mm and females 43 mm. Maximum heights of drills in America vary from 27 to 40 mm, and a giant subspecies reaches heights of 61 mm. Sexual maturity is said to be attained at ages varying from one to 3 years and at heights of 13 to 24 mm. *U. cinerea* displays some discrimination in choice of food, but feeds upon a wide variety of animal prey, particularly young oysters, edible mussels, and barnacles. Anomia spp. are only infrequently attacked. The drilling site is not limited to any specific region on the prey. Although young oysters are attacked most

commonly, those over 8 cm in length are drilled by large *U. cinerea*. It appears that thickness of shell is more important than length in decreasing rate of predation. Observations that oyster drills secrete a toxic substance while drilling which kills its prey has not been confirmed. The number of prey destroyed by drills per given time increases as size of prey decreases, and larger drills destroy more prey than smaller drills. In a temperature range of at least 13^o to 24^{o}C the rate of destruction increases with temperature; excessive exposure to air and to low salinities curtails drilling; and the drilling rate increases during the mating season. The maximum average number of small oysters destroyed by small drills is recorded as 34 per week. Adult drills destroy oysters 4 to 6 cm long at a rate of about 0.14 to 0.35 per week. Soft muddy bottoms, and to a lesser degree sandy bottoms, devoid of hard objects, are probably unfavorable for growth, multiplication, and locomotion of drills. At summer temperatures, drill mortality rates increase rapidly as salinities fall, but this rate is markedly reduced as temperatures drop, so that at low winter temperatures drills can withstand unusually low salinities for protracted periods. Minimum survival salinities at summer temperatures appear to vary from 12 to 17 ppt in different regions. Activities of drills are noticeably influenced by temperature, and initiation and cessation of these activities varies in different geographic regions. Locomotory movements take place in different regions in a thermal range approximately 2^o to 10^{o}C; feeding and drilling, above 7^o to 15^{o}C, and ovoposition above 11^o to 20^{o}C. At current velocities above 1.25 cm/sec drills turn into a move against the current; at velocities below this no rheotaxis is displayed. A pronounced negative geotaxis is exhibited at temperatures approximately above 10^{o}C. In strong light drills move away from the source of the light; in dim light they move toward the source; and at weaker intensities the phototaxic response is lost. Chemical attraction plays an important role in food selection by drills.

A number of physiological and at least two morphological races of *Urosalpinx cinerea* occur. The oyster drill is preyed upon by its own kind, by *Polinices*, *Asterias*, and possibly other animals, but the degree of predation is probably slight. It is a host to at least three parasites. The bulk of the drill population probably migrates only to a limited degree, particularly over oyster bottoms; occasional exceptions may be explained on the basis of phoresis. The majority of drills on firm bottoms devoid of oysters tend to move at an average rate of 15 to 24 ft/day (3-8 m/d) in the direction of food. An unknown proportion of drills in populations near shores migrate intertidally to spawn. "Sudden appearance" of high concentrations of drills on oyster bottoms may be explained on the basis of incomplete removal of young drills and subsequent growth of these, rather than by mass migration. *Eupleura caudata*, a close relative of *U. cinerea*, generally constitutes only a small percentage of a drill population within the range of these two species, but may be increasing in certain areas. It is more active in ovipositing than *U. cinerea*, laying an average of about 22 eggs per case. A number of local ecological conditions occur in various regions which have proved, or may prove, useful in drill control; low salinity, areas of barriers of mud, removal of bottom trash, and exposure on intertidal bottoms. Although *U. cinerea* is considered a menace principally to oyster culture, presence of a limited few on bottoms supporting marketable oysters may be desirable in elimination of oyster set on these oysters. Drills have probably been predators of exposed bivalves since evolution in *Urosalpinx* of the present drilling mechanism. There is no evidence to indicate that drills exist in greater densities per unit area today, but because of its widespread distribution it exists in total greater numbers than in pre-colonial times.

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Library: CBL, UD-Morris, UD-GCMES, UMCP

Carriker, M. R. 1956. Biology and propagation of young hard clams, Mercenaria mercenaria. *Journal of the Elisha Mitchell Scientific Society* 72(1):57-60.

Abstract: An eight-year cooperative study was made on the biology, particularly of the early, more vulnerable stages, of the hard clam; development of methods of culturing young clams en

masse in field laboratories and in salt ponds; and development of means of protecting newly set clams in the field. Larval and early post-setting stages of the clam pass through a veliger, pedoveliger, byssal, and early juvenile stage. The siphons develop as follows: partial fusion of the mantle edges, projection of a thin siphonal sleeve followed by development of the definitive excurrent siphon and absorption of the sleeve, and finally formation of the incurrent siphon. As the siphons lengthen the clam burrows deeper into the bottom. In the course of seven summers only occasional cultures of clam larvae reared in the laboratory reached the byssal stage in large numbers. Much of the cause of this high mortality is attributed to a fungus; other causes of mortality are unknown. In order partially or completely to avoid the field laboratory culture of clam larvae and to investigate the possibility of growing clams and oysters in salt ponds, a preliminary three-year study of the hydrography and biology of Home Pond, Gardiners Island, New York, was carried out. Emphasis was placed on a study of relatively undisturbed conditions preparatory to future studies in which the inlet will be closed temporarily. Home Pond measures about 3,000 ft. in length, averages 300 ft. in width, has an average depth of 2.5 ft. at mean low water, possesses an inlet about 30 ft. wide, and about 50-70% of the water in the pond moves out into the bay during the average ebbing tide. Salinities remain in the vicinity of 22 – 30 ppt during the summer. Rapidly growing populations of oysters and hard clams occupy portions of the pond. Large sets of these bivalves occur only infrequently in the pond, since the rate of exchange of the water with that in the bay is so great that the larvae spawned in Home Pond are flushed into Gardiners Bay before setting time. Only under special and infrequent circumstances, when ready-to-set larvae enter the pond from the bay in large numbers, do extensive sets occur there and these cannot be reliably predicted. Young bivalves in the pond are subject to excessive predation by mud, green, and blue crabs; mechanical enclosures provide considerable but not the most economical protection. These studies direct attention to the need in future studies to close the inlet to the pond temporarily and to fertilize the pond waters if insufficient food for bivalve larvae should be available.

Library: UD-GCMES, UD-Morris, UMBC, UMCP

Carriker, M. R. 1957. Preliminary study of behavior of newly hatched oyster drills, *Urosalpinx cinerea* (Say). *Journal of the Elisha Mitchell Scientific Society* 73:323-351.

Abstract: Orientation reactions of newly hatched *U. cinerea* (Family Muricidae, Subclass Prosobranchia, Class Gastropoda) to water current, light, gravity, various surfaces, evaporation, and to external metabolites of newly set *Mercenaria mercenaria* under laboratory conditions are described. Predator-prey interactions of these two molluscs are also discussed. In water temperatures between 27 and 31°C at salinities in the vicinity of 35 ppt, newly hatched drills exhibited a pronounced positive rheotaxis, a strong positive phototaxis in moderate illumination and a negative one in intense outdoor light, a strong negative geotaxis, a rapid righting reaction, and a marked capacity to adhere to surfaces. Newly hatched drills tended to crawl upward off the bottom, some vertically out of the water to dehydrate and others horizontally under the meniscus. Locomotory progress under the meniscus was relatively slow, horizontal movement being effected principally by water currents. Presence of food, of water flow, and of oscillation in water level reduced the number of drills crawling out of water. Dehydration was greatly reduced on intertidal surfaces overgrown with sessile organisms. Newly hatched drills crawled actively onto floating debris which settled over them during slack water. In various populations as many as 49% crawled onto plant fragments and were swept downstream. Wide dispersal is thus assured. Newly hatched oyster drills exhibited a pronounced positive chemotaxic response to external metabolites of newly ser *M. mercenaria*. Prey were readily located. Once a clam was grasped in the foot it was not readily relinquished by the drill. Young drills are voracious feeders. A drill 1.5 mm in height perforated a *M. mercenaria* 0.6 mm in length in 45 minutes and rasped out the flesh in a further 45 minutes. Predation rates varied from 1 to 19 young *M. mercenaria* drilled and consumed per young drill per day. Since young drill can crawl through superficial layers of sediment, newly set bivalves were not protected from them by burrowing shallowly. In nature,

buffer-food species probably reduce this predation rate. These studies suggest that newly hatched *U. cinerea* crawl about much more actively and are dispersed much more widely than was once supposed.

Library: UD-GCMES, UD-Morris, UMBC, UMCP

Carriker, 1963. Suspended sediment as a factor in the ecology of the marine snail *Urosalpinx cincerea*. **IN:** *Research Problems in Biology: Investigations for Students*, Series 2, Anchor Books, Doubleday and Company (New York). pp . 51-60.

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Carriker, M. R. 1967. Ecology of estuarine benthic invertebrates. **IN:** *Estuaries*, G. H. Lauff, Editor. American Association for the Advancement of Science Publication No. 83:442-487.

Library: CBL, HPL, UD-Morris, UMCP [GC96.5.C65], SMC [GC96.C6 1975]

Carriker, M. R., M. F. Buell and E. T. Moul. 1950. *A Preliminary List of the Literature on the Ecology of the Estuaries with Emphasis on the Middle Atlantic Coast of the United States*. Rutgers University (East Brunswick, New Jersey). 52 pp.

Carson, L. 2002. Amid weak economy, Maryland reports big jumps in land values; Assessments are rising faster than they have in more than a decade. *The Sun* (Baltimore, Maryland), 28 December, Telegraph, p. 1-A.

Carson, R. L. 1945. Fish and shellfish of the middle Atlantic coast. U.S. Department of the Interior, *Fish and Wildlife Service Conservation. Bulletin*. 38:1-32.

Abstract: After preliminary discussion of fishing gear, fishing grounds, and the principles of conservation, brief accounts are given of 23 species of fish and shellfish of commercial importance. Distribution, abundance, feeding habits, etc. are discussed.

Carson, R. L. 1947. *Chincoteague – A National Wildlife Refuge. Conservation Action* No. 1, U.S. Department of the Interior, Fish and Wildlife Service. U.S. Government Printing Office (Washington, D. C.). 18 pp.

Carter, H. H., D. W. Pritchard and J. S. Carpenter. 1966. The design and location of a diffuser outfall for a municipal was discharge at Ocean City, Maryland. *Chesapeake Bay Institute, The Johns Hopkins University Special Report* 10 (66-2). 44 pp.

Library: Johns Hopkins Univ., Md DNR, VIMS

Casey, J. and S. Doctor. 1996. *Effects on Crab Catch by Number and Placement of Cull Rings in Crab Pots in Chesapeake Bay and the St. Martin's River, Maryland*. Maryland Department of Natural Resources, Tidewater Administration, Fisheries Service (Annapolis). 12 pp.

Library: MDCBP

Casey, J.F. 1976. A comparative study of physical, chemical and fishery data in two dead-end canals and adjacent, unaltered estuarine areas. Maryland Department of Natural Resources, Fisheries Administration. Annapolis, MD.

Abstract: During 1973, 1974 and 1975 the canal systems within the Ocean Pines development and the Montego Bay mobile home park were sampled three to four times per year. Finfish trawls, benthic grabs, dissolved oxygen, temperature and salinity were measured in the canals and in the natural areas adjacent to the canals. Surface and bottom DO varied very little within the natural areas (6.2-8.4 mg I^{-1}), but ranged from 4.5-7.8 mg I^{-1} to 0.1-4.0 mg^{-1} within the canal waters. Salinity and temperature also varied from the natural water to the canal systems. Only the canals showed stratification. The temperatures within the canals were generally warmer than those within the natural areas; on average there was a 4 °C difference. At times, the canals were cooler due to increased depth. It was during these times above average numbers of fish were caught within the canals. Overall, fish populate densities in the natural areas exceeded those in the adjacent man-made canals because the water within the canals was "not conducive to the support and growth of fish populations."

Casey, J. F. 1981. Fishery resources of the coastal bays of Maryland. **IN:** *Conference on the Coastal Bays of Maryland and Virginia, Chincoteague, Sinepuxent and Assawoman*. Committee to Preserve Assateague Island, Inc. (Towson, Maryland). pp. 73-89.

Abstract: A short report, mainly for public education, describing a few the problems associated with the coastal bays (sewage, trash disposal, slow flushing times) and some of the benefits of the bays (commercial and recreational fishing, tourism, fish and waterfowl habitat.

Library: UMCP [QH541.5.C65 C653 1981]

Casey, J. F. 1994. *A Study of Biodegradable Escape Panels in Crab Pots*. Maryland Department of Natural Resources, Tidewater Administration, Tidal Fisheries Division, Tidal Fisheries Technical Report Series No. 10. 6 pp.

Library: MDCBP

Casey, J. F. 1995. Analysis of crab harvest in Maryland's coastal bays. Maryland Department of Natural Resources. Maryland Department of Natural Resources Fisheries Technical Memorandum Series No. 4. (March 1994). [available online at http://www.vims.edu/ GreyLit/MDNR/ftm004.pdf]

Casey, J. F. 1999. Current status of important finfish stocks in Maryland's coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:11-17.

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Casey, J. F. and B. Daugherty. 1989. *Evaluation of Survey Information on Ghost (lost/abandoned) Crab Pots in Maryland and Methods Their Effects on the Resource*. Maryland Department of Natural Resources, Tidewater Administration, Tidal Fisheries Division (Annapolis).

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Casey, J. F., S. B. Doctor and A. E. Wesche. 1993. *Investigation of Maryland's Atlantic Ocean and Coastal Bay Finfish Stocks.* Federal Aid Project No. F-50-R-2. Tidewater Division, Maryland Department of Natural Resources (Annapolis).

Casey, J. F., S. B. Doctor and A. E. Wesche. 1994. *Investigation of Maryland's Atlantic Ocean and Coastal Bay Finfish Stocks.* Federal Aid Project No. F-50-R-3. Tidewater Division, Maryland Department of Natural Resources (Annapolis).

Casey, J. F., S. Doctor and A. Wesche. 2001. *A Study of Collapsible Crab Traps as Used by Recreational Crabbers in the Coastal Bays of Maryland*. Maryland Department of Natural Resources Fisheries Service (Annapolis). 9 pp.

Casey, J. F., S. B. Doctor and A. E. Wesche. 2001. A Pilot Survey of Maryland's Coastal Bays to Determine Locations of Over wintering Sites of Mature Female Blue Crabs. Maryland Department of Natural Resources Fisheries Service, Technical Memo No. 26 (Annapolis). 11 pp.

Library: MDCBP

Casey, J. F., S. B. Doctor and A. E. Wesche. 2001. *Blue Crabs in Maryland's Coastal Bays. 2001 Annual Report*. Maryland Department of Natural Resources Fisheries Service, Coastal Bays Fisheries Investigation Project, Technical Memo No. 25. 17 pp.

Library: MDCBP

Casey, J. F., R. C. Raynie and A. E. Wesche. 1991. *Investigations of Maryland's Atlantic Ocean and Coastal Bay Finfish Stocks*. Maryland Department of Natural Resources, Federal Aid Project No. F-50-R-1.

Casey, J. F., R. C. Raynie and A. E. Wesche. 1992. *Investigation of Maryland's Atlantic Ocean and Coastal Bay Finfish Stocks.* Federal Aid Project No. F-50-R-1. Tidewater Division, Maryland Department of Natural Resources (Annapolis).

Casey, J. F. and A. E. Wesche. 1982. *Marine Benthic Survey of Maryland's Coastal Bays*. Maryland Department of Natural Resources, Tidewater Administration, Annapolis, Maryland. 22 pp.

Casey, J. F. and A. E. Wesche. 1982. Benthos and Finfish: A study of the effects of tidal fluctuation over a coastal bay shoal. Maryland Department of Natural Resources. Annapolis, MD. 36 pages.

Abstract: A shoal in Sinepuxent Bay 1/800 m south of the Ocean City inlet was divided into seven lanes to be sampled. Samples were taken during spring tides in the spring, summer and fall. During each sample period/ two samples were taken (the first an hour after sunrise and the other 3.5 hours after sunrise). Benthic sampling was accomplished using a Ponar grab sampler to sample within each lane. Also, a trawl sample was run in the channel adjacent to the shoal after each shoal sampling. Fish samples were taken in the center of each lane using a 15 m bay ("fry") seine of 0.64 mm mesh and pulled for a distance of 30 m. "Polychaetes comprised 50% to 70% of the total benthic population of the shoal with the balance of organisms spread among nine additional classes." Numerous birds were noted in the shoal area. These most likely feed upon the benthic epifauna and infauna of the shoal. Finfish and shellfish results "yielded 31 species representing six classes." The most abundant finfish were forager/grazer species such as the striped killifish/ Fundulus majalis, and the Atlantic silverside, Menidia menidia. "Among shellfish, the blue crab/ Callinectes sapidus, was the most common, followed by the sand shrimp, Crangon septemspinosa." The index of similarity and the index of diversity were calculated to compare the results between each lane.

Casey, J. F., A. E. Wesche, S. B. Doctor and H. Speir. 2001. *A Study of Commercial Crab Pots in Maryland: The Effect of Setover Time on Catch and Application of the Findings to Pojection of Effects of a Day Off in the Fishery*. Maryland Department of Natural Resources Fisheries Service, Fisheries Technical Memo No. 23.10 pp.

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Casey, J. G. 1964. *Angler's Guide to Sharks of the Northeastern United States, Maine to Chesapeake Bay*. U.S. Department of Interior, U.S. Fish and Wildlife Service, Bureau of Sport Fisheries, Circular No. 179.

Casey, W. H. and A. C. Lasaga. 1987. Modeling solute transport and sulfate reduction in marsh sediments. *Geochimica et Cosmochimica Acta* 51(5):1109-1120.

Abstract: The nature of solute transport in salt-marsh sediments where the pore water profiles of chloride and sulphate change seasonally, was studied in shallow cores from Palus Crisium, Chincoteague Bay, Virginia. Profiles of bicarbonate and sulphide were measured on samples in situ. Sulphate concentration, alkalinity and pH of the sediment, and salinities of surface wasters were measured in the field. Salinity of pore fluid was determined and on selected profiles, major cation concentrations were analyzed by atomic absorption spectroscopy. The results show that seasonal oscillation in sulphate and chloride concentration profiles is due to exchange of solutes with water on the surface of the marsh and to the desiccation of the sediment in the summer. The loss of water from the pore spaces is commonly accompanied by entry of air into the soil, which oxidizes sulphide, the oxidation causing titratable alkalinity to decrease and CO_2 degassing. Diffusion modeling of salinity can account for the profiles observed, provided that the marsh remains inundated. The complexities introduced to the solute transport equations by sediment desiccation invalidate steady-state modeling of solute transport and diagenesis. The concentration profiles of dissolved products of sulphate reduction require months to re-establish a steady state after being disrupted.

Library: CBL, HPL, MSU, UD-Morris, UD-GCMES, UMCP

Castagna, M. and P. Chanley. 1973. Salinity tolerance of some marine bivalves from inshore and estuarine environments in Virginia waters on the western mid-Atlantic coast. *Malacologia* 12:47-96.

Abstract: Many species of estuarine bivalves have a distribution pattern closely correlated with salinity, indicating the importance of salinity in determining these patterns. The approximate salinity tolerance range for 36 species of bivalves is described. Tolerance limits for 29 species were determined in laboratory experiments. Most of these species display a remarkable degree of euryhalinity. All survived a minimum salinity of at least 17.5 ppt and 25 species survived at 12.5 ppt. Twenty species survived at various lower salinities.

Salinity tolerance for a given species is not constant but varies with season, salinity experience, and temperature. Burrowing, feeding and reproduction usually occur at nearly all salinities at which survival is possible. Byssal formation requires higher salinity than is necessary for other activities.

In Virginia, about two-thirds of the species of salt-water bivalves discussed can be found over the entire salinity range they are capable of tolerating in the laboratory. Eleven species do not occur over their entire potential salinity range. Eight of the 11 species, *Yoldia limulata*, *Mytilus edulis*, *Venericardia tridentata*, *Lucina multilineata*, *Dosinia discus*, *Abra aequalis*, *Mya areanaria*, *Martesia cuneiformis*, are near the geographic limit of their range; their distribution locally may be limited primarily by factors that determine their geographic range. The distribution of 5 species, *Argopecten irradians*, *Congeria leucophaeta*, *Macoma mitchelli*, *Donax variabilis* and *Spissula solidissima*, may be influenced by predation, competition, or special environmental requirements. Four of the 11 species, *Congeria leucophaeta*, *Macoma mitchelli*, *Donax variabilis*, *Rangia cuneata*, occur is specialized habitats with low species diversity.

Library: CBL, TU, UD-Morris, UD-GCMES, UMCP

Causey, B. 1999. Use of marine zoning in the Florida Keys National Marine Sanctuary to balance resource protection with utilization. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:80-83.

Library: FSU [EP 1.23/6:620/R-00/001]

CB-SRBP Working Document 16.20, FWPCA, Middle Atlantic Region. 1967. Immediate pollution control needs. The Eastern Shore of Delaware/ Maryland and Virginia. FWPCA, Washington, DC.

Abstract: This report focused on the development of the Eastern Shore and the potential impacts to the Chesapeake Bay and the Virginia Atlantic Ocean drainage. Included were construction needs for sewage treatment plants to assure high water quality standards.

Center for Environmental and Estuarine Studies, University of Maryland. 1974. Concepts and Programs. CEES, Cambridge, MD. p. 55.

Abstract: Commercial landings of twelve species fished in the coastal Maryland during 1971 were listed with information on pounds caught and retail value. Some species are relevant to catches in the coastal bays.

Cerco, C. F. and C. S. Fang. 1978. Nonpoint source pollution in the Chincoteague Basin area. *Virginia Journal of Science* 29(2):81.

Library: CBL, UD-Morris, UMBC, UMCP

Cerco, C. F., C. S. Fang and A. Rosenbaum. 1978. Intensive hydrographical and water quality survey of the Chincoteague/Sinepuxent/Assawoman Bay systems. Volume III. Non-point source pollution studies in the Chincoteague Bay system. Special Scientific Report No. 86, Virginia Institute of Marine Science (Gloucester Point).

Abstract: The Army Corps of Engineers STORM model for predicting pollutant runoff was used to estimate current and projected (year 2000) runoff from the Chincoteague Bay watershed. Since the STORM model is best suited to predict long-term runoff from large watersheds, it was hard to specify initial conditions. Field data were used to replace estimated initial condition values. Sampling methodology included using small watersheds (10-100 acres) sampled during rain events. Samples were collected every 15 minutes for a period of 5 hours following a storm and analyzed for DON, NH4, NO3, NO2, TP, TOP, BODs, TOC, fecal coliform, and total coliform. These values were then extrapolated to larger watersheds. Because of the flatness of the watershed, it was divided into 12 sub-basins and the coefficient method of runoff prediction applied. Marshes, creeks, and bays serve as temporary storage of runoff with unknown effects on the model output. Current point source and non-point source comparisons show that point source loadings contain increased DON, NH4, P and BOD5, while non-point source loadings have increased loadings of NO3 and coliforms. Comparisons of current and projected non-point source loads show a projected increase in non-point source loading and a decrease in point source loading as restrictions become greater, stormwater volume will increase 29% by the year 2000, resulting in a 25-49% increase in pollutants, with the greatest increase in ammonia. Storm runoff calculations from wetlands indicate that a one half inch rainfall can contribute as much nutrients from wetlands as a monthly average from upland runoff. Also included in this volume are calculations for the watershed area and land uses surrounding Chincoteague Bay with monthly current and projected pollutant loadings from point and non-point sources.

Chaillou, J. C. and S. B. Weisberg. 1995. *Assessment of the Ecological Condition of the Delaware and Maryland Coastal Bays*. Versar, Inc. (Annapolis, Maryland).

Chaillou, J. C., S. B. Weisberg, F. W. Kutz, T. E. DeMoss, L. Mangiaracina, R. Magnien, R. Eskin, J. Maxted, K. S. Price and J. K. Summers. 1996. *Assessment of the Ecological Condition of the Delaware and Maryland coastal bays.* U.S. Environmental Protection Agency, Washington, DC (USA). Environmental Monitoring and Assessment Program, EPA/620/R-96/004. 119 pp.

Abstract: The coastal bays of Delaware and Maryland are an important ecological and economic resource whose physical characteristics and location make them particularly vulnerable to the effects of pollutants. This project was undertaken as a collaborative effort between state and federal agencies to assess the ecological condition of this system and fill a data void identified in previous characterization studies. Two hundred sites were sampled in the summer of 1993 using a probability-based sampling design that was stratified to allow assessments of the coastal bays as a whole, each of four major subsystems within coastal bays (Rehoboth Bay, Indian River Bay, Assawoman Bay, and Chincoteague Bay) and four target areas of special interest to resource managers (upper Indian River, St. Martin River, Trappe Creek, and dead-end canals). Measures of biological response, sediment contaminants, and eutrophication were collected at each site using the same sampling methodologies and quality assurance/quality control procedures used by EPA's Environmental Monitoring and Assessment Program (EMAP). As an additional part of the study,

trends in fish communities structure were assessed by collecting monthly beach seine and trawl measurements during the summer at about 70 sites where historic measurements of fish communities have been made. Major portions of the coastal bays were found to have degraded environmental conditions. Twenty-eight percent of the area in the coastal bays had degraded benthic communities, as measured by EMAP's benthic index. More than 75% of the area in the coastal bays failed the Chesapeake Bay Program's Submerged Aquatic Vegetation (SAV) restoration goals, which are a combination of measures that integrate nutrient, chlorophyll, and water clarity parameters. Most areas failed numerous SAV goal attributes. Sixty-eight percent of the area in the coastal bays had at least one sediment contaminant with concentrations exceeding published guidelines for protection of benthic organisms. Further study is needed to assess whether the biological effects observed were the direct result of contamination. Within the coastal bays, Chincoteague Bay was in the best condition of the four major subsystems, while Indian River was the worst. Only 11% of the area in Chincoteague Bay had degraded benthos compared to 77% in Indian River. Less than 10% of the area in Indian River met the Chesapeake Bay SAV Restoration Goals. In comparison, almost 45% of the area in Chincoteague Bay met the Chesapeake Bay Program's SAV restoration goals, a figure which increased to almost 85% when only the most controllable components of the goals (nutrient and chlorophyll) were considered.

Library: CSU [QH541.5.C65 E46 1996], SMC [QH541.15.E22 A87 1996], SU [QH541.5.C65 A77 1996], FSU, MSU, UMCP, UMES [all are EP 1.23/5:620/R-96/004], UD-Morris [EP 1.23/5:620/R-96/004]

Chamberlain, E. G. 1951. *A Survey of the Marshes of Delaware*. Delaware Board of Game and Fisheries, Federal Aid Division Final Report. Pittman-Robertson Project 7-R. 62 pp.

Chamberlain, N. A. 1957. Larval development of *Neopanope texana sayi*. *Biological Bulletin* 113(2):338.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Chamberlain, N. A. 1961. Studies on the larval development of *Neopanope texana sayi* (Smith) and other crabs of the family Xanthidae (Brachyura). *Chesapeake Bay Institute, The Johns Hopkins University, Technical Report* 22. 35 pp.

Abstract: Neopanope texana sayi, Hexapanopeus angustifrons, and Piluminus sayi have been reared in isolation from eggs through the first crab stage with about 80% survival. These species hatched in the laboratory as first zoeae and underwent three more zoeal stages and one megalopal stage before metamorphosis to the first crab stage. The duration of the larval stages was twice as long when the zoeae were fed Artemia nauplii plus algae, as when fed Artemia alone. Larvae did not survive when fed algae alone but lived longer than those not fed at all. The mechanism of this inhibition of development by algae is unknown. A morphological description of the larvae of Neopanope texana sayi is given. While no variation in the number of larval stages was found, variations in the zoeae at each stage are described. Some of these variable characters are those frequently used in comparative work on zoeae.

Chamberlain, N. A. 1962. Ecological studies of the larval development of *Rhithropanopeus harrisi* (Xanthidae, Brachyura). *Chesapeake Bay Institute, The Johns Hopkins University, Technical Report* 28: i-ii, 1-47.

Chambers, J. R. 1990. National trends in habitat degradation, fishery declines and NMFS' [National Marine Fishery Services'] national habitat conservation program. **IN:** *Focus on Maryland's Forgotten Bays: Report on the Conference on the Outer Coastal Bay*s. Committee to Preserve Assateague Island, Inc. (Towson, Maryland). pp. 25-31.

Library: UD-GCMES

Chanley, P. E. 1965. Larval development of a boring clam, *Barnea truncata*. *Chesapeake Science* 6(3):162-166.

Abstract: *Barnea truncata* larvae are nearly round in appearance with a dark band around the margin of the shell. The shell is faintly pink near the umbo and at the ventral margin of large larvae. Two interlocking hinge teeth are present in each valve of the larvae 70 μ in length or larger. One tooth is about 25 μ long while the other three are 5-10 μ. Straight hinge larvae measure 55-95 μ in length with a straight hinge line about 45 μ long. Height is 0-10 μ less than length, and thickness 20-25 μ less. The umbo is a rounded knob giving larvae a circular appearance and is present in larvae from 85-315 μ in length. In umbo larvae, height is 0-20 μ less than length, and thickness 25 to 80 μ less. Gills are formed before the loss of the velum, and metamorphosis occurs when larvae reach a length of 250-315 μ.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

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Chesapeake Bay Critical Area Commission. 1987. *A Guide to the Conservation of Colonial Waterbird Nesting Sites and Waterfowl Staging Areas in the Critical Area.* Guidance Paper No. 4. (Annapolis, Maryland). 16 pp.

Chesapeake Biological Laboratory. 1944. *Recommendations to the Board of Natural Resources on Crab Populations in Isle of Wight, Sinepuxent, and Chincoteague Bays*. Chesapeake Biological Laboratory (Solomons, Maryland). 6 pp.

Chesapeake Biological Laboratory. 1947. *Report of Crabbing Regulations in Chincoteague Bay.* Chesapeake Biological Laboratory (Solomons, Maryland). 6 pp.

Chesapeake Technical Support Laboratory, Middle Atlantic Region, FWPCA, Department of the Interior. 1967. Data Report: Water quality survey of the eastern shore Chesapeake Bay, Wicomico River, Pocomoke River, Nanticoke River, Marshall Creek, Bunting Branch and Chincoteague Bay.

Abstract: This report listed water quality (dissolved oxygen, BOD, suspended solids, and fecal coliform) data from July and August, 1967 for Marshall Creek, Bunting Branch and Chincoteague Bay. Marshall Creek (a tributary to Chincoteague Bay) and Bunting Branch (a tributary to St. Martin River) data

Chidester, F. E. 1916. The influence of salinity on the development of certain species of mosquito larvae and its bearing on the problem of distribution of the species. *New Jersey Agricultural Experiment Station Bulletin* 299:1-16.

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Library: California State Univ.

Christian, J. J., V. Flyger and D. E. Davis. 1960. Factors in the mortality of a herd of sika deer, *Cervus nippon. Chesapeake Science* 1(2):79-95.

Abstract: A six year population study on sika deer, *Cervus nippon*, introduced in 1916 on James Island, Chesapeake Bay, Maryland, provided unique results because of the unusual completeness of the data due to an islandic situation. A density of one deer per acre was reached in 1955. In 1958, 60 percent of the population, mainly young and females, died during January and February. Gross and microscopic studies were made on 18 deer, shot and autopsied in 1955, 1957-60, plus one recently dead at the time of the die-off. Adrenal weight increased, especially in the young, from 1955 to 1958 and then dropped 50 percent following the die-off. Inhibition of growth observed before and during the die-off vanished afterwards. Changes in the adrenal zone glomerulosa and medulla suggested overstimulation and a severe imbalance of fluid-electrolyte metabolism as the cause of the die-off. These changes may have been secondary to prolonged hyper-stimulation of the cortex as a result of excessive population density and its resultant social pressures. An inclusion hepatitis and glomerulonephritis are described which affected all deer, especially after 1958, but not in 1955. These diseases were ruled out as causal factors in the die-off, as were malnutrition and poisoning. The deer were apparently in good nutritive status throughout. It was concluded that the physiological derangements resulting from high population density produced the observed effects.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Christoffers, E. 1990. The Fisheries of Maryland's Coastal Bays. **IN:** *Focus on Maryland's Forgotten Bays*. The Belton Fund, U.S. EPA, Region III, Institute for Cooperation in Environmental Management.

Library: UD-GCMES

Christoffers, E. W. 1987. *Ecology of the Ghost Crab Ocypode quadrata (Fabricius) on Assateague Island, Maryland and the Impacts of Various Human Uses of the Beach on their Distribution and Abundance*. Ph.D. Dissertation, Michigan State University (East Lansing). *Dissertation Abstracts International Part B: Science and Engineering* 47(12). 224 pp

Abstract: The purpose of this study was to investigate ghost crab, Ocypode quadrata, ecology on Assateague Island, Maryland, and to assess impacts of human uses of seashore beaches on ghost crab distribution and abundance.

Chrzastowski, M. J. 1986. *Stratigraphy and geologic history of a Holocene lagoon: Rehoboth Bay and Indian River Bay, Delaware*. Ph.D. Dissertation, University of Delaware (Newark). 337 pp.

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Library: UD-GCMES, UMCP

Churchill, J. B., P. B. Wood and D. F. Brinker. 2000. Diurnal roost site characteristics of Northern Saw-whet owls wintering at Assateague Island, Maryland. *Wilson Bulletin* 112(3):332-336.

Abstract: Thirty diurnal roost sites of five radio-tagged Northern Saw-whet owls (*Aegolius acadicus*) were characterized for the winters of 1996-1997 on Assateague Island, Maryland and found that the owls preferred thick cover at roost sites. Roosts occurred most often in loblolly pine forest (*Pinus taeda*) and shrub swamps dominated by wax myrtle (*Myrica cerifera*). Vegetation was measured at paired roosts and random sites in similar habitats. Distance to nearest tree and average canopy height were significantly lower at roost sites than random sites. Numbers of stems larger than 2.5 cm diameter at breast height (dbh), stems smaller than 2.5 cm dbh), and roost trees dbh were larger at roost sites. Roost height, canopy cover, canopy height, shrub height, and ground cover differed significantly between pine and shrub swamp roosts, although cover above and below the roost site were similar. Higher densities of stems and shorter distances to the nearest tree at roost sites compared to random sites indicated that owls chose sites with dense cover, probably as protection from predators or weather.

Library: FSU, SMC, TU, UD-Morris, UMCP

Churchill, J. B., P. B. Wood and D. F. Brinker. 2002. Winter home range and habitat use of female Northern Saw-whet owls on Assateague Island, Maryland. *Wilson Bulletin* 114(3):309-313.

Abstract: The home range size was quantified as was habitat selection for seven female Northern Saw-whet owls (*Aegolius acadicus*) on Assateague Island, Maryland, during the winter of 1996 and 1997. Home range size (95% fixed kernel) was 103.5 ha (± 50.3 SE). Home range size increased with time spent radio tracking as biweekly home ranges were smaller than those calculated for longer time periods. Home ranges often overlapped in time and space and in one instance the home range for one owl was completely within that of another owl. Northern Saw-whet owls used primarily pine woods and shrub swamp habitats, with pine woods used more often than any other habitat type and significantly more than expected based on habitat availability.

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Library: UMCP [QE121.C62]

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Abstract: Radiometric analysis and zoogeographical correlations confirm the age of specimens of *Littorina littorea* from two Micmac Indian sites excavated near Halifax, Nova Scotia, to be 700 ± 225 years B.P. indicating they are pre-Columbian in origin. (Specimens of this species may be collected intertidally from hard structures along the Atlantic coast of Delmarva).

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

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Library: CBL, UD-Morris, UD-GCMES

Clerman, R. J. 1978. *Shrub Growth Patterns on Assateague Island: Effects of Dune Stabilization*. Master of Science Thesis, University of Virginia (Charlottesville).

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Clovis, J. F. 1968. The vegetation of Smith Island, Virginia. *Castanea* 33:115-121.

Library: FSU, TU, UD-Morris, UMBC, UMCP

Coe, W. R. 1912. Echinoderms of Connecticut. *Connecticut Geological and Natural History Survey Bulletin* 19:1-152.

Abstract: Descriptions and notes are presented for starfish and other Echinodermata of the Connecticut coast including *Ophiopholis aculeata, Ophiura brevispina, Arbacia punctulata, Echinarachnius parma, Mellita pentapora, Cucumaria pulcherrima, Thyone briareus, Thyone unisemita, Thyone scabra, Synapta inhaeren*, and *Synapta roseola*.

Library: UD-Morris

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Cole, M. A. and R. P. Morgan. 1978. Genetic variation in two populations of blue crab, *Callinectes sapidus*. *Estuaries* 1(3):202-205.

Abstract: Genetic variability of the blue crab, *Callinectes sapidus*, was estimated for populations in Chesapeake and Chincoteague Bays. Genetic similarity between these populations was attributed to larval intermixing in the mid-Atlantic Bight.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Commito, J. A., C. A. Currier, L. R. Kane, K. A. Reinsel and I. M. Ulm. 1995. Dispersal dynamics of the bivalve *Gemma gemma* in a patchy environment. *Ecological Monographs* 65(1):1-20.

Abstract: The purpose of this study was to analyze the dispersal dynamics of the ovoviviparous bivalve *Gemma gemma* (hereafter referred to as *Gemma*) in an environment disturbed by the pit-digging activities of horseshoe crabs, *Limulus polyphemus*. *Gemma* broods its young and has no planktonic larval stage, so all dispersal is the result of juvenile and adult movement. Animal movement was measured using natural crab pits, hand-dug simulated crab pits, and cylindrical bottom traps in the interidal zone at Tom's Cove, Virginia.

This study demonstrated that horseshoe crabs create localized patches with reduced densities of *Gemma*, that all sizes and ages of *Gemma* quickly disperse into these low density patches, and that the mechanism of dispersal is passive bedload and suspended load transport. Freshly excavated natural pits had significantly lower *Gemma* densities than did undisturbed background sediment, but there were no significant differences in total density of other species, number of species, and species diversity (H'). Equitability (J') was greater in pits than in controls because of the reduced abundance of *Gemma*, the numerically dominant species. Newly dug

simulated crab pits also had significantly lower *Gemma* densities than controls and returned to control levels by the next day. Density recovery trajectories for individually marked pits showed consistent responses in summer and fall, but not in winter when low Gemma abundance resulted in greater variability among pits.

Significant positive correlations between the volume of sediment and the number of *Gemma* collected per bottom trap support the hypothesis that *Gemma* dispersal is a passive transport phenomenon. Assuming no active density-dependent movement, the product of the *Gemma* density frequency distribution in undisturbed background sediment and the frequency distribution of sediment volume collected per trap created a predicted *Gemma* frequency distribution in traps that matched the actual distribution. Absolute dispersal rates and relative dispersal rates (absolute dispersal rate divided by background density in undisturbed sediment) into pits and traps were greater in summer than winter. Dispersal rate results suggest that increased horseshoe crab disturbance in summer may cause an increase in *Gemma* transport. Because *Gemma* individuals are dispersed by hydrodynamic action, it was expected that small, young individuals would be most easily transported in the bedload. There was, however, little evidence that movement into pits and traps was size- or age-selective.

Most recent benthic research has focused on the large-scale movement and settlement patterns of invertebrate larvae. The results from this study illustrate that dispersal of bottom-dwelling juveniles and adults plays an important role in regulating the local distribution and abundance of *Gemma*. Previous workers have shown that young Gemma live in dense aggregations and that growth and fecundity are reduced at such high densities, leading to population crashes. This study demonstrated a mechanism by which Gemma disperses into low-density patches where intraspecific competition may be mitigated, possibly resulting in enhanced individual reproductive success and population fitness.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Committee on Coastal Erosion Zone Management. 1990. *Managing Coastal Erosion*. National Academy Press (Washington, D.C.). 182 pp.

Abstract: This report was commissioned by the Federal Emergency Management Agency's Federal Insurance Administration to provide options for implementation of a coastal erosion zone management program; it also explores some of the major questions about developing a national policy on coastal erosion.

Library: SMC, UD-Morris, UD-GCMES, UMBC, UMCP [all are TC223 .N35 1990]

Committee on Engineering Implications of Changes in Relative Mean Sea Level. 1987. *Responding to Changes in Sea Level-Engineering Implications*. National Academy Press (Washington, D.C.). 148 pp.

Abstract: The first half of this book examines the history and estimated future (over the next century) of sea level, including the effects of sea-level rise on the coastal zone; the second half gives general and specific engineering responses to sea-level rise. The committee concludes that, in most areas, acceleration in the rate of mean sea-level rise is likely enough that it will affect planning and design of coastal facilities. It recommends increases in the funding of research on coastal processes, to provide adequate scientific knowledge to support decisions about protecting or abandoning coastal facilities as sea level rises.

Library: SU, UD-Morris, UMBC, UMCP [all are TC223.N37 1987]

Committee to Preserve Assateague Island, Inc. 1981. *Conference on the Coastal Bays of Maryland and Virginia*. 616 Piccadilly Road, Towson, Md. 21204. 110 pages.

Abstract: This study was composed of reports on the physical and biological characteristics/of the bays; including geology/ marshes/ submerged aquatic vegetation/ non-point source pollution/ and tidal flushing. The geological formation of the Coastal Bays and associated barrier islands were discussed and the sediment type and distribution (with maps) presented. There was a general trend of sandy sediments to the east and mud-silty sediments to the west. The marshes were described as tidal/ but the soils were variable and need to be described. Two dominant species of submersed aquatic vegetation existed in the Coastal Bays—*Zostera marina* (eelgrass) and *Ruppia maritima* (widgeon grass). Non-point source pollution was described as the main source of nitrogen to the Bays, but point source (sewage treatment plants) were the major source of phosphorus. Tidal flushing was discussed based on Pritchard's study (1960). General information dealing with birds and commercial seafood resources and some of the problems that they are facing were reported. Issues concerning both Maryland and Virginia were mentioned.

Library: UMCP [QH541.5.C65 C653 1981]

Committee to Preserve Assateague Island, Inc. 1990. Focus on Maryland's Forgotten Bays, The Citizen's Agenda. 616 Piccadilly Road, Towson, MD. 21204. 157 pages.

Abstract: This conference proceeding included scientific and non-scientific reports on environmental issues concerning the Coastal Bays. A few of the issues addressed include fisheries of the Coastal Bays/ sea level rise/ beach replenishment/ land use/ threats to Assateague Island National Seashore and discussions for citizens resolutions for problems. No scientific data were included/ except for graphs on commercial fish landings.

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Abstract: Evidence, based upon a study of 163 ring-necked snakes, is presented to show that the population of these reptiles in the northern portion of the Atlantic Coastal Plain is intermediate between the two subspecies *Diadelphis punctatus punctatus* and *Diadelphis punctatus edwardsii*.

Library: UMCP

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Conant, R., J. C. Mitchell and C. A. 1990. Herpetofauna of the Virginia barrier islands. *Virginia Journal of Science* 41(4A):364-380.

Abstract: Twenty-nine species of amphibians and reptiles have been recorded from the Virginia barrier islands, compared with 46 species from mainland Eastern Shore. Assateague, Chincoteague, Parramore, Hog, and Smith Islands have the highest species diversity, apparently because of a greater variety of vegetative habitats and presence of freshwater. Knowledge of the herpetology of these islands is still in the exploration stage; several islands have yet to be surveyed. A brief history of herpetological exploration and observations on the known biology of each species are presented. Particular attention is paid to the species' insular ecology. Forty-two percent of the mainland amphibian fauna is represented on the islands, compared to 78% of the reptilian fauna. Examination of models of island formation suggests that it may not be necessary to invoke dispersal over saltwater to explain the origin of the island herpetofaunas.

Species reported for Assateague Island were: *Bufo woodhousii, Hyla cinerea, Pseudacris triseriata, Rana catesbiana, R. clamitans, R. ultricularia, Caretta caretta, Chelonia mydas, C. serpentina, Chrysemys picta, Clemmys guttata, Dermochelys coriacea, Kinosternon subrubrum, Malaclemys terrapin, Pseudemys rubriventris, Terrapene carolina, Sceloporus undulatus, Coluber contrictor, Elaphe obsoleta, Heterodon platiurhinos, Nerodia sipedon*, and *Opheodrys aestivus*.

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Conkwright, R. D. and R. A. Gast. 1994. *Potential Offshore Sand Resources in Central Maryland Shoal Fields*. Maryland Geological Survey File Report No. 94-9 (Baltimore, Maryland). 49 pp.

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Cook, D. G. and Ralph of Brinkhurts. Annelida: Oligochaeta. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 374.* 23 pp.

Abstract: The manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the marine Oligochaeta of the East Coast of North America. The Families Naididae, Tubificidae, Enchytraeidae, and Megascolecidae are treated.

Cook, F. W. 1946. Occurrence of the Hudsonian Curlew on national wildlife refuges along the Atlantic coast. *The Auk* 63(1):90-92.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Cook, P. G., D. K. Solomon, L. N. Plummer, E. Busenberg and S. L. Schiff. 1995. Chlorofluorocarbons as tracers of groundwater transport processes in a shallow, silty sand aquifer. *Water Resources Research* 31:425–434.

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Cooksey, S., J. Lynch, C. R. Jenkins, Sr., M. Jackson, S. Price, E. Schwaab and S. Schwartz. 1999. Developing action items for the tri-state region. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:114-121.

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Cottrell, M. T., A. Mannino and D. L. Kirchman. 2006. Aerobic anoxygenic phototrophic bacteria in the Mid-Atlantic Bight and the North Pacific Gyre. *Applied and Environmental Microbiology* 72(1):557-564.

Abstract: The abundance of aerobic anoxygenic phototrophic (AAP) bacteria, cyanobacteria, and heterotrophs was examined in the Mid-Atlantic Bight and the central North Pacific Gyre using infrared fluorescence microscopy coupled with image analysis and flow cytometry. AAP bacteria comprised 5% to 16% of total prokaryotes in the Atlantic Ocean but only 5% or less in the Pacific Ocean. In the Atlantic, AAP bacterial abundance was as much as 2-fold higher than that of *Prochlorococcus* spp. and 10-fold higher than that of *Synechococcus* spp. In contrast, *Prochlorococcus* spp. outnumbered AAP bacteria 5- to 50-fold in the Pacific. In both oceans, subsurface abundance maxima occur.

Library: BSU, CBL, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Couch, J. A. 1966. Two peritrichous ciliates from the gills of the blue crab. *Chesapeake Science*. 7(3): 171-176.

Abstract: Forty-nine blue crabs were examined from the Chesapeake and Chincoteague Bays. Of these, 32 crabs were found to have one or both of the two pertrichous ciliates of the genera *Lagenophryus* and Epistylis on their gill lamellae. "The occurrence of these ciliates in great numbers on gills of moribund blue crabs raises a question as to whether or not they may contribute to mortality of crabs in shedding or holding tanks."

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Coull, B. C. 1977. Copepoda: Harpacticoida. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 399.* 48 pp.

Abstract: This manual contains an introduction to the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index of 72 general and 121 species of marine harpacticoid copepods reported from New Jersey to Maine. The key facilitates identification to genus whereas the annotated systematic list discusses each known species.

Coull, B. C. 1978. Subphylum Mandibulata, class Crustacea, Subclass Copepoda. **IN:** *An Annotated Checklist of the Biota of the Coastal Zone of South Carolina*, Richard G. Zingmark, Ed. University of South Carolina Press (Columbia). pp. 154-157.

Counts, C. L., III and T. L. Bashore. 1990. An Interpretive Guide to the Mollusca of Assateague Island National Seashore (Including Chincoteague National Wildlife Refuge). Coastal Ecology Research Laboratory, University of Maryland Eastern Shore (Princess Anne).

Counts, C. L., III and T. L. Bashore. 1991. Mollusca of Assateague Island, Maryland and Virginia: A reexamination after seventy-five years. *The Veliger* 34(2):214-221.

Abstract: A comparison was undertaken of molluscan collections in waters surrounding Assateague Island by J. Henderson and P. Bartsch in 1913 and collections by the present authors during 1988-1989. In 1914, Henderson and Bartsch reported 38 species of bivalves and 44 species of gastropods as compared with 33 species of bivalves and 40 species of gastropods in the present study. Of 82 species reported by Henderson and Bartsch, 50 are now present in Assateague waters plus an additional 25 species, including one species of Polyplacophora, and the cephalopod Loligo pealeii , that were not reported in their study. Of 11 gastropod taxa erected by Henderson and Bartsch for specimens collected in Chincoteague Bay, two species have been synonymized and the remaining nine species were not found in the present study. Stabilization of an inlet with a stone jetty after the hurricane of 1933 produced a salinity change in the bays of Assateague Island that may be responsible for some changes observed in the molluscan fauna.

Library: CBL, HPL, TU, UD-GCMES, UMBC, UMCP

Counts, C. L., III and R. S. Prezant. 2002. Assateague Island National Seashore Benthic Invertebrate Diversity Study Final Taxonomic Report. Completed under Cooperative Agreement No. 4000-4-3007 between Indiana University of Pennsylvania and the U.S. National Park Service. Indiana University of Pennsylvania (Indiana). i-xii + 1-266.

Abstract: A survey of the nearshore benthic invertebrates of Assateague Island National Seashore was undertaken in the Summer of 1994 and ending in the Spring of 1996. Sixteen sampling sites (four on the Atlantic Ocean, and 12 on Sinepuxent – Chincoteague bays) were located on transects situated 2 km apart and spanning the width of the island. Sampling at sites on the ocean side were defined by their distance from shore while those of the bayside transects were defined by water depth. Sampling occurred in the Summer, Fall, and Spring seasons. 444 samples were collected during each of the sampling periods for a total of 2,644 for the entire project. In addition to biotic samples, sediments were collected for analysis and measurements of water temperature, H, dissolved oxygen, and salinity were made whenever possible. Two-hundred ninety-eight (298) species were identified by the study as living in the nearshore waters surrounding Assateague Island National Seashore. These results compare with the 18 species of decapod crustaceans reported by Lebber and Lipson (1970), the 64 species of invertebrates listed by Drobeck et al. (1970), the 119 species of Casey and Wesche (1981) and the 66 species of Chaillou and Weisberg (1995). Taxa are reported for 13 phyla in a total of 113 families. Three species may be new to science and merit closer investigation. A Sorenson Index of community similarity (S) was calculated between the present study and previous investigations. An index coefficient of 0.480 was calculated in the comparison between the present study and all other studies and represents the higher number of taxa identified in the nearshore study of 1994 – 1996. When a more robust examination was made at the family level, a Sorenson coefficient of 0.672 was found when comparisons between all previous studies and the present investigation were made. Sixty-nine (69) species of nearshore benthic invertebrates were found to occur year-round at Assateague Island National Seashore. A total of 201 species were found to occur during the Summer, 164 in the Fall, and 145 in the Spring. Calculation of the Sorenson Index of community similarity (S) indicated little similarity between the invertebrate fauna found at any season of the year. Bay sampling sites were found to have the highest diversity with most having over 50 species per station (range – 54 – 100). Ocean stations were less diverse with a range of 11 to 26 species per station. Similarity of benthic invertebrate communities between stations resulted in a mean Sorenson coefficient of 0.478 for bay stations (range 0.353 to 0.609) and 0.488 for ocean sites (range = 0.368 to 0.516). The results of the autistic study indicate a highly diverse benthic invertebrate community is present at Assateague Island National Seashore; much more diverse than previously reported. The results also indicate that a sustained sampling effort must be made over several seasons to acquire the most complete picture of the biodiversity of a given site or region.

Counts, C. L., III, C. K. Weiss man and J. A. Massey. 1992. Marina and Recreational Boating Survey, Worcester County, Maryland 1991. Coastal Ecology Research Laboratory, University of Maryland Eastern Shore (Princess Anne). 156 pp.

Abstract: 3,380 boats were registered in Worcester County for the 1990 boating season. U.S. Army Corps of Engineers (USACE) (1976) estimates, made in 1975, for total boats operating on Worcester County bays at any one time in 1975 were approximately 700. Aerial surveys conducted during the present survey revealed a maximum of 759 craft on the water of the bays. Thus, there has not been a significant increase in boats on the water since the 1975 USACE study. n 65 boat launching ramps were found at residential developments within the county. An additional 10 ramps are located at commercially operated marinas. 10 other ramps are maintained by governmental agencies for a total of 85 ramps throughout the county. No government-maintained ramp experiences delays in launching even during holiday usage. Most public access ramps, either government or commercial, are underused by the public. Ground surveys of slip capacity indicates approximately 6,951 wet and dry slips, piers or docks exist along the coast f Worcester County bays with most of this capacity north of South Point. Only one commercial dry slip operation exists in the county with a capacity of 230 slips. Unrented slip space at commercially operated marinas was 351 for 1991. Thus, there is unused dockage capacity. The construction of an additional 3,144 slips is proposed with 2,082 of these being wet and the remaining 1,062 being dry, stack storage. This represents a 41.3% increase in slip infrastructure for Worcester County. Using projections of the USACE (1976) for uncontrolled growth scenarios, all of this additional construction would provide a basis for uncontrolled boating growth. Present estimates of the number of boats now operating on the coastal bays for 1990 (6,480) indicate that Worcester County is presently operating under the USACE's controlled-growth scenario.

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Cowles, R. P. 1908. Habits, reactions, and associations in *Ocypode arenaria*. *Papers of the Tortugas Laboratory, Carnegie Institution* (Washington, D.C.) 2:1-41.

Cowles, R. P. 1930. A biological survey of the off-shore waters of Chesapeake Bay. U.S. Department of Commerce, *Bureau of Fisheries, Document* 1091:277-381.

Coyne, K. J., C. E. Hare, L. C. Popels, D, A, Hutchins and S. C. Cary. 2006. Distribution of *Pfiesteria piscicida* cyst populations in sediments of the Delaware Inland Bays. *Harmful Algae* 5(4):363-373.

Abstract: The toxic dinoflagellate, Pfiesteria piscicida, is a common constituent of the phytoplankton community in the Delaware Inland Bays. In this study, molecular methods were used to investigate the distributions of benthic stages (cysts) of *P. piscicida* in sediment cores from the Delaware Inland Bays. Cores from 35 sites were partitioned into nephloid and anoxic layers and analyzed for *P. piscicida* by nested amplification of the 18S rDNA gene using *P. piscicida*-specific primers. The presence of inhibitory substances in the PCR reaction was evaluated by inclusion of an exogenous control DNA in the extraction buffer, thus eliminating samples that may

yield false-negative results. Our results indicate a patchy distribution of *P. piscicida* in sediments of the Delaware Inland Bays, with distinct differences between each of the three bays. Overall, *P. piscicida* was found more frequently in sediments from Rehoboth Bay compared to Indian River and Little Assawoman Bays. These differences suggest (i) that populations of *P. piscicida* may be more widely distributed in Rehoboth Bay, (ii) that populations of *P. piscicida* may have been introduced to Rehoboth Bay at an earlier time, (iii) that past blooms of *P. piscicida* in Rehoboth Bay estuaries may have seeded the sediments with higher numbers of cysts, and/or (iv) that Rehoboth Bay sediments may be more resistant to clearing due to storm turbulence.

Library: UD-GCMES

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Library: UD-Morris, UMCP

Crane, J. 1943. Display, breeding and relationships of fiddler crabs (Brachypoda, genus *Uca*) in the northeastern United States. *Zoologica* 28(4):217-223.

Abstract: The displays of *Uca pugnax* and *Uca pugilator* near New York City were studied in detail, and that of *Uca minax* superficially. The displays are as specifically distinct as those of tropical species and anatomical relationships are reflected in behavior. *Uca pugnax* and *U. minax* are relatively primitive, related closely to Group II species (including the tropical *Uca mordax*, etc.); *U. pugilator* is specialized, not closely related to any known group, but with affinities to both Groups IV and V (*Uca cumulanta*, etc. and *U. deichmanni* etc., respectively). Notes on color, breeding season and hibernation are included, and some important unsolved problems listed.

Library: UD-Morris, UMCP

Cressey, Roger F. 1978. Crustacea: Branchiura. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 413* 10 pp.

Abstract: Eleven species of *Argulus* are known from the northeastern United States. An illustrated key and an annotated list of those species with notes on their hosts and distribution within and without the study area are included. New host records are included.

Crisp, D. 1959. *Notes on barnacles of Chincoteague Bay and vicinity*. U.S. Department of the Interior, Fish and Wildlife Service. [Odell (1970) identifies this as a manuscript on file in Annapolis].

Crompton, J. L., S. Lee and T. J. Shuster. 2001. A guide for undertaking economic impact studies: The springfest example. *Journal of Travel Research* 40(1):79-87.

Abstract: This study's intent is to offer a generalizable model for undertaking economic impact studies that tourism professionals can use to conduct similar studies in their own communities. A conceptual rationale for undertaking economic impact studies is described. The four principles central to the integrity of economic impact analyses are reviewed: exclusion of local residents, exclusion of "time-switchers" and "causals," use income rather than sales output measures of economic impact, and correct interpretation of employment multipliers. The economic impact of a festival at Ocean City, Maryland, is offered as an exemplar.

Library: SU, TU, UD-Morris, UMES

Cronin, L. E. 1944. *Recommendations to the Board of Natural Resources on the crab regulations in Isle of Wight, Sinepuxent, and Chincoteague bays*. Department of Tidewater Fisheries. Manuscript of File. 4 pp.

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Cronin, L. E. 1955. Chesapeake Bay Studies. Annual Report, Maryland Department of Research and Education. pp. 150-252.

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Library: CBL, HPL, UD-Morris, UMCP [GC96.5.C65], SMC [GC96.C6 1975]

Cronin, L. E., W. A. Van Engle, D. G. Cargo and F. J. Wojcik. 1957. A partial bibliography of the genus *Callinectes*. Virginia Fisheries Laboratory, Special Scientific Report, No. 8:1-21.

Crowder, William. 1931. *Seashore Life Between the Tides*. Dover Publications, Inc. (New York). 461 pp.

Library: SU [QL122 .C68 1975]

Crowell, M., S. Edelman, K. Coulton and S. McAfee. 2007. How many people live in coastal areas? *Journal of Coastal Research* 23(5):iii-vi.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Culliton, T.J., M. A. Warren, T. R. Goodspeed, D. G. Remer, C. M. Blackwell, and J. J. McDonough III. 1990, 50 years of population change along the Nation's coasts, 1960-2010. National Oceanic and Atmospheric Administration Coastal Trends Series, 2d Report (Rockville, Maryland). 41 pp.

Abstract: Provides information on current and future population trends along the Nation's coastlines, which are grouped into five major regions: Northeast, Southeast, Great Lakes, Gulf of Mexico, and Pacific. Size, distribution, and density projections are given for regions, States, and counties.

Cushing, E. M., I. M. Kantrowitz, and K. R. Taylor. 1973. Water resources of the Delmarva peninsula. U.S.G.S. Professional Paper 882. Reston, VA.

Abstract: The St. Martin river stream flow site has records between 1968-1971. The annual low flow was given over 1, 10, and 20 year intervals. Flow estimates for the St. Martin river basin was reported to be 0.02-0.03 cfs mi^{-2}.

Custer, T. W. and R. G. Osborne. 1977. Wading birds as biological indicators: 1975 colony survey. *U.S. Fish and Wildlife Service Special Scientific Report – Wildlife* No. 206. 28 pp.

Library: UDel, USGS, ASU, WVU, LOC

Cutler, E. B. 1977. Siphuncula. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 403*. 7 pp.

Abstract: This report includes an account of the five species of Siphuncula living in shallow waters (down to 200 m) from Maine to Virginia. Four of these are widespread elsewhere in the world – *Golfingia eremita*, *G. margaritacea*, *G. minuta* and *Phascolion strombi*. *Phascolopsis gouldi* is endemic to the east coast of North America. An introduction to their biology, an annotated systematic list, selected bibliography, and an illustrated key are presented.

Dahlgren, U. 1931. Seasonal destruction of a ctenophore, *Beroe*, in Barnegat Bay, New Jersey. *Ecology* 12(4):752-756.

Abstract: The occurrence of the Ctenophore *Beroe* sp. two years out of every three in Barnegat Bay is discussed. Ecological factors that may play a role in the appearance and disappearance of the species are discussed; especially wind velocity and direction, seasonal water temperatures, and tidal regime. The physiography of Barnegat Bay is also discussed.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Daiber, F. C., L. L. Thornton, K. A. Bolster, T. G. Campbell, O. W. Crichton, G. L. Esposito, D. R. Jones and J. M. Tyrawski. 1976. *An Atlas of Delaware's Wetlands and Estuarine Resources.* College of Marine Studies, University of Delaware (Newark). 528 pp.

Dales, R. P. and G. Peter. 1972. A synopsis of the pelagic Polychaeta. *Journal of Natural History* 6(1):55-92.

Library: UD-Morris, UMBC, UMCP

Daniels, S. M. 1976. *Applications of Remote Sensing to Resource Classification and Inventory of a National Seashore Park*. Master of Science Thesis, American University (Washington, D.C.).

Library: American University

Darmody, R. G. and J. E. Foss. 1978. *Tidal Marsh Soils of Maryland*. Maryland Agricultural Experiment Station (College Park) MP 930. 60 pp.

Abstract: Modifications to the existing soil classification scheme, of soil taxonomy, as it applies to tidal marsh soils in Maryland, were suggested. These modifications include Histic and Typic Halaquals, Terric Sulfihemists, Histic Fluvaquents and Histic Psammaquents. Coastal Type marsh soils were found along the perimeter of the bays behind the Atlantic coast barrier islands. These soils have developed from the accumulation of tidal sediments and overwash sand from the beach and dunes in the lagoon behind the barrier island. The predominant vegetation on these marshes was *Spartina alterniflora* in the lower areas and *Spartina patens* in the higher portions. *Salicornia europaeae* was found growing in small, shallow depressions in the back marsh. The Coastal Type marsh soils consist of silty, clayey and sandy tidal sediment overlap in places with peat of varying thickness, but usually less than a meter in depth. The salt content ranged from 69 to 189 ppt NaCl, total sulfur content ranged from 0-.7 to 2.2 percent, and organic carbon content ranged from 9 to 26 percent. Chincoteague silt loam, Assateague loamy sand and Pikes peat soil series were proposed for the Coastal Type marsh soils. These soils were classified as Typic Sulfaquents and Typic Sulfihemists, respectively. Mineralogical analysis by X-ray diffraction indicated mixed clay mineralogy in the soils. The Coastal plain of Maryland has been sinking relative to sea level at a rate of about 0.25 cm yr^{1} for the last century. Coastal type marshes had the lowest species diversity due to the harsh saline environment.

Library: BSU, FSU, SU, UMCP

Davis, R. E. and R. Dolan. 1993. Nor'easters. *American Scientist* 81:428-439.

Abstract: A popular review of extratropical cyclonic storms along the Atlantic coast of the United States. The paper provides a description of storm origins and mechanics as well as classification of storm severity and damage to coastal structures and natural systems.

Library: BSU, CBL, CSU, FSU, MSU, SMC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Davis, R. E., R. Dolan and G. Demme. 1993. Synoptic climatology of the Atlantic Coast Northeasters. *International Journal of Climatology* 13:171-189.

Library: TU, UD-Morris, UMBC, UMCP

Davis, W. E. 1902. The movements of the Enterpneusta and the mechanism by which they are accomplished. *Biological Bulletin* 3:255-261.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Day, J. H. 1973. New Polychaeta from Beaufort, with a key to all species recorded from North Carolina. *NOAA Technical Report NMFS CIRC-375.* 140 pp.

Abstract: Over 6,000 polychaete worms belonging to 229 species were collected on a transect running from the sandy shore near Beaufort, North Carolina, to the upper part of the continental slope in 200 m. Eleven more species were collected from the shores of Beaufort Sound and from grab samples in 400, 600, and 3,020 m off North carolina. The whole collection includes 19 new species, 2 new subspecies and 16 new records for the United States. These have been described. An examination of the literature revealed that a further 83 species have been recorded by earlier workers so that a total of 323 species of polychaete worms are now known from North Carolina. Keys have been constructed to cover the whole fauna, all original records have been listed, and references to good descriptions of each species are given. During the course of the work several type specimens were examined and this has resulted in certain changes in nomenclature and redefinition of certain genera in the families Orbiniidae, Flabelligeridae, and Ampharetidae.

Dean, C. 1993. Horses of coast islands, a regional symbol, harm the environment. *The New York Times*, 27 July, Section C, The Environment Page.

Dean, R. G. 1986. *Analysis of Erosion Control Management Alternatives: Assateague Island National Seashore, North End*. Workshop Report, 25-28 February 1986. Center for Coastal and Environmental Studies, Rutgers University (New Brunswick, New Jersey).

Library: Maryland 36103000150714 (holdings)

Dean, R. G. and M.Perlin. 1977. Coastal engineering study of Ocean City Inlet, Maryland. **IN:** *Coastal Sediments '77*, Symposium of the Water, Port, Coastal and Ocean Division. American Society of Civil Engineers 5:520-542.

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Dean, R. G., M. Perlin and B. Daly. 1978. *A coastal engineering study of shoaling in Ocean City Inlet*. Report by Department of Civil Engineering, University of Delaware (Newark) for U.S. Army Corps of Engineers, Baltimore District, March 1978. 135 pp.

Demas, G. P. 1998. *Subaqueous Soils of Sinepuxent Bay, Maryland*. Doctoral Dissertation, University of Maryland (College Park). xiii + 266 pp.

Demas, G. P. and M. C. Rabenhorst. 1999. Subaqueous soils: Pedogenesis in a submersed environment. *Soil Science Society of America Journal* 63(5):1250-1257.

Abstract: Morphological and analytical data from 85 1.5- to 2.0-m profiles from Sinepuxent Bay, Maryland, indicate that the four pedogenic processes of additions, losses, transformations, and transfers outlined in the generalized theory of soil genesis are active in a subaqueous environment. The evidence of pedogenic processes includes the addition of biogenic calcium carbonate (shells), organic fragments, and organic matter; the loss of organic matter and surface material; the transfer of oxygen through diffusion and bioturbation processes; and the transformation of humic substances and sulfur (sulfidization). The change in the concept of estuarine substrates from sediment to soil has significant ramifications for pedologists, ecologists, estuarine researchers, and government agencies involved in soil resource inventory and estuarine restoration programs. Application of these concepts could help further our understanding of the relationships between subaqueous soil distribution and submersed aquatic vegetation (SAV); clam, scallop, and oyster habitat; and dredge sites with potential acid-sulfate weathering. The work has resulted in a change to the definition of soil in Soil Taxonomy to include subaqueous soils that are capable of or presently support rooted SAV.

Library: FSU, UD-Morris, UMBC, UMCP, UMES

Demas, G. P. and M. C. Rabenhorst. 2001. Factors of subaqueous soil formation: A system of quantitative pedology for submerged environments. *Geoderma* 102(3-4):189-204.

Abstract: The development and use of estuarine sediment maps for estuarine restoration efforts have been hindered by the lack of a formal classification system or comprehensive model that explains the distribution of sediments. To enhance the evaluation, understanding, and management of sediments in shallow water habitats, a new approach must be developed in order to provide a more holistic assessment and cartographic representation of the sediment column. Having demonstrated that shallow water environments undergo pedogenic processes and are systematically distributed across the subaqueous landscape, this new technique was applied to the development of subaqueous soil resource inventories of Sinepuxent Bay, Maryland, and Indian River Bay, Delaware. These efforts indicate that the present concept of sediments as unconsolidated geologic materials must give way to a new concept – the concept of subaqueous soils. In addition, there is a need to alter the present methodologies for the acquisition and cartographic representation of sediment data through the utilization of the soil-landscape paradigm and a classification scheme (such as soil taxonomy) for the development of subaqueous soil resource inventories. The supporting rationale for the development of subaqueous soil resource inventories is presented; and through a synthesis of geologic and pedologic principles and concepts, a new state factor equation is proposed to explain subaqueous soil genesis and distribution.

Library: TU, UD-Ag, UD-Morris, UMBC, UMCP

Demas, G. P., M. C. Rabenhorst and J. C. Stevenson. 1996. Subaqueous soils: A pedological approach to the study of shallow-water habitats. *Estuaries* 19(2A):229-237.

Abstract -- Science-based management of shallow-water habitats is limited by information on the spatial distribution of properties of sediments. This limitation in part stems from the lack of an adequate model or system to classify and delineate subaqueous soil types (sediments). Present classification systems are inadequate because the existing paradigm does not actually consider them as "soils" but merely as "sediments." Field observations suggest that these sediments could be better understood as "soils," and the present paradigm could be modified to incorporate a new one- a pedological paradigm. We propose the application of a pedological paradigm for subaqueous soils of subtidal habitats to develop ecological interpretations of subaqueous soil types and apply an inventory of subaqueous soil resources for management of estuarine shallow-water habitats.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Dembrowski, J. B. 1926. Notes on the behavior of the fiddler crab. *Biological Bulletin* 50(3):179-201.

Abstract: A detailed description of burrow digging by *Uca pugilator* is described. Form and length of the burrow may differ widely in individuals. Choice of the spot is determined by many factors but phototaxis and thigmotaxis do not furnish a satisfactory explanation. The end chamber of each burrow is an air chamber used during high tide. The fiddler crab is water-breathing, but can live in air for many weeks without changing the water of its gill chambers. Length of the burrow partly depends on the moisture of the ground. There is no internal periodicity in the life of U. pugilator, all movements invariably depending on external conditions. Each movement is largely adapted to the actual situation.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dennell, R. 1933-1934. The habits and feeding mechanism of the amphipod *Haustorius arenarius* Slabber. *Journal of the Linnean Society of London (Zoology)* 38:363-388.

Library: UMCP

Dennison, W. C. 1992 . Chincoteague Bay seagrass study. Unpublished data. Home Point Environmental Laboratories/ Cambridge, MD.

Abstract: Nutrient data from June 1990 through January 1992 was recorded for eight sites in Chincoteague Bay. Nutrient data includes NH4, NO2, NO3, P04, and total nitrogen and phosphorus. Physical parameters included water depth, temperature, salinity and total suspended solids. Chlorophyll a, b and c values and spherical light profiles were also presented. Data was preliminary and incomplete. Initial values for biomass and sediment percent organics from three stations within Chincoteague Bay occurred during June, July and August. Average seagrass biomass was 148 gdw/ m. Data concerning maximum net photosynthesis and dark respiration as a function of sulfide treatment in eelgrass leaves was recorded along with data on total suspended solids, pH, dissolved oxygen, and epiphytic attenuation.

Denno, R. F., G. K. Roderick, M. A. Peterson, A. F. Huberty, H. G. Dobel, M. D. Eubanks, J. E. Losey and G. A. Langellotto. 1996. Habitat persistence underlies intraspecific variation in the dispersal strategies of planthoppers. *Ecological Monographs* 66(4):389-408.

Abstract: Dispersal is considered a vital life history characteristic for insects exploiting temporary habitats, and life history theorists have often hypothesized an inverse relationship between dispersal capability and habitat persistence. Most often, this hypothesis has been tested using interspecific comparisons of dispersal capability and qualitative estimates of habitat persistence. Consequently, most assessments have failed to control for possible phylogenetic nonindependence and they also lack quantitative vigor.

This study capitalizes on existing intraspecific variation in the dispersal capability of *Pokelisia* planthoppers to examine the relationship between habitat persistence and dispersal, thereby minimizing possible phylogenetic effects. Two congeneric species (*Prokelisia marginata* and *P. dolus*) occur in the intertidal marshes of North America where they feed exclusively on cordgrass (Spartina). [Two sites in the study were George Island, Chincoteague Bay, Maryland, and Chincoteague, Virginia.] Because these planthoppers exhibit wing dimorphism, flight-capable adults (macropters with fully developed wings) are easily differentiated from flightless adults (brachypters with reduced wings). Thus, dispersal capability can be readily estimated by the percentage of macropters in a population.

At a regional spatial scale, a highly significant negative relationship was found between dispersal capability (percent macroptery) and habitat persistence. In this system, habitat persistence is influenced by a combination of marsh elevation, winter severity, and tidal range, which interact for development. *P. marginata* develops primarily in low-marsh habitats during summer, habitats that can be subjected to pronounced winter disturbance due to ice scouring and/or excessive tidal inundation. Levels of winter disturbance of the low marsh are extreme along the Atlantic coast, intermediate along the Pacific, and low along the Gulf. Both the failure of *P. marginata* populations to remain through winter in this habitat and the dispersal ability of these populations (92%, 29%, and 17% macroptery, respectively), are correlated with levels of disturbance. Thus, in regions where winter disturbance is high, levels of disturbance are correspondingly high to allow for recolonization of extirpated habitats from overwintering sites on the high marsh. Unlike P. marginata, P. dolus develops primarily in high-marsh habitats, which are much less disturbed on all coasts during winter. Consequently, this species remains year-

round in its primary habitat for development and most populations exhibit relatively low levels of macroptery (<10%).

When raised under common garden conditions, many more macropters of both species were produced from Atlantic compared to Gulf populations. Thus, the proportion of macropters produced from the populations used in this experiment paralleled the incidence of macroptery measured in the field, providing evidence that the geographic variation in dispersal capability in both species has in part a genetic basis. The results of this study provide strong intraspecific evidence for an inverse relationship between the dispersal capability of insects and the persistence of their habitats.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Denny, C. S., J. P. Owens, L. A. Sirkin and M. Rubin. 1979. The Parsonburg Sand in the central Delmarva Peninsula, Maryland and Delaware. U.S. Department of the Interior, U.S. Geological Survey Professional Paper 1067-B. 16 pp.

Dent, F. J. 1935. Layout of outer protective works, maintenance of depths in harbors, in sandy shores and before mouths of estuaries. **IN:** *Proceedings of the 16th International Congress of Navigation*, Section 11-1, Paper No. 16.

Denver, J. M. 1989. *Effects of Agricultural Practices and Septic System Effluent on the Quality of Water in the Unconfined Aquifer in Parts of Eastern Sussex County, Delaware*. Delaware Geological Survey Report of Investigations No. 45.

Abstract: The vertical and horizontal distribution and movement of nitrate and other chemical constituents around and irrigated field are described. Additionally, the effects of effluent from domestic septic systems on the quality of water in the unconfined aquifer are also presented.

Library: UD-GCMES, UD-Morris

Deonarine, S. N., C. J. Gobler, D. J. Lonsdale and D. A. Caron. 2006. Role of zooplankton in the onset and demise of harmful brown tide blooms (*Aureococcus anophagefferens*) in US mid-Atlantic estuaries. *Aquatic Microbial Ecology* 44(2):181-195.

Abstract: Harmful brown tides caused by the pelagophyte *Aureococcus anophagefferens* have occurred in mid-Atlantic estuaries for 2 decades. Low grazing rates by microzooplankton have been implicated as a possible cause of these events, but no study to date has concurrently quantified zooplankton population densities and zooplankton grazing rates of *A. anophagefferens* cells. The authors conducted field studies from 2002 to 2004 to quantify grazing on the brown tide alga *A. anophagefferens* by meso-, micro-, and nanozooplankton, while concurrently establishing the composition of the plankton community. Research sites included an estuary that experienced an intense brown tide (Chincoteague Bay, Maryland [MD]; 2004: 2×10^6 cells ml^{-1}) and one that experienced sporadic blooms (Quantuck Bay, New York [NY]; 2002: 8×10^5 cells ml^{-1}); 2003 and 2004: $<3 \times 10^4$ cells ml^{-1}). The MD site was dominated by small autotrophs <5 µm), such as *A. anophagefferens* and other picoeukaryotes, and small heterotrophs, such as *Paulinella ovalis*, while the NY site hosted a range of large and small autotrophs and zooplankton. Experiments indicated that small zooplankton (3 to 5 µm) were consumers of *A. anophagefferens* at bloom and non-bloom locations. However, dilution experiments documented active grazing on most picoplankton except *A. anophagefferens* in MD, while grazing rates on the brown tide alga in NY were comparable to grazing rates on the total phytoplankton community and other picoplankton. Experimental enrichment of estuarine waters with mesozooplankton indicated a preferential avoidance of *A. anophagefferens* by grazers during intense blooms, but active consumption during non-bloom conditions. Differences in the effect of grazing between sites suggest that zooplankton may be controlling brown tides in NY, but allowing blooms to form due to low grazing pressure in MD. These findings further suggest that the zooplankton community in NY has changed from one which formerly avoided the consumption of *A. anophagefferens* to one which currently contributes to top-down control of brown tides.

Library: CBL, HPL, UD-GCMES

Derickson, W. K. and K. S. Price, Jr. 1973. The fishes of the shore zone of Rehoboth and Indian River bays, Delaware. *Transactions of the American Fisheries Society* 102:552-562.

Library: CBL, FSU, HPL, SMC, TU, UD-GCMES, UD-Morris, UMCP, UMES

DeStoppelaire, G.H., T.W. Gillespie, J.C.Brock, & G.A.Tobin. 2004. Use of remote sensing techniques to determine the effects of grazing on vegetation cover and dune elevation at Assateague Island National Seashore: Impact of horses. *Environmental Management* 34: 642–649.

DeRose, C. R. 1965 A report on the effects of cannery waste on Marshall Creek. State of Maryland, Department of Water Resources, Water Quality Investigation and Analysis Division (Annapolis).

Abstract: A comparison of water quality was made before, during and after the period of operation of the Ralph L. Mason Company's tomato cannery. Before and after the cannery season/ water quality was declared okay for use as a source of water with treatment; however, it was declared poor recreational water. Fish habitat was good in the lower stream, yet poor in the upper portions of the stream. Analysis of water samples during the period of operation of the cannery revealed poor water quality in the lower part of the stream. In the upper portions of the stream, water quality was unsuitable for drinking, recreation, and aquatic organism habitat. Recommendations stated that the waste discharge from the cannery should "be checked to determine if it complies with State law.

Dexter, R. W. 1943. *Anurida maritima*: an important sea-shore scavenger. *Economic Entomology* 36(5):797.

Library: UMCP

Dexter, R. W. 1944. The bottom community of Ipswich Bay, Massachusetts. *Ecology* 25(3):352-359.

Abstract: The bays of Cape Ann, especially Ipswich Bay, were dredged during the summers of 1934-1937 and in 1940. The bottom community is here designated as the Strongylocentrotus-Buccinum biome which is similar to the Strongylocentrotus-Argobuccinum biome of the Pacific coast of North America as described by Shellford et al. (Ecological Monographs 5:249. 1935). An attempt is made to evaluate the relative importance of the predominant members of the bottom community during summer months according to present knowledge of this community. The bottom community of Ipswich Bay is characterized and controlled by echinoderms, large

gastropods, skates, sculpins, flounders, and decapod crustaceans over the sandy sediments. Scattered about are islets of algae serving as a focus for the attachment of many small invertebrates, especially snails, amphipods, coelenterates, bryozoans and tube-building annelids. On solid surfaces the algae and other attached organisms form a solid mat. This community is closely related to the bottom community along the meddle Maine coast, and somewhat related to the bottom community of the Woods Hole region. At the latter locality, however, there are many predominants which are not found north of Cape Cod, and several of the predominants found at Cape Ann are either lacking or are of but minor importance at Woods Hole.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dexter, R. W. 1945. Zonation of the intertidal marine mollusks at Cape Ann, Massachusetts. *Nautilus* 58(4):135-142.

Abstract: The vertical distribution of 21 species of molluscs is shown by selected tables. Quadrat counts were made between the tide lines on all of the types of shorelines and biotic communities in a tidal inlet. Many species are associated with a definite tidal level and a particular type of substratum or vegetation.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Dexter, R. W. 1947. The marine communities of a tidal inlet at Cape Ann, Massachusetts; A study in bioecology. *Ecological Monographs* 17(3):261-294.

Abstract: An ecological study of the organization and dynamics of the marine communities of a tidal inlet (Anniquam River) at Cape Ann, Massachusetts, carried out principally during the summer seasons of 1933-1937 inclusive, revealed that the marine communities could be divided into five biomes. Narrow ecotones were found to exist between the major communities resulting from an overlapping of characteristic species along the spring-tide levels. An intermingling of communities results from a mixture of sediments and hard bottom materials, and developments in physiographic succession. The precise zonation of intertidal communities and their components (which has been demonstrated by many investigators), is the only method by which these communities can be studied. Quadrat sampling is of significance in the study of tidal communities only in so far as the level of examination is known, with consequent relationship to exposure and submergence.

There is a rhythmical change in the composition and dynamics of the communities associated directly with the tidal flow and ebb. The organization and coactions of intertidal communities are markedly different at low rides and at high tide, the transformation taking place gradually and uniformly during fluctuation of the tide. Terrestrial and marsh animals feed on the intertidal zone when it is exposed. They invade the shore during ebb tide following down the water line as it retreats, and are forced back from the feeding grounds gradually as the tide returns. Subtidal permeant animals feed on the intertidal zone when it is submerged. They advance upon the shore with the incoming tide, some species being immediately behind the front wave of the water. Intertidal animals for the most part remain inactive during exposure, resuming locomotion ands feeding when submerged.

Each year significant differences were found in the major communities as a result of fluctuation of abundance of certain species. Some of the most striking and important changes observed involved the following species: *Zostera marina, Lacuna vinca, Polinices heros, Carcinides maenas, Asterias vulgaris, Mya arenaria, Nereis pelagica, Nassarius obsoletus, Mytilus edulis, Littorina saxatilis, Littorina obtusata, Thais lapillu*s and *Melampus bidentatus*. Sedimentation over time has induced successional changes in several biomes.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Di Vincenzo, M. 1994. Wild horses kicking up a fuss along the seaboard. *Buffalo News* (Buffalo, New York), 7 August, Science, p. 11.

Diamond, G. 2003. Fish lines. *The Washington Post* (Washington, D.C.), 28 March, Weekend, p. T-60.

Abstract: The Maryland Department of Natural Resources Fisheries Service has announced that Maryland's spring striped bass season will officially get underway April 19 instead of April 20 (Easter). This specific change applies to Maryland's portion of Chesapeake Bay from Brewerton Channel to the Maryland-Virginia line (excluding all bays, sounds, tributaries, creeks and rivers, except Tangier and Pocomoke sounds) and in Maryland's tributaries of the Potomac River downstream of the Harry W. Nice Bridge (U.S. 301). Requirements for licenses, hours, size and creel limits remain the same.Heavy rains and high water continue to hinder fishing, but the action should pick up as water temperatures rise. Largemouth bass can be found lurking near the mouths of creeks, mainly at points and sharp drop-offs. They are sluggish from colder than normal water, but those inhabiting the shallows have been aggressive on warm days. Jerkbaits, XPS or Smithwick in chartreuse, gold and silver/blue proved effective when fished in depths averaging eight feet. On overcast days, five-inch Yamamoto grubs, Sassy Shad and black jigs fished in depths of 10 to 15 feet produced some exceptionally large bass. Schools of striped bass began popping up over much of the lake. Most were found between Sturgeon Creek and Dike III, with the best catches coming from the dike's warmwater discharge area. Sassy Shad, bucktails and live shad were the most productive baits.UPPER BAY -- Muddy water flowing down the Susquehanna River has transformed the entire upper bay into a sea of muddy water. The few stripers that were caught during the first week of catch and release season were mostly taken on cut menhaden baits and bottom-fished bloodworms. The week's largest fish was a 32-pounder that was weighed and released. Scattered catches of exceptionally large white perch were made at Turkey Point by anglers bottom-fishing with bloodworms and night crawlers. A few channel catfish up to five pounds were taken at the same location while fishing for perch. The Chester River's upper reaches near Crumpton and Millington continue to provide anglers with random catches of yellow perch, but most of the spawning run is over.

Diaz, R. J., G. R. Cutter and C. H. Hobbs. 2004. Potential impacts of sand mining offshore of Maryland and Delaware: Part 2-Biological considerations. *Journal of Coastal Research* 20(1):61-69.

Abstract: The mining of sand resources from the inner continental shelf for beach nourishment may lead to impacts or increase stress on commercial and noncommercial living resources that utilize these areas. The objective of our work was to characterize benthos present in areas likely to be mined and to predict impacts of sand mining. In 1998 and 1999 we used a combination of methods (grab samples, sediment profile cameras, video sled, and trawl) to collect data on the benthos, both fishes and invertebrates, which utilized several potential sand mining areas. The authors found benthic communities and fish assemblages to be typical of middle Atlantic sandy inner continental shelf habitats. A sand mining scenario that removed the top meter of sand from Fenwick Shoal would disturb approximately 7.7 km^2 with the potential acute impact on noncommercial sessile species being the loss of about 150 x 10^6 individuals representing 300 kg of wet weight biomass that could have functioned as trophic support to fishes. In addition, mobile species would be displaced and have to search for replacement habitat. To minimize impacts and promote recolonization of mined areas the total removal of substrate should be avoided. Small areas with a project area should be left to serve as refuge patches that would

promote recolonization and serve as habitat for mobile species. Predicted impacts on demersal fishes would be lessened by a rapid recolonization, particularly the recovery of mobile epifaunal crustacean that serve as the primary trophic support species. Project timing and engineering could also be used to lessen impacts on fishes by reducing stress on crustaceans. For example, mining activities that ended in time for Spring/Summer recruitment would favor crustaceans while a Fall/Winter end would favor annelids.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dillow, J. A. 1999. *Ground-water discharge and nitrate loadings to the coastal bays of Maryland*. U.S. Department of the Interior, U.S. Geological Survey Water-Resources Investigations WRI 99-4167. 7 pp.

Dillow, J. J. A., W. S. L. Banks and M. J. Smigaj. 2001. Ground-water quality and discharge to Chincoteague and Sinepuxent bays adjacent to Assateague Island National Seashore. Abstracts of Papers, 2001 Annual Meeting, Geological Society of America 33(6):42.

Abstract: Part of the mission established for the National Park Service at Assateague Island National Seashore in Worcester County, Maryland, includes preserving and protecting the natural resources of Assateague Island and its adjacent estuaries. In support of this effort, the U.S. Geological Survey conducted a study of ground-water nutrient transport in the surficial aquifer to the estuaries. The study area includes Assateague Island, Chincoteague and Sinepuxent Bays, and the surface-water drainage basins associated with the bays. The purpose of the study was to describe ground-water flow paths that carry freshwater to Chincoteague and Sinepuxent Bays and their tributary streams, and to collect water-quality data associated with these freshwater inputs, particularly nutrient concentrations. Twenty-eight ground-water monitoring wells were installed in the surficial aquifer within the study area to collect hydraulic head and water-quality data at various depths. Base flow was measured and water-quality samples were collected at 17 nontidal streams to define the concentrations of nutrients being transported to the coastal bays from each site. Water recharged to the surficial aquifer follows flow paths with lengths ranging from a few hundred feet to several miles. Many of the shorter flow paths end by discharging ground water as base flow to streams, while longer flow paths end by discharging ground water directly to Chincoteague Bay or the Atlantic Ocean. Travel time for ground water flowing to the end of deep flow paths in the surficial aquifer may be 30 years or longer. Dissolved nitrate is the dominant nutrient in ground water in the study area. Nitrate concentrations in ground-water samples collected from wells ranged from below 0.05 mg/L as N to as high as 15.5 mg/L as N. Nitrate concentrations in samples of stream base flow ranged from below 0.05 mg/L as N to 5.29 mg/L as N, and showed a significant, positive statistical correlation with the percentage of the stream basin area used to cultivate row crops.

Dillow, J. J. A., W. S. L. Banks and M. J. Smigaj. 2001. Ground-water quality and discharge to Chincoteague and Sinepuxent bays adjacent to Assateague Island National Seashore, Maryland. U.S. Department of the Interior, U.S. Geological Survey, Water Resources Investigations Report 02-4029.iv + 42 pp.

Library: FSU, UMCP, UD-Morris [all are valueI 19.42/4:02-4029]

Dillow, J. J. A. and E. A. Greene. 1999. Ground-water discharge and nitrate loadings to the coastal bays of Maryland. U.S. Department of the Interior, U.S. Geological Survey, *Water-Resources Investigations Report* 99-4167. 8 pp.

Dittel, A. and C. E. Epifanio. 1982. Seasonal abundance and vertical distribution of crab larvae in Delaware Bay. *Estuaries* 5:197-202**..**

Abstract -- Larvae of 15 species or genera of crabs were collected and identified during a six month (May 26 to October 28, 1978) study in the mouth of Delaware Bay. Seasonal abundance and vertical distribution of each species were investigated. Most species studied had peak abundance in July and August except for *Cancer irroratus* and *Ovalipes ocellatus* which showed peak occurrence in May and June, respectively. Larvae of species strongly dependent on estuarine habitats, such as *Uca* spp., Pinnixa chaetopterana, and P. sayana, showed a tendency to congregate in near-bottom waters where net flow of water is landward, thus favoring retention within the estuary. Larvae of *Ovalipes ocellatus*, *Cancer irroratus*, and *Callinectes sapidus* were more common at the surface. This vertical distribution suggests that these larvae are flushed out of the estuary. The mechanisms of recruitment and replenishment of adult populations within the estuary would therefore depend on migration of megalopa and juveniles.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Dolan, R. 1987. The Ash Wednesday storm of 1962: 25 years later. *Journal of Coastal Research* 3:11-vi.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R. and R. E. Davis. 1992. An intensity scale for Atlantic Coast northeast storms. *Journal of Coastal Research* 8:352-364.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R. and R. E. Davis. in press. Coastal storm hazards. *Journal of Coastal Research*.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R. and B. Hayden. 1974. Adjusting to nature in our national seashores. *National Parks and Conservation Magazine* 48(6):9-14.

Library: BSU, TU, UD-Morris, UMBC, UMCP

Dolan, R. and B. Hayden 1981. Storms and shoreline configuration. *Journal of Sedimentary Petrology* 51(3):737-744.

Abstract: Spectral analysis of the 1962 great Atlantic coast storm penetration (overwash) along the Outer Banks of North Carolina and Fenwick Island, Maryland, reveals along-the-coast periodicities ranging in wavelength from 14 km to 15 km. Periodicities with similar wavelengths exist in long-term mean rates of change of the shoreline and storm-surge penetration line. This suggests the location and magnitude of storm deposits and storm hazards along the Atlantic coast are systematically disturbed.

Library: CBL, FSU, SMC, TU, UD-Morris, UMBC, UMCP

Dolan, R., B. Hayden and W. Felder. 1979. Shoreline periodicities and linear offshore shoals. *Journal of Geology* 87(4):393-402.

Abstract: Linear shoals off the Delmarva coast are believed to have evolved on the shoreface of Assateague Island in response to inshore processes. Analyses of shoreline rate-of-change data and the spatial distribution of the linear shoals indicate several spatial periodicities. the shoreline periodicities correspond to hypothetical standing edge waves. The liner shoals, however, do not have wavelengths consistent with either the shoreline periodicities or the edge wave. The strongest periodicity in the shoal field has an orientation parallel to relict beach ridges on Assateague Island dated ca 2000 BPE. Thus, the linear offshore shoals may have formed at a time when Assateague Island was shorter and edge waves of a different wavelength were present. Where sedimentary shorelines are strongly concave, such as the 123 km Arc between Cape Hatteras and Cape Lookout, inshore currents associated with standing edge waves seem to inhibit the development of linear shoal. Where the shoreline is convex, such as along the Delmarva coast, currents associated with standing edge waves are less prevalent and thus less likely to inhibit the development of linear shoals.

Library: BSU, FSU, SMC, SU, TU, UD-Morris, UMBC, UMCP

Dolan, R., B. Hayden and J. Heywood. 1978. Analysis of coastal erosion and storm surge hazards. *Coastal Engineering* 2:41-53.

Abstract: Prediction of shoreline erosion and storm-surge penetrations is essential for coastal planning and management in the United States. Historical aerial photography provides the best data base for information that can be used in establishing hazard zones along and across the coast. In this paper, a new methodology for deriving risk probabilities is summarized. The method is tested and applied along a highly developed (90 km) reach of the New Jersey Coast.

Library: UD-Morris, UMBC, UMCP

Dolan, R., B. P. Hayden and T. Heywood. 1977. Shoreline forms and shoreline dynamics: a mesoscale analysis. *Geosciences Manual* 18:53-59.

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Library: BSU, CBL, CSU, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Library: Univ. of Tulsa, Colorado State Univ., Univ. of Virginia, U.S. Park Service

Dolan, R., B. Hayden and C. Jones. 1979. Barrier Island configuration. *Science* 204(4391):401-403.

Abstract: The 11 Virginia barrier islands are undergoing rapid changes in shoreline configuration. If this trend continues for another 100 years, two capelike features will develop. The process responsible for this island-chain pattern may be a standing edge wave trapped between Assateague Island and Cape Charles.

Library: BSU, CBL, CSU, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R., B. Hayden and H. Lins. 2003. Barrier islands. *American Scientist* 68:16-25.

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Dolan, R., B, Hayden, S. May and C. Rea. 1980. Design of a coastal information system. *Shore and Beach* 48(2):21-31.

Abstract: The UVAIS coastal data referral system sponsored by the Office of Naval research is designed for use by coastal scientists, engineers, and planners, enabling them to locate data sets for comparison, analysis, and prediction. At present, the file contains a fairly complete listing of active and former wave and tide gauges in the United States, meteorological stations within ten miles of the coast, and beach survey data (primarily on the east coast). There is also a worldwide assortment of information about visual wave observations, nearshore current data, water temperature and salinity measurements, sediment data, and nearshore bathymetric surveys. The model file is still in a prototype stage containing a sampling of information on eleven geophysical models.

Library: UD-Morris, UMBC, UMCP

Dolan, R., B. P. Hayden and C. L. Vincent. 1974. *Shore Zone Land Use and Land Cover*. Natural Resources Report No. 8. U.S. Department of the Interior, National Park Service, United States Geological Survey (Washington, D.C.). 50 pp.

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Dolan, R., D. L. Inman and B. Hayden. 1990. The Atlantic coastal storm of March, 1989. *Journal of Coastal Research* 6:722-725,

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R., C. Jones and B. P. Hayden. 1979. Barrier island configuration. *Science* 204:401-403.

Library: BSU, CBL, CSU, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R. and H. Lins. 1986. The Outer Banks of North Carolina. *U.S. Geological Survey Professional Paper* 1177-B. 47 p.

Abstract: Highly urbanized Fenwick Island and the less developed islands of North Carolina are analyzed to demonstrate the processes and hazards associated with coastal barrier islands. The intended audience includes land-use planners, managers, and developers.

Dolan, R., H. Lins and B. Hayden. 1988. Mid-Atlantic coastal storms. *Journal of Coastal Research* 4(3):417-433.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dolan, R., H. Lins and J. Stewart. 1980. Geographical analysis of Fenwick Island, Maryland, a middle Atlantic coast barrier island. *U.S. Geological Survey Professional Paper* 1177-A. 24 pp.

Library: Univ. of Calgary, McMaster Univ.

Dolan, R., S. K. May, N. Gandy and B. Hayden. 1982. Barrier island classification and coastal hazard mapping. *Geological Society of America Bulletin* 14(107):476. [Program Abstract No. 08242]

Abstract: Shoreline erosion along the mid-Atlantic coast has averaged 1.5 m/yr over the past 50 years; however, detailed information about the erosion processes is not available for most of the nation's coasts. Therefore, risk assessment is difficult.

In response to this need for information, the authors defined 15 physical attributes considered diagnostic of any particular coastal area. Data were collected using a 3-minute grid spacing for the nation's 295 barrier islands. Characteristic and persistence analysis techniques have been applied which permitted the design of a barrier island classification based on the islands' geometry and energetics.

These classifications, augmented with data from the Pacific and Alaskan coasts, have been further analyzed in conjunction with land use patterns to develop a coastal hazards assessment for the United States. Risk classes are mapped on a 1:7,500,000 scale for the National Atlas, end. ed. and on a 1:1,000,000 scale to be published by the U.S. Geological Survey. All data are on file in a user-oriented computer information system.

Library: BSU, FSU, MSU, SMC, SU, UD-GCMES, UD-Morris, UMBC, UMCP

Dolan, R. and J. McCloy. 1965. *Selected Bibliography on Beach Features and Related Nearshore Processes*. Louisiana State University Press (Baton Rouge).

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Dolan, R., C. Rea and J. Heywood. 1979. Shoreline erosion along the middle Atlantic coast of the United States. *Geology* 7:602-606.

Library: BSU, SMC, SU, UD-Morris, UD-GCMES, UMBC, UMCP

Dolan, R., L. Vincent and B. Hayden. 1974. Crescentric coastal land forms. *Zeitschrift für Geomorphologie* 18(1):1-12.

Abstract: The spatial and temporal dimensionalities, as well as topographic and process associations of crescentric coastal landforms, are the context for standardization and terminology in the literature. These forms include cusplets, cusps, sand waves, and secondary and primary capes.

Library: FSU, UD-Morris, UMBC, UMCP

Dorabawila, N. and G. Gupta. 2005. Endocrine disrupter - estradiol - in Chesapeake Bay tributaries. *Journal of Hazardous Materials* 120(1-3):67-71.

Abstract: Exogenous chemicals that interfere with natural hormonal functions are considered endocrine disrupting chemicals (EDCs). Estradiol (17β-estradiol or E2) is the most potent of all xenoestrogens. Induction of vitellogenin (VTG) production in male fish occurs at E2 concentrations as low as 1 ng l^{-1}. E2 reaches aquatic systems mainly through sewage and animal waste disposal. Surface water samples from ponds, rivers (Wicomico, Manokin and Pocomoke), sewage treatment plants (STPs), and coastal bays (Assawoman, Monie, Chincoteague, and Tangier Sound – Chesapeake Bay) on the Eastern Shore of Maryland were analyzed for E2 using enzyme linked immuno-sorbent assay (ELISA). E2 concentrations in river waters varied between 1.9 and 6.0 ng l^{-1}. Highest E2 concentrations in river waters were observed immediately downstream of STPs. E2 concentrations in all the coastal bays tested were 2.3–3.2 ng l^{-1}.

Library: UD-Morris, UMCP

Dresser, M. and G. Garland. 2003. Racing industry leaders propose 18,000 slot machines at 5 tracks; Ehrlich distances himself from plan, which both foes and allies say overreaches. *The Sun* (Baltimore, Maryland), 11 January, Telegraph, p. 1-A.

Abstract: Robert L. Ehrlich Jr.] has said he would support slots at the Pimlico, Laurel and Rosecroft tracks and one being built in Allegany County. But he has firmly ruled out an expansion of gambling on the conservative Eastern Shore, where many fear the slots would tarnish the "family" image of Ocean City.The industry's proposal asked Ehrlich to seek protection against the legislature's reducing its share of gambling revenues, cutting the number of authorized slot machines or permitting slot machines to be installed anywhere but at the five tracks.[Thomas Bowman] said Ehrlich's request for industry input was an attempt "to do as much fact-finding as possible and to include the horse industry as much as is reasonable." He stressed that the horse industry was not writing law but was merely telling Ehrlich what it would like if slots become legal.

Drobeck, K., H. Hidu, J. M. Odell and W. Boynton. 1970. Chincoteague and Sinepuxent Bay Benthos. **IN:** *Assateague Ecological Studies, Part I: Environmental Information.* Natural Resources Institute, University of Maryland (College Park), Contribution No. 446. pp. 173-241.

Abstract: Extensive information on macrobenthic species from most areas of Chincoteague and Sinepuxent Bays is presented. A total of some 89 sites were sampled during summers of 1969 and 1970. Samples (triplicate 1 m^2 collections) were obtained using a shallow water escalator harvester. This gear was capable of quantitative sampling of animals greater than 1 centimeter in length. Data are reported in terms of numerical abundance. The authors reported that the benthic community appeared to be a complex mosaic with only some weak relationships to such measured environmental variables as grain size, salinity or seagrass presence or absence.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

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Library: Naturalis Leiden

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Library: UD-GCMES, UD-Morris, UMCP [all are GC380 .S49]

Dudley, P. L. and P. L. Illg. 1991. Copepoda, Cyclopoida: Archinotodelphyidae, Notodelphyidae, and Ascidicolidae. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS 96.* 40 pp.

Abstract: This manual includes an introduction to the general biology, a selected bibliography, and an illustrated key to 11 genera and 17 species of copepods of the Crustacea, Subclass Copepoda, Order Cyclopoida, Families Archinotodelphyidae, Notodelphyidae and Ascidicolidae, associated with ascidians from the Atlantic Coast of the United States. Species distributed from the Gulf of Maine to Long Island Sound are emphasized. An annotated systematic list, with statements of the world distribution and new records of association with hosts, and a systematic index are also provided.

Dueser, R. D. and W. C. Brown. 1980. Ecological correlates of insular rodent density. *Ecology* 61(1):50-56.

Abstract: Rodent populations were censused on nine Virginia barrier islands during the summers of 1975 and 1977. The five species observed included *Microtus pennsylvanicus*, *Mus musculus*, *Oryzomys palustris*, *Rattus norvegicus*, and *Sciurus carolinensis*. The number of rodent species ranged from zero on a small, low-lying, sandy island to five on a large, elevated, forested island. Rodent species richness (diversity) increased directly with island area, elevation, vegetation height, and habitat complexity (i.e., the number of distinct woody plant associations). Because of strict zonation of plant associations, increased habitat complexity represents increased availability of exploitable patches of habitat. As expected from studies of mainland rodent communities, this patchiness appears to promote increased species diversity. Each species exhibits an "exploitation specialty" involving little spatial overlap with other species. Although no direct tests have been conducted, we speculate that the rodent communities of these islands are at equilibrium. Low rates of colonization and high rates of extinction interact to produce low species diversity and a steep species-area curve.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dueser, R. D. and J. H. Porter. 1986. Habitat use by insular small mammals: relative effects of competition and habitat structure. *Ecology* 67(1):195-201.

Abstract: Two predictions concerning habitat use by small mammal species of Assateague Island, Virginia, were tested: 1) habitat segregation between species should be conspicuous, with centers of species abundance located in different plant associations, and 2) competition should exert a strong influence on habitat use by each species, with the effects of the other species at least as great as the effects of habitat structure. Production 1 was supported by analysis of mammal species abundances in 5 vegetation types. Habitat segregation was pronounced and species distributions reflected coarse-grained habitat patchiness. However, prediction 2 was not supported by analysis of the independent effects of competition and habitat structure on the local abundance of each species. Only *Mus musculus*, and to a much lesser extent *Zapus hudsonius*, appear to be affected more strongly by competition. The number and combination of species found on an island may simply represent a sample drawn from the pool of available species, weighted primarily by island area and habitat complexity and by the colonizing abilities of the species.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Dunkle, S. A., L. N. Plummer, E. Busenberg, P. J. Phillips, J. M. Denver, P. A. Hamilton, R. L. Michel and T. B. Coplen. 1993. Chlorofluorocarbons (CCl_3F and CCl_2F_2) as dating tools and hydrologic tracers in shallow ground water of the Delmarva Peninsula, Atlantic Coastal Plain, United States. *Water Resources Research* 29:3837–3860.

Abstract: Concentrations of the chloroflurocarbons (CFCs) CFC-11 and CFC-12 were determined in groundwater from coastal plain sediments of the Delmarva Peninsula. CFC-modeled ages were calculated independently for CFC-11 and CFC-12, and agreed to ithin 2-3 years in the majority of the waters. Recharge temperatures, determined from dissolved nitrogen and argon concentrations, varied from 9 ± 2°C over most of the peninsula to 14 ± 2°C at the southernmost tip of the peninsula in Virginia. The CFC-modeled ages were examined in relation to the known hydrogeologic environment, both on regional scales and in more intensively sampled local scale networks. The CFC-modeled recharge years and measured tritium concentrations were used to reconstruct a tritium input function that was compared to the modeled tritium plus He-3 distribution. Most of the present distribution of tritium in Delmarva groundwater is onsistent with low dispersivities. The results of the study strongly support the use of CFCs for dating shallow, aerobic groundwater.

Library: CBL, FSU, HPL, TU, UD-Morris, UMBC, UMCP

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Dunson, W. A. 1985. Effect of water salinity and food salt content on growth and sodium efflux of hatchling diamondback terrapins (*Maclemys*). *Physiological Zoology* 58(6):736-747.

Abstract: At hatching and form many months afterward (until they reach about 50 g), diamondback terrapins cannot grow in salinities above about twothirds that of seawater. Yet salinities near the nests are above this level. Very samll terrapins, taken at Cincoteague, Virginia, reared in 100% seawater and offered one drink of fresh water every 2 weeks can achieve limited growth. In 25% seawater at 28°C, growth of hatchling terrapins is stimulated in comparison with animnals in fresh water or 50% seawater. Hatchlings grown in 0.25 Molal glycerol solutions, osmotically similar to 25% seawater, have the same growth rates as those in fresh water. Hatchling terrapins injeted with NaCl have an elevated rate of sodium efflux (about 65 µmol/100 g wet mass·h), indicating that the lachrymal salt glands are functional. At hatching, body water content (77.0%) is much higher than that of adults (64.5%), and body sodium concentration (65 µmol/g dry mass) is slightly higher. However, sodium concentration in units of 65 µmol/g wet

mass is only 71% of adult levels. Further increases occur in salinities up to 50% seawater. There is an inverse relation between body size and water efflux in 100% seawater, and this differece appears to be one cause of the lesser tolerance of smaller terrapins to saline water. In contrast, sodium influx in hatchlings is only slightly elevated. The rate of sodium efflux in fed terrapins is directly correlated with feeding rate. However, the main source of sodium uptake at higher salinities appears to be incidental swallowing of water during ingestion of food – not the salt content of the food itself.

Library: CBL, MSU, SMC, TU, US-GCMES, UD-Morris, UMBC, UMCP

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Library: VIMS, Univ. of Richmond

Eline, J. F. and R. R. Keiper. 1979. Use of exclusion cages to study grazing effects on dune vegetation on Assateague Island, Maryland. *Proceedings of the Pennsylvania Academy of Science* 53(2):143-144.

Abstract: The effect of grazing by feral ponies on the dune vegetation of Assateague Island was studied using barbed-wire exclusion cages. Ten cages were constructed in different locations on the island on 13 May 1978. Each cage consisted on a 5 m2 area surrounded by a single strand of barbed-wire strung at a height of 78 cm above the ground. On 30 September 1978, 20 samples of vegetation, each 30 cm2 in size, were cut from inside and outside each cage. The samples were dried, then weighed, and the biomass compared. No significant difference was noted between ungrazed and grazed samples; apparently pony grazing, at least at current population levels, has little effect on the dune vegetation.

Library: UD-Morris

Ellis, J. K. and J. A. Musick. 2007. Ontogenetic changes in the diet of the sandbar shark, *Carcharhinus plumbeus*, in lower Chesapeake Bay and Virginia (USA) coastal waters. *Environmental Biology of Fishes* 80(1):51-67.

Abstract: This study describes the diet of the sandbar shark, *Carcharhinus plumbeus*, highlighting differences in diet within various regions of the Virginia (USA) nursery area, as well as ontogenetic changes in diet. Stomach samples were obtained in 2001 and 2002 from 232 sharks caught by gillnets or long lines. Historical data from the Virginia Institute of Marine Science (VIMS) Shark Ecology Program were also analyzed. Ontogenetic changes in diet were evident, with crustacean prey decreasing in frequency with increasing shark size, and elasmobranch prey importance increasing with increasing shark size. Whereas previous research in Chincoteague Bay, VA showed the blue crab, *Callinectes sapidus*, was the dominant crustacean in sandbar shark diet, the mantis shrimp, *Squilla empusa*, dominated the crustacean portion of the diet in this study. Differences in diet of sharks were observed among locations within the study area. Small juveniles (≤80 cm precaudal length) in the lower Chesapeake Bay ate more fishes, whereas Eastern Shore juveniles ate more crustaceans. Crustacean prey items varied among locations along the Eastern Shore, with more portunid crabs consumed in waters near Wachapreague and more mantis shrimp consumed near Sand Shoal Inlet. The authors study showed that *Carcharhinus plumbeus* is a generalist predator and is thus unlikely to strongly impact the population of any particular prey species, and in turn is not likely to be strongly affected by fluctuations in abundance of a single prey species.

Library: CBL, HPL, UD-GCMES, UMBC, UMCP

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Emery, K. O. 1965. Geology of the Continental Margin off Eastern United States. **IN:** *Submarine Geology and Geophysics*, W. F. Whittard and R. Bradshaw, Eds. Butterworth (London). pp 1-20.

Abstract: Both erosive features and deposits on the continental slope are related to Pleistocene low sea levels. Later deposition has only modified the surface in a few areas.

Library: FSU [GC83 .S82], UMCP [GC83 .W5]

Emery, K. O. 1966. Atlantic continental shelf and slope of the United States, a geological background. *U.S. Geological Survey Professional Paper* 529-A:1-23.

Library: Johns Hopkins Univ., California State Univ., Georgia State Univ., Univ. of Wisconsin

Emery, K. O. and L. E. Garrison. 1967. Sea levels 7000 to 20,000 years ago. *Science* 157(3789):684-687.

Abstract: Relative sea levels for early post-Pleistocene time are best known from radiocarbon dates of sediments on the continental shelves of Texas and off northeastern United States. Differences in indicated rates of the rise of relative sea level and in depths of the shelf-breaks reveal differential vertical movement of the two shelves during this time, with the result that the Atlantic shelf has sunk with respect to the Texas shelf.

Library: BSU, CBL, CSU, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Enderson, J. H. 1965. A breeding and migration survey of the peregrine falcon. *The Wilson Bulletin* 77(4):327-339.

Abstract: Banding records of Peregrine falcons, *Falco peregrinus*, indicate that many of the presumed "arctic" birds migrate to Central and South America to winter. Migrants reach the northern border of the United States in the first week of October. Peregrines winter rarely in the United States, except in coastal areas. They are especially conspicuous on the Atlantic and Gulf coasts, and most must be "arctic" birds since the eastern resident population has virtually disappeared.

Library: FSU, SMC, TU, UD-Morris, UMCP

Engle, J. B. and V. S. Loosanoff. 1944. On season of attachment of larvae of *Mytilus edulis* Linn. *Ecology* 25(4):433-440.

Abstract: The period of intense setting by *Mytilus edulis* was from mid-June to mid-July with peak setting confined to the week of 29 June – 6 July 1943. Mussels set in large numbers on collectors set on the bottom at a depth of 6 feet, and also on collectors suspended at the mean low water level. Those kept at the +2 and +5-foot tidal levels showed an extremely light set. The number of mussels found in different sections of the vertical collector showed that the upper limit of heavy mussel setting lies between one and two feet above the mean low water mark. Above that level the intensity of setting diminished abruptly. Between that level and the bottom the mussel set in large numbers. Observations indicated that the attachment of mussel larvae usually occurs when the water level is near the mean low water mark. The failure of mussel setting toward the end of the summer might be due to the absence of mature larvae. Although spawning continued at that time and young larvae were present in the water, virtually all of them disappeared before reaching the advanced stages of development. A correlation between the number of mature larvae and the intensity of setting is suggested. A similarity in the intensity of setting of local oysters (*Crassostrea virginica*) and mussels during the last five years was observed.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Epifanio, C., C. Valenti and A. Pembroke. 1984. Dispersal and recruitment of blue crab larvae in Delaware Bay. *Estuarine, Coastal, and Shelf Science* 18:1-12.

Library: CBL, HPL, SU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Ernst, C. H. and R. W. Barbour. 1972. *Turtles of the United States*. University of Kentucky Press (Lexington).

Library: MSU, SMC, UD-Morris, UMBC, UMCP, UMES [all are QL666.C5 E76], Ernst, C. H, R. W. Barbour and J. E. Lovich. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press (Washington, D.C.). xxxvi1i + 578 pp.

Library: SMC, SU, UD-Morris, UMCP [all are QL666.C5 E76 1994]

Erwin, R. M. 1977. Foraging and breeding adaptations to different food regimes in three seabirds: The common tern, *Sterna hirundo*, royal tern, *Sterna maxima*, and black skimmer, *Rhynchops niger*. *Ecology* 58(2):389-397.

Abstract: Aspects of foraging and breeding ecology of the Royal Tern, *Sterna* [=*Thalasseus*] *maxima*, Common Tern, *Sterna hirundo*, and Black Skimmer, *Rhynchops niger*, were compared in light of the food resource. Field studies conducted in 1973 and 1974 on two of Virginia's barrier islands revealed that the three species differed markedly in foraging ranges and habitat use, social feeding tendencies, and colony sizes and distribution. The investigation was designed to examine how these behavioral and ecological differences are related to different regimes of food patterns.

Analysis of beach seine records from inshore (<50 m) waters were compared with haul seine and trawl collections from offshore waters (>3 km) Ocean City, Maryland, Delaware Bay, and Chincoteague Bay. Spatial variability (between sampling site variation) was found to be much greater offshore than inshore, indicating greater 'patchiness' of fish. Also, the availability of surfacing fish appeared to fluctuate markedly over time.

In response to these food regime differences, Royal Terns, which feed further from the colony than Common Terns and Black Skimmers, (1) readily formed feeding aggregations, (2) showed large daily variability in feeding the young, and (3) were the most 'colonial' in nest-spacing, colony size and distribution. The strictly inshore-feeding skimmers usually fed alone, showed little variability in feeding, and formed the 'loosest' colonies of the three species. Common Terns were intermediate in all respects. The differences in the 'colonial tendencies' among species are consistent with the predictions of two earlier models relating breeding assemblages and food distribution.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Erwin, R. M. 1979. *Coastal Waterbird Colonies: Cape Elizabeth, Maine to Virginia*. U.S. Fish and Wildlife Service, Biological Service Program (FWS/OBS-79/10). 212 pp.

Library: UD-Morris [QL684.M2 K67]

Erwin, R. M. 1989. Responses to human intruders by birds nesting in colonies: experimental results and management guidelines. *Colonial Waterbirds* 12:104-108.

Library: UD (on line), JSTOR

Erwin, R. M., J. Galli and J. Burgen. 1981. Colony site dynamics and habitat use in Atlantic coast seabirds. *The Auk* 98(3):550-561.

Abstract: Seabird colony sizes and movements were documented in the DelMarVa coastal region in 1976-1977 and in New Jersey in 1978-1978. Most colonies were found on marsh and dredge depositions islands and on barrier island beaches. For the "traditionally" beach-nesting Herring Gull, Common Tern, and Black Skimmer, larger, more stable colonies were found on barrier beaches than on marsh islands. In marsh habitats, rates of colony-site change of marsh-nesting

Forster's Tern and Laughing Gulls were similar to those of the former beach nesters. Several adaptations have evolved in marsh specialists to cope with a high risk of reproductive failure due to flooding, but both Herring Gulls and Common Terns also appear to be very adaptable in nesting under various habitat conditions.

New colonies and those abandoned between years may be pioneering attempts by younger or inexperienced birds, because they are often smaller than persistent colonies, although patterns differ among areas and habitats. Colony-site dynamics are complex and result from many selective factors including competition, predation, physical changes in site structure, and flooding. The invasion of Herring Gulls into marshes along the mid-Atlantic coast has had an impact on new colony-site choice by associated seabirds. Calculating colony-site turnover rates allow for comparisons among species, habitats, and regions and may give useful insights into habitat quality and change and alternative nesting strategies.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Erwin, R. M. and C. E. Korschgen. 1979. *Coastal Waterbird Colonies: Maine to Virginia, 1977, An Atlas Showing Colony Locations and Species*. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Biological Services Program, FWS/OBS-79/08.

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Evans, J. J., A. W. Norden, F. Cresswell, K. Insley and S. Knowles. 1997. Sea turtle strandings in Maryland 1991 through 1995. *Maryland Naturalist* 41(1-2):23-34.

Library: CBL, FSU, SU, TU, UMBC, UMCP

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Everts, C. H. 1983. Shoreline changes downdrift of a littoral barrier. **IN:** *Coastal Structures '83*. US. Army Corps of Engineers. pp. 673-689.

Abstract: Crenulate-shaped bays form downdrift of coastal structures that impede the longshore transport of sediment. An extension of Silverter's method allows a prediction of the time-dependent evolution of a crenulate bay before littoral barriers are constructed. An example from Lower Township, New Jersey, illustrates the requirement for a downdrift boundary if the bay is to reach an equilibrium shape. Another example from south of the jetties at Ocean City Inlet, Maryland, shows the bay will continue to expand longitudinally until such a boundary is reached.

Everts, C. H. 1985. Effect of sea level rise and net sand volume change on shoreline position at Ocean City, Maryland. **IN:** *Potential Impacts of Sea Level Rise on the Beach at Ocean City, Maryland.* EPA 230-10-85-013. U.S Environmental Protection Agency (Washington, D. C.). pp. 67-98.

Abstract: The average measured shore retreat for the period 1930-80 was 176 ft, during which sea level rose 0.6 ft along the coast of Ocean City. Sand losses caused by longshore transport may be substantially reduced by a system employing a sand trap near Ocean City Inlet and a backpassing procedure to return the sand to the divergence nodal reach near the north end of Ocean City. The Bruun method implies that a beach nourishment solution would require 1.5-2.4 million cubic yards of sand through 2000 and 4.5-6.5 million cubic yards through 2025. The

Everts method projects that 4.6-5.2 million cubic yards of sand will be necessary through 2000 and 11.3-12.9 million cubic yards through 2025.

Library: UD-Morris [EP 1.2:Se 1/6]; CBL, FSU, SU, UMCP, UMES [all are GB459.4 .P67 1985]

Everts, C. H. 1987. Continental shelf evolution of response to a rise in sea level. **IN:** *Sea-Level Fluctuation and Coastal Evolution*, D. Nummedal, ed. SEPM Special Publication (Tulsa, Oklahoma). pp. 49-57.

Abstract: As the shoreface part of the inner continental shelf retreats, its edge forms a new surface which becomes an extension of the ramp. Waves are primarily responsible for shaping the concave shoreface at the shallow, most landward part of the shelf. Shoreface retreat occurs because of sand losses and/or sea-level rise. At Smith and Assawoman Islands in Virginia, present shoreline retreat rates are similar to the long-term shoreline retreat rates of the past when referenced to the same relative sea-level rise rates. These islands are migrating landward as littoral sand is transported landward by overwash and tidal inlet processes. At Ocean City, Maryland, Sandbridge, Virginia, and a portion of the Outer Banks, North Carolina, the present shore retreat rate is anomalously low when compared to the present relative rate of sea-level rise.

Library: UD-GCMES [QE1 .S67 no. 41], UMCP [QE696 .S425 1987]

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Fahrig, L., B. Hayden and R. Dolan. 1993. Distribution of barrier island plants in relation to overwash disturbance: a test of life history theory. *Journal of Coastal Research* 9(2):403-412.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Falk, J. M. 1999. Water-use planning in Delmarva's coastal bays: addressing carrying capacity issues. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:88-91

Library: FSU [EP 1.23/6:620/R-00/001]

Fang C. S., J. P. Jacobson, A. Rosenbaum, and P. V. Hyer. 1977. *Intensive hydrographical and water quality survey of the Chincoteague/ Sinepuxent/ Assawoman Bays, Vol. II. Data report: Intensive hydrographical and water quality.* Special Scientific Report No.82. Virginia Institute of Marine Science, Gloucester Point, VA.

Abstract: Included in this volume were raw data tables from an intensive water survey conducted in August of 1975 and annual (1975-1976) slack water runs for all Maryland Coastal Bays. Measurements made included general physical conditions (depth, tidal stage, temperature, salinity, secchi disk readings, dissolved oxygen, pH, and turbidity), as well as biochemical parameters (NO3, NO2, NH4, TKN, TOC, PO4, BOD5, Chlorophyll-a, and coliform bacteria). Additionally, current and tidal measurements were reported for both the intensive survey and annual sampling.

Fang, C. S., A. Rosenbaum, J. P. Jacobson and P. V. Hyer. 1977. *Intensive Hydrographical and Water Quality Survey of the Chincoteague/Sinepuxent/ Assawoman Bays, Vol. II. Data Report: Intensive Hydrographical and Water Quality.* Special Scientific Report No. 82. Virginia Institute of Marine Science (Gloucester Point).

Abstract: A description of objectives and the study area were presented for this Maryland Water Resources sponsored study (see also Cerco et al.. Fang et al., Hyer et al.). Data needed to calibrate a runoff model were collected in an intensive survey and during slack water runs every month for an annual cycle. A description of sampling regime/ water analysis, and sampling stations was presented for both surveys. An analysis of current and tidal data for Chincoteague Bay indicated that the freshwater source was from Trappe Creek and Newport Bay and that oceanic waters entered through two inlets. Results of benthic oxygen demand studies from 5 sites showed that there were approximately 2.2 g O2 m-2 d-1 demand in clear chambers and from 0.42 to 2.1 g O2 m~2 /d in dark chambers. Primary production estimates from one station resulted in a gross production rates of 6.8 mg//d for one day and 7.3 mg/L/d for a second day in August.

Farris, A. S. and J. H. List. 2007. Shoreline change as a proxy for subaerial beach volume change. *Journal of Coastal Research* 23(3):740-748.

Abstract: It is difficult and expensive to calculate changes in sediment volume for large sections of sandy beaches. Shoreline change could be a useful proxy for volume change because it can be collected quickly and relatively easily over long distances. The authors summarize several studies that find a high correlation between shoreline change and subaerial volume change. They also examine three new data sets. On Cape Cod, Massachusetts, the correlation coefficients between the time series of shoreline change and subaerial volume change at two locations are 0.73 and 0.96. On Assateague Island, the correlation coefficient between along-coast variations in shoreline change and subaerial volume change is 0.71. On the Outer Banks of North Carolina, the average correlation coefficient between temporal variations in shoreline change and subaerial volume change is 0.84. For spatial variations, the average correlation coefficient is 0.88. It is therefore concluded that shoreline change is a useful proxy for subaerial volume change.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Faust, M. A. 2006. Creation of the subgenus *Testeria* Faust subgen. nov. *Protoperidinium* Bergh from the SW *Atlantic Ocean*: *Protoperidinium novella* sp. nov. and *Protoperidinium concinna* sp. nov. Dinophyceae. *Phycologia* 45(1):1-9.

Abstract: Two new heterotrophic *Protoperidinium* species are described from oceanic waters from The Gulf Stream, SW Atlantic Ocean and Belizean Atlantic Barrier Reef Ecosystems, Caribbean Sea. *Protoperidinium novella* Faust sp. nov. and *P. concinna* Faust sp. nov. show a plate formula of 4', la, 7", 4C(3+t), 6S, 5"', and 2"", which is atypical for the genus. It is characterized by a miniscule flat closure on the extreme anterior of the pointed apical horn. Apical pore complex is absent. Apical ventral plate I' disconnects from the tip of the apical horn and connects directly to the anterior sulcal plate (Sa) along a straight line of the longitudinal axis of the

cell's sagittal plane. The shape and position of the intercalary plate (la) is another distinctive feature for these species, the presence of only one la plate. The thecal plate features of *P. novella* and *P. concinna* justifies the establishment of the new subgenus, *Testeria* Faust subgen. nov. The relationship with other congeneric species and the position within the genus *Protoperidinium* are discussed.

Library: CBL, TU, UD-GCMES, UMCP

Federighi, H. 1930. Salinity and size of *Urosalpinx cinerea* Say. *American Naturalist* 64(691):183-188.

Abstract: *Urosalpinx cinerea* was collected from two localities (Beaufort, North Carolina, and Norfolk, Virginia) with different salinities, but only slightly similar temperature, and lengths were measured. Results indicate that the animals grow to a larger size in brackish waters than in those with higher salinities. An attempt was made to explain the contradictory results in other forms.

Library: BSU, FSU, HPL, SMC, SU, TU, UD-GCMES, UD-Morris, UMBC, UMCP

Federighi, H. 1931. Studies on the oyster drill (*Urosalpinx cinerea* Say). *Bulletin of the U.S. Bureau of Fisheries* 47(4):85-115.

Abstract: A study of the distribution, migration, feedings activities, breeding habits, and rheotropic and geotropic behavior of the American oyster-drill, *Urosalpinx cinerea* Say, with recommendation of measures for its control over infested oyster beds and for checking its further distribution.

Library: UD-GCMES, UD-Morris, UMCP

Feeley, J. B. 1967. *The Distribution and Ecology of the Gammaridea (Crustacea, Amphipoda) of the Lower Chesapeake Estuaries*. Master of Science Thesis, College of William and Mary (Williamsburg, Virginia).

Library: College of William & Mary, VIMS

Fehrer, M. D., P. H. Wanner, M. C. Taylor, and W. L. Grogan, Jr. 1992. Bald cypress, *Taxodium distichum* (Coniferales: Taxodiaceae), a primary food source of gypsy moth, *Lymantria dispar*, in Maryland (Lepidoptera: Lymantriidae). *Proceedings of the Entomological Society of Washington* 94(1):119-122.

Abstract: The gypsy moth, *Lymantria dispar*, was observed feeding on bald cypress, *Taxodium distichum*, during 1987 on the Maryland portion of the Delmarva Peninsula. This is the first record of bald cypress as a natural food source of gypsy moths. Three sites dominated by bald cypress (>50%) in Worcester County, Maryland, were sampled during 1989 to determine whether gypsy moths could use this species as a primary food source and for ovoposition sites. Gypsy moth larvae fed readily on bald cypress needles in the laboratory, and underwent metamorphosis, mated and oviposited on an exclusive diet of this deciduous conifer. The average number of egg masses per tree (at two sites) increased from 5.5 to 10.5 (a 95% increase) between March and September 1989. Seventy-seven percent of laboratory reared larvae fed exclusively on bald cypress needles, completed larval development and emerged as adults.

Library: TU, UD-Morris, UMBC, UMCP

Feller, E. 1999. Update on federal legislation regarding the coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:105-106.

Library: FSU [EP 1.23/6:620/R-00/001]

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Library: UD-GCMES, UD-Morris, UMCP

Field, L. R. [1949] 1950. Sea anemones and corals of Beaufort, North Carolina. Duke University Press (Durham, North Carolina). *Duke University Marine Station Bulletin* 5:1-39.

Abstract: A description of 14 species of anthozoans is presented: one of stony corals, two of horny corals, one pennatulacean, one ceriantharian, and 9 sea anemones, including *Actinothoe eruptaurantia*, is presented. External anatomy, mesenterial patterns, snidae types, reproduction methods and ecological relationships are noted. Synonymy, glossary, bibliography, and an identification key are included.

Library: UD-GCMES, UD-Morris

Field, M. E. 1976. *Quaternary Evolution and Sedimentary Record of a Coastal Plain Shelf: Central Delmarva Peninsula, Mid-Atlantic Bight, U.S.A*. Ph.D. Dissertation, George Washington University (Washington, D.C.). 200 pp.

Library: George Washington Univ.

Field, M. E. 1979. Sediment, shallow subbottom structure, and sand resources of the inner continental shelf, central Delmarva Peninsula. Technical Paper 79-2, U.S.

Abstract: A data base consisting of 880, 180, and 35 kilometers (475, 97, and 19 nautical miles) each of high resolution seismic reflection, bathymetric, and side-scan sonar profilings was obtained in 1970 and 1974, along with 71 vibratory cores and 3 onshore borings. These data were analyzed to assess the resource potential of sand suitable for use in beach restoration and to establish the Quaternary evolutionary framework of the northern Delmarva inner shelf. Shallow subsurface strata consist of gently dipping Neogene sedimentary beds that conform to the gradient and direction of the Atlantic Coastal Plain and display no evidence of tectonic deformation. Eleven major acoustic surfaces, including the presumed Tertiary-Quaternary nonconformity at about -30.5 to -61 meters (-100 to -200 feet), are present within the upper 122 meters (400 feet) of the shelf subbottom. Buried channels are common to the sea floor of the entire region; in the Delaware Bay entrance, most channels are cut to 46 meters (150 feet) below sea level and are filled laterally from both the New Jersey and Delaware shelves. Many small channels on the Maryland shelf are alined with existing onshore drainage or historical inlet sites.

Field, M. E. 1980. Sand bodies on coastal plain shelves; Holocene record of the U.S. Atlantic inner shelf of Maryland. *Journal of Sedimentary Petrology* 50(2):505-528.

Abstract: The inner continental shelf of Maryland, Delaware and northern Virginia has been examined with high-resolution seismic reflection equipment and vibracores to develop an understanding of Quaternary processes and history on a coastal plain shelf. Morphology of the study region is dominated by the large shelf valley of the ancestral Delaware River and estuary and a linear-ridge field. Shallow subsurface strata consist of gently seaward-dipping Neogene sedimentary units showing no evidence of tectonic deformation -30 m to -60 m, are present within the upper 120 m of the shelf subbottom. Buried channels are common to the seafloor of the entire region; in the Delaware Bay entrance, most are cut to 45 m below sea level and were filled laterally by split platform progradation from both the New Jersey and Delaware shelves. Many small channels on the Maryland shelf are aligned with existing onshore drainage or historical inlet sites and display a linear relationship between maximum thalweg depth and distance from shore.

The upper 6 m of the sedimentary sequence of the inner shelf consists of terrigenous sand and silt derived from the adjacent Coastal Plain and Piedmont provinces. Four major sediment types are recognized: three of these are subarkosic arenites varying only in modal grain size and sorting; the fourth is a slightly sandy mud. Environments of deposition preserved on the present shallow shelf are: modern marine, back barrier, lagoonal and fluvial. Gray-brown, fine to coarse, well-sorted quartz sand is the dominant type of surface sediment and its relative abundance decreases in the subsurface. Increases in sand thickness occur locally in ridge areas and correspond directly to topographic relief. The ridge sand unconformity overlies poorly sorted fine sand and mud remnant from Holocene back barrier and lagoonal deposition; coarse constituents of the unit are commonly incorporated into the base of the ridge sand.

Linear ridges are a dominant topographic feature of the U.S. mid-Atlantic shelf, and they are particularly well-defined on the Maryland shelf. Marked similarities in geometry and sediment relations in these features provide evidence of their origin on the Holocene shoreface and later segmentation and isolation on the shelf. Individual ridges commonly display a progressive south to north change from a well-defined, narrow, single-crested shape to a poorly defined, broad, multicrested shape. This axial trend and the variation in coastal intersection angle are inherited from the ridge's origin on the shoreface where growth and bifurcation occur along the northeastern tip.

Shelf sand bodies off the central Delmarva Peninsula have formed by wave and current processes acting on previously deposited sediments, and these sand bodies are being formed and modified at present. The inner shelf of this region represents the trailing edge of a marine transgression; as such it is the coastal sedimentary facies most likely to be preserved in the rock record.

Library: CBL, FSU, SMC, TU, UD-Morris, UMBC, UMCP

Fieser, E. 2002. Housing run-up leads to big reassessment. *The Daily Record* (Baltimore, Maryland), 30 December, News.

Finkelstein, K. 1981. Holocene evolution of mesomicrotidal retrograding barrier island system, eastern shore of Virginia. *Geological Society of America Abstracts* 7:45.

Finkelstein, K. 1982. Accretional cape formation along straight barrier island shorelines. *Geological Society of America, Program Abstracts* 14:17.

Finkelstein, K. 1992. Stratigraphy and preservation potential of sediments from adjacent Holocene and Pleistocene barrier-island systems, Cape Charles, Virginia. **IN:** *Quaternary Coasts of the United States*, C. H. Fletcher, III and J. F. Wehmiller, Eds. SEPM, Society for Sedimentary Geology Special Publication 48:129-140.

Abstract: Two subaerial subparallel barriers are a result of separate marine transgressions that occurred before and after late Wisconsin glaciation. The present landward migration of the Holocene barrier should put it atop the Pleistocene barrier in approximately 1,400 years. Conformable and unconformable contacts separate the two barrier-island systems. With present sea-level rise and wave-base conditions continuing into the future, the lower Holocene and uppermost Holocene and uppermost Pleistocene transgressive sequences have strong preservation potential. The preserved succession of deposits consists of Pleistocene back-barrier mud and shoreface sand below Holocene back-barrier deposits. The stacking of transgressive barrier-deposits, albeit those from different transgressions, might serve as a stratigraphic petroleum trap if preserved into the geological record.

Library: TU, UD-Morris, UMBC, UMCP,

Fisher, A. 1999. Climate change and implications for coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:69-73

Library: FSU [EP 1.23/6:620/R-00/001]

Fisher, J. J. 1967. Origin of barrier island chain shoreline, middle Atlantic states. *Geological Society of America Special Paper* 115:66-67.

Abstract: Relict beach ridge patterns of the Virginia-North Carolina barrier islands ("Outer Banks") indicate development as a series of coast-parallel, extending spits. Reconstruction of former shorelines along the 225 miles of coast is as follows: 45% indicates initial development as coast-parallel spits; 45% as drowned and present-day headland beaches; 5% as cuspate forelands; and 5% as relict baymouth inlets.

Morphology of other Middle Atlantic barrier island coast lines (Cape Cod, Long Island, New Jersey, and Delmarva) is similar to that found for the Outer Banks coast line. Four distinct coast-parallel units can be recognized along each of these coast lines. They are: 1) an updrift spit or cuspate foreland; 2) a slightly convex seaward headland; 3) a slightly concave-convex barrier island unit; and 4) one or more strongly concave units of barrier islands.

No evidence found indicates development of barrier islands as features of emerged sea bottoms. This classical theory argued that offshore profiles along shore lines of emergence exhibit distinctive slope characteristics; however, forty 5-mile-wide projected offshore profiles constructed for this study indicate that all types of shore lines (barrier island, spit, baymouth bars, and even headlands) exhibit the same slope characteristics, a slope related not to origin, but to present-day wave conditions.

Rather than a feature of emergent conditions, barrier islands developed along a shore line of submergence. Decrease in the rate of sea-level rise at the end of the Hypsithermal interval allowed coastal prograding along both the Atlantic and Gulf coasts as barrier-island chains and chenier plains.

Library: UD-Morris

Fisher, J. S. 1977. Assateague Island: an appraisal of barrier island-storm interaction. *Bulletin of the American Meteorological Society* 58(10):1128.

Abstract: Tropical and extratropical storms play a major role in the sedimentary dynamics of this barrier island. Depending upon the magnitude and track, these storms can both supply and deplete the sand volume. Recent studies indicate that island stability is a function of the frequency and character of such storms.

Library: CBL, SU, UD-GCMES, UD-Morris, UMBC, UMCP

Fisher, J. S. 1980. Field and Laboratory Study of Storm Swash and Overwash Dynamics. Final Report (Assateague Island). *U.S. Government Reports Announcements* 14. 6 pp.

Abstract: Field studies at Assateague Island quantified the flux and frequency of overwash. Repeated surveys at several washovers revealed that storm-generated overwash transports sand landward up to 100 m past the beach crest for storms characterized by 1 year return periods. Post-storm winds transport this material seaward past the frontal dune line. Thus, overwash of this magnitude does not supply permanent sediments to the island interior or bay. Laboratory and field studies show that backshore structures enhance the backwash, and thus beach erosion, in the case of dunes, however, the dune erosion feeds the storm beach and thus offsets the erosion potential.

Fisher, J. S. and D. K. Stauble. 1977. Impact of Hurricane Belle on Assateague Island washover. *Geology* 5(12):765-768.

Abstract: The occurrence of Hurricane Belle on August 9, 1976 supplied additional data on the role of overwash on Assateague Island. Approximately 19 m SUP-3 of sand per metre of washover centerline (oriented normal to shoreline) was deposited at the survey site as a result of the storm. The major source of sand appears to be the beach and nearshore regions as opposed to the foredunes adjacent to the washover throat, because there is a lack of measured dune erosion. Unlike most winter storms, there was no concurrent offshore wind to deflate this deposit as the storm subsided. However, strong offshore winds in January 1977 eroded some 16 m SUP-3 /m from this centerline and redeposited this sand on the beach. This study suggests that overwash of the magnitude experienced during storms of less than major proportions may not be processes for significant long-term sand accumulation to this barrier island.

Library: BSU, SMC, SU, UD-Morris, UD-GCMES, UMBC, UMCP

Fisher, J. S., S. P. Leatherman and F. C. Perry. 1974. Overwash processes on Assateague Island. **IN:** *Proceedings of the 14th International Coastal Engineering, Copenhagen, Denmark*. American Society of Civil Engineers (New York). pp. 1194-1212.

Fisher, J. S. and D. K. Stauble, 1978. Washover and dune interaction on a barrier island. **IN:** *Coastal Zone '78,* Symposium on technical, environmental, socioeconomic and regulatory aspects of coastal zone management, S. E. Deegan, Ed. American Society of Civil Engineers (New York, NY).

Abstract: Studies on the northern end of Assateague Island have focused on only one of several important aspects of washover and foredune interactions. Nonetheless, they do serve to suggest some basic guidelines for the use of dune maintenance programs. The extrapolation of results to other areas must recognize that island width, dune size, wind climate, as well as overwash magnitude are all important elements which need further study in this context. Sand delivered to a washover will only provide nourishment for marsh growth when it is hydraulically transported there as overwash, or when post-storm winds blow it there. If however, the post-storm wind blows the sand back to the beach, it will help rebuild the foredunes and nourish the beach. Programs of

dune maintenance and repair can be incorporated into a general shoreline management strategy without adverse consequences to the sand budget.

Library: UMBC [GC1010 .C63 1978],

Flood, J. A. 1956. Low, narrow, 32 mile Assateague Isle becomes point of controversy. *The Evening Sun* (Baltimore, Maryland). 3 January.

Floor, J. A. 1956. Many attempts have been made to build a bridge to Assateague. *The Evening Sun* (Baltimore, Maryland). 4 January.

Flood, J. A. 1956. Two Assateague areas have single street. *The Evening Sun* (Baltimore, Maryland). 5 January.

Florschutz, O., Jr. 1959. *Mosquito Production and Wildlife Usage in Natural, Ditched, and Impounded Tidal Marshes on Assawoman Wildlife Area, Delaware*. Master of Science Thesis, University of Delaware (Newark). 94 pp.

Library: Univ. of Delaware

Flowers, C. 1963. One man's fight for an island. *The Sun* (Baltimore, Maryland). 28 February.

Flyger, V. 1960. Sika deer on islands in Maryland and Virginia. *Journal of Mammalogy* 41:410.

Library: FSU, SMC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Flyger, V. and N. W. Davis. 1964. Distribution of the Sika deer (*Cervus nippon*) in Maryland and Virginia in 1962. *Chesapeake Science* 5(4):212-213.

Abstract: Sika deer have spread from the original site of introduction on James Island in Chesapeake Bay and now occupy the western third of Dorchester County, Maryland. In Virginia they remain confined to Assateague Island.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Foltz, G. R., S. A. Grodsky, J. A. Carton and M. J. McPhaden. 2004. Seasonal salt budget of the northwestern tropical Atlantic Ocean along 38^{o}W. *Journal of Geophysical Research*. C. *Oceans* 109(C3):np.

Abstract: Strong seasonal river discharge, precipitation, evaporation, and the confluence of different water masses all contribute to a complex surface salinity seasonal cycle in the western tropical Atlantic. This paper addresses the atmospheric and oceanic causes of the seasonal variability in mixed layer salinity based on direct observations. Primary data sets include up to 5 years (September 1997 to December 2002) of measurements from moored buoys of the Pilot Research Array in the Tropical Atlantic (PIRATA), ship-intake salinity observations, and near-surface drifting buoys. We analyze the mixed layer salt balance at four PIRATA mooring locations along 38 degree W (15 degree N, 12^{o}N, 8^{o}N, and 4^{o}N). This region is strongly influenced by seasonally varying precipitation associated with the latitudinal migrations of the Intertropical

Convergence Zone. Thus at all four locations we find that surface freshwater fluxes are a major contributor to the mixed layer salt balance. The authors also find that horizontal transport plays a key role at most locations. At 15°N a strong seasonal cycle of horizontal advection contributes to a semiannual cycle of local storage. At 12°N the balance is mostly controlled by local surface freshwater fluxes, with a minor contribution from meridional advection. The strongest seasonal cycle of precipitation occurs at 8°N, resulting in a strong seasonal cycle of local salt storage. At 4°N the dominant semiannual cycle of precipitation is reflected in the surface freshwater flux. However, zonal and meridional advection are also significant, resulting in a strong annual variation in the mixed layer salt storage at this location. Some implications of our results for tropical Atlantic climate variability are briefly discussed.

Library: UD-GCMES, UD-Morris, UMBC

Forster, G. R. 1953. A new dredge for collecting burrowing animals. *Journal of the Marine Biological Association of the United Kingdom* 32(1):192-198.

Abstract: A light one-sided "anchor-dredge," designed to dig deeply into sands or muds on the sea bed, is described. Comparative tests and direct underwater observations have shown that the anchor-dredge samples the in-fauna more efficiently than do either large rectangular and oval dredges, or the more conical dredge.

Library: CBL, HPL, SMC, TU, UD-GCMES, UD-Morris, UMCP, UMES

Foss, J. E. 1981. Unique characteristics of the marshes. **IN:** *Conference on the Coastal Bays of Maryland and Virginia, Chincoteague, Sinepuxent and Assawoman*. Committee to Preserve Assateague Island, Inc. (Towson, Maryland). pp. 13-20.

Library: UMCP [QH541.5.C65 C653 1981]

Fowler, H. W. 1908. The king crab fisheries in Delaware Bay, and further notes on New Jersey fishes, amphibians and reptiles. *Report of the New Jersey State Museum for 1907*(Part III):111-119.

Abstract: A historical account of the king crab fishery of lower Delaware Bay and the various uses to which they had been put.

Library: UD-Morris

Fowler, H. W. 1911. The fishes of Delaware. *Proceedings of the Academy of Natural Sciences of Philadelphia* 63:3-16.

Library: CBL, SMC, TU, UD-Morris, UMCP

Fowler, H. W. 1912. The Crustacea of New Jersey. Annual Report of the New Jersey State Museum 1911(3):31-650.

Abstract: The fairy shrimp *Ino holmani* (= *Eubranchipus holmani*) is reported from specimens collected at Chincoteague, Virginia, in 1911. The materials was fragmentary.

Library: UD-Morris

Fowler, H. W. 1913. Notes on the fishes of the Chincoteague region of Virginia. *Proceedings of the Academy of Natural Sciences of Philadelphia* 65:61-65.

Library: CBL, SMC, TU, UD-Morris, UMCP

Fowler, H. W. 1914. Notes on the fishes at Ocean City, Maryland. *Copeia* 1914(2):2-3.

Library: CBL, FSU, SMC, SU, TU, , UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Fowler, H. W. 1925. Records of amphibians and reptiles for Delaware, Maryland and Virginia III. Virginia. *Copeia* 1925(146):65-67.

Library: CBL, FSU, SMC, SU, TU, , UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Foyle, A. M. and G. F. Oertel. 1992. Seismic stratigraphy and coastal drainage patterns in the Quaternary section of the southern Delmarva Peninsula, Virginia. *Sedimentary Geology* 80(3-4):261-277.

Abstract: Seismic-stratigraphic analysis of the coastal zone and inner shelf of Virginia's southern Delmarva Peninsula has revealed three geochronologically significant surfaces of post-Tertiary age that impose a relative chronostratigraphic framework on Quaternary marine transgressive and regressive events. Characteristics of these surfaces indicate that two are sequence boundaries, and one is a ravinement surface. The Pleistocene channels are large and limited in number and represent high-order channels of a drainage system that drained the Piedmont and Coastal Plain. The greater density of low-order stream channels on the H_b surface suggests a relationship to much smaller drainage basins that were confined to the seaward part of the Coastal Plain east of the Delmarva Peninsula.

Library: TU, UD-Morris, UMBC, UMCP,

Franklin, B. A. 1980. Let them eat oysters, Chincoteague festival says. *The New York Times*, 13 October, Section 1, p. 18.

Fraser, C. M. 1944. *Hydroids of the Atlantic Coast of North America*. University of Toronto Press (Toronto, Ontario, Canada). 431 pp.

Library: CBL (stacks), UD-GCMES [QL 377 .H9 F7 1977]

Freeman, B. L. and L. A. Walford. 1974. *Anglers' Guide to the United States Atlantic Coast. Section 4. Delaware Bay to False Cape, Virginia.* U.S. Department of Commerce, U.S. National Marine Fisheries Service, (Seattle, Washington). 18 pp.

Abstract: This is the 4th of an 8 part series dealing with fish, fishing grounds and fishing facilities. It is mainly a geographical study of marine recreational fishing. Pertinent information is given on land configuration and water depth, fish and fishing. Sections shown are Delaware Bay, Cape May to Sinepuxent Bay, Chincoteague Bay to Quinby Inlet, Atlantic City to Ocracoke. In addition to a specialized glossary, a chart of the most commonly caught fishes is included.

Library: UD-GCMES [Folio+ SH464.A85 F73], UD-Morris [oversize C 55.308:AN 4/976]

Frick, J. 1976. Orientation and behavior of hatchling green turtles (*Chelonia mydas*) in the sea. *Animal Behavior* 24:849-857.

Library: CBL, FSU, SNC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Frye, K. 1986. *Roadside Geology of Virginia*. Mountain Press Publishing Company (Missoula, Montana). x + 278 pp.

Library: FSU, SMC, UD-Morris, UMBC, UMCP [all are QE173 .F78 1986]

Fulford, E. T. 1985. *Investigation of the Effects of Scouring Under the Route 50 bridge in the Sinepuxent Bay.* U.S. Army Corps of Engineers FHWA/MD-85/05 (Baltimore, MD). 94 pp. [NTIS Order No.: PB87-182184/GAR].

Abstract: Scouring of the material at the base of the bridge bents and bascule piers of the U.S. Route 50 bridge over the Isle of Wight Bay at Ocean City, Maryland has been identified by the Maryland State Highway Administration (MDSHA). As a result of the scouring action, depths of the existing bottom have increased from an average of -3.0 feet mean low water (mlw), at the time of bridge construction, to as deep as -36 feet mlw in some locations today. Continued deepening of the bottom in these areas is expected to impact on the stability of the bridge in the near future. The report discusses the investigation which includes an identification of the extent of the scour problem and alternative solutions. (Sponsored by Federal Highway Administration, Baltimore, MD. Maryland Div., and Maryland State Highway Administration, Baltimore.)

Library: UMCP [TG320 .F65 1985]

Furbish, C.E. 1990. *Factors affecting the distribution of Distichlis spicata in the Spartina alterniflora saltmarshes of Assateague Island, Maryland*. Master of Science Thesis, University of Maryland Eastern Shore, Princes Anne.

Abstract: Specific physical, biological and chemical parameters believed to limit the growth of marsh grasses were examined. The results of physical and chemical studies suggested that decreased tidal flushing (due to man-made dune lines) along with an increase in elevation may have decreased subsurface salinities, which could account for the high stem densities of *D. spicata*. Behavioral observations and fecal analysis indicated that feral horses were plausibly responsible for preferential grazing pressure. The results of biological testing showed that the grasses responded to simulated preferential grazing with increased *D. spicata* coverage and decreased S. alterniflora coverage.

Furbish, C. E. and M. Albano. 1994. Selective herbivory and plant community structure in a mid-Atlantic salt marsh. *Ecology* 75(4):1015-1022.

Abstract: Factors affecting the distribution of the grasses *Spartina alterniflora* and *Distichlis spicata* in a mid-Atlantic salt marsh were examined. A series of eight shallow wells, four in patches of each grass type, was used to describe physicochemical conditions known to limit the distribution of both grasses. Tidal amplitude, surface and subsurface salinity, and subsurface oxidation-reduction potential were found to be within range, but suboptimal, for both grasses. Evidence of selective grazing upon *S. alterniflora* was found through examination of grazing sign within the grass pathches, observations of feral horse feeding behavior, and examination of feral horse feces for grass epidermal fragments. An exclosure experiment simulated preferential grazing and showed that *S. alternifora* responded negatively while *D. spicata* responded positively to simulated preferential grazing of *S. alterniflora*. These results point to a competitive relationship

between the grasses under suboptimal conditions for dominance of either species. Selective herbivory (analogous to predation) upon *S. alterniflora* was shown to be a plausible factor impacting the competitive relationship to favor *D. spicata*. Location along physical gradients, interspecies competition, and herbivory are discussed in relation to salt marsh plant communities.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Gallegos, C. L. 1994. Refining habitat requirements of submerged aquatic vegetation: Role of optical models. *Estuaries* 17(1B):187-199.

Abstract: A model of the spectral diffuse attenuation of downwelling irradiance was constructed for Chincoteague Bay, Maryland, and the Rhode River, Maryland. The model is written in terms of absorption spectra of dissolved yellow substance, the chlorophyll-specific absorption of phytoplankton, and absorption and scattering by particulate matter (expressed as turbidity). Based on published light requirements for submerged aquatic vegetation (SAV) in Chesapeake Bay, the model is used to calculate the range of water-quality conditions that permit survival of SAV at various depths. For estuaries in which light attenuation is dominated by turbidity and chlorophyll, the model delimits regions in which turbidity alone (chlorophyll < 10 µg/L), chlorophyll alone (turbidity > 1 NTU) or both factors (chlorophyll < 10 µg/L, turbidity > 1 NTU) must be reduced to improve survival at depths for SAV.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Galtsoff, P. S. 1964. The American Oyster, *Crassostrea virginica* Gmelin. *U.S. Fish and Wildlife Service Fisheries Bulletin* 64:1-480.

Library: UD-GCMES, UD-Morris, UMCP

Galtsoff, P. S. and V. L. Loosanoff. 1939. Natural history and method of controlling the starfish (*Asterias forbesi* Desor). *U.S. Bureau of Fisheries Bulletin* 49(31):73-132.

Abstract: Annual fluctuations in abundance of *Asterias forbesi*, frequently observed in Buzzard's Bay, Narragansett Bay, and Long Island Sound, are caused by changes in the rate of propagation and survival of local stocks but not be invasions of starfish from the outside. Observations made in 1935-1936 at regular intervals over entire areas of the bays and Sound, disclosed no marked seasonal changes in starfish distribution. The concentration of starfish in the inshore areas is correlated with the abundance of food (oysters and other molluscs) in shallow water. There was some redistribution of starfish within these areas, but no extensive seasonal migration from deep to shallow water and vice-versa. This is further corroborated by the fact that marked starfish released in Long Island Sound were found 10 months later only about a mile from the place of release. Observations made of individual specimens kept in large outdoor tanks confirm the findings in field studies, that movements of starfish are slow and irregular. Chemotropism is not of importance in directing the migrations of starfish as apparently *A. forbesi* does not detect food until close to it. Ripe starfish spawn when temperature is raised to 20^{o}C. In Long Island Sound they begin to spawn at 15^{o}C in the middle of June and continue until the end of August. From 2 July to 23 September starfish larvae set in Long Island Sound at all depths from mean low water to 70 feet; heaviest setting occurs at 10 ft. During the prespawning period, the majority of animals are indifferent to food; soon after completion of spawning they become voracious; with the onset of the cold season they consume little food. Various mechanical and chemical methods of controlling starfish are discussed. Particles of quicklime scattered over infested bottoms inflict

severe wounds and cause death. This method of control is more effective than others and can be used with no danger to marine life in general.

Library: UD-GCMES, UD-Morris, UMCP

Ganster, K. 2001. Watch out for the wild ponies while camping at Assateague Island. *Pittsburgh Post-Gazette* (Pittsburgh, Pennsylvania), 24 June, Arts and Entertainment, p. F-1.

Garber, S. D. 1988. Diamondback terrapin exploitation. *Plastron Papers* 17(6):1-5.

Gardiner, S. L. 1976. Errant polychaete annelids from North Carolina. *Journal of the Elisha Mitchell Scientific Society* 91:77-220.

Library: UD-GCMES, UD-Morris, UMBC, UMCP

Gardiner, S. L. and W. H. Wilson, Jr. 1979. New records of polychaete annelids from North Carolina with description of a new species of *Sphaerosyllis* (Syllidae). *Journal of the Elisha Mitchell Scientific Society* 93(4):159-172.

Library: UD-GCMES, UD-Morris, UMBC, UMCP

Gaskin, P. and J. R. Stottlemyer. 1974. Ecological and economic principles in park planning. The Assateague National Seashore model. *Coastal Zone Management Journal* 1(4):395:413.

Abstract: The National Park Service is required by law to conserve nationally significant resources for public benefit. Susceptibility to local short-term economic pressures and a lack of understanding of resource dynamics can jeopardize mandate compliance. Assateague Island National Seashore is an example of a dynamic barrier island where early understanding of ecologic factors should have preceded its establishment and must precede its management and development. Research conducted on a similar system has demonstrated the dramatic environmental impacts and high maintenance costs associated with an inappropriate recreation management scheme. Alternatives are available which minimize resource degradation and maintenance costs without restricting visitation. To better ensure incorporation of long-run ecologic and economic criteria into the decision-making process, a proposal is put forward which recognizes the need for an expanded research effort and close adherence to early planning steps.

Library: CBL, HPL, UD-Morris, UMCP

Gastrich, M. D. and C. E. Wazniak. 2002. A brown tide bloom Index based on the potential harmful effects of the brown tide alga, *Aureococcus anophagefferens*. *Aquatic Ecosystem Health and Management* 5(4):435-441.

Abstract: Harmful algal blooms [HABs] are an increasing phenomenon in coastal areas of the world. Recurring harmful brown tides caused by the minute alga, *Aureococcus anophagefferens*, are a regional problem in the Northeast Atlantic states of the United States. Brown tide blooms may cause significant ecological impacts on natural resources. A Brown Tide Bloom Index was developed based on published scientific studies and agency reports that relate concentrations of the brown tide organism to potential negative impacts on natural resources including shellfish, seagrasses and protozoa. For the first time, the index provides terminology that can be used to convey accurate information about impacts to natural resources resulting from concentrations of brown tide to scientists, environmental managers and the public. The purpose of the Brown Tide Bloom Index is to provide a metric, based on available scientific studies, which can be used by environmental managers to communicate the magnitude of brown tide blooms and impacts to natural resources. The Brown Tide Bloom Index includes three categories of brown tide blooms: Category 1 blooms (algal concentrations at <35,000 cells $m1^{-1}$) have no reported impacts; Category 2 blooms (≥35,000 to <200,000 cells $m1^{-1}$) have potential negative impacts on feeding and growth in shellfish; Category 3 blooms (≥200,000 cells $m1^{-1}$), discolor the water a yellow-brown and may cause severe impacts and mortality on shellfish, reduction in seagrasses and planktonic organisms.Gathof, J. M. 1984a. Family Phyllodocidae Williams, 1851. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 3:19-1 - 19-42.

Library: UD [on line via Science Direct]

Gathof, J. M. 1984b. Family Onuphidae Kinberg, 1865. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 6:39-1 - 39-35.

Library: Univ. of Alaska, Arizona State Univ., EPA, LOC

Gathof, J. M. 1984c. Family Eunicidae Savigny, 1818. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 6:40-1 - 40-31.

Library: Univ. of Alaska, Arizona State Univ., EPA, LOC

Gathof, J. M. 1984d. Family Arenicolidae Johnston, 1835. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 7:58-1 - 58-2.

Library: Univ. of Alaska, Arizona State Univ., EPA, LOC

Gathof, J. M. 1984e. Family Chrysopetalidae Ehlers, 1854. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 3:26-1 – 26-10.

Library: Univ. of Alaska, Arizona State Univ., EPA, LOC

Gatson, G. R. 1984. Family Paraonidae Cerruti, 1909. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 1:2-1 - 2-53.

Library: Univ. of Alaska, Arizona State Univ., EPA, LOC

Gaul, C. 1964. Worcester set for last stand over island. *The Evening Sun* (Baltimore, Maryland). 22 December.

Gawne, C. E. 1966. *Shore Changes on Fenwick and Assateague Islands, Maryland and Virginia*. Bachelor of Arts Thesis, University of Illinois (Urbana,). 140 pp.

Library: Univ. of Illinois, U.S. Army Res (Vicksburg)

Gerould, J. H. 1913. Siphunculids of the eastern coast of North America. *Proceedings of the United States National Museum* 44:373-437.

Library: CBL, TU, UD-Morris, UMCP

Gibbons, J. W. and J. W. Coker. 1978. Herptofauna colonization patterns of Atlantic coast barrier islands. *American Midland Naturalist* 99:219-233.

Journal Description: The *American Midland Naturalist* has been published for 90 years by the University of Notre Dame. The connotations of Midland and Naturalist have broadened and its geographic coverage now includes North America with occasional articles from other continents. The old image of naturalist has changed and the journal publishes what Charles Elton aptly termed "scientific natural history" including field and experimental biology. Its significance and breadth of coverage are evident in that the *American Midland Naturalist* is among the most frequently cited journals in publications on ecology, mammalogy, herpetology, ornithology, ichthyology, parasitology, aquatic and invertebrate biology and other biological disciplines.

Library: CBL, FSU, HPL, SMC, TU, UD-Morris, UMBC, UMCP, UMES

Gibbs, R. A., Jr. and B. B. Collette. 1959. On the identification, distribution and biology of the dolphins, *Coryphaena hippurus* and *C. equiselis*. *Bulletin of Marine Science of the Gulf and Caribbean* 9(2):117-152.

Abstract: *Coryphaena hippurus*, the common dolphin, and *Coryphaena equiselis*, to pompano dolphin, were studied. The specific name *equiselis* is considered valid, as opposed to the emended form *equisetis*. The two species differ markedly in numbers of dorsal and anal rays and lateral-line scales, in morphometric characters which reflect depth, in relative heights of dorsal and anal fins, in the shape of the tooth patch on the tongue, and in the color pattern and head spination of the young. Weights of males and females are similar below about 950 mm, after which males appear heavier. Both species are probably cosmopolitan in warm seas. *C. hippurus* is most often caught in waters over 70^{o}F. Adults of *C. equiselis* are seldom caught and are probably more pelagic and more tropical. *C. hippurus* breeds in the summer in the Gulf Stream, earlier in the Caribbean. Young C. hippurus are, paradoxically, less abundant than those of *C. equiselis*, particularly in the Gulf of Mexico and Florida Current. The sex ratio of *C. hippurus* is 1:1 in the Gulf Stream, but females apparently predominate in Caribbean sport catches. Stomach analyses show fishes to be the most abundant item in the diet of *C. hippurus*, with no evidence of selectivity. There is some indication that feeding is inhibited at night.

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Gibson, G. R., Jr. 1990. The near coastal waters of the east coast: Mid-Atlantic – under threat? **IN:** *Focus on Maryland's Forgotten Bays: Report on the Conference on the Outer Coastal Bay*s. Committee to Preserve Assateague Island, Inc. (Towson, Maryland). pp. 108-112.

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Gilbert, K. M. 1984. Family Glyceridae Grube, 1850. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 5:32-1 - 32-36.

Library: Univ. of Alaska, ASU, LOC, EPA

Gilbert, K. M. 1984. Family Goniadidae Kinberg, 1866b. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 5:33-1 - 33-19.

Library: Univ. of Alaska, ASU, LOC, EPA

Gilbert, K. M. 1984 Family Chaetopteridae Malmgren, 1867b. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 2:11-1 - 11-13.

Library: Univ. of Alaska, ASU, LOC, EPA

Glibert, P.M., R. Magnien, M. W. Lomas, J. Alexander, C. Fan, E.Haramoto, M. Trice, and T.M. Kana. 2001. Harmful Algal Blooms in the Chesapeake and Coastal Bays, Maryland, USA: Comparison of 1997, 1998 and 1999 events. Estuaries 24(6a),875-883.

Abstract -- Harmful algal blooms in the Chesapeake Bay and coastal bays of Maryland, USA, are not a new phenomenon, but may be increasing in frequency and diversity. Outbreaks of *Pfiesteria piscicida* (Dinophyceae) were observed during 1997 in several Chesapeake Bay tributaries, while in 1998, *Pfiesteria*-related events were not found but massive blooms of *Prorocentrum minimum* (Dinophyceae) occurred. In 1999, *Aureococcus anophagefferens* (Pelagophyceae) developed in the coastal bays in early summer in sufficient densities to cause a brown tide. In 1997, toxic *Pfiesteria* was responsible for fish kills at relatively low cell densities. In 1998 and 1999, the blooms of *P. minimum* and *A. anophagefferens* were not toxic, but reached sufficiently high densities to have ecological consequences. These years differed in the amount and timing of rainfall events and resulting nutrient loading from the largely agricultural watershed. Nutrient loading to the eastern tributaries of Chesapeake Bay has been increasing over the past decade. Much of this nutrient delivery is in organic form. The sites of the *Pfiesteria* outbreaks ranked among those with the highest organic loading of all sites monitored bay-wide. The availability of dissolved organic carbon and phosphorus were also higher at sites experiencing *A. anophagefferens* blooms than at those without blooms. The ability to supplement photosynthesis with grazing or organic substrates and to use a diversity of organic nutrients may play a role in the development and maintenance of these species. For *P. minimum* and *A. anophagefferens*, urea is

used preferentially over nitrate. *Pfiesteria* is a grazer, but also has the ability to take up nutrients directly. The timing of nutrient delivery may also be of critical importance in determining the success of certain species.

Glibert, P. M., C. E. Wazniak, M. R. Hall and B. Sturgis. 2007. Seasonal and interannual trends in nitrogen and brown tide in Maryland's coastal bays. *Ecological Applications* 17(5, suppl.):S79-S87.

Abstract: A retrospective analysis revealed that water quality in the coastal bays of Maryland (USA) has been declining over the past decade, as evidenced by increases in total nitrogenous nutrients and in outbreaks of brown tides caused by the pelagophyte *Aureococcus anophagefferns*. However, the increases in total nitrogen are not a function of increases in inorganic nitrogen, but rather a function of increases in dissolved organic nitrogen (DON). A near-decadal record (1996-2004) demonstrates that an approximate doubling of DON over this time period correlates with a similar increase in total chlorophyll and an even larger increase in the proportion of chlorophyll that is composed of brown tide. Additionally, on an annual basis overall chlorophyll levels and strength of the brown-tide blooms were related to the DON availability that developed during the prior months. *Aureococcus anophagefferens* is a harmful algal bloom species that preferentially uses DON for its nutrition over inorganic nitrogen forms and thus is a symptom of organic rather than inorganic nitrogen-based eutrophication. These results demonstrate that long-term changes in nutrient quantity and composition have occurred in the coastal bays of Maryland during the past decade and that total phytoplankton biomass, as well as the proliferation of brown tide, are related to these changes. Whether these changes are evidence of a long-term trajectory or represent a short-term anomaly will be revealed in future monitoring.

Library: UD-GCMES, UD-Morris, UMBC, UMCP, UMES

Gibson, D. D. 1987. Hammond's flycatcher (*Epidomax hammondii*) new to Maryland and the Atlantic coast. *The Wilson Bulletin* 99(3):500.

Abstract: A single specimen of Hammond's flycatcher, *Epidomax hammondii*, was collected at Ocean City, Worcester County, Maryland, 9 October 1963 and deposited at the U.S. National Museum (USNM 479689). The specimen represents the fourth collection of the species outside of the Great Plains. An earlier specimen had been taken in Kent County, Delaware, south of Woodland Beach.

Library: FSU, SMC, TU, UD-Morris, UMCP

Gillelan, G. H. 1965. Assateague. *Baltimore* Magazine (Baltimore, Maryland), April.

Glude, J. B. and T. C. Carver. n.d. *Venus* predation experiments in Chincoteague Bay. Manuscript on File, U.S. Fish and Wildlife Service.

Gobler, C. J., D. J. Lonsdale and G. L. Boyer. 2005. A review of the causes, effects, and potential management of harmful brown tide blooms caused by *Aureococcus anophagefferens* (Hargraves et Sieburth). *Estuaries* 28(5):726-749.

Abstract: Brown tides caused by the harmful alga *Aureococcus anophagefferens* abruptly appeared in some coastal embayments of the northeastern United States (Rhode Island, New York)

in 1985. Since then, brown tides have vanished from some bays, chronically reoccurred in others, and recently have exhibited an apparent southern expansion into new regions (e.g., New Jersey, Delaware, Maryland, and Virginia). Brown tides have also recently been detected across the Atlantic Ocean in South Africa. Although blooms of *A. anophagefferens* have no known direct, negative effects on human health, they are considered harmful because of their detrimental effects on estuarine organisms, such as suspension feeders (scallops and hard clams) and submerged aquatic vegetation. The selective effect of blooms on pelagic grazers (zooplankton and shellfish) is likely to affect food webs and biodiversity within affected ecosystems. Recent findings indicate brown tides occur in shallow estuaries with long residence times and high salinities (> 25ppt). These estuarine characteristics may foster the accumulation of algal biomass and a nutrient environment (high dissolved organic matter and low dissolved inorganic nitrogen) as well as a low light regime that encourages rapid cellular growth of *A. anophagefferens*. A lack of sufficient grazing control by benthic and pelagic suspension feeders during the initiation phase of blooms is also implicated in brown tide development.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Goettle, M. S. 1978. *Geological Development of the Southern Portion of Assateague Island*. Master of Science Thesis, University of Delaware (Newark). 187 pp.

Library: UD-Morris [QE 999 1978 .G599]

Goettle, M. S. 1980. Geological development of the southern portion of Assateague Island VA. *Geological Society of America Meeting Abstracts* 12:38.

Library: Univ. of Delaware, Virginia Tech

Gomes Ferreira, J., S. B. Bricker and T. Castro Simas. 2007. Application and sensitivity testing of a eutrophication assessment method on coastal systems in the United States and European Union. *Journal of Environmental Management* 82(4):433-445.

Abstract: The Assessment of Estuarine Trophic Status (ASSETS) screening model has been extended to allow its application to both estuarine and coastal systems. The model, which combines elements of pressure, state and response, was tested on four systems: Maryland Coastal Bays and Long Island Sound in the United States and The Firth of Clyde (Scotland) and Tagus Estuary (Portugal) in the European Union. The overall scores were: Maryland Coastal Bays: Bad; Firth of Clyde: Poor; Tagus Estuary: Good. Long Island Sound was modeled along a timeline, using 1991 data (score: Bad) and 2002 data (score: Moderate). The improvement registered for Long Island Sound is a consequence of the reduction in nutrient loading, and the ASSETS score changed accordingly. The two main areas where developments are needed are (a) In the definition of type-specific ranges for eutrophication parameters, due to the recognition that natural or pristine conditions may vary widely, and the use of a uniform set of thresholds artificially penalizes some systems and potentially leads to misclassification; (b) In the definition and quantification of measures which will result in an improved state through a change in pressures, as well as in the definition of appropriate metrics through which response may be assessed. One possibility is the use of detailed research models where different response scenarios potentially produce changes in pressure and state. These outputs may be used to drive screening models and analyze the suitability of candidate metrics for evaluating management options.

Library: CBL, FSU, HPL, TU, UD-Morris, UMCP

Good, R. E. 1965. Salt marsh vegetation, Cape May, New Jersey. *Bulletin of the New Jersey Academy of Science* 10:111.

Library: UD-Morris

Goodloe, R. B., K. A. Trembicki, R. J. Warren, E. G. Cothran and S. P. Bratton. 1991. Genetic variation and its management applications in eastern U.S. feral horses. *Journal of Wildlife Management* 55(3):412-421.

Abstract: Eletrophoretic and immunologic techniques were used to analyze blood samples collected from feral *Equus caballus* on four eastern U.S. barrier islands. Genetic variation measured in the island herds was similar to that reported in domestic horse breeds. Based on ecological and genetic criteria, it is believed that these populations should be reduced in size. A minimum of 72 animals should be retained on Assateague Island National Seashore, Maryland; 122 animals on Cumberland Island, Georgia; and 155 animals on Chincoteague National Wildlife Refuge, Virginia, to limit genetic loss to less than 1% per generation.

Library: CBL, FSU, SMC, SU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

Goodman, J. L., K. A. Moore and W. C. Dennison. 1995. Photosynthetic responses of eelgrass (*Zostera marina* L.) to light and sediment sulfide in a shallow barrier island lagoon. *Aquatic Botany* 50(1):37-47.

Abstract: The photosynthetic response of *Zostera marina* L. (eelgrass) to manipulations in sediment sulfide concentrations and light regimes was examined in Chincoteague Bay in June 1991. Negative impacts of sulfide on eelgrass in this study were observed through reductions in P_{max}, increases in the light intensity at which gross photosynthesis equals respiration, and decreases in the initial slope of the PI curve. The effects of eutrophication through reduced light and increased sediment sulfide on P_{max} were additive.

Library: CBL, HPL, SMC, TU, UD-Morris, UMCP

Gore, R. H. 1966. Observations on the escape response in *Nassarius vibex* (Say), (Mollusca: Gastropoda). *Bulletin of Marine Science* 16(3):423-434.

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Gorman, J. 2001. The Outsider: In the company of wild horses. *The New York Times*, 16 March, Section E, part 2, p. 31.

Abstract: When you've been to the mall too many Sundays and you need a change, the obvious place to go is Assateague Island. The mall is noisy, with harsh lights and altogether too many people. Assateague is a 37-mile-long barrier island off the coast of Maryland and Virginia, and in the off-season it is silent, except for the surf and birds, with very few people and no artificial lighting. It also has horses -- wild horses -- which are noticeably absent from the mall.

Goshorn, D. 1999. Increasing risk factors: *Pfiesteria*. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:56-58.

Library: FSU [EP 1.23/6:620/R-00/001]

Goshorn, D., M. McGinty, C. Kennedy, C. Jordan, C. Wazniak, K. Scwenke and K. Coyne. 2001. *An Examination of Benthic Macroalgae Communities as Indicators of Nutrients in Middle Atlantic Coastal Estuaries - Maryland Component*, Final Report 1998 – 1999. Maryland Department of Natural Resources, Tidewater Division (Annapolis, Maryland).

Gosner, K. L. 1971. *Guide to the Identification of Marine and Estuarine Invertebrates: Cape Hatteras to the Bay of Fundy.* Wiley-Interscience (New York). xix + 693 pp.

Library: CBL, FSU, HPL, SMC, UD-GCMES, UMBC, UMCP, UMES [all are QL362.5 .G68] QL 362.5G68

Gosner, K. L. 1979. *A Field Guide to the Atlantic Seashore*. Houghton Mifflin Company (Boston). xvi + 335 pp.

Library: CBL, FSU, SMC, SU, UD-GCMES, UMAB, UMBC, UMES [all are QH95.7 .G67 1979]

Gould, A. A. 1884. *A report on the invertebrate animals of Massachusetts, comprising the Mollusca, Crustacea, Annelida, and Radiata*. Published by order of the Massachusetts State Legislature (Cambridge). 372 pp.

Graber, P. H. F. 1984. The law of the coast in a clamshell: Part XIV: The Maryland approach. *Shore and Beach* 51:3-10.

Library: UD-Morris, UMBC, UMCP

Graham. S. 1973. The first record of *Caretta caretta* nesting on a Maryland beach. *Bulletin of the Maryland Herpetological Society* 9(2):24-26.

Library: SU, TU, UMCP

Grant, W. C., Jr. 1963. Notes on the ecology and behavior of the hermit crab, *Pagurus acadianus*. *Ecology* 44(4):767-771.

Abstract: A survey of the sublittoral population of the hermit crab *Pagurus acadianus* was conducted in a 147-m2 area near Salisbury Cove, Maine, during a 2 month period. The crab population in the area averaged about 20 individuals and as generally restricted to rocky bottoms. Low recapture values for crabs marked and released and the rapid recovery of the population after removal of all individuals during a period of several days indicates the transient nature of the population. In laboratory tests, *P. acadianus* showed the following order of preference for mollusc shells: *Buccinum* > *Thais* > *Littorina*. These results were confirmed by the distribution of shell types in the field collections. It is suggested that shells such as *Buccinum* which have a higher internal volume/weight index are definitely preferred. Behavior studies in the laboratory showed that although crabs had no visual orientation to mollusc shells they had been occupying, they were able to recognize them upon contact. During the investigation 71.4% of the crabs removed from their home shells reentered them again when given the choice between the home shell and another of the same species and dimensions.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Granter, J. E. 1977. *Results of Bird Surveys on Assateague Island*. U.S. Department of the Interior, National Park Service (Washington, D.C.).

Grave, B. H. 1928. Natural history of the shipworm, *Teredo navalis*, at Woods Hole, Mass. *Biological Bulletin* 55(4):260-282.

Abstract: The breeding season of *Teredo navalis* extends from about 10 May to 10 October. Spawning begins in spring when water reaches a temperature between 11^{o} and 12^{o}C. Spawning by each female occurs several times during the season. No lunar periodicity in spawning occurs and no synchronous spawning. The eggs are retained in the gills of the female during cleavage and early larval development. The time required for the fertilized egg to complete larval development to metamorphosis is approximately 5 weeks at Woods Hole. About half this time is passed in the brood pouch and half as a free-swimming veliger. When the eggs and early embryos are removed from the gills, they do not develop normally. The trochophore of *T. navalis* is non-motile, having a feebly developed protoconch or none. *T. navalis* reaches sexual maturity in 6 weeks or 2 months after metamorphosis, when it measures 4-5 cm in length. It reaches adult size in 1 year and dies during the second year. The largest specimen collected in four years measured 40 cm in length and 1 cm in greatest diameter. The rate of growth during the summer months and also during the winter was determined and tabulated. Certain habits of shipworms were also observed and recorded.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Grave, B. H. 1930. The natural history of *Bugula flabellata* at Woods Hole, Mass. *Journal of Morphology and Physiology* 49(2):355-384.

Abstract: The breeding season of *Bugula flabellata* extends from 10 June to 15 November. The young embryos develop in brood pouches (ovicells) and are finally expelled from the colony as swimming embryos. They come from the colonies at dawn or early morning. After a free-swimming period of 4-6 hours, each larva becomes attached and after a profound metamorphosis which involves the loss of larval organs, it develops into the Bryozoan colony by budding. The larvae are first positive to light, but become negative before attachment. Their behavior is described in detail and the mode of attachment is explained. After the larva has become attached a period of rapid growth by budding ensues. The rate of growth is given in a table in which it is shown that the first individual of the colony is completed in 2 days and that a new series of buds is formed every 2 days. There are 8 – 10 individuals after 1 week and over 100 in 2 weeks. In one month the colony is half-grown and becomes sexually mature. A colony becomes senescent in 3 months, when it measures 1.5 – 1.75 inches in diameter. Younger colonies, hibernate successfully and resume growth in early May, when new polypides are formed.

Library: UD-Morris, UMCP

Grave, B. H. 1933. Rate of growth, age at sexual maturity and duration of life in sessile organisms at Woods Hole, mass. *Biological Bulletin* 65(3):375-386.

Abstract: Although *Banalus*, *Hydroides* and *Teredo* become sexually mature and spawn during their first season when only 2 months old, they spawn most abundantly during their second season when 1 year old. Each spawns several times during the second summer. *Bugula*, *Botryllus*, *Mogula*, and various hydroids (*Campanularia*, *Gonothyrea*, *Obelia*), on the other hand spawn principally before they are 2 months old and it is doubtful they ever survive for a full year. Some of the most prolific animals seem not to live more than one year; they owe their great abundance to production of several generations in a single summer. These characteristics of organisms account for the rapid rehabilitation of certain species after depletion.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Grave, C. 1912. A manual of oyster culture in Maryland. *Fourth Report of the Maryland Shellfish Commission* 1912:5-75.

Grave, C. 1920. *Amaroucium pellucidum* forma *constellatum*. I. The activities and reactions of the tadpole larva. *Journal of Experimental Zoology* 30:239-257.

Library: UD-GCMES, UD-Morris

Gray, E. H. 1942. *Certain ecological and life history aspects of* Uca minax*, the red-jointed fiddler crab, as found in the vicinity of Solomon's Island, Maryland.* Master of Science Thesis, University of Maryland (College Park). 25 pp.

Gray, R. C. 1992. The wild ponies of Chincoteague. *Cricket* 20(1):45.

Library: FSU, SU, UMCP

Green, W. E. n.d. Petition to the Governor and the State Legislature "to create the Maryland Beach Authority for the protection, preservation, and proper development of our Ocean front known as Assateague Island." (Snow Hill, Maryland). 8 pp.

Greene, E. A. and R. J. Shedlock. 2001. Simulation of shallow ground-water discharge to coastal areas of Maryland's inland Bays. *Abstracts of Papers, Geological Society of America 2001 Annual Meeting*, 33(6):302.

Abstract: Natural resource managers in the Mid-Atlantic are concerned about the potential for eutrophication of estuarine waters from the delivery of excess nutrient loads from coastal watersheds. Ground water and surface water are significant sources of nutrients to coastal bays along the Atlantic Coast of Maryland. Knowledge of the relative importance of nutrient sources and the spatial distribution of ground-water nutrient loads is needed to target areas for monitoring and management. The U.S. Geological Survey is conducting a hydrologic investigation to estimate the total flux of nutrients transported by ground water to the coastal bays. The study integrates several standard and new technologies for field data collection. The data are being used to model ground-water flow, nutrient transport, and the mixing of fresh and saline waters beneath the bays. SUTRA, a variable-density, finite-element model, is used to simulate ground-water flow and investigate the spatial distribution of fresh ground-water discharge to the bays. Simulations will also determine zones of ground-water discharge and the position of the freshwater/saltwater interface. Parameters varied in the model include bay width, hydraulic conductivity of bottom sediments, and layers representing aquifers and confining beds. Simulations indicate that coastal geomorphic features such as bay width are important controls on zones of fresh ground-water discharge to tidal waters and on the position of the freshwater/saltwater interface in the surficial aquifer. In simulations where the bay width was narrow (1 to 2 km) the interface was seaward of the barrier island. For a wider bay (8 km) the model results show discharge of fresh ground water

is close to the landward margin of the bay. Simulations also showed vertical movement of saline waters from the bays downward through the underlying sediments.

Greenlaw, J. S. and G. E. Woolfenden. 2007. Wintering distributions and migration of slatmarsh and Nelson's sharp-tailed sparrows. *The Wilson Journal of Ornithology* 119(3):361-377.

Abstract: The authors delineate the winter distributions of the five subspecies of Saltmarsh Sharp-tailed (*Ammodramus caudacutus*) and Nelson's Sharp-tailed (*A. nelsoni*) sparrows, and comment on patterns of migration. The two subspecies of *A. caudacutus* (*A. c. caudacutus*, *A. c. diversus*) have similar core winter ranges that extend along the Atlantic coast from North Carolina to northeastern Florida. They also occupy two isolated areas within peninsular Florida in Everglades National Park and on the northwest Gulf coast. Migration in *A. caudacutus* is mainly confined to the coast. The subspecies of *A. nelsoni* (*A. n. nelsoni*, *A. n. alterus*, *A. n. subvirgatus*) occupy different but overlapping winter ranges. *A. n. nelsoni* is the most widespread, occurring from North Carolina to Texas. Some birds migrate along the Atlantic coast southwards in fall, and others follow interior routes through the Mississippi River watershed in both fall and spring. We suggest *A. n. nelsoni* wintering along the Atlantic coast in spring fly directly inland towards their northern breeding areas. Some birds in fall also approach the southeastern coastline directly across the Appalachian Mountains. *A. n. alterus* mainly winters along the southeastern Atlantic coast to Florida, and in fewer numbers along the Gulf coast at least to Louisiana. Some *A. n. alterus* may migrate to the Gulf coast directly via inland routes west of the Appalachian Mountains. *A. n. subvirgatus* has the most limited wintering distribution, from South Carolina to northeast Florida, and is strictly a coastal migrant south of New England. Limited wintering ranges and narrow winter habitat requirements place continental populations of sharp-tailed sparrows at risk.

Library: FSU, SMC, TU, UD-Ag

Greig, R. A., D. R. Wenzloff, A. Adams, B Nelson and C. Shelpuk. 1977. Trace metals in organisms from ocean disposal sites of the middle eastern United States. *Archives of Environmental Contamination and Toxicology* 6(4):395-409.

Abstract: Concentrations of Ag, As, Cd, Cr, Hg, Mn, Pb, and Zn were determined for selected marine fish and shellfish collected at or near 3 ocean disposal sites, a control site and 3 inshore areas of the middle eastern United States. The disposal sites were off New Haven, Connecticut, New York City, and Delaware Bay. The control site was at Chincoteague Inlet, Virginia, and other areas were in Long Island Sound (near the New Haven disposal site), Barnegat Bay, New Jersey, and a second area off New York City near the Bight apex disposal site. With the following exceptions, the amounts of trace metals in biological samples did not vary substantially among the geographic areas. Silver in rock crab flesh averaged 0 . 79 ppm for the New York Bight disposal site compared with 0 . 24 to 0 . 38 ppm for 4 other areas. Cadmium, Mn, and Zn concentrations were greatest in rock crab flesh collected from Long Island Sound area 2 (not a known disposal site) compared to 3 other areas; mean levels were 1 vs. 0 . 1 ppm, 29 vs. 0 . 8 to 1 ppm, and 64 vs. 32 to 36 ppm. The Mn content in gills of rock crabs from the same area in the Sound was 22 ppm compared with 6 ppm for Chincoteague Inlet. Digestive glands of channeled whelk collected from a disposal site in Long Island Sound contained the greatest amount of Ag, Cd, and Zn compared to the control area. Chincoteague Inlet, and a site outside the diposal area in the Sound. Levels were 20 vs. 6 to 7 ppm of Ag, 24 vs. 16 and 17 ppm of Cd, and 2650 vs. 1,025 and 405 ppm of Zn, respectively. In addition, whelk digestive gland from the 2 areas in the Sound contained about 1,100 ppm of Cu compared to only 32 ppm for Chincoteague Inlet. Trace metal concentrations in the organisms used during this study were of the same order of magnitude as those reported by various investigations for a variety of organisms collected from waters in the US Atlantic and Pacific as well as British waters of the Atlantic.

Library: CBL, TU, UD-Ag, UD-Morris, UMCP

Greine, J. E. Co. 1964. *Assateague Island State Park – Master Development Plan Report*. J. E. Greine Co., Maryland Department of Natural Resources (Annapolis, Maryland).

Griffing, S. M., Kilpatrick, A. .M., L. Clark and P. P. Marra. 2007. Mosquito landing rates on nesting American robins (*Turdus migratorius*). *Vector Borne and Zoonotic Diseases* 7(3):437-443.

Abstract: The authors measured mosquito landing rates on adult and nestling American robins at nests with infrared cameras in Washington, D.C., and Maryland, United States. Mosquitoes landed on nesting robins almost exclusively between dusk and dawn. The mean number of mosquito landings per night was higher for adults (123.3 Â± SE 32.8) than nestlings (37.26 Â± 14.8). The fraction of mosquitoes landing at a nest on nestlings increased with decreases in adult brooding. Oral swabs from nestlings at these and 13 other robin, Gray catbird, and house finch nests were negative for West Nile virus (WNV). These results show that landing rates were higher on adults and that parental brooding reduces the landing rates of mosquitoes on nestlings.

Griffith, G. W. and M. Castagna. 1962. Sexual dimorphism in oyster drills of Chincoteague Bay, Maryland and Virginia. *Chesapeake Science* 3(3):215-217.

Abstract: The sex and length of 5,475 oyster drills, *Urosalpinx cinerea* follyensis and *Eupleura caudata etterae*, were determined to ascertain if a significant difference existed in the mean size of males and females. The mean length of female *U. cinerea* was 28 mm, and of males, 24 mm; of female *R. caudata*, 29 mm, and of males, 25 mm. Statistical treatment of the data indicated that females of both gastropod species were significantly larger than males.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Griffith, R. E. 1961. *Phytoplankton of Chesapeake Bay – an illustrated guide to the genera.* Hood College (Frederick, Maryland) and Chesapeake Biological Laboratory (Solomons, Maryland) Monograph No. 1 (Contribution No. 172). 79 pp.

Griscom, D. L., A. Akiyoshi, T. Homae, K. Kondo, C. Yamanaka, T. Ueno, M. Ikeya, M. Affatigato and A. Schue. 2003. Fossil natural glasses composed of ferric oxyhydroxides: impactites of the 35.5 million year old Chesapeake Bay crater. *Journal of Non-Crystalline Solids* 323(1-3):7-26.

Abstract: Many of the pebbles and cobbles found in the ~5000-km^2 'upland deposits' of eastern Virginia and Southern Maryland (USA) are decorated with external flanges of hard red–brown material with uniform thicknesses ~5 mm terminated by crisp conchoidal fracture surfaces. Thirteen high-grade sandstone (quartzite) pebbles and cobbles exhibiting such features were cut with rock saws, revealing that the external flanges are contiguous with undulating red–brown bands of about the same thicknesses extending all the way through their interiors and, in several cases, that these interior bands are approximately parallel to spalled surfaces and/or internal fractures. These rocks have been studied by thin-section photomicroscopy, scanning electron microscopy, extended X-ray absorption fine structure (EXAFS), X-ray diffraction (XRD), X-ray fluorescence (XRF), scanning electron-spin-resonance imaging, and Mössbauer spectrometry. The EXAFS, XRF, XRD, and Mössbauer data combine to demonstrate that the hard red–brown materials contain goethite (α-FeOOH) in particle sizes ∼100–150 Å with impurity contents ⩽ 5%. It is not ruled out that these materials may also include an amorphous-ferric-oxyhydroxide component with short-range order constrained by the EXAFS to be similar to that in goethite. The origin of the upland deposits has long posed a riddle to geologists. And the geometry of the red–brown bands internal to the present rocks (not explainable by aqueous diffusion) now confronts materials scientists with a puzzle. We propose that the solutions to both the riddle and the puzzle may be linked to the effects of the known impact of an extraterrestrial object 35.5 million years ago into the area that is now the Chesapeake Bay (CB) on the US Atlantic Coastal Plain. We strengthen this proposition with (1) critical reconsideration of the previously accepted geological explanation of the upland deposits, (2) an assessment of the probable natures of the materials present in the CB-crater target area that would have become ejecta, (3) a review of the pertinent physics of impact cratering, (4) the detailed studies of the rocks mentioned above, and (5) a preliminary study of a sample of goethite subjected to experimental shocking. Based on these considerations, the hard red–brown materials of the upland deposits are proposed to have been quenched from molten sheets of Fe-oxyhydroxides generated by impact-induced shock waves passing through water rich in suspended ferric-oxyhydroxide particles. A model for the physics of this process is presented. It is reasonably assumed that iron-rich ground waters were present in aquifers extending into the ∼500-m-deep accumulation of quartz-based sediments known to have been in the target area of the CB impactor. Penetration of the molten Fe-oxyhydroxide sheets into the quartzite cobbles is ascribed to opening of interstitial spaces between the constituent sand grains by action of reverberating pressure and rarefaction components of the same shock waves that boosted these rocks to their present-day upland locations.

Library: UD-Morris, UMCP

Grogan, W. L., Jr. 1973. A northern pine snake, *Pituophis m. melanoleucas*, from Maryland. *Bulletin Maryland Herpetological Society* 9(2):27-30.

Abstract: The occurrence of *Pituophis m. melanoleucus* on the Isle of Wight in 1936 is noted as is a record of the species swimming from Assateague Island to an island in Sinepuxent Bay, presumably to eat bird eggs.

Library: SU, TU, UMCP

Grogan, W. L., Jr. 1985. New distribution records for Maryland reptiles and amphibians. *Bulletin of the Maryland Herpetological Society* 21(2):75-75.

Abstract: *Notophthalmus viridescens* is reported to have been collected in Wicomico County near Salisbury; *Eumeces laticeps* and *Cemophora coccinea* are reported from Worcester County at Shad Landing State Park; *Lampropeltis triangulatum* was collected from near Loretto, Somerset County

Library: SU, TU, UMCP

Grogan, W. L., Jr. and D. C. Forester. 1998. New record of the milk snake, *Lampropeltis triangulum*, from the coastal plain of the Delmarva Peninsula, with comments on the status of *L. t. temporalis*. *The Maryland Naturalist* 42(1-2):5-14.

Abstract: The first records of the milk snake, *Lampropeltis triangulum*, are provided for the coastal plain of the Delmarva Peninsula from Dorchester, Kent and Wicomico counties, Maryland, as well as new records from Cecil and Worcester counties, Maryland, and New Castle County, Delaware. Specimens from the southern portion of the peninsula are often brightly colored and exhibit morphological similarities to the scarlet kingsnake, *Lampropeltis triangulum elapsoides*.

Those from the extreme northern portion of the peninsula, adjacent to the Piedmont, more closely resemble the eastern milk snake, *Lampropeltis triangulum triangulum*, but usually differ by having a light neck collar and blotches that extend to, or onto, their ventral scales. The milk snakes on the coastal plain of the Delmarva Peninsula have likely received only limited gene flow from mainland populations since the formation of the Chesapeake Bay 10,000-15,000 years ago. Populations of milk snakes on the mid-Atlantic coastal plain from southern New Jersey south throughout the Chesapeake Bay region are fairly uniform morphologically, in size, color pattern, and in habits. The intergradation with *L. t. triangulum* may occur only at the extreme northern and western portions of this form's range along the Fall Line. Therefore, it is suggested that the mid-Atlantic coastal plain milk snake population should be recognized as the subspecies *L. t. temporalis*.

Library: CBL, FSU, SU, TU, UMBC, UMCP

Grogan, W. L., Jr. and C. M. Heckscher. 2001. Are northern pine snakes, *Pituophis m. melanoleucus*, indigenous to Delaware? *The Maryland Naturalist* 44(1):20-36.

Abstract: The first records of the northern pine snake, *Pituophis m. melanoleucus*, are provided from the state of Delaware. Two of these from Sussex County are reports that are unsubstantiated by specimens, while the third record is a specimen captured alive in Kent County in 1997. Historical records are reports of pine snakes from the Delmarva Peninsula are reviewed, and those deemed most plausible are plotted on a map of the region. A further review of the distribution of northern pine snakes and their associated habitats in the Mid-Atlantic States suggest that this snake may have been found throughout the northern portion of the Atlantic Coastal Plain, but has been extirpated from most areas as a result of habitat fragmentation and loss. Field surveys are needed to determine the northern pine snake's historical and present distribution.

Library: CBL, FSU, SU, TU, UMBC, UMCP

Grogan, W. L., Jr. and S. Navai. 1975. New records of mites associated with ceratopogonids (Diptera: Certaopogonidae). *Proceedings of the Entomological Society of Washington* 77(2):214-215.

Abstract: Larval mites, *Tyrella* sp. (Limnesiidae) are first recorded from the ceratopogonids: *Atrichopogon fusculus* (Coquillett), *Dasyhelea oppressa* Thomsen, *Culicoides furens* (Poey), and *Bezzia setulosa* (Loew). Adult mites, *Amblyseius* sp. (Phytoseiidae) are first recorded from *Culicoides schultzei* (Enderlein). The specimens discussed were collected by light trap at Irish Grove Wildlife Sanctuary near Marion, Somerset County, Maryland.

Library: TU, UD-Morris, UMBC, UMCP

Grogan, W. L., Jr. and W. W. Wirth. 1975. A revision of the Nearctic species of *Clinohelea* Kieffer (Diptera: Ceratopogonidae). *Great Basin Naturalist* 35(3):275-287.

Abstract: The seven species of *Clinochelea* known to inhabit North America are described and illustrated and a key is provided for identification. Two species groups are recognized: the *unimaculata* group and the *bimaculata* group. *Clinochelea longitheca* and *C. pseudonubifera* are new. *Clinochelea nebulosa* (Malloch) is a synonym of *C. curriei* (Coquillett). *Clinochelea bimaculata* (Loew) is reported to have been collected at Snow Hill, Worcester County.

Library: UD-Morris, UMCP

Grogan, W. L., Jr. and W. W. Wirth. 1975. A new nearctic species of the *Forcipomyia* (*Forcipomyia*) described in all stages (Diptera: Ceratopogonidae). *Proceedings of the Entomological Society of Washington* 77(4):466-471.

Abstract: *Forcipomyia* (*Forcipomyia*) *bysraki*, new species from North America, is described and illustrated in all stages. The species was reared from wet moss and from under bark of decaying trees. Among collection localities for the species are Shad Landing State Park and Snow Hill, Worcester County.

Library: TU, UD-Morris, UMBC, UMCP

Grogran, W. L., Jr. and W. W. Wirth. 1975. A revision of the genus *Palpomyia* Meigen of northeastern North America (Diptera: Ceratopogonidae). University of Maryland Agricultural Experiment Station (College Park), Contribution No. 5076, MP 875. v + 49 pp.

Abstract: Sixteen species of *Palpomyia* Meigen known to inhabit the northeastern North America are described and illustrated, and a key is provided for their identification. On the basis of genitalia, four species groups are recognized, the *tibialis, lineata, distincta*, and *flavipes* groups. Eight species are new: *P. altispina*, *P. hastata*, *P. jonesi*, *P. novitibialis*, *P. plebeiella*, *P. pseudorufra*, *P. rubiginosa*, and *P. scalpellifera*. *P. slossonae* (Coquillett), *P. illinoisensis* Malloch and (Malloch) and *P. trivialis* (Loew) are synonyms of *P. basalis* (Walker). *P. hirta* (Malloch) and *P. opacithorax* (Malloch) are synonyms of *P. flaviceps* (Johannsen). *P. subaspersa* is reported from Marion, Somerset County, and *P. cressoni, P. rubiginosa* and *P. lineata* are reported from Worcester County at Snow Hill.

Source: ASIS

Grogan, W. L., Jr. and W. W. Wirth. 1979. The North American predaceous midges of the genus Palpomyia Meigen (Diptera: Ceratopogonidae). *Memoirs of the Entomological Society of Washington* No. 8. vi + 125 pp.

Abstract: A taxonomic study was conducted of the North American predaceous midges of the genus *Palpomyia* Meigen. Thirty-one species were identified and illustrated and systematic data are accompanied by ecological and zoogeographic distribution notes. Nine new species are described. Species occurring on the Eastern Shore include: *Palpomyia subaspera*, *Palpomyia cressoni*, *Palpomyia lineata*, *Palpomyia plebeia*, *Palpomyia plebeiella*, *Palpomyia rubiginosa*, *Palpomyia rufa*, and *Palpomyia pseudorufa*.

Library: UMCP

Grosskopf, W. G. and D. L. Behnke. 1993. An emergency remedial beach fill design for Ocean City, Maryland. *Shore and Beach* 61:8-12.

Library: UD-Morris, UMBC, UMCP

Grosskopf, W. G. and D. K. Stauble. 1993. Atlantic coast of Maryland (Ocean City) shoreline protection project. *Shore and Beach* 61:3-7.

Library: UD-Morris, UMBC, UMCP

Grove, M. and D. L. Breitburg. 2005. Growth and reproduction of gelatinous zooplankton exposed to low dissolved oxygen. *Marine Ecology Progress Series* 301:185-198.

Abstract: The lobate ctenophore *Mnemiopsis leidyi* and the scyphomedusan jellyfish *Chrysaora quinquecirrha* are seasonally important consumers in the food web of Western Atlantic and Gulf of Mexico estuaries, including Chesapeake Bay. The abundance and importance of these gelatinous species may be increasing as a result of anthropogenic alteration of these systems, particularly the increasing severity and extent of low dissolved oxygen. Ctenophores and jellyfish are more tolerant of hypoxia than co-occurring finfish, and can sustain high feeding rates in hypoxic waters. The authors examined the effects of hypoxia exposure on *M. leidyi* and *C. quinquecirrha* growth rates and *M. leidyi* reproduction over 4 d periods in 1 m^3 mesocosms at a range of natural prey densities. Both small (0.2 to 2.0 ml biovolume) and larger (8.0 to 17.6 ml biovolume) ctenophores had significantly reduced growth at oxygen levels of 1.5 and 2.5 mg l^{-1} as compared to air-saturated water, especially at high prey densities. Egg production by large ctenophores was also significantly reduced by exposure to low dissolved oxygen concentrations. In contrast, *C. quinquecirrha* growth rates were unaffected by low dissolved oxygen concentrations tested. These results are counter-intuitive as *M. leidyi* preferentially utilizes moderately hypoxic bottom waters in the field, while *C. quinquecirrha* avoids such waters. Their findings suggest that hypoxia may differentially affect population growth of these dominant gelatinous species.

Library: CBL, HPL, SMC, UD-Morris, UD-GCMES, UMBC, UMCP

Guala, J. R., D. G. Wilson and H. D. Palmer. 1976. Hydraulic regimes which move sediment – near shore continental shelf off Maryland. *American Geophysical Union Transactions* 57(4):268.

Library: UD-GCMES, UD- Morris

Gushing, E.M., I. H. Kantrowitz and K. R. Taylor. 1973. *Water Resources of the Delmarva Peninsula*. U.S. Department of the Interior, U.S. Geological Survey Professional Paper 822.

Library: SMC [GB705.D3 C87 1973], SU [QE121 .C82], UD-Morris [I 19.16:822], UMCP [QE75 .P9 no.822]

Gutiérrez-Magness, A. L., L. Gutiérrez-Magness and Jeff P. Raffensperger. 2003. Development, calibration, and analysis of a hydrologic and water-quality model of the Delaware Inland Bays watershed. U.S. Department of the Interior, U.S. Geological Survey (Baltimore, Maryland), Water resources Investigations Report 03-4124. vi – 42 pp.

Abstract: The nutrient pollution and hydrography of Little Assawoman Bay is discussed and compared with that of Rehoboth Bay, and Indian River Bay, Delaware

Library: UD-Morris [I 19.42/4:03-4124]

Gutsell, J. S. 1931. Natural history of the bay scallop. U.S. Department of Commerce, *U.S. Bureau of Fisheries Bulletin* 46:569-632.

Abstract: The bay scallop, *Pecten irradians* Lamarck (now *Argopecten irradians irradians* Lamarck), is an important commercial mollusc which ranges from Massachusetts to Florida. In North Carolina, it occurs principally in sheltered shallow water in areas where the salinity, except for heavy freshets, is 20-38 ppt. Structure and function are considered at some length. Growth and age are studied from numerous measurements of the material collected periodically. Examination of gonads and periodic collecting for young indicate a spawning season beginning in mid or late summer, at its height in autumn and continuing into winter. The late veliger, or prodissoconch, is found to be equivalve. Sexual maturity and, in favorable areas, a large size are attained in 1 year. A few live to be something over 2 years old. A prominent 1-year or annual growth line (best seen as light line on dark upper valve) is formed, generally in the fall, and is followed by notable winter growth. Its formation appears to be connected with egg and sperm development. It is suggested that scallops seldom occur far from grassy bottom because vegetation affords the only abundant object of attachment for the young and there is little subsequent shifting. There is no close correlation between growth and salinity. The principal physical environmental factor affecting growth is found to be water current (more rapid growth with swifter current). Collections indicate a heavy mortality among post veligers less than 10 mm long. Accounts are given of two parasites believed to be trematodes not previously found in scallops. A recently described nematode (*Paranisakis pectinis* Cobb), apparently the second nematode ever found in *Pecten*, was taken from the visceral mass. The importance for conservation and development of a knowledge of scallop biology is emphasized.

Library: UD-GCMES, UD-Morris, UMCP

Guy, C. 2003. Corporate sponsors to try no-toll appeal to Maryland-area beachgoers. *The Sun* (Baltimore, Maryland), 2 April, .

Guy, C. 2003. No-toll drive across bay to be tried 3 weekends; Advertisers would pay for 12-hour periods. *The Sun* (Baltimore, Maryland), 2 April, Business, p. 1-C.

Abstract: "The authority has been looking for innovative ways to address that slowing at the plaza," said Lori A. Vidil, spokeswoman for the quasi-public agency that operates Maryland's toll bridges and tunnels.Launched yesterday with a flurry of press releases and advertised bid requests, the program is designed to encourage vacationers and other motorists to cross the bridge from 7 p.m. Friday to 7 a.m. Saturday on June 13, 20 and 27. Corporate sponsors could buy individual weekends which would range from $52,500 for the first one up to $61,000 for the third, or all three for $172,000, Vidil said. Maryland's Atlantic resort has for years crafted public-private advertising opportunities such as the one in which Clear Channel manages advertising on city buses, a contract that puts about $120,000 a year into Ocean City coffers.

Guy, C. and M. Dresser. 2002. Owner of shore farm could net $8.5 million in preservation deal; State seeks to limit development near O.C. *The Sun* (Baltimore, Maryland), 18 December), Local, p. 2-B.

Haefner, P. A., Jr. 1964. Morphometry of the common Atlantic squid, *Loligo pealei*, and the brief squid, *Lolliguncula brevis*, in Delaware Bay. *Chesapeake Science* 5(3):138-144.

Abstract: Specimens of the common Atlantic squid, *Loligo pealei*, and the brief squid, *Lolliguncula brevis*, collected from June to September, 1958, in Delaware Bay, were studied morphometrically. Growth rate, length frequency, weight-length ratios, and change of body shape

are presented and discussed for *L. pealei*. Scarcity of *L. brevis* made impossible any definite comparison of its morphometry with *L. pealei*, but certain trends were nevertheless noticeable.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Haefner, P. A., Jr. and C. N. Shuster, Jr. 1964. Length increments during terminal molt of the female Blue Crab, *Callinectes sapidus*, in different salinity environments. *Chesapeake Science* 5(3):114-118.

Abstract: Field studies were conducted on female blue crabs, *Callinectes sapidus* Rathbun, to determine the relationship between environmental salinity and the increase in length associated with the terminal molt. Premolt crabs from one locality were retained in live cars through the mature molt in each of three different saline environments and analyzed for increase in length. No significant differences in percent increase in body size were found among the three groups of crabs studied.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hairston-Strang, A., B. Harding and K. Powers. 2002. *Maryland Coastal Bays Forestry Strategy*. Maryland Department of Forestry (Annapolis).

Abstract: 108 species of marine and estuarine mollusks from and around Assateague Island, Maryland and Virginia collected from 1991 to 1996 are provided in a species list.

Haitch, R. 1985. Breeding squirrels. *The New York Times*, 20 anuary, Follow-up on the News, Section 1, Part 2, p. 33.

Abstract: Delaware's interest in the squirrels is strictly to preserve a species on the Federal endangered list, the biologist says. He acknowledges that suburban homeowners sometimes have different interests: keeping squirrels out of chimneys and attics. "There are so few of them," he says of the Delmarva, "that they're not expected to be any problem."

Hala, J. P., R. D. Conkwright, R. T. Kerhin and D. V. Wells. 1980. The design and calibration of a rapid sediment analyzer and techniques for interfacing to a dedicated computer system. *Maryland Geological Survey Information Circular* 32. 32 pp.

Hall, C. C., Editor. 1910. *Narrative of Early Maryland, 1633-1684*. Scribner's Sons (New York). 460 pp.

Library: Yale Univ., Cornell Univ., Univ. of Minnesota

Hall, C.R. 1970. Sinepuxent bay dye study. State of Maryland Department of Water Resources (Annapolis).

Abstract: A dye study evaluated the flushing rate of the area designated for a proposed wastewater discharge pipe from a treatment plant in Assateague Island State Park. The suggested location of the outfall pipe was approximately seven miles south of the Ocean City inlet within the channel of Sinepuxent Bay. The results of the dye study estimated the travel time from the proposed outfall pipe to the inlet was 5.8 days and the dispersion coefficient was 0.05 mi^2 day^{-1} at

slack water. Therefore, the anticipated increase in nutrients and organics would not cause any problems within the bay system.

Hall, R. L. 1973. *Soil Survey of Worcester County, Maryland*. U.S. Department of Agriculture, Soil Conservation Service, and Maryland Agricultural Station. 78 pp + appendices.

Library: BSU, FSU, SU, TU, UD-Morris, UMBC, UMCP

Hallermeier, R. J. 1981. A profile zonation for seasonal sand beaches from wave climate. *Coastal Engineering* 4:253-277.

Library: UD-Morris, UMBC, UMCP

Halsey, S. D. 1976. Late Pleistocene and Holocene geologic history and morphologic development of the Chincoteague – Assateague area of Maryland-Virginia. **IN:** *Women in Geology: Proceedings of the First Northeastern Women's Geoscientists Conference*. pp. 45-57.

Library: UD-Morris [QE21 .N67 1976]

Halsey, S. D. 1978. *Late Quaternary Geologic History and Morphologic Development of the Barrier Island Systems Along the Delmarva Peninsula of the Mid-Atlantic Bight*. Ph.D. Dissertation, University of Delaware (Newark). 592 pp.

Library: Univ. of Delaware, Univ. of Virginia

Halsey, S. D. 1979. Nexus - New model of barrier island development. **IN:** *Barrier Islands from the Gulf of St. Lawrence to the Gulf of Mexico*, S. P. Leatherman, Ed. Academic Press (New York). pp. 185-210.

Library: CBL, TU, UD-Morris, UMBC, UMCP [all are GB473 .C62 1978]

Halsey, S. D., S. C. Farrell, J. J. Hammond and J. C. Kraft. 1977. Preliminary investigations of former coastal features preserved along the mid-Wisconsinan shoreline of New Jersey and Delmarva. *Geological Society of America Program Abstracts* 9:271-272.

Hamilton, C. C. 1926. Maryland. **IN:** *Naturalist's Guide to the Americas*. Williams and Wilkins Co. (Baltimore, Maryland). pp. 401-410.

Hamilton, P. A., J. M. Denver, P. J. Phillips and R. J. Shedlock. 1993. Water quality assessment of the Delmarva Peninsula, Delaware, Maryland, and Virginia – effects of agricultural activities on, and distribution of, nitrate and other inorganic constituents in the surficial aquifer. *U.S. Geological Survey, Open File Report* 93-40. 87 pp.

Library: U.S. Dept. of the Interior, UNC Chapel Hill, USGS

Hamilton, P. A. and R. J. Shedlock. 1992. *Are Fertilizers and Pesticides in the Ground Water? A Case Study of the Delmarva Peninsula, Delaware, Maryland, and Virginia*. U.S. Department of Commerce, U.S. Geological Survey Circular 1080.

Abstract: A non-technical publication which describes key findings and subsequent water quality issues resulting from the National Water-Quality Assessment study of the Delmarva Peninsula.

Library: UD-Morris [I 19.4/2:1080]

Hamilton, P. A., R. J. Shedlock and P. J. Phillips. 1989. *Ground-Water-Quality Assessment of the Delmarva Peninsula, Delaware, Maryland, and Virginia - Analysis of Available Water-Quality Data through 1987*. U.S. Department of the Interior, U.S. Geological Survey Open-File Report 89-34.

Abstract: An initial assessment of the ground-water quality on the Delmarva Peninsula, and highlights where pertinent water-quality data are lacking is presented. Also included is a summary of Federal, State and local agencies which have water quality data in their files about the area. Also outlined is the range of chemical constituents for which information is available, the ease of summarizing and retrieving the data and general characteristics of the data for use in a regional ground-water quality assessment.

Library: UD-Morris, UMCP [all are I 19.76:89-34]

Hanrahan, S., A. Despasquale, R. Henry, S. Allen and M. Swanda. 1995. Sand resources off the ocean coast of Delaware. **IN:** *Proceedings of the 8th Annual National Beach Preservation Technology Conference*, L. S. Tait, Ed. Florida Shore and Beach Preservation Association (Tallahassee). pp. 383-398.

Hansen, H. J. , III. 1966. *Pleistocene stratigraphy of the Salisbury area, Maryland, and its relationship to the lower eastern shore A surface approach*. Maryland Geological Survey, Report of Investigation 2. 56 pp.

Abstract: The Salisbury Formation, essentially a subsurface unit, is described. The formation is subdivided into a lower "red gravelly facies" and an upper Beaverdam facies. Both are correlated with the Sangamon rise of sea level. The Walston Formation, which overlies the Salisbury Formation, was deposited during a marine regression in a series of fringing tidal marshes formed at progressively lower elevations. Overlying the Walston Formation in the Parsonburg divide area is the Parsonburg Sand, a deposit caused by coastal dune sands. It may date from a time near the end of the Sangamon and the beginning of the Wisconsin. Fossil mollusks have been found up to elevation 15 ft. near Libertytown, Maryland.

Hansen, H. J. 1981. Stratigraphic discussion in support of a major unconformity separating the Columbia Group from the underlying upper Miocene aquifer complex in eastern Maryland. *Southeastern Geology* 22(3):123-138.

Abstract: Well log correlations across the lower Eastern Shore of Maryland strongly suggest that beds of the Upper Miocene Aquifer Complex ("Yorktown-Cohansey(?)" Formation) are truncated by an angular unconformity occurring at the base of the Columbia Group ("Pensauken Formation"). More detailed local studies have demonstrated that the base of the Columbia Group is defined by a network of complexly incised fluvial channels which locally cut out beds of the underlying Aquifer Complex. At the coast the Manokin Aquifer, basal member of the Complex, is separated from the Columbia Group by about 200 feet of post-Manokin sediments. Westward, the upper beds of the Complex are truncated beneath a low-angle unconformity so that in western Wicomico County, a distance of about 30 miles, the Manokin Aquifer subcrops immediately beneath the Columbia Group. Juxtaposition of the fluvial, channel-fill sands of the Columbia Group with marginal marine sediments of the Upper Miocene Aquifer Complex has suggested to some workers that the units are lithofacies of the same depositional sequence. However, the cross-cutting of marker beds in the Aquifer Complex by the channel-fill sequence argues persuasively that the units cannot be coeval. For example, wells drilled across a paleochannel trend in north-central Wicomico County have shown channel-fill deposits cross-cutting, from youngest to oldest, a 60-foot thick aquitard assigned to the Aquifer Complex, the Manokin Aquifer and, in places along the thalweg, upper-most beds of the St. Marys(?) Formation. Although clearly younger than the upper Miocene Aquifer Complex, the age of the overlying channel-fill sequence remains uncertain. Recently obtained paleobotanical evidence suggests that it may be Late Tertiary, rather than pre-Wisconsin Quaternary as formerly assumed.

Library: UD-Morris, UM-CP

Hansen, H. J. 1982. *Waste Gate Formation. Part One: Hydrogeologic framework and potential utilization of the brine aquifers of the Waste Gate Formation, a new unit of the Potomac Group underlying the Delmarva Peninsula*. Maryland Geological Survey Open File Report OFR No. 82-02-1. 50 pp.

Library: UMBC, Stanford Univ., Indiana Univ.

Hansen, H. J. 1984. Maryland Atlantic coast. **IN:** *American Association of Petroleum Geologists – correlation of stratigraphic units in North America – Atlantic Coastal Plain Region Correlation Chart*, R. R. Jordan and R. V. Smith, coordinators. American Association of Petroleum Geologists (Norman, Oklahoma). 1 sheet.

Hansen, H. J. 1984. *Hydrogeologic Characteristics of the Waste Gate Formation, A new Subsurface Unit of the Potomac Group Underlying the Eastern Delmarva Peninsula*. Maryland Geological Survey Information Circular IC 39. 24 pp.

Library: UD-Morris [QE121 .A43 no. 39]

Hansen, H. J. 1988. Buried rift basin underlying coastal plain sediments, central Delmarva Peninsula, Maryland. *Geology* 16(9):779-782.

Abstract: A recently obtained seismic reflection profile provides the first evidence of a buried rift-basin structure underlying the eastern shore of Maryland. The basin, tentatively named the Queen Anne basin, is buried beneath about 1,020 m of coastal plain sediments. The eastern margin of the basin was traversed by the seismic line and appears to be the ramping side of a half-graben structure. It is offset by high-angle, antithetic faults that step the crystalline basement surface down to the west. The border fault system is believed to occur on the western margin of the structure and may coincide with a prominent northeast-trending gravity gradient. Rocks filling the rift basin appear to be at least 1,250 m thick. The Queen Anne basin may be part of a buried eastern belt of rift basins that follows the generally arcuate trend of the Appalachian origin before emerging in Virginia as the Taylorsville and Richmond basins.

Library: BSU, SMC, SU, UD-Morris, UD-GCMES, UMBC, UMCP

Hanson, K. C., S. McGeary and D. E. Krantz. 2000. GPR imaging of coastal Quaternary stratigraphy in the region of Assateague Island, Maryland. Abstracts of Papers, 35th Annual Meeting, Geological Society of America 32(1):23.

Abstract: Preliminary results are presented from an ongoing environmental geophysics project that is being initiated in the region of the Assateague Island National Seashore in Maryland by the Environmental and Quaternary Geophysics group at the University of Delaware. The goal of the project is to use ground-penetrating radar (GPR) on land and a chirp-seismic system offshore to map the Quaternary stratigraphy of the island and inland bay system. Two objectives are of particular interest--the impact of Pleistocene and Holocene sea-level fluctuation on this barrier-island coastal system and the influence of the coastal Quaternary geologic framework on groundwater flow in the region and potential transport of contaminants into the shallow water ecosystem. Groundwater contamination, particularly from agricultural sources, is an issue of serious environmental concern in this region. The National Park Service in conjunction with the U.S. Geological Survey is currently monitoring groundwater flow and estuarine water quality in the Chincoteague, Sinepuxent, and Newport Bays, which form the shallow water ecosystem that includes the estuarine waters of Assateague Island National Seashore. It is hoped that the geophysical data will provide constraints for groundwater flow models for the area and will help explain any anomalies in the water quality data.

Hantzsche, N. N. and E. J. Finnemore. 1992. Predicting ground-water nitrate-nitrogen impacts. *Ground Water* 30(4):490-499.

Abstract: The paper researches, reviews and discusses the potential cumulative effect of on-site sewage disposal practices on the buildup of nitrates in upper ground-water zones. Literature concerning the contribution and fate of nitrogen beneath septic tank disposal fields is reviewed. A simplified method for estimating long-term ground-water nitrate increases on an area-wide basis was developed.

Library: HPL, MSU, UD-Morris, UMBC, UMCP

Hardy, J. D., Jr. 1962. Comments on the Atlantic Ridley turtle, *Lepidochelys olivacea kempi*, in the Chesapeake Bay. *Chesapeake Science* 3(3):217-220.

Abstract: Five specimens of this sea turtle, a species infrequently recorded from Maryland and Virginia estuarine waters, were available for study. Morphometric and meristic data do not vary greatly from published accounts. Blue crabs were found in the stomach contents of one specimen from the bay.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hardy, J. D., Jr. 1964. A new frog, *Rana palustris mansuetti*, subsp. nov., from the Atlantic coastal plain. *Chesapeake Science* 5(1-2):91-100.

Abstract: A new subspecies of *Rana palustris* is designated. Specimens from the coastal plain of North Carolina were compared with specimens from other parts of the Atlantic coastal plain (including Nassawango Creek, Worcester Co., Maryland), the Piedmont Plateau, and the Appalachian Mountains and were found subspecifically distinct. Characters differing to subspecific levels were: degree of ventral mottling, patterns between the dorsolateral folds and pigmentation of the vomerine teeth.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hare, M. P. and J. R. Weinberg. 2005. Phylogeography of surfclams, *Spisula solidissima*, in the western North Atlantic based on mitochondrial and nuclear DNA sequences. *Marine Biology* 146(4):707-716.

Abstract: The Atlantic surfclam, *Spisula solidissima* (Dillwyn), is broadly distributed in sandy sediments of the western North Atlantic between the Gulf of St. Lawrence and the Gulf of Mexico. In the United States, a substantial commercial fishery between Long Island and Cape Hatteras harvests offshore populations of one subspecies, *S. s. solidissima*. A smaller coastal form, *S. s. similis* Say (also known as *S. s. raveneli* Conrad), has a partially sympatric geographic distribution, but differs in several life-history characteristics. DNA sequence variation in mitochondrial cytochrome oxidase I (COI) and in introns at two nuclear calmodulin loci was examined to measure genetic divergence between the two subspecies and to test for population structure among populations of *S. s. solidissima*. Surfclams were collected from seven localities between 1994 and 2001. Based on both mitochondrial and nuclear DNA variation, the two subspecies of *S. solidissima* are reciprocally monophyletic, with a net COI divergence of 13.9%, indicating long-term reproductive isolation. The only significant differentiation among populations of *S. s. solidissima* (based on an AMOVA analysis of COI sequences) was between the Gulf of St. Lawrence and more southerly populations. A long internal branch in the *S. s. solidissima* genealogy coupled with low haplotype diversity in the northern-most population suggests that populations north and south of Nova Scotia have been isolated from each other in the past, with gene exchange more recently. Populations of *S. s. similis* from Atlantic and Gulf of Mexico coasts had a net COI divergence of 9.2%. Thus, diversification of *Spisula* spp. clams in the western North Atlantic involved an early adaptive divergence between coastal and offshore forms, with later barriers to dispersal emerging in the offshore form from north to south and in the coastal form between Atlantic and Gulf of Mexico populations.

Library: CBL, HPL, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Hargis, W. J., Jr. 1957. A rapid live-sexing technique for *Urosalpinx cinerea* and *Eupleura caudata*, with notes on previous methods. *Limnology and Oceanography* 2(1):41-42.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Hargis, W. J., Jr., M. F. Arrighi, R. W. Ramsey and R. Williams. 1957. Some effects of high-frequency x-rays on the oyster drill *Urosalpinx cinerea*. *Proceedings of the National Shellfisheries Association* 47(1956):68-72.

Abstract: It was shown that *Urosalpinx cinerea* from the York River, Virginia, can tolerate high dose levels of high-frequency x-rays. Like many invertebrates, drills survive irradiation for longer periods of time than mammals usually do. Even if irradiation is applicable as a control tool, the costs of handling and treating with an x-ray machine would be prohibitive. However, more economical sources, such as Cobalt-60, would probably be made available in commercial doses.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Hargis, W. J., Jr. and C. L. MacKenzie, Jr. 1961. Sexual behavior of the oyster drills *Eupleura caudata* and *Urosalpinx cinerea*. *Nautilus* 75(1):7-16.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Harris, H. S., Jr. 1975. Distribution survey (Amphibia/Reptilia): Maryland and the District of Columbia. *Bulletin of the Maryland Herpetological Society* 11:73-167.

Library: SU, TU, UMCP

Harris, M. and J. C. Brock. 2006. Identification and extraction of the seaward edge of terrestrial vegetation using digital aerial photography. U.S. Department of the Interior, U.S. Geological Survey. [electronic file].

Library: UD-Morris.

Harris, M. S. C. 2000. *Assateague Shelf and Shore Workshop.* South Carolina Sea Grant SCSGC-W-00-001.

Abstract: This document is the program for the 26th annual Assateague Shelf and Shore Workshop. It contains about twenty presentation abstracts, and a thorough, well-illustrated field guide to the Myrtle Beach area of South Carolina. Presentations concern methods of coastal change and management up and down the entirety of the eastern U.S. seaboard.

Harrison, S. C. 1971. *The Sediments and Sedimentary Processes of Holocene Tidal Flat Complex, Delmarva Peninsula, Virginia*. Coastal Studies Institute Technical Report 12, Louisiana State University (Baton Rouge).

Library: Johns Hopkins Univ.

Harrison, W. 1963. Sediments of lower Chesapeake Bay – mass and related processes. *Geological Society of America Special Paper* No. 73. 86 pp.

Harrison, W, M. L. Brehmer and R. E. Stone. 1964. *Seashore tidal and non-tidal currents, Virginia Beach, Virginia.* U.S. Army Coastal Engineering Research Center, Technical Memorandum No. 5. 20 pp.

Harrison, W., W. C. Krumbein and W. S. Wilson. 1964. Sedimentation at an inlet entrance, Rudee Inlet – Virginia Beach, Virginia. U.S. Army Coastal Engineering Research Center, Technical Memorandum No. 8. 42 pp.

Harrison, W. and R. Morales-Alamo. 1964. Dynamic properties of immersed sand at Virginia Beach, Virginia. U.S. Army Coastal Engineering Research Center, Technical Memorandum No. 9. 52 pp.

Library: Woods Hole Oceanography, IUP, Nat'l Marine Fisheries Service, FSU

Harrison, W., N. A. Pore and J. J. Norcross. 1966. Predictor equations for surface and bottom drift of continental shelf waters between Cape Henlopen and Cape Hatteras, U.S.A. Abstracts of papers, *Second International Oceanographic Congress.* pp. 154-155.

Harrison, W. and K. A. Wagner. 1964. Beach changes at Virginia Beach, Virginia. U.S. Army Corps of Engineering Research Center, Miscellaneous Paper No. 6. 25 pp.

Library: VIMS, NOAA NMFS, Kent State

Hartman, P. E. 1971. *Assateague: Golden Future or Gone Forever?* The Committee to Preserve Assateague (Towson, Maryland).

Hartmann, O. 1945. The marine annelids of North Carolina. *Duke University Marine Station Bulletin* 2:1-51.

Abstract: A study conducted at Beaufort, North Carolina, identified a rich annelid fauna due to infiltrations of species from both the north and south. Previous works on the caetopoda of the Carolinas are reviewed. The 104 species reported on are listed alphabetically, by families, and by ecological associations or characteristic habitats.

Harvill, A. N., Jr. 1965. The vegetation of Parramore Island, Virginia. *Castanea* 30:226-228.

Library: FSU, TU, UD-Morris, UMBC, UMCP

Harvill, A. N., Jr. 1967. The vegetation of Assateague Island, Virginia. *Castanea* 32:105-108.

Library: FSU, TU, UD-Morris, UMBC, UMCP

Haven, D., M. Castagna, P. Chanley, M. Wass and J. Whitcomb. 1966. Effects of the treatment of an oyster bed with Polystream and Sevin. *Chesapeake Science* 7(4):179-188.

Abstract: A series of field tests near Wachapreague, Virginia, in 1963 evaluated Polystream and Sevin mixed with sand as a means of controlling populations of oyster drills, Urosalpinx cinerea. Tests were designed to evaluate effects on planted oysters, drills, drill egg case disposition, crabs, and benthic invertebrates. Application of the chemicals to planted oyster beds did not reduce drill populations or numbers of drill egg cases deposited. Oyster production was not increased and treatment had an adverse effect on most species of benthic macroinvertebrates. Absence of drill control could have been associated with mixing of treated sand into subsurface deposits but other factors may have been involved.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hayden, B. P. 1975. *Investigations of Coastal Environments of the National Seashore (Progress Report).* U.S. Department of the Interior, National Park Service (Washington, D.C.). 3 pp.

Hayden, B. P. and R. Dolan. 1977. Seasonal changes in the planetary wind system and their relationship to the most severe coastal storms. *Geoscience and Man* XVIII:113-119.

Library: UD-Morris, UMCP [all are GB451.2.R4]

Hayden, B. P. and R. Dolan. 1979. Barrier island lagoon sand marshes. *Journal of Sedimentary Petrology* 49(4):1061-1072.

Abstract: The width, depth, marsh cover, and marsh-water interfaces were recorded for the lagoons along 200 km of the coast between Long Island, New York, and Miami, Florida. Eigenvectors of these variables for 134 sites (cases) were calculated and analyzed to identify the characteristic variations of these morphometric attributes. Three modes of variation account for 88% of the variance of the original data: the dominant mode contrasts wide, complex lagoons and narrow, simple lagoons. The second contrasts wide, simple with narrow, complex lagoons. A third mode contrasts wide, shallow, complex with narrow, deep lagoons with few marsh-water intersects. The first mode is correlated geographically with variations in the steepness and curvature of the inner portion of the continental shelf. Using variations in the morphometric attributes of the lagoon-marsh system and the fronting islands on the ocean side, the Atlantic coast barrier islands, lagoons, and marshes are classified into three regions and eight sub-regions. The concept of barrier island "ensembles" along the Atlantic coast is reviewed in terms of the island-lagoon marsh system and their covariation with offshore bathymetry. The concept of these ensembles is strongly supported.

Library: CBL, FSU, SMC, TU, UD-Morris, UMBC, UMCP

Hayden, B. P., R. Dolan and W. Felder. 1979. Spatial and temporal analyses of shoreline variations. *Coastal Engineering* 2:351-361.

Abstract: Using detailed data from historical aerial photography, high-resolution (100 m) shoreline and storm surge penetration line rates-of-change and variance were calculated for 428 km of coast between New Jersey and Cape Lookout, North Carolina. Shoreline erosion rates along the U.S. mid-Atlantic coast average 0.6 m/yr but commonly vary (± 1 σ) along the coast from -3.6 m/yr to 2.4 m/yr and from -6.8 m/yr to 5.6 m/yr on a decade-to-decade basis.

Spatial and temporal variances in shoreline change rates make the design of coastal experiments and systematic monitoring programs difficult. The precision of measurements of the rates of change of the shoreline and storm-surge penetration line decrease as the along-the-coast sampling interval increases. This decrease follows a hyperbolic tangent form of decline.

For the U.S. mid-Atlantic coast a sample spacing of 500 m will provide an estimate of the mean shoreline rate-of-change to within 0.25 σ of the higher resolution (100 m) estimate. The average standard deviation of shoreline change rates for the U.S. mid-Atlantic coast is ± 3.01 m/yr. Consequently, a 500-m sampling spacing will result in a precision of ± 0.75 m/yr for shoreline change. In addition to the hyperbolic tangent decline of measurement precision, along-the-coast periodicities in shoreline and storm-surge penetration line rates of change occur. Accordingly, unless the objective of the measurement program is to define these periodicities, a constant interval sampling should be avoided.

Library: UD-Morris, UMBC, UMCP

Hayden, B. P., R. Dolan, S. May and P. May. 1980. Erosion hazards along the mid-Atlantic coast. *Proceedings of the 11th Annual Binghampton Geomorphology Symposium*. pp. 155-180.

Hayden, B. P., R. Dolan, C. C. Rea and W. N. Felder. 1979. Erosion rates: How representative are they? *Shore and Beach* 47:25-30.

Abstract: Based on an analysis of rate of change data for both the shoreline and the limit of storm-surge penetration for more than 400 km of coast at 100 m intervals (including the Atlantic coast of Maryland), it is concluded that 1) Shoreline change rates on an island-wide basis vary from 3.0m/yr erosion to 1.0 m/yr accretion with a mean for the study area of 0.6 m/yr. 2) Along-the-coast variations in shore line and storm-surge penetration line change are as much as an order of magnitude larger than the mean rates. 3) In general, sampling intervals of 2.4 km or less are required in order to specify island-wide means within ±0.25σ of the high resolution mean. 4) Site-specific (transect or profile) measures of storm-surge penetration rates are representative of approximately ± 500 m along the coast. 5) Mid-Atlantic coast shorelines are characterized by a complex series of along-the-coast periodicities in shoreline dynamics and, in general, unless the objective is to define the periodicities, regular sampling intervals should be avoided. 6) Lastly, shoreface dynamics are highly variable in space, therefore mean rates of change are of little value unless accompanied by a specification of associated variance.

Library: UD-Morris

Hayes, D. C. and F. E. Drummond. 1995. *Use of Fathometers and Electrical-Conductivity probes to Monitor Riverbed Scour at Bridge Piers*. U.S. Department of the Interior (Richmond, Virginia); U.S. Geological Survey (Denver, Colorado), Earth Science Information Center, Open File Report, Water resources Investigations Report 94-4164. 8iv + 17 pp.

Abstract: The scouring at the Sinepuxent Bay bridge (Verazzano Bridge) at Assateague Island National Seashore is discussed along with scouring patterns at Leipsic River, Delaware, and Pamunkey River, Virginia.

Library: FSU, UD-Morris, UMCP [all are I 19.42/4:94-4164]

Hazel, J. E. 1968. Pleistocene ostracode zoogeography in Atlantic coast submarine canyons. *Paleontology* 42(5):1264-1271.

Abstract: Twenty-five rock samples dredged from ten submarine canyons off the Atlantic coast of the United States have yielded ostracodes that are interpreted to be of Pleistocene age. It is suggested that during times of lowered sea level the boundary between cold and milt-temperature faunal provinces lay approximately between Baltimore and Washington (between 37°N and 38°N latitude). This represents a shift of about 500 miles to the south.

Heard, R. W. 1982. *Guide to the Common Tidal Marsh Invertebrates of the Northeastern Gulf of Mexico*. Mississippi Alabama Sea Grant Consortium MASGP-79-004. 82 pp.

Library: LOC, Smithsonian Institute, NYU, Mississippi State Univ., Univ. of GA

Hedgepeth, J. W. 1948. The Pycnogonida of the western North Atlantic and the Caribbean. *Proceedings of the U.S. National Museum* 97:157-342.

Abstract: A systematic review of the 70 species in 24 genera, comprising the pycnogonid fauna from Newfoundland to northern South America, with discussions of distribution and taxonomic problems. The Caribbean-Gulf of Mexico area, especially near the Florida Keys, is an active center for the dispersion of small species to the shores of Europe and Africa, probably via the *Sargassum*. The relationships between the fauna of the east and west coasts of North America, of both sides of the Isthmus of Panama, and between New England and the Boreal-Arctic region are also discussed. Collections from all the major museums were examined and figures provided for all the species represented. New taxa described are: *Nymphon giltayi*, probably from Grand Bank; *N. floridanum*,

Tortugas; *Pallenopsis longirostris* Wilson (= *P. oscitans* [Hoek] and *P. plumipes* Meinert); *Anoplodactylus stylirostris* and *A. pectinus*, Tortugas; *Achelia brevichelifera*, North Atlantic; *Ammothella marcusi*, Tortugas; *Ascorhynchus serratum*, off Yucatan; *Calypsopycnon*, Type *C. georgiae*, origin unknown; *Colossendeis michaelsarsi* Olsen (= *C. arcuata* Bouvier); *Pycnogonium reticulatum*, Key West, Florida. The report concludes with a tabulation of all important records for Pycnogonida in the North Atlantic since 1869. Charts of the stations of the major expeditions are provided.

Library: CBL, TU, UD-Morris, UMCP

Heilprin, J. 2001. Judge approves national park jet skis ban. Associated Press wire service story.

Abstract: Assateague Island National Seashore was among 21 national park sites at which a ban on jet ski use was sustained by U.S. District Judge Gladys Kessler.

Heilprin, J. 2002. Park Service sets personal watercraft rules for park system. Associated Press wire service story, 16 April.

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Henderson, J. B. and P. Bartsch. 1914. Littoral marine mollusks of Chincoteague Island, Virginia. *Proceedings of the United States National Museum* 47(2055):411-421.

Library: CBL, TU, UD-Morris, UMCP

Henry, F. 1952. The clams that are dug with a fire hose. *Sunday Sun* (Baltimore, Maryland).

Henry, M. 1947. *Misty of Chincoteague*. Rand McNally (Chicago, Illinois). 173 pp.

Library: UD-Morris [PZ813 .H523m]

Henry, R. 1956. Birds, beasts, insects still rule Assateague Park site. *The Sun* (Baltimore, Maryland). 19 July.

Hensel, H. A. and R. E. Tiller. 1951-1952. *Maryland commercial fisheries sta*tistics. Maryland Department of Research and Education, Publication 99.

Hensel, H. A. and R. E. Tiller. 1955. *Maryland commercial fisheries statistics 1953-1954*. Maryland Department of Research and Education, Contribution No. 107.

Hensel, H. A. and G. S. Murphy. 1956. *Maryland commercial fisheries statistics 1955*. Maryland Department of Research and Education, Reference No. 56-26.

Library: Maryland State Law library

Hewatt, W. G. and J. D. Andrews. 1956. Temperature control experiments on the fungus disease, *Dermocystidium marinum*, of oysters. *Proceedings of the National Shellfisheries Association* 46(1955):129-133.

Abstract: The fungus is one of the principal causes of oyster mortality in some areas. Infections were transmitted by feeding a tissue mince from heavily-infected oysters. Controlled experiments showed that the progress of the fungus infection was arrested, and mortalities from the disease were negligible, in laboratory tanks at 15°C, but that all oysters killed by the disease within about four weeks at 28°C. Infected oysters held in a tray suspended from the laboratory pier died at an intermediate rate. The results also suggest that oysters taken from an area in which the fungus is endemic are less susceptible to infection.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Hewitt, J. H. 1994. Mr. Dowing and his oyster house. *American Visions* 9(3):22.

Abstract: Thomas Downing was born to freed parents in 1791 in Chincoteague, on Virginia's seaboard, where he learned about oysters. Once he arrived in New York City, his knowledge of oysters helped him make a success of the oyster business. Downing, however, was also a success as a humanitarian, helping to establish an antislavery society as well as the first high school in New York City that Blacks could attend.

Library: BSU, CSU, UD-Morris, UMBC, UMCP

Higgens, E. A. T. 1969. *A Floristic and Ecological Survey of Assateague Island, Virginia-Maryland.* Master of Science Thesis, University of Maryland (College Park). 109 pp.

Higgins, E. A. T., R. D. Rappleye and R. G. Brown. 1971. The flora and ecology of Assateague Island. *University of Maryland Agriculture Experiment Station Bulletin* A-172. 70 pp.

Library: UD-Morris [QK122 .H53]

Hildebrand, S. F. and W. C. Schroeder. 1928. Fishes of Chesapeake Bay. *Bulletin of the U.S. Bureau of Fisheries* 43(1):1-388. [Document 1024]

Abstract: All species taken in Chesapeake Bay during extensive collecting, as well as those previously recorded but not taken during the recent investigation (total 202), are included. Descriptions of species were made directly from Chesapeake specimens, as far as available. When specimens were not at hand, the source of the description was given. Descriptions of families and genera, also, are included. Keys to the families, genera, and species are given. A brief account of the life history, the commercial importance for the Chesapeake, the general distribution, and the occurrence in Chesapeake Bay, follow the description of each species. Sections in the beginning of the volume are devoted to a discussion of the literature, the general statistics, including remarks, on the fisheries of Chesapeake Bay. A special study of a certain fishery situated near the mouth of Chesapeake Bay which has been in operation for over 50 years, in its bearing on the general fisheries of the bay, is also given. A few new taxa are described with the types placed in the collection of the U.S. National Museum.

Library: UD-GCMES, UD-Morris, UMCP

Hill, S. 1986. An annotated checklist of the vascular flora of Assateague Island (Maryland and Virginia) *Castanea* 5:265-305.

Library: FSU, TU, UD-Morris, UMBC, UMCP

Hirschmann, E. 1963. Most in Worcester for private Assateague use. *The Evening Sun* (Baltimore, Maryland). 2 May.

Hite, M. P. 1924. Some observations of storm effects on ocean inlets. *American Journal of Science*, Series 5, 7:319-326.

Library: BSU, MSU, SU, UD-Morris, UMBC, UMCP, UMES

Ho, J. 1977. Copepoda: Lernaeopodidae and Sphyriidae. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 406.* 14 pp.

Library: NMFS, Johns Hopkins Univ., WVU, ECU

Ho, J. 1978. Copepoda: Cyclopoids Parasitic on Fishes. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 409.* 12 pp.

Library: NMFS, Johns Hopkins Univ., WVU, ECU

Hobbs, C. H., III. 1990. Reconnaissance exploration for heavy minerals on the inner continental shelf off Virginia. *Marine Mining* 9(3):365-378.

Abstract: In over three years of study of the occurrence and distribution of heavy minerals on the inner continental shelf adjacent to Virginia, a general plan has been developed for sampling and conducting geophysical investigations. In a set of approximately 400 samples, both grabs and cores, the maximum concentration of heavy minerals in any samples was 14.66% by weight. Maximum concentrations of individual minerals within the bulk sample were 5.90% ilmenite, 0.26% rutile, 0.30% leucoxene, 0.08% monazite, and 0.72% zircon. Restated in terms of the percentage by weight of the heavy mineral portion of the sample, maximum concentrations were ilmenite 60.33, rutile 3.15, leucoxene 8.20, monazite 2.47, and zircon 9.22.

Library: UD-Morris

Hoese, H. D. 1962. Sharks and rays of Virginia's seaside bays. *Chesapeake Science* 3(3):166-172.

Abstract: Seven sharks (*Carcharias taurus, Mustelus canis, Negaprion brevirostris, Carcharhinus milberti, Sphyrna zygaena, Squalus acanthias*, and *Squatina dumerili*) and six batoids (*Raja eglanteria, Dasyatis centroura, D. sayi, Gymnura altavela, G. micrura* and *Rhinoptera bonasus*) are reported from the Seaside of the Eastern Shore of Virginia. *Mustelus canis* may be the most common Seaside shark, but yong *Caracharhinus milberti* are common enough to support a small commercial fishery, and the remainder of the species are not uncommon. *Negaprion brevirostris* is reported for the first time from Virginia; four males taken from the Wachapreague area in 1961. Deep channels and lack of a salinity barrier may explain what seems to be a rich Seaside elasmobranch fauna. The shark fauna seems more closely related to the outer coasts of Maryland, Delaware, and New Jersey than to Chesapeake Bay, although more collections in the lower bay are needed.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hoese, H. D., C. E. Richards and M. Castagna. 1961. Appearance of the gag, *Mycteroperca microlepis*, in coastal waters of Virginia. *Chesapeake Science* 2(1-2):104-105.

Abstract: Eighteen young gag (grouper), *Mycteroperca microlepis*, 61-186 mm F.L., were recorded in Chincoteague Bay, Eastern Shore water, off Virginia Beach, and within Chesapeake Bay from July to November 1960. Average lengths at progressive collecting periods suggest rapid growth. Coloration and pattern varied somewhat among the specimens.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hofton, M. A. and J. B. Blair. 2002. Laser altimeter return pulse correlation: A method for detecting surface topographic change. *Journal of Geodynamics* 34(3-4):477-489.

Abstract: Quantifying and monitoring of many natural hazards requires repeated measurements of a topographic surface whose change reflects a geological or geophysical process. Topography and topographic change measurements are routinely made using techniques such as Interferomoetric Synthetic Aperture Radar and GPS, but both of these techniques have limitations for these purposes. A technique attracting increasing attention for its ability to perform accurate high-resolution topographic mapping (including sub-canopy) is laser altimetry, or lidar. The authors evaluate the feasibility of a new method for using laser altimeter return echoes, or waveforms, to detect relative elevation change. The method, dubbed the return pulse correlation method, maximizes the shape similarity of coincident laser return waveforms from two observation epochs by shifting them vertically. An evaluation was made of the accuracy of the pulse correlation method using laser altimeter data acquired over the NASA Wallops Flight Facility, Virginia, a region where no elevation change is expected within the time period of the surveys, and at Assateague Island, Maryland, a highly dynamic barrier island where several meters of erosion and deposition have been observed. Results show that the use of pulse correlation method generates elevation change estimates similar in magnitude to those obtained by simply differencing coincident laser altimeter elevation measurements (dubbed the spot comparison method). Along the beach at Assateague Island, similar patterns of accretion and deposition are detected using both the pulse correlation and spot comparison methods, although some horizontal resolution is lost using the pulse correlation method because of the wide footprint spacing of the waveform-recording laser altimeter used in the study. In the test case presented here, increasing the size of the laser footprint from 25 to 60 m caused the magnitude of the vertical change signal to be underestimated, confirming that the resolution of the measurement technique and the scale of the deformation features should be considered when planning survey missions. The use of this method can improve the accuracy of surface change estimates made using laser altimeter waveforms, especially beneath vegetation, by eliminating the subjective interpretation of waveforms used to extract a single elevation measurement.

Library: TU, UD-Morris, UMCP

Holechek, J. 1968. Conch collecting family takes winter jaunt to Assateague. *The Sun* (Baltimore, Maryland).

Holme, N. A. 1964. Methods of sampling the benthos. *Advances in Marine Biology* 2:171-260.

Library: CBL, HPL, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Holmes, S. J. 1905. The Amphipoda of southern New England. *Bulletin of the U.S. Bureau of Fisheries* 24:459-529.

Library: UD-GCMES, UD-Morris, UMCP

Holthuis, L. B. 1951. A general revision of the Palaemonidae (Crustacea: Decapoda: Natantia) of the Americas. I. The subfamilies Euryrhynchinae and Pontoniinae. *Allan Hancock Foundation Publications, Occasional Papers 11.* 332 pp.

Abstract: Three subfamilies are recognized: Euryrhynchinae, with three species, Pontoniinae with 55 American species in 13 genera, and Palaemoninae reported in the following paper. Five genera and 28 species are new.

Library: CBL, HPL, UD-GCMES, UD-Morris, UMCP

Holthuis, L. B. 1952. A general revision of the Palaemonidae (Crustacea: Decapoda: Natantia) of the Americas. II. The subfamily Palaemoninae. *Allan Hancock Foundation Publications, Occassional Papers 12.* 396 pp.

Library: CBL, HPL, UD-GCMES, UD-Morris, UMCP

Homer, M. L. 1997. Hard clam survey. **IN:** *Coastal Bays Shellfish Inventory: Final report to Coastal Zone Management Division, Maryland Department of Natural Resources*, M. L. Homer, M. L. Tarnowski, R. Bussell and C. Rice, Eds. Contract No. 14-96-134-CZM010, Grant No. NA570Z0301 (Annapolis, Maryland). 206 pp.

Homer, M. L., M. Tarnowski, L. Baylis and C. Judy. 1994. *A Shellfish Inventory of Chincoteague Bay, Maryland*. Maryland Department of Natural Resources, Fisheries Servoice (Annapolis).

Homer, M. L., M. Tarnowski and R. Bussell. 1999. The potential for bivalve aquaculture in Maryland's coastal bays. *Journal of Shellfish Research* 18(1):268.

Abstract: Maryland DNR re-introduction project, growth and survivorship data are now available. Preliminary results indicate that growth rates may not be sufficient to produce marketable scallops before their second winter. Given the short life-span of this species and the labor involved in battling fouling organisms, bay scallop culture in Maryland has some serious problems to overcome. Although Virginia has established a significant hard calm aquaculture industry, including production in Chincoteague Bay, few attempts have been made within Maryland's boundaries. The main impediment to hard clam culture appears to be associated with the permitting process, which includes three state agencies, five federal agencies, public hearings, and, on occasion, an appeals board. This daunting array of agencies, associated regulations, and opposition from waterfront property owners has attracted few individuals to the process. Environmental conditions in the Maryland coastal bays, however, appear to be sufficient to establish at least a modest hard clam aquaculture industry. There are areas outside Federal jurisdiction that provide clean, hard bottom for either planting bags or netting small beds of seed

clams. Hatchery-reared clams are readily available from Virginia and there is a suitable, nearby market for hard clams.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Homer, M. L., M. Tarnowski, R. Bussell and C. Rice. 1997. *Coastal Bays Shellfish Inventory.* Final Report to Coastal Zone Management Division, Maryland Department of Natural Resources (for the period October 1995 to September 1996). Maryland Department of Natural Resources Fisheries Service Shellfish Program (NOAA) [Annapolis]. 206 pp.

Library: Md DNR

Honeycutt, M. G. and D. E. Krantz. 2001. Deciphering the role of antecedent geology in shaping modern coastal evolution; examples from the Delmarva Peninsula. *Abstracts of papers, 50th Annual Meeting, Geological Society of America Southeastern Section* 33(2):64-65.

Abstract: A wide array of current topics in coastal geology require, at a fundamental level, a detailed model of the nearshore geologic framework. Among these are studies of sediment transport and sequence stratigraphy, as well as models of shoreline change occurring over societally relevant timescales. Shoreline-change studies rarely incorporate data related to framework geology, even though these data provide essential context for interpreting erosion rates in sediment-starved coastal areas. The Delmarva coastal zone, last studied intensively in 1970s and 1980s, is the site of a new wave of data collection and analysis. This research effort provides a prime opportunity to refine models of coastal evolution during transgression, and to develop new models to quantify the role of antecedent geology in controlling shoreline retreat and inner shelf geomorphology. A three-dimensional model for the Delaware and Maryland Atlantic shoreface is being constructed from existing core data and nearly 700 line-kilometers of previously uninterpreted 3.5 kHz and boomer (0.2-2.2 kHz) seismic-reflection profiles and new, high-resolution Chirp (2-12 kHz) profiles collected in the extreme nearshore zone and back-barrier waterways. Preliminary results show that outside of incised valleys, Holocene sediments form only a thin veneer above Pleistocene units along much of the Delaware coast. Geostatistical analysis of historical shoreline-change data from Maryland and Delaware revealed a positive correlation between alongshore changes in the geologic framework and erosion rates. The lowest shoreline-retreat rates were found adjacent to resistant Pleistocene headlands, as expected, but similarly low rates were also observed in two areas where earlier Holocene units provide localized sediment sources. One of these regions, located on Assateague Island (Md.), may represent the first evidence of an earlier Holocene (4,500? ybp) highstand event preserved on the Delmarva Peninsula. Additional geophysical data (Chirp and ground-penetrating radar) and shallow cores will be collected in 2001 to explore the origin of this proposed earlier Holocene barrier island.

Hooper, J. N. A. and R. W. M. Van Soest (Eds.). 2003. *Systema Porifera: A Guide to the Classification of Sponges*. Plenum Pub Corp (New York). 1810 pp.

Library: UD-GCMES [QL371 .S96 2002]

Hopkins, S. H. 1962. Distribution of species of *Cliona* (boring sponge) on the eastern Shore of Virginia in relation to salinity. *Chesapeake Science* 3(2):121-124.

Abstract: Four species of *Cliona* occur on both the seaside and bayside of the Eastern Shore peninsula of Virginia: *C. celata* Grant, *C. vastifica* Hancock, *C. lobata* Hancock, and *C. truitti*

Old. *C. celata*, the most abundant species in the high salinity bays of the seaside and is the least abundant species in the lower salinities of bayside creeks. *C. truitti*, rare on the seaside, is the most abundant species in bayside creeks and becomes more and more predominant as the salinity gets lower, going up the Chesapeake Bay shore.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Hopkins, T. L. 1965. Mysid shrimp abundance in surface waters of Indian River Inlet, Delaware. *Chesapeake Science* 6:86-91.

Abstract: A study was made on mysid species composition, reproductive periods, and diurnal and seasonal abundance in Indian River Inlet, Delaware. *Neomysis americana* was present in the surface plankton throughout the year and was the dominant species, averaging 80% of the mysid population. This species was most numerous in surface waters during hours of darkness and seasonally was most abundant from April through September. It may possibly produce three generations per year – two short-lived summer generations and a longer-lived winter generation. *Mysidopsis bigelowi* was also present throughout the year. It averaged 17% of the mysid population and was sporadically abundant from September through February. It reproduces from April through November. *Metamysidopsis munda* and *Gastrosaccus dissimilis* were infrequently collected and together averaged less than 3% of the mysid populations. They were encountered only in late summer and fall, during which time egg-bearing females or larvae were observed. Mysids are extremely abundant in these Delaware waters and there is evidence that they serve as an important source of food for fish populating these inshore waters during the warmer months.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Horsley Witten Hegemaim, Inc. 1992. Consultants in water resources and land planning. Ground water supply protection and management plan for the eastern shore of Virginia. Rockville, Maryland.

Abstract: In 1976 the eastern shore of Virginia was declared a ground water management area. The report gave background information on the hydrogeological and ground water conditions of the eastern shore. Investigations of the ground water have concluded that agriculture, animal wastes, development impacts, salt water intrusions, well interference, along with future demands were all major factors effecting the water quality and quantity in the area. Recommendations were proposed to deal with water protection, management, and continued research. Some of the recommendations included the "implementation of a land use/water quality data base," the development of an education program to focus on the role of the public in protecting ground water and research on salt water, recharge and pesticide issues.

Hovanitz, W. 1944. The ecological significance of the color phases of *Colias chrysotheme* in North America. *Ecology* 25(1):45-60.

Abstract: The historic distribution of *Colias chrysotheme* (Insecta: Lepidoptera) is discussed. The species appeared at Newcastle, Delaware, and in Maryland in 1884. The orange form of the species was first noted on the Delmarva Peninsula in 1920 at Ocean City, Maryland. The yellow form was found in the northern part of the peninsula in 1923 but did not become orange until south of Berlin, Maryland.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Howarth, Robert W. 1988. Nutrient limitation of net primary production in marine ecosystems. *Annual Review of Ecology* 19:89-110.

Abstract: A variety of lines of evidence leads to a conclusion that net primary productivity in many marine ecosystems is probably limited by nitrogen, but phosphorus may limit production in some ecosystems. Differences in nutrient limitation are the result of differences in the ratio of total nitrogen to total phosphorus in nutrient inputs to the system and differences in internal biogeochemical processes. These processes include nitrogen fixation and a variety of recycling processes. Given similar inputs of nitrogen and phosphorus to temperate-zone lakes and marine ecosystems, nitrogen limitation is more likely in the marine ecosystems since planktonic nitrogen limitation is much less likely to make up nitrogen deficits.

The current understanding of nitrogen and phosphorus limitation is limited by the great complexities in biogeochemical cycling and by uncertainties in nutrient inputs to estuaries. Whole-ecosystem experiments and mesocosm experiments in a variety of types of marine ecosystems are the best approach to furthering our understanding. Given the tremendous cost of controlling nutrient inputs to estuaries, whole-ecosystem experiments to gain better information on nutrient limitation would seem to be an excellent investment.

Hozink, M. J. and H. Hanson. 1969. Contorted sediments in modern open beach sand. *Pennsylvania Academy of Science, Proceedings 1968*. 42:184-186.

Abstract: A deformed wedge of sand approximately 50 ft-wide with a maximum preserved thickness of about 3 ft., occurs about 2 ft below the surface of the beach at Assateague Island, Maryland. The wedge is under the berm at the foot of the 'primary dune,' and is apparently of great length parallel to the shore. Deformation appears to have been caused by trapped air rising to the surface.

Library: UD-Morris

Hubert, B. 1982. Assateague plan favors ORVS, development. *National Parks and Conservation Magazine* 56(3-4):45-46.

Library: BSU, TU, UD-Morris, UMBC, UMCP

Hubertz, J. M., R. M. Brooks, W. A. Brandon and B. A. Tracy. 1993. *Hindcast Wave Information for the Atlantic Coast 1956-1975*. Wave Information Study Report 30, Coastal Engineering Research Center, U.S. Army Engineer Waterways Experiment Station (Vicksburg, Mississippi).

Abstract: The Coastal Engineering Research Center (CERC) calculated wave information along the U.S. Atlantic coast for the period 1956-1975 in the late 1970's. Calculations were made with a numerical wave hindcast model using wind speeds and directions calculated from atmospheric surface pressure records and ship observations. Measured wind and wave data became available in the 1980's from a number of buoys located off the Atlantic coast. Comparisons of mean wind and wave parameters were made between the measurements of the 1980's and hindcast results for 1956-1975 assuming the mean wind and wave climates for the different time periods were the same. Mean wind climinates compared well, but mean wave climates differed. The skill of recently developed wave hindcast models indicates that the hindcast wave results could be improved by using present model technology with the previously calculated winds. Comparison of hindcast results, using present technology, to measurements for the year 1990 show little bias with respect to wave height and peak period at coincident locations and times. Typical root mean square differences are 0.5 m and 2-3 sec for wave height and peak period respectively. The hindcast for 1956-1975 is improved by using higher resolution numerical grids to better represent the U.S. coastline, continental shelf bathymetry, and offshore islands and shoals in the Bahamas region and by using a more accurate wave mode. Results are presented at locations and in a format appropriate for present coastal engineering studies.

Hulings, N. C. Marine ostracods from western North Atlantic Ocean off the Virginia coast. *Chesapeake Science* 7(1):40-56.

Abstract: Thirty-nine species of marine benthonic ostracods are reported from the coast of Virginia. Three species, *Callistocythere reticulata, Cytherura pseudostriata* and *Triginglymus denticulata* are described as new. A comparison of the previously reported ostracods and the presently reported ostracods is made. It is suggested that the present ostracod fauna is closely related to the fossil Tertiary ostracod fauna of Virginia and surrounding areas.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Humm, H. J. 1962. Key to the genera of marine blue-green algae of southeastern North America. *Virginia Institute of Marine Science – Special Scientific Report* No. 28. 5 pp.

Humm, H. J. 1962. Bibliographic data useful in the study of marine algae. *Virginia Institute of Marine Science, Special Scientific Report* No. 29. 11 pp.

Library: LOC, NOAA NMFS, OSU, VIMS

Hunter, W. R. and R. T. Meadows. 1965. Aspects of water physiology in the salt-marsh pulmonate snail, *Melampus dibentatus. Biological Bulletin* 129:409 [Abstract]

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Hyer, P. V., J. P. Jacobson and C. S. Fang. 1975. *Index of existing data sources for Chincoteague, Sinepuxent, Assawoman and Little Assawoman Bays.* Virginia Institute of Marine Science (Gloucester Point).

Abstract: An index of physical, geological, biological and water quality information prior to 1975. Physical data included some hydrographic information. Geological data included information on bottom sediments, surface water and ground water resources. Biological studies were primarily focused on commercial species. Water quality information involved pollution sources, data summaries and sources.

Library: UMCP (Maryland Room) [TD225.C5 H9]

Hyman, L. H. 1940. The polyclad flatworms of the Atlantic coast of the United States and Canada. *Proceedings of the United States National Museum* 89(3101):449-495.

Abstract: All known polyclad flatworms from the region are described (except those of the *Sargassum*) and includes a revision of the work of Pearse. All sections, families, and genera are defined. There are 17 species and 1 subspecies in 8 families of the Acotylea and 7 species in 3

families of the Cotylea. Three new genera are created in the Acotylea: *Coronadena* (Discocelidae), *Digynopora* (Leptoplanidae), and *Planctoplanella* (Planoceridae). There are figures and descriptions of five new species. All but one of the old species of Girard and Verrill have been identified and allocated to the proper genera and the confusing synonymy and incorrect identifications of these forms straitened out. The most interesting finds are a new pelagic polyclad from the Carolina coast (*Planctoplanella americana* sp. nov.) and the discovery that one of Pearse's species belongs to the genera *Enantia*, having marginal spines, of which the only other known species was found only once, over 40 years ago.

Library: CBL, TU, UD-Morris, UMCP

Hyman, L. H. 1944. Marine *Turbellaria* from the Atlantic coast of North America. *American Museum Novitates* 1266:1-15.

Abstract: Two acoels, *Afronta aurantiaca* and *Ectocotyla paguri*, from the Maine coast, an allocoel, *Plagiostomum album*, from the Maine coast, a marine triclad, *Probursa veneris*, from Long Island, and a cryptocelid, *Comrostatum insularia*, from the Florida keys, are figured and described. Families Ectocotylidae and Probursidae are created. *Ecocotyla paguri* is remarkable in having a plicate pharynx, a posterior adhesive disk, ectocommensal habits, being epizoic on the hermit crab *Pagurus pubescens*, and viviparous reproduction. *Probursa veneris* differs from all known triclads in the far posterior position of the ovaries, which are situated at the level of the rear end of the pharynx.

Library: CBL, TU, UD-Morris, UMCP

Jauck, A. and L. Points. 1997. *Assateague – Island of the Wild Ponies*. Sierra Press (Mariposa, California).

Library: SU(Nabb) [F187 .E2 J3 2002]

Jenkins, D. G., W. L. Grogan, Jr. and M. E. Folkoff. 1994. An additional record of the freshwater jellyfish, *Craspedacusta sowerbyi*, on Maryland's Eastern Shore, with notes on its habitat (Hudrozoa: Hydroida: Petasidae). *The Maryland Naturalist* 38(3-4):3-6.

Abstract: A second record of the freshwater jellyfish, *Craspedacusta sowerbyi*, is given for the Eastern Shore of Maryland from East Lake, Wicomico County. The species had been reported from Dorchester County in 1992. Details of its habitat in East Lake are provide with estimates of population density.

Library: CBL, FSU, SU, TU, UMBC, UMCP

Jensen, R. E. 1983. Atlantic coast Hindcast, Shallow-Water Significant Wave Information. Wave Information Study Report 9, Coastal Engineering Research Center, U.S. Army Engineer Waterways Experiment Station (Vicksburg, Mississippi).

Library: ASU, NOAA, Indiana State Univ., Univ. of Kentucky

Jesien, R. V. and C. H. Hocutt. 1991. *Tagging studies and stock characterization of summer flounder (Paralichthys dentatus) in Maryland's Coastal Water near*

Ocean City, MD. Final Report. Tidewater Administration. Maryland Department of Natural Resources (Annapolis).

Abstract: Tagging studies were conducted and data collected regarding the summer flounder populations in the coastal bays of Maryland during the summer of 1991. Inshore sampling consisted of trawl collections. Three hundred and fifty four tows were completed within Assawoman Bay, yielding an average 5.04 fish per tow. Sixty one tows were completed within Chincoteague Bay yielding 4.00 fish per tow. Fish were tagged, length and weight information were recorded, and scale samples were taken to help determine seasonal movement, age and growth characteristics of the flounder within the bay systems. Based on the available data, it appeared that most fish tended to move south upon emerging from the seaside bays. Apparently, there was little movement of fish between Chincoteague and Assawoman Bays.

Johnson, C. W. 1890. List of marine Mollusca of the Atlantic Coast from Labrador to Texas. *Proceedings of the Boston Society for Natural History* 40(1):1-204.

Library: UD-Morris

Johnson, D. R., B. S. Hester and J. R. McConaugha. 1984. Studies of wind mechanism influencing the recruitment of blue crabs in the Middle Atlantic Bight. *Continental Shelf Research* 3:425-437.

Library: CBL, HPL, UD-GCMES, UMCP

Johnson, J. C. 1975. Assateague: Jewel of the east coast. *National Parks and Conservation Magazine* 49(1):4-9.

Library: BSU, TU, UD-Morris, UMBC, UMCP

Johnson, P. G. 1984. Family Spionidae Grube, 1850. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 2:6-1 - 6-69.

Library: Univ. of CA Davis, Univ. of Alaska, ASU, LOC, EPA

Johnson, P. T. 1976. A herpeslike virus from the blue crab, *Callinectes sapidus*. *Journal of Invertebrate Pathology* 27(3):419-420.

Abstract: Virus-infected crabs were collected from Chincoteague Bay, Virginia in Aug 1974, this was the 1st report of a herpes-like virus form an arthropod. Haemolymph withdrawn form the crabs was milky in appearance, did not clot, contained few haemocytes and was filled with minute refractive particles. Further examination of stained tissue sections revealed numerous cells with grossly enlarged nuclei. Some nuclei were naked, lacking cytoplasm and lysing in vacuoles. Several cells had lysed or were in the process of lysing. Gill epithelium and some other types of connective tissue cells were also affected.

Library: CBL, UD-Ag, UD-GCMES, UD-Morris, UMCP, UMES

Johnson, P. T. 1976. Bacterial infection in the blue crab, *Callinectes sapidus*: course of infection and histopathology. *Journal of Invertebrate Pathology* 28(1):25-36.

Abstract: During the summer, groups of *C. sapidus*, collected in commercial crab traps in Chincoteague Bay, Virginia, often undergo heavy mortalities during the 1st week to 10 days in the lab. Gram-negative bacteria are seen in hemolymph and tissues of many of the sick and dying crabs. The bacterial infections appear to be acquired during capture and transport, suggesting that potentially pathogenic bacteria in water or on the exoskeleton may be introduced into tissues by wounding or other means during the stressful conditions suffered at that time. The pathology caused by bacterial infection includes diminution in numbers of hemocytes, reduced clotting ability of the hemolymph, and progressive formation of hemocyte aggregations with necrotic centers in the heart, arteries, and hemal sinuses and spaces. By the 3rd day, aggregations, often with many bacteria visible in the centers, occur especially in the gills, antennal gland, and Y organ. There are large premortem plasma clots in some animals. The focal and massive necroses that occur may be due to hypoxia resulting from obstruction of hemolymph flow by cellular aggregations and plasma clots and to toxic products of necrotic cells and/or bacteria.

Library: CBL, UD-Ag, UD-GCMES, UD-Morris, UMCP, UMES

Johnson, Col. W. R. 1961. *Maryland Coast Line*. U.S. Army Corps of Engineers Baltimore District. Reprint of speech before American Shore and Beach Preservation Association, Ocean City Maryland, 14 June 1961.

Jones, E. L. 1961. The bridge and then? *The Sun* (Baltimore, Maryland). 10 April.

Jones, E. L. 1963. Chincoteague's tourist package; the other end of Assateague. Part I of II. *The Sun* (Baltimore, Maryland). 9 June.

Jones, E. L. 1963. The other end of Assateague: Wildlife refuge. Part II of II. *The Sun* (Baltimore, Maryland). 10 June.

Jones, M. L. 1963. Four new species of *Magelona* (Annelida, Polychaeta) and a redescription of *Magelona longicornis* Johnson. *American Museum of Natural History Novitates* 2164:1-31.

Library: CBL, TU, UD-Morris, UMCP

Jordan, R. R. 1964. Columbia (Pleistocene) sediments of Delaware. *Delaware Geological Survey Bulletin* 12.

Abstract: Pleistocene sediments of Delaware are assigned to the Columbia Formation instead of the names applied to these strata used in New Jersey, Maryland and elsewhere. Channel cutting and filling are attributed to the distributary portion of a stream system operating on the coastal plain during the time of glacial advance and lowered sea level. A later stand of the sea some tens of feet above the present is required for the marine features of southern Delaware.

Library: UD-Morris, UMCP

Ju, S.-J., D. H. Secor and H. R. Harvey. 1999. Use of extractable lipofuscin for age determination of blue crab *Callinectes sapidus. Marine Ecology Progress Series* 185:171-179.

Abstract: The blue crab *Callinectes sapidus* is an economically and ecologically important species in many temperate estuaries, yet stock assessments have been limited to length-based methods for demographic analyses. We evaluated the potential of age pigments (lipofuscins) sequestered in neural tissue of eye-stalks and brains to estimate the age of blue crabs collected from Chesapeake Bay and Chincoteague Bay. The rate of lipofuscin accumulation was determined using crabs of known age reared in the laboratory. Age pigments were extracted from neural tissues (eye-stalls or brain), quantified, and normalized to protein content to allow comparisons across tissue types and crab sizes. Field collected blue crabs (35 to 185 mm carapace width) contained highly variable levels of age pigments (coefficient of variation = 58%). Lipofuscin level was significantly related to carapace width, but not significantly different between gender or sampling location. In juveniles (40 to 70 mm carapace width) reared for 6 mo, the age pigments showed no significant change during the rapid summer growth period, but significantly increased during fall (after 3 mo). Lipofuscin contents in known-age reared crabs were positively related to chronological age. Modal analysis of lipofuscin for field-collected adult males provided separation of multiple modes, whereas carapace width showed only a single broad mode. These results confirm the potential use of lipofuscin for age estimation of blue crabs.

Library: CBL, HPL, SMC, UD-GCMES, UD-Morris, UMBC, UMCP

June, F. C. and J. W. Reintjes. 1957. Survey of the fisheries off Delaware Bay. *U.S. Fish and Wildlife Service, Special Scientific Report – Fisheries* No. 222:1-55.

Abstract: A survey of the ocean fisheries in the region lying between Barnegat and Winter Quarter lightships has furnished detailed information on the fisheries and important fish stocks within the area. Menhaden, otter trawl, and surf clam fisheries account for 98% total production. Miscellaneous minor fisheries include purse seine for food fish, pot, pound net, drift gill net, trawl line, hand line, troll line, scallop dredge and sport. The sport or recreational fishery is included among the minor fisheries on the basis of estimated production. An economic evaluation would place it among the three major fisheries, however. Analyses were made of the menhaden purse seine fishery from 1939 – 1953. Field data collected for 1952 – 1953 from dock and plant records and fishing logbooks give information on catch-per-unit effort and fishing effort for all the major fisheries, fishing grounds and seasons for all fisheries.

Kearney, M.S., A.S. Rogers, J.R.G. Townshend, J.C. Stevenson, J. Stevens, E. Rizzo, & D. Stutzer. 2002. Landsat imagery shows decline of coastal marshes in Chesapeake Bay and Delaware Bays. *Eos, Transactions, American Geophysical Union* 83: 173, 177–178.

Library: Maryland State Law library

Kahn, D. M. and T. E. Helser. 2005. Abundance, dynamics and mortality rates of the Delaware Bay stock of blue crabs *Callinectes sapidus*. *Journal of Shellfish Research* 24(1):269-284.

Abstract: The Delaware Bay stock of blue crabs supports a bistate fishery in New Jersey and Delaware, with annual landings climbing through the 1980s and 1990s to almost 11×10^6 pounds (4,390 metric tons) in 1995 and then declining to a recent average of 7×10^6 pounds (2,796 metric tons) over the last 5 y. In Delaware, this fishery ranks as number one in value. Landings declines in 1996 spurred efforts to conduct a stock assessment, which is now updated annually. This assessment was based on: (1) a biomass-based minimum recruitment threshold from a Ricker stock-recruitment model fit to indices of relative abundance from a research trawl survey and (2) a catch-survey model incorporating observation and process error that produced annual estimates of absolute abundance, biomass, and fishing mortality rates from 1979 through 2002. Adult blue crab

abundance estimates showed a positive trend over the period, ranging from 20×10^6 in 1979 up to 146×10^6 in 1993, with recent estimates between 70×10^6 and 97×10^6. Estimated average exploitable stock biomass over the period was 23.43×10^6 pounds (9,357 metric tons). Recruit abundance was highly variable, ranging from 34×10^6 up to 631×10^6. Use of the log survival ratio to estimate Z showed no trend in Z, although estimates were highly variable. Estimation of the exploitable stock size was problematic due to high density-dependent recruit mortality. Because of this fact, we developed upper and lower bounds of the exploitation rate, then estimated upper and lower bounds of F from Baranov catch equation, $F = \mu/(1 - e^{-Z})*Z$. We also estimated the Collie & Kruse (1998) harvest rate and extended it to estimate F. The upper bound of F ranged from 0.13 up to 0.77 and averaged 0.44. The upper bound on F and the Collie-Kruse F showed a positive linear or curvilinear trend. Annual M estimates from Z - F, conditioned on an original model input value of constant M = 1.0, were erratic and showed no trend but were correlated with recruitment, supporting the hypothesis of compensatory density dependence. The relatively low estimate of F versus M and the overcompensatory and resilient stock-recruitment relationship suggest that overfishing is not occurring on this stock.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Kaminski, J. E. and P. H. Dernoeden. 2002. Geographic distribution, cultivar susceptibility, and field observations on bentgrass dead spot. *Plant Disease* 86(11):1253-1259.

Library: TU, UD-Ag, UD-Morris, UMCP

Kana, T. W. R. E. Katmarian and P. A. McKee. 1997. The 1986-1995 Myrtle Beach nourishment project ten-year performance summary. *Shore and Beach* 65(1):8-23.

Abstract: The City of Myrtle Beach, South Carolina, completed an 8.5-mile long beach nourishment project in 1986-1987. At the time, it was the second largest nourishment ever performed in the United States using trucks and an inland source of sand. While lengthy, the project involved small unit volumes averaging only about 20 cubic yards per linear foot of shoreline (cy/ft). By comparison, the Miami Beach (Florida) project (1976-1981) averaged about 250 cy/ft (Wiegel, 1992), and the 1988-1991 Ocean City (Maryland) project averaged 175 cy/ft. Many expected the Myrtle Beach project to be short lived, given its size. Yet, the City of Myrtle Beach obtained a ten-year bond to amortize the $4.5 million cost, assuming (as our company did) the project would provide benefits over a decade or more. For nearly ten years, Coastal Science & Engineering, Inc. (now CSE-Baird) has surveyed Myrtle Beach and computed the rate of sand loss in the project area by means of semiannual beach and inshore profiles. During this period, Myrtle Beach has experienced major northeasters on 1 January 1987 and 13 March 1993, and Hurricane Hugo on 21-22 September 1989. Surveys in 1995 confirmed that 20-50 percent (varying by season) of the original nourishment volume remained in the project area. This report is a summary of the project, its performance over one decade, and its implications for a pending large-scale nourishment of South Carolina's Grand Strand, of which Myrtle Beach constitutes the strategic center reach.

Library: UD-Morris, UMBC, UMCP

Kaplan, M. 2001. Taking the bridge to Virginia's Eastern Shore. *The Record* (Bergen County, New Jersey), 20 May, Travel, p. T-5.

Kaufman, W. and O. H. Pilkey, Jr. 1983. *The Beaches are Moving; The Drowning of America's Shoreline* (with a new epilogue). Duke University Press (Durham, North Carolina). 336 pp.

Abstract: Originally published in 1979 and reprinted with a new epilogue in 1983 to accompany the series "Living with the Shore" (see below). The authors hold strong views against building structures near the coastline; this nontechnical book explains the natural coastal processes that form and change beaches and describes some of the problems that arise when we attempt to control these natural processes.

Library: CSU, FSU, SU, TU, UD-Morris, UMBC, UMCP, UMES [all are GB460.A2 K38 1983]

Keat, J. S. 1963. U.S. offers to develop Assateague Island into national seaside park. *The Sun* (Baltimore, Maryland). 21 April.

Keefe, C. W. and W. R. Boynton. 1970. Primary production of Chincoteague Bay salt marshes. **IN:** *Assateague Ecological Studies, Part I: Environmental Information.* Natural Resources Institute, University of Maryland (College Park), Contribution No. 446. pp. 157-173.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

Keefe, C. W. and W. R. Boynton. 1973. Standing crop of salt marshes surrounding Chincoteague Bay, Maryland-Virginia. *Chesapeake Science* 14(2):117-123.

Abstract: Chincoteague Bay is surrounded by approximately 95 km^{-2} (23,000 acres) of irregularly flooded salt marsh dominated by short *Spartina alterniflora*. The maximum standing crop, chemical composition, and live: dead ratio of the marsh grasses were estimated from samples taken at 20 marsh stations in August, 1970. Live standing crop ranged from 427 to 558 g dry matter m^{-2} and 335 to 470 g organic matter m^{-2}. The total standing crop of live plants consisted of 48 x 10^6 kg of dry material of which 39 x 10^6 kg was organic material. Chemical analysis indicated that P and K were rapidly leached from the dead plants while Mg tended to be retained. Live: dead ratios ranged from 0.9 to 2.3 and were lower than those found in regularly flooded marshes.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Kehew, A. E. 2006. *Geology for Engineers & Environmental Scientists*, Third Edition. Prentice Hall (Upper Saddle River, New Jersey). xvii +574 pp.

Library: TU, UMCP [all are TA705 .K38 2006]

Keinath, J. A., D. E. Bernard and J. A. Musick. 1991. *Status of Kemp's Ridley in Virginia and Adjacent Waters*. Report to the U.S. Fish and Wildlife Service, Office of Endangered Species, Virginia Institute of Marine Science (Gloucester Point).

Keinath, J. A., J. A. Musick and R. A. Byles. 1987. Aspects of the biology of Virginia's sea turtles: 1979-1986. *Virginia Journal of Science* 38:329-336.

Library: CBL, UD-Morris, UMBC, UMCP

Keiper, R. R. 1976. Social organization of feral ponies. *Proceedings of the Pennsylvania Academy of Science* 50(1):69-70.

Abstract: Direct field observations were conducted on 200 feral ponies on Assateague Island. The ponies organized into 16 distinct herds. Most of the herds consist of a dominant stallion and 2-15 mares and their offspring. Often a mare rather than the dominant stallion controls the activities and movements of the herd. Some stallions wander from her to herd or remain by themselves for long periods.

Library: UD-Morris

Keiper, R. R. 1976. Interaction between cattle egrets and feral ponies. *Proceedings of the Pennsylvania Academy of Science* 50(1):89-90.

Library: UD-Morris

Keiper, R. R. 1977. Observations on the nocturnal behavior of feral ponies. *Proceedings of the Pennsylvania Academy of Sciences* 51(1):57-58.

Abstract: The nocturnal behavior of feral ponies was recorded during 68 hours of direct field observation during the summer of 1976. Observations were made between 1900-0500 EST. Data was recorded at 1 minute intervals for each hour of darkness for five different kinds of behavior: grazing, resting, grooming, drinking and walking behavior. Grazing occurred intensely for several hours after dark and just before dawn. Resting was seen at all hours, but occurred most frequently during the early morning hours. Walking and drinking occurred primarily just after dark when the animals moved to water holes for water. Grooming behaviors occurred at constant low levels throughout the night.

Library: UD-Morris

Keiper, R. R. 1983. *Continual Monitoring of Grazing Effects of Feral Ponies on Assateague Island, 1982-1983*. Final Report. U.S. Department of the Interior, U.S. National Park Service, Contract No. PX4000-3-0646.

Keiper, R. R. 1985. Are sika deer responsible for the decline of white-tailed deer on Assateague Island, Maryland? *Wildlife Society Bulletin* 13(2):144-146.

Abstract: Assateague Island is inhabited by white-ailed deer, *Odocoileus virginianus*, and sika deer, *Cervus nippon*. Four sika deer were introduced to the island in 1923; today the population is greater than 1,000. This study illustrates the conflicts between and determines the late fall food habits for the native and introduced species.

Library: FSU, SMC, SU, TU, UD-A, UMBC, UMCP, UMES

Keiper, R. R. 1985. *The Assateague Ponies*. Tidewater Press (Centreville, Maryland). 101 pp.

Library: SU, UMBC, UMCP, UMES [SF315.2.C4 K45]

Keiper, R. R. and M. A. Keenan. 1980. Nocturnal activity of feral ponies. *Journal of Mammalogy* 61(1):116-118.

Abstract: The noctural activities of feral ponies on Assateague Island, Maryland and Virginia. Activities were divided between standing, lying down, feeding, walking, rub-rolling, drinking, and mutual grooming. Mean time in any one activity indicated the horses spent most of their time (32.78%) grazing followed by standing (14.07%), lying down (9.89%), walking (2.67%), rub-rolling (0.29%), mutual grooming (0.23%) and drinking (0.07%).

Library: FSU, SMC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Keiper, R. R. and L. A. Keiper. 1978. A survey of visitor knowledge, attitudes, and judgment of feral ponies on Assateague Island. *Proceedings of the Pennsylvania Academy of Science* 52:136-142.

Abstract: because of the increased contact between visitors and the feral ponies that inhabit the Assateague Island National Seashore, a questionnaire was developed to determine the knowledge, attitudes, and judgment of the visitors concerning the ponies. The questionnaire also included questions designed to provide demographic and park utilization information. During the summer of 1977, 1130 surveys were handed out to visitors in the Maryland State Park and the National Park Service campgrounds on Assateague Island. Approximately 45% (513) of the surveys were returned and analyzed. Most of the visitors had an accurate knowledge of where the ponies secure their food and water. Likewise, the results suggested that campers accept the ponies and their potential dangers as part of the ecosystem and they suggest that the animals should not be managed to any greater degree.

Library: UD-Morris

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Abstract: This report lists the invertebrates found in Chincoteague Bay, how they were collected and a qualitative evaluation of their abundance. Some of the most common invertebrates found were the common mud crab (*Eurypanopeus depressus*), Cappríllids, perriwinkles (Littorina), the hard clam (*Mercenaria mercenaria*), and Holothuroidian species.

Library: UD-Morris

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Library: College of Charleston

Kelly, W. 1968. Production of fishery products in selected areas of Maryland, Virginia, and North Carolina. *U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries (Market News Report)*. 31 pp.

Library: NOAA, College of Charleston

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Abstract: A series of discrete depth plankton tows made every 3 h over a 72-h period off Ocean City, Maryland, in July 1974 allowed analysis of the diel-depth distribution of ichthyoplankton. Overall egg and larval densities averaged 5.6 eggs/m^3 and 6.3 larvae/m^3. Seven species of eggs made up over 90% of those caught with *Merluccius bilinearis* eggs accounting for 45.9% of the eggs taken. Over 16 species of fish larvae were identified, of which *Urophycis* sp. *Pomatomus saltatrix*, and *Citharichthys arctifrons* were the most abundant. The fish eggs were concentrated near the surface and their age distribution at different times of day provided information about diel spawning times, spawning depth, and embryonic mortality. Larvae of all species moved to shallower depths at night.

Library: CBL, HPL, FSU, SMC, UD-GCMES, UD-Morris, UMCP, UMES

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Abstract: Seven species and 1 variety of freshwater triclads were collected in Virginia. The forms studied and described are: *Curtisia formani*, *Euplanaria trigrina*, *Euplanaria dorotocephala*, *Fonticola gracilis*, *Fonticola morgani*, *Fonticola morgani polycelis*, *Planaria dactyligera*, and *Procotyla typhlops*. The Virginia planarians are classified with regard to their ecology.

Library: UD-GCMES, UD-Morris, UMBC, UMCP

Kennedy, N. T. 1980. Chincoteague – watermen's island home. *National Geographic* 157(6):810-829.

Kerhin, R. T. 1989. Non-energy minerals and surficial geology of the continental margin of Maryland. *Marine Geology* 90(1-2):95-102.

Abstract: The surficial sediments have been mapped and the shallow geologic framework outlined of the Maryland inner continental shelf. The initial study encompassed a small area offshore of Assateague Island but was extended northward to include the Ocean City area and eastward across several linear shoals. Four distinct seismic units are identified from seismic reflection profiles. The lowermost unit, T1, exhibits high-angle clinoforms truncated at the top by a locally prominent near-horizontal reflector. Above this reflector are concordant strata with parallel to subparallel bedding designated as Q2. Incised into Q2 is an extensive channel, Q3, that trends both coast-parallel and coast-normal. The upper unit, Q4, overlaps portions of units Q2 and Q3 along the eastward edges of the study area and is represented in the nearshore by (Holocene inlet?) channeling adjacent to the shoreface. Note that this excludes the modern shelf sand "sheet".

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Kerhin, R. T., R. Conkwright and D. Wells. 1999. Ten years of studies on Maryland's inner continental margin and coastal bays. *Marine Georesources and Geotechnology* 17(2-3):127-137.

Abstract: During the past ten years of the Association of American State Geologists-Mineral Management Service Continental Margins Program, the Maryland Geological Survey investigated the sedimentological, paleontological, stratigraphical and geophysical character of Maryland's inner continental shelf. Based on seismic records and sedimentological analyses completed during the first four years, a late Quaternary stratigraphic model was developed. Five distinct stratigraphic units were identified and described on the Maryland inner shelf. These units represent late Pleistocene interglacial deposits, the oldest of which corresponds to pre-Illinoian (oxygen-isotope stages 7 and/or 9) transgressive shelf sands. Overlying the Q1 unit, the Q2 unit is a 6-meter thick mud sequence of oxygen-isotope stage 5 (128-75 ka) age. Units Q3 and Q4 representing fluvial and leading edge estuarine deposits (oxygen-isotope stages 4, 3 and 2) filled numerous paleochannels that were incised into units Q2 and Q1. Modern trailing-edge transgressive shelf shoals (Unit Q5) discontinuously cap the sequence. The 5th and 6th years studies reported on the economic minerals of surficial and cored sediments. Vibracores collected off the Maryland's shelf during previous studies were analyzed for mineral types and abundances, weight percent of general size fractions, and heavy mineral (HM) content. Mineralogic maturity indices were compiled to correlate the THM and economic heavy minerals (EHM) abundances with position offshore, sediment type, and the indices themselves. For the 7th year, the Maryland Geological Survey re-examined geophysical records and lithological data originally collected by the Army Corps of Engineers to locate and assess beach fill borrow areas for the Ocean City Beach Replenishment Project. Data from 163 vibracores and over 300 kilometers of high-resolution seismic profile records collected off Ocean City, Maryland, supported the stratigraphic model developed by MGS during the first four years of the AASG-MMS program. The Maryland coastal bays became the focus of study during the 8th and 9th years during which seismic records, cores and surficial sediment were collected in Isle of Wight and Assawoman Bays. Shallow pretransgression surface was mapped, relating the existing streams to offshore paleochannels. The tenth year study focused on developing a repository for vibracores collected on Maryland's inner continental shelf.

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Kiddon, J. A., J. F. Paul, H. W. Buffum, C. S. Strobel, S. S. Hale, D. Cobb and B. S. Brown. 2003. Ecological condition of US Mid-Atlantic estuaries, 1997–1998. *Marine Pollution Bulletin* 46(10):1224-1244.

Abstract: The Mid-Atlantic Integrated Assessment (MAIA-Estuaries) evaluated ecological conditions in US Mid-Atlantic estuaries during the summers of 1997 and 1998. Over 800 probability-based stations were monitored in four main estuarine systems—Chesapeake Bay, the Delaware Estuary, Maryland and Virginian coastal bays, and the Albemarle–Pamlico Estuarine System. Twelve smaller estuaries within the four main systems were also assessed to establish variance at the local scale. A subset of the MAIA-Estuaries data is used here to estimate the extent of eutrophication, sediment contamination, and benthic degradation in mid-Atlantic estuaries. An Environmental Report Card and Index of Environmental Integrity summarize conditions in individual estuaries, the four estuarine systems, and the entire MAIA region. Roughly 20–50% of the region showed signs of eutrophication (high nutrients, excessive production of organic matter, poor water clarity, or depleted dissolved oxygen), 30% had contaminated sediments, and 37% had degraded benthic communities. Compared with the Environmental Monitoring and Assessment Program (EMAP)-Virginian Province study in 1990–1993, larger fractions of Chesapeake Bay (17%) and Delaware River (32%) had increased metals or organics in sediments.

Library: CBL, SMC, TU, UD-GCMES, UMCP

Kim, Y. and E. N Powell. 2007. Distribution of parasites and pathologies in sentinel bivalves: NOAA status and trends "Mussel Watch" program. *Journal of Shellfish Research* 26(4):1115-1151.

Abstract: The 1995–1998 histopathology data from NOAA's Mussel Watch Program were analyzed to: (1) document the occurrence of parasites and pathologies in sentinel bivalves during the 1995–1998 time period, (2) describe and compare the geographic distribution of these parasites and pathologies between different bivalve species and between different geographic regions, and (3) evaluate trends in parasite taxon richness. Parasite taxon richness was higher in oysters than in mytilids and dreissenids. Parasites having higher prevalences in a given host taxon routinely also had higher infection intensities. When different geographic locations were compared, the same trends occurred much more rarely. Oysters were more heavily infected based on total parasite body burden than mytilids, and the frequency of hosts with at least one parasite was higher. Excluding the numerically-dominant gregarines, however, removed the differential between oysters and mytilids, with the exception of East-coast mytilids that were more frequently parasitized than East-coast oysters. Dreissenids had lower prevalence and infection intensity for all parasites than the other host bivalve taxa. Though cestodes offer a discrepancy, most of the more common oyster parasites were unicellular, whereas most of the more common mytilid parasites were multicellular. On the average, parasite distributional patterns along a stretch of coastline were more often clinal in nature in mytilids, in that prevalence and infection intensity tended to change gradually over relatively large distance scales, and more bounded in nature in oysters, in that prevalence and infection intensity tended to change more sharply over shorter distance scales. Latitudinal trends were diametric opposites on the two northern coasts. More parasites occurred in mytilids from northern bays of the East coast, whereas fewer occurred in mytilids from northern bays of the West coast. Mytilids far exceeded oysters in the incidence of pathologies, including digestive gland and gonadal abnormalities and hemocytic infiltration. On the West coast, the vast majority of these pathologies occurred in mussels of the *Mytilus edulis* complex rather than *M.*

californianus. All pathologies were more common in mytilids from the northeast coast than in West-coast mytilids. Indeed, discounting the gregarines, northeast coast mytilids combined the highest instances of pathologies with among the highest parasite body burdens of any bivalve taxon and coastal area combination in the Mussel Watch program.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

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Library: CBL, HPL, FSU, SMC, UD-GCMES, UD-Morris, UMCP, UMES

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Abstract: Data from Assateague Island, Maryland and Virginia, indicate that forced copulation and induced abortion are not common events among all feral *Equus caballus* herds.

Kirkpatrick, J. F. and J. W. Turner, Jr. 1991. Compensatory reproduction in feral horses. *Journal of Wildlife Management* 55(4):649-652.

Abstract: Feral loss rate was estimated in two separate herds of feral *Equus caballus* with significantly different foaling rates that inhabited the same barrier island. In mares from Assateague Island National Seashore, the foaling rate was 32.5%; for mares from Chincoteague National Wildlife Refuge the rate was 62.5%. Estimated fetal loss for mares from Assateague Island and Chincoteague was 7.1 and 6.2%, respectively. Ten of the 40 mares from Assateague Island (25%) were lactating and only two produced foals, whereas two of the 48 mares from Chincoteague (4.1%) were lactating and neither produced foals. Data indicate that 1) the differential foaling rates are not the result of fetal loss after 90-days postconception; 2) lactational anestrus is a contributing factor to differential foaling rates; and 3) the annual removal of foals from the Chincoteague herd results in compensatory reproductive mechanisms and higher foaling rates.

Library: CBL, FSU, SMC, SU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

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Koch, E.W., & R.J. Orth. 2003. Seagrasses of the mid-Atlantic coast, u.s.a. *In:* Green, E.P., & F.T. Short (eds). *World Atlas of Seagrasses*. University of California Press, California.

Kochel, R. C. and R. Dolan. 1986. The role of overwash on a mid-Atlantic coast barrier island. *Journal of Geology* 94(6):902-906.

Abstract: The importance of storms and their overwash in barrier island transgression is assessed quantitatively by determining net sediment budgets of four representative Assateague Island washover sites for the 1982-83 season. The results show that most of the annual accretion occurred during one large storm which had a return interval of 10 to 15 years. The combined effects of eight

subsequent storms with return intervals of less than 2.5 years accounted for less sedimentation. Change due to eolian redistribution was insignificant.

Library: BSU, FSU, SMC, SU, TU, UD-Morris, UMBC, UMCP

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Abstract: Sediment budget data for six fans along Assateague Island are presented for a four-year period that includes an exceptionally stormy year, an exceptionally calm year, and two years having average storm history. Accretion due to overwash processes was dominant during the stormy year, but still significant in normal years. In contrast, aeolian deflation and deposition dominated during the calm year. Assateague Island fan surfaces accreted significantly over the course of the study, by an island-wide average of 22 cm. Observed variations in fan surface changes depended primarily upon the frequency of precipitation, frequency of overwash, and topography of the local fan area. The effects of two exceedingly large storms resulted in extensive accretion on fan surfaces that was greater than the sum of 15 moderate storms during the four years.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Abstract: Results are presented from topographic surveys of the Assateague Island National Seashore using an airborne scanning laser altimeter and kinematic Global Positioning System (GPS) technology. The instrument used was the Airborne Topographic Mapper (ATM), developed by the NASA Arctic Ice Mapping (AIM) group from the Goddard Space Flight Center's Wallops Flight Facility. In Thu November, 1995, and again in May, 1996, these topographic surveys were flown as a functionality check prior to conducting missions to measure the elevation of extensive sections of the Greenland Ice Sheet as part of NASA's Global Climate Change program. Differences between overlapping portions of both surveys are compared for quality control. An independent assessment of the accuracy of the ATM survey is provided by comparison to surface surveys which were conducted using standard techniques. The goal of these projects is to make these measurements to an accuracy of plus or minus 10 cm. Differences between the fall 1995 and

1996 surveys provides an assessment of net changes in the beach morphology over an annual cycle.

Library: FSU, SU, UD-GCMES, UD-Morris, UMCP

Kraeuter, J. N., S. Buckner and E. N. Powell. 2005. A note on a spawner – recruit relationship for a heavily exploited bivaolve: The case of northern quahogs (hard clams), *Mercenaria mercenaria* in Great South Bay, New York. *Journal of Shellfish Research* 24(4):1043-1052.

Abstract: The Town of Islip, NY has collected a long-term data set (1977–2004) on northern quahog (hard clam), *Mercenaria mercenaria*, abundance. The data comprise approximately 350 duplicate 1 m^2 samples each year taken with a clam shell bucket. All samples were sieved through a 6.4 mm sieve and the hard clams enumerated by size. In addition, clam landings data for the town waters are available for the same time period. Clam populations have declined from their peaks in the 1970s to very low levels in the 1990s and 00's. These dramatic shifts in population abundance have made the exploration of spawner/recruit relationships possible. A number of alternate models were attempted, but based on knowledge of the biology of the species and other factors, all but two did not appear to be plausible. The two models (2nd order polynomial and Log) yielded high r^2 values and intercepted the 0 axis between 0.5 and 0.75 adult clams m^{-2} indicating a density dependent effect on recruitment. The polynomial model also suggested a carrying capacity level of about 5 adult clams m^{-2} and a density dependent upper level of density. This is the first time a spawner recruit relationship has become apparent for hard clams.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Kraft, J. C. 1971. Sedimentary facies patterns and geologic history of a Holocene marine transgression. *Bulletin of the Geological Society of America Bulletin* 82(8):2131-2158.

Abstract: A study was made of the Holocene transgression of the Atlantic Ocean in Delaware. The facies sediments are thin and difficult to interpret. The ocean is destroying a large part of the Holocene record as it transgresses. A study of numerous core borings shows the rise of sea level during the Holocene. No evidence is given to show levels higher than the present.

Library: BSU, FSU, MSU, SMC, SU, UD-GCMES, UD-Morris, UMBC, UMCP

Kraft, J. C. 1971. The migration of Holocene sedimentary environments in coastal Delaware, North American continental shelf. *Quaternaria* 14:23-38.

Abstract: A theoretical basis for interpreting coastal transgressive sequences is provided based on studies in coastal Delaware. Sea level has gradually risen over the last 12,000 years. From 12,000 to 3,000 B.P., the rise was about 10 ft (3.3 m) per 1,000 years; from 3,000 to the present, about 5 ft (1.6 m) per 1,000 years.

Library: UD-Morris

Kraft, J. C., R. B. Biggs and S. D. Halsey. 1973. Morphology and vertical sedimentary sequence models in Holocene transgressive barrier systems. **IN:** *Coastal Geomorphology*, D. R. Coates, Ed. State University of New York at Binghamton. pp. 321-355.

Abstract: A study of the transgressive barrier elements of the Delmarva Peninsula including a chart showing the Holocene rise of sea level in the area. There is also a map showing the shoreline 12,000 and 7,000 B.P., as well as the shoreline projected to 10,000 and 75,000 years in the future.

Library: FSU, TU, UMCP [all are GB400 .E58 1972]; UD-Morris [GB450 .C62]

Kraft, J. C. and G. Margules. 1971. Sediment patters, physical characters of the water mass and Foraminiferida distribution in Indian River Bay, coastal Delaware. *Southeastern Geology* 12(4):223-252.

Abstract: A discussion is presented of Holocene peat at -87 ft which is 10,800 ± 300 B.P. *Crassostrea virginica* at -38 ft is 3,430 ± 170 B.P. The basal marsh peat may indicate the head of a tributary to a large estuary such as Delaware Bay. Twelve genera and 23 species of forams are reported. No significant correlation was found between foram abundance and distribution of sediment types.

Library: UD-Morris, UM-CP

Krantz, D. E. 2001. Geology and hydrogeology of the Delmarva coastal bays. Abstracts of Papers, 50th Annual Meeting, Geological Society of America, Southeastern Section, 33(2):76.

Abstract: The coastal bays along the Atlantic coast of the Delmarva Peninsula are representative of a common class of small estuaries. Because of restricted circulation and limited exchange with the ocean, these bays tend to trap both nutrients and fine-grained sediments, and are susceptible to eutrophication. Ground water supplies a significant, but poorly quantified, proportion of the total flux of fresh water and nutrients to the coastal bays. For lack of better information, existing hydrologic models typically assume a homogeneous, isotropic medium for the surficial aquifer. Recent field studies in the coastal bays of Delaware and Maryland have employed several standard and new technologies to survey the hydrogeologic setting of the area. Ultimately, this new, detailed information will be used to improve hydrologic models for simulating ground-water flow and the transport of nutrients in the surficial aquifer of the coastal zone. The integrated program of field data collection has included: Chirp and boomer seismic surveys in the bays to map the Holocene infill and the Pleistocene and upper Tertiary stratigraphic units that comprise the surficial aquifer; horizontal resistivity to map the distribution of fresh and saline ground waters beneath the bays and identify subsurface zones of mixing; and aerial thermal-infrared imagery to detect temperature anomalies in the bays and tidal tributaries that indicate areas of focused ground-water discharge. In addition, hydraulic vibracoring, in situ porewater sampling, and gamma and electromagnetic-induction logging of boreholes down to 25 m in the estuary are being used as ground truth for the seismic and resistivity profiles. These observational data have provided some fundamental insights into modes of ground-water flow to the coastal bays. A recurring theme is that the stratigraphic complexity of the coastal zone controls many hydrologic processes. Among these are preferential pathways of ground-water flow, subsurface zones of mixing between fresh and salt water, and geochemical transformations of constituents transported by ground water, such as denitrification of ground-water nitrate by chemically reduced sediments.

Krantz, D. E., F. T. Manheim and J. F. Bratton. 2001. Hydrostratigraphic framework and controls on ground-water discharge to Maryland and Delaware. Abstracts of Papers, 2001 Annual Meeting, Geological Society of America 33(6):42-43.

Abstract: The hydrostratigraphic framework appears to impart a first-order control on the distribution and flow of fresh ground water and brackish zones of mixing in the aquifer beneath the Maryland and Delaware coastal bays. Geophysical surveys of horizontal resistivity, Geopulse seismics, and aerial thermal infrared imaging show vertical and horizontal patterns that deviate from, and are more complex than, the distribution of fresh ground water predicted from variable-density flow modeling. Hydraulic vibracoring, gamma logging, and in situ porewater sampling in the estuary to depths of 20-25 m provide lithologic and geochemical ground truth for interpretation of the 2-dimensional geophysical profiles. These field observational data will be used to guide refinements to the numerical modeling. Key parameters that influence the flow of ground water and modes of discharge to the coastal bays include: the distribution and thickness of fine-grained Holocene estuarine sediments; the depth, geometry, and orientation of incised valleys and paleo-drainage networks; the horizontal and vertical distribution of laterally continuous high-permeability sediments (Pleistocene shorelines and nearshore sands) and low-permeability sediments (back-barrier muds and incised-valley fill); and the depth to the underlying confining layer(s). For Chincoteague and Sinepuxent Bays in Maryland, the Geopulse seismic profiles (frequency range of 200 to 2000 Hz) show three primary sequences down to 280-300 ms (about 225-250 m). The upper sequence of Pleistocene back-barrier, coastal, and inner-shelf deposits comprises a complex surficial aquifer. The Pleistocene sequence is underlain by 60 to 70 m of the Pliocene marine Yorktown Formation, which is a regional confining layer. The Yorktown confining layer overlies the confined aquifers of the upper Miocene marine units. On a more local scale, fresh ground water was identified beneath Chincoteague Bay as much as 1 km from shore along the trend of Pleistocene shorelines; examples include off South Point on Sinepuxent Neck and in Purnell Bay near the Virginia border. Similarly, the vertical distribution of fresh and saline interstitial water is controlled on the decimeter scale by permeability contrasts from the depositional bedding of the Pleistocene and Holocene coastal sediments.

Kraus, N. C. 2000. Reservoir model of ebb-tidal shoal evolution and sand bypassing. *Journal of Waterway, Port, Coastal and Ocean Engineering* 126(6):305-313.

Abstract: A mathematical model is presented for calculating the change in volume and sand-bypassing rate at ebb-tidal shoals. Conceptually and mathematically, the ebb-tidal shoal is distinguished from bypassing bars that emerge from it and from attachment bars where the bypassing bars merge with the beach. The volumes and bypassing rates of these morphologic entities are calculated by analogy to a reservoir system, where each reservoir can fill to a maximum (equilibrium) volume. The ratio of the input longshore sand transport rate and the equilibrium volume of the morphologic feature is found to be a key parameter governing morphologic evolution. The analytical model gives explicit expressions for the time delays in evolution of the bypassing bar and the attachment bar, which are directly related to the delays in sand bypassing. Predictions of morphology change agree with observations made at Ocean City Inlet, Maryland. Examples of extension of the model by numerical solution are given for a hypothetical case of mining of an ebb-tidal shoal and for an idealized case of bidirectional longshore sand transport, in which updrift and downdrift bypassing bars and attachment bars are generated.

Library: MSU, UD-Morris, UMCP

Kraus, N. C. 2006. Understanding piping plover population dynamics through mathematical model, with application to northern Assateague Island, Maryland, and Long Island, New York, barrier beaches. *Shore and Beach* 74(1):3-9.

Abstract: The piping plover (*Charadrius melodus*) is a small migratory shorebird that breeds in three geographic areas: along the Atlantic Ocean coast; sandy beaches of the Great Lakes; and along major rivers, lakes, and wetlands of the northern Great Plains of the United States. This federally listed endangered species is dependent upon non-vegetated to sparsely vegetated sandy areas near bay, lake, and ocean intertidal areas for breeding, and it has experienced population declines due to reduction in habitat along developed and stabilized coasts,

increased predation, and human disturbance. This paper explores a simple mathematical model, the logistic equation, which appears to represent leading factors governing a plover population. The model was found to describe plover population data from two locations on the Atlantic coast: northern Assateague Island, Maryland, and the south shore of Long Island, New York. Model predictions and possible applications are discussed in the context of a potential aid for plover management.

Library: UD-Morris, UMBC, UMCP

Kraeuter, J. N. and D. R. Calder. 1978. Class Pycnogonida. **IN:** *An Annotated Checklist of the Biota of the Coastal Zone of South Carolina*, Richard G. Zingmark, Ed. University of South Carolina Press (Columbia). p. 153.

Kraeuter, John N. and D. S. Haven. 1970. Fecal pellets of common invertebrates of lower York River and lower Chesapeake Bay, Virginia. *Chesapeake Science* 11(3):159-173.

Abstract: Fecal pellets voided by 70 invertebrate species are described, 66 of these for the first time. Pellet size is related to the size of animals, and linear regressions are given for two species. Pellet characteristics described are cross-sectional shape, sculpture, differentiation, composition, and shape. The morphology is specific for many animals. However, certain species void feces which are 1) diffuse, 2) morphologically inconsistent, or 3) lack differentiating characteristics.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Krauk, J. M., T. A. Villareal, J. A. Sohm, J. P. Montoya and D. G. Capone. 2006. Plasticity of N:P ratios in laboratory and field populations of *Trichodesmium* spp. *Aquatic Microbial Ecology* 42(3):243-253.

Abstract: The authors followed changes in N:P ratios in batch cultures of the planktonic marine cyanobacterium *Trichodesmium* (IMS 101) grown in 2 different media and in field populations from 4 different oceanic regions. Cultures grown on low P media showed a rapid rise in N:P ratio upon depletion of phosphate. Ratios exceeding 125 were reached in 1 experiment before attaining stationary phase. A transect across the North Atlantic Ocean along 32 degree N showed a monotonic decrease in the N:P ratio of field collected colonies, dropping from about 60:1 on the western side of the basin to about 30:1 on the eastern side. A second cruise sampled colonies and surface slicks in waters along the north coast of Australia, where ratios of N:P were generally lower than in the North Atlantic, ranging from 11:1 to 47:1 with an average of 22:1. A comparison of rising and sinking colonies collected at 8 stations in the Gulf of Mexico shows a higher mean N:P ratio among sinking colonies than floating colonies. Overall, the average N:P in the Gulf of Mexico was about 68:1. N:P ratios of *Trichodesmium* around the Hawaiian Islands were very consistent between 2 consecutive years of sampling, with an average colony N:P for both years of about 38:1. Our research demonstrates high variability in the cellular N:P in *Trichodesmium* both in the laboratory and in the field. *Trichodesmium* N:P ratio may provide an index to the relative severity of P limitation in these diazotrophs. Geochemical and ecological modeling efforts which rely on using the N:P ratio of diazotrophs in deriving nitrogen fixation rates should account for the variability of these ratios in situ.

Library: CBL, HPL, UD-GCMES

Kraus, N. C. 2006. Understanding piping plover population dynamics through mathematical model, with application to northern Assateague Island, Maryland, and Long Island, New York, barrier beaches. *Shore and Beach* 74(1):3-9.

Abstract: The piping plover (*Charadrius melodus*) is a small migratory shorebird that breeds in three geographic areas: along the Atlantic Ocean coast; sandy beaches of the Great Lakes; and along major rivers, lakes, and wetlands of the northern Great Plains of the United States. This federally listed endangered species is dependent upon non-vegetated to sparsely vegetated sandy areas near bay, lake, and *ocean* intertidal areas for breeding, and it has experienced population declines due to reduction in habitat along developed and stabilized coasts, increased predation, and human disturbance. This paper explores a simple mathematical model, the logistic equation, which appears to represent leading factors governing a plover population. The model was found to describe plover population data from two locations on the *Atlantic* coast: northern Assateague Island, Maryland, and the south shore of Long Island, New York. Model predictions and possible applications are discussed in the context of a potential aid for plover management.

Library: UD-Morris, UMBC, UMCP

Kriebel, D. L. and R. G. Dean. 1985. Estimates of erosion and mitigation requirements under various scenarios of sea level rise and storm frequency for Ocean City, Maryland. **IN:** *Potential Impacts of Sea Level Rise on the Beach at Ocean City, Maryland.* EPA 230-10-85-013. U.S Environmental Protection Agency (Washington, D. C.). pp. 99-175.

Abstract: A numerical erosion model is applied to representative beach profiles for Ocean City, Maryland, to estimate: 1) the expected erosion impact of severe storms with 10- to 500-year return periods, 2) the potential erosion impact of sea level rise to the year 2075, and 3) the mitigation requirements, that is, volume of beach fill, needed to maintain the current shoreline position based on predicted erosion due to storms and/or sea level rise. Total mitigation requirements to maintain the existing shoreline range from 19,000,000 yd super(3) to 40,000,000 yd super(3) over the 8-mile Ocean City shoreline for the 95-year period. Mitigation requirements to maintain the existing level of storm protection are approximately the same.

Library: UD-Morris [EP 1.2:Se 1/6]; CBL, FSU, SU, UMCP, UMES [all are GB459.4 .P67 1985]

Kritzler, H. 1984. Family Terebellidae Grube, 1850. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 7:52-1 - 52-72.

Kuehn, H. E. and G. E. Dent. 1947. Comparative study of magnetic surveys of Worcester County, Md., made on the ground and from airplane observations. *U.S. Bureau of Mines Report of Investigations* 4070. 23 pp.

Kuster, W. V. 1959. *Titanium Minerals in the Heavy Sand Deposits of Assateague Island, Maryland*. U.S. Department of the Interior, Bureau of Mines, Department of Investigations 5512. 22 pp.

Kutz, F. W., T. E. DeMoss, L. Mangiaracina, R. Magnien, R. Eskin, J. R. Maxted, K. Price, J. Chaillou and S. Weisberg. 1995. The Delaware-Maryland coastal bays joint assessment. Office of Research and Development, Region III, U.S. Environmental Protection Agency, (Annapolis, Maryland); U.S. EPA, Philadelphia, PA. 7 pp.

Abstract: The inland coastal bays of Maryland and Delaware are estuarine areas formed behind barrier islands. They represent critically important ecological and economic resources. The bay system is considered generally shallow and landlocked. The objectives of the study are to (1) characterize the ecological condition of the coastal bays of Maryland and Delaware, (2) compare the current condition of selected parameters and locations to historical conditions, and (3) to associate indicators of condition with indicators of natural and anthropogenic stresses. This assessment project is a joint undertaking of the States of Maryland and Delaware, and the EPA.

Kutz, F. W., J. F. Paul and T. B. DeMoss. 1999. Update on the ecological condition of the Delmarva coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:43-49.

Library: FSU [EP 1.23/6:620/R-00/001]

Larson, M., H. Hanson, N. C. Kraus and J. Newe. 1999. Short- and long-term responses of beach fills determined by EOF analysis. *Journal of Waterway, Port, Coastal and Ocean Engineering* 125(6).

Abstract: Topographic data from three different beach nourishment projects were analyzed using empirical orthogonal functions (EOFs) to determine the response of the fills at different time and space scales. The studied nourishments were undertaken at Ocean City, Maryland, Silver Strand, Calif., and Sylt, Germany, encompassing different nourishment schemes, forcing conditions, and general beach properties. Time series of measured beach topographies were used as input data in the EOF analysis, which produced maps describing the dominant spatial patterns in the data. These patterns displayed the effect of the fills, severe storms, and natural morphological features such as shore-attached shoals and rhythmic features. The evolution in time of the eigenvectors showed that the perturbation of the natural conditions typically caused by a fill disappears after about 1 year, provided that the material is available for cross-shore adjustment by the normal wave climate. If the fill material is placed high up on the beach, a series of severe storms may be needed to adjust the topography back to its natural state.

Library: MSU, UD-Morris, UMCP

Larson, R. J. 1976. Cnidaria: Scyphozoa. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 397.* 18 pp.

Laskowski, S., B. Barker, H. Speir, R. Orth, R. Welton and S. Dawson. 1999. Harvest pressures and equipment impacts – how to maintain a sustainable catch. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:62-68.

Library: FSU [EP 1.23/6:620/R-00/001]

Latane, L., III. 2003. Artist lanored long for duck stamp. *Richmond Times Dispatch* (Virginia), 12 January, Area/State, p. B-3.

Laurier, F. and R. Mason. 2007. Mercury concentration and speciation in the coastal and open ocean boundary layer. *Journal of Geophysical Research*. D. *Atmospheres* 112(D6).

Abstract: Atmospheric elemental mercury and reactive gaseous mercury (RGHg) concentrations, as well as ancillary parameters and meteorological data, were collected during a cruise in the North Atlantic Ocean between Bermuda and Barbados and at two land-based sites: the Chesapeake Biological Laboratory (CBL), a semirural, coastal site, and a site within the city of Baltimore, Maryland. There were two deployments at CBL, including a 6-month deployment in 2003/2004. Wet deposition samples were collected and analyzed for mercury where possible. A diurnal change in RGHg concentration was found at both CBL and over the North Atlantic Ocean, with maxima in the afternoon that coincided with maximum UV radiation, demonstrating the importance of in situ formation of RGHg. The maxima in RGHg concentration did not coincide with elevated Hg^0 but were often found under conditions of low wind speed, and over the ocean, under low ozone conditions. In contrast, at the urban site there was more evidence of local sources. The data collected at the sites are contrasted and compared and used to examine the factors controlling the formation of RGHg in open ocean and nearshore locales and to estimate the importance of the dry deposition of RGHg to surface waters. Finally, the data collected at CBL in 2002-2004 were compared to earlier data collected in 1997-2000 to examine trends in concentration with time and to contrast these with the open ocean data sets to examine changes in Hg^0 at the hemispheric scale.

Library: UD-GCMES, UD-Morris, UMBC

Lea, C. and S. H. King. 2002. Restoring an Atlantic barrier island endemic. *Endangered Species Bulletin* 27(1):20-21.

Library: FSU, MSU, SU, UD-Morris, UMCP

Leatherman, S. P. 1976. Barrier island dynamics: overwash processes and eolian transport. **IN:** *Proceedings of the 15th Coastal Engineering Conference held at Honolulu, Hawaii, USA from 11-17 July 197*6, M. Angel, Ed. American Society of Civil Engineers (New York, NY).

Abstract: The northern 5 miles of shoreline at Assateague Island, Maryland are presently being eroded. During storms, swash surges are able to overtop the most landward (storm) berm as overwash with deposition occurring on the barren flats. Where primary barrier dunes still exist, sediment-charged surges are funneled through breaches in the dune field for deposition of the entrained material on the washover fan. Sediment budget computations show that there has been a small net loss of material at each washover area, in spite of 7 discrete overwash events during a 26 month time interval. The predominant north-west winds effectively eroded the overwash material, transporting the majority of the sand back to the beach. This analysis indicates that there exists a balance between overwash and eolian processes with wind transport being slightly dominant.

Leatherman, S. P. 1976. *Quantification of Overwash Processes*. Ph.D. Dissertation, University of Virginia (Charlottesville).

Library: Univ. of Virginia, U.S. Army Eng Res.

Leatherman, S. P. 1977. Interpretation of overwash sedimentation associated with a large scale northeaster. *Marine Geology* 24:109-121.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Leatherman, S. P. 1977. Interpretation of overwash sedimentary sequences. *Abstracts of Northeast Sectional Meeting, Geological Society of America.* pp. 292-293.

Leatherman, S. P. 1977. Overwash hydraulics and sediment transport. **IN:** *Coastal Sediments '77: Fifth Symposium of the Waterway, Port, Coastal and Ocean Division of ASCE,* Davis,R. A., Jr. (Ed.). American Society of Civil Engineers, New York, NY (USA). Waterway, Port, Coastal and Ocean Division Publ. by: ASCE; (New York, NY). p. 135-148.

Abstract: Overwash measurements were taken for the March 19-20, 1975 storm at Assateague Island, Maryland. This small winter northeaster resulted in an average of 29 ft SUP-3 of overwash deposition per foot of dune breach. The overwash surges exhibited fairly high velocities compared to their low flow depths. Froude numbers indicated that the flow was generally subcritical, resulting in horizontal bedding of the overwash sediments. A classical fluid mechanics approach was used to determine the flow competency and capacity. Shields' diagram was used to show that the overwash surges could transport pebble size material. Einstein's bedload equation was used to predict the amount of sediment transport within accepted limits.

Library: MSU, UD-GCMES, UMCP [all are GB460.U6 C6]

Leatherman, S. P. 1978. Sediment grading in overwash deposits. *American Association of Petroleum Geologists, Bulletin* 62:536.

Abstract: Overwash is a process of swash overtopping of the frontal dunes of a barrier island during storm conditions. These unidirectional surges occur in a pulsating fashion through time, as only the larger swash uprushes are allowed to cross the barrier threshold. Sediment sampling was conducted by coring, between overwash surges, during a storm-generated event. These data were taken during the March 19-20, 1975, northeaster at Assateague Island, Maryland.

The overwash deposit is characterized by distinctive horizontal laminations. The sequence was interpreted by observing changes among sedimentation units. Normally graded, monomineralic sequences are depositional in nature. The quartz and heavy sands were commonly deposited as a mixture without initial particle segregation. Analysis of the cores collected during the overwash showed that postdepositional sorting resulted in inverse sediment grading. The smaller surges, between the large pulses of sediment-charged water, did not initiate transport, but favored the downward movement of the geometrically smaller and denser particles. The heavy minerals were allowed to work their way through the quartz matrix and become concentrated on the bottom of the unit. These findings suggest another mechanism of differential sorting and grading in waterlaid deposits.

Library: MSU, TU, UD-Morris, UMBC, UMCP

Leatherman, S. P. 1979. Barrier dune systems: A reassessment. *Sedimentary Geology* 24:1-16.

Abstract: Barrier dunes are an important and natural part of most migrating barrier island systems. Sediments transfer across a barrier during storms by overwash or inlet dynamics results

in temporary plantation and/or truncation of the dune field. Post-storm recovery usually includes revegetation and subsequent dune building processes. Barrier dunes have not been shown to accelerate beach erosion, as reported by some scientists, rather they serve as a source of sediment. The effect of eroding dunes on swash processes during storm conditions requires more field and wave tank investigations. It appears that barrier dunes do not affect the long-term, geologic processes of landward barrier migration with a rising sea level.

Library: TU, UD-Morris, UMBC, UMCP,

Leatherman, S. P. 1979. Beach and dune interactions during storm conditions. ***Quarterly Journal of Engineering Geology*** 12:281-290.

Library: UD-Morris, UMCP

Leatherman, S. P. 1979. Migration of Assateague Island, Maryland, by inlet and overwash processes. *Geology* 7(2):104-107.

Abstract: The northern part of Assateague Island, Maryland, has a history of rapid shoreline erosion, with washovers much in evidence. A comparison of aerial photography shows that the greatest island widths and highest rates of landward migration are associated with inlet dynamics. The overwash process, at maximum transport conditions in this sand-starved area, is effective only in maintaining the island as a low, narrow barrier.

Library: BSU, SMC, SU, UD-Morris, UD-GCMES, UMBC, UMCP

Leatherman, S. P. 1980. Non-structural approach to coastal problems. **IN:** *Barrier Island Forum and Workshop*, U.S. Department of the Interior, National Park Service North Atlantic Region (Boston, Massachusetts). pp. 139-147.

Leatherman, S. P. 1981. Barrier beach development: a perspective on the problem. *Shore and Beach* 49:2-9.

Abstract: The first priority of the Federal Government should be to acquire at least the most important remaining unprotected barrier areas. There should also be changes in policies that allow and even stimulate barrier development. Future construction on undeveloped barriers should not qualify for Federal flood insurance or shoreline engineering projects. An exception may be the maintenance of navigable channels through barriers where national benefit exceeds the cost and no prudent or feasible alternative exists.

For urbanized barriers, redevelopment of severely damaged areas should not be allowed. Once the property owners are compensated for their losses, the Federal Government, working with state and local agencies, should acquire these tracts. Actual title to the land will probably reside with the state or local level, but future development will be precluded, and the land can be set aside for public recreation and conservation. Further construction of high-rise buildings on any barrier structure should be seriously questioned, and most likely prohibited. This type of construction commits the public to a long-term, high cost program of shoreline protection. Finally, barrier landowners and other principal beneficiaries of shoreline stabilization programs must assume a greater proportion of the cost for protection of developed barriers.

Library: UD-Morris, UMBC, UMCP

Leatherman, S. P. 1983. Historical and Projected Shoreline Changes, Ocean City and North Assateague Island, Maryland. *Scientific and Technical Aerospace Reports* 22(22):1-45.

Abstract: Recession greatly accelerated by interruption of the net south littoral drift since construction of the Ocean City inlet jettie in 1934-1935. The barrier island has responded to this sediment deficiency by forming a concave shoreline configuration and has migrated very rapidly landward along the north end.

Library: SU, UD-Morris, UMBC, UMCP

Leatherman, S. P. 1983. *Historical and Projected Shoreline Changes, Ocean City and North Assateague Island, Maryland*. Maryland Water Resources Research Center (College Park), Report No. 79. 39 pp.

Library: CBL, FSU, HPL, TU, UD-Morris, UMBC, UMCP

Leatherman, S. P. 1983. Barrier island migration with Holocene sea level rise. **IN:** *Near-Shore Sedimentology: Proceedings of the 6th Symposium on Coastal Sedimentology*. Florida State University (Tallahassee). pp. 127-142.

Abstract: Quatitative studies at Fire Island, New York, and Hatteras Island, North Carolina, have shown that these barrier are actually eroding on both sides and experiencing bayside submergence. Research at Assateague Island, Maryland, showed that islands must narrow to a critical width after which barrier-rollover by inlet and overwash processes becomes effective.

Leatherman, S. P. 1984. Shoreline evolution of north Assateague Island, Maryland. *Shore and Beach* 52:3-10.

Abstract: The metric mapping computer system was used to analyze historical shoreline changes of the north end of Assateague Island from 1850 to 1980. Results showed that erosion had increased from an average of 1.9 feet per year to approximately 36 feet per year since the Ocean City inlet stabilization jetty was constructed in 1935. The barrier island has responded to this sediment deficiency by forming a concaval shoreline configuration, and the erosive effects could be expected to impinge further south through time." It is believed that the north end of Assateague Island will migrate onto the mainland and a new inlet would probably open south of the Ocean City Airport. One effect of the merge of the north end of the island with the mainland is that "Ocean City would experience increased storm surge flooding and inlet/bay siltation problems.

Library: UD-Morris, UMBC, UMCP

Leatherman, S. P. 1985. Geomorphic effects of accelerated sea-level rise on Ocean City, Maryland. **IN:** *Potential Impacts of Sea Level Rise on the Beach at Ocean City, Maryland.* EPA 230-10-85-013. U.S Environmental Protection Agency (Washington, D. C.). pp. 33-66.

Abstract: The Atlantic Coast of Ocean City, Maryland, is undergoing long-term shoreline retreat as a result of sea level rise. Many areas show reversals in trend, where an area that is characterized by high recessional rates for a period of time is later retreating more slowly, as compared to the overall trend, or accreting. These dramatic short-period (perhaps 20- to 30-year) trends may result from the alongshore migration of low-amplitude, very long wave length, sand waves. Analysis of these long-period sand waves can result in much confusion when trying to interpret short-term information, such as beach profiles. This analysis indicates that the longest accurate record available should always be used for determining shoreline trend.

Library: UD-Morris [EP 1.2:Se 1/6]; CBL, FSU, SU, UMCP, UMES [all are GB459.4 .P67 1985]

Leatherman, S. P. 1987. Beach and shoreface response to sea-level rise: Ocean City, Maryland. *Progress in Oceanography* 18(1-4):139-149.

Abstract: Sea-level is one of the principal determinants of shoreline position. Sea-level rise induces or accelerates on-going shore retreat since deeper water decreases wave refraction, thus increasing littoral drift, and also allowing waves to arrive closer to shore before breaking. Ocean City, Maryland, was selected as a case study site to determine historical shoreline changes and to project future beach erosion based on accelerated rates of sea-level rise. During the past 130 years (1850-1980), this shore has retreated similar to 75m and many highrise buildings at Ocean City are now threatened during storm conditions. Accelerated sea-level rise is expected to increase the rate of retreat by a factor of 2 to 5 based on analysis of present trends. This significantly reduces the planning time available for mitigating the hazard and increases the vulnerability of this urbanized barrier through time.

Library: HPL, FSU, SMC, SU, TU, UD-Morris, UD-GCMES,UMCP

Leatherman, S. P. 1988. *Barrier Island Handbook*. University of Maryland Coastal Publications Series (College Park). 92 pp.

Library: CBL, UMBC, UMCP [all are GB473 .L35]; UD-GCMES [GB471 .L43 1988]

Leatherman, S. P. 2003. Interpretation of overwash sedimentation associated with a large scale northeastern *Marine Geology* 24:109-129.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Leatherman, S. P. and A. T. Williams. 1976. Sedimentation in a barrier island overwash fan. *Journal of the Geological Society of London* 132(6):707-708.

Leatherman, S. P. and A. T. Williams. 1977. Lateral textural grading in-overwash sediments. *Earth Surface Processes* 2(4):333-341.

Abstract: Overwash deposits are characterized by horizontally layered laminations. Vertical sequences could be interpreted in terms of individual storm deposits by recognizing time breaks or discontinuities in the stratigraphic section. Results from comparison of channel deposit data for textural grading across the washover fan were inconclusive. Samples taken from individual laminations revealed the true extural grading when traced along a 61 m trench and sampled at designated localities. The overwash deposit was found to become finer in grain size from the apex to the margins of sedimentation in the direction of transport.

Library: FSU, TU, UD-Morris, UMCP

Leatherman, S. P. and A. T. Williams. 1978. Barrier island processes. *Journal of the Geological Society of London* 135(4):479 [Abstract].

Abstract: Investigations into the short term sedimentary dynamics of barrier island washover areas indicate a balance between overwash and aeolian processes: washover fans/flats serve as temporary reservoirs for eventual redistribution of sediment by wind. Sand transport by wind is not as dramatic as storm generated overwash but is continuous over a long time period. Historical

shoreline analysis of Assateague Island, Maryland, has shown the dominance of inlet dynamics in the process of landward barrier migration. The geological significance of overwash is interpreted to be confined mainly to bayshore 'straightening' except where the shoreline has narrowed to a critical width. Inlet breaching and subsequent flood tidal delta formation is viewed as the dominant process.

Leatherman, S. P. and A. T. Williams. 1983. Vertical sedimentation units in a barrier island washover fan. *Earth Surface Processes and Landforms* 8(2):141-150.

Abstract: Overwash is a major component of a barrier island's response to high energy conditions. Examination of the 19-20 March, 1975, storm deposits at Assateague Island, showed that an overwash sequence could be divided into sedimentation units. Interpretation depends upon defining textural and mineralogical combinations that can be logically ordered as a vertical sequence. If the sequence is depositional and formed from a single material, normal grading usually results; if polymineralogical and erosionally truncated, inverse grading with a top layer of heavy minerals can be formed via an in situ sorting process dependent on disturbance depth and overwash influence.

Library: FSU, TU, UD-Morris, UMCP

Leatherman, S. P., A. T. Williams and J. S. Fisher. 1977. Overwash sedimentation associated with a large-scale northeaster. *Marine Geology* 24(2):109-121.

Abstract: The December 1, 1974 northeaster was a significant event in terms of sediment transport with 20 m Super(3) of sand per meter of dune breach being carried onto the backdune area of Assateague Island as overwash. Previous investigators have reported larger transport rates for landfall hurricanes, but this is the largest amount recorded for a winter northeast. The Ash Wednesday Storm, March 6-8, 1962, was a much larger event, but no quantitative data exists for overwash deposition. The resulting sedimentary deposit can be interpreted by defining sedimentation units. Inverse sediment grading was predominant, but normal grading occurred when the material was monomineralic and the unit totally depositional in nature. The timing of the storm surge was recorded in some sections as a distinctive heavy mineral enrichment in the sediment.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Lebber, K. M., III and R. L. Lipson. 1970. H. Identity and distribution of decapod crustaceans in relation to environmental factors of Chincoteague Bay. **IN:** *Assateague Ecological Studies. Final Report. Part I. Environmental Information*. University of Maryland (College Park), Natural Resources Institute, Contribution No. 446. pp. 245-294.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

Lee, D. S. 1972. List of the amphibians and reptiles of Assateague Island. *Bulletin of the Maryland Herpeological Society* 8(4):90-95.

Library: SU, TU, UMCP

Lee, D. S. 1973. Additional reptiles and amphibians from Assateague Island. *Bulletin of the Maryland Herpeological Society* 9(4):110-111.

Library: SU, TU, UMCP

Lee, V. 1999. Rhode Island's salt pond regional management plan: A case study. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:84-85.

Library: FSU [EP 1.23/6:620/R-00/001]

Leffler, M. W, E. R. Smith and C. Mason. 1986. Nearshore surveys and sediment sampling, Assateague Island, Maryland, 1984. Report No. CERC-86-5, Army Coastal Engineering Research Centter (Vicksburg, Mississippi). 138 pp. [NTIS Order No.: AD-A168 726/8/GAR]

Abstract: By collecting cross-island and nearshore profiles and sediment samples, an erosion control study of the northern Assateague Island area was developed. Comparisons were made with the profile data collected in 1965 and 1979. The Field Research Facility's Interactive Survey Reduction Program (Birkemeier 1984) was used to edit, and plot the profile data. The 104 sediment samples were analyzed using standard sieve analysis techniques, and listings and plots of the size distributions are given. These plots show large and interesting changes which have occurred within the study area. Extensive growth of Ocean City Inlet's ebb tidal delta between 1965 and 1979 is clearly indicated. South of the inlet, the island shows wholesale transgression of the entire profile, while further south the contour remains relatively stable.

Lemon, V. C. 1987. *Assateague Island: Dynamics and Management Policy*. Ph.D. Dissertation, University of Maryland College Park. Dissertation Abstracts International Part B: Science and Engineering 48(1). 128 pp. [Diss. Ph.D.: Order No.: FAD DA8709434]

Abstract: Assateague Island is a long, narrow barrier island located off the coast of Maryland and Virginia. It is a national seashore, containing Chincoteague National Wildlife Refuge and a Maryland state park, which attracts several million visitors annually. This study presents an overview of a number of physical and nonphysical factors affecting management of beach/dune areas. Its purpose is to explore interrelationships of the shoreline erosion rate, dune elevation and dune vegetation to assist in management. Recommendations include: priority engineering attention to sand losses at the north end; increased dune maintenance throughout at points of erosive stress; management of wild horse and deer herds to allow maximum dune vegetation development; consideration of further restrictions on public use.

Library: UMCP [LD3231.M70d Lemon, V. C.]

Leslie, L. L. and W. J. Choyke. 1987. Quiet and seclusion on the Eastern Shore. *The Record* (Bergen, New Jersey), 26 April, Travel, p. T5.

Levitan, W. M. and R. Shanks. 1983. United States coastal ecological inventories – a tool for estuarine planning. *Estuaries* 6(3):290. (Abstract)

Abstract: Recent developments, such as a new Federal emphasis on the deregulation of industries and an accelerated Outer Continental Shelf (OCS) oil and gas leasing program, have increased the need for advanced planning of siting of coastal energy and industrial facilities. Given the

projected needs for oil and gas exploration and associated production and support facilities along the United States coasts, the United States Fish and Wildlife Service has conducted an ecological inventory to assist in advanced planning and evaluation procedures. This study resulted in the production of 83 fish and wildlife coastal inventory maps, covering the entire Atlantic, Pacific, and Gulf of Mexico coasts, and three reports, one for each of the major coasts. The purpose of the inventory maps and the reports is to establish the extent of coastal natural resources, as well as their location and value. The report supplements the maps with biological descriptions and lends support and credence to the map inventories. The maps, which have been reduced on U.S. Geological Survey 1:250,000-scale quadrangles, provide an inventory of important coastal fish and wildlife species and their habitats which are vulnerable to the construction and operation of energy or industrial facilities. Other land use designations, such as wildlife refuges, parks, and Federal Class I air quality areas, also are included. These resource maps have been sought by coastal planners for coastal zone management and oil spill contingency planning and by biologists for baseline data information.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Linder, C. C., J. F. Casey, S. Doctor and A. Wesche. 1996. Maryland's coastal bays shore zone fish communities. **IN:** *Assessment of the Ecological Condition of the Delaware and Maryland Coastal Bays,* Chaillou, J. C., S. B. Weisberg, F. W. Kutz, T. E. DeMoss, L. Mangiaracina, R. Magnien, R. Eskin, J. Maxted, K. S. Price and J. K. Summers. U.S. Environmental Protection Agency, Washington, DC (USA). Environmental Monitoring and Assessment Program, EPA/620/R-96/004. pp. A-26 – A-56.

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Foreward: This document, Coastal 2000: Benthic Community Condition *in* Maryland's Coastal Bays, was prepared by Versar, Inc., at the request of Ms. Cathy Wazniak of the Maryland Department of Natural Resources under Cooperative Agreement CA-00-02/07-4-30608-3734 between Versar, Inc., and the University of Maryland Center for Environmental and Estuarine

Studies. The report assesses the status of benthic communities in the Maryland's coastal bays in support of the United States Environmental Protection Agency's Coastal 2000 Program.

Llanso, R. J., L. C. Scott and F. S. Kelley. 2002. *National Coastal Assessment 2001 Benthic Community Condition in Maryland's Coastal Bays.* Final report to Maryland Department of Natural Resources, Tidewater Ecosystem Assessment Division.

Foreward: This document, National Coastal Assessment 2001: Benthic Community Condition *in* Maryland's Coastal Bays, was prepared by Versar, Inc., at the request of Ms. Cathy Wazniak of the Maryland Department of Natural Resources under Cooperative Agreement CA-02-01/07-4-30722-3734 between Versar, Inc., and the University of Maryland Center for Environmental and Estuarine Studies. The report assesses the status of benthic communities in the Maryland's coastal bays in support of the United States Environmental Protection Agency's National Coastal Assessment Program.

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Abstract: The decline of piping plover (*Charadrius melodus*) populations and subsequent listing as a threatened species has been attributed, in part, to low chick survival. During 1988-90, we observed piping plover chicks daily to evaluate hypotheses of differential food resources, predation, and disturbance explaining differences in chick survival in 3 habitats on Assateague Island National Seashore (AINS), Maryland. Chicks reared on the bay beach and island interior had higher daily survival rates (0.97, 0.99 vs. 0.87; $P < 0.001$), higher foraging rates (13.3, 10.8 vs. 5.9 attempts/min; $P < 0.001$), and spent more time foraging (76, 80 vs. 37%, $P < 0.004$) than chicks reared on the ocean beach. Terrestrial arthropod abundance on the bay beach and island interior was greater than on the ocean beach in 5 of 6 cases (P less than or equal to 0.01). Amphipods, however, were more abundant on ocean beaches than in bay and island interior habitats each year (P less than or equal to 0.03). Chicks 4-5 days old that were reared on the bay beach or island interior habitats were heavier than those reared on the ocean beach (8.5, 7.8 vs. 6.5 g; $P < 0.01$). Overall disturbance rates did not differ among habitats (behavioral observations; $P = 0.29$). The number of predator trails did not differ among the 3 habitats ($P = 0.2$). Red fox (*Vulpes vulpes*) trails were more numerous in the island interior and ocean beach ($P < 0.001$), ghost crab (*Ocypode quadrata*) burrows were more numerous on ocean beach ($P < 0.001$), and gull (*Larus* spp.) and raccoon (*Procyon lotor*) trails were more numerous on bay beach ($P < 0.001$ and $P = 0.001$, respectively). Piping plover chicks moved from ocean beach nest sites to the bay beach and island interior along ephemeral, vegetation-free paths created during winter storms by waves surging across the island. These paths should be maintained to enable piping plover chicks to move to the island interior and bay habitats where chick survival is greatest. Preserving access to high quality brood-rearing habitat will ensure reproductive rates that will sustain the local population and contribute to the species' recovery.

Library: CBL, FSU, SMC, SU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

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Abstract: The authors surveyed little-known ray-finned fish assemblages from Maryland's coastal bays in order to establish species-habitat relationships for common species. From 1996–1999, 25 sites were sampled monthly with otter trawls in the coastal bays of Maryland. *Anchoa mitchilli* (bay anchovy) constituted nearly 50% of the catch for each year, and species composition was largely similar across years, with some differences likely related to variation in recruitment. For example, *Clupea harengus* (Atlantic herring) was particularly abundant during 1996 and 1999 following their spawning season. They used canonical correspondence analysis to determine how assemblages were related to temperature, dissolved oxygen (DO), salinity, and land-use variables during summer (June–September) and throughout the rest of the year. A gradient correlated with temperature and DO significantly structured assemblages throughout most of the year; during summer, the proportion of wetland habitat was important. They demonstrate that environmental gradients important for structuring fish assemblages differ between summer and non-summer months and there is a general shift in habitat use during summer from the lower estuary to other areas of the coastal bays. Their data also provide support for earlier observations that temperature was the major factor influencing changes in fish assemblage structure in the coastal bays. Our results point to better characterization of fish habitats in order to effectively manage coastal ecosystems of Maryland.

Library: UD-Morris [on line], UMBC

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Library: BSU, CBL, FSU, UMBC, UMCP [all are TD224.M3 W3 no.6]; SU [QE121 .A197 no.6]; TU [GB1025.M3 L8]

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Lund, E. J. 1957. Self-silting of the oyster and its significance for sedimentation geology. *Publications of the Institute of Marine Science, Texas* 4(2):313-319.

Abstract: When oysters are placed as a closed system under anaerobic conditions by forced closure of the shell there is a wide range of survival capacity as measured by survival time of different oysters. The survival time varied from about 2 days to 16 days during the low winter temperature range of 14°C to 23°C. In a less extensive experiment carried out during the summer season with a temperature range between 26°C and 31°C, maximum survival time under closure conditions of the oyster was about 7 days. What determined these great differences in survival time, as a closed metabolic system in different individual oysters, remains a fascinating problem for the future. It is to be expected that the capacity of any oyster to survive anaerobic conditions for a considerable period of time serves as a protection against the hazards often imposed by sedimentation and self-silting. Self-silting, which involves, in part, deposition of large quantities of organic matter leads readily toward the establishment of semi- or highly-anaerobic conditions around the oysters. Oysters therefore normally require a sufficiently rapid flow of water to prevent continued self-silting. Self-silting, if not prevented, would become a self-imposed hazard often of much greater importance than silting by gravity under the same conditions. The reducing tendency as measured by the platinum electrode is a useful index of the anaerobic conditions of life in the environment of the oyster. It is common practice by oyster growers to transport oysters under conditions of forced closure from one locality to another. If such closure occurs at high summer temperatures of 30°C to 35°C, as may often happen, then in general a co0nsiderable mortality may be expected if such closure lasts for more than 24 hours, since the anaerobic capacity and survival under closure of some oysters in a population is quite limited.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Lund, E. J. 1957. Self-silting by the oyster and its significance for sedimentation geology. *Publications of the Institute of Marine Science, Texas* 4(2):320-327.

Abstract: Laboratory experiments showed that normal oysters under laboratory conditions, deposited by self-silting, approximately 8 times the volume of sediment deposited by gravity alone under exactly the same conditions of sedimentary load, velocity, and volume flow of sea water and bottom area of deposition. This confirms the results from previous experiments in which 6 – 12 times the volume of silt deposited by gravity alone was deposited by the oyster. The experiments show that at relatively low turbidities ranging from 78% to 95% light transmission, a single layer of oysters covering half the bottom area can produce sufficient silt deposit to completely cover themselves in 36 days, if the self-silt deposit is not removed by external forces. Calculations on the basis of the experiments show that the volume of self-silt produced by a single continuous layer of oysters in 11 days, on an area of 1 acre, would be 8.36 tons. Definite relations exist between volume of self-silt deposit, sediment load, and volume flow. It has been shown that self-silting may increase the hazards under which the oyster lives. This applies to food supply, aerobic respiration and may apply to other environmental factors. On the natural oyster bed the silt deposited by the oysters is very often augmented by the silt self-produced by other commensal organisms attached to the oysters. The practical importance of self-silting for the life of the oyster depends upon whether or not external forces, due to wind, waves, and water currents, are sufficiently strong to maintain a removal of the self-silt deposit. Thus, the practical importance of self-silting is only significant in oyster habitats where the velocity of bottom currents are inadequate. It must be noted that it is the velocity of water current in contact with the oysters, not that at the surface of the bays, that is of importance. Conclusions based only on measurements of

velocity of currents at the surface of the bays would not be reliable. The role of self-silting as a factor min oyster mortality becomes of increased potential importance in bays where velocity of bottom water flows is limited or where water is more or less quiescent, and therefore subject to rapid local rises of temperature during seasons when the respiratory reserve of glycogen for partial anaerobic respiration is at a low level. The self-silt deposit of the oyster is more stable and resistant to flow traction than some materials deposited by gravity. Even if the self-silt is removed from oyster beds by bottom water currents, the self-silting process would increase the effectiveness of the ordinary sedimentary process by gravity. In parts of an oyster reef where active growth occurs, water currents must be sufficiently strong to compensate for silting effects.

Library: CBL, UD-Morris, UD-GCMES, UMCP

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Abstract: The capacity of an oyster to clear turbid water suspensions has been used as a physiological index. Clearance of turbid sea water was used to determine the effects of crude oil. bleedwater, so-called "soluble fraction," and their threshold concentrations as stimuli.

Library: CBL, UD-Morris, UD-GCMES, UMCP

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Abstract: More than 1,370 sea turtles were recorded from Chesapeake Bay and nearby coastal waters May 1979-December 1981. *Caretta caretta* was most abundant and occupied the Bay from May through November, with peak abundance in June. Forty-three *Lepidochelys kempi* and eight *Dermochelys coriacea*, primarily immatures were recorded. Some loggerheads return to estuaries in successive summers. A preliminary estimate of loggerhead seasonal stock in the lower Bay is about 3,000 individuals. Dead sea turtles counted included 527 *C. caretta*, 28 *L. kempi*, 7 *D. coriacea* and 83 unidentified carcasses. The major identifiable source of mortality in 1980 was drowning in pound net hedging. Seasonal abundance and high mortality of sea turtles in Chesapeake Bay provide reason to reevaluate existing sea turtle management strategies.

Library: CBL, FSU, SMC, SU, TU, , UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Abstract: Fifteen captive wild mares (*Equus caballus*) were treated with porcine zona pellucida contraceptive vaccine and either Freund's Complete Adjuvant (n = 7) or Freund's Modified Adjuvant (n = 8). All mares received a booster inoculation of porcine zona pellucida plus Freund's Incomplete Adjuvant a month later. Anti–porcine zona pellucida antibodies were measured over 10 mo following the initial inoculation. There were no significant differences in antibody titers at any point during the 10 mo, and seven of the eight mares in the Freund's Modified Adjuvant group were above the 60% level at the end of the study, which is considered to be the contraceptive threshold for horses. There were no significant differences in titers between pregnant and nonpregnant horses, nor was there a significant correlation between age and titers. One local injection site reaction occurred after booster treatment with Freund's

Incomplete Adjuvant, and 11 healthy foals were born during the course of the study. These data suggest that Freund's Modified Adjuvant is an acceptable substitute for Freund's Complete Adjuvant in certain free-ranging and captive wildlife species.

Library: TU, UD [on line], UMBC

Lynch, M. P., T. F. Smolen, B. L. Laird, M. A. Patton. 1974. The Assateague marine sanctuary: A case study. *Special Scientific Report of the Virginia Institute of Marine Science* No. 94. [Contract NOAA/OCZM 3-35406]

Abstract: The resources of the Assateague Island region, particularly those in the Chincoteague Bay-Sinepuxent Bay complex would be greatly benefited by protection against development on the western shore of this bay complex. Environmental interests in the Assateague region support the designation of a marine sanctuary to serve this purpose. Local populace believe that existing controls are adequate to protect the region. Physiographically and ecologically the region is ideal for a sanctuary in that it is, particularly on bay side, essentially self contained and subject to little influence from without the area. Assateague Island itself is a barrier island with sand beaches on the ocean side and marshes on the Chincoteague Bay - Sinepuxent Bay side. The Chincoteague Bay complex is a very shallow body of water. 24% of the shoreland is presently used for agriculture, 21% is unmanaged (mostly wooded) and 10% is residential. 23% is dedicated to recreation and {approx} 19% is held as preserved area. Careful public education activities and attention to proposed sanctuary regulations will probably go a long way to mitigating general resentment of an increased federal role in the area management. A management strategy which minimizes the federal role and places maximum control possible in state of local hands will have the best chance of acceptance.

Maa, J. P.-Y., C. H. Hobbs, S. C. Kim and E. Wei. 2004. Potential impacts of sand mining offshore of Maryland and Delaware: Part 1-Impacts on physical oceanographic processes. *Journal of Coastal Research* 20(1):44-60.

Abstract: In an effort to assess the possible changes to physical oceanographic processes that might result from alteration of bathymetry as a result of dredging or sand mining, we evaluated the differences in the output of various numerical models run with the natural and hypothetical post-dredging bottom conditions. Fenwick and Isle of Wight Shoals offshore of the Delaware-Maryland border of the mid-Atlantic continental shelf served as the test site. The authors considered two dredging scenarios, a one-time removal of 2×10^6 m^3 of sand from each of two shoals and a cumulative removal of 24.4×10^6 m^3, but only the larger appeared significant. The study of wave transformation processes relied upon a series of runs of the REF/DIF-1 model using sixty wave conditions selected from analysis of the records from a nearby, offshore wave gauge. The model was tuned and calibrated by comparing measured near-shore wave conditions with data calculated using the same measured offshore waves that generated the real near-shore conditions. The modeled, post-dredging data indicated an increase in wave height of up to a factor of two in the area between the dredged shoals and the shore and, in some locations, a lesser increase in breaking wave height and a decrease in breaking wave height modulation. The model results also may help explain the existing pattern of erosion and relative stability. Application of the well-known SLOSH model (Sea, Lake, and Overland Surges from Hurricanes) for storm surge and POM (Princeton Ocean Model) for tidal currents indicates that the likely dredging related changes in those processes are negligible.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

MacKenzie, C. L., Jr. 1961. Growth and reproduction of the oyster drill, Eupleura caudata in the York River, Virginia. *Ecology* 42(2):317-338.

Abstract: The reproduction, reproductive effort, growth, and reproductive ecology of the sharp-lipped drill, *Eurpleura caudata* in the York River, Virginia, is presented. Results in this estuary are compared with populations along the Atlantic coast.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Mackintosh, B. 1982. *Assateague Island National Seashore: An Administrative History (1933 to Present).* Report No. FNP-400-83-04, U.S. National Park Service, Division of History (Washington, D. C.). 238 pp. [NTIS Order No.: PB83-186932]

Abstract: As a model for administrative histories of National Park System areas, this report deals with Assateague Island National Seashore's background of controversy, complexity, and change. The park's story begins in 1933, when a storm created the present configuration of the island. It was not until September 21, 1965, that the park was established by law. This administrative history deals with the 32-year span between the conception of a park to its actual creation as well as the problems of land acquisition, its physical development, and resource management. The situation of being administered by three agencies of government is also discussed. The report contains illustrations, maps, legislation and other documentation in its appendices.

Library: SU, UMCP [all are F187.W7 M32 1982]; UD-Morris [I 29.2:As 7/2]

MacLean, S. A. 1980. Study of *Haematractidium scombri* in Atlantic mackerel, *Scomber scombrus*. *Canadian Journal of Fisheries and Aquatic Science* 37(5):812-816.

Abstract: The prevalence of *H. scombri*, an intraerythrocytic protozoan, was studied over a 3-yr period in Atlantic mackerel migrating off Chincoteague, Virginia. In 1974, 24%, in 1975, 42%, and in 1976, 45.3% of the fish examined were infected. Age-2 mackerel (measuring 25-28 cm fork length) were more frequently and more heavily infected than older fish. Adult mackerel from Boothbay Harbor, Maine, and from the bottom overwintering population in the Gulf of Maine also were infected; however, *H. scombri* was not found in blood smears of age-0 mackerel from Montauk, Long Island, New York. *Haematractidium* was not found in tissue sections, but structures that might be exoerythrocytic stages were seen in kidney and spleen imprints.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-GCMES, UD-Morris, UMBC, UMCP, UMES

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Abstract: A comparison of measurements of shells of living species of *Busycon carica* (1,000), *Busycon canaliculatum* (70), and *Busycon contrarum* (50) indicates that the populations of these marine snails at Beaufort, North Carolina, are distinct in character. The *B. carica* population is juvenile in nature with a predominance of immature individuals. The population of *B. contrarum* is quite variable and somewhat senile with more mature and fewer younger specimens. The *B. canaliculatum* population is remarkably uniform with a preponderance of moderate sized individuals. *B. canaliculatum* had mean shell measurements that included a length of 12.4 cm, width of 6.4 cm, shell proportion (W/L) of 1.95, and volume of 113 ml; *B. carica* had a mean length of 9.0 cm, width of 5.0 cm, width-spines of 4.5 cm, shell proportion (L/W-S) of 2.06, and volume of 73.6 ml; *B. contrarum* had a mean length of 14.4 cm, a width of 7.9 cm, a width-spines of 6.6 cm, shell proportion (L-W-S) of 2.07, and a volume of 176 ml. Relative abundance ratios of the three species at Beaufort from June 1942 to June 1843 were 1 *B. contrarum* : 2 *B. canaliculatum* : 33 *B. carica*.

A group of 973 specimens of *B. carica* were marked, measured, and released at different stations in Beaufort Harbor during 1942 and 1943. By the summer of 1946 a total of 10.3% of these specimens had been recovered. Of those released, 8.9% were living and 1.4% were dead at the time of recovery.

The density of the population of *B. carica* on the Town Marsh-Bird Shoal flats in the summer of 1943 was estimated at one individual for each area 8.9 ft^2.

Seasonal and diurnal rhythms of activity of Busycons were observed. *B. contrarum* is characteristically active during the warmer months and during the day. *B. canaliculatum* is the most active at cooler temperatures, that is at night during warmer months, either night or day during the spring and fall, and active both day and night except during extremely cold or excessively hot weather. All specimens of *Busycon* spp. are more active for a short time before low tide and after the tide has begun to rise than at other times of day or night.

The sex ratio of males to females in *Busycon carica* varied from 1:1 to 2:1, but for *B. canaliculatum* the variation was more pronounced from 1:4 to 4:1. In the Beaufort region copulation was found to occur with Busycon carica in March, August, and September, with *B. canaliculatum* during the same months, but usually later in the month than in the case with *B. carica*. Copulation of *Busycon contrarum* was observed in August. Freshly laid egg strings are commonly found during May, June, September, October, and November. The egg strings vary in length from less than 20 to over 150 cases per string. The usual number of eggs in a single capsule is between 30 and 50. An entire string may contain from 4,000 to 6,000 eggs.

Algae, Bryozoa, tube-dwelling annelids, sedentary gastropods, and barnacles were found to be common consorts of the outer surface of shells of living Busycon spp.

The size range of common bivalves eaten by *Busycon* spp. were determined. *Tagelus*, *Chione*, *Venus* (*Mercenaria*), *Dosinia*, and *Modiolus* were some of the common food animals of *Busycon* spp. The total number of teeth in the radulae of *Busycon* spp. found to vary from 270 – 400 for *B. carica*, 350 – 425 for *B. contrarum*, and 450 for *B. canaliculatum*. The number of teeth present is consistent with the carnivorous diet of the members of the genus. Man, grabs, and gulls constitute the chief predators of *Busycon* spp.

Growth was observed in 52% of the recovered living specimens of released *Busycon carica*. The formation of a single shoulder spine requires from 94 to 501 days. The growth, or disturbance, lines formed during a single year may vary from none to three. The maximum rate of shell growth takes place in the center of the lip, or in the shoulder region of the shell. For small specimens, the mean percentage increase in length per hundred days is 1.46%; with specimens of medium size it is 2.8%; for larger specimens 2.12% and for very large specimens 2.7%.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Magnarelli, L. A., K. C. Stafford, III, J. W. Ijdo, E. Fikrig, J. H. Oliver, Jr., H. J. Hutcheson and J. L. Boone. 1999. Antibodies to granulocytic ehrlichiae in white-footed and cotton mice in eastern United States. *Journal of Wildlife Diseases* 35(2):259-265.

Abstract: Serum samples collected from *Peromyscus leucopus* (white-footed mouse) or *Peromyscus gossypinus* (cotton mouse) during 1987 through 1990 in Florida, Georgia, Maryland, Mississippi, and North Carolina and in 1997 in southern Connecticut were analyzed by indirect fluorescent antibody (IFA) staining methods or Western blot procedures for antibodies to granulocytic ehrlichiae. Of the 82 sera from white-footed mice in Connecticut tested by IFA methods with either the BDS or NCH-1 strain of the human granulocytic ehrlichiosis (HE) agent, 45 (55%) and 42 (51%) of the samples contained antibodies to these strains, respectively, at concentrations ranging from 1:80 to 1:2560. One (2%) of 43 sera from P. leucopis captured in Assateague Island, Maryland, had a titer of 1:80, while three (20%) of 15 sera from cotton mice caught in Amelia Island, Florida, had antibodies to the NHC-1 strain at titers of 1:160 to 1:1280. Fifty-five sera from *P. leucopus* in Cape Hatteras, North Carolina, and 30 sera from *P. gossypinus* in Mississippi were negative. Western blot analyses confirmed seropositivity for 19 (95%) of 20 mouse sera positive by IFA staining methods, including samples from both mouse species captured in Connecticut, Maryland, or Florida. There were key banding patterns to proteins having molecular masses of about 44, 80, 105, 110, or 120 kDa. Both serologic assays can be used to determine if mice have been exposed to granulocytic ehrlichiae. These rodents also may be useful in surveillance programs to identify endemic sites for HE and in performing laboratory studies on immune responses to the etiologic agent.

Library: FSU, UD-Morris, UMCP

Magnien, R. 1999. Water and habitat quality effects on living resources. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:50-52.

Library: FSU [EP 1.23/6:620/R-00/001]

Makinen, C. P., T. A. Moisan, J. L. Blanco, J. R. Moisan, J. W. Ambler, L. Atkinson, P. W. Bernhardt, K. C. Filippino, S. B. Hooker, A. Mannino, M. R. Mulholland, J. Nolan, M. E. Russ, R. N. Swift, A. L. Sybrandy and J. Yungle. 2006. NASA Wallops Coastal Ocean Observing Laboratory [WA-COOL], the Integrated Ocean Observing System (IOOS) of the Southern Mid-Atlantic Bight. *EOS, Transactions, American Geophysical Union* 87(36):[np]. supplement.

Abstract: Coastal regions in the southern Mid-Atlantic Bight (MAB) are directly influenced by regional freshwater fluxes emanating from both the Delaware and Chesapeake Bays. The authors NOAA/NASA sponsored project, WA-COOL, has many facets and supports researchers in Virginia and neighboring areas. Specifically, the WA-COOL program supports the Bio-physical Interactions in Ocean Margin Ecosystems [BIOME] project, which aims to characterize and monitor the influence of the Chesapeake and Delaware Bays on the adjacent coastal ocean margin ecosystem by applying cutting edge technologies and methodologies in the coastal zone and developing coastal management applications. WA-COOL is presently participating in the deployment of a bi-optical buoy, research cruises, and a series of data retrieval systems. Their coastal observatory includes: (1) 2 high frequency radar arrays (CODAR) to monitor surface circulation along the Delmarva Peninsula and at the Chesapeake Bay mouth; (2) a Coastal Ocean Bio- optical buoy (COBY) to provide in situ observations for ocean color algorithm development and validation and phytoplankton dynamics; (3) a Surface Autonomous Vehicle (SAV) called Ocean-Atmosphere Sensor Integration System (OASIS) to support long-term in situ observations; (4) bi-weekly cross-shelf physical and bio-optical surveys to provide time series data; (5) seasonal coastal shelf region research cruises to support BIOME activities; and, (6) an Open source Project

for a Network Data Access Protocol (OPeNDAP) system for data distribution. The combination of these efforts brings together a novel coastal ocean observing system for the Virginia, Maryland and Delaware region. Data from WA-COOL will support modeling applications, weather services, search and rescue, hazmat response, education, and other public and private institutional and agency needs.

Manahee, H. R. 1959. *Indians of Early Maryland*. Maryland Historical Society (Baltimore). 47 pp.

Library: BSU [E78.M3 M322 1959]; FSU, MSY, SMC, SU, UD-Morris, UMBC, UMCP [all are E78.M3 M32]

Mangum, C. P., S. L. Santos and W. R. Rhodes, Jr. 1968. Distribution and feeding in the onuphid polychaete, *Diopatra curea* (Bosc). *Marine Biology* 2(1):33-40.

Abstract: Population density of the onuphid polychaete *Diopatra cuprea* is poorly correlated with particle size distribution of the substratum. It varies directly, however, with current velocity. Measurements of the volume of oxygen drawn through the tube by the inhabitants' rhythmic activities, and the volume consumed under similar conditions, indicate that the rate of oxygen utilization is usually low; therefore, the influence of current velocity cannot be exerted through its effect on oxygen supply. It is suggested herein that the worm's tube, which protrudes several centimeters above the substratum in the form of an inverted hook, is a food-catching device whose efficiency is governed by the volume of water flowing past. This hypothesis is supported by the identity of many species found in both the gut and the tube. It is also suggested that the tube-irrigating activities permit the animal to test the medium for the presence of chemical stimuli emanating from food caught by the tube; supra-threshold concentrations of these stimuli elicit the feeding response.

Library: CBL, HPL, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Manheim, F. T., D. E. Krantz, D. S. Snyder, J. F. Bratton, E. A. White and B. Sturgis. 2001. Streaming resistivity and core drilling define groundwater discharge into coastal bays of the Delmarva Peninsula. Abstracts of papers, 2001 Annual Meeting, Geological Society of America, 33(6):42.

Abstract: This paper describes new techniques for the delineation of submarine ground-water discharge-a source of excess nutrient supply to coastal bays of the Delmarva Peninsula. Streamer resistivity surveys using a dipole-dipole "DC Resistivity" system developed by the Zonge Co. were towed behind small boats. The system incorporated a multichannel cable and 2-D, "smooth model" inversion postprocessing. Effective measurement depth varied from 10 to 50 m in the shallow bays. Nearly 300 km of surveys were conducted in Rehoboth, Indian River, Chincoteague, Sinepuxent, Isle of Wight, and Assawoman Bays. Extensive freshwater distributions appeared in inversion model profiles as high resistivity layers (>10 ohm-m) beneath low-intermediate resistivity layers (.6-3 ohm-m). Subsurface freshwater tongues were associated with either elevated topography (e.g. 2 m or more) or creek mouths. Many freshwater anomalies were limited to a few hundred meters from shore, but in some places distinct anomalies were observed 1 km offshore or more. Subsurface brackish waters characterized most of subseafloor of the bays. In one area of Indian River Bay hypersaline brine (2x salinity of normal sea water) was identified at depth. Hoverprobe coring confirmed fresh interstitial waters in Herring Creek (Rehoboth Bay, DE) and near Public Landing (Chincoteague Bay, MD). In the latter area subseafloor fresh water with high nitrate indicated seaward movement of oxygenated fresh water. Shallower sediments showed undetectable nitrate but large ammonia concentrations. Fresh sub-bay ground water beyond limits suggested by a diffuse Ghyben-Herzberg hydrologic model seems to be associated with the presence of finer bottom sediments along the western margin of the investigated bays.

Organizations supporting the above studies (beyond those associated with the above investigators) include the University of Delaware, Delaware Geological Survey, Delaware Sea Grant, Maryland Department of Natural Resources, U.S. National Park Service (Assateague Island National Seashore), Johns Hopkins University Applied Physics Laboratory, and the Virginia Institute of Marine Science.

Mann, R. and H. Ris, Jr. 1975. Formulating a boating capacity planning system for Chesapeake and Chincoteague Bays. *Ocean 75* IEEE--75-CHO--995-1-OEC. IEEE (New York, NY).

Abstract: Large numbers of boats in estuarine water bodies of limited size and depth may cause undesirable over-crowding, adverse environmental effects, or both. The results of the first phase of a 2-phase research and management planning study of recreational boating in Chesapeake and Chincoteague Bays have identified the structural and operational characteristics of beating activities and facility construction which, from the reviewed literature, are acknowledged to affect boat-user satisfaction or sensitive environmental indicators. Although biological carrying capacity determinations appear to remain problematic and less preferable than control of pollution causative factors at the source, estimations of boating user satisfaction carrying capacity are more easily achievable. An 11 step capacity planning system has been formulated as a result.

Manning, R. B. 1974. Crustacea: Stomatopods. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 387.* 6 pp.

Mansueti, R. 1947. The "water moccasin" myth in Maryland. *Maryland Journal of Natural History* 17(3):54-58.

Library: UD-Morris, UMBC, UMCP

Mansueti, R. J. 1955. *Maryland Resource Bibliography. Guide to Key Works Dealing with the Zoology, Botany, Geology and Related Subject*s. Chesapeake Biological laboratory Resource Study Report 7:1-27.

Mansueti, R. J. 1963. The Atlantic bonito, *Sarda sarda*, in northern Chesapeake Bay, and comments on the seaside fishery of Maryland. *Chesapeake Science* 3(1):47-49.

Abstract: An immature female Atlantic bonito weighing 2 lb, 10m oz is recorded from upper Chesapeake Bay near Rock Hall, Kent County, for the first time in Maryland. Salinity ranges from 5 to 10 ppt there. Additional records from pound nets in this region and from the Potomac River, Maryland, comprising 86 pounds, were recoded in August 1961. A review of the Maryland seaside fishery indicates that it fluctuates from a few pounds to 160,000 pounds annually. There is little consistency in catches by gear and years, which is apparently related to major changes in gear in the area, consumer demand, and perhaps natural fluctuations in abundance.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Mansueti, R. J. and F. W. Sieling. 1956. Portuguese man-o-war stings Maryland bathers. *Maryland Tidewater News* 12(8):4.

Library: CBL, FSU, SMC, UMCP

Manville, R. H. and J. J. Wilson. 1970. Fossil walrus from Virginia waters. *Journal of Mammalogy* 51(4):810-811.

Abstract: A fossilized mandible of the Atlantic walrus *Odobenus rosmarus rosmarus* was dredged up in 1966 from a depth of 20 fathoms, 20 miles south-east of Chincoteague, Virginia. This is briefly described; C-14 dating shows this specimen is at least 15,000 yr old.

Library: FSU, SMC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Marshall, N. 1949. *Summary Statement of the Status of Our Knowledge of the Marine Fisheries of Virginia.* Special Scientific Reports, Virginia Institute of Marine Science No. 4. 4 pp.

Martin, G. W. 1929. Dinoflagellates from marine and brackish waters of New Jersey. *Studies in Natural History, University of Iowa Studies* 12(9):1-32.

Abstract: Forty-one species of dinoflagellates are described from the coastal waters of New Jersey, including Delaware Bay, Barnegat Bay, Tuckerton Bay and the adjacent ocean. Among these species, *Gymnodinium nelsoni*, *Gymnodinium rufescens*, *Gymnodinium pellucidum*, and *Peridinium excavatum* are newly described. Keys to all genera and species are included.

Library: UMCP

Martinez, J. 2000. Two North Shore beaches win praise. *The Boston Herald*, 5 August, News,, p. 13.

Marye, W. B. 1936-1938. Indian paths of the Del-Mar-Va Peninsula. *Bulletin of the Archaeological Society of Delaware* 2(3-6):5-22; 4-27; 1-15; 1-25; 1-13.

Library: UD-Morris, UMCP

Mayre, W. B. 1940. *Indian Towns of the Southeastern Part of Sussex County, Delaware*. Archaeological Society of Delaware (Wilmington). 16 pp.

Library: UD-Morris [E99 .A83 M3]

Marye, W. B. 1945. The sea coast of Maryland. *Maryland Historical Magazine* 40:94-117.

Abstract: A review of Atlantic coastal Maryland's history. Topics included are: changing nomenclature; first surveys and land grants; native Americans and first settlers; coastal islands; Fenwick Island; old Sinepuxent Inlet; former occupations and diversions of the shore; wrecks and wreckmasters; evolution of the seaside resort; boarding houses; and boardwalk development.

Library: BSU, CSU, FSU, MSU, SMC, SU, TU, UD-Morris, UMAB, UMBC, UMCP, UMES

Maryland Assateague Island Bridge Commission. 1959. *Report of the Commission to Study the Feasibility and Ways and Means of Erecting a Bridge between Assateague Island and the Mainland of Worcester County*. 1 volume [contains maps, diagrams, plans and tables]

Maryland Coastal Bays Program. 1997. *Today's Treasures Tomorrow – An Environmental Report on Maryland's Coastal Bays*. Maryland Department of Natural Resources, Coastal Bays Program (Annapolis) 97-02.

Abstract: Maryland's Coastal Bays consist of five small watersheds that drain into the Atlantic Ocean, without draining first into the Chesapeake Bay. The Coastal Bays contain habitat for threatened and endangered species, migratory birds, and fin and shellfish resources important for commercial and recreational use. Some relatively large forest and wetland areas still remain. However, agriculture is currently contributing large amount of nutrients to the ecosystem and the region is under intense development pressure, primarily in the northern region. Major environmental problems that have been identified include: degraded water quality, chemical contamination, habitat loss, changes in living resources, and unsustainable growth and development. In order to address these issues, the Maryland Coastal Bays program adopted a plan: Today's Treasures for Tomorrow: A Comprehensive Conservation and Management Plan for Maryland's Coastal Bays (CCMP) in 1999. The CCMP notes that approximately 1,500 acres of tidal wetlands and 25,000 acres of non-tidal wetlands have been lost since the 1930s. Bulkheads installed for stabilization led to some loss of tidal wetlands. These wetlands losses also resulted in habitat loss and reduction in nutrient and sediment filtration. The Coastal Bays Management Conference was formed to recommend strategies to protect and enhance the Coastal Bays. The Management Conference included representatives from all levels of government, business, and private interests. The CCMP listed several specific goals and challenges for which the Department of the Environment (MDE) and other partner agencies are responsible.

Maryland Coastal Bays Program. 1997. *Eutrophication Monitoring Plan*. Appendix A of the Maryland Bays Comprehensive Conservation Management Plan. Maryland Coastal Bays Program (Berlin). i + 19 pp.

Abstract: Increased nutrients to the Coastal Bays lead to degraded water quality and ecosystem health. Increased phytoplankton blooms (measured as water column chlorophyll-a) and related swings in dissolved oxygen (DO) are symptoms of ecosystem degradation. Measuring nutrient concentrations in the water column over time allows managers to track changes in nutrient inputs. As the major source of freshwater to the bays, groundwater is also a dominant source. Groundwater flows much slower than surface runoff (several years to decades compared to hours to days); therefore, nutrients entering the bays may be from actions that happened on land many years ago. Hence, improvements to water quality as a result of management actions taken on land may take a minimum of five to ten years.

Maryland Coastal Bays Program. 2002. *Maryland Coastal Bays Program Volunteer Water Quality Report August 1997 – July 2002*. Maryland Coastal Bays Program (Berlin, Maryland). 73 pp.

Maryland Department of Natural Resources. 1985. *Marine Fisheries Unit Catch and Sightings List*. Maryland Department of Natural Resources, Coastal Bays and Ocean (Annapolis). 8 pp.

Abstract: This reference lists the fish species and their corresponding fish code number for the coastal bay and ocean areas.

Maryland Department of Natural Resources. 1991. Fisheries Data Base Files/ 1945-1991. Maryland Department of Natural Resources (Annapolis).

Abstract: Commercial landings of finfish in Maryland's coastal waters were listed by pounds caught per year from 1945 through 1991. Bluefish, flounder, grey sea trout and menhaden have historically been the largest catches.

Maryland Department of Natural Resources. 1991. Fisheries Data Base Files (preliminary). Commercial shellfish landings in the ocean bays 1962-1991. Maryland Department of Natural Resources (Annapolis).

Abstract: Data on commercial catches of shellfish and crabs in the coastal bays was reported in terms of pounds caught per year. No hard clam catches were reported.

Maryland Department of Natural Resources. 1992. SAS files of fish data (J. Casey). Maryland Department of Natural Resources (Annapolis).

Abstract: These files contain data collected from regular trawl surveys of the coastal bays. The data include the size and species of each fish collected in each trawl. Extensive analysis is required, however, before information such as relative abundance of fish populations can be extrapolated. These analyses will require a considerable investment of time and the expertise of a fisheries biologist.

Maryland Department of Natural Resources. 1992. Mid-winter survey. Bird census of the coastal bay region,1991-1992. Maryland Department of Natural Resources (Annapolis).

Abstract: Bird counts in the coastal bays area were conducted during the winters of 1991 and 1992. Counts were reported for dabblers, divers, sea ducks, other ducks, swans and geese. The most numerous were snow geese, black ducks, mallards, buffleheads, and brant.

Maryland Department of Natural Resources. 2000. *State of Maryland Shore Erosion Taskforce Final Report*. Department of Natural Resources, Coastal Zone Management Division (Annapolis). viii + 62 pp.

Abstract: Shoreline erosion is one of the most significant problems facing Maryland's diverse coastal environment. Approximately 31 percent of Maryland's 4,360 mile coastline, which encompasses the Chesapeake Bay, the Coastal Bays, and the Atlantic coast, is currently experiencing some degree of erosion. While the range and magnitude or erosion varies both within and among the state's physiographic regions, the problem affects all 16 coastal counties along the Chesapeake Bay and the Coastal Bays watersheds. Consequently, shore erosion poses a significant threat to property owners, the public, and the natural resources, both terrestrial and aquatic, of our state's coastal zone.

In response to citizen concerns over the state's capacity to control shoreline erosion, the Maryland General Assembly passed Resolution 13 during the 1999 legislative session, requesting that the Governor establish a Shore Erosion task Force to: (1) identify shore erosion needs by county, (2) clarify local, State, and federal roles, (3) establish five and ten year shore erosion control plans, and (4) review contributing factors to shore erosion. The report contains a description of environmental and institutional contexts of shore erosion in Maryland, the organization of the task force, nine recommendations designed to address erosion issues and provide a broad spectrum of solutions, organizational and fiscal strategies to implement the nine recommendations, and a summary of the most important task force findings.

Maryland Department of Natural Resources. 2001. *An Assessment of the Economic Value of the Coastal Bays' Natural Resources to the Economy of Worcester County, Maryland*. Prepared by The Greeley-Polhemus Group, Inc., West Chester, Pennsylvania, for the Maryland Department of Natural Resources, Education, Bay Policy, Growth Management Services Unit (Annapolis). iii + 95 pp.

Abstract: The objective of the study was to characterize and quantify the "market" and "non-market" economic values of the natural resources of the Coastal Bays to the economy of Worcester County. The results from the study are intended to be useful in planning and policy development by the county and state in continuing to ensure that the region grows and prospers.

Library: FSU [HD75.6 .A88 2001]; SMC,[HD75.6 .A87 2001]; SU, TU, UMAB [all are HD75.6 .A77 2001]; UMCP [HD75.6 .G74 2001]

Maryland Department of Natural Resources. 2001. *Coastal Bays Blue Crab Fishery Management Plan*. Coastal Bays Fishery Advisory Committee, Maryland Department of Natural Resources (Annapolis). 44 pp.

Abstract: The goal of the management plan is to conserve coastal bay stock, protect its ecological and socio-economic values, and optimize the long-term use of the resource. To do this, six objectives were established in the management plant: 1) improve understanding of how disease (Hematodinium) contributes to the mortality and population abundance of ble crabs; 2) improve understanding of blue crab biology and stocks; 3) maintain an economically stable and sustainable commercial blue crab fishery; 4) improve the recreational crabbing experience; 5) protect, maintain and enhance blue crab habitat; and 6) improve enforcement of crabbing restrictions.

Library: MCBP

Maryland Department of Natural Resources. 2004. *Newport Bay and Sinepuxent Bay Watersheds Characterization*. Maryland Department of the Environment Watershed Services (Annapolis). viii + 50 pp.

Library: FSU [TD225.N39 N39 2004], SU, TU, UMCP [all are GB565.M37 M35 2004]

Maryland Department of the Environment. Undated.. Water Quality Files, 1970-1983. Maryland Department of the Environment (Baltimore).

Abstract: Computerized water quality data from various sources were compiled for all Maryland Coastal Bays. Stations were listed by longitude and latitude coordinates and data may be sorted by station data or parameter. Parameters studied included physical conditions (depth, temperature, salinity, etc.) and a complete sweep of water quality conditions (dissolved oxygen, nutrients, chlorophyll, etc.). Our files include a listing of all data that was available for each station and all recorded data from 1983 for nutrients, oxygen, and chlorophyll-a. The 1983 data focused in the St. Martins River, but included several stations in Isle of Wight and Assawoman Bays. Stations were sampled between 2 and 10 times during July, August and September. A summary report of these data was completed by the Maryland Department of Health and Mental Hygiene (1985).

Maryland Department of the Environment. Undated. *Maryland Water Quality 1976*. Division of Planning (Baltimore). Coastal Area, Chapter 4.

Abstract: Water samples from the 1975 VIMS study revealed the quality of water in the coastal bays to be generally excellent. Poor water quality was noted in localized areas of some tributaries. Low benthic species diversities attested to poor water quality in the upper St. Martin river, mouth of the St. Martin river, upper Assawoman bay, the Isle of Wight bay, and near the Route 50 bridge at Ocean City. The St. Martins river was closed to shell fishing throughout 1975 because bacteriological standards were exceeded. The bay proper of Assawoman bay had good water quality. Newport bay had violations of minimum standards for dissolved oxygen (Trappe creek) and bacteria (Trappe creek and Ayer creek). Inorganic nitrogen and chlorophyll-a levels were higher in the upper tributaries and lower in Newport bay; total phosphorus was lower in the upper tributaries and higher in Newport bay. Chincoteague bay had good water quality and benthic diversities. Inorganic nitrogen and chlorophyll levels were lower in 1975 than in 1974. However, some values for dissolved oxygen were marginal (4.4 to 4.8 mg I^{-1}). The main non-point source of pollution in the coastal bay area was determined to be agricultural land runoff. Other non-point pollutant sources included septic tank failures, urban land runoff/ and residential canals. A table including shoreline erosion and accretion information was included. Most of the erosion in the bays was slight. Recommendations for the continuation of the sediment and erosion control program, the farm conservation program, and the solid waste program were proposed. The development of new programs in areas such as storm water management/ salt water intrusion and boating were suggested.

Maryland Department of the Environment. 1983. *St. Martins River Phytoplankton*. Water Quality Monitoring Division. Maryland Department of the Environment (Baltimore).

Abstract: Phytoplankton data included cell counts and identification of major species for three sampling dates during July, August and September. Highest concentrations of phytoplankton occurred in Bishopville Prong (total of over 1,200,000 to 2,000,000 cells I^{-1}) and second highest in Shingle Landing Prong. Concentrations decreased down river/ toward the mouth of St. Martins River (35,000 cells I^{1}). Species identifications indicated a dominance of blue-greens and diatoms in Bishopville Prong; however, pigmented flagellates along with diatoms dominated in Shingle Landing Prong and St. Martins River. Fish trawl sampling data from July 19, 1983 was also included.

Maryland Department of the Environment. 1990. Water Quality Inventory Report 305 (b). Maryland Department of the Environment (Baltimore). Ocean/Coastal Area. pp. a-13 - a-15.

Abstract: Brief summaries of general water quality within the Assawoman/ Isle of Wight, Sinepuxent/ and Chincoteague Bays were given. Water quality data was obtained from benthic macroinvertebrate sampling stations and from the shellfish monitoring program. Water quality in Assawoman/ Isle of Wight/ and Sinepuxent Bays were rated "good" in the tidal areas/ but "fair" to "poor" in confined areas and tributaries. The open waters of Chincoteague and Newport Bays were rated "excellent/" but "fair" to "poor" in confined areas. Water quality impacts/ such as restricted shellfish harvesting and/or chronic algae blooms/ were reported.

Maryland Department of the Environment. 1992. Nomination of Maryland's Coastal Bays to the National Estuary Program. Maryland Department of the Environment (Baltimore).

Abstract: A proposal from the State of Maryland to the USEPA for support of a five-year program of study/ monitoring/ education and planning for the Maryland Coastal Bays. The program was not funded.

Maryland Department of the Environment. 2004. Oyster & clam harvesting waters. Maryland Department of the Environment (Annapolis). [This is a series of maps]

Library: FSU [G3842.C5L2 2003]

Maryland Department of Health and Mental Hygiene. 1985. St. *Martins River - Bishopville Prong - Shingle Landing Prong - Assawoman Bay - Isle of Wight Bay complex. QA/QC water quality data status summary report*. Water Management Administration/ Division of Technical Analysis (Baltimore). 60 pp.

Abstract: This report was a summary report of the Maryland Department of the Environment 1983 data collection (see above). Graphs and data tables included data from St. Martins River, Bishopville Prong and Shingle Landing Prong only. Parameters sampled included the following: NH4, NO2, NO3, Organic N, total P, orthophosphate, chlorophyll-a, salinity, temperature and pH. Peak levels of nutrients on both the Bishopville and the Shingle Landing transects occurred midway in the creek (5 miles from the St. Martin River mouth), while chlorophyll-a peaks occurred further downstream (3-5 miles from mouth). The highest reported values for nitrogen were found in Bishopville Prong (NH4 = 15 mg I^{-1}; NO3 = 0.8 mg I^{-1}), while highest phosphorus levels reported were found in Shingle Landing Prong (total P = 4.0 mg I^{-1}). Chlorophyll-a levels in Shingle Landing Prong exceeded 100 ug I^{-1} and averaged about 60 ug I^{-1} in Bishopville Prong. A dye study was conducted in August, 1983. Dye was introduced at the Ocean City inlet and along the mainstem of Isle of Wight and Assawoman Bays. Concentration measurements 24, 48 and 72 hours after introduction showed a concentration of dye in the middle of Isle of Wight Bay. A survey of the benthic infauna concluded that density was much greater in the open bays than in the St. Martins River and the associated creeks.

Maryland Governor's Special Committee to Study Shore Erosion. 1961. *A Shore Erosion Policy for Maryland*. Report of the Governor's Special Commission to Study Shore Erosion (Annapolis). 63 pp.

Maryland State Department of Transportation. 1982. Topographic map and general highway map of Worcester County, Maryland. Department of Transportation, State Highway Administration. Surface Water Inflows to Coastal Bays. (Annapolis).

Abstract: A list including all of the creeks and rivers that surround the bays was compiled to determine any possible fresh water inflows.

Maryland State Planning Department. 1963. *Development of Assateague Island; Report to the Governor*. Maryland State Planning Department (Baltimore). 12 pp.

Maryland State Planning Department. 1965. *Classification and Inventory of Wildlife Habitats in Maryland*. Maryland State Planning Department in cooperation with the Maryland Department of Game and Inland Fisheries and Bureau of Outdoor recreation – U.S. Department of the Interior. 74 pp.

Maryland Tidewater Administration. Undated. Marine Finfish Project and Hard Clam Project, Comments on Coastal Bay Dedging for Beach Fill. Maryland Department of Natural Resources, Tidewater Administration (Annapolis). 5 pp.

Abstract: The project was initiated to determine the recovery rate of benthic invertebrates to a dredged area. The results showed that within three years fourteen separate species were identified. However, the new species were different than the original fifteen species that were found in the area prior to the dredging activity. It is believed that these changes were caused by the alteration of habitat (the dredge site now being much deeper than its surroundings). One suggestion was that the Ocean City inlet could be doubled in width in order to provide a source for beach replenishment material since that area has already been disturbed.

Marzec, R. J., Y. Kim and E. N. Powell. 2006. Condition index of surfclams (*Spisula solidissima*) in the Mid-Atlantic. *Journal of Shellfish Research* 25(2):752.

Abstract: Scientists from the Haskin Shellfish Research Laboratory and National Marine Fisheries Service-Northeast Fisheries Science Center conducted a survey of surf clam (*Spisula solidissima*) stocks in an area from northern New Jersey to southern Virginia during June and July of 2004 in order to evaluate the progress of mortality, apparently related to warming of the Mid-Atlantic Bight. One component of the survey was the measurement of condition index at 104 locations from Delmarva to Long Island. The program followed a pilot study in 2002 that suggested that surf clam mortality off Delmarva was likely caused by warmer temperatures decreasing feeding and subsequently leading to starvation. All sampling was conducted aboard the F/V *Lisa Kim*, a commercial clammer. Condition index was highest inshore, with the exception of a few of the most inshore stations, and lowest at the offshore edge of the clam's range. An estimate of meat weight for a standard 120-mm clam, from site-specific length-weight regressions, revealed that the animals near the center of the inshore-offshore distribution had a greater weight for a given length than those living at the edges of the clam's range, probably due to the influence of temperature on feeding and growth. Low condition in the extreme inshore locations suggests that warmer temperatures continue to negatively affect surf clam nutrition and indicate the continued susceptibility of clams along the southern and inshore boundary to warming in the Mid-Atlantic Bight.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Mason, R. P., N. M. Lawson and G.-R. Sheu. 2001. Mercury in the Atlantic Ocean: factors controlling air-sea exchange of mercury and its distribution in the upper waters. *Deep-Sea Research* (Part II, *Topical Studies in Oceanography*) 48(13):2829-2853.

Abstract: To understand further the cycling of mercury at the earth's surface we discuss the results of recent measurements of Hg concentration and speciation in the upper ocean and marine boundary layer of the Atlantic Ocean. In water, dissolved gaseous Hg (DGHg) and total Hg measurements are reported; for the atmosphere, total gaseous Hg, reactive gaseous Hg (RGHg) and particulate Hg measurements were made. These measurements allow estimation of gas evasion to the atmosphere and deposition to the ocean. In conjunction with the field collections, incubation experiments both on board ship and in the laboratory have examined further the processes controlling the oxidation and reduction of Hg species in water. The authors results suggest that dry deposition of RGHg. could be significant.

Library: CBL, HPL, UD-GCMES, UD-Morris, UMCP

Massey, D. M., S. C. Newbold and B. Gentner. 2006. Valuing water quality changes using a bioeconomic model of a coastal recreational fishery. *Journal of Environmental Economics and Management* 52(1):482-500.

Abstract: This paper develops and applies a structural bioeconomic model of a coastal recreational fishery. We combine a dynamic fish population model, a statistical model of angler catch rates, and a recreation demand model to estimate the value of water quality changes for the Atlantic Coast summer flounder fishery. The model predicts that improving water quality conditions in Maryland's coastal bays alone would have relatively small impacts on the fishery as a whole. However, water quality improvements throughout the range of the species could lead to substantial increases in fish abundance and associated benefits to recreational anglers from increased catch rates. We also estimate an alternative version of the catch function, with no direct measure of fish abundance included, and we compare results from this "reduced form" approach to results from our structural model.

Library: CBL, HPL, TU, UD-Morris, UMBC, UMCP, UMES

Mather, B. 1946. *Limulus polyphemus* – the king crabs. *Maryland. A Journal of Natural History* 16(3):47-53.

Library: TU, UMCP

Mather, J. R., H. Adams, III and G. A. Yoshioka. 1964. Coastal storms of the Eastern United States. *Journal of Applied Meteorology* 6:20-30.

Library: FSU, SU, TU, UD-GCMES, UD-Morris, UMBC, UMCP

Matthews, E. B. 1933. *Pleistocene stratigraphy of the Salisbury area, Maryland, and its relationship to the lower eastern shore A surface approach*. Maryland Geological Survey, Geological Map, R.I. No. 2.

Library: BSU, FSU, SMC, SU, UMBC, UMCP, UMES [all are QE121 .A23 no.2]

Matthiessen, P. 1965. A reporter at large: sand and wind and waves. *The New Yorker* (New York), 3 April.

Matuszeski, B. 1999. Complex issues, simple truths. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:39-42.

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Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Maurer, D., W. Leathem, P. Kinner, and J. Tinsman. 1979. Seasonal fluctuations in coastal benthic invertebrate assemblages. *Estuarine and Coastal Marine Sciences* 8(2):181-193.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Maurer, D., L. Watling, P. Kinner, W. Leathem, and C. Wethe. 1978. Benthic invertebrate assemblages of Delaware Bay. *Marine Biology* 45:65-78.

Abstract: During two consecutive summers, the first quantitative bay-wide survey (207 stations) of benthic invertebrates was conducted in Delaware Bay. In 1972, 109 species were collected at 105 stations; and in 1973, 125 species were collected at 102 stations. A total of 169 different species were collected for both summers. The number of species and nu8mber of individuals increased with increasing salinity and increasing median grain size. These relationships were compared and were found similar to those in estuaries and bays throughout the world. Average density was 722 individuals/m^2, which is low compared to other estuaries. The relationship of low secondary production to pollution, macroscopic algae, sediment transport, predation, and hydrography is discussed. Deposit feeders comprised the major feeding type. Local species composition was similar to that in Chesapeake Bay, and dominant species occurred in estuaries throughout the Mid-Atlantic Bight. The benthic invertebrates of Delaware Bay were related to the cosmopolitan mode of estuarine faunas. Fauna assemblages were identified by cluster analysis. The assemblages were associated with sediment type and salinity. It was concluded that Delaware Bay comprises a mosaic of animal assemblages, some of which have relatively sharp boundaries similar to classical level bottom type communities whereas the boundaries of others are almost impossible to detect, and these represent species distributed along an environmental continuum.

Library: CBL, HPL, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Abstract: Manmade, dead-end canals are common in residential developments along the coastal bays of Delaware and Maryland. The close proximity of housing to the water and the concentration of boating activities enhances the potential for anthropogenic stress to living resources in these poorly flushed aquatic systems. Measurements of water quality, sediment contaminants, and benthic macroinvertebrate assemblages were taken in 25 randomly selected canals and compared to 175 non-canal sites located throughout the coastal bays. The mean bottom dissolved oxygen concentration in canals was half that found in non-canal sites. Mean water column and benthic chlorophyll concentrations were, respectively, two times and four times higher

in the canals. Sediment contaminant concentrations were significantly higher in the canals compared to the coastal bays, and exceeded published guideline values indicating possible adverse ecological effects. The contaminants of greatest concern in the canals included arsenic, copper, polyaromatic hydrocarbons, polychlorinated biphenyls, and several banned, persistent pesticides (DDT, dieldrin, endrin, and chlordane). Benthic macroinvertebrate assemblages in canals were severely degraded; mean species richness, abundance, and biomass were 1/7, 1/10, and 1/20, respectively, of the values for the remaining coastal bays. A single pollution-tolerant polychaete species, *Streblospio benedicti*, comprised approximately three-fourths (70%) of the community in the canals. Deep (> 1 m) and muddy canals were in poorer condition than shallow and sandy ones.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

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Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

McCain, J. C. 1965. The Caprellidae (Crustacea: Amphipoda) of Virginia. *Chesapeake Science* 6(3):190-196.

Abstract: Five species of capellid amphipods occur in Virginia waters: *Aeginna longicornis, Hemiaegina minuta, Paracaprella tenuis, Caprella equilibra*, and *Caprella geometrica*. Though all are offshore species, the latter three commonly occur within Chesapeake Bay. *Deutella abracadabra* is placed as a junior synonym of *Paracaprella tenuis* and the name *Caprella geometrica* is assigned to the "acutifrons" forms found along the Atlantic and Gulf of Mexico coasts of the United States. *Aeginna longicornis* and *Caprella geometrica* are reported from the Atlantic coastal waters of Virginia.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

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Library: SMC, SU, UD-Morris, UMCP [all are QL653.M3 M3]

McCloskey, L. R. 1973. Pycnogonida. Marine Flora and Fauna of the Northeastern United States. *NOAA. Technical Report NMFS CIRC-386.* 12 pp.

Abstract: This manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the Pycnogonida along the coast of the United States from Maine to New Jersey out to 100 m.

McConaugha, J. 1988. Estuarine-shelf interactions as regulators of estuarine decapod population dynamics. Proceedings of the Army Corps of Engineers Symposium on larval Fish and Shellfish Transport Through Coastal Inlets. *Transactions of the American Fisheries Society Symposium* 3:99-103.

McConaugha, J. 1999. Recent trends in blue crab fishery. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:22-25.

Library: FSU [EP 1.23/6:620/R-00/001]

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Abstract: Two topics on decapod larval biology are discussed: retention and recruitment of decapod larvae in the water column. Most decapods have retained a planktonic larval phase which is generally interpreted as a mechanism for increased dispersal. Evidence of restricted gene flow and biological/physical interaction research have suggested that larvae can be retained and recruited to the parental population via mesoscale processes. To fully understand recruitment processes improved estimates of mortality rates for planktonic larval stages will be required. Recent evidence suggests that mortality rates are not constant over the complete larval development period but increase with time. During some seasons meroplankton including decapod larvae can constitute more than 50% of the planktonic biomass. The quantity of energy transferred into the water column can be significant. Their role in planktonic ecology may be significant and additional research is required. Emphasis in this report is placed upon the blue crab, *Callinectes sapidus*.

Library: UD-Morris

McCormick, J. and H. A. Somes, Jr. 1982. *The Coastal Wetlands of Maryland*. Maryland Department of Natural Resources, Coastal Zone Management Program. Jack McCormick and Associates, Inc., WAPORA, Inc. (Chevy Chase, Maryland). xvi + 243 pp.

Library: CB [QH541.5.M3 M37], FSU, HPL, SMC, SU, TU, UMBC, UMCP, UMES [all are QH541.5.M3 M3]

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Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

McDougall, K. D. 1943. Sessile marine invertebrates of Beaufort, North Carolina. *Ecological Monographs* 13(3):321-374.

Abstract: A method is described for the collection and study of sessile marine invertebrates by submerging tiles, wooden blocks, and glass plates attached to artificial piles, a floating plank, and other devices. The breeding periods, seasonal fluctuations, and vertical distribution of pile-dwelling animals were studied. Many species of animals are confined to, or are most abundant at, particular levels on the piles. Such vertical zonation may be brought about in several different ways: (a) Larvae may settle predominantly at a particular level and there grow to maturity (*Balanus amphitrite, Chthamalus fragilis, Geukensia demissa*); (b) larvae may settle at all levels, but adverse influences may subsequently destroy those which settle above or below certain limits (hydroids, *Crassostrea, Bugula neritina*); (c) motile species tend to move into and remain in particular zones (*Urosalpinx, Arbacia*). Several species were found, the larvae of which settled most abundantly in a zone which does not correspond with the zone of densest adult population (*Crassostrea, Bugula neritina*). Factors (a) and (b) may both operate to determine the final limits of vertical distribution of a species (*Chthamalus fragilis, Balanus eburneus*). The level at which larvae settle is probably influenced by their trophistic responses to light and gravity.

Breeding seasons were determined for twenty-one species from their settlement on clean tiles at one- or two-week periods. Additionally, competition for space was examined as well as the effects of light on spatial distribution. Current velocities and their effects on the settlement and growth of sessile invertebrates were noted and was the settlement of larvae on surfaces of different angles.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

McGary, J. W. and F. W. Sieling. 1953. *Data Report 15. Chemical and Physical Data, Chincoteague Bay Area July 1943 to June 1953*. Chesapeake Bay Institute, Johns Hopkins University Reference 53-10. 169 pp.

Abstract: The report contained intensive temperature and salinity data.

Mcgrady, M. J., G. S. Young and W. S. Seegar. 2006. Migration of a Peregrine Falcon *Falco peregrinus* over water in the vicinity of a hurricane. *Ringing and Migration* 23(2):80-84.

Abstract: Peregrine Falcons *Falco peregrinus* migrating over the Gulf of Mexico have limited perching opportunities and can encounter weather that impedes southward movement. In 1998 the authors tracked via satellite a migrating second-year female Peregrine during 79 days from Assateague Island, Virginia, to inland Venezuela, and related its movement to local weather conditions, especially during its crossing of the Gulf where it encountered weather affected by Hurricane Mitch. They document Peregrine migration in extreme weather conditions and highlight the importance of tailwinds and updraughts, especially during the water crossing - even for a Peregrine, which is not adapted for soaring flight. Analyses of the large pool of data from migrating Peregrines fitted with satellite-received transmitters in relation to weather are lacking.

McGinty, M., C. Kennedy, K. Schwenke, C. Jordan, C. Wazniak, L. Hanna, P. Smail, & D. Goshorn. 2002. *Abundance and Distribution of Macroalgae in Maryland Coastal Bays. Understanding the Role of Macroalgae in Shallow Estuaries: Workshop Proceedings*. Maryland Department of Natural Resources, Annapolis, Maryland.

McHugh, J. L. 1956. Trapping oyster drills in Virginia. II. The time factor in relation to the catch per trap. *Proceedings of the National Shellfisheries Association* (1955):155-168.

Abstract: The catching rate of oyster drills, *Urosalpinx cinerea* and *Eupleura caudata*, in traps of galvanized chicken-wire baited with seed oysters decreases with time. The catches of *Urosalpinx* per trap per week did not differ significantly whether traps were lifted daily or only once each week; but when the fishing period was lengthened to two weeks, catches were significantly less. Catches of *Eupleura* per week were significantly less in weekly than in daily lifts of the traps.

Library: CBL, UD-Morris, UD-GCMES, UMCP

McHugh, J. L. 1956. Trapping oyster drills in Virginia. III. The catch per trap in relation to condition of the bait. *Proceedings of the National Shellfisheries Association* 47(1956):83-102.

Abstract: Controlled experiments in shallow water near shore at Gloucester Point, Virginia, demonstrated that traps rebaited with fresh seed oysters from James River caught more *Urosalpinx cinerea* and *Eupleura caudata* than traps that contained old bait that had been in use for some time. Other experiments showed that seed oysters (young) caught more drills than adult oysters, and adult oysters caught more than oyster shell, when used as bait in traps. Attraction power of bait deteriorated with time. Catches did not vary with quantity of bait.

Library: CBL, UD-Morris, UD-GCMES, UMCP

McHugh, J. L. and R. S. Bailey. 1957. History of Virginia's commercial fisheries. Neglected historical records throw light on today's problems. *Virginia Journal of Science* 8(1):42-64.

Library: CBL, UD-Morris, UMBC, UMCP

McIntyre, J. W. 1978. Wintering behavior of common loons. *Auk* 95(2):396-403.

Abstract: Common loons, *Gavia immer*, wintering in Tom's Cove off Assateague Island, Virginia, defended individual feeding territories of 4-8 ha during the day and rafted together at night. The major activity, feeding, followed a daily pattern. Tidal changes, especially the onset of ebb tide, influenced feeding location and intensity. Generally considered solitary birds, loons may have a loosely cohesive social system of individuals that remain in contact throughout the year.

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Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Mead, A. D. 1899. The natural history of the starfish. *Bulletin of the U.S. Bureau of Fisheries* 19:203-224.

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Meadows, R. E. and K. Saltonstall. 2007. Distribution of native and introduced *Phragmites australis* in freshwater and oligohaline tidal marshes of the Delmarva Peninsula and southern New Jersey. *Journal of the Torrey Botanical Society* 134(1):99-107.

Abstract: The authors surveyed freshwater and oligohaline portions of tidal river systems in Delaware, the eastern shore of Maryland, and southern New Jersey for native and introduced *Phragmites australis* populations. Populations of native *P. australis* occur along the major rivers of the eastern shore of Maryland, particularly the Choptank and Nanticoke Rivers, and were common along river and creek edges and typically less dense than introduced *P. australis*. In contrast, few native populations occur along rivers in Delaware and southern New Jersey where introduced *P. australis* dominates. These differences in distribution of native *P. australis* could be due to the magnitude of human impacts and the timing of invasion of introduced *P. australis* into these systems. The presence of so many populations of native *P. australis* on the eastern shore of Maryland is unique today as the subspecies has all but disappeared from much of its historical range along the Atlantic Coast.

Library: FSU, SMC, TU, UD-Morris, UMCP, UMBC, UMCP

Meanley, B. 1943. Red-cocaded woodpecker breeding in Maryland. *The Auk* 60(1):103.

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Meanley, B. 1950. Swainson's warbler on coastal plain of Maryland. *The Wilson Bulletin* 62(2):93-94.

Abstract: Swainsons warbler, *Limnothlypis swainsonii*, is reported from Willards, Wicomico County, and Pocomoke, Worcester County, Maryland, as well as from lower Sussex County, Delaware, near Selbyville. Information is presented on preferred nesting habitat and diet.

Library: FSU, SMC, TU, UD-Morris, UMCP

Meanley, B. 1981. *Bird Life at Chincoteague and the Virginia Barrier Islands*. Tidewater Press (Centreville, Maryland). vi + 107 pp.

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Medved, R. J. and J. A. Marshall. 1981. Feeding behavior and biology of young sandbar sharks, *Carcharhinus plumbeus* (Pisces, Carcharhinidae), in Chincoteague Bay, Virginia. *Fishery Bulletin* 79(3):441-447.

Abstract: During the summers of 1977, 1978, and 1979 the feeding behavior and biology of young sandbar sharks (*C. plumbeus*) were investigated in Chincoteague Bay, Virginia, using catch data obtained from rod and reel fishing. The blue crab, *Callinectes sapidus*, was found in 41.3% of the stomachs examined; 20% of the stomachs were empty, and the remainder contained various crustaceans and fishes. The proportion of empty or nearly empty stomachs was greater for night captures than for day captures. Yearly differences in sex ratio existed and the total length distribution of sharks measured suggested the presence of relatively distinct size classes.

Library: CBL, HPL, FSU, SMC, UD-GCMES, UD-Morris, UMCP, UMES

Medved, R. J. and J. A. Marshall. 1983. Short-term movements of young sandbar sharks, *Carcharhinus plumbeus* (Pisces, Carcharhinidae). *Bulletin of Marine Science* 33(1):87-93.

Abstract: Using tethered floats on 20 sharks and ultrasonic telemetry on 3 others, the short-term movements of young *Carcharhinus plumbeus* were investigated in the area of Chincoteague, Virginia. The pattern of movement was predominately in the direction of tidal current flow at a horizontal rate approximately equal to current speed. Movement not in the direction of tidal flow occurred rarely and was associated with slow current speed and the proximity of large schools of menhaden, *Brevoortia tyrannus*. Rate and magnitude of change in swimming direction increased during slack water periods and upon movement into areas with negligible current flow. No day-night, flood current-ebb current, sex, or size effects were found for locomotor activity. Results suggest that tidal current flow is a major factor influencing the movements of young sandbar sharks in this area.

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Medved, R. J., C. E. Stillwell and J. J. Casey. 1988. The rate of food consumption of young sandbar sharks (*Carcharhinus plumbeus*) in Chincoteague Bay, Virginia. *Copeia* 1988(4):956-963.

Abstract: Three methods for determining food consumption were used to estimate the daily ration of young sandbar sharks in Chincoteague Bay, Virginia. One method required information concerning the rate of gastric evacuation and the amount of food in the stomachs of sharks caught in the wild. Another approach used the stomach contents to determine feeding frequency and reconstruct meal size. The final method for estimating daily ration was a bioenergetics model relating food intake to growth and metabolism. Most of the parameter estimates needed in each of the models were obtained from earlier studies on this shark but several values were extrapolated from studies of other species. The estimates produced by the models were compared with respect to the assumptions implicit in each and the uncertainties associated with the parameter values used. Overall, the models produced similar estimates and indicate that the daily ration for this shark in Chincoteague Bay is close to 1% body weight.

Library: CBL, FSU, SMC, SU, TU, , UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Medved, R. J., C. E. Stillwell and J. J. Casey. 1985. Stomach contents of young sandbar sharks, *Carcharhinus plumbeus* , in Chincoteague Bay, Virginia. *Fishery Bulletin* 83(3):395-402.

Abstract: During the summer of 1983 the stomach contents of 414 sandbar sharks captured by gill nets, and rod and reel fishing gear in Chincoteague Bay, Virginia, were examined. The blue crab, *Callinectes sapidus*, occurred in 67.4% of the stomachs and Atlantic menhaden, *Brevoortia tyrannus*, occurred in 13.3% of the stomachs. Other species of small crustaceans and fishes were found in < 6.0% of the stomachs, and 17.9% of the stomachs were empty. Data collected concerning the amount, stage of digestion, and number of food items in the stomachs indicated that feeding occurred during relatively short periods of time separated by long periods during which food was digested and no additional food was consumed.

Library: CBL, HPL, FSU, SMC, UD-GCMES, UD-Morris, UMCP, UMES

Megaree, F. 1966. Assateague park in future but superintendent at work. *The Evening Sun* (Baltimore, Maryland), 5 January.

Megaree, F. 1966. Studying Assateague – naturalist tries to get feel of it. *The Evening Sun* (Baltimore, Maryland), 6 June.

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Megaree, F. 1966. Island's ponies get new boss. *The Evening Sun* (Baltimore, Maryland), 27 June.

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Melville, M. M. 1930. The natural history of *Polynices heros*. *Annual Report of the Biological Board of Canada for the Year* 1930:23.

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Library: CBL, SMC, UD-Morris, UMCP [all are QL444.I8 M42]

Messick, G. A. 1994. *Hematodinium perezi* infections in adult and juvenile blue crabs *Callinectes sapidus* from coastal bays of Maryland and Virginia. *Diseases of Aquatic Organisms* 19:77-82.

Library: UD-GCMES

Messick, G. A. 1999. Increasing risk factors: *Hematodinium* sp. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:59-61.

Library: FSU [EP 1.23/6:620/R-00/001]

Messick, G. A. 2002. A survey for prevalence of *Paramoeba* spp. in Blue Crabs along the Atlantic and Gulf Coasts. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 56:105-113.

Abstract: *Paramoeba perniciosa* is a parasite that has been found in blue crabs *Callinectes sapidus* from coastal embayments from Florida to Connecticut and has been associated with mortalities in crab shedding facilities in coastal bays of Maryland and Virginia. Hemolymph samples from more than 7300 crabs over a 9-year period from the Gulf (N = 228) and Atlantic (N = 7167) coasts of the United States revealed 0.5% of crabs assayed to be infected by *P. perniciosa*. Infections were limited to crabs collected from Virginia to New Jersey; Rehoboth Bay, Delaware, had a considerably higher prevalence than other sites sampled. Infections were not present or detected in Gulf coast crabs. Areas reported with *P. perniciosa* in blue crabs overlap areas reported with paramoeba-like infections in the American lobster *Homarus americanus* and rock crabs *Cancer irroratus*. One lesser blue crab *Callinectes similis* sampled from a Maryland coastal bay was infected by a *Paramoeba* sp. morphologically similar to *P. perniciosa* in the blue crab. Actual prevalence of *Paramoeba* spp. in *Callinectes* spp. crabs may be higher than reported here due to assay methods. Parasites can cause mortalities in crab populations to the extent that numbers are significantly reduced and therefore disease may need to be considered in fishery models.

Messing, C. G. and J. H. Dearborn 1990. Echinodermata: Crinoidea. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS 91.* 29 pp.

Abstract: The crinoid fauna of the continental margin (0-1500 m) of northeastern North America (Georgia to Canada) includes 14 species in 13 genera and 5 families. Included are a discussion of the external morphology and natural history of crinoids and a glossary of terms, an illustrated key to local taxa, annotated systematix list, and an index. The fauna includes 2 species found no further south than New England and 8 that occur no further north than the Carolinas and Blake Plateau. *Comactinia meridionalis* (Agassiz) is the only species commonly found in shallow water (<50 m). No taxa are endemic to the area.

Metzgar, R. G. 1973. *Wetlands in Maryland*. Department of State Planning, Natural Resources, Department of Economic and Community Development, Publication No. 157. Annapolis, MD.

Abstract: Wetlands were found to comprise about eight percent (37,700 acres) of the total acreage in Worcester County. Wetlands were classified into safe (9%), moderately vulnerable (33%), and highly vulnerable (30%) to development. Regularly flooded salt marshes were the dominant form of wetlands in the coastal bay area. An estimated 10,639 acres of Worcester County wetlands have been destroyed or altered.

Library: CBL, FSU, HPL, MSU, SU, UMBC, UMES [all are QH 76.5.M3.M47]; UMCP [HC107 .M32 no.157]

Milne, L. J. and H. J. Milne. 1946. Notes on the behavior of the ghost crab. *American Naturalist* 80(792):362-380.

Abstract: From Long Island, New York, to Rio de Janeiro, Brazil, the ghost crab, *Ocypode quadrata*, is found on sandy beaches. Behavior of specimens from Townsend's Inlet, New Jersey, was studied by day and night through the summer and autumn, and specimens were observed for extended periods of time in captivity. Adults make burrows in the dry beach beyond storm-wave lines and in the dunes, emerging principally at night when they obtained food from the beach drift and wet their modified gill chambers. Females well loaded with eggs were observed in late July. At this time and until October, a great variation in size was noted among specimens on the beach, probably indicating that the aquatic megalops stage transforms to the terrestrial crab throughout the summer. In October, burrows were higher on the beach and much longer, but specimens were active during a warm spell; apparently the species hibernates in these burrows (which do not reach the water or even wet sand). Heat tolerance is high, but in July exposure for 2 hours to 12^{o}C was fatal. Methods of combat and concealment were studied and differences noted in behavior of the sexes. Males resist being driven into the water, but females readily wade out beyond reach. While completely submerged in quiet water, females force a current through their eggs by opening the abdominal fold slightly and quickly rotating the body on the bases of the ambulatory legs until the dorsal surface of the carapace is downward. A similar attitude is struck by both sexes in attempting to seize the chelipeds of an enemy which is above them Normal running on the beach involves all eight ambulatory legs, but rapid running to escape capture involves only 6 legs, the hind pair being held clear of the ground; additional maneuverability seems to be gained in this way. Captive specimens accepted cold sea water from a pipette, as well as animal matter (dead or alive) including dried insects, but no ghost crab would accept fireflies.

Library: BSU, FSU, HPL, SMC, SU, TU, UD-GCMES, UD-Morris, UMBC, UMCP

Milligan, Michael R. 1984. Family Flabelligeridae Saint Joseph, 1894. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 6:47-1 - 47-20.

Miner, R. W. 1950. *Field Book of Seashore Life*. G. P. Putnam's Sons (New Uork). v + 888 pp.

Library: CBL, FSU, HPL, SMC, SU, UD-Morris, UMCP, UMES [all are QH91 .M5 1950]; TU [QH91 .M53]

Minor, E. C., J. P. Simjouw and M. R. Mulholland. 2006. Seasonal variations in dissolved organic carbon concentrations and characteristics in a shallow coastal bay. *Marine Chemistry* 101(3-4):166-179.

Abstract: Dissolved organic matter (DOM) composition and dynamics in temperate shallow coastal bays are not well described although these bays may be important as local sources of

organic carbon to ocean waters and are often sites of economically-important fisheries and aquaculture. In this study surface water samples were collected on a monthly to bi-monthly basis over two years from a mid-Atlantic coastal bay (Chincoteague Bay, Virginia and Maryland). Dissolved organic carbon (DOC) concentrations and light absorbance characteristics were measured on sterile-filtered water, and high-molecular weight (>1 kDa) dissolved OM (DOM) was isolated to determine stable isotope composition and molecular-level characteristics. Our time series encompassed both a drought year (2002) and a year of above-average rainfall (2003). During the dry year, one of our sites developed a very intense bloom of the brown tide organism *Aureococcus anophagefferens* while during the wet year there were brown tide bloom events at both of our sampling sites. During early spring of the wet year, there were higher concentrations of >1 kDa DOC; this fraction represented a larger proportion of overall DOC and appeared considerably more allochthonous. Based upon colored dissolved organic matter (CDOM) and high-molecular weight DOM analyses, the development of extensive phytoplankton blooms during our sampling period significantly altered the quality of the DOM. Throughout both years Chincoteague Bay had high DOC concentrations relative to values reported for the coastal ocean. This observation, in conjunction with the observed effects of phytoplankton blooms on DOM composition, indicates that Chincoteague Bay may be a significant local source of "recently-fixed" organic carbon to shelf waters. Estimating inputs of DOC from Chincoteague Bay to the Mid-Atlantic Bight suggests that shallow productive bays should be considered in studies of organic carbon on continental shelves.

Library: CBL, HPL, UD-GCMES, UD-Morris, UMCP

Mitchell, J. C. and J. M. Anderson. 1994. *Amphibians and Reptiles of Assateague and Chincoteague Islands*. Virginia Museum of Natural History (Matinsville).

Library: CBL, UD-Morris [QL653.V6M57]

Mixon, R. B. 1985. Stratigraphic and geomorphic framework of uppermost Cenozoic deposits in the southern Delmarva Peninsula, Virginia and Maryland. *U.S. Geological Survey Professional Paper* 1067-G. 53 pp.

Library: UD-Morris [I 19.16:1067-G]; UMCP [QE75 .P9 no.1067-G]

Mohlenbrock, R. H. 1994. This Land. Chincoteague Refuge, Virginia. *Natural History* 103(6):92.

Library: BSU, CBL, CSU, FSU, MSU, SMC, SU, TU, UD-Morris, UMAB, UMBC, UMCP, UMES

Moisan, T. A., J. L. Blanco C. P. Makinen and J. Nolan. 2006. Coastal inherent optical properties of phytoplankton in the southern Mid-Atlantic Bight: A BIOME project. *EOS, Transactions, American Geophysical Union* 87(36, suppl.):np.

Abstract: Coastal regions within the Southern Mid-Atlantic Bight (MAB) are directly influenced by regional freshwater fluxes that emanate from several large bay systems (Delaware and Chesapeake Bays). The outflows from these bays have high sediment loads, high nutrient levels, and high amounts of phytoplankton biomass associated with them that heavily influence the adjacent coastal margin ecosystems. Under the WA-COOL/BIOME Project, the authors are conducting a series of coastal ship cruises along the Delmarva Peninsula to characterize the seasonal variability in physical, chemical, and biogeochemical water column processes. They conducted a cruise in spring and summer (2005) and measured the inherent optical properties of phytoplankton, particles, and detritus in the region in relationship to the nutrient and physical fields. They found a profound influence of the Chesapeake Bay estuary on the neighboring coastal waters. They found high particle absorption (m-1) near the mouth of the Chesapeake Bay which was coincident with low salinity and high nutrient concentrations. They also saw a correlation between upwelling and downwelling areas and phytoplankton absorption which implies that the phytoplankton rapidly respond to nutrient availability in this region. They did not observe a close correlation between detrital absorption and phytoplankton absorption implying that the two have different sources of variability. Results from spring and summer BIOME cruises will be presented including species composition, pigmentation, and apparent optical properties.

Molina, K. C. and M. Erwin. 2006. The distrubution and conservation status of the gull-billed tern (*Gelochelidon nilotica*) in North America. *Waterbirds* 29(3):271-295.

Abstract: The Gull-billed Tern (*Gelochelidon nilotica*) has until recently received little conservation and management attention within North America despite a relatively low overall population size and significant declines in parts of the breeding range. This lack of attention may stem in part from the wide distribution of the species, encompassing parts of six continents, and from its tendency to nest in relatively small, scattered and often ephemeral colonies. Populations of North American subspecies are alarmingly small. The current population of the eastern subspecies *Gelochelidon nilotica aranea* in the U.S. is unlikely to exceed 3,600 pairs, with over 60% of these birds occurring in Texas. The Texas population has remained generally stable, but declines of populations in Maryland (where probably extirpated), Virginia, North Carolina, Florida, and possibly Georgia give cause for concern for this subspecies. For the western subspecies *Gelochelidon nilotica vanrossemi*, as few as 250 pairs nest at only two locations in the U.S., both in California. When populations in western Mexico are considered, the entire *G. n. vanrossemi* population numbers only 600-800 pairs. Currently the Gull-billed Tern is listed as "endangered" or "threatened" in four states, and is considered to be of management concern in five others. The breeding range of the species has contracted and shifted slightly from its known historic range in the middle Atlantic states, but otherwise occupies its historic range in the United States and has expanded slightly to coastal southern California. Some range contraction in Mexico (e.g., in Sonora) may have occurred. In eastern Mexico, historical information is almost non-existent and knowledge of current distribution and abundance is incomplete. Main threats to populations in North America include loss of natural nesting islands through beach erosion or perturbations to estuarine functions, development or modification of upland habitats near breeding areas that may be important for foraging, and disturbances to colonies by humans and feral or human-subsidized predators. This species often nests on man-made substrates suggesting it could be responsive to management of breeding sites. Key research needs include more frequent and refined population monitoring, a better understanding of demographics, metapopulation dynamics and factors limiting populations as well as refinement of subspecies' breeding distributions and wintering ranges.

Library: UD-Morris [on line]

Montgomery, L. and A. Huslin. 2002. Glendening wants Md. to spend on land. *The Washington Post* (Washington, D.C.), 18 December, Metro, p. B-1.

Abstract: [Parris N. Glendening] (D) will ask the Board of Public Works today to authorize the state to pay $3.5 million to restrict development on more than 2,000 acres in Worcester County. The Eastern Shore property, known as Newport Farms, is owned by businessman Charles R. "Buddy" Jenkins, who has contributed recently to Lt. Gov. Kathleen Kennedy Townsend and Comptroller William Donald Schaefer, both Democrats.Glendening spokesman Charles F. Porcari countered that "Newport Farms represents perhaps the most pristine tract in one of Maryland's most fragile ecosystems. Five years from now, it would be a tragedy if this was a 10-acre parking lot serving a hotel filled with slot machines."While Schaefer has excoriated Glendening for trying to push through the Glatfelter deal, Schaefer spokeswoman Christine Duray said she is not sure

how Schaefer will vote on the deal with Jenkins, a longtime Schaefer friend and campaign contributor.

Moore, J. P. 1907. Description of new species of spioniform annelids. *Proceedings of the Academy of Natural Sciences of Philadelphia* 59:195-207.

Library: CBL, SMC, TU, UD-Morris, UMCP

Moncrief, N. D. and R. D. Duesser. 2001. Allozymic variation in the endangered Delmarva fox squirrel (*Sciurus niger cinereus*): Genetics of a translocated population. *American Midland Naturalist* 146(1):37-42.

Abstract: The allozymic variation at 42 loci in a translocated population of *Sciurus niger cinereus*, as well as naturally occurring (source) population from which individuals were obtained, were examined. The translocated population was founded more than 20 years ago by a total of 30 animals introduced directly from the source population and by descendents from a previous translocation from the same source population. Genetic variation, as measured by mean heterozygosity, did not differ significantly between the source and translocated populations. The mean number of alleles per locus was significantly lower in the translocated population relative to the source population. Genetic variation in both *S. n. cinereus* populations is within the range of values found on other populations of S. niger. Nevertheless, we suggest that the Chincoteague population and other translocated populations of *S. n. cinereus* be examined periodically (using larger sample sizes) for losses of genetic variation. Also, additional methods (e.g., analysis of mitochondrial and/or nuclear DNA) should be used to document genetic variation within and among translocated and naturally occurring populations of *S. n. cinereus.*

Library: CBL, FSU, HPL, SMC, TU, UD-Morris, UMBC, UMCP, UMES

Montagna, W. 1942. The sharp-tailed sparrows of the Atlantic coast. *The Wilson Bulletin* 54:107-120.

Abstract: The Acadian sharp-tailed sparrow, *Ammospiza caudata subvirgata*, intergrades with *Ammospiza caudata diversa*. *Ammospiza caudata diversa* breeds south of Tuckerton, New Jersey, in the marshlands of Delaware, Maryland, and northern Virginia, to Chincoteague Island, which is the southernmost known location of the breeding.

Library: FSU, SMC, TU, UD-Morris, UMCP

Moore, L. J., P. Ruggiero and J. H. List. 2006. Comparing mean high water line shorelines: Should proxy-datum offsets be incorporated into shoreline change analysis? *Journal of Coastal Research* 22(4):894-905.

Abstract: More than one type of shoreline indicator can be used in shoreline change analyses, and quantifying the effects of this practice on the resulting shoreline change rates is important. Comparison of three high water line (proxy-based) shorelines and a mean high water intercept (datum-based) shoreline collected from simultaneous aerial photographic and lidar surveys of a relatively steep reflective beach (tan β = 0.07), which experiences a moderately energetic wave climate (annual average H_s = 1.2 m), reveals an average horizontal offset of 18.8 m between the two types of shoreline indicators. Vertical offsets are also substantial and are correlated with foreshore beach slope and corresponding variations in wave runup. Incorporating the average horizontal offset into both a short-term, endpoint shoreline change analysis and a long-term, linear regression analysis causes rates to be shifted an average of −0.5 m/y and −0.1 m/y, respectively.

The rate shift increases with increasing horizontal offset and decreasing measurement intervals and, depending on the rapidity of shoreline change rates, is responsible for varying degrees of analysis error. Our results demonstrate that under many circumstances, the error attributable to proxy-datum offsets is small relative to shoreline change rates and thus not important. Furthermore, we find that when the error associated with proxy-datum offsets is large enough to be important, the shoreline change rates themselves are not likely to be significant.

A total water level model reveals that the high water line digitized by three independent coastal labs for this study was generated by a combination of large waves and a high tide several days before the collection of aerial photography. This illustrates the complexity of the high water line as a shoreline indicator and calls into question traditional definitions, which consider the high water line a wetted bound or "marks left by the previous high tide."

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Moore, W. G. 1959. Observations on the biology of the fairy shrimp, *Eubranchipus holmani*. *Ecology* 40(3):398-403.

Abstract: The fairy shrimp *Ino holmani* (= *Eubranchipus holmani*) is reported from specimens collected at Chincoteague, Virginia, in 1911 by Fowler (1912). The materials was fragmentary and according to Flowler no longer exist in the collections of the Academy of Natural Sciences of Philadelphia. Details of the systematics, morphology, ecology, and biology are presented for the species.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Morales-Alamo, R. and D. S. Haven. 1974. Atypical mouth shape of polyps of the jellyfish, *Aurelia aurita*, from Chesapeake Bay, Delaware Bay, and Gulf of Mexico. *Chesapeake Science* 15(1):22-29.

Abstract: Fully developed polyps of Chesapeake Bay *Aurelia aurita* reared in the laboratory from known medusae were found to have circular mouths instead of the typical cruciform shape. This characteristic distinguishes them from *Chrysaora quinquecirrha* and *Cyanea capillata* in the same region and could be useful for identification purposes in field collections. Laboratory-reared polyps of *A. aurita* from Delaware Bay and the Gulf of Mexico also retained a circular mouth throughout their development. This mouth shape distinguishes the polyps from those three regions from those of the same species from higher latitudes and appears to be a deviation from the normal development of the organism.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Morgan, N. C. and E. C. Uebel. 1974. Efficacy of the Assateague insect trap in collecting mosquitoes and biting flies in a Maryland marsh. *Mosquito News* 34(2):196-199.

Abstract: Many more male than female *Tabanus lineola* Fabricius and many more female than male Culicidae were captured in newly designed UV-lighted insect traps. Generally, the traps were most effective from dusk to dawn, but the majority of the male tabanids and the female mosquitoes were captured between midnight and dawn. Captures of large numbers of male tabanids with UV-lighted traps have not been previously reported.

Library: UD-Morris, UMBC, UMCP

Morin, R. 1991. *Draft Working Document: Maryland Diamondback Terrapin Management Plan and Background Information*. Maryland Department of Natural Resources, Fisheries Division (Annapolis).

Morris, J. V. 1968. A recreational plan for a national seashore and its surrounding region…Assateague Island, Maryland and Virginia. *National Parks and Conservation Magazine* 43(257):15-20.

Library: BSU, TU, UD-Morris, UMBC, UMCP

Morrison, H. R. and C. E. Lee. 1981. *America's Atlantic Isles*. National Geographic Society (Washington, D.C.). 200 pp.

Library: FSU, SU [all are F106 .M85]

Morton, J. M., A. C. Fowler and R. L. Kirkpatrick. 1989. Time and energy budgets of American black ducks in winter. *Journal of Wildlife Management* 53(2):401-410.

Abstract: The authors used scan sampling techniques to quantify behavior and energy expenditure of American black ducks (*Anas rubripes*) at Chincoteague National Wildlife Refuge (NWR), Virginia, during the winters of 1985-86 and 1986-87. Time, tide, and habitat influenced black duck behaviors; therefore, diurnal time budgets were constructed by distributing scans over a time-tide matrix within refuge pool, saltmarsh, and tidal-water habitats. Black ducks observed during the day fed least and rested most when in refuge pools, and fed most and rested least when in tidal waters. Estimated daily energy expenditure (DEE) of American black ducks wintering at Chincoteague NWR was similar to values reported in Maine at a given temperature. Although DEE of undisturbed and disturbed flocks were similar, black ducks curtailed feeding and increased time spent in alert and locomotion behaviors in response to disturbance.

Library: CBL, FSU, SMC, SU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

Morton, J. M., R. L. Kirkpatrick and M. R. Vaughan. 1990. Changes in body composition of American Black Ducks wintering at Chincoteague, Virginia. *The Condor* 92(3):598-605.

Abstract: Fifty-nine American black ducks, *Anas rubripes*, were collected during early-, mid-, and late-winter 1985-1986 at Chincoteague, Virginia, to assess overwinter changes in physiological condition. Lipid Index (LI = grams lipid/gram nonlipid dry carcass X 100) values of adult males were relatively high throughout winter, whereas LI values of both female age classes were low in early winter, peaked by mid-winter, and remained high into late winter. Juvenile females had consistently lower LI values than adult females, indicating that juvenile females may be physiologically disadvantaged during winter. Protein mass did not vary over winter, but tended to be less in juvenile females than in adult females. In contrast, other have found that lipid and protein masses of female American black ducks (both age classes) wintering in Maine decreased between fall and winter. This disparity may be explained by latitudinal differences in winter severity and diet. It is argued here that improved physiological condition, as a result of wintering farther south, may influence overwinter survivorship more strongly than reproductive potential during the subsequent spring.

Library: FSU, SMC, TU, UD-Ag, UMBC, UMCP

Moul, E. T. 1958. *Algae of Chincoteague Bay, Maryland*. Chesapeake Biological Laboratory Reference No. 53-9. 2 pp.

Abstract: This report listed algal species found within Chincoteague Bay, their location and date collected. *Enteromorpha* spps. were found to be the most common macro-algal species in the area.

Location: Assateague Island National Seashore Files Library. Call Number 0189

Moul, E. T. 1973. Higher plants of the marine fringe. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS CIRC-384.* 61 pp.

Abstract: The common higher plants of the beaches, dunes, morainal cliffs, and tidal marshes of Southern New England are treated in an illustrated key, using only vegetative characters. Both scientific and common names are given. Habitat lists of the plants are included, presenting to the investigator the association of plants as they occur in nature. The range of each plant along the Atlantic coast is designated. A glossary of terms is included.

Muir, W. C., M. A. Barath and P. Prevoznik. 1992. Determination of Bethany Beach, DE, and Ocean City, MD. Ocean outfalls. Region 3 (403(c). Environmental Protection Agency, Washington, DC, Off. of the Administrator. 53 pp.

Abstract: The purpose of the document is to determine that the 402 requirements of the Clean Water Act (CWA) are being met at two of Region III's ocean outfalls. The Ocean Discharge Criteria, Section 403(c), of the CWA states: The determination is based on U.S. Environmental Protection Agency (EPA), Region III's five year Ocean Outfall Study and the findings of the 1992 follow-up study. Significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities are included.

Mulford, R. A. 1963. Distribution of the dinoflagellate genus *Ceratium* in the tidal and offshore waters of Virginia. *Chesapeake Science* 4(2):84-89.

Abstract: Distribution of the genus *Ceratium* in lower Chesapeake Bay and adjacent offshore waters of the Atlantic Ocean is described. Of 13 species listed, four (*C. lineatum*, *C. trichoceros*, *C. massiliense*, and *C. arctium*) have not been previously recorded in the lower bay. Most species represent warm-temperate or tropical forms which culminate in an autumn community. As a whole the genus becomes progressively more important proceeding offshore from upper estuarine conditions. Temperature and salinity ranges observed for each species are reported.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Mullin, K. D. and G. L. Fulling. 2003. Abundance of cetaceans in the southern U.S. North Atlantic Ocean during summer 1998. *Fishery Bulletin* 101(3):603-613.

Abstract: The U.S. Marine Mammal Protection Act requires that the abundance of marine mammals in U.S. waters be assessed. Because this requirement had not been met for a large portion of the North Atlantic Ocean (U.S. waters south of Maryland), a ship-based, line-transect survey was conducted with a 68 m research ship between Maryland (38.00°N) and central Florida (28.00°N) from the 10-m isobath to the boundary of the U.S. Exclusive Economic Zone. The study area (573,000 km^2) was surveyed between 8 July and 17 August 1998. Minimum abundance estimates were based on 4163 km of effort and 217 sightings of at least 13 cetacean species and other taxonomic categories. The most commonly sighted species (number of groups) were bottlenose dolphins, *Tursiops truncatus* (38); sperm whales, *Physeter macrocephalus* (29);

Atlantic spotted dolphins, *Stenella frontalis* (28); and Risso's dolphins, *Grampus griseus* (22). The most abundant species (abundance; coefficient of variation) were Atlantic spotted dolphins (14,438; 0.63); bottlenose dolphins (13,085; 0.40); pantropical spotted dolphins, S. *attenuata* (12,747; 0.56); striped dolphins, *S. coeruleoalba* (10,225; 0.91); and Risso's dolphins (9533; 0.50). The abundance estimate for the Clymene dolphin, *S. clymene* (6086; 0.93), is the first for the U.S. Atlantic Ocean. Sperm whales were the most abundant large whale (1181; 0.51). Abundances for other species or taxonomic categories ranged from 20 to 5109. There were an estimated 77,139 (0.23) cetaceans in the study area. Bottlenose dolphins and Atlantic spotted dolphins were encountered primarily in continental shelf (<200 m) and continental slope waters (200-2000 m). All other species were generally sighted in oceanic waters (>200 m). The distribution of some species varied north to south. Striped dolphins, Clymene dolphins, and sperm whales were sighted primarily in the northern part of the study area; whereas pantropical spotted dolphins were sighted primarily in the southern portion.

Library: CBL, HPL, FSU, SMC, UD-GCMES, UD-Morris, UMCP, UMES

Muma, M. H. 1943. *Common Spiders of Maryland*. Natural History Society of Maryland (Baltimore). 173 pp.

Library: CBL [QL 457.1.M7]; TU [QL457.1 .M83], FSU, UMCP [all are QL457.1 .M77]

Murphy, G. J. 1957. *Maryland Commercial Fisheries Statistics 1956*. Maryland Department of Research and Education, Reference No. 57-54.

Library: Maryland State Law library

Murphy, G. J. 1958. *Maryland Commercial Fisheries Statistics 1957*. Maryland Department of Research and Education, Reference No. 58-19.

Murphy, G. J. 1959. *Maryland Commercial Fisheries Statistics 1958*. Maryland Department of Research and Education, Reference No. 59-24.

Murphy, G. J. 1960. *Commercial Fisheries Catch Statistics of Major Species Landed in Worcester County, Maryland. Production in Pounds and Value, 1890-1958.* Chesapeake Biological Laboratory (Solomons, Maryland), Reference No. 60-5. 7 pp.

Abstract: A tabular listing of the weight of commercial finfish and shellfish landed in Worcester County, MD. Some of the records begin as early as 1890 and others begin in 1950.

Murphy, R. F and D. H. Secor. 2006. Fish and blue crab assemblage structure in a U.S. mid Atlantic coastal lagoon complex. *Estuaries and Coasts* 29(6B):1121-1131.

Abstract: Variability in assemblages of organisms in contiguous lagoons is dependent upon component bays and their connections to the ocean and terrestrial watersheds. Fish and blue crab assemblage structure of Maryland's coastal lagoon complex, which consists of Assawoman, Isle of Wight, Sinepuxent, and Chincoteague Bays, was analyzed for spatial and seasonal patterns for the period 1991-2002. Nonmetric multidimensional scaling ordinated sites from a Maryland state trawl survey into discrete groups associated with each embayment. Dominant species included Callinectes sapidus, Anchoa mitchilli, Leiostomous xanthurus, Bairdiella chrysoura, and Brevoortia tyrannus. The relative abundance of these and other dominant species were significantly higher in the two bays north of the ocean inlet than in bays south of the inlet. Ninety-two species were identified in the survey, with total species richness highest in the southern-most bay (Chincoteague: S = 83) and lowest in the northern most bay (Assawoman: S = 59). On a catch per unit effort basis, the northern two bays were more diverse and productive. These bays were most affected by anthropogenic eutrophication, but also exhibited higher connectivity to the ocean inlet. There was clear seasonality in assemblage structure with peak abundance and diversity in the summer compared to spring and fall. Factors that influenced seasonal and spatial structure of Maryland's coastal lagoon complex included temperature, degree of eutrophication, and proximity to oceanic exchange. The arrangement of the bays in their exposure to oceanic and watershed influences specify that habitat management actions should occur at a bay-level scale rather than across the lagoon complex.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Musick, J. A. undated. Herptiles of the Maryland and Virginia coastal plain. **IN:** *A Checklist of the Biota of Lower Chesapeake Bay*, M. L. Wass, compiler. Special Scientific Report No. 65, Virginia Institute of Marine Science (Gloucester Point).

Musick, J. A. 1979. The marine turtles of Virginia (Families Cheloniidae and Dermochelyidae) with notes on identification and natural history. Virginia Institute of Marine Science, *Education Series 24* (Gloucester Point).

Musick, J. A. 1988. *The Sea Turtles of Virginia with Notes on identification and Natural History*, 3rd Edition. Virginia Institute of Marine Science (Gloucester Point).

Naplin, N. A. and C. L. Obenchain. 1981. A description of eggs and early larvae of the snake eel, *Pisodonophis cruentifer* (Ophichthidae), with comments on egg stages collected in the plankton. **IN:** *The Early Life History of Fish: Recent Studies*, R. Lasker and K. Sherman, Eds. P.-V. REUN. CIEM. 178:580-582, RAPP.

Abstract: *Pisodonophis cruentifer* eggs and larvae were collected in mid-July 1974, 95 km off Ocean City, Maryland. Developmental stages are described: (a) blastodermal cap (2.35 mm); (b) germ ring 1/2 down (2.63 mm); (c) blastopore almost closed (2.69 mm); (d) middle, 24 myomeres (2.49 mm); (e) tail 5/8 around yolk, 60 myomeres (2.66 mm); (f) tail 7/8 around yolk, 62 + 9 = 71 myomeres (2.66 mm); (g) tail 1 3/8 around yolk, 62 + 39 = 101 myomeres (2.67 mm).

Library: UD-GCMES [GC1 .I567 v. 178]

Nathan, R. R., Associates. 1963. *Assateague Island and Vicinity – A Study of Recreational Values and Potential Use*. U.S. Bureau of Outdoor Recreation, U.S. Department of the Interior (Washington, D.C.). 1 volume.

Library: UD-Morris [GV182 .U45x 1963]

Nathan, R. R. 1964. Impact of development of Assateague Island. Hearing before the Subcommittee on Public Lands, 88th Congress, Washington, D.C. [document located at Library of Congress]

National Oceanic and Atmospheric Administration. 1977. Climate of Maryland. **IN:** *Climatography of the United States*. U.S. Department of Commerce, National

Oceanographic and Atmospheric Administration Periodic Summarization of Climate, No. 50, Climate of the States. 19 pp.

Library: University of California, Santa Barbara

National Oceanic and Atmospheric Administration. 1985. *National Estuary Inventory Data Atlas*. Vol. 1. Physical and Hydrological Characteristics. National Oceanic and Atmospheric Administration, U.S. Department of Commerce (Washington, D.C.). pp. 1-22.

Abstract: Physical and hydrological characteristics (surface area, dimensions, fresh water inflows, and tidal data) for Chincoteague bay were reported. The average depth of the bay was 4.4 feet and was found to be 32 miles long and averaged 4.5 miles in width. The estuarine drainage area was 300 mi2 and the long term daily freshwater inflow averaged 0.4 cfs.

National Oceanic and Atmospheric Administration. 1988. *National Estuary Inventory Data Atlas*. Public Recreation Facilities in Coastal Areas. National Oceanic and Atmospheric Administration, U.S. Department of Commerce (Washington, D.C.). pp. 46-47.

Abstract: Recreational areas and facilities are listed.

National Oceanic and Atmospheric Administration. 1980-1991. Climatological data, Maryland and Delaware. Volumes 84-95. National Oceanic and Atmospheric Administration, U.S. Department of Commerce (Washington, D.C.).

Abstract: Precipitation data for Assateague Island National Seashore was obtained on a monthly basis from 1980-1991.

National Oceanic and Atmospheric Administration. 1989. National Status and Trends Program. A summary of data on tissue contamination from the first three years (1986-1988) of the mussel watch project. NOS OMA. National Oceanic and Atmospheric Administration, U.S. Department of Commerce (Washington, D.C.). 49 p.

Abstract: The mussel watch program included the annual collection and analysis of mussels and oysters from 177 sites. One site was located within the Chincoteague inlet of Virginia. The program tested for twenty-one chemical contaminants. Hand collection was the method used in collecting the American Oyster, *Crassostrea virginica*. The only trend found within the Chincoteague Bay site was a decrease in Arsenic concentrations.

National Oceanic and Atmospheric Administration. 1990. *Estuaries of the United States: Vital Statistics of a National Resource Base. A Special NOAA 20th Anniversary Report.* U.S. Department of Commerce, National Oceanic and Atmospheric Administration (Rockville, Maryland).

Library: CBL, SU [all are GC97 .E75 1990]; UD-Morris, UMCP [all are 55.402:Es 8/3]

National Oceanic and Atmospheric Administration. 1991. *National Status and Trends Program (NS&T). Second summary of data on chemical contaminants in sediments from the National Status and Trends program*. NOS OMA. National Oceanic and Atmospheric Administration, U.S. Department of Commerce (Washington, D.C.). 59 pages.

Abstract: Surface sediments were collected and analyzed at 300 sites. One site was located within the Chincoteague Inlet in Virginia. Sediments were tested for contamination by Ag, As, Cd, Cr, Cu, Hg, Pb, Sn, Zn, LMWPAH, HMWPAH, tDDT, and tPCB. The sediment samples from the Chincoteague Bay site showed no "high" concentrations for any of the chemicals tested.

National Oceanic and Atmospheric Administration. 1991. National Status and Trends Program (NS&T). Second summary of data on chemical contaminants in sediments from the National Status and Trends program. NOS OMA. National Oceanic and Atmospheric Administration, U.S. Department of Commerce (Washington, D.C.). 59 pages.

Abstract: Surface sediments were collected and analyzed at 300 sites. One site was located within the Chincoteague Inlet in Virginia. Sediments were tested for contamination by Ag, As, Cd, Cr, Cu, Hg, Pb, Sn, Zn, LMWPAH, HMWPAH, tDDT, and tPCB. The sediment samples from the Chincoteague Bay site showed no "high" concentrations for any of the chemicals tested.

National Park Service. 1984. Clam population monitoring. Unpublished data. Assateague Island National Park (Berlin, Maryland).

Abstract: Project description stated the collection of baseline data on clam populations for the detection of population changes.

National Park Service. 1987. Mid-winter bird survey. Unpublished data. Assateague Island National Park (Berlin, Maryland).

Abstract: Project description stated the collection of data on winter bird populations and their distribution patterns in Maryland.

National Park Service. 1988. Bayside marsh establishment project, initial planting - June 1988. Unpublished report. Assateague Island National Park (Berlin, Maryland).

Abstract: An area was planted with marsh grasses on the western end of Assateague Island. The shoreline had been undergoing erosion since the 1950's. The site was prepared by bush-hogging 20 ft. of woody vegetation from the scarp edge. *Spartina alterniflora*, *S. patens*, and *Panicum amarum* were planted at specific elevations noted for the species in that area. A sand fence was built to help in accretion of the marsh. During 1989, maintenance included rebuilding the fence and planting new grasses in areas that had been stripped of vegetation due to erosional sources. Transects were done in the area during January 1989 and the widths of the initial plantings were compared to the widths of the plantings a year later. Results showed that grasses that had not been washed out survived the first growing season.

National Park Service. 1988. Marsh mitigation monitoring. Ongoing project. Assateague Island National Park (Berlin, Maryland).

Abstract: Project description stated the monitoring of mitigation attempts with vegetation studies.

National Park Service. 1989. Water quality overview of Maryland's coastal bays. Unpublished report. Assateague Island National Park (Berlin, Maryland).

Abstract: The report included an overview of historic and ongoing scientific research in Assawoman, Chincoteague/ and Sinepuxent Bays. Historic investigations included sections on hydrology, sediment, algae, SAV, benthic organisms, pestiferous species and fishes within the bays. Ongoing investigations included water quality monitoring, streamflow gaging, finfish surveys and benthic monitoring programs.

National Park Service. 1990. Secretive marsh bird survey. Ongoing project. Assateague Island National Park (Berlin, Maryland).

Abstract: Project description stated the estimation of distribution and relative abundance of black rails and other secretive marsh bird populations. Also included were testing of various monitoring methods used to locate these populations.

National Park Service. 1991. *Assateague Island National Seashore Water Quality Monitoring, 1987-1990. Data Summary Report*. Water Resources Division and Assateague Island National Seashore technical Report NPS/NRWRD/NRTR 91/06. U.S. Department of the Interir, National Park Service (Washington, D.C.). 86 pp.

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National Park Service. 1991. *Assateague Island National Seashore Water Quality Monitoring 1987-1990. Data summary report*. Water Resources Division and Assateague Island National Seashore. Technical Report NPS/NRWRD/ NRTR 91/06. U.S. Department of the Interior (Washington, D.C.). 86 pp.

Abstract: Water quality data are summarized from nine stations within Chincoteague and Sinepuxent Bays. Seventeen parameters were averaged monthly from April through September for the years 1987-1990. In 1989, two diel studies were conducted. The executive summary described the water quality as "good", with exceptions in confined areas such as the mouth of Trappe Creek. Water temperatures ranged from 8 °C to 30 °C over the sampling period. DO averaged 7.6 mg l^{-1} and ranged from 4.8 to 10.5 mg l^{-1} in samples collected between 9:30 am to 3:30 pm. Salinities varied little (28-29 ppt) and pH averaged about 7.9. The average total suspended solids were slightly higher in Sinepuxent Bay (48.5 mg l^{-1}) than those in Chincoteague Bay (45.9 mg l^{-1}). However, average water clarity (as measured by the Secchi disk depth) was much higher in Sinepuxent Bay (0.77 m) than in Chincoteague Bay (0.64 m). Chlorophyll-a concentrations were highest in the Trappe Creek area (average of 19.7 ug l^{-1}) and decreased in open Chincoteague Bay (average of 5.4 ug l^{-1}). The average for all stations in Chincoteague Bay/ for the study period, was 11.4 ug l^{-1}. This value was only slightly higher than Sinepuxent Bay (10.1 ug l^{-1}). Generally, monthly averages for 1990 were higher than the previous years. Overall averages for nutrients were similar in both Bays/ with NH4 levels of 2.4 um, NO2-NO3 levels of 0.7 um and PO4 levels of 0.35 um. Stations were ranked according to water quality. Trappe Creek and Sinepuxent Bay ranked the lowest and the open waters of Chincoteague Bay ranked the highest.

National Parks Association. 1964. Assateague Island: Challenge in park planning. *National Parks Magazine* 38(206):4-7.

Library: TU, UD-Morris, UMBC, UMCP

National Parks Association. 1968. *Assateague Island, Maryland and Virginia – A Recreational Plan for a National Seashore and It's Surrounding Region*. Jonas V. Morris, Morris and Associates (Washington, D.C.). 8 pp.

National Research Council. 2000. *Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution.* National Academy Press (Washington, D.C.).

Library: Anne Arundel Community College, GSFC, Community College of Baltimore County, NOAA

National Transportation Safety Board. 1985. Marine accident/incident summary reports--U.S. fishing vessel *Atlantic Mist*, Atlantic Ocean, approximately 15 nml, east of Chincoteague Island, Virginia, January 31, 1985. National Transportation Safety Board, Bureau of Accident Investigation (Washington, D.C.). NTSB/MAR-85/03/SUM. 15 pp. [NTIS Order No.: PB85-916415/GAR].

Abstract: At 1946 on January 31, l985, the 75-foot-long fishing vessel *Atlantic Mist* rolled to port, recovered briefly, and sank stern first. Of the five persons on board the vessel, the master and two crewmembers were injured, the mate died, and one crewmember remains missing and is presumed dead. The *Atlantic Mist* was a total loss; its estimated value of $300,000. The National Transportation Safety Board determined the probable cause of the sinking of the uninspected commercial fishing vessel Atlantic Mist was the feature of the master to lock the covers on the circular deck openings, which allowed boarding seas to flood the fish hold.

National Transportation Safety Board. 1998. *Safety Study: Personal Watercraft Safety*. National Transportation Safety Board (Washington, D.C.). PB98-917992, NTSB/SS-98/01. vi + 98 pp.

Abstract: The Safety Board examined 814 (one-third) of the 1997 accidents and examined all of the data for the 1996 reported accidents involving personal watercraft. Based on the analysis, the safety issues discussed included 1) protecting personal watercraft riders from injury, 2) operator experience and training, and 3) boating safety standards. Recommendations were issued to the manufacturers of personal watercraft, the U.S. Coast Guard, the U.S. Coast Guard Auxilliary, the U.S. Power Squadrons, BOAT.U.S., the National Association of State Boasting Law Administrators, the Personal Watercraft Industry Association, and the States and Territories. The recommendations focused on the safe operation of personal watercraft.

Library: UMBC, UMCP, UD-Morris [all are USFCH TD 1.127: 98/01]

Natural Resources Institute, University of Maryland. 1970. Assateague Ecological Studies. Part II: Environmental threats. Contribution No. 446. Chesapeake Biological Laboratory (Solomons, Maryland).

Abstract: The environmental threats of dredging, land disturbance and insect control in and around Assateague on phytoplankton, seagrasses, marshes, shellfish and finfish were discussed. The effects of the bioaccumulation of pesticides within phytoplankton was shown in diatoms. These "toxic plants" then have adverse effects on the rest of the food web.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

Natural Resources Institute, University of Maryland. 1970. Assateague Ecological Studies. Part III: Assateague study. Contribution No. 446. Chesapeake Biological Laboratory (Solomons, Maryland).

Abstract: "Suggestions for land use and park management for the Assateague National Seashore" were made.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

Naver, M. 1963. Assateague seems more desirable as shore land disappears. *The Evening Sun* (Baltimore, Maryland), 30 April.

Naver, M. 1963. Green loses health and money but stays in island fight. *The Evening Sun* (Baltimore, Maryland), 1 May.

Naver, M. 1965. Assateague Island bill signed by president. *The Evening Sun* (Baltimore, Maryland), 21 September.

Nelson, T. C. 1925. On the occurrence and food habits of ctenophores in New Jersey inland coastal waters. *Biological Bulletin* 48:92-111.

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Nesbit, R. A. and W. C. Neville. 1935. Conditions affecting the southern winter trawl fishery. *U.S. Bureau of Fisheries Circular* No. 18. 12 pp.

Library: Harvard University (Harvard College Library), USGS (Great Lakes), U. of Miss., VIMS V-Tech

Neville, W. C. and G. B. Talbot. 1963. Fishery for scup with special reference to fluctuations in yield and their causes. *U.S. Fish and Wildlife Service, Special Scientific Report* No. 459:1-61.

Abstract: The catch of scup over the past 50 years has fluctuated widely. Data on this fishery for recent years (1922-35), obtained from State and federal agencies, commercial fishery, and fishermen, have been analyzed to determine causes of fluctuations. It was found that fluctuations in the summer fishery from New Jersey to Massachusetts were caused mainly by differences in the size of the successive year classes entering the fishery. Fluctuations in the catch of the winter trawl fishery off the Virginia Capes resulted from changes in the amount of cooling of the bottom water where these fish are found in winter. During cold water conditions, the fish became more concentrated and were more easily caught; whereas, when the water was warmer, the fish scattered more widely and were not as readily available. Although fluctuations in catch of the summer and winter fishery have different causes, results of tagging and observations of size composition have disclosed that both fisheries draw on the same general stock.

Newcombe, C. L. and H. Kessler. 1939. Variations in growth indices of *Mya areanaria* L. on the Atlantic coast of North America. *Ecology* 17(3):429-443.

Abstract: Linear and weight indices of size were studied in *Mya arenaria* from four widely separated regions of the Atlantic coast. The various constants of the linear and weight growth dimensional ratios characterizing the regions have been compared with the most significant variables of the different environments. The maximum variations revealed in the "b" values for the linear dimensions of *M. arenaria* from different regions are appreciable whereas differences in the actual widths and thicknesses of corresponding lengths are not considered significant. A striking variation has been found in the shell weights and dry body weights of specimens from the four regions. Shell weights of the Bay of Fundy specimens are approximately twice as heavy as those of similar lengths in the Chesapeake Bay. Shell weights for the Gulf of Maine and Gulf of St. Lawrence regions fall within these two extremes and in the order named. In contract to this relationship, body weights for specimens over 18 mm in length of the Chesapeake Bay are significantly greater than those of the Bay of Fundy. No significant correspondence exists between linear growth dimension ratios and environmental influences whereas shell weights strongly demonstrate inverse correlation with temperature. A strong positive correlation between dry body weight and temperature was found. The fairly constant nature of the linear growth dimensional ratios and the significant variability of the weight indices in the different latitudes considered indicates that care must be exercised i the selection of a standard size index upon which to base experimental results.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Newcombe, C. L., N. E. Phillips and S, A, Gould. 1937. Growth indices of *Littorina irrorata. Biologia Generalis* 13:465-481.

Newman, M. W., C. A. Johnson III, and G. B. Pauley. 1976. A Minchinia-like haplosporidan parasitizing blue crabs, *Callinectes sapidus*. *Journal of Invertebrate Pathology*. 27: 311-315.

Abstract: "A haplosporidan parasite was found infecting two moribund blue crabs, *Callinectes sapidus*, from Virginia and North Carolina. Spore stages were not found in either crab. Because of the presence of haplosorosomes in the cytoplasm, the parasites are thought to be a species of *Minchinia* or *Urosporidium*."

Library: CBL, UD-Ag, UD-GCMES, UD-Morris, UMCP, UMES

Newman, M. W. and G. E. Ward, Jr. 1973. An epizootic of blue crabs, *Callinectes sapidus*, caused by *Paramoeba perniciosa*. *Journal of Invertebrate Pathology* 22(3):329-334.

Abstract: During the spring of 1971, a modest epizoological study of the 'gray crab' disease was made in Chincoteague Bay, Virginia, an enzootic area. An outbreak of *Paramoeba* infections occurred in June with a peak prevalence of at least 17 per cent. Crabs appeared to succumb rapidly, and evidence indicated that all animals attaining patent infections eventually died. *P. perniciosa* is believed to be the probable cause of many of the previously reported mass mortalities of blue crabs along the southeastern Atlantic coast.

Library: CBL, UD-Ag, UD-GCMES, UD-Morris, UMCP, UMES

Newman, W. S. and C. A. Munsart. 1968. Holocene geology of Wachapreague Lagoon, Eastern Shore Peninsula, Virginia. *Geology* 6:81-105.

Library: BSU, SMC, SU, UD-Morris, UD-GCMES, UMBC, UMCP

Nicholson, W. R. and R. D. Van Deusen. 1954. Marshes of Maryland. *Chesapeake Biological Laboratory Resources Study Report* 6. 6 pp. [also Maryland Game and Inland Fish Comission]

Nixon, S. 1999. Nutrient enrichment of shallow marine ecosystems. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:6-10.

Library: FSU [EP 1.23/6:620/R-00/001]

Nixon, S. W. 1995. Coastal marine eutrophication: A definition, social causes, and future concerns. *Ophelia* 41:199-219.

Library: CBL, HPL, UD-GCMES, UD-Morris, UMCP

Norcross, J. J., W. L. Massmann and E. B. Joseph. 1961. Investigations of inner continental shelf waters off lower Chesapeake Bay. Part II – Sand and lance larvae *Ammodytes americanus*. *Chesapeake Science* 2(1/2):49-59.

Abstract: Plankton samples were collected monthly from 22 stations in the Atlantic Ocean and 3 in Chesapeake Bay. Numerous larvae of sand lance, *Ammodytes americanus*, were taken from January through April, 1960. Larvae were widely distributed over the survey area but were most abundant beyond 25 miles from shore. Statistical analysis of sample mean lengths indicated movement offshore and a tendency for a group hatched together to remain together. Rate of larval development was approximated at 11.7 mm per month for the first four months. It is believed that spawning occurred at 5-12 fathoms in the study area. Hatching began in late November, reached a peak sometime after mid-December, and continued until mid-March. Few larvae were collected in waters with salinities less than 30 ppt.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Norden, A. W., T. D. Schofield and J. J. Evans. 1998. Sea turtle strandings from Maryland waters reported to the National Aquarium in Baltimore, 1990 through 1997. *Maryland Naturalist* 42(1-2):20-23.

Library: CBL, FSU, SU, TU, UMBC, UMCP

Nordlinger, S. E. 1963. Assateague development seen "cesspool paradise." *The Sun* (Baltimore, Maryland), 20 March.

Nordlinger, S. E. 1963. $6,000 fixed for lots on Assateague. *The Sun* (Baltimore, Maryland), 4 April.

Nordlinger, S. E. 1963. Udall says bridge plan should wait. *The Sun* (Baltimore, Maryland), 5 May.

Nordlinger, S. E. 1963. Board argues Assateague public use. *The Sun* (Baltimore, Maryland), 14 May.

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Nordlinger, S. E. 1963. Goldstein backs Udall on isle. *The Sun* (Baltimore, Maryland), 25 June.

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Nordstrom, K. F. and J. R. Allen. 1980. Geomorphically compatible solutions to beach erosion. *Zeitschrift für Geomorphologie* N.F. 34:142-154.

Library: FSU, UD-Morris, UMBC, UMCP

Norton, J. B. S. and R. G. Brown. 1946. A catalog of the vascular plants of Maryland. *Castanea* 11:1-50.

Library: FSU, TU, UD-Morris, UMBC, UMCP

Novitsky, T. J. 1984. Discovery to commercialization: the blood of the horseshoe crab. *Oceanus* 27(1):13-18.

Abstract: An account of the discovery and commercialization of the *Limulus* amebocyte lysate (LAL) used in pyrogen detection.

Library: UD-Morris

Nutting, C. C. 1915. American hydroids. *U.S. National Museum Special Bulletin*. 3 volumes.

Library: UMCP [Q11 .U7 no.4]

Nuzzi, R. and R. M. Waters. 2004. Long-term perspective on the dynamics of brown tide blooms in Long Island coastal bays. *Harmful Algae* 3(4):279-293.

Abstract: Brown tide, a bloom of the picoplankter *Aureococcus anophagefferens*, first appeared in eastern Long Island (Suffolk County) waters in the late spring of 1985, at about the same time it emerged, although to a lesser degree, in Narraganset Bay, RI. Since then, it has recurred sporadically in Suffolk County, and blooms have been reported in New Jersey, Delaware, Maryland, and only one other area of the world, Saldanha Bay, South Africa. Bloom initiation and maintenance within Suffolk County appear to be related to *A. anophagefferens*' ability to use dissolved organic nitrogen (DON) during periods of limited dissolved inorganic nitrogen (DIN) availability. Factors controlling DIN availability include groundwater influx related to meteorological conditions, introduction of septic leachate from on-site wastewater treatment systems, and biological removal. The complexity of bloom dynamics is illustrated by a cascade of events in Great South Bay involving shellfish clearing rates, a macroalgal bloom, and microbial decomposition.

Library: UD-GCMES

O'Beirn, F. X. 1999. Community aquaculture in Virginia. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:107-109.

Library: FSU [EP 1.23/6:620/R-00/001]

O'Beirn, F. X. and M. W. Luckenbach. 2000. A study investigating the potential of an alternative oyster seed source for Virginia aquaculturists. *Journal of Shellfish Research* 19(1):653-654.

Abstract: In Virginia, a consequence of the reduced harvest of wild oyster(*Crassostrea virginica*) stocks has been the development of intensive, hatchery-based oyster aquaculture. While this industry has been growing steadily, one obstacle to its continued expansion is the lack of a consistent supply of seed oysters both in terms of quality and quantity. Aquaculturists have continually reiterated that the biggest impediment to their expansion is the paucity of seed oysters. East coast hatcheries are engaged in oyster seed production, but demand and disease exposure considerations limit availability. Consequently, we have investigated the feasibility of utilizing the slowest growing oysters produced from the hatchery (normally discarded) in a novel field nursery system. Four stocks were deployed in Spring 1998 and three stocks in Fall 1998, at two sites (Chincoteague and Wachapreague) on the Eastern Shore of Virginia. Controls were grown in similar conditions to the runt oysters. Growth and survival in each stock was monitored for 16 weeks. At the Chincoteague site, runt oysters performed equally as well as the controls. At the Wachapreague site, the controls outgrew the runt oysters. While there were some differences in the performances of the stocks within a site, major differences were apparent in growth and survival of stocks between the two growing areas. The utilization of such "runt" oysters may be feasible, if the aquaculturist is assured of good growing conditions. Otherwise the risks associated with the practice may not warrant the investment of time and resources.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

O'Connor, M. 1997. On the Outside: Parklands on Eastern shoreline worth visit. *The Boston Herald*, 12 June, Travel, p. 59.

O'Connor, T. P. 1990. *Coastal Environmental Quality in the United States, 1990: Chemical Contamination in Sediments and Tissues. A Special NOAA 20th Anniversary Report*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration (Rockville, Maryland).

Library: MDNR, Oxford, Smithsonian Institution, NOAA, Naval Academy; Dewey : 574.5/2636

Odell, J. M. 1970. K. A bibliography of natural, political and historical aspects of Assateague Island, Maryland – Virginia and vicinity. **IN:** *Assateague Ecological Studies, Part I: Environmental Information.* Natural Resources Institute, University of Maryland (College Park), Contribution No. 446. pp. 390-426.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

O'Donnell, J. J. 1963. Assateague. Letter to the Editor, *The Sun* (Baltimore, Maryland), 6 June.

Odum, W. E., J. Harvey, L. Rozas and R. Chambers. 1986. *Functional assessment of selected wetlands of Chincoteague Island, Virginia*. University of Virginia (Charlottesville), Department of Environmental Sciences, NTIS Order No.: PB87-126595/GAR. 134 pp.

Abstract: At the request of the U.S. Environmental Protection Agency, a study was conducted to assess the potential hydrologic and ecologic functions of eight wetlands sites on Chincoteague Island, Virginia. These sites ranged from 4 to 21 ha and included estuarine emergent and scrub/shrub wetlands as well as palustrine emergent, scrub/shrub, and forested wetlands. The authors was asked to use the 1983 Adamus/Stockwell technique as the assessment method and to provide general descriptions of the sites and the suitability of the technique for assessing the wetlands. The report discusses the results of the assessment and the problems with some of the ratings.

Oertel, G. F., M. S. Kearney, S. P. Leatherman and H.-J. Woo. 1989. Anatomy of a barrier platform: Outer barrier lagoon, southern Delmarva Peninsula, Virginia. *Marine Geology* 88(3-4):303-318.

Abstract: Much of the lagoonal mud behind the barriers sis apparently pre-Holocene, and primordial Holocene lagoons were apparently very shallow. Hence, along the southern Delmarva Peninsula, landward-migrating barrier islands retreated across topographic highs composed of silt and clay.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Oertel, G. F. and K. Overman. 2004. Sequence morphodynamics at an emergent barrier island, middle Atlantic coast of North America. *Geomorphology* 58(1-4):67-83.

Abstract: The southern Delmarva Peninsula is located along the middle Atlantic Coastal Plain of the United States. The axial highland of the peninsula formed in four stages of Pleistocene spit progradation. The landward shoreline of the peninsula is on the Chesapeake Bay. The seaside shoreline of the peninsula is on the Atlantic Ocean. The coast of the peninsula is composed of five landscape sections described as a headland, a left-hand spit, a right-hand spit, a wave-dominated barrier island, and tide-dominated barrier islands. Fisherman Island is a barrier island located at the southern end of the southern Delmarva Peninsula. The landscape features on Fisherman Island do not illustrate a direct linkage to (1) the sediment dispersion from the Delaware headland or (2) the influence of local antecedent topography. The island has a bipolar progradational history that is normal to the axis of the southerly sediment dispersion pattern from the Delmarva headlands. During the late Holocene, sea- level rise flooded the low-elevation land at the distal end of the southern Delmarva Peninsula. The submerged area formed a shallow platform in the entrance to the Chesapeake Bay. Two sediment dispersion tracts affected the development of this area. On the ***ocean*** side of the peninsula, sediment moved southward along the lower shoreface to the Chesapeake Bay entrance. On the west side of the peninsula, southerly moving bay currents also dispersed sediment to the entrance of the bay. The two tracts converged on the northern side of the bay entrance forming a broad sand shoal. Wave diffraction and refraction around the margins of the shoal 'swept' sediment into linear sand bars that migrated back toward the peninsula. By the middle of the 19th century, the fusion of sand bars on the shoal surface produced a permanent nucleus for island development. Wave refraction caused wave crests to 'wrap around' the island core producing separate easterly and westerly components of shore aggradation. The westerly aggradational history is recorded in closely spaced sets of beach ridges. The easterly aggradational history is recorded in broadly spaced hammocks.

Library: FSU, UD-Morris, UMBC, UMCP

Oertel, G. F., G. T. F. Wong and J. D. Conway. 1989. Sediment accumulation at a fringe marsh during transgression, Oyster, Virginia. *Estuaries* 12(1):18-26.

Abstract: Rates are governed by the surface elevation with respect to mid-tide elevation, the rate of sea-level rise, and outwash from the mainland. Only some portions of the fringe marsh are able to keep pace with sea-level rise and thus migrate up the mainland slope during transgressions.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Old, M. C. 1941. The taxonomy and distribution of the boring sponge (Clionidae) along the Atlantic coast of North America. *Chesapeake Biological laboratory Publication* 44:1-30.

Oliver, B. and E. A. Gross. 2005. Update on emerging infections: news from the Centers for Disease Control and Prevention. Legionnaires disease associated with potable water in a hotel--Ocean City, MD, October 2003 to February 2004. *Annals of Emergency Medicine* 46(3):288-290.

Library: UD-Morris {electronic only]; UMBC, UMES

Olla, B. L. and A. L. Studholme. 1971. The effect of temperature on the activity of bluefish, *Pomatomus saltatrix* L. *Biological Bulletin* 141:337-349.

Abstract: The swimming speed of the bluefish, *Pomatomus saltatrix*, increased as temperature increased of decreased from acclimation levels of 19-20^{o}C. As the temperature approached 11.9^{o}C and 29.8^{o}C, there were significant changes in average swimming speed and schooling which were considered to be indicative of stress. The daily rhythmic activity was not well-defined at stress temperatures. As the temperature departed from stress levels toward acclimation, swimming speed dropped significantly and the daily rhythm of activity returned.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Omwake, H. G. 1946. Trade Goods Found in Sinepuxent Neck, on Maryland's Eastern Shore. *Bulletin of the Archaeological Society of Delaware* 4(3):13-25.

Library: UD-Morris

Orth, R. J. 1973. Benthic infauna of eelgrass, *Zostera marina*, beds. *Chesapeake Science* 14(4):258-269.

Abstract: The infauna of *Zostera* beds in the Chesapeake Bay-York River estuary and Chincoteague Bay was sampled in March and July 1970 using a corer. Sediments were fine sand or very find sand. Sorting of sediments varied from poorly sorted to moderately well-sorted and appeared to be positively correlated with the density of *Zostera* at the respective stations. A total of 117 macroinvertebrate taxa was collected. Spp number decreased both up the estuary and seasonally from March to July. Movement of epifaunal species from the sediments where they occur in winter months when *Zostera* is scarce, to the leaves in summer accounted partly for this seasonal difference. This seasonal decrease was not noted at the station farthest up-estuary where *Zostera* was scarce all yr. Faunal similarity of the areas sampled, as measured by 3 indices, indicates that the infauna of most *Zostera* beds in the Chesapeake Bay area is similar, except at the up-estuary limits of *Zostera* distribution. Macrofaunal density was higher than that of any other benthic habitat in the Chesapeake Bay.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Orth, R. J. 1999. Identifying and resolving fisheries management conflicts in a recovering eelgrass system. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:53.

Library: FSU [EP 1.23/6:620/R-00/001]

Orth, R.J. 2002. Seagrasses in Delmarva Coastal Bays: Where did it go, why did it come back and where is it going? Understanding the role of macroalgae in shallow estuaries: Workshop proceedings. Maryland Department of Natural Resources, P.9-10.

Orth, R., J. Simons, J. Capelli, V. Carter, A. Frisch, L. Hindman, S. Hodges, K. Moore and N. Rybicki. 1986. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay – 1986*. Virginia Institute of Marine Science (Gloucester Point). xi + 180 pp.

Library: VIMS

Orth, R.J., A. A. Frisch, J. F. Nowak, and K. A. Moore. 1987. Distribution of submerged aquatic vegetation in the Chesapeake Bay and tributaries and Chincoteague Bay-1987. U.S. Environmental Protection Agency (Washington, D.C.).

Abstract: Brief report on the amount and species of SAV found in Chincoteague Bay. An SAV distribution map was included. There were 2,310 hectares of submersed vegetation in Chincoteague Bay, with all vegetation distributed on the eastern shore of the Bay.

Orth, R. J., A. A. Frisch, J. F. Nowak and K. A. Moore. 1989. *Distribution of submerged aquatic vegetation in the Chesapeake Bay and tributaries and Chincoteague Bay -- 1987*. Virginia Institute of Marine Science (Gloucester Point). NTIS Order No.: PB89-184683/GAR. 265 pp

Abstract: The distribution of submerged aquatic vegetation during 1987 in the Chesapeake Bay, its tributaries, and Chincoteague Bay was mapped at a scale of 1:24,000 using color aerial photography. Submerged aquatic vegetation bed perimeter information was digitized and stored in a computerized data base. Ground truth information was obtained from the U.S. Geological Survey, the Maryland Department of Natural Resources, the University of Maryland Horn Point Laboratory, Harford Community College and the Virginia Institute of Marine Science. Citizen support via the U.S. Fish and Wildlife Service and Chesapeake Bay Foundation, as well as the Maryland Charterboat Association via the Maryland DNR Watermen's Assistance Program, provided additional ground truth information.

Orth, R. J., A. A. Frisch, J. F. Nowak, and K. A. Moore. 1989. Distribution of submerged aquatic vegetation in the Chesapeake Bay and tributaries and Chincoteague Bay-1989. U.S. Environmental Protection Agency (Washington, D.C.).

Abstract: Brief report on the amount and species of SAV found in Chincoteague Bay. An SAV distribution map was included. There were 2,310 hectares of submersed vegetation in Chincoteague Bay, with 74% "moderate coverage" and 21% "dense coverage".

Library: CBL, FSU, HPL, SU, TU, UMCP [all are QK122.8 .D57]; UMES [QK122.8 .D57]

Orth, R. J., M. L. Luckenbach, S. R. Marion, K. A. Moore and D. J. Wilcox. 2006. Seagrass recovery in the Delmarva Coastal Bays. *Aquatic Bota*ny 84(1):26-36.

Abstract: *Zostera marina* (eelgrass) in the coastal bays of the Delmarva Peninsula declined precipitously in the 1930s due to the pandemic wasting disease and a destructive hurricane in 1933. This resulted in major changes in many of the ecosystem services provided by this seagrass, such as loss of bay scallops (*Argopecten irradians*) and disappearance of brant (*Branta bernicla*). Natural recovery of *Z. marina*, possibly deriving from either small remnant stands or undocumented transplant projects after the demise of *Z. marina*, has been significant in four northern bays, with over 7319 ha reported through 2003 compared to 2129 ha in 1986, an average expansion rate of 305 ha year^{-1}. This rapid spread was likely due to seeds and seed dispersal from recovering beds. However, no recovery had occurred in the southern coastal bays prior to restoration efforts, possibly due to both their distance from potential donor beds, restricted entrances to the bays, and the narrow time period when seeds are available for colonization via rafting reproductive shoots carrying viable seeds. Survival and expansion of small test plots (4 m^2) is discussed.

Library: CBL, HPL, SMC, TU, UD-Morris, UMCP

Orth, R. J. and J. van Montfrans. 1990. Utilization of marsh and seagrass habitats by early stages of *Callinectes sapidus*: A latitudinal perspective. *Bulletin of Marine Science* 46:126-144.

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Orth, R. J. and K. A. Moore. 1988. Submerged aquatic vegetation in Delawares inland bays. **IN:** *Phytoplankton Nutrients, Macroalgae, and Submerged Aquatic Vegetation in Delaware's Inland Bays*. Academy of Natural Sciences of Philadelphia 96-121.

Library: LOC, BAKER & TAYLOR INC TECH SERV & PROD DEV

Orth, R. J. and J. F. Nowak. 1990. Distribution of submerged aquatic vegetation in the Chesapeake Bay and tributaries and Chincoteague Bay-1989. U.S. Environmental Protection Agency. Washington, DC. pp. 65-68.

Abstract: Brief report stating the condition and location of SAV in Chincoteague Bay. A map of SAV distribution was included. There were 2,494 hectares of submersed vegetation in Chincoteague Bay and 84% of the beds were "moderate coverage", while 9.8% were "dense coverage".

Library: CBL, HPL, SMC, TU, UD-Morris, UMCP

Orth, R J., J. F. Norwalk, G. F. Anderson and J. R. Whiting. 1994. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay – 1993*. U.S. Environmental Protection Agency, Chesapeake Bay Program (Annapolis, Maryland).

Library: Maryland Dept of Legis Service MD DNR, NOAA, US Naval Academy, College of Charleston, VIMS

Orth, R. J., J. Simons, J. Capelli, V. Carter, A. Frisch, L. Hindman, S. Hodges, K. Moore, and N. Rybicki. 1986. Distribution of submerged aquatic vegetation in the Chesapeake Bay and tributaries and Chincoteague Bay. U.S. Environmental Protection Agency (Washington, D.C.). pp. 63-65.

Abstract: Report deals with the amount, type and condition of SAV in Chincoteague Bay. A brief history of SAV in the coastal bay area was given. SAV distribution map was included. The area covered by seagrasses was 2134 ha, or about 6.6% of the total bay area. The dense beds comprise 51%, while moderately dense beds compromise 49% of the total grass bed areas.

Osburn, R. C. 1944. A survey of the Bryozoa of Chesapeake Bay. *Maryland Department of Research and Education Publication* No. 63.

Library: Chesapeake Biological Laboratory

Otto, S. V. 1973. Hermaphroditism in two species of pelecypod mollusks. *Proceedings of the National Shellfisheries Association* 63:96-98.

Abstract: Five additional hermaphroditic soft shell clams (*Mya arenaria*) were found in samples from several beds in Chesapeake Bay in 1971. With these new findings, a total of 10 hermaphrodites, 7 bilateral and 3 mixed, have been found among 1,311 specimens examined. These are the only known cases of soft clam hermaphroditism ever reported for Chesapeake Bay. One bilaterally hermaphroditic hard clam (*Mercenaria mercenaria*) was found from 546 examined in Chincoteague Bay. This is the first known case of hermaphroditism in hard clams in Chincoteague Bay. A total of 520 hard clams were also examined from Chesapeake Bay, but no hermaphrodites were found.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Owens, J. P. and C. S. Denny. 1978. *Geologic Map of Worcester County*. Maryland Geological Survey, scale 1:62,5000. 1 sheet.

Abstract: A colored map with explanations of the various geologic units which describe Worcester County, Maryland. Map scale is 1:62,500.

Owens, J. P. and C. S. Denny. 1979. Upper Cenozoic deposits of the Central Delmarva Peninsula, Maryland and Delaware. *U.S. Geological Survey Professional Paper* 1067-A. 28 pp.

Library: CBL [QE75 .P9 v.1067-A]; HPL [QE690 .O93]; UD-Morris [I 19.16:1067-A]

Page, J. 1986. Getting to know the neighbors: Virginia refuge isn't strictly for the birds. *The Record* (Bergen, New Jersey), 8 June, Travel, p. T1.

Pajak, M. J. and S. Leatherman. 2002. The high water line as shoreline indicator. *Journal of Coastal Research* 18(2):329-337.

Abstract: Beach erosion rates are often determined by delineating historical shoreline positions from maps and arial photographs and more recently global positioning systems (GPS). The high water line is usually selected as the shoreline indicated for mapping purposes; it is defined as the wetted boundary and by "markings left on the beach by the last high tide." The high water line that is acquired from field determinations or photographic means is assumed to be represent the mean shoreline position for that year, but field studies have shown that its position is variable because of changes in water level due to waves, wind, tides, and other factors. This study investigated the short-term variability in the high water line location over tidal cycles, days, and months through field observations and interpretation of videotape data. Studies, undertaken at Assateague Island National Seashore in Maryland and at the Field Research Facility at Duck, North Carolina, indicated that the high water line is a useful shoreline indicator within certain limits. GPS-acquired shorelines based on actual identification of the high water line in the field are deemed more accurate than photo-interpreted shorelines for coastal erosion mapping and management.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Palmer, E. H. 1939. Ghosts of the seashore (*Ocypoda albicans* Bosc). *Natural History Society of Maryland Bulletin* 9(12):103-107.

Library: TU, UMCP

Palmer, E. H. 1941. The king crab (*Limulus polyphemus*). *Bulletin of the Natural History Society of Maryland* 11(5):90.

Library: TU, UMCP

Palmer, H. D. and D. C. Wilson. 1975. Nearshore current regimes in a linear shoal field, Middle Atlantic Bight. **IN:** *Coastal Sedimentation: Benchmark Papers – Geology*, Vol. 42, O. J. P. Swift and D. Palmer, Editors. Dowdon, Hutchinson, and Ross, Inc. (New York).

Palmer, H. D., D. G. Wilson and J. R. Guala. 1976. The hydraulic regime and sediment transport on the inner continental shelf off Maryland. /Joint Oceanographic Assembly; Edinburgh, (UK); 13 Sep 1976. **IN:** Book of Abstracts of papers presented at Joint Oceanographic Assembly, Angel, M., Ed. FAO, Rome (Italy).

Abstract: The hydraulic regime at an inner continental shelf site 4 . 5 km offshore from Assateague Island, Maryland is under study. Current meters, wave gauges and an acoustic sediment transport sensor have been placed on the sea floor at a depth of 13 m on the seaward slope of a linear shoal, one of many such features present on the inner shelf of the Mid-Atlantic Bight. Data sent by telemetry are recorded at a shore-based station where they are combined with meteorological information to provide analyses of environmental conditions which promote sediment transport on the inner shelf. Most data analyzed have provided insight into fair-weather conditions, but storm flow and associated sediment transport for more rigorous conditions of winter waves and currents will be presented. The fair-weather data indicate that either a net shore-parallel or offshore movement of bottom water transports sediments in a net offshore of longshore mode during peak periods of fair-weather flow. Close coupling of coastal wind and wave conditions suggest that inner shelf currents capable of moving sand are a direct response of short-term phenomena related to wind and swell/wave approach vectors. A bimodal wave spectra indicates that 8-second swell from the southeast interacts with 5-second waves from the northeast in sediment transport events. The latter are the typical steep storm waves which strike the coast during winter months. The paper will include seasonal spectra from winter, spring and summer data, plus a summary of the overall hydraulic regime at this site. A description of the acoustic sediment transport sensor and a pore-water pressure monitoring device, will accompany presentation of offshore data from the fixed array.

Paquette, C. 1998. Debate engulfs new Fire Island superintendent. *The New York Times,* 10 May, Section 14LI, p. 1.

Abstract: Mr. Steele said he feels that Constantine J. Dillon, the Superintendent of the Fire Island National Seashore, should be more involved in local issues like this one. Fire Islanders say Mr. Dillon is taking a hard line and is more concerned about the ecology than working with the residents. This approach, they say, has caused low morale among those working the barrier beach this year.Gerard Stoddard, the president of the Fire Island Association, which represents more than half the property owners, disagrees with Mr. Dillon, who is widely known by his nickname, Costa. "Costa's primary objective is to protect the island's resources," Mr. Stoddard said, "and he says the only way to run something is to follow the rules."Now retired and living in Gainesville, Fla., Mr. Hauptman agreed that Fire Island is a complex park to run. "You've got to recognize the infinite variety of constituents and care about their point of view, or at least act like you do," he said during a telephone interview. "You have to deal sensitively with private property rights, know your legislative history and the dialogues between the people that put the National Seashore there, and know why it's there. That guides the decision-making. These are important

people and must be listened to. They're highly articulate." Mr. Hauptman objected to laying down the law on every occasion. "Just because it's the Park Service doesn't make it good and right," he said.

Paradiso, J. L. and C. O. Handley, Jr. 1965. Checklist of the mammals of Assateague Island. *Chesapeake Science* 6(3):167-171.

Abstract: Twenty-five mammal species are listed from Assateague Island, off the Atlantic coast of Maryland and Virginia, of which 11 are native species, 6 are feral or semi-feral forms introduced by man, and 8 are marine. The land species are discussed in relation to their habitats which include coastal dunes, fresh and salt water marshes, swamps, and forests. The species discussed are: *Didelphis marsupialis* (opossum), *Cryptotis parva* (least shrew), *Sylvilagus floridanus* (cottontail), *Oryzomys palustris* (rice rat), *Peromyscus leucopus* (white-footed mouse), *Microtus pennsylvanicus* (meadow vole), *Ondatra zibethicus* (muskrat), *Rattus norvegicus* (Norway rat), *Mus musculus* (house mouse), *Zapius hudsonius* (meadow jumping mouse), *Physeter catodon* (sperm whale), *Stenella* sp. (spotted porpoise), *Delphinus delphis* (common dolphin), *Tursiops fruncatus* (Atlantic bottle-nosed dolphin), *Globicephala melaena* (northern pilot whale), *Balaenoptera physalus* (fin-backed whale), *Megaptera norvaengliae* (hump-backed whale), *Vulpes* (red fox), *Procyon lotor* (raccoon), *Lutra canadensis* (river otter), *Phoca vitulina* (harbor seal), *Cervus nippon* (sika deer), *Odocoileus virginianus* (white-tailed deer), *Equus caballus* (domesic horse), *Bos taurus* (domestic cow), and *Capra hircus* (domestic goat).

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Parker, S. 1999. Partnership puts ideals into action – Delmarva low impact tourism experiences (DELITE). **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:112-113.

Library: FSU [EP 1.23/6:620/R-00/001]

Parr, A. E. 1933. A geographic-ecological analysis of the seasonal changes in temperature conditions in shallow water along the Atlantic coast of the United States. *Bingham Oceanographic Collection, Bulletin* 4(3):1-90.

Parsons, G. R. 1992. The effect of coastal land use restrictions on housing prices: A repeat sale analysis. *Journal of Environmental Economics and Management* 22(1):25-37.

Abstract: In 1986, the Critical Areas Commission of the state of Maryland established a set of land use restrictions that limit residential development on land abutting the Chesapeake Bay. In this paper the author estimates the effect of these restrictions on housing prices in one county on the Bay. I use a repeat sale analysis—inferring the effect of restrictions by observing price changes on houses that sold both before and after the restrictions were enacted. Housing prices in the Critical Area with water frontage increased by 46–62% due to restrictions. Housing prices in the Critical Area without frontage increased by 14–27% and prices near but not in the Critical Area increased by 13–21%.

Library: CBL, HPL, TU, UD-Morris, UMBC, UMCP, UMES

Patterson, M. E., J. D. Fraser and J. W. Roggenbuck. 1991. Factors affecting piping plover productivity on Assateague Island. *Journal of Wildlife Management* 55(3):525-531.

Abstract: The authors studied piping plovers (*Charadrius melodus*) on Assateague Island (Md., Va.) in 1986-87 to estimate population size and to identify factors affecting productivity. Fledging rates (0.19-1.11 chicks/pair) appeared to be lower than the level necessary to maintain a stable population. Fifty-four percent of the nests were unsuccessful. Predators accounted for most (91%) of the known causes of nest losses. Only 1 nest (2.2% of losses with known cause) was lost due to direct human destruction, and we found no evidence that suggested recreational disturbance was factor affecting productivity. Mean chick fledging success was 69% for broods foraging at bay flats or tidal pools and 19% for broods foraging on ocean beach ($P < 0.05$).

Library: CBL, FSU, SMC, SU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

Patton, T. 1999. Welcome. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:5.

Library: FSU [EP 1.23/6:620/R-00/001]

Patton, T. 2005. *Listen To the Voices, Follow the Trails: Discovering Maryland's Seaside Heritage*. Penned, Ink, LLC. Indianapolis, Indiana.

Paul, J. F., J. H. Gentile, K. J. Scott, S. C. Schimmel, D. E. Campbell and R. W. Latimer. 1999. *EMAP-Virginian Province Four-Year Assessment (1990-1993).* Office of Research and Development, U.S. Environmental Protection Agency (Washington, D.C.). EPA/620/R-99/004. xvii + 119 pp.

Library: CBL, FSU, UD-Morris (microfiche), UMCP [all are EP 1.23/5:620/R- 99/004]

Paul, J. F., K. J. Scott, A. F. Holland, S. B. Weisberg, S. K. Summers and A. Robertson. 1992. The estuarine component of US EPA's Environmental and Assessment Program. *Chemistry and Ecology* 7:93-116.

Library: UD-Morris, UMCP (Chemistry)

Pawson, David L. Echinodermata: Holothuroidea. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 405.* 15 pp.

Pazzaglia, F. J., R. A. J. Robinson and A. Traverse. 1997. Palynology of the Bryn Mawr Formation (Miocene): insights on the age and genesis of middle Atlantic margin fluvial deposits. *Sedimentary Geology* 108(1-4):19-44.

Abstract: The ages of fluvial deposits at the head of Chesapeake Bay, thought to be the up dip, chronostratigraphic equivalents of a well-dated late Oligocene to Quaternary marine sequence in the Salisbury Embayment, are poorly known. We present data regarding a new occurrence of a palynoflora recovered from the Bryn Mawr Formation in Cecil County, Maryland. The floral assemblage for the Bryn Mawr Formation includes at least 40 taxa at the generic level where

Quercus, Cupuliferae, *Ilex, Carya, Taxodium*, and *Pinus* are important elements. Most of the taxa identified from the Bryn Mawr Formation palynoflora are extant and occur within the modern middle Atlantic Coastal Plain; however, several important taxa such as *Alangium, Engelhardia, Sciadopitys, Tricolporopollenites* sp., and *Cupuliferoidaepollenites* sp. are at present either extinct or exotic to the middle Atlantic Coastal Plain. Comparison of the Bryn Mawr Formation palynoflora to well-dated marine deposits of the Salisbury Embayment suggests a late middle to early late Miocene age (late Serravallian-early Tortonian) for Bryn Mawr Formation phase-2 deposition, supporting previously proposed genetic links to the marine deposits of the Choptank Formation in the subsurface of the Delmarva Peninsula.

Relative abundances of common, extant taxa such as *Quercus, Carya, Pinus*, and NAP (the total non-arboreal pollen) vary considerably throughout late Cenozoic deposits of the middle Atlantic Coastal Plain. We present data for common, extant taxa in a ternary diagram to define discrete palynofacies that discriminate among middle Miocene, late Miocene, Pliocene, and Pleistocene palynofloras. These results show that relative abundances of common, easily identifiable extant pollen may be as diagnostic as exotic taxa in assigning ages to middle Atlantic Coastal Plain deposits.

The Bryn Mawr Formation palynoflora, like other middle to late Miocene palynofloras of the middle Atlantic Coastal Plain, suggests terrestrial climatic cooling. In the larger temporal scale of climate change throughout the Cenozoic, this change in Miocene climate is one of three major events that may have had a significant impact on the rate of sediment yield from the Appalachians as recorded in the volume of offshore basin sediments.

Library: TU, UD-Morris, UMBC, UMCP,

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Pearse, A. S. 1914. On the habits of *Uca pugnax* (Smith) and *U. pugilator* (Bosc). *Transactions of the Wisconsin Academy of Science, Arts and Letters* 17(2):791-802.

Library: UD-Morris, UMCP

Pearse, A. S. 1938. Polyclads of the east Coast of North America. *Proceedings of the United States National Museum* 86(3044):67-98.

Abstract: Twenty-seven species of the order Polycladia are reported from the east coast of North America from Texas to Baffin Bay. 11 species are described in the genera *Discocelis, Stylochus, Eustylochus, Stylochoplana, Hoploplana, Conjuguterus, Oculoplana, Pseudoceros, Oligoclado, Acerotisa*, and *Prosthiostomum*.

Library: CBL, TU, UD-Morris, UMCP

Pearse, A. S. 1945. Ecology of *Upogebia affinis* (Say). *Ecology* 26(3):303-305.

Abstract: Notes are presented on the habitat, morphology, life history, parasites, food, and behavior of *Upogebia affinis* at Beaufort, North Carolina.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Pearse, A. S., H. T. Humm and G. W. Wharton. 1942. Ecology of sand beaches at Beaufort, N.C. *Ecological Monographs* 12(2):135-190.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Peglar, M. T., T. A. Nerad, O. R. Anderson and P. M. Gillevet. 2004. Identification of amoebae implicated in the life cycle of *Pfiesteria* and *Pfiesteria*-like dinoflagellates. *Journal of Eukaryotic Microbiology* 51(5):542-552.

Abstract: This study was undertaken to assess whether amoebae commonly found in mesohaline environments are in fact stages in the life cycles of *Pfiesteria* and *Pfiesteria*-like dinoflagellates. Primary isolations of amoebae and dinoflagellates were made from water and sediment samples from five tributaries of the Chesapeake Bay. Additional amoebae were also cloned from bioassay aquaria where fish mortality was attributed to *Pfiesteria*. Electron microscopy and small subunit (SSU) rRNA gene sequence analysis of these isolates clearly demonstrated that the commonly depicted amoeboid form of *Pfiesteria* is very likely a species of *Korotnevella* and is unrelated to *Pfiesteria* or *Pfiesteria*-like dinoflagellates. The authors have determined that the *Pfiesteria* and *Pfiesteria*-like dinoflagellates examined in this study undergo a typical homothallic life cycle without amoeboid stages. Furthermore, they have demonstrated that cloned amoebae sharing morphological characteristics described for stages in the life cycle of *Pfiesteria* do not transform into dinozoites. The strict clonal isolation and cultivation techniques used in this study substantially support the conclusion that the amoebae and some of the flagellates depicted in the life cycle of *Pfiesteria* are environmental contaminants of the *Pfiesteria* culture system and that the Ambush Predator Hypothesis needs to be rigorously reevaluated.

Library: CBL, SMC, TU, UD-Morris, UMBC, UMCP

Pellenbarg, R. and R. B. Biggs. 1970. Background environmental data on Assateague and surrounding areas. **IN:** *Assateague Ecological Studies, Part I: Environmental Information.* Natural Resources Institute, University of Maryland (College Park), Contribution No. 446. pp. 42-69.

Abstract: Weather data were described as scarce and needed to be extrapolated from stations inland. Insolation data were practically nonexistent. The area was described as experiencing high winds, which blow onshore by day and offshore by night. The general direction during summer was southeasterly, an estimate derived from wave date at Ocean City. Temperatures were moderated due to the close proximity of the Atlantic Ocean, and rainfall was evenly distributed throughout the year (average of 3 inches per month). Tides and currents were described according to Pritchard (1960), with the addition of measured tide heights at Ocean City and Greenbackville. Groundwater sources were from two major aquifers— the Pocomoke, about 200 feet down, and the Manokin, about 300 feet down. Shallow groundwater was described as lenses on a seawater base.

Library: CBL, SU [all are QK940.A9 M3]; UMCP [QK940.A9 M3, UPUB C21.002 no.446]

Perkins, S. O. and S. R. Bacon. 1928. Soil Survey Worcester County, Maryland. *U.S. Department of Agriculture, Bureau of Chemistry and Soils No. 11, Series* 1924. 31 pp.

Library: FSU, SU (Nabb) [all are S599.M3 W7 1928]; UMCP [S599.M3 P46]

Perry, W. A. 1958. State rapped on island's development. *The Evening Sun* (Baltimore, Maryland), 24 November.

Perry, W. A. 1959. Jeep joins hundreds of lots hired on Assateague Isle. *The Evening Sun* (Baltimore, Maryland), 16 July.

Peterson, A. G. 1930. Commerce of Virginia, 1789-1791. *William and Mary Quarterly Historical Magazine*, Second Series, 10 (4):302-309.

Abstract: A review of the commodities and commerce of tidewater Virginia is discussed. Brief mention is made of U.S. customs officials located at Folly Landing and Cherrystone, Virginia.

Library: UD-Morris, UMBC, UMCP, UMES [all are on line]

Petranka, J. W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press (Washington, D.C.).

Library: SMC, UD-Morris, UMCP [all are QL668.C2 P36 1998]

Pettibone, M. H. 1956. Some polychaete worms of the families Hesionidae, Syllidae, and Nereidae from the east coast of North America, West Indies, and Gulf of Mexico. *Journal of the Washington Academy of Science* 46(9):281-294.

Abstract: *Parahesione luteola* (of Hesionidae) from New Jersey and Massachusetts (*Podarke luteola* Webster; = *Hesione agilis* Webster and Benedict) is described. *Brania wellfleetensis* from Massachusetts, *Nereis grayi* from Massachusetts, *Nereis allenae* from West Indies are described. Supplementary descriptions, including male and female heteronereids, are given for *Nereis egregicirrata* from West Indies, *Nereis pelagica* Linné (= *Nereis largoensis* Treadwell), and *Nereis occidentalis* Hartman (= *Nereis pelagica occidentalis* Hartman).

Library: UD-Morris, UMCP

Pettibone, M. 1957. Endoparasitic polychaetous annelids of the family Arabellidae with descriptions of new species. *Biological Bulletin* 113(1):170-187.

Abstract: Two new species of lumbrinereid-like polychaetes (Superfamily Eunicea, Family Arabellidae), living as parasites in other polychaetes (Eunicea, Onuphidae), are described: *Drilonereis benedicti* in *Onuphis magna*, Florida; *Drilonereis caulleryi* in *Onuphis conchylega*, off Massachusetts to off Virginia. Young arabellids living parasitically in the onuphid, *Diopatra cuprea*, Massachusetts, are described and are thought to be the young of *Notocirrus spiniferus*. The relatively few known cases of lumbrinerid-like species living parasitically in other polychaetes and echiuroids are reviewed.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Pettibone, M. H. 1963. Marine polychaete worms of the New England region. 1. Families Aphroditidae through Trochochaetidae. *Bulletin of the U.S. National Museum* 227:1-356.

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Pettibone, M. H. 1963. Revision of some genera of polychaete worms of the family Spionidae, including the description of a new species of *Scolelpis*. *Proceedings of the Biological Society of Washington* 76:89-103.

Library: CBL, TU, UD-Morris, UMCP

Pettibone, M. H. 1964. Phylum Annelida. **IN:** *Keys to Marine Invertebrates of the Woods Hole Region*, R. I. Smith, Ed. Systematics-Ecology Program, Marine Biological Laboratory (Woods Hole, Massachusetts), Contribution No. 11. pp. 47-83.

Library: CBL, FSU, HPL, UD-GCMES, UD-Morris [all are QL183 .S6]

Pettibone, M. H. 1966. Revision of the Pilargidae (Annelida: Polychaeta), including descriptions of new species, and redescription of the pelagic *Podarmus ploa* Chamberlin (Polynoidae). *Proceedings of the U.S. National Museum* 118(3525):155-208.

Library: CBL, TU, UD-Morris, UMCP

Pettibone, M. H. 1971. Revision of some species referred to *Leptonereis*, *Nicon*, and *Laeonereis* (Polychaeta: Nereidae). *Smithsonian Contributions to Zoology* 104:1-53.

Library: CBL, SU, UMCP [all are QL1 .S54 no.104]

Pettibone, M. H. 1982. Classification of Polychaeta. **IN:** *Synopsis and Classification of Living Organisms*, S. P. Parker, Ed. McGraw-Hill (New York). Vol. 2:3-43.

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Phelan, D. J. 1987. *Water Levels, Chloride Concentrations, and Pumpage in the Coastal Aquifers of Delaware and Maryland*. U.S. Department of the Interior, U.S. Geological Survey Water Resources Investigation WRI 87-4229. 106 pp.

Abstract: Studies of the Manokin (thickness = 50-150 ft)/ Ocean City (thickness = 30-150 ft), Pocomoke (thickness = 30-80 ft)/ and unconfined aquifers (discontinuous) were summarized. Coastal ground waters were found to be susceptible to saltwater intrusion from three possible sources, one of which was the downward leakage from the ocean bays. Water levels have declined several feet since 1970.

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Library: FSU [EP 1.23/6:620/R-00/001]

Pierce, C. D. 1983. Autumn in Assateague. *EPA Journal* 9:13.

Library: CBL, FSU, MSU, SU, UD-Morris, UMBC, UMCP

Pilkey, O. H. 1988. A "Thumbnail Method" for beach communities: Estimation of long-term replenishment requirements. *Shore and Beach* 56:23-31.

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Pilkey, O. H. and T. D. Clayton. 1987. Beach replenishment: The national solution. **IN:** *Coastal Zone '87*. American Society of Civil Engineers (New York). pp. 11408-1419.

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Pilkey, O. H. and T. D. Clayton. 1989. Summary of beach replenishment experience on U.S. east coast barrier islands. *Journal of Coastal Research* 5(1):147-159.

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Pilkey, O. H. and W. J. Neal, series editors. various dates. *Living With the Shore.* Duke University Press (Durham, North Carolina.

Abstract: This series currently contains 14 volumes, each of which examines the shoreline of an individual State (Florida has two volumes, for East and West Florida). The books are intended for a nontechnical audience; they review the geologic history, the history of development, the coastal processes affecting the shoreline, human intervention on the shore, government programs affecting coastal real estate, and safeguards to take when buying or building to prepare for storms and hurricanes. The books also contain a detailed analysis of the entire shoreline with recommendations of where and where not to buy shore property

Pineiro, S. A., W. Babiker, T. Berhane, A. Chauhan, C. Stine and H. N. Williams. 2006. Distribution patterns of B*dellovibrio* and Like-Organisms (BALO) genotype in two major estuaries. *EOS, Transactions, American Geophysical Union* 87(36 suppl):np. suppl.

Abstract: *Bdellovibrio* and like-organisms (BALO) isolated from salt water ecosystems have been observed to be quite diverse with at least 11 genotypes. Most of the genotypes have been isolated from environmentally diverse and geographically dispersed ecosystems, around the globe including oceans, seas and a halophilic lake. However, one type appears to be restricted to the Chesapeake Bay and some other estuaries which suggests that it is a true estuarine strain. If this is the case, it would be expected that in the Chesapeake and Delaware Bays the "estuarine" genotype would be partitioned more in the moderate to lower salinity regions, in the mid and upper sectors of the estuaries than near the mouth where higher salinity waters are similar to that of the Atlantic Ocean waters that enters the respective bays. The aim of this project was to test this hypothesis. Samples of water one meter below the surface and off the bottom were collected along a transect of the bays and the Patuxent River, a subestuary of the Chesapeake Bay. In the Chesapeake Bay, sediment and biofilm samples from the shells of oysters were also collected. The samples were plated for BALO using the double agar overlay technique. Plaques typical of BALO were selected for several rounds of subculturing to yield a pure culture. A filtered (0.2 mu m filter) suspension of BALO free of prey cells was prepared from a 48 h culture of artificial seawater prey (Vibrio parahaemolyticus P-5) broth and was centrifuged to pellet the cells. DNA was extracted and 16S universal primers were used for PCR amplification. The sequences were analyzed by Blast 2sequences, CustalX and PAUP. The results revealed a diverse population of BALO in both the Chesapeake and Delaware Bays and the Patuxent River. Six genotypes were recovered from the Chesapeake Bay and three from the Delaware Bay and Patuxent River, respectively. As expected, the "estuarine" genotype was only found in the moderate to lower salinity upper regions of the bays. This finding supports the hypotheses that these BALO are genuine estuarine strains. Previously only two major groups of BALO were described, marine and freshwater/terrestrial. The evidence from this study suggests a new major group adapted specifically to the estuarine environment. This raises important questions for future study on the factors that select for these unique BALO strains in the estuaries and provides opportunities to study the effects of salinity and prey bacteria. Studies are in progress to determine if other estuarine systems with different properties also harbor the estuarine BALO strains.

Platt, H. M., Ed. 1979. *Interim Beach Maintenance at Ocean City*. Maryland Department of Natural Resources Coastal Resources Division (Annapolis). 316 pp.

Abstract: The proposed action is to provide interim beach maintenance of Ocean City, Maryland, beach. The interim approach consists of constructing a system of short groins along the northernmost 8 miles of Ocean City beach. The proposed action is expected to stabilize the existing beach and thereby maintain the recreation potential and storm protection presently provided by the beach. Some additional storm protection will be provided by the sand fill as well. The seaward horizontal section of the groins may be grouted to provide access to recreational fishermen. Construction of the groins is expected to allow the tourist industry in Ocean City to persist at its present level and rate of expansion. Adverse ecological effects will occur, but are expected to be minimal because the areas affected (the nearshore surf zone along Ocean City beach, and the offshore borrow site) are normally highly stressed environments which support a low diversity of highly resilient organisms.

Poag, C. W., B. A. Swift, BA; J. S. Schlee, M. M. Ball and L. L. Sheetz. 1990. Early Cretaceous shelf-edge deltas of the Baltimore Canyon trough: Principal sources

for sediment gravity deposits of the northern Hatteras Basin. *Geology* 18(2):149-152.

Abstract: Evidence is presented that the principal sources for Early Cretaceous (Berriasian-Valanginian) gravity-flow deposits of the northern Hatteras Basin were three large shelf-edge deltas located along the outer margin of the Baltimore Canyon Trough, similar to 100 km southeast of Cape Charles, Virginia, Ocean City, Maryland, and Long Branch, New Jersey. Sedimentary detritus from the central Appalachian highlands and the Maryland-Virginia coastal plain was transported across the Early Cretaceous continental shelf to form the Cape Charles and Ocean City deltas, whereas deposits of the Long Branch delta came chiefly from the Adirondack and New England highlands. Each delta supplied sediment gravity flows to large slope aprons and submarine-fan complexes on the Early Cretaceous continental slope and rise.

Library: BSU, SMC, SU, UD-Morris, UD-GCMES, UMBC, UMCP

Pohl, M. E. 1946. Ecological observations on *Callianassa major* Say at Beaufort, North Carolina. *Ecology* 27(1):71-80.

Abstract: *Callianassa major*, a marine decapod crustacean, is abundant in the Beaufort, North Carolina, region contrary to the reports of previous investigators. Its deep burrows are found on beaches that face the open ocean and shoals which are exposed at low tide and completely covered at high tide. The tubular burrow, usually vertical to the surface, may be divided into three portions. The mouth, about 5 mm in diameter, opens into the first portion which is 5 – 20 cm long and 5 – 8 mm in diameter. From this extends the second portion, 10 – 15 cm long and widening gradually to approximately 20 mm. The third portion, 20 mm wide, is the longest. An approximate average of the length of the whole burrow is 146 cm with variations from 60 to over 210 cm. Branches were common and occurred most often at the second portion. The characteristic brown lining which prevents caving-in is very thin throughout the first portion of the burrow, thicker at the second, and thickest (3 – 7 mm) at the third. Cylindrical fecal pellets surrounded some burrow mouths. The greatest number of burrows was at a zone three-fourths of the way up the beach from the low water mark.

It took three days for a *Callianassa* in a battery jar half full of sand to build a burrow. The individual burrowed for a short distance, backing out to dump each load of sand and extending the tunnel parallel to the surface. After a pit had been hollowed-out in which the animal could turn, she never left the burrow. The pit was then extended to the bottom of the jar. In burrowing, the *Callianassa* loosened the sand with the first and second pairs of legs and carried it in a "basket" formed by the third maxillipeds, first pair of legs, and antennae.

This psammobiant is structurally specialized for its burrow habitat. Adaptations include the slender and elongated body; the thin exoskeleton which enables the animal to twist and turn; and the appendages modified for bracing the body against the burrow wall, for burrowing, for carrying sand in the "basket" and for sifting food from sand. The burrow lining which prevents caving-in, the respiratory current, and the fecal pellets which are almost insoluble in water are further adaptations. *Callianassa* often cleaned itself with the tips of its setose appendages. Almost continuous movement of the three pairs of discoidal swimmerets causes the respiratory current within the burrow. These appendages are also used in swimming; the tail fan is brought into play in rapid maneuvers.

It is believed that *Callianassa major* does not leave its burrow often since no free-swimming crabs were observed outside burrows, and none were seen to leave them.

C. major feeds by sifting detritus from sand with its setose appendages, but may also obtain food from the aerating current. A microscopic examination of gut contents showed an amorphous mass containing small grains of sand, diatoms, and other algae, and many bacteria. Two bacteria, *Sarcina flava* and *Proteus vulgaris*, were isolated by plate cultures from the intestine.

Approximately 8,170 eggs were attached to the setae on the first four pairs of swimmerets of one female.

The commensals found were the crab, *Pinnixa cristata* Rathbun; the bryozoan *Acanthodesia tenuis* (Desor); and the copepod *Clausidium dissimile* Wilson.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Points, L. G. 1976. Wild, wild horses. *National Park Service Newsletter* 11:5.

Polack, H.-J. 1966. Litter mounting on Assateague. *The Sun* (Baltimore, Maryland), 25 August.

Polack, H.-J. 1967. Assateague area is falling apart. *The Sun* (Baltimore, Maryland), 15 July.

Pollock, L. W. 1976. Tardigrada. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circ-394.* 25 pp.

Abstract: The manual includes an introduction to the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the Tardigrada of the marine coastal areas of the world to a depth of 5,000 m.

Poole, F. G. 1942. Breeding notes on eastern shore birds. *Maryland Natural History Society Bulletin* 12(4):56-58.

Porter, J. H. and R. D. Dueser. 1982. Niche overlap and competition in an insular small mammal fauna: a test of the niche overlap hypothesis. *Oikos* 39(2):228-236.

Abstract: The niche overlap hypothesis states that "maximum tolerable overlap should vary inversely with the intensity of competition." The authors recorded multiple captures o 6 species on Assateague Island, Maryland. To describe the structural niche (microhabitat) of each species, 9 habitat variables were measured at each trap station where an animal was captured. Using data on population densities and microhabitats, pairwise niche overlap and competition was estimated with discriminant analysis and multiple linear regression analysis, respectively. A positive correlation is reported between niche overlap and competition, rather than the negative relationship predicted by the hypothesis. The negative correlation between niche overlap and species diversity reported for previous tests of the hypothesis may reflect a decrease in the average strength of interaction between species as diversity increases, rather than a competition-mediated decrease in niche overlap.

Library: HPL, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Powell, E. N. and R. Mann. 2005. Evidence of recent recruitment in the ocean quahog *Arctica islandica* in the Mid-Atlantic Bight. *Journal of Shellfish Research* 24(2):517.

Abstract: The authors report results of a survey explicitly focused on ocean quahog recruitment in the Mid-Atlantic Bight. The recruitment survey resampled all NMFS survey sites south of Hudson Canyon and a selection of sites north and east of Hudson Canyon off the Long Island coast over the entire depth range of this species with the exception of the most inshore reaches off Long Island. More ocean quahogs were encountered, on a per tow basis, in the vicinity of and north of Hudson Canyon. The proportion of recruits in the size-frequency distribution was higher in the south and the most recent recruitment events were concentrated there. Analysis of the 104

size-frequency distributions delineated regions of recent recruitment, areas that have not seen significant recruitment for many decades and areas that received heavy recruitment some decades previously but not recently. Overall, the survey suggests that three regionally distinctive processes determine the size-frequency distributions of ocean quahog assemblages and recruitment therein. The area northeast of Hudson Canyon is unique in the regionally extensive uniformity of size-frequency distributions among sampled assemblages, the near absence of recent recruitment and the presence of large numbers of older recruits, 65–80 mm in size. The inshore (by ocean quahog standards) area off New Jersey is unique in the dominant presence of the largest size classes of ocean quahogs and the remarkable absence of significant recruitment over an extraordinary time span. The area south of 39°N is unique in the widespread presence of relatively young recruits, including some animals with ages within the time span of the present fishery. Recruitment events in ocean quahog populations, although rare in the sense of occurring only once in a score or two of years, are frequent in the context of the +200-year life span of this species, yet also rare in the context of stock survey timing and fishery dynamics. This study strongly supports the assumption that long-lived species recruit successfully only rarely when at carrying capacity. This study also suggests that the history of recruitment over the last perhaps two-score years, revealed by this survey, may be a poor measure of the recruitment dynamics to be anticipated over the next two-score years when the population abundance is reduced to what is anticipated to approximate the biomass at maximum sustainable yield. Given the long time span required for ocean quahogs to grow to fishable size, a substantive disequilibrium may exist between the recruitment anticipated from the relationship of adult biomass to carrying capacity and the contemporaneous number of recruits for minimally 20 y after adult abundance is reduced from circa-1980 carrying capacity to biomass, maximum sustainable yield.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Powell, L. R. 1974. *Major Causes of Variations in Suspended Sediment Concentrations in Chincoteague Bay, Delmarva Peninsula*. Master of Science Thesis, Millersville College (Pennsylvania).

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Preston, F. W. 1966. The mathematical representation of migration. *Ecology* 47(3):375-392.

Abstract: If sufficiently systematic numerical observations or trappings of birds or other animals on migration are made, and the accumulating totals plotted on probability paper on a time base or abscissa, they will frequently plot to a fairly straight line. This means that the "distribution" of the observations in time is approximately Gaussian, and from the plot the peak of migration and the standard deviation of timing can be ascertained with some accuracy.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Prezant, R. S., C. L. Counts, III and E. J. Chapman. 2002. Mollusca of Assateague Island, Maryland and Virginia: Additions to the fauna, range extensions, and gigantism. *Veliger* 45(4):337-355.

Abstract: Collections of 108 species of marine and estuarine mollusks from around Assateague Island, Maryland and Virginia, from 1991 to 1996, vary from and extend the known species lists generated by three previously published collections over the past 100 years. Extensive sampling, including benthic grabs, trawls, and hand collecting, has added 54 species of mollusks (20 bivalves, 31 gastropods, one polyplacophoran, and two cephalopods) to the 1914 list of Henderson and

Bartsch and 46 (19 bivalves, 26 gastropods, and one cephalopod) to that of Counts and Bashore from 1991. Homer et al. in 1997 provided a mollusk survey of Maryland coast bays and listed 73 molluscan species (including 10 species recorded as shells only and eight as taxonomic uncertainties). To the latter we have added 51 molluscan taxa they did not find (19 bivalves, 29 gastropods, one polyplacophoran, and two cephalopods). All collections represent a total described malacofauna of this region of 146 shallow-water species excluding undecided or non-described taxa in earlier papers. Within the populations of some of the species collected were a few exceptionally large individuals, adding to previous records of unusually large specimens of mollusks from this region of the Atlantic coast. Additionally, some species of mollusks (*Tectura testudinalis*, *Eupleura semisulcata* [Gastropoda], *Tridonta borealis* [Bivalvia]) and some non-molluscs (the ascidian *Ecteinascidia turbinata* and a confirmation of an extension of the anthozoan *Peachia parasitica*) have been found in the waters surrounding Assateague, well outside of their previously reported geographic ranges. The results of the present study suggest the need for a re-evaluation of possible environmental shifts that could have taken place since the collections of the early 1900s and have elsewhere been implicated in the change of malacofauna of Assateague Island since that time. Additionally, range extensions reported could reflect a subtle geographic transition zone, newly introduced species, or, most likely, an understudied coastal area.

Library: CBL, HPL, TU, UD-GCMES, UMBC, UMCP

Price, K. S., Jr. 1962. Biology of the sand shrimp, *Crangon septemspinosa*, in the shore zone of the Delaware Bay area. *Chesapeake Science* 3:244-255.

Abstract: Over 2,500 sand shrimp were collected between October 1958 and December 1960 from shallow waters along Delaware Bay shores where salinity ranged from 4.4 to 31.4 ppt and temperature extremes were one and 26.0^{o}C.

The growth rate of *C. septemspinosa* was estimated to be about 1.6 mm per month and no seasonal variation was observed. The smallest shrimp collected was 6 mm long while the largest was 70 mm. Three year-classes of females and two year-classes of males inhabit the shoal waters in spring. By summer the oldest year-class of both sexes disappeared from these areas. A size difference was apparent between males and females. The longest female measured was 70 mm as compared to 47 mm for the longest male.

The major spawning season for *C. septemspinosa* was from March to October, with ovigerous females appearing the year round except for December in the shoal water samples. Berried females were collected at water temperatures ranging from 0.0 to 25.0oC, and salinity varied from 17.7 to 29.3 ppt. The first egg bearers in the spawning season were large females. In July smaller berried females were more numerous. The importance of this size difference is emphasized by the fact that egg carrying capacity of a female is related to her length. The largest female recorded (70 mm) carried over 7,500 eggs. Ovigerous females ranged in length from 22 mm to 70 mm. Calculated ages for these lengths are one year and about 3.5 years, respectively. Females outnumbered males, especially during the spawning season. A preponderance of females bearing eggs in early stages (prior to the formation of eye pigment) was noted in the field study.

A high incidence of organic debris in gastric mills, as well as behavior, suggests that scavenging is an important means of supplementing the diet. The most prominent group of organisms found in gastric mills of these shrimp were planktonic Crustacea.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Price, K. S., M. Timmons and J. C. Chaillou. 1996. Delaware coastal bays shore zone fish community trends. **IN:** *Assessment of the Ecological Condition of the Delaware and Maryland coastal bays,* Chaillou, J. C., S. B. Weisberg, F. W. Kutz, T. E. DeMoss, L. Mangiaracina, R. Magnien, R. Eskin, J. Maxted, K. S. Price and J. K.

Summers. U.S. Environmental Protection Agency, Washington, DC (USA). Environmental Monitoring and Assessment Program, EPA/620/R-96/004. pp. A-2 – A-25.

Pritchard, D. W. 1960. Salt balance and exchange rate for Chincoteague Bay. *Chesapeake Science* 1:48-57.

Abstract: Chincoteague Bay is a bar-built estuary with two inlets from the Atlantic Ocean – one at Ocean City, Maryland, and the other some 30 miles southward at Chincoteague Inlet, Virginia. All available salinity data collected in the years 1851 through 1956 are used here to evaluate the processes which control the average monthly salinity in the bay. The major features of the salt balance are satisfactorily explained by a simple model equating the rate of change of salinity to terms involving net fresh water inflow and exchange rate through the inlets. An estimation of the exchange rate is made which indicates that approximately seven percent of the volume of the bays waters are renewed each day.

Pritchard, P. C. H. 1980. *Dermochelys coriacea. Catalog of American Amphibians and Reptiles* 238:1-238.4.

Prosser, N. 1999. The Fishable Waters Act of 1999. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:76-79.

Quinn, H., J. P. Tolson, C. J. Klein, S. P. Orlando and C. Alexander. 1989. *Strategic Assessments of Near Coastal Waters-Susceptibility of East Coast Estuaries to Nutrient Discharges: Passamaquoddy Bay to Chesapeake Bay, Summary Report*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Oceanography and Marine Assessment, Ocean Assessments Division, Strategic Assessment Branch (Rockville, Maryland).

Ragone Clavo, L. M., J. G. Walker and E. M. Burreson. 1997. Occurrence of QPX, quahog parasite unknown in Virginia hard clams, *Mercenaria mercenaria*. *Journal of Shellfish Research* 16(1):334.

Abstract: In July 1996, in response to industry concerns, the Virginia Institute of Marine Science (VIMS) initiated a sampling program to examine wild and cultured hard clams, *Mercenaria mercenaria*, for QPX, Quahog Parasite Unknown, a protozoan parasite that has been associated with severe mortalities of hard clams in localized areas in Canada and New England. Analysis of our initial samples from three sites revealed the presence of the parasite in 1-2 year old cultured clams at a Chincoteague Bay, VA grow-out location. This is the first report of QPX in Virginia.

Prevalence was low, 8%, and infections were localized and low in intensity. There was considerable evidence that the clams were mounting an effective immune response as numerous parasite cells were dead and there was no indication of QPX-associated mortality of hard clams in Chincoteague Bay. In response to the observation of QPX in Virginia clams, VIMS expanded its monthly survey of hard clams for QPX and in August 1996, clams were sampled from the original three sample sites and from ten additional sample sites. An effort was made to survey wild and cultured clams from western and eastern shore areas where clam harvest and grow-out take place. QPX was again present in cultured clams collected at the Chincoteague Bay site. The prevalence of QPX in the August sample was 20%. QPX was also observed at a prevalence of 8% in cultured clams from Sandy Island which is also located on the seaside of Virginia's eastern shore. Infections in clams from both locations were again localized and low in intensity. We will continue to monitor selected sites at 4-8 week intervals and the results of our monitoring efforts will be presented.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Ragone Clavo, L. M., J. G. Walker and E. M. Burreson. 1998. Prevalence and distribution of QPX, Quahog Parasite Unknown, in hard clams *Mercenaria mercenaria* in Virginia. *Diseases of Aquatic Organisms* 33(3):209-219.

Abstract: In July 1996, the Virginia Institute of marine Science initiated a sampling program to examine wild and cultured hard clams, *Marcenaria mercenaria*, for QPX, Quahog Parasite Unknown, a protistan parasite associated with severe mortalities of hard clams in localized areas in maritime Canada and Massachusetts. The sampling program set out to seasonally monitor wild clams from one site, James River, Virginia, and cultured clams from two sites, Chincoteague Bay and Mattawoman Creek, Virginia. Histological examination of initial samples revealed 8% prevalence of the parasite in 1-2 year-old cultured clams in Chincoteague Bay. This is the first documentation of QPX in Virginia. To ascertain the distribution of the parasite in Virginia, the survey was expanded between August 1996 and July 1997 to include 16 additional sites. A total of 1,305 wild and cultured clams was sampled from Chesapeake Bay tributaries and coastal areas where harvest and culture occur. QPX was not found in Chesapeake Bay, but was present in cultured clams from three coastal embayments – the original Chincoteague Bay site, Burton Bay and Quinby Inlet. The parasite was found in Chincoteague Bay at each sample period at prevalences ranging from 8 to 48%. Infections were generally light to moderate intensity and were most often observed in mantle and gill tissues. The maxmum prevalence was observed in May 1997 and coincided with notable clam mortalities. QPX prevalences at the other sites were low, ranging from 4 to 15%. To date QPX has not had a significant impact on Virginia's hard clam fishery and aquaculture industry; however, the presence of the pathogen in 3 of the state's most productive hard clam grow out areas warrants continued monitoring and research.

Library: UD-GCMES

Rambo, G. and J. E. Clausner. 1989. Jet pump sand bypassing, Indian River Inlet, Delaware. *Dredging Research – U.S. Army Corps of Engineers*, DRP-89-2. pp. 1-5.

Abstract: A 500 ft.-wide inlet is stabilized to the north and south by rubble-mound jetties. Net northerly transport has resulted in net accretion adjacent to the south jetty and erosion to the north beach, threatening to breach a road. Other material is trapped in flood and ebb tidal shoals. The required nourishment of 100,000 yd^3/yr to the north could be made available by sand bypassing from the south. Project alternatives are outlined and the favored method, periodic nourishment of the north beach using a jet pump from the south area, is described.

Library: UD-Morris, UMCP

Randol, P. A. 1997. 50th Chincoteague wild pony swim and auction. There's still something magical about this annual event. *The Western Horseman* 62(11):44.

Rasmussen, W. C. and T. H. Slaughter. 1955. The groundwater resources. **IN:** The Water Resources of Somerset County, Wicomico and Worcester Counties. *Maryland Department of Geology, Mines and Water Resources Bulletin* 16:1-469.

Abstract: Somerset, Wicomico, and Worcester counties, the lower three counties of the Eastern Shore, have abundant ground water available for the development. A conservative estimate indicates 360 million gallons per day of water suitable for most purposes available for an indefinite period from water-bearing beds within the uppermost 500 feet of the sedimentary sequence. This is about 30 times as much as the current use, estimated at 12.4 million gallons a day. Many million more gallons of somewhat mineralized water are available for restricted uses or for general purposes after treatment.

The waster occurs in 14 aquifers, which range in depth from the surface to more than 7,700 feet below the surface. Four of these aquifers are used extensively down to depths of 300 feet. Eight of the aquifers are used to a slight extent in most of the area but to an important extent locally, and wells in them produce from depths as great as 1,706 feet. Two of the aquifers lie at depths of several thousand feet and have not been tapped for water.

Somerset, Wicomico, and Worcester counties are part of the Atlantic Coastal Plain. The land forms of the Coastal Plain have an important effect upon the retention and infiltration of rainfall, the retardation of runoff, and the discharge of ground water be evapotranspiration. Remnants of six coastal marine terraces account for the flatness of the landscape and the low stream gradients. Poorly drained oval-shaped depressions, ranging in size from 7 acres to over 17,000 acres, bounded by sandy rims of low relief are the most important minor land form. Meandering tidal streams, rejuvenated headwaters, older remnant barrier beaches, dunes, and periglacial soils are other land forms that control the entrance and discharge of ground water.

A description of the various geologic formations found in the region are described. Included are: Raritan, Magothy, Matawan, Monmouth, Calvert, Choptank, St. Marys, Yorktown, and Cohansey formations.

The Manokin aquifer is the principal water-bearing source for Princess Anne, Snow Hill, and Ocean City and provides large to small quantities of water to many wells over much of the tricounty area. Its intake belt is 6 to 8 miles wide, lying beneath a relatively thin mantle of the formations of Pleistocene and Pliocene(?) age in western Wicomico County. It dips southeast about 10 feet to the mile to depths of more than 300 feet below sea level in the southeast corner of the area. It is a gray, coarse to fine sand, about 80 feet thick. The water is suitable for most purposes in the northern three-quarters of the area, but it has a high chloride content, over 250 ppm, and high dissolved solids in the southern fourth of the area.

The Pocomoke aquifer is the principal aquifer at Pocomoke City, and an important source for Ocean City. It is a gray, predominantly medium-grained sand, with an average thickness of 45 feet, which yields fairly large quantities of water to a few wells and moderate to small quantities to many wells, chiefly in Worcester County. The quality of water is suitable for most purposes. The intake zone, covered by a permeable mantle of Pleistocene and Pliocene(?) deposits, crosses Somerset, Wicomico, and Worcester counties as a diagonal belt, 6 to 7 miles wide, from the mouth of the Big Annemessex River through Pittsville into the State of Delaware. The Aquifer slopes southeasterly to a depth of more than 200 feet below sea level beneath Assateague Island.

Library: UD-Morris

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Rattner, B. A., J. Eismann, R. K. Hines, M. J. Melancon, C. P. Rice and W. Riley, Jr. 1997. Cytochrome P450 and organochlorine contamination in black-crowned night-herons from the Chesapeake Bay region. *Environmental Toxicology and Chemistry* 16(11):2315-2322.

Abstract: Black-crowned night-herons (*Nycticorax nictycorax*) offspring were collected from a relatively uncontaminated coastal reference site (next to Chincoteague National Wildlife Refuge, Virginia) and two sites in the Chesapeake Bay watershed (Baltimore Harbor, Maryland, and Rock Creek Park, Washington, D.C.). Hepatic microsomal activities of benzyloxyresorufin-O-dealkylase were significantly elevated (up to sixfold and ninefold induction, respectively) in pipping embryos from the Baltimore Harbor colony compared to the reference site, whereas in embryos from the Rock Creek Park colony were intermediate. Concentrations or organochlorine pesticides and metabolites in pipping embryos from both sites in the Chesapeake watershed were greater than at the reference site but below the known threshold for reproductive impairment. However, concentrations of 10 arlhydrocarbon receptor active polychlorinated biphenyl (PCB) congeners and estimated toxic equivalents were up to 37-fold greater in embryos collected from these two sites in the Chesapeake Bay region, with values for toxic congeners 77 and 126 exceeding those observed in pipping heron embryos from the Great Lakes. Monooxygenase activity of pipping embryos was associated with concentrations of several organochlorine pesticides, total PCBs, arlhydrocarbon receptor-active PCB congeners, and toxic equivalents (r = 0.30-0.59), providing further evidence of the value of cytochrome P450 as a biomarker of organic contamination exposure. Organochlorine contaminant levels were greater in 10-day-old nestlings from Baltimore Harbor than the reference site but had no app[aren't effect on monooxygenase activity or growth. These findings demonstrate induction of cytochrome P450 in pipping black-crowned night-heron embryos in the Chesapeake Bay region, probably by exposure to PCB congeners of local origin, and the accumulation of organochlorine pesticides and metabolites in nestling herons from Baltimore Harbor. Biomonitoring with additional waterbird species (e.g., bald eagle, common tern, great blue heron) that appear to be more sensitive to PCBs than black-crowned night-herons is recommended to document health of waterbirds and remediation of the Chesapeake Bay.

Library: CBL, TU, UD-Morris, UMBC, UMCP, UMES

Rattner, B. A., M. J. Melancon, T. W. Custer R. L. Hothem. 1996. Cytochrome P450 and contaminant concentrations in nestling black-crowned night-herons and their interrelation with sibling embryos. *Environmental Toxicology and Chemistry* 15(5):715-721.

Abstract: Hepatic cytochrome P450-associated monooxygenase activities were measured in 11-d-old nestling black-crowned night herons (*Nycticorax nycticorax*) collected from a reference site (next to Chincoteague National Wildlife Refuge, Virginia) and three contaminated sites (Cat Island, Green Bay, WI; Bait Island, San Francisco Bay, CA; and West Marin Island, San Francisco Bay, CA). Arylhydrocarbon hydroxylase and benzyloxyresorufin-O-dealkylase activities of nestlings from contaminated sites were only slightly elevated (less than threefold) compared with the reference site. Organochlorine pesticide and total polychlorinated biphenyl (PCB) concentrations in nestlings were greatest at contaminated sites, although much lower than found in concurrently collected eggs and pipping embryos. Pollutant concentrations of nestlings were rarely associated with monooxygenase activity. In contrast, concurrently collected pipping heron embryos (often siblings of the nestlings) exhibited pronounced monooxygenase induction (means at contaminated sites were elevated up to sevenfold and values of some embryos exceeded 25-fold induction). Furthermore, monooxygenase activity of pipping embryos was significantly correlated with total PCBs, arylhydrocarbon receptor-active PCB congeners, and toxic equivalents. The modest monooxygenase responses of heron nestlings suggest that this biomarker may have only limited value during this rapid-growth life stage.

Library: CBL, TU, UD-Morris, UMBC, UMCP, UMES

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Library: TU, UMCP

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Abstract: Numerical modeling of coastal circulation encompassing the nearshore requires forcing by tide, surface gravity waves, and possibly other factors. In the nearshore, the wave-induced longshore current and setup are dominant hydrodynamic processes, and lateral boundary conditions representing tide and oceanic forcing typically do not include surface-wave contributions. Without proper boundary conditions, significant gradients in current and water level can occur that contaminate the solution in the internal domain. A standard strategy is to place the boundaries far from the site of interest, but this strategy greatly increases computational demands, and it may not be appropriate for long-term simulations. This paper describes a wave-adjusted boundary condition that accounts for wave-induced water level and current acting in combination with tidal forcing. The wave-adjusted boundary condition is demonstrated for an idealized case of a parallel-contour beach and for an engineering application at Ocean City, MD.

Library: TU, UD-Morris, UMCP

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Abstract: Management of feral horses grazing on Atlantic and Gulf coast barrier islands requires information on seasonal habitat preferences and distribution of important forage species to maintain stable populations and prevent destruction of fragile island ecosystems, particularly as coastal development further restricts free range. Counts from seasonal aerial surveys of Currituck Banks, N.C. were used to determine whether particular habitats were used more or less than would be expected by chance. On-ground observations were used to determine the relative intensity of grazing on vegetation by habitat and season. Feral horses showed seasonal preferences for particular forage species and habitat types. Horses grazed upon at least 16 graminoid and 5 forb species across 6 identified habitat types covering 4,619 ha. In late winter, Maritime Forest was used significantly more than expected while Tidal Freshwater Marsh was used less than expected. In spring, all habitats were used in the proportion expected based on availability. In early summer, Wet Grassland was preferentially used while Dry Grassland was preferentially avoided. The

relative degree of exposure from wind may explain why horses spent less time than expected in exposed marshes during winter and more time than expected in forest. The availability of fresh water and hydrophytes may explain why horses spent more time than expected in Wet Grassland in summer and less time than expected in Dry Grassland. Seasonal habitat preferences should be considered when managing for ecosystem sustainability of feral horses on barrier islands.

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Abstract: A small trawl and beach seine survey was made, June 1965-July 1966, of marine fishes inhabiting 27 selected stations in seaside waters of Virginia's Eastern Shore. Seventy species were collected, 47 by trawl and 52 by seine. Eleven species are considered resident. Ten species made up 97.8% of the total number collected with Menidia menidia being the most abundant. A checklist of 96 species known to inhabit the area is given with hydrographic and distributional details for each species when known. Species assemblages by seasons for inlet, midchannel, inshore beaches, and tidal creeks are also given in tabular form.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

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Abstract: A list of species occurring in mudflats, tide pools, beaches, on rock jetties and wharves at Cape Henry and Cape Charles, Virginia, is presented.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Abstract: A rough count shows that more than 50 formations and physiographic names have been used along the Atlantic coast from New Jersey to Georgia. There is good physiographic and paleontological evidence of a Sangamon shoreline at about 28 and possibly 42 ft. There is no evidence of higher Pleistocene shorelines in New Jersey, Delaware, or Maryland. There is

physiographic and paleontologic evidence of such a shoreline in South Carolina and Georgia. The terraces above the 100 ft. contour are probably non-marine and may be of Tertiary age. The old idea that the Atlantic Coastal Plain has been very stable during Pleistocene time is questioned. The eustatic fluctuations may be superimposed on a tectonically rising coast. There is evidence of a mid-Wisconsin high stand of sea, but it is questioned whether this is due to a higher stand of the sea than present or to tectonic movements. There is no evidence of a Holocene stand of the sea higher than present.

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Library: SMC, SU, TU, UD-Morris, UMBC, UMCP

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Abstract: The potential sources of relatively great concentrations of arsenic (As) in oysters from the Southeastern United States coast was examined in a study conducted from August 1998 through October 1999. A transplant experiment was conducted to determine whether genetic or environmental differences accounted for the observed difference between Southeastern oysters, and oysters elsewhere on the east coast. Oysters originating in South Carolina (a region where As in oysters is usually greater) and Maryland (a region where arsenic is oysters is less) were reciprocally transplanted to determine whether site of growth or site of origin would determine the accumulation of As. To examine the potential role of various potential sources of As exposure on the concentrations of As in oysters, samples of native oysters, water, pore water and suspended particles were collected and analyzed for As monthly, while the sediments were examined four times during the year. Concentrations of As in transplanted oysters matched the concentrations of As in oysters native to the area in which they were grown, rather than that of oysters from their site of origin. Oysters from South Carolina had average concentrations of As$\approx$3.2 times that of oysters from Maryland. This enrichment was similar to enrichments of water (3.4 times), sediment (2.5 times), suspended particles (1.7 times), and pore water (3.1 times) from South Carolina compared to Maryland. This supports the hypothesis that the cause of the apparent As enrichments in the Southeastern oysters is environmental, but leaves the question of the primary source for arsenic incorporation by oysters open.

Library: CBL, TU and UD-Morris [both electronic], UMCP

Ripley, J. L. and C. M. Foran. 2006. Population structure, growth rates, and seasonal abundance of two *Syngnathus* pipefish species. *Estuaries and Coasts* 29(6B):1161-1171.

Abstract: Northern pipefish, *Syngnathus fuscus*, and dusky pipefish, *Syngnathus floridae*, are among the most abundant ichthyofauna components of the Chesapeake Bay eelgrass beds, *Zostera marina*, but population structure and many life history traits remain uncharacterized. We conducted monthly collections from May through September 2003-2005 in Chincoteague Bay, Virginia, to investigate seasonal migration and spawning, sex ratios, size at maturity, sexual dimorphism in length, and growth rates. Both *S. fuscus* and *S. floridae* spawned from May through September. Water temperature was significantly correlated with *S. fuscus* catches, whereas *S. floridae* abundance peaked after maximum water temperatures. Sex ratio data indicated *S. floridae* populations are balanced, while *S. fuscus* populations are strongly female-biased. Both species can quickly reach reproductive maturity, potentially within one season, because *S. fuscus* and *S. floridae* population growth rates average 1.0 mm d^{-1} and minimum standard length at maturity measures 125 and 103 mm, respectively, for females and 99 and 91 mm, respectively, for males. For *S. fuscus*, females were significantly longer than conspecific males during time periods when juveniles were not rapidly maturing. Size sexual dimorphism in this species coincides with reports of extensive paternal care and supports the hypothesis that the strength of sexual selection differs in these species.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Ripley, J. L. and C. M. Foran. 2007. Influence of estuarine hypoxia on feeding and sound production by two sympatric pipefish species (Syngnathidae). *Marine Environmental Research* 63(4):350-367.

Abstract: This research utilizes the acoustic behavior of two sympatric pipefish species to assess the impact of hypoxia on feeding. The authors collected northern, *Syngnathus fuscus*, and dusky pipefishes, *Syngnathus floridae*, from the relatively pristine Chincoteague Bay, Virginia, and audiovisually recorded behavior in the laboratory of fish held in normoxic (>5mg/L O_2) and hypoxic (2 and 1mg/L O_2) conditions. Both species produced high frequency (0.9-1.4kHz), short duration (3-22msec) clicks. Feeding strikes were significantly correlated with both wet weight of ingested food and click production. Thus, sound production serves as an accurate measure of feeding activity. In hypoxic conditions, reduced food intake corresponded with decreased sound production. Significant declines in both behaviors were evident after 1 day and continued as long as hypoxic conditions were maintained. Interspecific differences in sensitivity were detected. Specifically, *S. floridae* showed a tendency to perform head snaps at the surface. *S. fuscus* exhibited a breakdown in the coupling of sound production with food intake in 2mg/L O_2) with clicks produced in other contexts, particularly choking and food expulsion. Reductions in feeding will ultimately impact growth, health, and eventually reproduction as resources are devoted to survival instead of gamete production and courtship. This work suggests acoustic monitoring of field sites with adverse environmental conditions may reflect changes in feeding behavior in addition to population dispersal.

Library: CBL, UD-GCMES, UD-Morris, UMBC, UMCP

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Abstract: An up-date of previous work in 1977 is presented in which nutrient budgets for subbasins of Indian River Bay, Rehoboth Bay and Little Assawoman Bay were developed. In addition, an assessment of the efficacy of nutrient controls on the subbasin level was performed along with recommendations for nutrient management.

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Rodriguez, A., C. Zimmerman, A. Roach and C. Schupp. 2007. Visualizing the impact of a wind turbine facility on the viewshed of Assateague Island National Seashore. *Coastal Geotools '07.* p. 60.

Abstract: As the demand and cost of fossil fuels increase, the popularity of wind turbine facilities in the United States continues to rise. Although no formal proposals have been submitted, some discussions have recently taken place concerning the installation of such a facility off the coast of Assateague Island National Seashore. These wind turbines can be 100's of meters tall, and the location, size, and number of turbines could severely impact the natural viewshed of the National Seashore. As a result, investigations into these impacts have begun through the use of visualization and GIS software. WindPro, which is wind turbine software designed by the Danish company EMD, was recently purchased and is currently being utilized to create a visualization of wind turbines on landscape digital photographs. Lidar elevation data and viewshed tools within ESRI ArcGIS software are also being used to determine which areas within the Seashore would be most affected by potential locations of the wind turbine facility. These methods will allow research managers at Assateague Island National Seashore to visually and specifically demonstrate the effect a wind turbine facility would have on the natural viewshed.

Library: SU, UMBC, UMCP [all are C 55.32/8 with web access]; UD-GCMES [on line access]

Roithmayr, C. M. 1963. Distribution of fishing by purse seine vessels for Atlantic menhaden, 1955-59. *United States Fish and Wildlife Service, Special Scientific Report – Fisheries* No. 434:1-22.

Abstract: The number and location of purse seine sets recorded in logbooks and the number of vessel landings at reduction plants were compiled and estimates made of the total number and distribution of sets for Atlantic menhaden, Brevoortia tyrannus, during five seasons, 1955-59. Number of sets, by month and area, is given, and variations are noted. Distribution of sets by month is shown graphically. Apparent fish movements were inferred from the distribution of sets

Roman, C. T. and K. F. Nordstrom. 1988. The effect of erosion rate on vegetation patterns of an east coast barrier island. *Estuarine, Coastal and Shelf Science* 26(3):233-242.

Abstract: The relationship between geomorphic processes and barrier island vegetation patterns was analyzed along the northern 14 km of Assateague Island National Seashore, Maryland. Long-term shoreline changes on this sediment-starved coast ranges from erosion of 6.6 m/yr to deposition o 0.4 m/yr resulting in a continuum of vegetation patterns from an overwash-dominated community to a stable shrub thicket and associated salt-marsh community. Erosion rates greater than a critical threshold of 4.5 m/yr result in an overwash community which persists over time.

Library: CBL, HPL, SU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Roosenburg, W. M. 1994. Nesting habitat requirements of the diamondback terrapin: a geographic comparison. *Wetland Journal* 6(2):8-11.

Ropes, J. W. 1970. Maryland surf clam landings increase. Chesapeake Bay Affairs, *Commercial Fisheries News* 3(2).

Ropes, J. W. 1979. Shell length at sexual maturity of surf clams, *Spisula solidissima* from an inshore habitat. *Proceedings of the National Shellfish Association* 69:85-91.

Abstract: Sexual maturity was determined in small *S. solidissima* of a discrete group found at Chincoteague Inlet, Virginia, in late 1964. Gametes were present in 12% of the clams in an October 1964 sample, but larger and smaller immature specimens predominated. Most (91%) of the clams in a May 1965 sample were ripe, but, thereafter, differentiated gametes were in only 10% of the samples during the remainder of the year. The few sexually mature clams were the largest or nearly the largest (69 mm or more) in the samples. Although a spawning occurred in early summer of 1965, and some individuals were recognized as sexually mature afterwards, the clams that year were considered not fully mature. Full maturity, characterized by extensively proliferated gonadal tubules and differentiated gonia, was attained by all clams in 1966. The smallest fully mature clam was 45 mm long, but growth to a size larger than other clams in a sample seemed important in earlier development of sexuality. Factors affecting rapid growth, and not age alone, then, seemed to influence attainment of sexual maturity.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Ropes, J. W. and A. M. Barker. 1972. The Atlantic surf clam fishery - 1970. *Commercial Fisheries Review* 39(9-10):36-44.

Abstract: The 1970 surf clam fishery produced record landings of 66.8 million 1bs of meats-35% more than in 1969. The New Jersey catch of 48.0 million 1bs, a 24% increase, almost equaled the total landings for 1969. Maryland and New York landings increased by 6.6 and 0.5 million 1bs, respectively. Landings at Virginia ports totaled 0.9 million 1bs. The fleet size decreased and the

southward shift continued. The number of vessels declined at Point Pleasant, New Jersey, and Cape May-Wildwood, New Jersey, but remained the same at Ocean City, Maryland, and Long Island, New York.

Library: CBL, FSU, UD-Morris, UD-GCMES, UMCP

Rosati, J. D. 2005. Concepts in sediment budgets. *Journal of Coastal Research* 21(2):307-322.

Abstract: The sediment budget is fundamental in coastal science and engineering. Budgets allow estimates to be made of the volume or volume rate of sediment entering and exiting a defined region of the coast and the surplus or deficit remaining in that region. Sediment budgets have been regularly employed with variations in approaches to determine the sources and sinks through application of the primary conservation of mass equation. Historically, sediment budgets have been constructed and displayed on paper or maps. Challenges in constructing a sediment budget include determining the appropriate boundaries of the budget and interior cells; defining the possible range of sediment transport pathways, and the relative magnitude of each; representing the uncertainty associated with values and assumptions in the budget; and testing the sensitivity of the series of budgets to variations in the unknown and temporally-changing values. These challenges are usually addressed by representing a series of budget alternatives that are ultimately drawn on paper, maps, or graphs. Applications of the methodology include detailed local-scale sediment budgets, such as for an inlet or beach fill project, and large-scale sediment budgets for the region surrounding the study area. The local-scale budget has calculation cells representing features on the order of 10s to 100s of meters, and it must be shown separately from the regional sediment budget, with cells ranging from 100s of meters to kilometers.

This paper reviews commonly applied sediment budget concepts and introduces new considerations intended to make the sediment budget process more reliable, streamlined, and understandable. The need for both local and regional sediment budgets is discussed, and the utility of combining, or collapsing, cells is shown to be beneficial for local budgets within a regional system. Collapsing all cells within the budget creates a “macrobudget,” which can be applied to check for overall balance of values. An automated means of changing the magnitude of terms, while maintaining the same dependency on other values within the sediment budget, is presented. Finally, the need for and method of tracking uncertainty within the sediment budget, and a means for conducting sensitivity analyses, are discussed. These new concepts are demonstrated within the Sediment Budget Analysis System with an application for Long Island, New York, and Ocean City Inlet, Maryland.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Rosenburg, W. M. 1991. *Final Report: The Chesapeake Diamondaback Terrapin Investigations*. CRC Publications.

Rosenfield, A. 1976. Infectious diseases in commercial shellfish on the middle Atlantic coast. **IN:** *Middle Atlantic Continental Shelf and the New York Bight, Proceedings of the Symposium*. American Museum of Natural History, New York City, 3, 4 and 5 November 1975. no. 2, M. G. Gross, Ed. American Society of Limnology and Oceanography, Inc., (Lawrence, Kansas). pp. 421-423.

Abstract: Several important molluscan and crustacean food organisms of the middle Atlantic coast of the United States are subjected to natural and man- caused perturbations and to infectious diseases. Among the naturally occurring diseases, the protozoan oyster parasites *Minchinia nelsoni* and *Minchinia costalis* cause devastating oyster mortalities, particularly in Delaware and lower Chesapeake Bays. *Minchinia nelsoni* infections continue to be prevalent in Delaware Bay,

with apparent resistance to the disease having developed there. Several other infectious disease agents cause pathology or damage to these bivalve molluscs including viruses, bacteria, other protozoans, fungi, helminths, and crustacean parasites. Except for *Minchinia* and *Labyrinthomyxa marina* (= *Dermocystidium marinum*), none of these organisms is known to cause massive mortalities of adult bivalve molluscs. However, expression of herpes-type inclusions in hemocytes may be enhanced in ousters exposed to thermal effluents. Proliferative cell conditions in marine shellfish have been reported with increased frequency recently and neoplasias of molluscs in epizootic proportions have been reported from both US coasts. Gonadal neoplasms in soft-shell clams (*Mya arenaria*) have been found in areas associated with oil spills. Studies of benthic crustaceans from Sandy Hook Bay and the New York Bight show that the parasitic amoeba *Paramoeba perniciosa* occurs in rock crabs *Cancer irroratus* and American lobsters *Homarus americanus*. Lobsters, shrimp, and rock crabs near sludge and spoil disposal grounds in the New York Bight had shell erosion and ulcers. Naturally occurring bacteremias in lobsters and blue crabs have been reported and may play a role in crustacean epizootics. Virus-like infections in blue crabs from Chincoteague Bay have recently been noted. Polychlorinated biphenyls may activate production of a *Baculovirus* in shrimp exposed to sublethal levels of these compounds. Viruses may be latent in shellfish and activated by the presence of certain chemicals.

Library: UD-GCMES [GC511 .M5]

Rounds, R. A., R. M. Erwin and J. H. Porter. 2004. Nest-site selection and hatching success of waterbirds in coastal Virginia: some results of habitat manipulation. *Journal of Field Ornithology* 75(4,):317-329.

Abstract: Rising sea levels in the mid-Atlantic region pose a long-term threat to marshes and their avian inhabitants. The Gull-billed Tern (*Sterna nilotica*), Common Tern (*S. hirundo*), Black Skimmer(*Rynchops niger*), and American Oystercatcher (*Haematopus palliatus*), species of concern in Virginia, nest on low shelly perimeters of salt marsh islands on the Eastern Shore of Virginia. Marsh shell piles are free of mammalian predators, but subject to frequent floods that reduce reproductive success. In an attempt to examine nest-site selection, enhance habitat, and improve hatching success, small (2 x 2 m) plots on five island shell piles were experimentally elevated, and nest-site selection and hatching success were monitored from 1 May to 1 August, 2002. In addition, location, elevation, and nesting performance of all other nests in the colonies were also monitored. No species selected the elevated experimental plots preferentially over adjacent control plots at any of the sites. When all nests were considered, Common Tern nests were located significantly lower than were random point elevations at two sites, as they tended to concentrate on low-lying wrack. At two other sites, however, Common Tern nests were significantly higher than were random points. Gull-billed Terns and American Oystercatchers showed a weak preference for higher elevations on bare shell at most sites. Hatching success was not improved on elevated plots, despite the protection they provided from flooding. Because of a 7 June flood, when 47% of all nests flooded, hatching success for all species was low. Nest elevation had the strongest impact on a nest's probability of hatching, followed by nest-initiation date. Predation rates were high at small colonies, and Ruddy Turnstones (*Arenaria interpres*)depredated 90% of early Gull-billed Tern nests at one shell pile. The importance of nest elevation and flooding on hatching success demonstrates the potential for management of certain waterbird nesting sites. Facing threats from predators on barrier islands and rising sea levels especially in the mid-Atlantic region, several species of nesting waterbirds may benefit dramatically with modest manipulation of even small habitat patches on isolated marsh islands.

Library: TU, UD-Morris, UMCP

Rountree, H.C., & T.E. Davidson. 1997. *Eastern Shore Indians of Virginia and Maryland*. University of Virginia Press, Charlottesville, Virginia.

ISBN: 0813918014

Rudloe, A. 1981. Aspects of the biology of juvenile horseshoe crabs, *Limulus polyphemus*. *Bulletin of Marine Science* 31:125-133.

Library: CBL, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Russell, F. S. 1931. The vertical distribution of marine macroplankton. X. Notes on the behavior of *Sagitta* in the Plymouth area. *Journal of the Marine Biological Association of the United Kingdom* 17(2):391-414.

Abstract: The younger stages of *Sagitta elegans* appear to withstand higher intensities of light in the daytime than do the older stages, and they migrate first to the surface at dusk, as do those of *Sagitta setosa*. The older stages leave the surface first at dawn. Diagrams show the curves of equal intensities of light beneath the sea surface throughout 24 hours, as calculated from air intensities obtained in June, with coefficients of absorption of0.20 and 0.10, respectively at all depths. It appears that the older *Sagitta* are more sensitive to light of higher intensities later in the day. Details are given of the results of a series of hauls at different depths throughout the day and night in June 1926. These results are compared with those obtained on three nights in previous years. The importance is stressed of the effects on the type of behavior shown by any animal produced by the depth at which it is living in the daylight and the speed at which it can swim upward.

Library: CBL, HPL, SMC, TU, UD-GCMES, UD-Morris, UMCP, UMES

Russell, F. S. 1931. The vertical distribution of marine macroplankton. XI. Further observations on diurnal changes. *Journal of the Marine Biological Association of the United Kingdom* 17(3):767-784.

Abstract: (See above)

Russell, F. S. 1933. On the biology of *Sagitta*. III. A further observation on the growth and breeding of Saggita setosa in the Plymouth area. *Journal of the Marine Biological Association of the United Kingdom* 18(2):555-558.

Abstract: (See below)

Russell, F. S. 1933. On the biology of *Sagitta*. IV. Observations on the natural history of *Sagitta elegans* Verrill and *Sagitta setosa* J. Muller in the Plymouth area. *Journal of the Marine Biological Association of the United Kingdom* 18(2):559-574.

Abstract: Two species of *Sagitta* occur in the waters off Plymouth, *S. elegans* and *S. setosa*. Each passes through several generations in the year, but neither breeds during November-January. The adults of the different broods growth to different sizes. The different broods appear to differ in their sensitivity to light as shown by their vertical distribution; *S. setosa* lives slightly higher in the water than does *S. elegans*. During 1930, 1931, and 1932, the composition of the Sagitta population was examined weekly. In the first half of 1930, *S. elegans* practically predominated; towards the end of that year *S. setosa* began to increase in comparative abundance so that by the end of 1931 and during most of 1932 it almost predominated over *S. elegans*.

Library: CBL, HPL, SMC, TU, UD-GCMES, UD-Morris, UMCP, UMES

Russell, H. D. 1941. Recent mollusks of the family Neritidae of the Western Atlantic. *Bulletin of the Museum of Comparative Zoology, Harvard College* 88(4):347-404.

Abstract: Six general occurring the western Atlantic which include 15 species and 1 subspecies. Descriptions are given with an account of the radulae, and additional geographic data and the ecology of all species that have been studied in the field.

Library: CBL, UD-Morris, UMCP

Rutberg, A. T. 1990. Inter-group transfer in Assateague pony mares. *Animal Behavior* 40(5):945-952.

Abstract: Between-group transfer of adult female *Equus caballus* was investigated for 3 consecutive summers on Assateague Island, Maryland. Long-term transfers occurred at rates of 0.06-0.18 per mare per month. Mares with foals transferred more frequently than mares without foals, but neither female age, pregnancy, nearest-neighbor distance nor dominance rank affected the likelihood of transferring. Band turnover rates were uncorrelated with the average frequency of mare-mare aggression within the band, but new mares entering a band suffered a transient rise in aggression received. Thus, female aggression did not encourage, and may have discouraged, interband transfers. Older stallions and stallions who had held bands for ≥2 yr or more had significantly larger and more stable bands. Fewer mare turnovers were seen in bands whose stallions tended to face their mares, showed a relatively high proportion of time feeding, and showed a relatively low proportion of time involved in aggression with other stallions, although at marginal levels of significance for all three variables. Thus, variability in stallion attributes, and possibly behavior, probably plays the strongest role in determining mare transfer patterns.

Library: CBL, FSU, SNC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Rutberg, A. T. and S. A. Greenberg. 1990. Dominance and aggression frequencies and modes of aggressive competition in feral pony mares. *Animal Behavior* 40(2):322-331.

Abstract: Feral *Equus caballus* mares at Assateague Island, Maryland, formed linear hierarchies within bands. Generally, older mares dominated younger, and larger dominated smaller mares. Large mares initiated aggression more often than small mares when age was controlled for, but older mares initiated aggression less often than younger mares when sze was controlled for. Thus, mares peak in aggressiveness fairly soon after achieving full size and then, while maintaining or improving their rank in the dominance hierarchy, progressively reduce their involvement in aggression as they grow older. Involvement in aggression per mare increased as number of mares in the group increased, an effect independent of nearest-mare distances. Aggression was directed more frequently than expected at subordinate mares who were nursing, and also occurred more frequently than expected at water holes. The proportion of aggressive encounters during grazing closely matched the total proportion of time spent grazing. Subordinate mares with foals received aggression more often than subordinate mares without foals. The high frequency of aggression associated with foals and nursing suggests that interference with reproduction of subordinates is an important mode of competition between mares.

Library: CBL, FSU, SNC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Rutberg, A. T. and R. R. Keiper. 1993. Proximate causes of natal dispersal in feral ponies: Some sex differences. *Animal Behavior* 46(5):969-975.

Abstract: For *Equus caballus* at Assateague Island, Maryland, 97% of males and 81% of females dispersed from their natal groups by five years of age. For animals that left their natal group, average age of dispersal was 20.8 months for males and 24.6 months for females. Male dispersal age was strongly and significantly correlated with number of peers in the natal group; males dispersing with peers were significantly older than males dispersing without peers, suggesting that males delayed dispersal when peers were available for interaction. Female dispersal age was not influenced by number of peers, but was correlated with age of first reproduction. Factors not influencing dispersal age in either sex were presence of a younger sibling, maternal band transfers, and maternal age and dominance rank. The relatively high frequency of females failing to disperse from their natal groups is puzzling since diminished fecundity occurs in non-dispersing pony mares.

Library: CBL, FSU, SNC, SU, TU, UD-Morris, UMBC, UMCP, UMES

Ryan, E. P. 1956. Observations on the life histories and distribution of the Xanthidae (mud crabs) of Chesapeake Bay. *American Midland Naturalist* 56(1):138-162.

Abstract: Data on life histories and factors affecting distribution of five species of xanthid crabs in Chesapeake Bay: *Neopanope texana sayi* from inshore waters of lower bay, *Panopeus herbsti* from waters with salinity above 14 ppt, *Hexapanopeus angustifrons* from deeper waters; *Eurypanopeus depressus* and *Rhithropanopeus harrisi* are abundant in sheltered places, usually oyster reefs, both growing after sexually mature. Two keys are given for the identification of the six xanthids known from the bay; one for specimens with the major chela present, the other for those lacking it.

Library: CBL, FSU, HPL, SMC, TU, UD-Morris, UMBC, UMCP, UMES

Ryder, J. A. 1884. Journal of operations on grounds of Eastern Shore oysters – Co. on Chincoteague Bay near Stockton, Md., during the summer of 1883. *U.S. Commission of Fisheries Bulletin* 4:43-47.

Library: UD-GCMES, UD-Morris, UMCP

Ryer, C. H. 1987. Temporal patterns of feeding by blue crabs (*Callinectes sapidus*) in a tidal-marsh creek and adjacent seagrass meadow in the lower Chesapeake Bay. *Estuaries* 10:136-140.

Abstract -- A 24-h study of blue crab feeding periodicity was conducted concurrently in a tidal marsh creek and adjacent seagrass meadow in the lower Chesapeake Bay. Crabs from the grassbed tended to have fuller guts than crabs from the marsh creek. In the grassbed, a weak trend toward nocturnal feeding was observed, with an apparent peak at dusk. During the day, crabs were not easily observed and were assumed to be feeding beneath the eelgrass canopy; at night crabs fed in the canopy. In the marsh creek, feeding was related to the tidal cycle, with guts being fullest at high tide and decreasing to lows just prior to the next high tide. This study suggests the potential importance of habitat on blue crab feeding patterns.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Ryland, J. S. and P. J. Hayward. 1991. Erect Bryozoa. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS 99.* 48 pp.

Abstract: Forty-nine species of erect Bryozoa from a broad range of Cyclostomes, Ctenostome, and Cheilostome families are described and illustrated, and an artificial dichotomous key is provided for their identification. In general, the marine bryozoan faunas of the northeastern coasts of the United States are poorly known; species records are sparse and voucher collections few, and it is certain that many more species occur in this region than are presently known. The species described here occur in intertidal, coastal or offshore habitat; some are well known and have been recorded on numerous previous occasions, others have been only rarely reported, while a few are known to occur commonly in the north of the region but have yet to be recorded south of Cape Cod. Some of the species described have not been recorded at all on northeastern coasts of the United States, but are widely distributed in North Atlantic continental shelf habitats and perhaps occur in similar parts of the outer shelf of this region. This fauna is thus provisional, but is intended to stimulate further work on the Bryozoa.

Rzhavsky, A. V. 1994. On the morpholecology of spirorbid tubes (Polychaeta: Spirorbidae). *Ophelia* 39:177-182.

Library: CBL, HPL, UD-GCMES, UD-Morris, UMCP

Sallenger, A. H., Jr., J. List, M. Hansen, R. A. Holman, S. Manizade, J. Sontag, A. Meredith, K. Morgan, J. K. Yunkel, E. B. Frederick, H. Stockdon, W. B. Krabill, R. N. Swift and J. Brock. 2003. Evaluation of airborne topographic lidar for quantifying beach changes. *Journal of Coastal Research* 19(1):125-133.

Abstract: A scanning airborne topographic lidar was evaluated for its ability to quantify beach topography and changes during the Sandy Duck experiment in 1997 along the North Carolina coast. Evaluation estimates, acquired with NASA's Airborne Topographic Mapper (ATM) were compared to elevations measured with three types of ground-based measurements – 1) differential GPS equipped all-terrain vehicle (ATV) that surveyed a 3 km reach of beach from the shoreline to the dune, 2) GPS antenna mounted on a stadia rod used to intensely survey a different 100 m reach of beach, and 3) a second GPS-equipped ATV that surveyed a 70-km-long transect along the coast. ATM surveys of Assateague Island (spanning the border of Maryland and Virginia) prior to an immediately following a severe northeaster showed vertical beach changes in places greater than 2 m, much greater than expected errors associated with the ATM.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Sanders, H. L. 1958. Benthic studies of Buzzard's Bay. I. Animal – sediment relationships. *Limnology and Oceanography* 3:245-358.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Sanders, H. L. 1960. Benthic studies in Buzzard's Bay. III. The structure of the soft-bottom community. *Limnology and Oceanography* 5:138-153.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Savoy, T. and D. Pacileo. 2003. Movements and important habitats of subadult Atlantic sturgeon in Connecticut waters. *Transactions of the American Fisheries Society* 132(1):1-8.

Library: CBL, FSU, HPL, SMC, TU, UD-GCMES, UD-Morris, UMCP, UMES

Sawyer, T. K. 1975. Marine amoebae from surface waters of Chincoteague Bay, Virginia: two new genera and nine new species within the families Mayorellidae, Flabellulidae, and Stereomyxidae. *Transactions of the American Microscopical Society* 94(1):71-92.

Abstract: Field trips to Chincoteague Bay, Virginia were made to determine the types of marine amoebae that could be detected in sea-water samples taken during different months of the year (January, April, May, August, October). Sea water from the bay ranged in salinity from 25.7 to 32.6 ppt, and temp ranged from 4.5 to 28{degree}C. Water samples collected in Jan (4.5^{o}C) yielded approx the same species diversity as water samples collected in August (28^{o}C). Descriptions are offered of 2 new genera, *Boveella* gen.n. (Mayorellidae) and *Stygamoeba* gen.n. (Stereomyxidae), and 9 new species: *Mayorella corlissi*, *M. smalli*, *Vexillifera pagei*, *V. ottoi*, *V. browni*, *Triaenamoeba jachowskii*, *Flabellula hoguae*, *Boveella obscura*, and *Stygamoeba polymorpha*.

Library: CBL, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Sawyer, T. K. 1975. Marine amoebae from surface waters of Chincoteague Bay, Virginia: one new genus and eleven new species within the families Thecamoebidae and Hyalodiscidae. *Transactions of the American Microscopical Society* 94(3):305-323.

Abstract: Eleven new spp of marine amoebae were established in pure clonal cultures after isolation from sea-water samples taken from Chincoteague Bay, Virginia. Comparative features of interphase nuclei of different genera and species were determined, rates of locomotion were measured, and survival in diluted sea water and in fresh water was studied in water and on agar media. Phase contrast photomicrographs were made to document specific features of trophozoites, interphase nuclei, and floating-or rayed-stages. One new genera and 8 new species are assigned to the family Thecamoebidae Schaeffer, 1926: *Lingulamoeba leei* gen. nov., sp. nov., *Platyamoeba murchelanoi* sp. nov., *P. langae* sp. nov., *P. weinsteini* sp.nov., *P. douvresi* sp.nov., *Clydonella rosenfieldi* sp. nov., *C. sindermanni* sp. nov., and *C. wardi* sp. nov. 3 new species are placed in the family Hyalodiscidae Poche, 1913: *Hyalodscus angelovica* sp. nov., *Gibbodiscus newmani* sp. nov., and *Unda schaefferi* sp. nov. Recent progress in the taxonomy and systematic of the families Thecamoebidae and Hyalodiscidae and certain unresolved problems of generic and specific characteristics are discussed.

Library: CBL, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Sawyer, T. K. 1979. Species diversity among marine Protozoa in sediment from a sewage disposal site. *Journal of Protozoology* 22(3, part 1):26A.

Abstract: Sea-bottom sediments were collected from 10 stations located in or near a New York Sewage disposal site. Five of the stations yielded one or more species of *Acanthamoeba* (A. *castellanii*, A. *rhysodes*, A. *polyphaga*, A. *culbertsoni*, A. *hatchetti*). Upon subculture all 5 were found to grow throughout the range of distilled-water to seawater. *Acanthamoeba* usually did not appear on parent cultures made with seawater because marine species usually cleared bacterial food before slower growing species became established. Full-strength seawater-agar plates yielded: *Paramoeba pemaquidensis*, *P. aesturina*, Vexillifera ottoi, *Flabellula* sp., *Clydonella vivax*, *C. wardi*, *C. rosenfieldi*, *Platyamoeba flabellata*, *P. langae*, *P. murchelanoi*, *Lingulamoeba leei*, *Hyalodiscus angelovica*, *Stygamoeba polymorpha* , and unidentified small limax amoebae.

All of the marine species previously were identified from surface waters of Chincoteague Bay, Virginia. Other incompletely identified species included a minute heliozoan, a small testacean of about 30 m in diameter, a colorless *Labyrinthula* with distinct slime tracks, and a species with reticulate filose pseudopodia which resembled *Lieberkuhnia* and a large plasmodial form which resembled proteomyxans belonging to the order *Leptomyxida*. The last two forms were isolated only from black sewage-sludge sediment.

Library: CBL, SMC, TU, UD-Morris, UMBC, UMCP

Scarpulla, E. J. 1989. First records for the leatherback turtle (*Dermochelys coriacea*) along Maryland's Atlantic coast. *Maryland Naturalist* 33(304):59-60.

Library: CBL, FSU, SU, TU, UMBC, UMCP

Scheltema, R. S. 1961. Metamorphosis of the veliger larva of *Nassarius obsoletus* (Gastropoda) in response to the bottom sediment. *Biological Bulletin* 120:92-102.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Scheltema, R. S. 1964. Feeding and growth in the mud snail, *Nassarius obsoletus*. *Chesapeake Science* 5(4):161-166.

Abstract: *Nassarius obsoletus* is primarily a deposit feeder. The microflora to be found on the surface of sediment of intertidal flats serves as its major source of food. Living bivalves do not form part of the diet as previously reported. Dead organisms such as molluscs, Crustacea, and fish are eaten when available but are not a principal item of food. Occasionally, thallus algae are probably also used. Ecologically, *N. obsoletus* may be regarded largely as a herbivorous species and deposit feeder. In the strict sense, however, it is an omnivore and a facultative scavenger.

Growth of *N. obsoletus* occurs principally during the summer months. The winter is passed in a state of quiescence below mean low water. Zero- and one-year classes are readily distinguished but after the third summer the various age groups can no longer be identified by the length frequency method. The longevity of *N. obsoletus* cannot be directly determined but some individuals probably live to at least five years. A growth of 1.3 to 1.4 mm per month was estimated during the first two summers in a New England population. An increase in length of 3 to 5 times that at the time of metamorphosis occurs during the first summer's growth.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Scheltema, R. S. 1965. The relationship of salinity to larval survival and development in *Nassarius obsoletus* (Gastropoda). *Biological Bulletin* 129:340-354.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Scheltema, R. and R. V. Truitt. 1956. The shipworm, *Teredo navalis*, in Maryland coastal waters. *Ecology* 37(4):841-843. [Contribution No. 103, Maryland Department of Research and Education]

Abstract: The destructive family of marine molluscs, the Teredinidae, were observed in Maryland coastal waters during the years 1950 through 1953. *Teredo navalis* Linné is the species commonly found at Ocean City, Maryland. The set of T. navalis occurs during the months of July through

October and occasionally as late as early November. The months of heaviest set vary. The heaviest sets at Ocean City occurred in August 1950, September 1951, and July 1952. The magnitude of the set observed at Ocean City was greatest in 1951 and least in 1952. There was a substantial difference n the severity of the attack. The set at Ocean City increased with increasing depth below mean low water. The rate of boring at Ocean City was greatest the first few months after set, decreased during the subsequent winter, and appeared to increase the following spring. A low incidence in the set of *T. navalis* was observed in the Chincoteague Bay estuary between 1950 and 1952. On the basis of knowledge to date, the reason for this low incidence was unknown. Adequate precautions in the construction of waterfront structures in Chincoteague Bay should be taken to prevent possible severe destruction in future years.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Schimmel, S. C., B. D. Melzian, D. E. Campbell, C. J. Strobel, S. J. Benyi, J. S. Rosen and H. W. Buffum. 1994. *Statistical Summary: EMAP – Estuaries Virginian Province – 1991*. U.S. Environmental Protection Agency, Office of research and Development, Environmental Research Laboratory (Narragansett, Rhode Island). EPA/620/R-94/005.

Schmitt, W. L. 1935. Mud shrimps of the Atlantic Coast of North America. *Smithsonian Miscellaneous Collections* 93(2):1-21.

Abstract: A key is presented for ten species of Calianassa found on the North American Atlantic coast. Included are description of the new taxa *Callianassa* (*Callichirus*) *islagrande*, *Callianassa jamaciense*, *Callianassa jamaicense rathbunae*, *Callianassa* (*Callichirus*) *longiventris*, and *Callianassa* (*Callichirus*) *acanthochirus*.

Schneider, R. L. 1984. *The Relationship of Infrequent Oceanic Floding to Groundwater Salinity, Topography, and Coastal Vegetation*. Master of Science Thesis, Department of Environmental Sciences, University of Virginia (Charlottesville).

Schoepf, J. D. 1911. *Travels in the Confederation (1783 – 84).* Translated and edited by A. J. Morrison. W. J. Campbell, Publishers (Philadelphia, Pennsylvania). 2 volumes.

Library: SMC, UD-Morris, UMCP, UMES [all are E164 .S38 1968]

Schreve, F., M. A. Chrysler, F. H. Blodgett and F. W. Besley. 1910. *The Plant Life of Maryland*. Maryland Weather Service. Special Publication, Volume III. Johns Hopkins Press (Baltimore, Maryland).

Library: FSU[QK941.M3 S57 1969], TU [QK941.M3 P5], UD-Morris [QC984 .M3 A23], UMBC [QK165 .S4 1969], UMCP [QK165 .S4 1969]

Schultz, A. and E. Compton-Gooding, Eds. 1991. *Geologic Evolution of the Eastern United States.* Virginia Museum of Natural History (Martinsville, Virginia). Guidebook No. 2. 304 pp.

Library: FSU, TU, UMBC [all are QE78.3 .G45 1991]

Schuster, C. N. 1983. A commentary on claw deformations in the blue crab. *Estuarine Bulletin* 7(2-3):15-23.

Library: CBL, UD-GCMES, UMCP

Schwab, E. 1999. Development of a Maryland coastal bays water-use management plan. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:92-94.

Library: FSU [EP 1.23/6:620/R-00/001]

Schwartz, F. J. 1960. Bibliography of Maryland fisheries including published and unpublished papers on the fisheries and related fields of tidewater Maryland. *Chesapeake Biological Laboratory (Solomons) Contribution* No. 144. 35 pp.

Library: Univ. of MDCP, Frostburg, MD DNR, Towson Univ.

Schwartz, F. J. 1960. The barnacle, *Platylepas hexastylos*, encrusting a green turtle, *Chelonia mydas mydas*, from Chincoteague Bay, Maryland. *Chesapeake Science* 1(2):116-117.

Abstract: First record of the green turtle, *Chelonia mydas mydas*, in Maryland's Chincoteague Bay is presented. Also, the second known observation of a barnacle, *Platylepas hexastylos* – green turtle association is discussed.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Schwartz, F.J. 1960. Recent records of the xanthid crab, *Panopeus herbsti*, from Maryland and Virginia waters." *Chesapeake Science*. 1(3-4):201-203.

Abstract: Fifty-one recent (1956-1960) specimens established the xanthid crab, *Panopeus herbsti*, as part of Maryland and Virginia's mud crab fauna. Nine specimens of this mud crab were taken in Chesapeake Bay as far north as the Patuxent River while 42 were recorded from Chincoteague Bay. Some specimens from Chesapeake Bay were larger and found in shallower water than previously reported. The salinity range for the species has been extended from 14-19 ppt to 20-34 ppt.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Schwartz, F. J. 1961. Fishes of Chincoteague and Sinepuxent bays. *American Midland Naturalist* 65(2):384-408.

Abstract: A comprehensive monthly trawl survey of Maryland and Virginia's Sinepuxent and Chincoteague Bays found 65 species of fishes within 40 families and 59 genera currently occupying these two seaside bays. Twenty-three species were new to the fauna which, since 1876, now totals 99 species. Various methods (beach seining/ crab potting, hook and line fishing, and wire oyster test trays) were employed to capture smaller species. An annotated list of species, as

well as comments regarding seasonal population dynamics, size ranges, ecological requirements or preferences, are presented. Fish distributions, hydrographic conditions and invertebrates, mainly crabs, squids and Aurelia illustrated the predominant use of the southern inlet as an avenue of entry into Chincoteague Bay. The fishes and crabs that do enter Sinepuxent Bay by way of the northern inlet were not found beyond the 5-8 mile southward influx of water from that inlet.

Library: CBL, FSU, HPL, SMC, TU, UD-Morris, UMBC, UMCP, UMES

Schwartz, F. J. 1964. Fishes of the Isle of Wight and Assawoman bays near Ocean City, Maryland. *Chesapeake Science* 5(4):172-193.

Abstract: The occurrence of 104 species of fish belonging to 54 families and 87 genera in the Isle of Wight and Assawoman bays near Ocean City, Maryland, is reported. These fish were collected in 1959, 1961, 1962, and 1963 by various gear. Each species is accompanied by some ecological notes pertaining to seasonal oscillations of species populations, patterns of distribution in the bays, etc.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Schwartz, F. J. and D. G. Cargo. 1960. Recent records of the xanthid crab, *Panopeus herbsti*, from Maryland and Virginia waters. *Chesapeake Science* 1(3-4):201-203.

Abstract: Fifty-one recent (1956-1960) specimens now firmly establish the xanthid crab, *Panopeus herbsti*, as part of Maryland and Virginia's crab fauna. Nine specimens of this mud crab were taken in Chesapeake Bay as far north as the Patuxent River while 42 were recorded for Chincoteague Bay. Some specimens from Chesapeake Bay were larger and found in shallower water than previously reported. The salinity range for this species has been extended from 14-19 ppt to 10-34 ppt.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Schwartz, F. J., M. Castagna, and G. Griffith. 1960. Comments on the abundance and ecology of the ascidian, *Amaroucium constellatum* in Sinepuxent and Chincoteague bays. *Chesapeake Science* 1(3-4):197-199.

Abstract: The ascidian *Amaroucium constellatum* inhabits the shallow coastal Sinepuxent and Chincoteague bays and was found predominantly over mud, mud-oyster bottoms or on pilings and occasionally on the oyster drill, *Urosalpinx cineaea*, where moderate currents and salinities above 28 ppt. prevail. *A. constellatum* was also noted on sand bottoms to a depth of five fathoms in coastal waters near Chincoteague, Virginia.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Scott, D. 1986. Notes on the eastern hognose snake, *Heterodon platyrhinos* Latreille (Squamata: Colubridae), on a Virginia barrier island. *Brimleyana* 12:51-55.

Scott, D. E. and R. D. Dueser. 1992. Habitat use by insular populations of *Mus* and *Peromyscus*: What is the role of competition? *Journal of Animal Ecology* 61:329-338.

Abstract: Reciprocal-removal experiments were conducted to test for the occurrence and consequences of interspecific competition between the rodents *Mus musculus* and *Peromyscus leucopus* on Assateague Island, Virginia. Habitat use and population density of each species were monitored during pre- and post-removal periods. The species exhibited conspicuous differences in

pre-removal habitat use, with *M. musculus* occupying grassland and *P. leucopus* occupying adjacent shrub thickets. Neither species exhibited significant habitat shift or numerical increase following the removal of its putative competitor. Several possible explanations for the apparent absence of competitive release are discussed. Either competition did not occur during the experimental period, or it occurred but not on a level detectable by the experimental design used. The absence of habitat shifts, which should be detectable even on the level of the individual, argue for the former. The fact that *M. musculus* and *P. leucopus* could have coexisted at this location for only 300 years or so argues against the reduction of competition by "competitive coevolution." These results suggest that habitat selection and intraspecific interactions are much more important determinants of habitat use by these species than are interspecific interactions.

Scott, J. 1986. *Between Ocean and Bay: A Natural History of Delmarva*. Tidewater Publishers (Centreville, Maryland).

Library: SMC, SU, UD-Morris, UMCP [all are QH104.5.D46 S36 1991]

Scott, S. F. M. 1945. The developmental history of *Amaroecium constellatum*. I. Early embryonic development. *Biological Bulletin* 88:126-138.

Library: BSU, CBL, FSU, HPL, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Seagraves, R. J. 1986. *Survey of the Sport Fishery of Delaware Bay*. Delaware Department of Natural Resources and Environmental Control. Document No. 40-05/86/04/02. (Dover).

Secor, D. H., S. E. Campana, V. S. Zdanowicz, J. W. H. Lam, L. Yang and J. R. Rooker. 2002. Inter-laboratory comparison of Atlantic and Mediterranean bluefin tuna otolith microconstituents. *ICES Journal of Marine Science* 59(6):1294-1304.

Abstract: Elemental analysis of juvenile (age 0+ and 1 year) Atlantic bluefin tuna *Thunnus thynnu*s otoliths by isotope dilution and conventional inductively coupled plasma mass spectrometry (ID ICP-MS and ICP-MS) indicated that the concentrations of certain elements varied among putative nursery grounds in the Atlantic Ocean. Further, trace element fingerprints of age-1 tuna from each nursery u the western Atlantic and Mediterranean Sea u were distinct and varied sufficiently to distinguish individuals from different regions with moderate confidence. Overall correct classification rates for a simulated test set of age-1 tuna were 68% (using ICP-MS) and 81% (using ID ICP-MS), despite a small sample size (9 Mediterranean vs. 19 western Atlantic tunas). Although ID ICP-MS was the more accurate of the two ICP-MS technologies, inter-laboratory precision was moderately high (3-18%) for individual elemental concentrations (Li, Na, Mg, K, Ca, Mn, Sr, and Ba), and multi-variate elemental fingerprints were similarly ordinated between laboratories (r=0.75). Age-0 tuna samples were too small to permit statistical classification tests, but showed similar levels of elemental concentrations between laboratories. The results indicate that it should be possible to assign nursery ground origin to adult bluefin tuna based on the elemental composition of their extracted otolith core.

Library: UD-GCMES, UD-Morris

Sell, S. 2003. 10 great places to seek refuge from urban noise. *USA Today*, 14 March, Life, p. 3D.

Source:USAToday Accession Number: J0E263448518003

Selli, R. and S. Venzo. 1966. La partecipazione italiana al 7 Congresso Internazionale del Quaternario (INQUA). *La Ricerca Scientifica rivista del Consiglio Nationale delle Richerche* 36(12):3-11.

Abstract: The paper includes a brief summary of Plaeistocene geology of the Atlantic Coastal Plain between Long Island and Maryland as seen on an INQUA field trip during 1965.

Library: UMCP

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Severson, J. 1997. Don't be sidelined by off-season vacations; On Virginia's Assateague Island in the winter, waves of peace and calm. *Pittsburgh Post-Gazette* (Pittsburg, Pennsylvania), 5 January, Travel, p/. 5.

Shaler, N. S. 1886. Preliminary report on seacoast swamps of the eastern United States. *U.S. Geological Survey, 6th Annual Report*, p. 364.

Intro: Among the most interesting results of the interaction of the sea and land are the swamps formed along the ocean shore. Such swamp deposits are found along most coasts. Although the special considerations of this report concern only the swamps of the New England and the more northerly portions of the American coast, it will be desirable to consider the outlines of the history of all sea-shore swamps, at least to the extent necessary to make the way clear to our study of the more limited field. A very little study of the sea shore will show the intelligent observer that detrital matter is there subject to very peculiar conditions which are not found away from the narrow field where the sea comes into contact with the land.

Shanks, K. 2002. Isle of Wight Bay Watershed Characterization. **IN:** *Support of Worcester County's Watershed Restoration Action Strategy for the Isle of Wright Bay Watershed.* Maryland Department of Natural Resources (Annapolis).

Library: FSU, SU, TU, UMCP [all are TD225 .I84 I84 2002]

Internet Link: http://www.dnr.state.md.us/watersheds/surf/proj/wras.html

Shedlock, R. J., J. M. Denver, M. A. Hayes, P. A. Hamilton, M. T. Koterba, L. J. Bachman, P. J. Phillips and W. S. L. Banks. 1999. Water-quality assessment of the Delmarva Peninsula, Delaware, Maryland, and Virginia – results of investigations, 1987-91. U.S. Department of the Interior*, U.S. Geological Survey Water-Supply Paper* 2355-A. 41 pp.

Library: FSU, SU, UD-Morris [all are I 19.13:2355-A], UMCP [TC801 .U2 no.2355-A]

Shepard, A. N., R. B. Theroux, R. A. Cooper, and J. R. Uzmann. 1986. Ecology of *Cerianharia* (Coelenterata, Anthozoa) of the northern Atlantic from Cape Hatteras to Nova Scotia. *Fishery Bulletin* 84(3):625-646.

Library: CBL, HPL, FSU, SMC, UD-GCMES, UD-Morris, UMCP, UMES

Shepard, F. P. 1954. Nomenclature based on sand-silt-clay ratios. *Journal of Sedimentary Petrology* 24:151-158.

Library: CBL, FSU, SMC, TU, UD-Morris, UMBC, UMCP

Shepard, F. P. 1963. *Submarine Geology*, 2nd. Ed.. Harper and Row (New York). 557 pp.

Library: CBL, HPL, UD-Morris, UD-GCMES, UMBC, UMCP

Sherfy, M. H., T. A. Mollett, K. R. McGowan and S. L. Daugherty. 2006. A reexamination of age-related variation in body weight and morphometry of Maryland nutria. *Journal of Wildlife Management* 70(4):1132-1141.

Abstract: Age-related variation in morphometry has been documented for many species. Knowledge of growth patterns can be useful for modeling energetics, detecting physiological influences on populations, and predicting age. These benefits have shown value in understanding population dynamics of invasive species, particularly in developing efficient control and eradication programs. However, development and evaluation of descriptive and predictive models is a critical initial step in this process. Accordingly, the authors used data from necropsies of 1,544 nutria (*Myocastor coypus*) collected in Maryland to evaluate the accuracy of previously published models for prediction of nutria age from body weight. Published models underestimated body weights of our animals, especially for ages <3. They used cross-validation procedures to develop and evaluate models for describing nutria growth patterns and for predicting nutria age. They derived models from a randomly selected model-building data set (n = 192–193 M, 217–222 F) and evaluated them with the remaining animals (n = 487–488 M, 642–647 F). The authors used nonlinear regression to develop Gompertz growth-curve models relating morphometric variables to age. Predicted values of morphometric variables fell within the 95% confidence limits of their true values for most age classes. They also developed predictive models for estimating nutria age from morphometry, using linear regression of log-transformed age on morphometric variables. The evaluation data set corresponded with 95% prediction intervals from the new models. Predictive models for body weight and length provided greater accuracy and less bias than models for foot length and axillary girth. Their growth models accurately described age-related variation in nutria morphometry, and our predictive models provided accurate estimates of ages from morphometry that will be useful for live-captured individuals. Their models offer better accuracy and precision than previously published models, providing a capacity for modeling energetics and growth patterns of Maryland nutria as well as an empirical basis for determining population age structure from live-captured animals.

Library: CBL, FSU, SMC, SU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

Shideler, G. L., J. C. Oertel and K. Kinkelstein. 1984. Quaternary stratigraphic evolution of the southern Delmarva Peninsula, coastal zone, Cape Charles, Virginia. *Geological Society of America Bulletin* 95:489-502.

Abstract: The Quaternary evolution of the coastal zone along the southern Delmarva Peninsula in Virginia was investigated by means of high-resolution seismic survey and supplemental shallow core borings. The seismic stratigraphic framework of the area is composed of three depositional sequences separated by two prominent unconformities. In ascending order, the three seismic

sequences represent a late Tertiary substratum, Pleistocene deposits of post-Illinoisan (?) age, and Holocene deposits. Stratigraphic analysis indicates that the evolutionary development of the area was controlled mainly by glacio-eustatism and paleotopographic features

The late Tertiary substratum was dissected by southeasterly flowing streams of the ancestral Susquehanna fluvial system, resulting in a highly furrowed surface consisting of valleys and interfluves that exhibit as much as 46 m of local relief. The erosional surface probably represents a mature multicyclic landscape of pre-Sangamonian (?) age. The unconformable overlying Pleistocene deposits attain a maximum thickness of 41 m. Pleistocene sedimentation was closely controlled by the paleotopography, with relatively thicker deposits accumulating within ancestral valleys. In contrast, thinner deposits accumulated over the ancestral interfluves, which did not become active sites of sedimentation until after the topographic relief had been substantially subdued by valley infilling. Pleistocene deposits are characterized by complex facies relationships, multiple generations of fluvial channeling, and the presence of a variety of coastal geomorphic features. Fluvial channel zones largely overlie the thalwegs of major southeasterly trending ancestral valleys, indicating a paleotopographic control of Pleistocene drainage routes. The youngest Pleistocene geomorphic feature, which constitutes a distinctive sand lithosome, is a coastal barrier ridge that appears to have developed during a Sangamonian interglacial or mid-Wisconsinan interstadial high stand of sea level. During the late Wisconsin regression, Pleistocene deposits were eroded, resulting in the development of a relatively low-gradient subdued landscape compared to the highly furrowed pre-Sangamonian landscape.

Holocene deposits unconformably overlie the Pleistocene sequence and attain a maximum thickness of 19 m. Sedimentation during the Holocene transgression was primarily influenced by late Wisconsinan paleotopography, with relatively thicker deposits accumulating within paleochannels and along the modern shoreface. Holocene deposits also exhibit complex facies relationships, extensive channeling, and coastal geomorphic features. The Holocene sediments consist of two distinct lithosomes that are representative of modern barrier-island and lagoon - marginal-lagoon subenvironments. Microfossil assemblages indicate paleosalinities ranging from upper estuarine to marginal marine-inlet conditions. Vertical environmental transitions during the late Holocene transgression reflect a progressive restriction of the southern Delmarva coastal area by barrier-island development, with subsequent lagoonal infilling. The modern barrier islands are retrograding, and lagoonal infilling has progressed to varying degrees, having been influenced by both back-barrier sedimentation rates and pre-Holocene topography.

Library: BSU, FSU, MSU, SMC, SU, UD-GCMES, UD-Morris, UMBC, UMCP

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Library: CBL, TU, UD-Morris, UMCP

Short, R. B. 1991. Dicyemida. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS 100.* 16 pp.

Abstract: This manual treats six species of dicyemid mesozoans that have been reported in three species of hosts (*Octopus vulgaris*, *O. joubini*, and *O. briareus*) from the eastern coast of North America and the Gulf of Mexico, including the Florida Keys. All are parasites of species of *Octopus* and are in the genus *Dicyema*, family Dicyemidae. In the introduction, the life cycle, as known, and the general morphology of dicyemids are briefly described, and methods are given for collecting and preparing material for study. These are followed by a key to species and by an annotated checklist, which includes data, some hitherto unpublished, on their known prevalence in hosts from various localities, including Bimini and Bermuda.

Shoup, M. 1993. Blanketing the beaches; find that place in the sun. *The Record* (Bergen, New Jersey), 21 March, Travel, p. T1.

Shoup, M. 1993. Combing for the best beaches; the water is warm, the breeze cool and the sand soft. It's your favorite beach but is it among the world's best? No doubt a University of Maryland Professor who made a science of tramping and rating coastlines can tell you. *Pittsburgh Post-Gazette* (Pittsburgh, Pennsylvania), 18 July, Travel, p. C7.

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Library: CBL, FSU, SMC, SU, TU, UMBC, UMCP

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Shuster, C. N. 1951. On the migration of young *Polynices*. *Anatomical Record* 111:126.

Library: SU, TU, UD-Morris, UMCP

Siano, J. 2002. Parks take steps to clean air. *The New York Times*, 25 August Section 5, p. 2.

Sieling, F. W. 1954. Report on certain phases of the Chincoteague Bay investigations. *Proceedings of the National Shellfisheries Association* 45:212-216.

Abstract: A report on progress made on an ecological survey directed toward the re-establishment of the oyster industry in the Maryland part of the Chincoteague Bay area. It discusses the problems encountered in planting shells for the purpose of establishing potential seed areas. The region covered is from Fenwick Island, Delaware, to Chincoteague Inlet, Virginia, and coastal bays in between. Discussed are hydrography as well as fouling by serpulid worms, *Anomia simplex*, bryozoans, and *Crepidula* spp.

Library: CBL, UD-Morris, UD-GCMES, UMCP

Sieling, F. W. 1954. Hurricane damaged oyster and clam areas in Chincoteague Bay. *Maryland Tidewater News* 11(7):2, 3.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1955. Marine fouling pests numerous in Chincoteague Bay. *Maryland Tidewater News* 11(8):1, 2.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1955. Oyster drill damage heavy in Chincoteague Bay. *Maryland Tidewater News* 11(8):1, 4.

Abstract: The oyster drill, *Urosalpinx cinerea*, was found to be limited by low salinities. High salinities along with other ideal ecological conditions made Chincoteague Bay an optimal habitat for the growth of large numbers of this 'marine pest.' During 1954, high numbers of drills caused great damage to planted oysters in Maryland and Virginia coastal areas. A majority of planters estimated a loss of at least 15% of their oysters, while some lost up to 60 %.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1955. Surf clam industry at Ocean City expands. *Maryland Tidewater News* 11(10):1, 2, 4.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1955. Hydrographic study of Chincoteague Bay yields new data. *Maryland Tidewater News* 11(12):1, 2, 4.

Abstract: The hydrographic survey confirmed that the salinity within Chincoteague Bay became hypersaline at times due to increased evaporation. Physical information given included measurements of the coastal bays (Chincoteague/ Sinepuxent/ Isle of Wight, Assawoman and Little Assawoman) to be a total of 40 miles long and ranging from 0.25 to 5 miles wide. Depths within the bays ranged from 2 to 4 feet and from 20 to 40 feet at the inlets. The total surface area of the water at mean low tide was estimated to be approximately 120 square miles.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1956. New fouling organism appears in Chincoteague Bay. *Maryland Tidewater News* 12(11):4.

Abstract: Specimens of the keyhole limpet, *Diodora alternata*, were found in the lower Chincoteague Bay during the summer of 1954. This organism competes with oyster spat for living space on planted shells. In 1955, the limpets were found abundant in the central bay area. The only specimens reported in Chincoteague Bay prior to 1954 were observed in 1914.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1956. Southern species of large oyster drill found on seaside Virginia. *Maryland Tidewater News* 12(10):1, 3-4.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1956. The hardshell clam fishery of Maryland waters. *Maryland Tidewater News* Supplement 9, 12(10):1-2.

Abstract: General information (brief life history details and clamming techniques) about clams was presented. Catch data show that nearly all of Maryland's' hard clams come from the coastal bay area. "Clammers produced approximately twenty five million clams, worth about one third

million dollars, each year in Chincoteague and Sinepuxent Bays and adjoining waters." Trends for commercial clam catches and values from 1931 to 1954 show a general increase with a maximum of 250,000 pounds of meat reached during 1947. Clams in the area have been found to reach marketable size within a little over two years.

Library: CBL, FSU, SMC, UMCP

Sieling, F.W. 1956. Suspended cultch for oyster set tested in Chincoteague Bay. *Maryland Tidewater News*. 12(10): 3, 4.

Abstract: Metal trays and wire bags were suspended in the intertidal zone to hold shells so that oyster larvae had a place to set which was away from their predators. Results showed that the suspended cultch had a set that was sixteen times greater than the set on shells that were planted on the bottom directly beneath the bags.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1957. Rock crabs invade Chincoteague Bay. *Maryland Tidewater News* 13(6):3.

Abstract: During the early summer of 1957, unusually large numbers of rock crabs. *Cancer irroratus*, were caught in Sinepuxent, Newport/ and Upper Chincoteague Bays. Before that time only an occasional specimen had been caught in the area. This unique invasion was believed to be due to colder than normal bay waters.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1957. *Chemical and Physical Data, Chincoteague Bay Area, June 1953 – December, 1956*. Maryland Department of Research and Education, Chesapeake Biological Laboratory, University of Maryland (Solomons), Reference 57-25. 93 pp.

Library: UD-GCMES [GC511 .S53]

Sieling, F. W. 1957. The experimental oyster seed area near Ocean City, Maryland. Reference No. 57-33, Maryland Department of Research and Education.

Abstract: An area south of the Ocean City inlet, on the eastern side of Sinepuxent Bay, was tested (1952-1957) as a source of seed oysters. Commercial quantities of cultch and oyster shells were planted each year and the area yielded greater than 300 spat per bushel every year. One factor that made this area an excellent site for receiving a set was the fact that it ebbs dry at low tide. Therefore, the spat were protected from certain enemies and fouling organisms.

Sieling, F. W. 1958. Low salinity and unusual biological conditions noted in Chincoteague Bay. *Maryland Tidewater News* 14(4):15-16.

Abstract: A possible relationship between lowered salinities, algal growth, and oyster mortalities was discussed. One hypothesis was that increased runoff, lowered salinities and increased nutrients within the bay were responsible for producing optimal conditions for algal blooms. Abundant growth of red algae was observed in the field. The decomposition of large algal mats, in turn, produced anaerobic conditions on the bottom in certain areas, which may have allowed for

the growth of anaerobic, sulphur bacteria. Levels of hydrogen sulfide increased until a level which is toxic to oysters was reached.. This chain of events may have been the cause of high oyster mortalities which were observed in the bay.

Library: CBL, FSU, SMC, UMCP

Sieling, F. W. 1958. The status of the seafood industry of the Chincoteague Bay area. *Chesapeake Biological Laboratory Reference* No. 58-53. 3 pp.

Abstract: The seafood industry of Chincoteague Bay during 1952-1953 was compared to the industry during 1957-1958 in terms of commercial catches of hard clams and oysters. The amount of hard clams caught commercially dropped from 17,000,000 clams to 11,900,000 clams perhaps due to the implementation of dredging in 1953 which hurt the natural populations. Oyster catches increased from 50,000 bushels to 119,000 bushels due to the advances in seed planting and oyster drill control.

Sieling, F. W. 1959. Chemical and physical data, Chincoteague Bay area, June 1953-December 1956. Maryland Department of Research and Education, University of Maryland, Chesapeake Biological Laboratory (Solomons), Reference 57-25. 93 pp.

Abstract: Report includes complete temperature and salinity data.

Sieling, F. W. 1960. Mass mortality of the starfish, *Asterias forbesi*, on the Atlantic coast of Maryland. *Chesapeake Science* 1(1):73-74.

Abstract: Great numbers of the common starfish, *Asterias forbesi*, were washed ashore from the Atlantic Ocean along Worcester County, Maryland, during an unusually severe storm in February 1960. Several millions were killed on the beach, while others survived. A length frequency distribution revealed a bimodal distribution suggesting two age groups, as have been observed in more northern waters. Large numbers of surf clams, *Spisula solidissima*, were also washed ashore with the starfishes.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Sieling, F. W. 1960. A notable range extension of the southern drill, *Thais haemastoma floridana*, into Chincoteague Bay. *Chesapeake Science* 1(3-4):212-215.

Abstract: Live specimens of the southern drill have recently been collected in the Chincoteague Bay area of Maryland and Virginia. This extends its known northern limit some 10 miles beyond its previously recognized range. Evidence from dredged shells, however, indicated that the species was established at a much earlier date in the Maryland part of Chincoteague Bay, perhaps before the closure of the Green Run inlet in 1883.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Sieling, F. W. 1960. The resources of Worcester County coastal waters (summary of existing data, January 1960). *Chesapeake Biological Laboratory Reference* No. 60-10. 17 pp.

Abstract: This report contained summaries of ongoing research/ along with published and unpublished papers pertaining to Maryland's coastal resources. Summaries of oyster, clam, blue

crab and finfish status are discussed in terms of predation, parasites, growth/mortality rates and competition. Spot, silver perch and trout were. the most abundant seasonally in the northern bays, while flounder, tautog, sharks and skates were most abundant in Chincoteague and Sinepuxent bays. Overall, anchovies and silversides were the most abundant year round.

Sieling, F. W. and J. W. McGary. 1952. Preliminary report on the Chincoteague Bay survey. *National Shellfisheries Association* 1952:194-197.

Abstract: The report discussed general physical parameters of Chincoteague Bay and changes which have occurred since 1847. Temperature, salinity, dissolved oxygen and turbidity data were discussed, but no values were presented. Salinity varied with time of year; it was higher (35 ppt) in summer and at times "higher than the ocean salinity". Salinity fluctuated greatly with rainfall due to the shallow waters. Temperature measurements showed vertical gradients of 1.5 degrees C; horizontal gradients were much greater. Dissolved oxygen "deficiency" increased in the summer months. Sinepuxent Bay had greater deficiencies than other areas. Normal tidal range at the two inlets is 4.5 feet and 0.5 feet in the middle of the Bay. Turbidity correlated with wind, but cleared quickly. Ongoing study descriptions included an evaluation of oyster fouling organisms and benthic coring to determine sedimentation rates.

Sigerfoos, C. P. 1908. Natural history, organization, and late development of the Teredinidae, or shipworms. *Bulletin of the U.S. Bureau of Fisheries* 27:191-231.

Library: UD-GCMES, UD-Morris, UMCP

Simpson, R. W. 1992. The battle of Assateague Island. Virginia's famous Chincoteague pony auction has drawn attacks by animal rights groups. *The Western Horseman* 57(12):118.

Singewald, J. T., Jr. 1949. The shore erosion problem. *Maryland Department of Geology, Mines and Water Resources Bulletin* 6:1-18.

Singewald, J. T., Jr. 1949. Shore erosion in tidewater Maryland. Department of Geological and Water Resources (Annapolis). 32 pp. [Reprint from Bulletin 6]

Library: CBL, MSU, SU, UD-Morris, UMCP [all are QE121 .A25 no. 6], FSU [QE571 .M3]

Singewald, J. T. and T. H. Slaughter. 1949. Shore Erosion in Tidewater Maryland. *Maryland Department of Geology, Mines, and Mineral Resources Bulletin* (Baltimore) 6. 141 pp.

Abstract: There have been 3,070 acres of erosion and 1,970 acres of deposition in Worcester County over an average time interval of 92 years, making a net loss to the county of 1,100 acres. A table summarized Worcester County measurements for shore erosion along the Atlantic coast, and shores of Assawoman Bay, Isle of Wight Bay, Sinepuxent Bay, and Chincoteague Bay.

Library: UD-Morris

Sinott, A. and E. M. Cushing. 1978. Summary Appraisals of the Nation's Ground-water Resources, Mid-Atlantic Region. *U.S. Geological Survey Professional Paper* 813-I. iv + 32 pp.

Library: UD-Morris [I 19.16:813-I], UMCP [QE75 .P9 no.813-I]

Sinnott, A. and G. C. Tibbitts, Jr. 1961. Pleistocene terrace on the Eastern Shore Peninsula, Virginia. U.S. Department of the Interior, *U.S. Geological Survey Professional Paper* 424-D:248-250.

Abstract: The Chowan terrace extends the length of the peninsula, and is flanked by remnants of the younger Dismal Swamp and Princess Anne terraces.

Sinnott, A. and G. C. Tibbitts, Jr. 1968. *Ground-water Resources of Accomack and Northampton Counties, Virginia*. Commonwealth of Virginia, Division of Mineral Resources (Charlottesville). 113 pp.

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Abstract: The prime factor that has allowed the tremendous growth of Ocean City in such a short time is the existence of an excellent ground-water supply and distribution system coupled with an adequate sewage treatment system; an example of admirable foresight by local authorities. Development of the mainland-bay side is inevitable but how fast is presently difficult to predict. If the present rate of construction continues on Ocean City barrier island, the present beach will not be able to sustain the summer vacation population of Ocean City and from mainland bay sources. The State of Maryland has a responsibility in the restoration and maintenance of the Ocean City beach from the inlet to the Maryland-Delaware line providing the beach is made public. Until the present beach is restored, the State in conjunction with local city and county authorities should insist on regulatory control of construction on or over the dune. If and when the beach is restored, there can be a readjustment of existing regulations by all local and state officials. Economically, eastern Worcester County and Ocean City are undergoing a character change from a rural, low-keyed, summer resort to a Florida, big-city resort atmosphere.

Library: UD-Morris, UMBC, UMCP

Slemons, R. D., W. R. Hansen, K. A. Converse and D. A. Senne. 2003. Type A influenza virus surveillance in free-flying nonmigratory ducks residing on the Eastern Shore of Maryland. *Avian Diseases* 47(s3):1107-1110.

Abstract: Virus surveillance in free-flying, nonmigratory ducks living on the eastern shore of Maryland indicated that influenza A viruses were introduced into the area or that the prevalence of endemic infections increased between July 15 and August 27, 1998. Cloacal swabs collected between May 28 and July 15, 1998, were negative for influenza A virus recovery (0/233), whereas 13.9% (29/209) of swabs collected between August 27 and September 2, 1998, were positive for influenza A virus recovery. Five hemagglutinin subtypes (H2, H3, H6, H9, and H12), six neuraminidase subtypes (N1, N2, N4, N5, N6, and N8), and nine HA-NA combinations were identified among 29 influenza A isolates. Interestingly, 18 of the 29 isolates initially appeared to contain two or more HA and/or NA subtypes. The free-flying, nonmigratory ducks served as excellent sentinels for the early detection of type A influenza viruses in the southern half of the Atlantic Migratory Waterfowl Flyway during the earliest phase of the yearly southern migration.

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Abstract: Species of *Hematodinium* are endoparasitic dinoflagellates of crustaceans. Certain stages of the parasites can be very difficult to detect in the hemolymph of their hosts, because the trophic stages resemble hemocytes, and they can occur at relatively low densities, making diagnosis by microscopy difficult. We developed a polymerase chain reaction (PCR) assay to detect the *Hematodinium* sp. infecting the blue crab, *Callinectes sapidus*, based on the amplification of the parasite's first internal transcribed spacer region (ITS1) of the ribosomal RNA (rRNA) gene complex. The PCR assay was combined with a restriction endonucleases digestion (*Bsg* I) of the amplification products to differentiate between different forms of *Hematodinium* from different hosts. The assay had a limit of detection equivalent to 0.3 parasites per 100-µL hemolymph. In addition, two oligonucleotide DNA probes were designed to target the 18S rRNA gene sequence of the parasite, facilitating detection *in situ* in crustacean tissues. These probes appear to target several, if not all species within the genus, because they labeled all isolates of *Hematodinium* tested in this study, whereas they were not hybridizing to other parasite species. The PCR-RFLP assay will be invaluable for future studies investigating parasite prevalence, the existence of secondary hosts or environmental reservoirs, and modes of transmission, whereas the DNA probes will be useful for confirming and localizing *Hematodinium* parasites in crustacean tissues.

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Library: CBL, TU, UD-Morris, UMCP

Smith, S. J. and B. A. Ebersole. 1997. Numerical modeling evaluation of hot spots at Ocean City, Maryland. **IN:** *New Insights into Beach Preservation.* Proceedings of the 10th National Conference on Beach Preservation Technology. Florida Shore and Beach Preservation Association (Tallahassee, Florida). pp. 230-245.

Abstract: "Hot spots" are areas of localized erosion along a shoreline. Conversely, "cold spots" are areas that experience localized accretion. Hot spots may occur on beach fills for a variety of reasons, including cross-shore adjustment of the beach fill, beach-fill end losses, longshore adjustment of the beach fill, and wave transformation patterns due to irregular features in the nearshore bathymetry. Several areas along the shoreline of Ocean City, Maryland, have been documented as hot spots through monitoring of recently constructed beach-fill projects (Stauble et al. 1993). Erosional reaches of shoreline at Ocean City tend to be co-located with shore-face attachments of elongated offshore shoals. As part of a study to investigate the causes of hot spots at Ocean City, a numerical wave model and a potential sand transport model were used to evaluate the effect of the irregular bathymetry on longshore sand transport rates. The purpose of this paper is to present numerical model results which link the erosional hot spots at Ocean City, Maryland, to longshore sand transport processes and to define characteristics and behaviors of the hot spots. The paper describes the application of the numerical models and presents analysis relating the model results to observations from field monitoring of the beach fills at Ocean City.

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Abstract: Detailed analysis of repeated teen-age resort riots is presented to illustrate selected processes involved in crowd conventionalization. A model of conventionalization is constructed

which emphasizes the interdependence of police control, public opinion, and crowd action. Special consideration is given to neglected properties of crowd situations which can be accounted for in terms of patterns of police control and the interdependence of status systems and modes of crowd participation. Included is a discussion of the Labor Day riot in Ocean City in 1959.

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Speiran, G. K. 1992. Nitrate concentrations in ground water beneath a riparian wooded wetland near Townsend, Virginia. **IN:** *Abstracts of the 1992 Virginia Water Resources Conference*, April 12-15, 1992. Virginia Water Resources Research Center and the Virginia Lakes Association.

Abstract: An outline of research on ground-water chemistry and flow in the water table near Townsend, Virginia, is presented. The study hopes to improve the understanding of processes that control nitrate concentrations beneath riparian woodlands.

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Abstract: Experimental studies were conducted on a New Jersey salt marsh during the summers of 1949 and 1950 to determine the hazards to wildlife from mosquito control involving the use of DDT. Four plots were treated periodically by plane dosages ranging from 0.2 to 1.6 lbs/acre. Movements of some birds were noted in response to depletion or increased availability of food but these were mostly temporary although one rail died of acute DDT poisoning. Large numbers of killifish died at dosages of 0.8 lb/acre and above while blue and fiddler crabs suffered considerable reactions at even the lower dosages. Amphipods, isopods and shrimp incurred very heavy losses while insects, spiders and worms were more resistant. Little or no apparent harm resulted to red mites and molluscs.

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Abstract: Detailed monitoring of the performance of a two-phase beach nourishment project has provided valuable information on beach fill behavior and long-term response of a beach fill to prevailing coastal processes. The Atlantic Coast of Maryland (Ocean City) Shoreline Protection

Project began with the placement of a recreational beach by the State of Maryland during the summer of 1988. Within three months of placement, four storm impacted the area. Recovery was monitored for an additional two years. In the summers of 1990 and 1991, additional fill material including a storm protection dune was placed by the U.S. Army Corps of Engineers as a second phase for the purpose of storm protection. Within a year of the first placement, two large storms impacted the project. The beach nourishment project performed well in protecting the beachfront infrastructure of Ocean City from storm damage. The fill material was eroded from the foreshore after the major storms of 1989 and 1991/92, but could be accounted for in the nearshore between the shoreline and closure. Representative profile survey locations how the differential behavior of the fill controlled by nearshore bathymetric variability along the project length. Analysis of sediment characteristics of samples collected during the State fill project showed the influence of the fill material on the native beach and the change in sorting after the passage of four storms.

Library: UD-Morris [TC1501 .T43 no. 93-13]

Staub le, D. K. and M. A. Cialone. 1996. Ebb shoal evolution and sediment management techniques Ocean City inlet, Maryland. **IN:** *The Future of Beach Nourishment*, L. S. Tait, Ed. Florida Shore and Beach Preservation Association (Tallahassee, Florida). pp. 209-224

Abstract: As part of the U.S. Army Corps of Engineers Coastal Inlets Research Program (CIRP) a series of inlets are being studied to investigate inlet shoal evolution and improve sediment management techniques. Waves and tidal currents influence the evolution of ebb and flood shoals, the throat section and adjacent shorelines at inlets. Complex interactions of these processes occur within the distinct morphodynamic environments of the inlet, and influence sediment deposition patterns and their resulting grain-size distributions. To better understand inlet processes and sedimentation, a field study of the evolution of the ebb shoal bathymetry and extensive sediment sampling was conducted in 1995 at Ocean City Inlet, Maryland. This inlet was created by a hurricane in 1933 and was quickly stabilized with two jetties. As the inlet has evolved, a large ebb shoal formed, and erosion of Assateague Island (to the south) occurred, causing the island to move landward one island width. A large beach fill program has also been ongoing since 1988 at the Town of Ocean City (to the north). In the past 62 years, the ebb tidal delta has evolved to be asymmetrically oriented to the south (the predominant drift direction) and has recently welded to Assateague Island. The shoal has continued to increase in volume. A two-part flood shoal is also increasing in volume within Isle of Wight and Sinepuxent Bays. Sand management at this engineered inlet has been enhanced by a study of the sedimentation processes. With the collection of 119 sediment samples and the application of various statistical techniques, analysis of the sediment grain-size properties in each inlet environment was accomplished. Characteristic patterns were found in sediment parameters that were useful in mapping inlet sediment distributions and inferring sediment transport. The beach fill placed on the updrift end of the system has had an influence on the inlet sedimentation. Natural sand bypassing around the ebb shoal in recent years appears to be supplying sand to the sediment starved and frequently overwashed south beach. (DBO)

Library: UD-GCMES, UMCP, [all are TC223.1 .N385 1996]

Stauble, D. K. and M. A. Cialone. 1997. The tale of three inlets: Sediment management techniques. New Insights Into Beach Preservation. *Proceedings of the 10th National Conference on Beach Preservation Technology*. Florida Shore and Beach Preservation Association (Tallahassee, Florida). pp. 199-214.

Abstract: Surface sediment samples have been collected and morphologic characterization has been performed at three tidal inlets along the East Coast of the United States. This study was performed to provide an understanding of the variation in grain-size distributions on the shoals,

channels, and adjacent beach which leads to improving sand management techniques at tidal inlets. Barnegat Inlet, New Jersey has been stabilized by a recently-completed two-jetty system. A large, asymmetrical ebb shoal attaches to the downdrift shore and a two-part flood shoal complex opens into Barnegat Bay, with an "s" shaped main navigation channel around the south side of the front shoal and crossing over to the north side of the back shoal. Ocean City Inlet, Maryland also has a two-jetty configuration and asymmetrical ebb shoal attaching to the downdrift shore. A restricted bay area results in formation of two flood shoals, one small southern shoal in Sinepuxent Bay and a larger northern shoal in Isle of Wight Bay. Ponce de Leon Inlet, Florida also contains a two-jetty system with an asymmetric ebb shoal to the south and a restricted bay area with a complex intersection of the inlet throat with three channels. The flood shoal is also divided into a north and south portion. Sediment samples were collected from channel, shoal and adjacent beach environments at each of these inlets. Statistical analysis revealed that the coarser means and poorer sorting was characteristic of the channel samples and the finer more well-sorted samples were found on the shallow shoal areas. The use of Q-mode factor analysis has provided a technique to associate similar grain size distributions within the study inlets. Using the entire grain size range, three factors were identified to characterize the variance in inlet sediments. The sediment at Barnegat Inlet was composed of coarse to medium sands, Ocean City Inlet had coarse through medium to fine sands, while Ponce de Leon Inlet was limited to fine sands. This analysis provides knowledge of recent sand deposition patterns and infers sediment pathways that can be used in inlet sand management.

Library: UD-GCMES, UMCP, [all are TC223.1 .N385 1996]

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Steele, C. W., B. Zeppenfeld, J. Belvick, K. Dreher, M. Jameson, M. Mattis, D. Moffatt, K. Smith and M. Steffy. 1995. Competition, niche breadth and niche overlap in two sympatric estuarine killifishes: A test of ecological theory. *Second Annual Marine and Estuarine Shallow Water Science and Management Conference*., U.S. E.P.A. (Philadelphia, Pennsylvania). p. 50

Abstract: Mummichog, *Fundulus heteroclitus*, and striped killifish, *F. majalis*, sympatric killifishes with similar eco-morphology, were collected from Tom's Cove, Assateague Island, VA (mummichog, N = 83; striped killifish, N = 90). Gut content analyses followed standard procedures (Yap, 1988). Results of the analyses were compared using Schoener's Index for niche overlap by measuring components of the fishes' stomachs both by wet weight and by type. According to standard ecological theory, diet overlap is expected to increase with increasing food abundance in estuaries during summer months; significant overlap (20.90) in the diets of two species was thus expected. However, only moderate overlap was indicated in this study (0.56 to 0.62). Measurements of niche breadth using occurrence frequencies with Gladfelter-Johnson's index of niche breadth (modified by Cardona, 1991) indicate that, in our study area, striped killifish have about twice the niche breadth as mummichog (B' = 0.134 and 0.088, respectively). Active selection of particular prey taxa from the two available prey sources (water column and substratum), mediated by apparent species-specific differences in foraging behavior, resulted in

interspecific differences in type, number, and weight of prey consumed. Striped killifish fed extensively on food items from the substratum, including molluscs (primarily clams) and annelid worms; mummichog did not. These two species appear to be partitioning the resource even under apparent conditions of ample food availability.

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Library: Su, TU, UD-Morris, UMCP

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Abstract: Studies were conducted at Assateague Island, Maryland-Virginia, to determine the relative number of ghost crabs *Ocypode quadrata* Fab. on beaches subject to different recreational uses. The mean density of crabs per 0 multiplied by 1 ha plots was found to be 10 on an undisturbed beach, 19 on a pedestrian-impacted beach, 1 on a light off-road vehicle (ORV)- and pedestrian-impacted beach, and 0 multiplied by 3 in a heavy ORV-use beach. ORVs could be adversely affecting the crabs directly by crushing or burying them or indirectly by interfering with their reproductive cycle or altering their environment. Vehicular disturbance probably results in fewer crabs or no reproduction at all, with new inhabitants migrating from undisturbed areas. Pedestrians appear to have no harmful effects on ghost crabs; instead the crabs may be capitalizing on the food scraps scattered across the beach by bathers.

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Abstract: On 25 June 1956, the eastern glossy ibis was found breeding in Worcester County, Maryland. This represents the fourth breeding locality recorded along the Atlantic, coast north of Florida, during recent years, and is indicative of a rather rapid northward expansion of the breeding range.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Stewart, R. E. and B. Meanly. 1960. Clutch size of the clapper rail. *The Auk* 77(2):221-222.

Abstract: Information on clutch size of the clapper rail, *Rallus longirostris*, was obtained in salt marshes near Chincoteague, Virginia. Clutches were considered complete when repeated visits to the nest showed no additional eggs or when embryonic development could be clearly detected. The size of completed clutches was determined for 149 first or primary nests. Mean clutch size was 9.00 ± 0.19 eggs. This is somewhat lower than mean clutch size recorded from New Jersey and North Carolina, and higher than the clutch size recorded from Georgia. The full clutch size in

16 replacement or secondary nests in the Virginia area also was determined. These represented nests that were constructed by pairs following destruction of their first nests through predation or action of severe high tides. They included 13 nests found during the period 20 June – 27 June 1959, and three near Cobb Island, Virginia, on 10 August 1951. Mean clutch size of this series was 5.62 ± 1.06, which is 3.38 less than the mean for the first or primary Virginia nests.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Stewart, R. E. and C. S. Robbins. 1947. Recent observations on Maryland birds. *The Auk* 64(2):266-274.

Abstract: Swainson's warbler, *Limnothlypis swainsonii*, is reported from Pocomoke. Worcester Co, Maryland.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

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Stockdon, H. F., A. H. Sallinger, Jr., J. H. List and R. A. Holman. 2002. Estimation of shoreline position and change using airborne topographic lidar data. *Journal of Coastal Research* 18(3):502-513.

Abstract: A method has been developed for estimating shoreline position from airborne scanning laser data. This technique allows rapid estimation of objective, GPS-based shoreline positions over hundreds of kilometers of coast, essential to the assessment of large-scale coastal behavior. Shoreline position, defined as the cross-shore position of a vertical shoreline datum, is found by fitting a function to cross-shore profiles of laser altimetry data located in a vertical range around the datum and then evaluating the function at the specified datum. Error bars on horizontal position are directly calculated as the 95% confidence interval on the mean value based on the Student's t distribution of the errors of the regression. The technique was tested using lidar data collected with NASA's Airborne Topographic Mapper (ATM) in September 1997 on the Outer Banks of North Carolina. Estimated lidar-based shoreline position was compared to shoreline position measured by a ground-based GPS vehicle survey system. The two methods agreed closely with a root mean square difference of 2.9 m. The mean 95% confidence interval for shoreline position was ± 1.4 m. The technique has been applied to shoreline change of Assateague Island, Maryland and Virginia, where three ATM data sets were used to assess the statistics of large-scale shoreline change caused by a major "northeaster" winter storm. The accuracy of both the lidar system and the technique described provides measures of shoreline position and change that are ideal for studying storm-scale variability over large spatial scales.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Stourt, C. L. 1953. *A Study of Tidal Lagoon Sediments in Chincoteague Bay, Maryland*. Bachelor of Arts Thesis, Department of Geology, Princeton University (Princeton, New Jersey).

Stribling, J. M. 1986. *Net Aerial Productivity and Nutrient Dynamics of Spartina alterniflora in a Grazed Salt Marsh*. Master of Science Thesis, University of Maryland Eastern Shore (Princess Anne).

Abstract: Standing crop, net aerial primary productivity, plant nitrogen and phosphorus levels, soil nutrient concentrations and redox potentials were studied in grazed and ungrazed salt marshes on Assateague Island. Plant tissue nitrogen concentrations were found to be comparatively high. Live leaves were found to have 1-2 % dry weight nitrogen and 0.12-0.21 % dry weight phosphorus (nutrient concentrations were approximately one-half for the roots and rhizomes). The standing crops of live and dead leaves, live rhizomes and net production were 264 grams dry weight m^{-2} yr^{-1}. Sediment pore water nutrient concentrations were high enough to support greater plant growth. The study suggested that grazing may be the cause for low production perhaps .by reducing root nutrient uptake and by interfering with nutrient retranslocation.

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Library: UD-GCMES, UD-Morris, UMCP

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Abstract: The critical loads to streams, steady-state stream chemistry and catchment chemical weathering rate in 73 catchments has been determined in the state of Maryland, USA. It was calculated with the PROFILE model from chemical limits for biological indicators, soil mineralogy, soil texture, annual average temperature, average soil moisture, net long-term uptake of base cations and nitrogen to the vegetation, annual precipitation and runoff and deposition of sulphur and nitrogen precursors of acid deposition. The results show a full range of critical loads from very low values in the sensitive catchments of western Maryland and the Coastal Plain on the Chesapeake Bay, to insensitive catchments in the Fredrick Valley and Ridge and the Piedmont plain. The critical loads will be used as an input to an integrated regional assessment of the quantitative sensitivity of streams to acid rain, and the assessment of regional stream alkalinity response to different abatement strategies. The mapping of steady-state stream chemistry indicates that streams in Maryland are still acidifying under the present deposition load. Land-use seems to play an important role in maintaining neutral pH in many of the streams of Maryland.

Library: CBL, TU, UD-Morris [electronic], UMCP, UMES

Swan, B. L. 2005. Migrations of adult horseshoe crabs, *Limulus polyphemus*, in the Middle Atlantic Bight: a 17-year tagging study. *Estuaries* 28(1):28-40.

Abstract: Adult horseshoe crabs, *Limulus polyphemus*, were tagged in the Middle Atlantic Bight area, from New York to Virginia on the continental shelf and within bays, to determine their migratory patterns and longevity. Of 30,432 horseshoe crabs that were tagged during the years 1986-2002, 1,122 were recovered alive, and 1,027 were dead. Many of the live recoveries were observed within 30 d (54.4%) and after years (37.53%) with one tagged animal surviving up to 10 yr. In 9 locations from Great Kills Harbor, New York, to Chesapeake Bay, Maryland,

the horseshoe crabs return to their release beach within days during the spawning season. Of the 762 (100%) recoveries from crabs released along the Delaware Bay shoreline, 75.07% traveled 0-20 km, 21.0% traveled 20-50 km, 2.36% traveled 50-100 km, and 1.57% traveled over 100 km. Within Delaware Bay, 327 tagged animals (43.6%) had moved away from the release points to other locations, and 59 of these had moved out of the bay onto the continental shelf along the Mid-Atlantic Bight coastline. Horseshoe crabs migrate into Delaware Bay from waters off Ocean City, Maryland, and adjacent coastal bays. In addition to defining the range of the Delaware Bay spawning populations, 2 neighboring populations were identified by the tagging program. In one, animals tagged in southern New York mingled with those in the Sandy Hook, New Jersey area, comprising a population that ranged from Raritan Bay across New York Harbor to Jamaica Bay. The second confirmed that a discrete population existed in northern Chesapeake Bay in the general vicinity of the Annapolis Bay Bridge.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Swift, D. J. P. and M. E. Field. 1981. Evolution of a classic sand ridge field: Maryland sector, North American inner shelf. *Sedimentology* 28:461-482.

Abstract: The ridge and swale topography of the Middle Atlantic Bight is best developed on the Delaware-Maryland inner shelf. Here sand ridges can be seen in all stages of formation. Several aspects of the ridge field are pertinent to the problem of ridge genesis. The first is ridge morphology. There is a systematic morphologic change from *shoreface ridges* through *nearshore ridges* to *offshore ridges*, which reflects the changing hydraulic regime. As successively more seaward ridges are examined, maximum side slope decreases, the ratio of maximum seaward slope to maximum landward slope decreases, and the cross-sectional area increases. These changes in ridge morphology with depth and distance from shore appear to be equivalent to the morphologic changes experienced by a single ridge during the course of the Holocene retrogression. A second aspect is the change in bottom sediment characteristics that accompanies these large-scale morphologic changes. Megaripples, sand waves and mud lenses appear in the troughs between nearshore and offshore ridges. These changes indicate that the storm flows which maintain ridges are less frequently experienced in the deeper sector, and that the role of high-frequency wave surge becomes less important relative to the role of the mean flow component in shaping the sea floor. A third aspect is the systematic relationship of grain size to topography. Grain size is 90o out of phase with topography, so that the coarsest sand lies between the axis of the landward trough and the ridge crest, while the finest sand lies between the ridge crest and the axis of the seaward trough. This relationship is characteristic of large-scale bedforms. Finally, flow was measured and transport calculated on the same ridge during a one-month period (November 1976). Threshold was exceeded only during storm events. Mean transport was southerly and a little seaward with respect to both ridge crest and the shoreline. These flow measurements are in conformity with the pattern of smaller bedforms. A 43-year time series of bathymetric change for this ridge reveals a systematic pattern of landward flank erosion, seaward flank deposition, and seaward crest migration. Sand ridges are considered the consequence of constructive feedback between an initial topography and the resulting distribution of bottom shear stress. The relationship between grain size and topography supports this model, but does not account directly for the oblique angle of the ridge with respect to the coastline. This feature may be due to a more rapid alongshore migration rate of the inshore edge of the ridge that the offshore edge, and the relationship between this migration rate, and the rate of shoreface retreat.

Library: TU, UD-Morris, UMBC, UMCP

Swift, E. 2003. Panther or pussycat? Mystery creature stalks town on Eastern Shore. *The Virginian-Pilot* (Norfolk, Virginia), 1 February, p. A1.

Tango, P., W. Butler, & C. Wazniak 2004. Assessment of harmful algae bloom species in the Maryland Coastal Bays. *In:* Wazniak, C.E., & M.R. Hall (eds). *Maryland's Coastal Bays Ecosystem Health Assessment 2004*. DNR-12-1202-0009. Maryland Department of Natural Resources, Tidewater Ecosystem Assessment, Annapolis, Maryland.

Abstract: Thirteen potentially harmful algae taxa have been identified in the Maryland Coastal Bays: Aureococcus anophagefferens (brown tide), Pfiesteria piscicida and P. shumwayae, Chattonella spp., Heterosigma akashiwo, Fibrocapsa japonica, Prorocentrum minimum, Dinophysis spp., Amphidinium spp., Pseudo-nitzchia spp., Karlodinium micrum, and two macroalgae genera (Gracilaria and Chaetomorpha). The greatest number of species occurred in the polluted tributaries of the St. Martin River and Newport Bay. Approximately five percent of the phytoplankton species identified in the Maryland Coastal Bays represent potentially harmful algae bloom (HAB) species. The HABs are recognized for their potentially toxic properties and, in some cases, their ability to produce large blooms capable of negatively affecting light and dissolved oxygen resources. Brown tide (A. anophagefferens) has been the most widespread and prolific HAB species in the area in recent years, producing growth impacts to juvenile clams in test studies and potential impacts to seagrass distribution and growth (see Chapter 7.1). Macroalgal fluctuations may be evidence of a system balancing on the edge of a eutrophic (nutrient-enriched) state. No evidence of toxic activity has been detected among the Coastal Bays phytoplankton. However, species such as Pseudo-nitzschia seriata, Prorocentrum minimum, Pfiesteria piscicida, Dinophysis acuminata and Karlodinium micrum have produced positive toxic bioassays or generated detectable toxins in Chesapeake Bay. Pfiesteria piscicida was retrospectively considered as the likely causative organism in causing a large historical fish kill on the Indian River, Delaware. Similarly Chattonella cf. verruculosa was implicated in a large fish kill and persistent brevetoxins detected in Delaware's Rehoboth Bay during 2000. Tracking potential HAB species diversity, abundance, distribution and toxic activity through time provides important indicators of environmental change within the Coastal Bays.

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Tarnowski, M. L. 1999. Molluscan inventory of the Maryland coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:30-35.

Library: FSU [EP 1.23/6:620/R-00/001]

Tarnowski, M. L. and M. L. Homer. 1999. Re-introducing the bay scallop *Argopecten irradians* into Chincoteague Bay, MD. *Journal of Shellfish Research* 18(1):315.

Abstract: Nearly 70 years ago, the bay scallop disappeared from Chincoteague Bay, coincident with a destructive disease that wiped out the region's eelgrass beds. During the past decade, however, seagrasses have made a remarkable recovery in this area. With thousands of acres of seagrass meadows now in existence and stable, relatively high year-round salinities afforded

through the stabilization of the Ocean City (Md.) Inlet foremost among several positive parameters, conditions appear to be optimal for the return of the bay scallop. In October 1997, 533,000 seed scallops (8 mm mean length) were introduced into Chincoteague Bay and placed in predator exclusion pens. By the end of the 1997 growing season, the scallops had tripled in size and survivorship was about 85%. Overwintering mortality was extremely low, less than 10%, and by May 1998, the scallops had grown to an average shell length of 30 mm. Survivorship was compromised in August 1998 due to a severe thermal event in the shallower water pen. Overall survival was estimated to be 45% in September and 20% in late November. The surviving scallops attained a size of about 50 mm by November. Two distinct spawning events occurred in 1998, one in May-June, followed by another in August-September. Water column sampling revealed the presence of scallop larvae during the summer of 1998. In late October 1998, an additional 610,000 seed scallops were placed into pens in Chincoteague Bay. Initially 20 mm in size, these scallops attained mean shell lengths of 26 mm by early December. Initial survivorship was better than 95%. Samples were taken in December 1998 to determine recruitment success. "Wild" scallops were collected in a number of areas some 8-11 km south of the exclosure pens, although at this time it is not known if these were progeny from scallops released in Virginia or from the penned scallops held in Maryland.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

Tarnowski, M.L., & M.L. Homer. 2003. *Reclamation of Buried Shell Habitat in Chincoteague Bay*. Final Report to the Maryland Coastal Bays Program Implementation Grant Program. Berlin, Maryland.

Tarnowski, M. L. and M. L. Homer. 2005. Population trends of hard clams (*Mercenaria mercenaria*) in the Maryland coastal bays. *Journal of Shellfish Research* 24(2):679.

Abstract: The hard clam populations of Maryland's coastal bays are relatively young, becoming established in the favorable salinity conditions created after Ocean City Inlet opened in 1933. Surveys were first conducted when the populations were less than 20 years old. Densities were substantially lower than other states, and the clams were mostly larger chowder sizes, indicating sporadic recruitment. Subsequent surveys in the late 1960's found the situation largely unchanged. A commercial fishery developed concomitantly with the establishment of the clam populations. This was joined by a burgeoning recreational fishery as the area became increasingly popular with vacationers. Estimates from the mid-1950's suggest that harvests were roughly equal between the two. By the mid-1970's the commercial fishery had collapsed due to competition from surf clams for the chowder market and possibly over fishing. Despite a negligible fishery for the next 20 years, the population failed to expand. In 1993, MDNR instituted an annual dredge-based survey. Clam densities were 25% of 1950's estimates, but size distributions and recruitment patterns were similar to the earlier surveys. The populations have been relatively stable over the past 11 years, with a modest increase in recruitment during the late 1990's coinciding with a disease outbreak in blue crabs. Poor recruitment may be attributed to low broodstock densities, high predation rates, and a paucity of protective shell cover. With approximately 40% of the coastal bays now closed to commercial clamming, primarily in the recently recovering seagrass beds, these clam populations may begin to flourish.

Library: CBL, HPL, SU, UD-GCMES, UD-Morris, UMCP, UMES

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Library: Univ. of CA Davis, Univ. of Alaska, ASU, LOC, EPA

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Library: Univ. of CA Davis, Univ. of Alaska, ASU, LOC, EPA

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Library: Univ. of CA Davis, Univ. of Alaska, ASU, LOC, EPA

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Abstract: Three very young crevalle jack, raging from 38 to 41 mm total length, emitted a burst of rapid, short, rasping croas upon being landed in a beach seine out of the ocean surf off Assateague Island, Maryland. Dissection revealed well-developed upper and lower pharyngeal teeth indicating that the sounds were produced as in adults.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Taylor, R. M. 1982. Lichens (Ascomycetes) of the intertidal region. . Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS Circular 446.* 26 pp.

Abstract: This manual treats the lichens found in the intertidal region from New Jersey to Newfoundland. Methods of collection, preparation, and study are briefly treated. Twenty-two species are covered, both in an illustrated key and an alphabetical listing, with brief descriptions and notes on ecology and distribution. A glossary of terms is included.

Taylor, S. R. 1964. The abundance of chemical elements in the continental crusts – a new table. *Geochimica et Cosmochimica Acta* 28:283-294.

Library: CBL, HPL, MSU, UD-Morris, UD-GCMES, UMCP

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Library: BSU, MSU, SU, UD-Morris, UMBC, UMCP, UMES

Teal, J. M. 1958. Distribution of fiddler crabs in Georgia salt marshes. *Ecology* 39(2):185-193.

Abstract: Factors controlling the distribution of the fiddler crabs, *Uca minax*, *Uca pugilator*, and *Uca pugnax*, were studied in the Georgia salt marshes. The salt marsh is described and divided into types: Tall *Spartina* Edge marsh, Medium *Spartina* Levee Marsh, Short *Spartina* Low marsh, Short *Spartina* High marsh, *Salicornia-Distichlis* marsh, and *Juncus* marsh. Sampling showed that *U. minax* is found in certain parts of the Short *Spartina* High marsh; *U. pugilator* is found on the tidal creek banks and in the *Salicornia-Distichlis* marsh; *U. pugnax* is found in all but the Edge marsh but is numerous only in the Medium and Short *Spartina* marshes.

Feeding experiments showed that the crabs could live on bacteria or fermented marsh grass mixed with mud or sand. This sort of food is widely distributed in the marsh and is not therefore a factor in crab distribution.

The lethal high temperatures for the three species are nearly the same and are not a factor in their distribution.

U. minax could live in fresh water for more than three weeks, *U. pugilator* for a few days, *U. pugnax* for only one and a half days. When offered fresh and salt water, *U. minax* chose to live in fresh; the other two species chose salt.

Substratum preference tests showed that *U. minax* and *U. pugnax* preferred mud either above or under water. *U. pugilator* preferred sand above water. When another species was present, the number of burrows dug under favorable conditions by *U. pugilator* was reduced by 50 percent or more. A second species caused a similar reduction of over 25% for *U. minax* but no significant reduction for *U. pugnax*.

U. pugilator was unable to survive in the marsh types with a pure mud substratum, a result possible correlated with special setae on the maxillipeds. In the *Salicornia-Distichlis* marsh, *U. pugilator* survived better than the other species.

It was concluded that the distribution of *U. pugnax* is determined by preference for vegetated muddy substratum and salt water; predation may limit it toward low tide level. *U. minax* chooses sites with mud substratum and fresh water; competition may be of some importance in limiting its spread into other marsh types. *U. pugilator* chooses sandy areas but is prevented from occupying all the sandy marshes by competition with the other two species.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Library: Univ. of CA Davis, Univ. of Alaska, ASU, LOC, EPA

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Abstract: The phorozooid is an almost unknown stage in the asexual generation of the pelagic tunicate *Doliolum nationalis* Borgert. Heretofore, it has merely been reported but not described. Phorozooids were found in surface meter and half-meter net samples taken in the Atlantic Ocean within 50 miles of the Virginia Coast, in December 1959 and July, August and September 1960. The mean length of the December specimens was 2.64±0.46 mm, that of the July specimens 1.86±0.21

mm. Except for a smaller average size, the absence of gonadal tissue and the presence of a ventral peduncle, a phorozooid resembles the gonozooid, the hermaphroditic stage.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

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Thieler, E. R., W. C. Schwab, R. P. Signell, P. T. Gayes and M. S. Harris. 2001. The shoreface as a source and sink for beach nourishment. Abstracts of Papers, 50th Annual Meeting, Geological Society of America Southeastern Section 33(2):20.

Abstract: The inner continental shelf (or shoreface) of barrier islands plays a critical role in determining sediment availability and exchange between the beach and the continental shelf, and may serve as both a source and a sink for beach sediment. At Fire Island, NY, decade-scale beach monitoring data, wave modeling and sediment budget calculations suggest that shoreface-attached sand ridges are an important source of sediment to the beach. Ridge morphology and distribution may control alongshore patterns of erosion and accretion by focusing shoreward sediment flux at discrete locations, dissipating or focusing wave energy, or a combination of these processes. Shoreface sand bodies are presently used or targeted as a source for large-scale beach nourishment projects at several locations on the U.S. Atlantic coast (e.g., Assateague Island and Ocean City, MD, Fenwick Island, DE, Fire Island, NY). Our results from Fire Island suggest that the removal of shoreface sand bodies by mining could have a measurable impact on accretion or erosion of the adjacent shoreline at these locations. Evidence from two nourished beaches suggests that the inner shelf can also become a sink for beach sediment at the storm-event to decade time scales relevant to beach nourishment. The dispersal of nourishment sediment off Folly Beach, SC onto the inner shelf has been linked to episodic cross-shore transport during storm events over the course of several years. At Wrightsville Beach, NC, over 35 years of large-scale beach nourishment (approximately 8 million cubic meters) appears to have exceeded the storage space available in the shoreface sedimentary prism, resulting in the accumulation of nearly 2 million cubic meters of nourishment sediment on the lower shoreface and inner shelf in water depths >9 m. The time and space scales of this sediment transport and storage are clearly of engineering interest for the planning, design, and long-term maintenance of nourished beaches.

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Abstract: Experimental sprayings in Maryland of a 2-acre freshwater pond, an area around and over a 15 X 15 ft pound net in swiftly running tidewater, and a similar area in slowly moving tidewater, in an attempt to simulate conditions that might be encountered in actual spraying of marsh areas for mosquito control, failed to develop any startling lethal effects upon aquatic life from quite concentrated DDT oil solutions and emulsions used in excessive doses.

Library: FSU, TU, UD-Ag, UD-Morris, UMBC, UMCP, UMES

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Abstract: It is hoped that this report will promote a reasoned consideration of the long-term consequences of sea level rise, and thereby enhance the eventual success of erosion control strategies at Ocean City and other coastal communities. In this report, three independent teams of coastal process scientists estimate the erosion that will take place at Ocean City for three scenarios of future sea level rise: (1) current trends of 1 foot per century along the Atlantic coast; (2) the National Academy of Sciences estimate of a 2-1/3 foot global rise in the next century with an 11 inch rise by 2025; and (3) the EPA mid-high scenario of a global rise of 4-1/2 feet in the next century and 15 inches by 2025. The quantity of sand necessary to maintain the current shoreline is also estimated for each of the scenarios. The potential costs of erosion control are also examined.

Library: UD-Morris [EP 1.2:Se 1/6]; CBL, FSU, SU, UMCP, UMES [all are GB459.4 .P67 1985]

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Abstract: An illustrated key to nearshore and shelf species includes 133 taxa. Seventy-nine genera are represented. In an annotated list, the distribution and ecology of each species are recorded within the area of Cape Hatteras to Nova Scotia and out to a depth of 50 m on the continental shelf. The key is intended to aid the nonspecialist in identification of the species to be expected in the marshes, estuaries, littoral zones, bays, and inner continental shelf.

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Abstract: Pacific and Atlantic Ocean sea surface temperatures (SSTs) were used as predictors in a long lead-time streamflow forecast model in which the partial least squares regression (PLSR) technique was used with over 600 unimpaired streamflow stations in the continental United States. Initially, PLSR calibration (or test) models were developed for each station, using the previous spring-summer Pacific (or Atlantic) Ocean SSTs as predictors. Regions were identified in the Pacific Northwest, Upper Colorado River Basin, Midwest, and Atlantic states in which Pacific Ocean SSTs resulted in skillful forecasts. Atlantic Ocean SSTs resulted in significant regions being identified in the Pacific Northwest, Midwest, and Atlantic states. Next, streamflow stations were selected in the Columbia River Basin, Upper Colorado River Basin, and Mississippi River Basin and a PLSR cross-validation model (i.e., forecast) was developed. The results of the PLSR cross-validation model for each station varied with linear error in probability space scores of +9.5 to +51.0% where 10% is considered skillful forecasts using Pacific and Atlantic SSTs.

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Abstract: The Atlantic coast population of the American oystercatcher (*Haematopus palliates*) has seen mixed success in its recovery from historic lows at the turn of the 20th century. During the mid-1980s, breeding numbers in Maryland were estimated at 50-75 pairs based on incidental observations and the results of the state's first breeding bird atlas project. With growing national and regional concern for the species and a need for current information on its status in Maryland, the state's first comprehensive survey of nesting oystercatchers was conducted during the 2003 breeding season. Both hatching success and fledging success were relatively high, with some breeding birds nesting in areas where they were not previously found in the state. Most oystercatchers nested on salt marsh islands, as opposed to the extensive barrier island found along Maryland's coast. Although a similar number of birds nested in the Chesapeake Bay and Coastal Bays, nest success was significantly greater in the Chesapeake Bay. Landscape type proved to be the only variable that was significantly associated with statewide nest success, though it did not explain the differences in success between Chesapeake Bay and Coastal Bay birds. Several existing and potential threats require consideration in future studies and management of this species.

Library: UD-Morris [on line]

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Abstract: Concentrations of the accessory phytoplankton pigment 19′-butanoyloxyfucoxanthin (but-fuco), derived from archived high performance liquid chromatography (HPLC) data from the Atlantic coastal bays of Maryland and Virginia (1993–1995 and 1999–2002), were used to determine the presence of *Aureococcus anophagefferens* at 18 stations. Paired data of direct cell counts of *A. anophagefferens* and but-fuco concentration data from 2000 to 2002 were linearly regressed ($R^2 = 0.78$). This regression was used to estimate historical cell densities from 1994 to 1995 and to improve the spatial resolution from 1999 to 2002. Although the HPLC method used did not permit quantification of but-fuco before 1994, the records indicate that qualitatively *A. anophagefferens* was present in 1993. Quantitative measurements grouped into bloom index categories showed that annually, peak densities occurred in May to July. Severe Category 3 blooms (>200,000 cells ml^{-1}) were found in 1995, 2001, and 2002. Spatially, concentrations of but-fuco were higher in the northern extent of the study region than in the lower Chincoteague Bay, and along the western shore of Chincoteague Bay than on the eastern side. On an interannual basis, it appeared that *A. anophagefferens* became more geographically widespread and blooms more intense throughout the study period.

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measured with a real-time, quantitative polymerase chain reaction (PCR) methodology that enabled high-throughput detection of as few as 31 copies of the ribosomal non-transcribed spacer region in 500 ng oyster DNA. The other pathogens were assayed using PCR with species-specific primers. *Perkinsus marinus* was identified in Indian River Bay at moderate prevalence (approximately 40%) in both an artificial reef and a wild oyster population whereas sentinel oysters were PCR-negative after 3-months exposure during summer and early fall. *Haplosporidium nelsoni* was restricted to one oyster deployed in Little Assawoman Bay. QPX and *P. marinus* were not detected among wild clams. While oysters in these bays have historically been under the greatest threat by MSX, it is apparent that *P. marinus* currently poses a greater threat to recovery of oyster aquaculture in Delaware's Inland Bays.

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Library: CBL, FSU, HPL, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

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Abstract: To determine if bald cypress, *Toxodium distichum* (L.) Richard, could be a “most suitable host” for gypsy moth, *Lymantria dispar* (L.), laboratory-reared larvae were fed white oak, *Quercus alba* L. (a “most preferred host” species), bald cypress, or a mixed diet of bald cypress and white oak, and survival, development, and fecundity for 2 developmental years were monitored. Criteria for most suitable host were >80% survival of 1st instars, development to pupation in <41 d, female pupal weights >1,099 mg, and production of >350 full-sized ova. Laboratory studies for 1990 and a992 indicated that bald cypress generally met the criteria and thus the tree was considered a most suitable host for the gypsy moth. In 1990 and 1992, respectively, 69 and 83% of 1st instars survived after being reared on bald cypress, compared with 77 and 74% on white oak and 82 and 87% on mixed diet. In 1990 and 1992, 61% of larvae fed on bald cypress completed larval development and pupated, as opposed to 73 and 56% on white oak and 80 and 83% on mixed diet. For 1990, mean days to pupation and adult emergence, respectively, were 50 and 63 d for bald cypress, 47 and 56 d for white oak, and 47 and 61 d for mixed diet. Mean days to pupation and adult emergence for 1992, respectively, were 48 and 61 d for bald cypress, 46 and 60 d on white oak, and 48 and 61 d on mixed diet. The percentage of pupae that emerged as adults in 1990 and 1992, respectively, were 74 and 98% on bald cypress, 96 and 100% on white oak, and 95 and 99% on mixed diet. Mean female pupal weights for 1992 were 1,100 mg (bald cypress), 1,350 (white oak, and 1,440 mg (mixed diet). Mean numbers of ova produced for 1990 and 1992, respectively, were 475 and 41 for bald cypress, 453 and 456 for white oak, and 508 and 519 for mixed diet.

Library: ASIS, BSU, FSU, TU, UD-Ag, UD-Morris, UMBC, UMCP

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Waterman, T. H. 1950. *Aurellia aurita*. **IN:** *Selected Invertebrate Types*, F. A. Brown, Ed. John Wiley & Sons (New York). pp. 112-119.

Library: FSU, SMC, UD-GCMES, UD-Morris, UMBC, UMCP [all are QL362 B88], TU [QL362 .B7]

Watkin, E. E. 1941. The yearly life cycle of the amphipod, *Corophium volutator. Journal of Animal Ecology* 10(1):77-93.

Abstract: 1. The species *Corophium volutator* and the closely related form C. arenarium occur abundantly in the estuary of the river Dovey, North Wales. The former is confined to the finer soils which occur on the margins of the brackish water streams which cross the estuary, the latter to the coarser soils above the limits of ordinary neap tides. 2. Successive samples of *C. volutator* were obtained throughout 1938 and the early months of 1939. All the individuals in each sample were measured for total length, the sex of each individual over 4 mm. in length determined and the sexual condition of the females, based on an examination of the brood pouch, determined. 3. The population in the late winter of 1937-8 consisted of an overwintering group of mature forms with a length of 7 mm. or over and an overwintering group of immature forms with a length of under 7 mm. The mature forms of this population began to breed in February and gradually died off throughout March and April. The immature forms reached maturity through March, April, May, June and July, producing successive broods of young which reached maturity in July. 4. By August all the overwintering population had died off and the new broods were in active reproduction. New broods followed each other through August and September and breeding finally ceased in early October. The October population showed a steady growth through the autumn and winter months to recommence the breeding cycle in March 1939. Two generations are indicated. 5. All females are mature at 6 mm. and a few at 5 mm. The average size of the breeding females is around 7 mm., after which the death rate is rapid, an occasional individual reaching a size of 10 mm. The brood lamellae are developed gradually in all females over 4 mm. 6. An attempt to prove that the egg-laying cycle follows a lunar rhythm gave a negative result. The newly hatched 1 mm. group show maxima in each month from April to October, and the time in the lunar cycle in which these occur suggests that more intensive sampling might establish a lunar periodicity in the time of hatching. 7. The average size of the males is less than that of the females; only a few males reach a length of 8 mm. The number of males in relation to the total population of males and females in the groups of 4 mm. and over showed a successive decrease from the 4 to the 8 mm. groups. Throughout the year the number of males is proportionately greater in early spring when the reproductive season is beginning and at midsummer when the reproductive season is at its height. 8. A few intersexes occur at all seasons of the year.

Library: BSU, CBL, HPL, MSU, TU, UD-GCMES, UD-Morris, UMBC, UMCP, UMES. JSTOR

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Watling, L., W. Leathem, P. Kinner, C. Wethe, and D. Maurer. 1974. Evaluation of sludge dumping off Delaware Bay. *Marine Pollution Bulletin* 5(3):39-42.

Library: CBL, SMC, TU, UD-GCMES, UMCP

Watling, Les, and Don Maurer. 1973. *Guide to the Macroscopic Estuarine & Marine Invertebrates of the Delaware Region.* College of Marine Studies, University of Delaware (Newark). 178 pp.

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Watson, K. D., J. E. Clausner and R. D. Henry. 1993. Beach response to sand bypassing at Indian River Inlet, Delaware. **IN:** *Proceedings of the Hilton Head Island, South carolina, International Coastal Symposium*, P. Bruun, Ed. pp. 651-656.

Watts, B. 1999. Migrant shorebirds – role of the Delmarva coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:36-38.

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Wazniak, C. 1999. Appendix A: Maryland Coastal Bays Program Eutrophication Monitoring Plan. **IN:** *Maryland Coastal Bays Comprehensive Conservation Management Plan*. Maryland Coastal Bays Program (Berlin).

Wazniak, C. E. and P. M. Glibert. 2004. Potential impacts of brown tide, *Aureococcus anophagefferens*, on juvenile hard clams, *Mercenaria mercenaria*, in the Coastal Bays of Maryland. *Harmful Algae* 3(4):321-329.

Abstract: The rate of growth of juvenile hard clams, *Mercenaria mercenaria*, was studied in the Coastal Bays of Maryland during an outbreak of the brown tide, *Aureococcus anophagefferens*. Brown tide dominated the plankton community during the month of June 2002, with cell densities at several sites reaching category 3 (>200,000 cells ml^{-1}) levels. Temperatures during the bloom were 18.6–27.5 °C. Nutrient conditions preceding and during the bloom were conducive for the proliferation of *A. anophagefferens*: while inorganic nitrogen and phosphorus were <1 µg at N or P l^{-1}, urea was elevated during bloom development. Organic nitrogen, phosphorus and carbon were in the range of levels observed in previous brown tide blooms and increased following the collapse of the bloom. Growth rates of juvenile clams were significantly lower during the period of the brown tide bloom than following its collapse. Growth rates of *M. mercenaria* were found to be negatively impacted at brown tide densities as low as 20,000 cells ml^{-1}, or category 1 levels. The low growth rates of *M. mercenaria* could not be explained by temperature, as the lowest growth rates were found when water temperatures were at levels previously found to be optimal for growth.

Library: UD-GCMES

Wazniak, C., P. Tango, & W. Butler. 2004a. Abundance and frequency of occurrence of brown tide, *Aureococcus anophagefferens*, in the Maryland Coastal Bays. *In:* Wazniak, C.E., & M.R. Hall (eds). *Maryland's Coastal Bays Ecosystem Health Assessment 2004*. DNR-12-1202-0009. Maryland Department of Natural Resources, Tidewater Ecosystem Assessment, Annapolis, Maryland.

Wazniak, C., L. Karrh, T. Parham, M. Naylor, M. Hall, T. Carruthers, & R. Orth. 2004b. Seagrass abundance and habitat criteria in the Maryland Coastal Bays. *In:* Wazniak, C.E., & M.R. Hall (eds). *Maryland's Coastal Bays Ecosystem Health Assessment 2004*. DNR-12-1202-0009. Maryland Department of Natural Resources, Tidewater Ecosystem Assessment, Annapolis, Maryland.

Wazniak, C. E., M.R. Hall, T.J.B. Carruthers, B. Sturgis, W.C. Dennison, & R.J. Orth. 2007. Linking water quality to living resources in a mid-Atlantic lagoon system. *Ecological Applications* 17(5, suppl.):S64-S78.

Abstract. The mid-Atlantic coastal bays are shallow coastal lagoons, separated from the Atlantic Ocean by barrier sand islands with oceanic exchanges restricted to narrow inlets. The relatively poor flushing of these lagoon systems makes them susceptible to eutrophication resulting from anthropogenic nutrient loadings. An intensive water quality and seagrass monitoring program was initiated to track ecological changes in the Maryland and Virginia coastal bays. The purpose of this study was to analyze existing monitoring data to determine status and trends in eutrophication and to determine any associations between water quality and living resources. Analysis of monitoring program data revealed several trends: (1) decadal decreases in nutrient and chlorophyll concentrations, followed by recently increasing trends; (2) decadal increases in seagrass coverage, followed by a recent period of no change; (3) blooms of macroalgae and brown tide microalgae; and (4) exceedance of water quality thresholds: chlorophyll a (15 lg/L), total nitrogen (0.65 mg/L or 46 lmol/L), total phosphorus (0.037 mg/L or 1.2 lmol/L), and dissolved oxygen (5 mg/L) in many areas within the Maryland coastal bays. The water quality thresholds were based on habitat requirements for living resources (seagrass and fish) and used to calculate a water quality index, which was used to compare the bay segments. Strong gradients in water quality were correlated to changes in seagrass coverage between segments. These factors indicate that these coastal bays are in a state of transition, with a suite of metrics indicating degrading conditions. Continued monitoring and intensified management will be required to avert exacerbation of the observed eutrophication trends. Coastal lagoons worldwide are experiencing similar degrading trends due to increasing human pressures, and assessing status and trends relative to biologically relevant thresholds can assist in determining monitoring and management priorities and goals.

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Abstract: A water resources investigation in northeastern Worcester County, Maryland, during 1969-71, by the U.S. Geologic Survey in cooperation with the Maryland Geologic Survey is reported. An attempt is made to describe the productive limits of ground-water resources and the potential effects of increased withdrawal on the chemical quality of water from those sources.

Library: BSU, CBL, FSU, SMC, SU, UD-Morris, UMBC, UMCP [all are QE121 .A23 no.24]

Weigle, J. M. and G. Achmad. 1982. *Geohydrology of the Fresh-Water Aquifer System in the Vicinity of Ocean City, Maryland with a Section on Simulated Water-Level Changes*. Maryland Geological Survey, Report of Investigation RI 37. 55 pp.

Abstract: A description of the hydrogeologic framework of the aquifer system is provided with a discussion of the occurrence of salty water in the Manokin aquifer in the vicinity of Ocean City, Maryland, and an evaluation of alternate ground-water development plans. The latter section of the report used a digital simulation model to illustrate how potentiometric head losses could be minimized by dispersal of well fields or by pumping from more than one aquifer, or both.

Library: BSU, CBL, SMC, SU, UMBC, UMCP [all are QE121 .A23 no.37]; UD-Morris [QE121 .A48 no. 37]

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Weimer, L. G. 1986. The irascible savior of Assateague Island. *Sierra* (May/June):64-70.

Abstract: An account of William E. Greene's efforts to preserve Assateague Island by placing it into the public domain.

Library: FSU, SU, TU, UMBC, UMCP, UD-Morris

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Abstract: The subsurface Total Dissolved Nitrogen (TON) flux through a watershed receiving significant nonpoint nutrient inputs is reported. The study also assessed the horizontal and vertical scales of variation in TON concentration. Also evaluated were the accuracy and transport assumptions of several published loading models. Finally, research methods appropriate to the coastal zone are discussed.

Library: CBL, FSU, HPL, TU, UD-Morris, UMBC, UMCP

Weissman, C. K. 1994. *Effects of Environmental Variables on Mole Crab, Emerita talpoida (Say), Population Density Along the Barrier Island Coast of Maryland*. Master of Science Thesis, University of Maryland Eastern Shore (Princess Anne). viii+ 142.

Abstract: The environmental variables affecting the population density of mole crabs, *Emerita talpoida*, along the barrier island coast of Maryland were examined. Physical (water and sand temperature, beach slope, sand grain size) and human impact (vehicular and pedestrian traffic and beach replenishment) parameters were measured and/or observed for twenty three months. Density differences were detected for beaches with the highest and lowest human disturbance, although no linear relationship was found. Beach replenishment and pedestrian traffic are the most effective types of human disturbance. Off Road Vehicle traffic had no visible effect on crab density. Season had the greatest effect on crab population density. Water and sand temperature were strongly correlated with crab density. Beach slope was highly variable, and had no statistical effect. Sand grain size also had no statistical effect.

Library: UMES

Wells, D. V. 1994. Non-energy resources and shallow geologic framework of the inner continental margin off Ocean City, Maryland. *Maryland Geological Survey Open File Report No*. 16 (Baltimore). 97 pp.

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Wells D. V., R. D. Conkwright and J. Park. 1994. Geochemical and geophysical framework of the shallow sediments of Assawoman Bay and the Isle of Wight Bay in Maryland. *Maryland Geological Survey (Baltimore) Open File Report No.* 15. 125 pp.

Abstract: The objectives of the study were to delineate the shallow stratigraphic sequence of the coastal bays, relating the stratigraphy to late Quaternary sea level fluctuations, and to document the geochemical character of the shallow sediments, providing preliminary base-line data for comparison for future studies. The coastal bay sediments are predominantly SILTY. SILT contents averaged 44% for all samples. Averages for SAND and CLAY contents are 31% and 25%, respectively. SAND contents generally are higher for those samples collected along the eastern margin of the bays. CLAY becomes an important component in cores collected in the tributaries. Concentrations for nitrogen, carbon and sulfur for most of the sediments are within ranges expected for marine sediments and are comparable with those found in the Chesapeake Bay and other Atlantic coast estuaries. Nitrogen contents range from 0 to 1.39%, averaging 0.22%; carbon contents range from 0.02 to 30%, averaging 2.8%; and sulfur contents range from 0 to 5.28%, averaging 1.05%. Nitrogen, carbon and sulfur contents are strongly related to the texture

of the coastal bay sediments with higher values associated with finer-grained sediments. Metal concentrations are within ranges of other coastal bays not subject to heavy industry. The behavior of the metals were determined by two methods. The first method used enrichment factors referenced to average continental crust (Taylor, 1964). Enrichment factor values for Cu, Mn and Ni are <1 for most of the sediments suggesting that the reference material used may not represent the coastal bay sediments. Nevertheless, enrichment factors indicate that the upper 20 – 30 cm of sediment column are enriched with Cr, Cu, Ni and Zn compared to sediments deeper than 30 cm. The metal concentrations in the deeper sediments are interpreted to represent historical or background levels. The second technique used to assess metal concentrations in sediments correlated metal content with the grain size composition. Sediment deeper than 30 cm were used to obtain the relationship between texture and metal contents so as to determine background metal concentrations. Background levels were calculated for all samples and compared to measured levels, obtaining variation factors. Variation factors showed the same trends in the behavior of Cu and Zn as did the enrichment factors.

Wells, D. V., R. D. Conkwright, J. M. Hill and J. Park. 1994. The surficial sediments of Assawoman Bay and Isle of Wight Bay in Maryland: Physical and chemical characteristics. *Coastal and Estuarine Geology File Report No*. 94-2, Maryland Geological Survey (Baltimore). 99 pp.

Abstract: The distribution of sediment types in Isle of Wight and Assawoman bays is very similar to that for Chincoteague Bay and Rehoboth and Indian River bays. These bays correspond to Folger's (1972) category of bays having small tidal range and limited input from landward sources. In these bays, the bottom is dominated by sand transported in by overwash processes, inlet-related delta formations and from winnowing action by waves in shallow areas. Finer grained sediments (SILT and CLAY) are restricted to deeper channel areas and in tributaries. Carbon, nitrogen and sulfur contents for most of the surficial coastal bay sediments are within the range expected for marine sediments. These elemental contents are strongly related to the texture of the sediments, with higher values associated with fine-grained sediments. The highest values were obtained from SILTY CLAYS collected in the upstream areas of the tributaries. Very high values for carbon were obtained from several sediment samples collected in the upstream area of the St. Martin River. These high values are thought to be excessive and reflect high nutrient input into the river. Nitrogen contents relative to carbon, expressed as N/C ratios, suggest that much of the nitrogen measured in sediments from tributaries came from terrestrial-derived organic matter. The low N/C values obtained from St. Martin River sediments suggested that, in spite of the high nitrogen loadings into the river basin, relatively little nitrogen is preserved in the sediments. Results from this study indicate that the St. Martin River acts as a natural sink for many pollutants. Variation levels for Zn and Cu, as well as carbon, sulfur and nitrogen contents, are highest for sediments in the St. Martin River compared to those from other areas in the two bays. These higher levels may be attributed, in part, to the fine-grained nature of the sediments (SILTS and CLAYS) found in the St. Martin River. On the other hand, these levels also reflect the relatively high pollutant input into the river compared to other tributaries. Isle of Wight Bay receives 57% of current metal loadings and 50% of projected loads contributed by the Maryland Coastal Bays watershed. The drainage area for Isle of Wight is 32% of the total watershed for Maryland's coastal bay system. Assawoman Bay appears to be more pristine with regard to Zn and Cu enrichments.

Library: UD-Morris [GB450 .C65 no. 15]

Wells, D. V., R. D. Conkwright, R. Gast, J. M. Hill and J. Park. 1996. The shallow sediments of Newport Bay and Sinepuxent Bay in Maryland: Physical and chemical characteristics. *Coastal and Estuarine Geology File Report No*. 96-2, Maryland Geological Survey (Baltimore). 116 pp.

Library: MD DNR, USGS

Wells, D. V., S. M. Harris, J. M. Hill, J. Park and C. P. Williams. 1997. The shallow sediments of upper Chincoteague Bay area in Maryland: Physical and chemical characteristics. *Coastal and Estuarine Geology File Report No*. 97-2, Maryland Geological Survey (Baltimore). 90 pp.

Library: MD DNR, USGS

Wells, D. V., E. L. Hennessee and J. M. Hill. 2002. *Shoreline Erosion as a Source of Sediments and Nutrients Northern Coastal Bays, Maryland*. Resource Assessment Service, Maryland Geological Survey, Coastal and Estuarine Geology File Report No. 02-05.iv + 149 pp.

Abstract: During a 47-year period, shoreline erosion, determined for Assawoman and Isle of Wight bays and the St. Martin River unprotected shorelines, contributed an estimated 11.6 X 10^6 kg/yr of total sediments into the three bay system. Of the total sediment load, approximately 42%, or 4.9 X 10^6 kg/yr, were total suspended solids. That amounts to about one-third of the total suspended solids load from upland (surface) run-off. Annual total sediment loadings were greatest in the St. Martin River (6.9 X 10^6 kg/yr), due in part to high bank elevations and relatively dense bluff material. Bulk densities of sediments collected from bluffs averaged 1.4 g/cm^3. Total sediment loading from shore erosion in Assawoman Bay was about half that of the St. Martin River (3.2 X 10^6 kg/yr). Sediment loadings from Isle of Wight Bay shorelines were even lower (1.5 X 10^6 kg/yr). Much of the shoreline bordering Assawoman and Isle of Wight bays is low-lying marsh, composed of sediments with average bulk densities of 0.4 g/cm^3.

Sand-sized sediments account for approximately 57% of the total sediments contributed from shoreline erosion. The sand contributed from about half of the sand coming into the bays. More than one-third of the sand is eroded from the St. Martin River shoreline.

Shoreline erosion is a significant source of nutrients, contributing up to 8.5% of the total nitrogen and total phosphorus delivered to the system. Nutrient contributions from shoreline erosion slightly exceed input from point source. In addition to nutrients, erosion also contributes significant amounts of Pb and Zn, accounting for 4% and 9.5%, respectively, of the total loadings of those metals to the bays.

Library: on line, MDGS

Wells, D. V., J. M. Hill, J. Park and C. P. Williams. 1998. The shallow sediments of middle Chincoteague Bay area in Maryland: Physical and chemical characteristics. *Coastal and Estuarine Geology File Report No*. 98-2, Maryland Geological Survey (Baltimore). 104 pp.

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Wells, D. V. and R. T. Kerhin. 1982. *Geological Analysis and Re-Evaluation of Isle of Wight Shoals as a Potential Borrow Site*. Maryland Department of Natural Resources, Tidewater Administration (Annapolis). 33 pp.

Darlene V. Wells, D. V., S. VanRyswick, R. A. Orth, Jr., R. D. Conkwright, and K. A. Offerman. 2004. *Hydrodynamic Modeling in the Southern Coastal Bays: Water level monitoring, September 7-October 12, 2004*. Maryland Department of Natural Resources, Maryland Geological Survey (Annapolis). On-line Report.

Abstract: Chincoteague Bay is considered to be the most pristine of the Delmarva coastal bays. However, recent monitoring studies of the coastal bays have documented problems with low dissolved oxygen (DO) in Chincoteague Bay. In order to identify the cause of the low DO, additional information is needed on nutrient cycling within the coastal bays. The first step to developing a sophisticated ecological model for the bays is determining the hydrodynamic processes that control the circulation of the nutrients and the distribution of free-floating phytoplankton and macroalgae.

Over the past decade, the Army Corps of Engineers, Engineer Research & Development Center, Coastal & Hydraulics Laboratory (CHL) has been developing a comprehensive circulation model for the North Atlantic. This numeric model has been fine-tuned in the Ocean City Inlet area by increasing the computational mesh resolution in the vicinity of the Inlet and collecting current and tide data for model calibration. This fine-tuning was done to support of the Corps' rehabilitation of the South Jetty (Ocean City Inlet) and various projects relating to the Constructions Phase of the Ocean City and Vicinity Water Resource Project.

The Maryland Department of Natural Resources under a MCBP Implementation grant, initiated a project to collect additional tide and current data needed to refine the grid size and validate the model in Chincoteague, Newport and Sinepuxent Bays. This project consisted of two study components conducted over a one-month period: 1.) The University of Maryland, Center for Environmental Science (UMCES) monitored currents velocities at Chincoteague and Ocean City Inlets utilizing both fixed Acoustic Doppler Current Profilers (ADCP) and towed ADCPs; and 2.) Concurrent with the UMCES ADCP monitoring, the Maryland Geological survey recorded water levels at four locations in the southern bays. Descriptions of the instrumentation and methods used by the Maryland Geological Survey to collect the water level data are presented in this report. Descriptions of the instrumentation and methods used by the Maryland Geological Survey to collect the water level data are presented in this report.

Wells, G. P. 1945. The mode of life of *Arenicola marina* L. *Journal of the Marine Biological Association of the United Kingdom* 26(6):170-207.

Abstract: The burrows of the lugworm, *Arenicola marina*, were studied in various situations near Bangor, North Wales. The burrow consists of three portions. (1) the gallery is roughly L-shaped, whose walls are impregnated by the worm's secretions and marked by its neuropodia; the worms moves to and fro in the gallery with its tail towards the upper end. (2) The tail shaft is a short passage connecting the upper end of the gallery with the surface of the sand, where it may have two or more openings; it houses the worm's tail at the moment of defecation and lacks neuropodial markings. (3) The head shaft connects the lower end of the gallery with the surface and is very variable in structure; the most typical form is a column of yellowish sand, 1-3 times as wide as the gallery, rising towards the surface and there spreading into a cone below a saucer-shaped depression; exceptionally, the shaft includes an open, vertical passage, of the same diameter as the gallery, in which case the burrow is an open "U." A lugworm inhabits a single burrow at least for weeks at a stretch, if the conditions are favorable. Evidence that the worm feeds at the lower end of the head shaft was given by accumulations of rejected bits of shell, seaweed, etc. at that point, but there were many signs that the worm ascends the shaft from time to time. A laboratory study was made of the processes by which the worm sets up and operates the head shaft. Three main factors cooperate: the loosening of the sand by a water current, which the worms continually drive through the burrow, and which ascends the shaft; upward excursions of the worm, during which it works on the sand and drags it down into the shaft by means of special movements; and feeding from the base of the shaft. Brief notes on the food of the lugworm, and on a method of aerial respiration are appended.

Library: CBL, HPL, SMC, TU, UD-GCMES, UD-Morris, UMCP, UMES

Wells, H. W. 1954. *Ecological Population Survey of the Hard Clam, Venus (=Mercenaria) mercenaria, in the Chincoteague Bay Area of Maryland*. Master of Science Thesis, Duke University (Durham, North Carolina). 52 pp.

Abstract: Hard clam population levels, dimensional relationships, distribution patterns, frequency distribution profiles, average and maximum weights were determined and correlated to environmental data collected during the summers of 1952 and 1953. Population estimates for the entire Chincoteague Bay area were 107,500,000 clams in 1952 and 175,500,000 clams in 1953. Results showed that the highest average densities of clam populations were found in areas with shell-containing bottoms. The second highest areas were those with sand bottoms; however, the densities were three times less than the densities in the shell bottoms. Mud bottoms supported the lowest average populations. In relation to current velocities, areas with surface current velocities of 0.6 to 1.0 knots and bottom current velocities of 0.3-0.4 knots had the highest densities of clams. Weight and length frequency distribution histograms done for Chincoteague Bay averaged approximately 175 g/individual and 80 mm length. Clams found within Isle of Wight and Assawoman Bays averaged approximately 140 g/individual and 80 mm length. Data tables of populations, bottom types, length and weight measurements were included.

Wells, H. W. 1957. Abundance of the hard clam *Mercenaria mercenaria* in relation to environmental factors. *Ecology* 38(1):123-128.

Abstract: The distribution of *Mercenaria mercenaria* was determined for the Chincoteague Bay area of Maryland, and examined for correlations and links to environmental factors. Distribution correlates well with bottom types, ranking shell, sand, sand-mud mixtures, and mud in order of decreasing local abundance. Higher densities of clams were also correlated with stronger currents. A correlation with underwater vegetation may exist, but could not be proved due to the scarcity of such vegetation. Numbers of clams were apparently excluded from certain parts by unfavorable low spring salinities and low summertime ocean temperatures. Clams were more abundant in deeper water. The effects of clam fishing upon clam densities were noted, especially that of dredging clams, but no correlation could be made between abundance and fishing pressure.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Wells, H. W. 1961. The fauna of oyster beds, with special reference to the salinity factor. *Ecological Monographs* 31:239-266.

Abstract: A study conducted in the Beaufort, North Carolina, area between 1955 and 1956. The distribution of oyster associates were compared with physical factors, particularly salinity. Three hundred and three species were collected. The numbers of species declined upstream and bore a direct relationship to the salinity of the water. Mortalities due to hurricanes and the subsequent recovery of oyster beds were followed.

Twenty species were tested in the laboratory for tolerances to low salinities. The ranking of their salinity death points was compared with distribution of these species in Newport River. Only two species showed wide deviations from the distribution expected on the basis of their salinity death points. It was concluded that a great majority of the species of the oyster bed community are limited in their upstream penetration by salinity.

Library: BSU, CBL, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP

Wells, H. W. 1965. Maryland records of the gastropod, *Littorina littorea*, with a discussion of factors controlling its southern distribution. *Chesapeake Science* 6(1):38-42.

Abstract: The common periwinkle, *Littorina littorea*, is reported from Ocean City, Maryland, and its southern spread is reviewed. A southward-flowing longshore current has assisyted its southward spread. The southern limit of this species is correlated with water mean isotherm of 20^{o}C in the warmest month on both sides of the Atlantic. This limit may be expected to fluctuate with yearly variations in coastal water temperature.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

Wells, H. W., M. J. Wells and I. E. Gray. 1960. On the southern limit of *Balanus balanoides* in the western Atlantic. *Ecology* 41(3):578-580.

Abstract: Collections of *Balanus balanoides* (L.) from Ocean City, Maryland, and at Kitty Hawk, Rodanthe, and Waves, North Carolina, have extended the southern limit for this species on the Atlantic coast to the region of Cape Hatteras. Factors responsible for the southern limitation of this species have been discussed. The suggestion is made that a sharp temperature break in the vicinity of Cape Hatteras is responsible for preventing farther southward extension of this species.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Wells, H. W., M. J. Wells and I. E. Gray. 1964. Ecology of sponges in Hatteras Harbor, North Carolina. *Ecology* 43:752-766.

Abstract: Patterns of settling, growth, gemmule formation, and disappearance of sponges in Hatteras Harbor are presented for a one-year period and related to water temperature. Ten species are represented in the harbor, of which eight were recorded settling on submerged clam shells. Certain water temperatures, critical for some sponges, are realized two months earlier than in Milford Harbor, Long Island Sound. In response to these temperatures, certain events in the life cycles of *Microciona prolifera* and *Haliclona loosanoffi* occur two months earlier in Hatteras Harbor. In Hatteras Harbor, the latter species persists throughout the winter, exhibits two periods of settling, and relies on gemmules to survive adverse summer conditions, whereas in Long Island Sound it exhibits a single period of settling and relies on gemmules to survive adverse winter conditions. Observations are also made on competition for space by sponges and by the compound ascidian, *Botryllus schlosseri*, and on other aspects of the ecology of sponges in Hatteras Harbor.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Wenner, C. A. 1973. Occurrence of American eels, *Anguilla rostrata*, in waters overlying the eastern North American continental shelf. *Journal of the Fisheries Research Board of Canada* 30(11):1752-1755.

Abstract: Eleven reproductively maturing specimens of *Anguilla rostrata* were collected during 3 independent off-shore trawling operations. 3 females were taken on Dec 5, 1967 southeast of the mouth of Chesapeake Bay in 10-13 fthms, 1 male and 1 female on Nov 5, 1969 southeast of Cape Cod in 35-45 fathoms, and 6 females east of Assateague I. On December 22, 1971 in 5 fathoms. Morphometric analysis showed that the specimens were within the range of 'silver' phase of *A. rostrata*. Gonadal observations were made on all specimens.

Library: CBL, FSU, HPL, SMC, SU, TU, UD-GCMES, UD-Morris, UMBC, UMCP, UMES

Wesche, A. 1999. Status of blue crab stocks in Maryland's coastal bays. **IN:** *Proceedings of the Delmarva Coastal Bays Conference III: Tri-State Approaches to Preserving Aquatic Resources*, F. W. Kutz, P. Koenings and L. Adelhardt, eds.. U.S. Environmental Protection Agency, Office of Research and Development (Washington, D.C.), EPA/620/R-00/001:26-29.

Library: FSU [EP 1.23/6:620/R-00/001]

Wesche, A. and J. Casey. 1985. Status report: Elvers of the coastal bays of Maryland. Maryland Department of Natural Resources (Annapolis). 4 pp.

Abstract: A total of eight elver traps were placed in tributaries of Assawoman and Isle of Wight Bays on March 20, 1985 and monitored until April 4. Results indicated that Buntings branch. Greys Creek, Manklin Creek, Swamp Gut Creek and Turville Creek all experienced some elver migration. Turville Creek had the largest catches of any Maryland stream. Recommendations for the management of the elver fishery included the establishment of elver fishery regulations, the construction of an elver ladder, and stricter management of elver runs.

Weslager, C. A. 1942. Indian tribes of the Delmarva Peninsula. *Bulletin of the Archaeological Society of Delaware* (Wilmington)3(5):25-36.

Library: UD-Morris, UMCP

Weslager, C. A. 1950. Indians of the Eastern Shore of Maryland and Virginia. **IN:** *The Eastern Shore of Maryland and Virginia*. Lewis Historical Publishing Company (New York). 69 pp.

Library: SMC [F180 .E3], SU, TU, UD-Morris, UMCP [all are F187.E2 C5]

Weston, Donald. 1984. Family Polynoidae. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 3:21-1 - 21-30.

Wetmore, A. 1927. Records from the coast of Maryland. *The Auk* 44(2):256-257.

Abstract: Records of the occurrence of bird species are given for Atlantic coastal Maryland. These are: *Alca torda*, 4 December (1926); *Melospiza melodia atlantica*, breeding and also present in early December; *Chondestes grammacus grammacus*, 13 August; and *Passerculum princeps*.

Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

Wharton, C. 1956. State park site is offered for bridge okay. *The Evening Sun* (Baltimore, Maryland)., 4 January.

Wheaton, F. 2007. Review of oyster shell properties. II. Thermal properties. *Aquacultural Engineering* 37(1):14-23.

Abstract: Oyster thermal properties and applications of thermal transfer to oyster shucking are discussed. Oyster shell thermal conductivity varied from 0.9 to 2.27 W/m Â°C, depending on the study and oyster used [Gomez-Martinez, O., Zambrano-Arjona, M., Alvarado-Gil, J.J., 2002. Imaging of subsurface defects in bivalve shells by photothermal techniques. Materials Research Society, *Material Research Society Symposium Proceedings*, vol. 711. Merida, Mexico; Tulshian, N., Wheaton, F.W., 1986. Oyster (*Crassostrea virginica*) shell thermal conductivity: technique and determination. *Trans. Am. Soc. Agric. Eng*. 29 (2) 626-632]. Oyster shell density varied from 1710 to 1940 kg/m3 (Tulshian and Wheaton, 1986). Releasing the oyster shell bond appears to be possible using heating or freezing. Heating is a more reliable method of shucking than freezing but the heat must be applied to the shell exterior over the muscle-shell bond without unduly heating the shell edges. Heating was applied using a water bath, white and filtered visible light, and infrared irradiation. Freezing was accomplished by an alcohol-dry ice bath, a household freezer, and by direct expansion of Freon-12. Thermal conductivity of the shell limits the usefulness of heating temperatures over 400 Â°C because the time to sever the muscle-shell bond is an exponentially decreasing function.

Library: TU, UMBC, UD-GCMES, UMCP, UMES

Wheeler, J. C. 1990. *Water Withdrawal and Use in Maryland, 1986*. U.S. Geological Survey Open File Report 88-714.

Abstract: A summary of the amounts of fresh and saline water withdrawn and used in Maryland in 1986. The data is discussed briefly and presented in graphs, tables, and maps by counties, drainage basins and aquifers.

Library: FSU [TD224.M3 M38 1986], TU [TD224.M3 W44], UMCP [TD224.M3 W54 1990]

Whigham, D., M. Pittek, K. H. Hofmockel, T. Jordan and A. L. Pepin. 2002. Biomass and nutrient dynamics in restored wetlands on the outer coastal plain of Maryland. *Wetlands* 22(3):562-574.

Abstract: A three-year study of aboveground biomass and nutrient dynamics in twelve restored depressional wetlands of different ages demonstrated significant annual variability among sites. Annual variations appeared to be primarily due to differences in hydrologic conditions over the three years of the study. Differences among wetlands were not related to time since restoration. When data for all sites were combined, annual differences in biomass and most measurements of nutrients (concentrations and standing stocks) did not, however, differ significantly. These results suggest that differences that are measured at individual wetland sites may be less important at the landscape level. Biomass decreased from the outer temporary to inner submersed zone, and there were few differences among wetlands when the temporary, seasonal, and submersed zones were compared. Nutrient concentrations in the plant biomass increased from the temporary zone to the submersed zone, resulting in few differences in nutrient standing crops across zones. Results from this study demonstrate that some measurements of restoration success (i.e., biomass production) should be used cautiously because they are likely to be highly variable among sites and across years and thus may be of limited use in post-restoration monitoring. Other ecosystem parameters (e.g., nutrient concentrations of biomass) are much more constant spatially and temporally, indicating that nutrient cycling processes in vegetation were established quickly following restoration. Nutrient characteristics of wetland vegetation thus may be a useful metric for evaluating restoration success or failure.

White, C. P. 1989. *Chesapeake Bay: A Field Guide*. Tidewater Publishers (Centreville, Maryland). ix + 212 pp.

White, J. F., Jr. and A. W. White. 2002. *Amphibians and Reptiles of Delmarva*. Tidewater Publishers (Centreville, Maryland). xvi + 248 pp.

Abstract: A descriptive field guide to the morphology, systematics, distribution, and ecology of 73 species of amphibians and reptiles found on the Delmarva Peninsula. Seventy of the species are known to occur on the peninsula. The remaining 3 species are thought to be present but have not been documented. Eight species of salamanders, 4 of toads, 12 of frogs, 8 of turtles, 5 of sea-turtles, 4 of lizards, and 18 of snakes are described as occurring within Worcester County, Maryland, for a total herptofauna of 53 species.

Library: SMC, UD-Ag, UD-GCMES, UD-Morris, UMCP [QL653.D46 W55 2002]

Whiteford, C. 1961. Hearing set on Assateague bridge. *The Sun* (Baltimore, Maryland), 20 April.

Whiteford, C. 1963. Assateague Isle future is debated. *The Sun* (Baltimore, Maryland), 16 August.

Whitman, F. S., Jr. 1956. "Atlantic City" raises problem. *The Sun* (Baltimore, Maryland), 2 May.

Whitman, F. S., Jr. 1956. Assateague land patent bid denied. *The Sun* (Baltimore, Maryland), 7 August.

Wicks, E.C. 2005. *Coastal Plant Communities and Sea Level Rise: Is Sediment Adjacent to Retreating Marshes Suitable for Seagrass Growth?* Master of Science thesis, University of Maryland, Maryland.

Wigley, Roland L. 1964a. Order Mysidacea. **IN:** *Keys to Marine Invertebrates of the Woods Hole Region*, R. I. Smith, Ed. Systematics-Ecology Program, Marine Biological Laboratory (Woods Hole, Massachusetts), Contribution No. 11. pp. 93-97.

Library: CBL, FSU, HPL, UD-GCMES, UD-Morris [all are QL183 .S6]

Wigley, Roland L. 1964b. Order Cumacea. **IN:** *Keys to Marine Invertebrates of the Woods Hole Region*, R. I. Smith, Ed. Systematics-Ecology Program, Marine Biological Laboratory (Woods Hole, Massachusetts), Contribution No. 11. pp. 98-102.

Library: CBL, FSU, HPL, UD-GCMES, UD-Morris [all are QL183 .S6]

Wigley, Roland L. and B. R. Burns. 1971. Distribution and biology of mysids (Crustacea: Mysidacea) from the Atlantic coast of the United States in the N.M.F.S. Woods Hole Collection. *Fisheries Bulletin* 69(4):717-746.

Library: UD-GCMES, UD-Morris, UMCP

Wilcher, T. S. 1964. *King of Assateague*. Vantage Press (New York).

Library: UMCP [QL795.H7 W5]

Wilde, F. D., D. B. Radtke, J. Gibs and R. T. Iwatsubo, editors. 1999. *National Field Manual for the Collection of Water Quality Data – Collection of Water Samples*. U.S. Department of the Interior, U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, Chapter A4. 156 pp.

Library: FSU, UD-Morris, UMCP [all are I 19.15/5:BK.9/CHAP.A 6]

Wiley, M. L. and R. Hartman. 1969. National Park Service. Preliminary report on the fishes found in the proposed dredge areas of Chincoteague Bay. Unpublished report. U.S. Department of the Interior, National Park Service (Berlin, Maryland).

Abstract: Along the west side of Assateague Island, a total of twenty five species of fish were collected at eight sites. Most of the fish collected were juveniles and young of the year. The most abundant species were Atlantic silversides, *Menidia menidia*, and Bay anchovies, *Anchoa mitchilli*. The report proposed that certain shallow water species may be adversely affected by dredging in these areas.

Wilke, A. L., B. D.Watts, B. R.Truitt and R. Boettcher. 2005. Breeding season of the American oystercatcher in Virginia. *Waterbirds* 28(3):308-315.

Abstract: Surveys of the American oystercatcher, *Haematopus palliatus*, were conducted in all suitable nesting habitat in coastal Virginia, USA during the 2003 breeding season. The total of 588 pairs more than doubles previous estimates for the state, and provides a benchmark for the comparison of future surveys. These results suggest that Virginia supports the largest number of oystercatchers in the breeding season relative to other east coast states. Previous surveys in Virginia focused only on one coastal area, the barrier islands. Over two hundred pairs recorded in the seaside lagoon system of the Delmarva Peninsula in 2003 accounted for the large discrepancy between previous estimates for the state and the results of this survey. Over 89% of the total number of pairs was observed on the islands and in the lagoon system of the Delmarva Peninsula. Approximately 87% of the pairs were on land that is managed or regulated to some degree for the conservation of nesting birds by federal, state, municipal and non-governmental organizations, including 20% that occurred on land closed to public use during the bird-breeding season. Only 13% of the pairs were on land that affords no protection to breeding birds.

Library: UD-Morris [on line]

Williams, A. B. 1974. Crustacea: Decapoda. Marine Flora and Fauna of the Northeastern United States. *NOAA Technical Report NMFS CIRC-389*. 50 pp.

Abstract: The manual includes an introduction to general classification, an illustrated key, an annotated systematic list, a selected bibliography and a systematic index to the marine decapod crustaceans of the inshore and continental shelf waters of the northeastern United States.

Williams, B. D. and J. Love. 2006. Environmental relationships to larval ingression into coastal bays of the Delmarva Peninsula. *EOS, Transactions, American Geophysical Union* 87(36, suppl.):np.

Abstract: The population dynamics of coastal and estuarine fishes are greatly affected by larval recruitment, which can depend on precipitation and seasonal changes in water temperature. Despite their close proximity to the Chesapeake Bay, a major nursery for mid-Atlantic Bight species, no studies address larval recruitment to the coastal bays of Maryland. Two inlets of the largest of the coastal bays, Chincoteague Bay, were sampled for larval fishes during winter (2004 - 2005). The authors sampled a northern (Ocean City, MD) and southern (Chincoteague, VA) inlet biweekly with a 1-m diameter plankton net during nightly mid-flood tides. All fish were preserved in a 10% formalin solution and later processed in the laboratory. Specimens were identified to species, measured, and enumerated. A total of 929 individuals representing 22 species were collected. Larval fish assemblages were dominated by *Anguilla rostrata* (American eel), but also included *Micropogonias undulatus* (Atlantic croaker), *Anchoa mitchilli* (Bay Anchovy), and *Brevoortia tyrannus* (Atlantic Menhaden). Fish assemblages did not differ between northern and southern inlets, and consistent with other larval studies of the Mid-Atlantic Bight, they found strong seasonal patterns of assemblage structure. Non-metric multidimensional scaling analyses reduced the entire assemblage data to three interpretable axes that explained nearly 47% of the variance in the data set. Two of these axes were strongly correlated with precipitation, wind speed, and wind angle. Habitat modeling for the four larval species is still being conducted and results will be presented.

Williams, D. A. 2000. Report: Rising number of beach closings because of bacterial. Associated Press State and Local Wire Service, 4 August, BC Cycle.

Williams, J. B., H. J. Speir, S. Early and T. B. Smith. 1982. *1979 Maryland Saltwater Sport Fishing Survey*. Maryland Department of Natural Resources, Tidewater Administration Report TA-CRD-82-1.

Williams, J. B., T. P. Smith, H. J. Speir and S. Early. 1983. *1980 Maryland Saltwater Sport Fishing Survey*. Maryland Department of Natural Resources, Tidewater Administration Report TA-CRD-83-1.

Williams, S. L. and R. J. Orth. 1998. Genetic diversity and structure of natural and transplanted eelgrass populations in the Chesapeake and Chincoteague Bays. *Estuaries* 21(1):118-128.

Abstract: The objective of this study was to gain baseline population data on the genetic diversity and differentiation of eelgrass (*Zostera marina* L.) populations in the Chesapeake and Chincoteague bays. Natural and transplanted eelgrass beds were compared using starch gel electrophoresis of allozymes. Transplanted eelgrass beds were not reduced in genetic diversity compared with natural beds. Inbreeding coefficients (F sub(IS)) indicated that transplanted eelgrass beds had theoretically higher levels of out crossing than natural beds, suggesting the significance of use of seeds as donor material and of seedling recruitment following transplantation diebacks. Natural populations exhibited very great genetic structure (F sub(ST) = 0.335), but transplanted beds were genetically similar to the donor bed and each other. Genetic diversity was lowest in Chincoteague Bay, reflecting recent restoration history since the 1930s wasting disease and geographical isolation from other east coast populations. These data provide a basis for developing a management plan for conserving eelgrass genetic diversity in the Chesapeake Bay and for guiding estuary-wide restoration efforts. It will be important to recognize

that the natural genetic diversity of eelgrass in the estuary is distributed among various populations and is not well represented by single populations.

Population genetics; Natural populations; Sea grass; Transplants; Isoenzymes; Ecosystem management; Ecosystem disturbance; Genetic diversity; Population structure; Population differentiation; Aquatic Plants; Plant Populations; Estuaries; Species Diversity; Rehabilitation; Conservation; Baseline Studies; Electrophoresis; Zostera marina; Population genetics; Conservation, wildlife management and recreation; Other angiosperms; Estuaries; Conservation and Environmental Protection.

Library: CBL, HPL, FSU, SMC, SU, TU, UD-GCMES, UMBC, UMCP, UMES

Willis, D. 1995. Birth control darts work on wild horses. *Buffalo News* (Buffalo, New York), 6 August, Science, p. 11F.

Wilson, A. D. 2002. Assateague & Chincoteague: Beauty and nature combined. *Sea Technology* 43(2):75-76.

Library: CBL, HPL, UD-Morris, UMBC, UMCP

Wilson, J. G. and D. W. Jeffrey. 1994. Benthic biological pollution indices in estuaries. **IN:** *Biomonitoring of Coastal Waters and Estuaries*, J. M. Kramer, Ed. CRC Press (Boca Raton, Florida). pp. 311-327.

Library: CBL, SMC, UD-GCMES, UMBC, UMCP [all are QH545.W3 B567 1994]

Wilson, J. M. 1984. *The Columbia Aquifer of the Eastern Shore of Maryland. Part 2: Selected Water-Well Records, Chemical Analyses, Water-Level Measurements, Lithologic Logs, and Geophysical Logs.* Report of Investigation RI 40(2). 110 pp.

Library: CBL, FSU, SMC, SU, UD-Morris, UMBC, UMCP [all are QE121 .A23 no. 40]

Wilson, K., K. Heck and K. Able. 1987. Juvenile blue crab, *Callinectes sapidus*, survival: an evaluation of eelgrass, *Zostericola marina*, as refuge. *Fisheries Bulletin* 85:53-58.

Library: UD-GCMES, UD-Morris, UMCP

Wilson, W. T. 1977. *History of Crisfield and Surrounding Areas on Maryland's Eastern Shore*. Gateway Press (Baltimore, Maryland).

Library: SU, TU, UMCP [all are F189.C8 W54]

Winters, B. 1962. Assateague Wildlife Refuge demanded. *The Evening Sun* (Baltimore, Maryland), 14 August.

Winters, B. 1963. Bill for Assateague park introduced in Congress. *The Evening Sun* (Baltimore, Maryland), 10 September.

Wirth, W. W. and W. L. Grogan, Jr. 1982. The predaceous midges of the genus *Phaenobezzia* in North America (Diptera: Ceratopogonidae). *Memoirs of the Entomological Society of Washington* 10:179-192.

Abstract: The genus *Phaenobezzia* Haeselbarth is diagnosed and recognized as a valid genus distinct from *Bezzia* Kieffer. From a study of the types of the North American species *Probezzia incerta* Malloch is recognized as a junior synonym of *Phaenobezzia opaca* (Loew) (new synonymy) [some specimens collected at Snow Hill, Worcester County] and *Phaenobezzia fulvithorax* (Malloch), transferred from P*robezzia*, is recognized as a distinct species (new combination). *Phaenobezzia sabroskyi*, new species, is described from Florida, Louisiana, and Maryland, and a key is presented for the three known North American species

Library: UMCP

Wirth, W. W. and W. L. Grogan, Jr. 1983. The nearctic species of the *Bexxia bivittata* group (Diptera: Ceratopogonidae*)*. *Proceedings of the Biological Society of Washington* 96(3):489-523.

Abstract: The *bivittata* Group of the genus *Bezzia* Kieffer, subgenus *Bezzia*, is comprised in North America of at least 15 species, of which the following 12 are described as new: *aklavakensis* from Canadian Northern Terriotory, *andersonorum* from Maryland, *capitata* from Honduras and Arizona, *chelistyla* from Arizona, *gibberella* from Maryland, *luteiventris* from Virginia, *mohave* from California, *nigripes* from Utah, *sandersoni* from Arizona, *setosinotum* (specimens collected at Salisbury, Wicomico County) and *spatula* from Maryland, and *texensis* from Texas. Diagnoses are given of all taxa, a key is presented, and all species are illustrated. *Bezzia bivittata* is reported from Snow Hill, Worcester County.

Library: ASIS, CBL, TU, UD-Morris, UMCP

Withington, L. 1913. Arrivals from Virginia. *William and Mary College Quarterly Historical Magazine* 22(1):52-53.

Abstract: Described the arrival of Jenkin Price of Accomack, Virginia, at London. Price had been a planter in Accomack and in 1660 the General Assembly gave him 500 pounds of tobacco for saving the lives of Col. Henry Norwood, Maj. Francis Moryson, Maj. Philip Stevens and Maj. Francis Cary, all of whom had been Cavaliers abandoned on an island in Assateague Bay (Tom's Cove).

Library: SMC, TU, UD-Morris, UMBC, UMCP, UMES

Witten, J. D. and S. J. Trull. 1991. Quantification and Control of Nitrogen Inputs to Buttermilk Bay, Massachusetts. National Water Works Association Conference, FOCUS on Eastern Regional Ground Water Issues, Portland, Maine, October 29-31.

Abstract: A synoptic overview of research completed to determine the sources and loadings for various nitrogen inputs into Buttermilk Bay, Massachusetts, a coastal embayment within Buzzard's Bay. Land management strategies were developed to control anthropogenic sources of nitrogen within the contributing area.

WMAR-TV. 1964. Future of Assateague. Editorial addressed to "all public spirited citizens." 17 March. 1 p.

Wolcott, D. L. and T. G. Wolcott. 1999. High mortality of piping plovers on beaches with abundant ghost crabs: Correlation, not causation. *Wilson Bulletin* 111(3):321-329.

Abstract: Ghost crabs (*Ocypode quadrata*) have been implicated in mortality of eggs and chicks of the beach-nesting Piping Plover (*Charadrius melodus*) whose Atlantic Coast populations are listed as threatened. Through observation and experimentation, we investigated the interactions between ghost crabs and plovers on Wild Beach, a Piping Plover nesting area on Assateague Island, Virginia. This site has a high abundance of ghost crabs and historically low fledging success compared to adjacent areas with fewer crabs. We observed encounters of crabs with plover eggs, chicks, and adults in the field, but never predation. In staged encounters of crabs with eggs and chicks (using hatchery reared quail as plover surrogates), we were unable to elicit predatory behavior either on the beach or in the lab. We conclude that although instances of ghost crab predation on Piping Plover eggs and chicks occur, they are rare and cannot account for the high mortality frequently reported on beaches where ghost crabs are abundant. Adult plovers behave toward crabs as if they were dangerous to eggs and chicks, and their young broods in the study area did not forage along the foreshore. Hence, ghost crabs may increase mortality indirectly. Frequent responding to crabs by parents may attract more deadly brood predators. Brood nutrition may suffer as adult plovers direct chicks away from areas where forage is reportedly richer but crabs are abundant, such as the foreshore. Nutrient intake may be further reduced on more southerly breeding grounds where high temperatures on backshores force chicks to stop foraging and take shelter during mid-day. Although high mortality cannot be attributed directly to predation by crabs, it may be due to factors that covary with crab abundance, such as high temperature, behavioral responses of adult birds, and poor forage.

Library: FSU, SMC, TU, UD-Morris, UMCP

Wolcott, T. G. and D. L. Wolcott. 1984. Impact of off road vehicles on macroinvertebrates of a mid-Atlantic beach. *Biological Conservation* 29(3):217-240.

Abstract: Potential and actual impacts of off-road vehicle (ORV) use on beach macroinvertebrates were examined on the Cape Lookout National Seashore (North Carolina). Mole crabs, *Emerita talpoida*, and coquinas, *Donax variabilis*, were not damaged. Ghost crabs, *Oxypode quadrata* were completely protected by burrows as shallow as 5 cm, and therefore were not subject to injury during the day, but they could be killed in large numbers by vehicles while feeding on the foreshore at night. Ghost crab populations on the national seashore were large (10,000/km of beach) and a small proportion of the population would be killed by a single vehicle pass. Nevertheless, predicted population mortalities calculated from observed kills of ghost crabs per vehicle-km ranged from 14-98% for 100 vehicle passes. Currently vehicle use on this beach is light and essentially none occurs on the foreshore after dark. Little impact on beach macroinvertebrates would be expected from this usage pattern. Actual impact on ghost crab populations, assessed by burrow censuses , was negligible. No differences were detected between heavy-use and light-use sites in total population size, average crab size orm population change through the heaviest traffic season. However, increases in traffic to levels seen on other beaches, especially night driving, would probably have devastating effects on ghost crab populations. In heavily used areas, banning ORVs from the foreshore between dusk and dawn may be required to protect this species.

Wolf, P. S. 1984a. Family Pilargidae Saint Joseph, 1899. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 4:29-1 - 29-41.

Wolf, P. S. 1984b. Family Maldanidae Malmgren, 1867b. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 2:15-1 - 15-21.

Wolf, P. S. 1984c. Family Pectinariidae Quatrefages, 1865. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 7:50-1 - 50-10.

Wolf, P. S. 1984d. Family Dorvilleidae Chamberlin, 1919b. **IN:** *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*, J. M. Uebelacker and P. G. Johnson, Eds. Minerals Management Service, U.S. Department of the Interior (Metairie, Louisiana). 6:44-1 – 44-37.

Woll, R. S. 1978. *Maryland Ground-Water Information: Chemical Quality Data*. Maryland Geological Survey Basic Data Report 10. 125 pp.

Abstract: The document presents previously published and unpublished ground-water-quality data in a single volume. The report contains all of the chemical analyses of Maryland's ground-water performed in the U.S.G.S. laboratories through December of 1974.

Library: SMC, TU, UMBC, [all are GB1025.M3 W3 no. 10]; SU [QE121 .A197 no.10]; UMCP [TD224.M3 W3 no.10]; UD-Morris [TD225 .B2 W3 no. 10]

Wong, K.-C. 1991. The effect of coastal sea level forcing on Indian River Bay and Rehoboth Bay, Delaware. *Estuarine, Coastal and Shelf Science* 32(3):213-229.

Abstract: Previous studies have suggested that sea level and current variability in Indian River Bay and Rehoboth Bay, Delaware are primarily forced by coastal sea level fluctuations. A linearized frequency-dependent pumping mode model is developed to (1) examine the response characteristics of the Indian River Bay-Rehoboth Bay system, and (2) assess the relative importance of the coastal forcing from the Indian River Inlet and the Lewes-Rehoboth Canal. The results indicate that the pumping mode model can adequately address the first-order response of the two bays. The results further indicate that sea level variabilities in the two bays are almost entirely forced by coastal forcing from the Indian River Inlet at both tidal and subtidal frequencies. The coastal forcing from the inlet also dominates the volume flux through the system at all frequencies. but the coastal forcing conveyed through the Lewes and Rehoboth Canal can generate up to 20% of the total volume transport at very low frequencies. The low frequency volume flux through the canal, however, generates a flow through the entire system and produces minimal sea level response. The overall response of the two bays to coastal forcing depends strongly on the degree to which the two bays are coupled. The ditch connecting the two bays acts as an effective low-pass filter to preferentially damp out high-frequency tidal motions in Rehoboth Bay. Because of the coupled nature of the response, the ditch also exerts substantial influence on the response characteristics of Indian River Bay.

Library: CBL, HPL, SU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Wong, K.-C. 2002. On the wind-induced exchange between Indian River Bay, Delaware and the adjacent continental shelf. *Continental Shelf Research* 22(11-13):1651-1668.

Abstract: The structure of the wind-induced exchange between Indian River Bay, Delaware, and the adjacent continental shelf is examined based on current measurements made at the Indian River Inlet which represents the only conduit of exchange between the bay and the coastal ocean. Local wind measurements and sea levels from stations located along the open coast and in the interior of the bay are also obtained. Coastal sea level fluctuations are coherent with winds over periodicities of 2–10 days, with the highest response corresponding to winds aligned along two bands, one broadly centered around the general orientation of the Middle Atlantic Bight coastline between New Jersey and Virginia (040°T), and the other narrowly focused on the direction perpendicular to the local coastline (090°T). Currents in the inlet are also highly coherent with the wind along these two directions, but the high coherence is limited to time scales between 2 and 5 days. Within those time scales the currents in the inlet show largely depth-independent fluctuations which are highly coherent and in quadrature phase with the coastal sea level fluctuations, indicating that the subtidal exchanges in those time scales are principally accomplished by the remote wind effects on the shelf through the impingement of coastal sea level fluctuations at the entrance to the inlet. This coastal pumping effect produces unidirectional inflow throughout the water column under coastal set-up conditions, and outflow occurs under coastal set-down conditions. There is indication that a weaker, but still significant mode of bi-directional exchange also exists in the inlet, with currents in the upper layer fluctuating in opposite directions relative to those in the lower layer.

Library: CBL, HPL, UD-GCMES, UMCP

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Library: CBL, UD-Morris, UD-GCMES, TU, UMCP

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Abstract: Disturbance is a significant mortality source in many assemblages. The susceptibility of organisms to this mortality source is, in part, a function of the availability of substrate heterogeneities that act as refuges from the disturbance process. There are at least five major categories of temporal and spatial refuges from disturbance: (1) temporal periods outside the activity range of the disturbance process; (2) temporal periods within the activity range of the disturbance process; (3) spatial zones beyond the activity range of the process; (4) physical heterogeneities within the activity range of the disturbance process; and (5) biologically generated refuges within the activity range of the disturbance process.

The last category is particularly interesting because it involves an organism's use of a refuge which is the product of another organism or organisms. Data from a marine system (Tom's Cove, Assateague Island, Virginia) are used to demonstrate the effectiveness of several types of refuges, particularly biologically generated refuges. The refuge-forming species is *Diopatra cuprea*, an onuphid polychaete which inhabits shallow water, medium-grained sand flats from Cape Cod to Florida. The abundance and species richness of other members of the infauna are shown to be positively associated with the presence of the tubes of *Diopatra*. This effect is confined to the area immediately surrounding the tubes of *Diopatra*. It was experimentally demonstrated that a tube-like structure, such as a plastic straw, has the same effect of the infauna as does the tube of *Diopatra*. Thus, as predicted, the physical and biological refuges affect infauna abundance similarly. They should not show similar patterns of distribution in space and time, however, and this is discussed.

Library: BSU, CBL, CSU, FSU, HPL, JSTOR, MSU, SMC, SU, TU, UD-Morris, UD-GCMES, UMBC, UMCP, UMES

Wooden, S. A. 1981. Disturbance and community structure in a shallow water sand flat. *Ecology* 62:1052-1066.

Abstract: *Diopatra cuprea*, an onuphid polychaete, is a large and conspicuous component of semi protected sand flats along the east coast of North America. It build a large tube which projects above the surface of the sediment. Infaunal abundances are greater around such tubes than elsewhere. To test the hypothesis that tubes provide a local refuge from predation, abundances of the conspicuous predators and sediment disruptors, *Callinectes sapidus* the blue crab and *Limulus polyphemus* the horseshoe crab, were manipulated at a site in Tom's Cove, Assateague Island, Virginia. In the absence of all predators >0.625 cm, infaunal abundances no longer increased as a function of *Diopatra* abundance. Thus, the tube of *Diopatra* appears to act as a refuge from predation for infauna. Further manipulations of the predators indicated that *Callinectes* was far more important than *Limulus*. Species which were numerically dominant in the presence of predators predominated in the predator removals as well. These experiments were repeated three times over a three year period (1974, 1975, 1976) and in general the results were consistent over that period. Densities of juvenile *Diopatra* increased dramatically inside predator exclosure. Densities of adult *Diopatra* did not. The abundance of this refuge-forming organisms, therefore, is at least partially dependent upon the frequency with which individuals pass through the size-dependent period of susceptibility.

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Abstract: New boat ramps (4) and slips (3,238) planned for the Assawoman, Chincoteague, Isle of Wight, and Sinepuxent Bays were reported.

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Abstract: The report outlines the geology and hydrogeology of Worcester County, 'Maryland. The plan seeks to outline options for on-site sewage disposal in different areas of the County which are both sensitive to hydrogeologic conditions and protective of valuable ground and surface water resources and the public health.

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Wulff, B. L. 1968. Summer marine algae at the jetty at Ocean City, MD. *Chesapeake Science* 9:56-60.

Abstract: Thirty-four species of marine algae were collected from the north jetty at Ocean City, Maryland, during July and August 1966. The species were: **Cyanophyta:** *Entophysalis deusta, E. conferta, Lyngbya semiplena, Schizothrix calcicola, Calothrix crustacea, C. confervicola*; **Rhodophyta:** *Bangia fusco-purpurea, Goniotrichum alsidii, Porphyra leucosticta, P. umbilicalis, Acrochaetium trifilum, A. virgatulum, A. spp., Nemalion multifidum, Gracilaria foliifera, Callithamnion baileyi, Ceramium fastigiatum, C. strictum, C. rubrum, Polysiphonia harveyi, P. urceolata, P. novae-angliae, P. denudata*; **Phaeophyta:** *Giffordia duchassaingiana, Petalonia fascia, Scytosiphon lomentaria, Fucus vesiculosus*; **Chlorophyta:** *Enteromorpha micrococca, E. minima, E. intestinalis, E. linza, E. compressa, E. prolifera, Ulva lactuca*, and *Chaetomorpha aerea*. Four species (*P. fascia, P. leucosticta, S. lomentaria* and *P. umbilicalis*) were at their southernmost geographic limit during the summer months and another four species (*N. multifidum, C. baileyi, P. urceolata* and *P. novae-angliae*) were at their southernmost limit at Ocean City the year-round. Consequently, Ocean City, Maryland, is a new southern boundary for some marine algae having their northern limits north of Cape Cod.

Library: BSU, CBL, FSU, HPL, SMC, TU, UD-Morris; UMBC, UMCP, UMES

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Abstract: One of the most certain consequences of global warming is an increase of global (eustatic) sea level. The resulting inundation from rising seas will heavily impact low-lying areas; at least 100 million persons live within one meter of mean sea level and are at increased risk in the coming decades. The very existence of some island states and deltaic coasts is threatened by sea level rise. An additional threat affecting some of the most heavily developed and economically valuable real estate will come from an exacerbation of sandy beach erosion. As the beach is lost, fixed structures nearby are increasingly exposed to the direct impact of storm waves, and will ultimately be damaged or destroyed unless expensive protective measures are taken. It has long been speculated that the underlying rate of long-term sandy beach erosion is two orders of magnitude greater than the rate of rise of sea level, so that any significant increase of sea level has dire consequences for coastal inhabitants. We present in this paper an analytical treatment that indicates there is a highly multiplicative association between long-term sandy beach erosion and sea level rise, and use a large and consistent data base of shoreline position field data to show that there is reasonable quantitative agreement with observations of 19th and 20th century sea levels and coastal erosion. This result means that the already-severe coastal erosion problems witnessed in the 20th century will be exacerbated in the 21st century under plausible global warming scenarios.

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Zheng, J. and R. G. Dean. 1997. Numerical models and intercomparisons of beach profile evolution. *Coastal Engineering* 30(3-4):169-201.

Abstract: A modified non-linear cross-shore sediment transport relationship is developed based on equilibrium beach profile concepts and scaling relationships. This non-linear relationship provides a reasonable explanation for the significantly different time scales of beach evolution evident in various laboratory experiments. The proposed non-linear model called ``CROSS" is calibrated and compared with the commonly employed linear transport relationship using laboratory data. A total of seven large scale wave tank experiments from three different facilities are examined. The results demonstrate that the non-linear transport model provides better overall predictions than the linear transport equations. The CROSS model and three other commonly used models are applied to predict beach erosion at Ocean City, Maryland during the November 11, 1991 and January 4, 1992 storms. Seven survey lines are available for comparison with the numerical simulations. Overall, CROSS, EDUNE and SBEACH (version 3.0) provide reasonable predictions for both dune erosion and the entire profiles. The sensitivity of CROSS to the transport coefficient, active water depth, storm surge levels and the storm wave heights are examined for the storm erosion at Ocean City. It appears that CROSS is quite insensitive to the transport coefficient. The subaqueous part of a profile is quite sensitive to the wave height and the subaerial part is less affected. The CROSS model provides better predictions with the ratio of active water depth to incoming wave height of 1 than with the ratio of 1.28, and the 20% increased storm surge yields a better simulation.

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Abstract: Data sets obtained from five different locations of storm erosion are investigated to quantify the variability of beach erosion in the longshore direction. The average beach profile changes and the corresponding standard deviations at various elevation contours are calculated for each data set. Four cross-shore numerical models, CROSS, CCCL, EDUNE, and SBEACH, are applied to simulate beach erosion at Ocean City, Maryland during the November 1991 and January 1992 storms. The variability of the dune and berm erosion in the longshore direction is found to be significant with standard deviations ranging from 30% to 100% of the average retreat. The available cross-shore models, which have been developed to represent the average profile changes due to specific storm conditions do not represent directly the longshore variability. To account for the longshore variability in dune recession for regulatory and design purposes, it is necessary to modify the cross-shore modeling results empirically.

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Abstract: This manual treats the estuarine and coastal marine barnacles of the northeastern Atlantic from the Gulf of St. Lawrence to Cape Hatteras, North carolina. The introduction includes a review of the general biology, classification, and diagnostic features of the five orders of Cirripedia, and an annotated species list covers those sirripeds reported from the region. The bulk of the manual is devoted to aids in the identification of barnacles (Order Thoracica), and includes an illustrated systematic key to species augmented by a discussion and glossary of morphologic terms, and a guide to study methods.