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marine education



***A Bibliography of Educational Materials Available
from the Nation's Sea Grant College Programs***

Foreward

This bibliography is one result of a cooperative marine education effort being pursued by the nation's Sea Grant Programs and the staff of United Technologies' Living Seas Pavilion at EPCOT Center in Orlando, Florida. The Living Seas concept was first introduced to Sea Grant nearly a decade ago at a Sea Grant Association meeting when Kym Murphy displayed a model of the proposed facility. Bob Wildman, of the National Sea Grant Program, was appointed to the Living Seas' Advisory Committee in 1981, and program development was closely monitored by representatives of the State University System of Florida Sea Grant College Program.

In February 1986 Florida's Sea Grant Extension Program leader, Marion Clarke, met with Kym Murphy and Living Seas' education director Sue Lagacé to explore mutual marine education interests. This led to the appointment of joint committees to explore possible avenues of cooperative efforts, particularly in the area of curricula and supplemental materials.

The National Sea Grant Program, established by Congress in 1966 and jointly sponsored by federal, state and local governments, the nation's universities, and the people of the United States, has a three-fold mandate of promoting research, education and public awareness of our oceans and the Great Lakes.

Since that original legislation, Sea Grant College Programs or Sea Grant Institutional Programs have been established in every coastal state as well as each state bordering the Great Lakes. Many of these programs have marine education programs that have resulted in development of textbooks and curricula materials that are now used in elementary and secondary schools throughout the nation. The materials outlined in this bibliography are available from the developing institution. Complete ordering instructions are given, as well as notations for free materials and those available at cost. While many of the materials are specific to a particular region or coast, others are usable throughout the country, including inland states.

This publication was initially intended only for use with Living Seas' education program and as a reference document in EPCOT's Teacher Education Center. Once compiled, however, it seemed apparent that educators throughout the country might find such a national listing to be useful. Teachers can request that their names be added to new publication announcement lists for specific programs. This will ensure that they are notified as new materials are published in the future.

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URI, NARRAGANSETT BAY CAMPUS
NARRAGANSETT, RI 02882**

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Alaska Sea Grant College Program
University of Alaska
138 Irving II
Fairbanks, Alaska 99775-5040

Marine Life Life Cycle Posters. AK-SG-77-3 \$1.00 each.
A series of five posters, each measuring 24 " x 36" , that depicts the life cycles of pink shrimp, ocean perch, king crab, weathervane scallop and halibut.

Ordering Instructions Make checks payable to the University of Alaska. If order totals more than \$3.50, add \$2.00 for shipping. If less than \$3.50, add \$.50 for shipping. Send orders to:

Alaska Sea Grant College Program
Communications Office
University of Alaska
138 Irving II
Fairbanks, AK 99775-5040

California Sea Grant College Program
The University of California A-032
La Jolla, California 92093
(619) 534-4440

Directory of Academic Marine Programs in California. Second edition, 1985 Publication No. **R-CSGCP-014.** California Sea Grant College Program. \$1.00 (postage and handling).
A guide for teachers and students to undergraduate and graduate courses of study in the marine sciences at California colleges and universities.

Salt Marsh Vegetation: Examples from the Tijuanaa Estuary. Joy B. Zedler. 1982. Publication No. **E-CSGCP-0003** (English version) and **E-CSGCP-004** (Spanish version). \$1.25.
These 40-page publications describe salt marsh vegetation in Southern California using the Tijuana

Estuary as an example and explain how marsh plants are able to tolerate the stresses of the environment. Specify English or Spanish version when ordering.

Ordering Instructions Mail check or money order, payable to UC Regents, to:

California Sea Grant College Program
A-032
University of California
La Jolla, CA 92093-0232

The University of Connecticut
Sea Grant Program
Avery Point
Groton, Connecticut 06340
(203)445-3457

Notes on Connecticut's Coastal and Marine Resources. CT-SG-87-09.
Observations from on-the-water workshops in conjunction with Project Oceanology. Topics include Connecticut's estuaries, marine fisheries, shellfisheries and seafood secrets. 16 pages.

Hypoxia in Long Island Sound. Fact sheet 1. **CT-SG-88-02.**
The Long Island Sound Study (EPA) reports on low oxygen levels and its effect on marine life.

Adding Marine Education to Your Curriculum Patricia Staley. **CT-SG-87-20.**

Tips and information sources for teachers, with a New England focus. 8 pages.

Ordering Instructions Send requests to:

University of Connecticut
Sea Grant Program
Avery Point
Groton, CT 06340

University of Delaware
Sea Grant Marine Advisory Service
700 Pilottown Road
Lewes, Delaware 19958
(302) 645-4346

MAS Bulletins (entire series \$3.50).

Jellyfish - Regular Summer Visitors to Delaware Shores. MAS-2. Revised 1987.

Illustrated guide to four species common to the region, with life history, migratory patterns, and how jellyfish can sting.

Weakfish - Catch a Queen for Dinner. MAS-3.

Illustrated description of the species and its habitat: includes fishing tips.

Delaware vs. the Sea: Are We Losing the Battle? MAS-4.

Explains the activity of the sea and how coastal areas are eroded and built up. Brief description of geologists' research methods and engineers' beach protection measures.

Common Seashells of Delaware. MAS-5.

Diagrams, photographs, and descriptions of most common seashells.

The Horseshoe Crab - A Reminder of Delaware's Past. MAS-6.

Illustrated description, history, habits, population trends of this colorful seashore animal.

Flounder, the Ocean's Platter. MAS-7. Revised 1987.

Illustrated description of various species of flounder common to Delaware coastal waters, explaining appearance, habits, fishing suggestions.

Shark. MAS-10.

Describes and illustrates six sharks common to the mid-Atlantic area; handling, cleaning, preserving tips, and recipes.

Delaware's Blue Crab. MAS-11.

Describes the life history and methods for commercial and recreational crabbing.

The Hard Clam. MAS-12. Revised 1986.

Biology and life cycle of the hard clam; recreational and commercial clamming.

The Delaware Bay Oyster and the MSX Problem. MAS-13.

Reports on recent findings by researchers and looks at the steps being taken by fisheries managers to prevent another outbreak of MSX disease.

MAS Notes - Marine Education (1 copy of each topic free).

A series of one- or two-page fact sheets which cover a wide variety of topics. MAS Notes have become a popular way to answer questions concerning Delaware's marine environment. Topics include: Beach Safety Information Sources; Beach Seining; Hurricane Preparedness for Coastal Sussex County,

Delaware; Marine Careers; and Sharks: A Resource Guide.

The Delaware Estuary: Rediscovering a Forgotten Resource (\$20.00)

A full-color, 144-page review of the Delaware Estuary- its history, geology, resources and management.

Audio-Visuals-may be rented for up to 7 days for \$5.00 (sales price in parentheses):

Marine Careers, 35 mm slide/tape presentation (\$50). Narrated slide show that describes career opportunities in marine-related professions. Length: 15 min.

Beach Safety on the Delmarva Peninsula, 35 mm slide/tape presentation (\$50). Provides the unfamiliar beachgoer with an overview of natural conditions and marine life at the ocean's edge. Length: 20 min.

The Blue Crab, 35 mm slide/tape presentation (\$50). Covers the natural history of the area's most famous crustacean with simple language, colorful pictures and cartoons. Targeted for elementary students, the package also includes a classroom activities booklet designed to reinforce concepts depicted in the slideshow. Length: 15 min.

Beachwalk: Exploring the Living Coast, 35 mm slide/tape presentation (\$50). Introduces young students (K-3) to the marine life easily found while walking on Delaware's beaches. The basic concepts of waves, tides, salinity and sedimentation are interwoven to illustrate the uniqueness of living at the water's edge. Length: 15 min.

Ordering Instructions: Make checks payable to the University of Delaware. Mail request with check to:

University of Delaware
Marine Communications Office
Sea Grant College Program
196 South College Avenue
Newark, DE 19716

State University System of Florida
Sea Grant College Program
Building 803
Gainesville, Florida 32611
(904) 392-5870

Florida Marine Education Resources Bibliography.

\$3. SGR-51 (March 1983).

Lists nearly 500 documents, all of which are available from the author or publisher. Subject areas include not only marine biology and oceanography, but also literature, the arts, engineering, etc. Each item is annotated with information on subject, grade level and application (e.g., laboratory, field project, etc.). Some materials are specific to unique Florida coastal and marine features, such as mangroves, but others deal with more general topics. 115 pages.

Marine Education K-12 MAP-17 (April 1982).

Provides information on finding funds and opportunities for K-12 marine education resources, courses and activities. 18 pages.

Marine Education and Research Organizations in Florida. SGEB-3 (March 1984).

A compilation of educational and research organizations in Florida with programs in the marine sciences. Includes addresses, phone numbers and descriptions of facilities and programs. 86 pages.

Man Meets Coast- A Coastal Game. \$3. MAP-26.

An educational game for 30 to 75 players who assume new identities to explore and resolve various coastal issues facing their fictitious community. For both adults and junior-senior high school students, the game proceeds from neighborhood meetings to meetings of common interest groups (e.g., fishermen, developers, conservationists, tourists, etc.) and concludes in a county commission hearing to decide policies regarding such common issues as fishing in canals, dredging of a ship channel, and coastal water supply regulations.

Man Meets Coast. MAP-11.

An illustrated cartoon booklet concerning man's attraction to the coast, the problems that result and what is being done about them. (Included with the Coastal Game or can be ordered separately). 32 pages.

Fisheries Biology for Everyone. \$3. SGEB-11.

Presents fisheries biology in an enjoyable and readable way, but stresses the management aspects relative to the scientific and ecological. The hand-lettered manuscript, which includes cartoon drawings emphasizing important points, brings to life information vital to any user of the living marine resources, particularly fishermen. Can also be used in senior high school level marine biology courses. 178 pages.

The Beach-A Natural Protection From the Sea. MAP-19.

Discusses the principal features of a beach that are effective in protecting the uplands, how the beach "works," the effect of littoral drift, and the function of the sand dunes. 4 pages.

Marine 4H Program Materials (available from Florida 4H Department, University of Florida).

Florida 4H Marine Science Program. 4H 314.

Projects in this annual are designed mainly for 4H leaders and members. Each project is a unique study because a simple procedure is all that is needed to fulfill its objective. Projects include both biotic (those that deal with living things) and abiotic (those that are not living such as sand and tides). The biotic factors are arranged from the lowest form of marine organism to the highest form, while the abiotic factors are placed in their respective order so that learning from one project will help in working with the next. 49 pages.

Field Study of the Marine Environment (Leader's Guide). **4H 338.**

Provides the leader with information useful in helping 4H members understand the importance of one marine ecosystem to another and, in turn, the importance of ecosystems to humans and vice versa. 18 pages.

Starting and Maintaining a Marine Aquarium. 4H 356.

Explains all about aquaria to 4H members who are interested in starting a project on saltwater aquaria, including using artificial or natural seawater, setting up the aquarium, filling it, buying the fish, feeding, cleaning, water maintenance, etc. 12 pages.

Starting and Maintaining a Marine Aquarium (Project Record). **4H 356.**

Accompanies 4H-356 for use of the 4H member in keeping a record of the project. 7 pages.

Life in the Sea (Member's Guide). **4H 358.**

Contains seven projects that can be started by visiting an oceanarium and finished through 4H Club work or individual research at home or in a library. These projects include dolphins, manatees, seals and sea lions, penguins, mollusks, Caribbean/Atlantic Coast tide pool, and coral reefs. 47 pages.

Life in the Sea (Project Record). **4H 359.**

Accompanies 4H-358 for use of the member in keeping a record of the projects. 23 pages.

Life in the Sea (Leader's Guide). 4H 360.

Assists leaders in working with members on projects in 4H-358. Contains answers to the questions raised in 4H-358.

Intertidal Zone Project (Guide for Senior 4H Members). 4H 362.

Intended for those who live near the ocean or for those who can visit the beach at least once a month. Explains the working of the intertidal zone and contains six activities to be conducted, including seining, plant and algae collecting, plankton collecting, measuring salinity, measuring temperature, and measuring turbidity. 76 pages.

Wetlands (Project Manual). 4H 365.

Describes the types of wetlands-estuaries, salt marshes, swamps and mangrove wetlands-and discusses their importance to the marine life that use the wetlands as a nursery. 19 pages.

Wetlands (Project Record). 4H 366.

Accompanies 4H-365 for use of the 4H member in maintaining a record of the wetlands projects. 11 pages.

Fins and Scales. 4H 367.

Contains descriptions and line drawings of fish, their fins and their scales. 11 pages.

The Florida 4-H Marine Education Program.

Provides a history and steps taken to establish the 4-H Marine Program in Florida. A statement of objectives, approach and results of the program effort are described. 6 pages.

Florida 4-H Department Marine Booklists.

A list of publications, sources and annotated bibliography of books found useful in the development

and implementation of the Florida 4-H Marine Program. 25 pages.

Florida 4-H Marine Ecology Program-Information and Event Guidelines.

A publication describing the Marine Ecology Event with objective program organization, program contact, leader training, youth training, scheduling the event and its activities, event category and format, breaking ties, and the award program. 11 pages.

4-H Marine Resource Program Guide.

This publication describes program resource opportunities and suggests types of individual that could service a Marine Education Program. 4 pages.

The National 4-H Report Form: An Example for a Marine Science Project.

This publication describes and gives examples on how to adopt the National 4-H Report Form for use in Marine Science Projects. 19 pages.

Starting and Maintaining a Marine Aquarium: 4-H Member Project Record Book.

4H-357 Maintain project records for Booklet 4H-353, Starting and Maintaining a Marine Aquarium. 7 pages.

Ordering Instructions: Mail checks, payable to University of Florida, to:

Publications
Marine Education Program
Sea Grant College Program
Bldg. 803, University of Florida
Gainesville, FL 32611

University of Georgia
Sea Grant College Program
Ecology Building
Athens, Georgia 30602
(404) 542-7671

A Field Guide to Jekyll Island. Taylor Schoettle, illustrated by Carol Johnson. \$5.00.

This is a comprehensive guide to a barrier island typical of many islands along the southeast coast. Physical processes of this dynamic barrier island are discussed and common plants and animals found on the beach and in the salt marsh are illustrated. For adults, teachers, and high school and college classes. 47 pages, includes booklists and references.

Gray's Reef National Marine Sanctuary: An Educational Handbook. Dr. Jay Calkins, illustrated by Carol Johnson, Edith Schmidt and Karen Roeder. \$2.50.

This book describes biological, chemical and geologic processes that make this "live bottom" reef a unique and important resource. The handbook contains informational text, illustrations and classroom activities for high school/advanced middle school students interested in oceanography and marine biology. 33 pages.

The Coast of Georgia: Land, Sea and Marsh. Produced, directed and written by Dr. Jay Calkins. Video. \$50.00.

This 30-minute video program was produced to give high school and middle school students and the general public an overview of the coast of Georgia. Beach processes, hydrographics and food webs of the salt marshes are all revealed in an attractive audiovisual format. Human impact and the controversial use and abuse of coastal areas is also discussed. VHS format.

Harvesting Georgia's Shrimp. Video. \$15.00.

This 20-minute video program shows in detail the harvesting of shrimp on the southeast coast. Boats, gear technology and operation of a trawling vessel in search of the delicious white shrimp are all revealed. VHS format.

How Birds Make a Living on the Coast. Written and illustrated by Will Hon.

This poster gives students and adults a graphic view of coastal birds. The text and illustrations provide the learner with a look at the anatomical adaptations that coastal birds have developed to feed in a variety of ecological niches.

Gray's Reef (Common Fishes of). David Miller and Reita Rivers, illustrated by Charlotte Ingram.

This poster illustrates and describes the common fishes found around Gray's Reef National Marine Sanctuary. The fishes found on Gray's Reef are typical of many of the fishes found along the southeast coast, but atypical because many reef fishes of the Caribbean are also found there.

Ordering Instructions: Mail checks, payable to the University of Georgia, to:

Sea Grant College Program
Ecology Building
University of Georgia
Athens, GA 30602



University of Hawaii
Sea Grant Program
1000 Pope Road, MSG 200
Honolulu, Hawaii 96822

How to Use the Library to Find Marine-Related Information. Peter J. Rappa. 4 pages. March 1984. **UNIHI-Seagrant-AB-84-02.**

Ocean Activity Workbook University of Hawaii Sea Grant College Program. 32 pages. June 1982. **UNIHI-Seagrant-MR-82-01.**

National Survey of Fishery Education in Institutions of Higher Education. Rose T. Pfund. 48 pages, 3 appendices. May 1985. **UNIHI-Seagrant-MR-85-02.** \$1.

Blue Water Marine Laboratory. 27 pages, 11 figures. August 1976. **UNIHI-Seagrant-WP-00-24.**

Makahiki Kai Festival of the Sea '78: Teacher's Guide. Jane Torikai. 76 pages. February 1978. **UNIHI-Seagrant-WP-00-30.** \$1.50.

Marine Option Program Data Acquisition Project: Honolulu Bay, Maui. Leonard Torricer, et al. 38

pages, 3 figures, 11 tables, 3 plates. May 1979. **UNIHI-Seagrant-WP-00-40.**

Survey of Fishery Programs in Colleges and Universities in the United States. Rose T. Pfund. 1986. In Fisheries 11 (6): 16-21. **UNIHI-Seagrant-JC-87-01.**

Ordering Instructions: Mail checks, payable to University of Hawaii, to:

University of Hawaii
Sea Grant College Program
Publications Office
1000 Pope Road, MSB 200
Honolulu, HI 96822

Illinois-Indiana Sea Grant Program

University of Illinois
51 Mumford Hall
1301 W. Gregory Drive
Urbana, Illinois 61801
(217) 333-9448

Wetlands Are Wonderlands. Single copies free, additional are \$1.

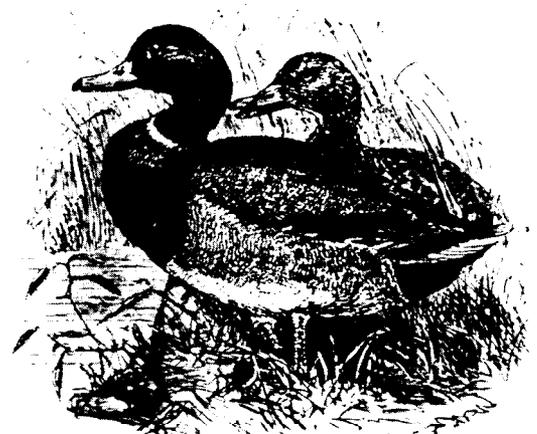
4-H marine education guides, one for 4-H leaders and one for 4-H members/youth.

Great Lakes Heritage Guide. Single copies free.

A guide for youth in acquiring training and field experience related to the Great Lakes, in areas such as ecology, marine careers, natural resources, recreation, history and culture.

Ordering Instructions: Send requests, with checks payable to the University of Illinois, to the attention of Robin Goettel, at:

Illinois/Indiana Sea Grant
University of Illinois
51 Mumford Hall
1301 W. Gregory Drive
Urbana, IL 61801



Louisiana Sea Grant
Center for Wetland Resources
Louisiana State University
Baton Rouge, Louisiana 70803-7507
(504) 388-1558

Waterborne! Louisiana's Ports and Waterways, J. Schweitzer. LSU-E-84-001, 58 pages, \$5.00.

Intended as a supplement in eighth-grade Louisiana history courses, this book traces the history and development of ports and water transportation in Louisiana. Illustrations, maps, index, bibliography.

Seascope: A Marine Activity Book for Elementary Schools, J. Schweitzer, E. Coleman, L. Weber. LSU-E-82-0001, 84 pages, \$6.50.

Contains ten separate study units geared to grades four through six. Subjects include the uses and nature of water, the marine environment, the ecology of Louisiana's coastal marshes, shells, behavior and eating habits in marine animals, the biology of the crawfish, and boats and boating terms. Illustrated, with games, maps and simple experiments.

Marine Science Teaching Aids (Series). 4 to 8 pages, free.

Designed for high school teachers, this series presents marine-related concepts that can be taught in typical high-school science classes and includes background information and suggested activities.

Nautical Education for Offshore Extractive Industries-Support Operations and Seamanship, G. Hoffmann.

For use in high school vocational education courses in nautical science, this text covers cargo operations, marine towing, ecology and energy, attitude, seamanship, and U.S. marine law and regulations.

Sea Turtles in Louisiana's Coastal Waters, D. Fuller, A. Tappan, M. Hester. LSU-T-87-004, 40 pages, \$4.00. Reviews the biology of the five species of sea turtles found in the Gulf of Mexico, discusses turtle mortality and preservation measures now underway and reports the results of a study of turtles in Louisiana waters.

Restless Ribbons of Sand, J. Wells, C. Peterson. LSU-T-86-004, 20 pages, free.

Describes the formation, structure and ecology of Atlantic and Gulf coastal barrier islands. Discusses the value of barriers, the impacts of man's activities on them, and management efforts such as the Coastal Barrier Resources Act. Color illustrations.

A Guide to Saltwater Aquariums, S. Ruckstuhl. LSU-H-85-001, 13 pages, free.

Describes the equipment needed for setting up a saltwater aquarium and gives instructions for setting up and maintaining the tank and choosing the appropriate animals.

Hurricanes Can Kill, S. Ruckstuhl, LSU-TL-83-003, 4 pages, free.

A hurricane safety checklist describing the precautions necessary when coping with an approaching hurricane. Available with this leaflet is a hurricane tracking chart (18" x 24") showing the Gulf and Caribbean area and describing hurricane-related terms used by the National Weather Service.

Common Vascular Plants of the Louisiana Coastal Marsh, R. Chabreck, R. Condrey. LSU-T-79-003, 120 pages, \$7.00.

Contains physical descriptions and line drawings of Louisiana's common marsh plants. A map plots where they commonly occur. Alphabetized by species, the book also contains a list of plants by families, a glossary, and an index.

Ordering Instructions: If required, may check payable to Louisiana Sea Grant. East Baton Rouge Parish residents add 7% sales tax; other Louisiana residents add 4% tax.

Louisiana Sea Grant
LSU Center for Wetland Resources
Baton Rouge, Louisiana 70803-7507

University of Maine
Sea Grant Marine Advisory Program
30 Coburn Hall
Orono, Maine 04469
(207) 581-1440

Connections to the Sea: A 4-H Guide to Marine Education. Compiled by Cooperative Extension Service. 57 pages. E-MSG-82-7. Free.

This guide provides basic information about the ocean and our relationship to it. Detailed marine education activities; suggested resources; and a field guide to organisms.

A Teacher's Guide to the Whales of the Gulf of Maine. Catherine Kiorpes Elk. 50 pages. E-MSG-83-10. \$3.50.

A whale curriculum guide to prepare schools for the popular Whales-on-Wheels educational presentation and provide detailed, up-to-date information and activity suggestions on the whales of the Gulf of Maine. Includes copyright-free supplementary materials to reproduce for handouts.

What Is Our Maritime Heritage? John Butzow, et al. Northern New England Marine Education Project. 33 pages. E-MSG-85-4. \$5.00.

A marine education infusion unit on ships and sailing in northern New England. Each major ship type is presented as a separate section, with background information given for classroom presentation or individual reading assignments. Includes listing of multidisciplinary activities/projects.

How Do People Use Lighthouses and Navigational Charts? John Butzow, et al. Northern New England Marine Education Project. 35 pages. E-MSG-84-6. \$5.00.

A marine education infusion unit on navigational aids. Marine charts, nuns and other buoys, lighthouses, navigation, dead reckoning, determining latitude and longitude, and quadrants. Includes listing of multidisciplinary activities/projects.

Is Our Food Future in the Sea? John Butzow, et al. Northern New England Marine Education Project. 31 pages. E-MSG-84-8. \$5.00.

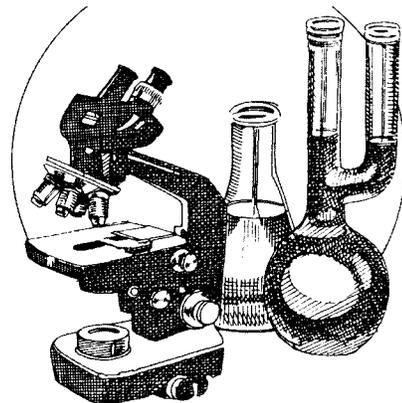
A marine education infusion unit on aquaculture and sea farming. This unit focuses on the biology, economics and gastronomics of sea farming, especially of shellfish. The blue mussel, the oyster, finfish farming, the lobster, algae culture, classroom activities, teacher resources.

Do You Know Our Maritime Fishes? John Butzow, et al. Northern New England Marine Education Project. 31 pages. E-MSG-82-8. \$5.00.

A marine education infusion unit on finfish in the Gulf of Maine. Classes of fish, commercial and recreational fishing, fish behavior, migrating fish, food webs, fish in the arts and crafts, shark and bony fish dissection, classroom activities, teacher resources.

Ordering Instructions: Mail check, payable to University of Maine, to:

Sea Grant Marine Advisory Program
University of Maine
30 Coburn Hall
Orono, ME 00469



University of Maryland
Sea Grant Program
1224 H.J. Patterson Hall
College Park, Maryland 20742
(301) 454-6059

Marine Science Education Workbooks: Tides and Marshes. Jack Greer, ed. 37 pages. **UM-SG-ES-79-01.** \$2.

The workbook is aimed at middle school/junior high school students, though teachers and group leaders may find a wider application for the materials. Each workbook contains a Teachers Narrative, a Student Activities Section and a Resource Section and suggests ways of coordinating these materials with conventional junior high school science texts. Figures include diagrams of intertidal zones, tidal effects on vegetation and the moon's effect on tides.

Marine Science Education Workbooks: Food Webs in an Estuary. Jack Greer, ed. 26 pages. **UM-SG-ES-79-02.** \$2.

The workbook introduces the subject of food chains and food webs, using elementary examples from an estuarine system. Although the focus is on the Chesapeake Bay, the material may be adaptable to any similar estuarine environment. Figures include diagrams of simple food chains.

Marine Science Education Workbooks; The American Oyster. Jack Greer, ed. 57 pages. **UM-SG-ES-79-03.** \$2.

The American Oyster, Maryland's most valuable seafood, serves as the subject of this workbook, a

marine science mini-unit aimed at middle school/junior high school students. The workbook includes a number of figures; diagrams of oyster anatomy, salinity charts, harvest graphs and charts showing the location of oyster bars and the range of oyster predators. There are also pictures of harvesting devices and descriptions of the Chesapeake Bay oyster fishery.

Decision Making and the Chesapeake Bay. Emmett L. Wright. 220 pages. **UM-SG-ES-85-01.** \$14.95. 1985. This curriculum unit focuses on the Chesapeake Bay as both a political and ecological watershed. Aimed primarily at high school science or social studies classes, it provides a significant amount of information about the Chesapeake Bay, while involving students in a simulated decision-making process.

Ordering Instructions: Please make checks payable to University of Maryland. Send request with check to:
Communications
University of Maryland
Sea Grant Program
1224 H.J. Patterson Hall
College Park, MD 20742

Massachusetts Institute of Technology
Sea Grant Program
Room E38-302
77 Massachusetts Avenue
Cambridge, Massachusetts 02139
(617) 253-7041

Citizen's Guide to Sources for Marine and Coastal Information in Massachusetts. 4th edition compiled by Susan Stolz Goldie. **MITSG 86-6.** Single copies free; multiple copies, \$1 each.

This guide lists more than 135 Massachusetts agencies, information centers and organizations concerned with and important to marine and coastal affairs. Each entry includes office hours, address and telephone numbers, as well as a brief description of the objectives, specialties and services of each organization. A subject index provides easy interest-group reference.

Ordering Instructions: Address requests to:
Sea Grant Information Center
MIT Sea Grant College Program
Room E38-320
Massachusetts Institute of Technology
292 Main Street
Cambridge, MA 02142

Michigan Sea Grant College Program
2200 Bonisteel Boulevard
Ann Arbor, Michigan 48109
(313) 764-1138

Great Lakes Fishing in Tradition Curriculum Unit.

Paul Nowak, Leslie Lin and William Stapp, et al. MICHU-SG-83-400. \$37.50 + \$1.50 for sales tax. The unit teaches concepts in social science, illustrating how changes in Great Lakes fish populations, caused by the sea lamprey, overfishing, and pollution, have brought about social change. One film-strip explores the history on the Great Lakes, another explores the role of pollution in altering the Great Lakes environment. Students learn how fish are processed and cooked, how to sample and analyze stream water quality, and they take part in a mock Native American fishing rights courtroom trial.

Great Lakes Fact Sheets. 25¢ each; \$1 per set of 6. Single copies free to Michigan residents. Use order number and title when ordering. *Order from MSU Bulletin Office, PO Box 231, East Lansing, MI 48824, 517/235-0240.*

Map-fold fact sheets, poster map on the back of each sheet. Facts about Geography, Water Use, Land and Shoreline Use, Economic Importance, Points of Interest. Maps available on:

Great Lakes Basin	E-1865
Lake Superior	E-1866
Lake Michigan	E-1867
Lake Huron	E-1868
Lake Erie	E-1869
Lake Ontario	E-1870

Superior Today. Michigan Sea Grant College Program and WNMU-TV, Northern Michigan University, Marquette, MI 49855. 1985. MICHU-SG-86-400. Videotape: 3/4" \$35.00; 1/2" \$25.00.

An award-winning 30-minute documentary that explores the greatest of the Great Lakes - its physical dimensions and characteristics, formation and history, climate and weather, creatures, utilization, pollution, economic development.

The Trouble with Toxics. Michigan Sea Grant Extension, 334 Natural Resources Building, Michigan State University, East Lansing, MI 48824-1222. 1987. MICHU-SG-87-401. Videotape: 3/4" \$75.00; 1/2" \$35.00.

This 30-minute documentary presents the challenge of dealing with the hundreds of contaminants in the Great Lakes with information about sources of toxic substances, their chronic effects, fate and control, management of fisheries, public policy and prevention strategies.

What You Can Do for Cold Water Near-Drowning.

Dive Rescue Inc./International, 2619 Canton Ct.,

Fort Collins, CO 80525. 1979. \$49.95. 20-min slide/tape program.

With persistent resuscitation efforts, individuals, particularly children, immersed for up to 45 minutes in cold water have recovered with no after effects. This program explains what happens to the body in cold water that enables it to survive and emphasizes the importance of cardio-pulmonary resuscitation (CPR) when the victim is pulled from the water.

Waterproof Your Family: Survival Strategies Start

With You. Dive Rescue Inc./International, 2619 Canton Ct., Fort Collins, CO 80525 and Michigan Sea Grant College Program. 1987. \$249.95. 28-page program guide, 20-min slide/tape show, 75-min VHS, 10 posters, 100 handouts.

Easy-to-use program focuses on accident survival skills for all ages. In classroom and pool sessions, swimmers and non-swimmers learn how to handle an unexpected immersion. With preparation, practice and a positive attitude, most drownings can be avoided.

Fishes of Isle Royale. K. Lagler and C.R. Goldman. Isle Royale National Historical Association, 87 N. Ripley, Houghton, MI 49931. 1982. \$4.45 plus 4% sales tax and 20% handling.

Covers the history of Isle Royale, origins of fishes, descriptions and illustrations to identify the fishes of Isle Royale.

Great Lakes Fish Cookery: Recipes for Underutilized Fish Species - Alewife, Burbot, Carp and Sucker.

Rosanna Mattingly. 1976. MICHU-SG-76-500. Recipe booklet with suggestions for preparation of fish, sauces and stuffings. Useful for a fishing field trip or home economics class.

Cold-Water Drowning: A New Lease on Life. Martin Nemiroff and U.S. Coast Guard. 1977. MICHU-SG-77-104. \$.10 each.

Detailed information on the steps to take to rescue a victim in a cold-water drowning emergency. Includes graphics depicting rescue techniques.

Fall Beachcombing. Suzanne Tainter. 1978. MICHU-SG-78-305.

Describes the natural treasures that can be found on Great Lakes beaches including rocks, plants and animals.

Cold Water Survival-Hypothermia. Stephen Stewart and Sue Tainter. 1980. MICHU-SG-80-513.

Brief descriptions of hypothermia, first aid for the hypothermia victim, and hypothermia prevention.

Fish in Lake Michigan: Distribution of Selected Species. Larry Sommers, et al. 1981. MICHU-SG-81-600. \$3.00.

Explains the natural and human factors which influence fish distribution. Includes species maps.

Bluff Slumping and Stability: A Consumers Guide.

Suzanne Tainter. 1982. MICHU-SG-82-902. \$2.00.
Natural forces (erosion) and human activities which contribute to bluff instability are defined and possible control measures are discussed.

Shoreline Erosion: Questions and Answers. Michigan Sea Grant. 1985. MICHU-SG-85-511. \$.50 each.
Contains answers to questions frequently asked by shoreline property owners about erosion, structures, permits, laws, costs and contractors.

Diver Education Series: Introduction to Scuba Diving. Lee Somers. 1986. MICHU-SG-86-504. \$1.25.

Are you interested in scuba diving, but not sure what you might be getting into? How can you choose a good scuba training course? Answers to these and other questions.

Diver Education Series: Oceanography for Divers: Waves, Tides and Currents. Lee Somers. 1986. MICHU-SG-86-508. \$1.00.

To dive safely, the diver must have a working knowledge of waves, tides, currents and water quality. This paper provides the diver with a general understanding of the physical characteristics common to lakes and oceans. Diving techniques are described to give the diver a better understanding of how to dive under various conditions.

Diver Education Series: Oceanography for Divers: Hazardous Marine Life. Lee Somers. 1986. MICHU-SG-86-510. \$2.00.

The life of the marine environment is beautiful and fascinating, and relatively few marine plants and animals are hazardous to the diver. This paper will help the diver recognize organisms that can inflict injury, describe how to avoid injury, and the proper first aid for the different types of injuries inflicted by marine organisms.

Diver Education Series: Oceanography for Divers: Nearshore Hydrographic Survey Using Divers. Lee Somers. 1987. MICHU-SG-87-502. \$2.50.

This booklet describes a simple and practical nearshore hydrographic survey technique that is relatively accurate, comprehensive, and inexpensive. For the marine scientist and advanced recreational diver, this technique offers a viable option when support vessels and sophisticated instrumentation are not available. For students participating in research diver training programs, the technique provides an exercise resulting in a better understanding of nearshore physical characteristics and experience in nearshore survey and chart preparation.

Seines to Salmon Charters: 150 Years of Michigan Great Lakes Fisheries. *Michigan Sea Grant Extension*

MSU Bulletin Office, P.O. Box 6640, East Lansing, MI 48826-6640.1977.

This booklet provides a brief, but comprehensive treatment of the state's Great Lakes fisheries, sport and commercial, with illustrations of fishing boats and gear, and graphs plotting the growth and decline of various species.

Great Lakes Fish Preparation. Michigan Sea Grant Extension, MSU Bulletin Office. 1978 (reprinted 1982), E-1179. 50 cents.

This well-illustrated bulletin describes proper handling of freshly caught or purchased fish, and offers tips for different cooking methods, including a fish cooking chart and recipes for breadings, toppings, batters, liquids, seasonings and sauces, and soups.

Freshwater Fish Preservation. Michigan Sea Grant Extension, MSU Bulletin Office. 1978 (revised 1980; reprinted 1986). E-1180. 65 cents.

This bulletin explains several techniques for preserving fish from the Great Lakes and other freshwater lakes and streams. Included are freezing, canning, smoking, salting and pickling.

Scientific Marine Careers. Michigan Sea Grant Extension, MSU Bulletin Office. 1979. E-1355. 30 cents.
Describes various types of scientific marine careers in the fields of biology, chemistry, geology, physical science, environment, social science and general science.

Professional Marine Careers. Michigan Sea Grant Extension, MSU Bulletin Office. 1979. E-1356. 30 cents.
Describes various types of professional marine careers in the fields of environmental affairs, business and industry, consultation and education, engineering, merchant marine, fine arts, government and general occupations.

Technical Marine Careers. Michigan Sea Grant Extension, MSU Bulletin Office. 1979. E-1357. 30 cents.
Describes various types of technical marine careers in the fields of ship/boat building and repair, merchant marine, commercial fishing, offshore mining and petroleum operations, port activity and maintenance, marina and marine dealer.

Determining the Age of Fish. Cooperative Extension Service, MSU Bulletin Office. 1984. E-1774. 35 cents.
Describes various characteristics of a fish that can be used to determine its age.

Great Lakes Brochure. Michigan Sea Grant Extension, MSU Bulletin Office. 1985. \$1.00 for set; 25 cents each.

Six fact sheets and map brochures: Great Lakes Basin (E-1865); Lake Superior (E-1866); Lake Michigan (E-1867); Lake Huron (E-1868); Lake Erie (E-1869); Lake Ontario (E-1870).

Eating Great Lakes Fish. Michigan Sea Grant Extension, MSU Bulletin Office. 1987. E-2028. 25 cents.
Provides current answers to questions about pos-

sible contamination of fish from the Great Lakes, includes diagrams for cleaning and cooking fish to minimize exposure to possible contaminants.

Wetlands Affect You and Me: Member's Manual.

Cooperative Extension Service, MSU Bulletin Office. 1979. 4-H 1038. 70 cents.
Activities prepared as part of the 4-H Marine Science program to teach members/students about wetlands-what they are, why they are important, how to preserve them, and more.

Wetlands Affect You and Me: Leader/Teacher Guide.

Cooperative Extension Service, MSU Bulletin Office. 1979. 4-H 1039. 70 cents.
Leader/teacher's guide to member/student activities on wetlands prepared as part of the 4-H Marine Science program. See publication above.

Our Basic Environment Series: Water, Member's Manual.

Cooperative Extension Service, MSU Bulletin Office. 1979. 4-H 1044. 70 cents.
Activities prepared as part of the 4-H Marine Science program to teach members/students about water-water characteristics, water cycle, water pollution, water quality, and more.

Our Basic Environment Series: Water, Leader/Teacher Guide.

Cooperative Extension Service, MSU Bulletin Office. 1979. 4-H 1045. 70 cents.
Leader/teacher's guide to member/student activities on water prepared as part of the 4-H Marine Science program. See publication above.

Fishing for Fun: Member's Manual. Cooperative Extension Service, MSU Bulletin Office. 4-H 1056. 40 cents.

A series of activities for students that introduce them to fish, fishing, tackle and sportsmanship.

Fishing for Fun: Leader/Teacher Guide. Cooperative Extension Service, MSU Bulletin. 4-H 1057. 70 cents.

An activity guide for leaders/teachers to use with students to help them understand and appreciate the value of fishing and fish products and to develop fishing skills.

Ordering Instructions: Except where noted, mail check, payable to Michigan Sea Grant, to:

Michigan Sea Grant Program
2200 Bonisteel Boulevard
Ann Arbor, MI 48109

Michigan Sea Grant Extension, or Cooperative Extension Service, publications should be ordered from:

Michigan Sea Grant Extension
MSU Bulletin Office
P.O. Box 6640
East Lansing, MI 48826-6640

University of Minnesota
Sea Grant College Program
Extension Office
208 Washburn Hall
Duluth, Minnesota 55812
(218) 726-8106

Edge of the Arrowhead. R. Lydecker, 1982. 60 pp. \$2.
Provides thumbnail sketches of the history of Minnesota's North Shore.

A Family Guide to Minnesota's North Shore. N. Hereid, E. Gennaro, 1983, 1986. 42 pp. \$3.95.
Activities for the whole family, drawing attention to the historic, scenic, and geological aspects of the 200-mile stretch along Lake Superior.

Lacustrine Lessons.

Newsletter for educators. Provides water-related lessons for grades K-12. Published 4-5 times per school year.

Hypothermia: the Cold Facts. \$30 to rent; \$60 to buy.

This is a new videotape that explains current research on hypothermia, how to prevent hypothermia, and how to increase your chances of survival in

cold water. The half-four program is presented in a non-technical feature format. It is suitable for hunters, anglers, youth groups, medical personnel and anyone who plays or works near cold water. **Rent from:** Minnesota Sea Grant Extension, 208 Washburn Hall, UMD, Duluth, MN 55812, (715)726-8106; or **Buy From** Media Design Associates, PO Box 3189, Boulder, CO 80307, (303)443-2800.

Ordering Instructions: Mail check, payable to University of Minnesota, to:

Sea Grant College Program
Extension Office
208 Washburn Hall
University of Minnesota
Duluth, MN 55812

Mississippi-Alabama Sea Grant Consortium
Caylor Building
Gulf Coast Research Lab
Ocean Springs, Mississippi 39564
(601) 875-9341

Birds and Birding on the Mississippi Coast. MASGP-86-031. \$17.95 (*Order from University Press of Mississippi, 3825 Ridgewood Road, Jackson, MS 39211.*)

This book contains three primary sections. Section one contains general information on the Mississippi coastal zone, including the barrier islands. Section two provides specific information on approximately 360 species of birds to include breeding, abundance, distribution, dates of occurrence, and the best areas for observation. Section three contains site guides.

Buying and Preparing Blue Crabs. MASGP-85-015 Free.

This brochure gives step-by-step instructions for purchasing and preparing blue crabs. Illustrations are included.

Buying and Preparing Fish. MASGP-86-006. Free.

This handy guide on buying and preparing fish includes a health and nutrition chart, quality and freshness table, and illustrated directions for filleting.

Buying and Preparing Oysters. MASGP-84-003. Free.

This brochure provides laymen with advice on handling oysters, characteristics to look for when purchasing oysters, as well as a discussion on preparation.

Chopsticks: Investigations of the Pusher-head Trawl. MASGP-85-016. \$3.

A 35-page resource book that describes "chopsticks" fishing, also known as pusher-head trawling, this publication discusses the methods and materials needed as well as net configurations used in this trawling technique. In this method of fishing, the trawl is spread and pushed in front of the vessel by two utility poles that extend to the bottom of the estuary. Further, this report provides data concerning catch composition, abundance, condition of bycatch, and diver observations.

First Aid for Damaged Beaches and Dunes. MASGP-81-011. Free.

This brochure contains a four-step plan for Mississippi and Alabama shoreline-property owners to aid in the restoration of damaged beaches and dunes.

Flounders and Floundering. MASGP-74-023. Free.

This pamphlet reveals tips concerning the "right" equipment to use in landing a flounder.

Guide to Common Tidal Marsh Invertebrates of the Northeastern Gulf of Mexico. MASGP-70-004. \$8. This 82-page book fulfills a need in the literature by providing a well-illustrated, up-to-date identifica-

tion guide for marine macroinvertebrates that live or occur in the salt marshes along the Mississippi-Alabama coast and immediately adjacent areas of Florida and Louisiana.

How to Find Marine Information in Public and School Libraries. MASGP-77-013. (Reprinted with permission from Marine Advisory Service, University of Rhode Island.) Free.

This five-page booklet provides ten basic steps for the reader to use in finding information from various types of libraries.

Hypothermia. MASGP-86-015. Free.

Illustrated directions outline steps to take if an individual is unfortunate enough to fall overboard and experience a rapid and life-threatening loss of body heat.

The Jubilee Phenomenon. MASGP-83-011. Free.

This pamphlet gives an overview of the basic cause of jubilees, the conditions that favor their occurrence, and observations associated with them.

Man and the Gulf of Mexico Educational Series. MASGP-82-007. *Available from University Press of Mississippi, 3825 Ridgewood Road, Jackson, MS 39211.*

This series is composed of four paperback books that can be used individually or as a set. Each is a textbook-workbook with general and specific objectives for each unit, vocabulary exercises, diagrams, many illustrations, and instructions for experiments. The series can be used as textbooks for marine science courses, as supplements for introductory biology courses, or as library reference books.

Marine and Estuarine Ecology, Volume 1, 88 pages, illustrated. \$5.00

An introduction to fundamental concepts and the vocabulary needed for understanding the ecology of marine environments, this volume emphasizes the diversity and dynamics and demonstrates the interdependency of living organisms. Plankton, nekton, intertidal and coastal organisms, and coastal habitats are given careful examination. Special attention is given to instructing students in recording data accurately and logically and in making sound generalizations. This volume also acquaints students with basic equipment for studying marine life.

Marine Habitats, Volume 2, 88 pages, illustrated. \$5.00.

This text introduces five marine habitats-salt marsh, mud flat, sound, beach and the barrier is-

land-and presents general information about the organisms that live in each. It emphasizes the interdependency of plants and animals -and compares and contrasts the manner in which these organisms adapt themselves to their habitats.

Diversity of Marine Plants, Volume 3, 135 pages, illustrated. \$6.00

This volume explains the biological classification system and the process of photosynthesis. Eleven experiments investigate seven types of algae, marine bacteria, sea grasses, and salt marsh plants.

Marine Animals, Volume 4, 126 pages, illustrated. \$6.00.

This book introduces the physical characteristics, the behavior, and the natural environment of a variety of marine animals. Included are protozoans, sponges, coelenterates, ctenophores, polychaetes (marine annelids), mollusks, echinoderms, marine crustaceans (barnacles, blue crabs, hermit crabs, shrimp and horseshoe crabs), sea squirts and tunicates, sharks and stingrays (cartilaginous fish), seashore birds, marine turtles, and marine mammals. This volume includes extensive illustrations and offers students fifteen activities for identifying and learning about marine animals and their adaptive behavior.

Mississippi Marine Resources-Pilot Manual. MASGP-81-002. Free.

This 16-page, illustrated manual provides an overview of both marine and fresh water including planktonic forms and dunes and vegetation. There are ten concepts and/or activities that would be applicable for middle and secondary students.

Oysters in Alabama. MASGP-85-011. Free.

This brochure reviews the biology, environment and management of the commercially important species, *Crassostrea virginica*.

A Pictorial Guide to Common Demersal Fishes in the Gulf of Mexico. MASGP-86-009. \$3.50. **Order from Alabama Sea Grant Advisory Service, 3940 Government Blvd. No. 5, Mobile, Alabama, 36609.** (Make checks payable to the Alabama Cooperative Extension Service.)

Since fishery biologists along with commercial and recreational fishermen are exploring and exploiting the deeper waters of the Gulf of Mexico more than even, this 96-page pictorial guide is a "first step" in making these deepwater fish better known. This guide identifies fish from 100 to 600 fathoms.

Shrimp in Alabama. MASGP-86-012. Free.

This pamphlet gives a summary of the penaeid shrimp landed in coastal Alabama waters from a commercial, biological and management viewpoint.

Speckled Seatrout in Alabama. MASGP-86-013. Free.

This brochure provides an overview of the biology, fishing success and management of the speckled seatrout in coastal Alabama.

Starting and Maintaining a Marine Aquarium.

MASGP-81-001. Free.

This 23-page booklet outlines the basic steps in establishing a saltwater aquarium. Detailed instructions are given on the materials needed, food preferences, artificial seawater, filter systems, suggested animal combinations, water maintenance and potential problems.

Newsletters-The following are available, free of charge at the present time. Please order from the addresses listed.

Force Five -Mississippi-Alabama Sea Grant Consortium, P.O. Box 7000, Ocean Springs, MS 39564-7000.

Gulf Coast Fisherman-Mississippi Sea Grant Advisory Service, 4646 West Beach Blvd., Suite 1-E, Biloxi, MS 39531.

Sea Harvest News-Seafood Report-Alabama Sea Grant Advisory Service, 3940 Government Blvd., No. 5, Mobile, AL 36609.

The Skimmer-University of Southern Mississippi, Department of Science Education, Southern Station, Box 5087, Hattiesburg, MS 39406-5087.

Water Log-Mississippi-Alabama Sea Grant Legal Program, Mississippi Law Research Institute, The University of Mississippi, Box 20, University, MS 38677.

Ordering Instructions: Except where otherwise noted, order publications from:

Mississippi-Alabama Sea Grant Consortium
P.O. Box 7000
Ocean Springs, MS 39564-7000

University of New Hampshire Sea Grant Extension Program
15 Garrison Avenue
Durham, New Hampshire, 03824
(603) 862-3460

Alone on the Shore: A Survival Kit for Educators.

Julia Steed Mawson. \$8.50

A packet containing information about planning your day with your class at the shore, suggested activities and games, a small field guide to organisms, a "yellow pages" of marine education resources in the region.

Day of the Coast Celebration. Sharon Meeker. 15 pages. \$1.00

How to plan a stimulating all-school day of marine activities involving volunteers, people from the community and the teachers and students.

UNH Floating Lab Resource Manual. Michael Brody & Sharon Meeker. 207 pages. \$15. UNH-MPAR-SG-83-3.

An oceanographic curriculum focused on the New England coast, but readily adaptable to other regions.

New Hampshire Seafood Directory. Sharon Meeker. 76 pages. \$3.00. UNHMP-AR-SG-85-12.

Compiled in 1985, lists seafood retailers and wholesalers and contains information on how to select, buy and cook varieties of seafood found in New England waters. Commonly asked questions about seafood are answered and nutritional information is included.

Coastal Issues: A Wave of Concern. Julia Steed Mawson and Linda J. Maxson. 107 pages. \$15.00. Trial Edition.

An interactive curriculum on issues affecting coastal areas, with a variety of activities for high school students.

Through the Looking Glass Teachers' Guide. Julia Steed Mawson and others. 61 pages. \$6.50. UNH-AV-SG-115.

Curriculum for marine awareness that features the rocky shores of the Northeast. (Intended for grades 1-8).

Waves Across New Hampshire - Evaluation: 10 Years of Sea Grant Sponsored Marine Education. Sharon Meeker. 20 pages. \$3.00. UNH-MP-AR-SG-87-4.

A survey of three marine education programs, and a comparison between teaching of marine science in 1976 and 1987.

Ordering Instructions: Mail check or money order, if required, to:

Sea Grant Extension Program
New England Center Administration Building
University of New Hampshire
Durham, N.H. 03824

New Jersey Marine Sciences Consortium

Building 22
Fort Hancock, New Jersey 07732
(201) 872-1300

Where the Land Meets the Sea Exploring a Coast Activity Book and Teacher's Guide 3-4 Grade. A. Galli and S. Levine. NJSG-83-103.

Where the Land Meets the Sea Exploring a Coast Activity Book and Teacher's Guide, 5-6 Grade. A. Galli. NJSG-83-104.

Shore processes and problems: Educating the Public on Critical Coastal Issues. A. Galli and V.G. Guida. NJSG-83-106.

Let's Go Near the Water. B. Church.

Water activities for girl scouts in New Jersey. Developed by the Burlington County Girl Scout Council.

Ordering Instructions: Mail requests to:

New Jersey Marine Science Consortium
Building 22
Fort Hancock, N.J. 07732

New York Sea Grant Institute
State University of New York and Cornell University
Dutchess Hall
State University of New York at Stony Brook
Stony Brook, New York 11794-5001
(516) 632-6905

Please Go Near the Water: A Marine Field Trip Manual. 153 pages.

A guide to New York City waterfront field trips, prepared in 1980; this teacher's manual focuses on the field trips as a means of understanding the urban marine environment.

Sea Grant Graduates: A Resource for the Nation. 4 pages.

Reprinted from Marine Technology Society Journal, in 1983, this article explores the benefits of the National Sea Grant College Program.

Coastlines. Quarterly newsletter.

Contains information concerning research, education and extension activities in New York State.

Coastal Educator's News. Bimonthly newsletter.

Intended for all teachers dealing with coastal topics, this newsletter is published bimonthly during the school year and once in the summer. Focus is on lesson ideas, programs and corresponding dates related to coastal education.

Audiovisual Materials - Contact Robert Kent at Cornell Cooperative Extension of Suffolk County, 246 Griffing Avenue, Riverhead, N.Y. 11901, for information on the following.

If Fish Could Talk

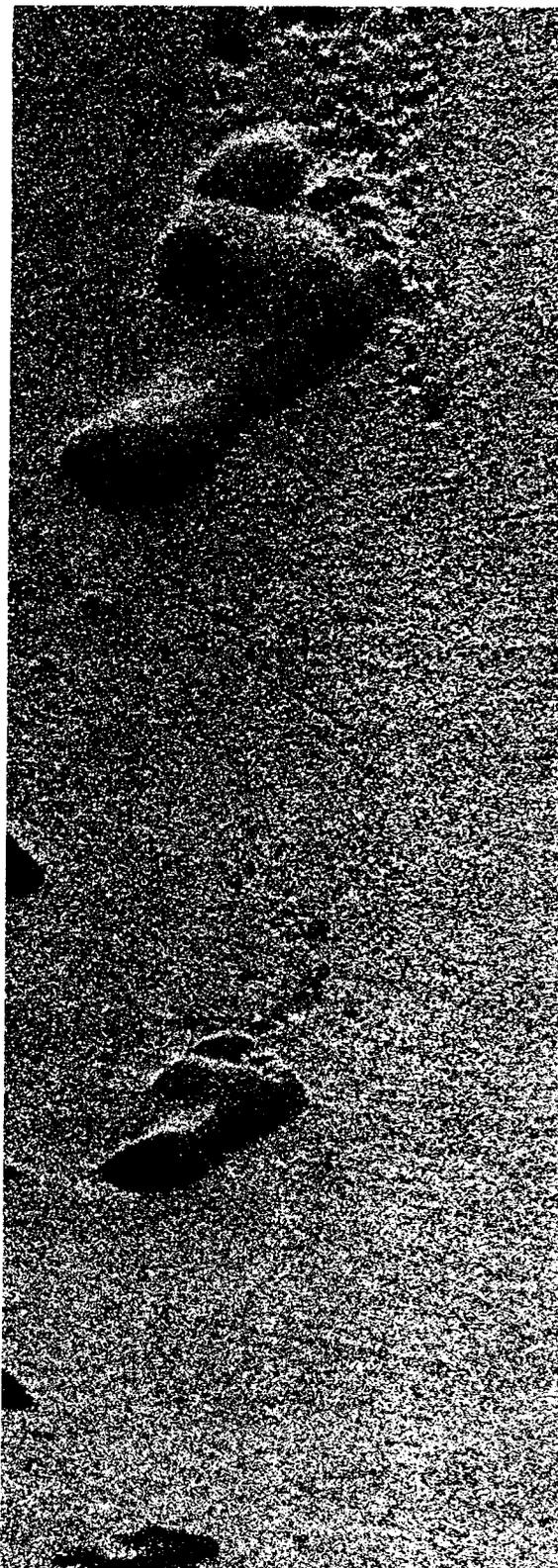
This program was designed for use in high schools to provide students with a historical perspective of waste disposal and its problems. Contains a 35 mm film strip, cassette recording, key ideas, discussion questions and activities, student readings, and teaching suggestions.

The Great Garbage Chase

Designed for use in elementary schools, this program is intended to help children understand the impact of marine pollution.

Ordering Instructions: Unless otherwise noted, mail requests for information to:

Publications
New York Sea Grant Institute
Dutchess Hall
SUNY at Stony Brook
Stony Brook, N.Y. 11794-5001



University of North Carolina Sea Grant Program

Box 8605

Raleigh, North Carolina 27695-8605

(919) 737-2454

Sea Shells Common to North Carolina. Hugh J. Porter and Jim Tyler. 36 pages. \$1.50. **UNC-SG-72-09.**
An illustrated guide to the state's shells.

A Guide to Soft Shell Crabbing. Wayne Wescott. 32 illustrated pages. \$3. **UNC-SG-84-01.**
Instructs laymen on blue crab biology, identifying and handling peelers, harvest and shedding methods, and more.

A Guide to Salt Marsh Plants Common to North Carolina. Elizabeth Jean Wilson. 32 pages. \$1.50. **UNC-SG-81-04.**
A teaching guide to the herbs, vines, grasses and shrubs found in North Carolina marshes.

Estuarine Shoreline Erosion in North Carolina. Stan Riggs, Mike O'Conner, Vince Bellis and Tony Duque. 23" x 35" posters. Please specify which posters you want. Free. No number.
A series of three colorful posters depicting erosion in the state's major estuaries; Albemarle Sound and Neuse River, and the last poster, Cause and Effect, explains the reasons for estuarine erosion.

Beached Marine Mammals. 2 pages. Free. **UNC-SG-BP-84-2.**
This brochure tells the step-by-step procedure for handling a stranded or dead sea mammal.

The Hardbottoms of Onslow Bay- Map. 39x27" posters. \$5. **UNC-SG-86-25.**
These hardbottoms are pinpointed on a map. The flip side of this poster features five attractive, four-color paintings of the underwater reefs and the flora and fauna they attract. This side of the poster makes an excellent educational tool for teachers and students. The realistic paintings can provide endless classroom discussion of offshore geology, underwater habitats and species identification.

A Guide to Ocean Dune Plants Common to North Carolina. E. Jean Kraus. \$4.50. **UNC-SG-87-01.**
A handy field guide and resource book on the plants that grow on ocean dunes. Contains more than 50 detailed illustrations of trees, shrubs, vines, herbs and grasses.

Coastal Capers: A Marine Education Primer. Lundie Spence and Vivian Barbee Coxe. \$3.50. **UNC-SG-8405.**
This provides activities that primary grade and exceptional education teachers can use to introduce and explain the marine environment. The activities will sharpen student skills in science, math, language arts, social studies and art. Illustrated.

North Carolina Marine Education Manuals. Lundie Mauldin, Dirk Frankenbery and Johanna Bazzolo. These four manuals are designed to assist educators, particularly middle-grade science and social studies teachers. They present the coast as a setting and subject for study. Each manual has a similar format. Marine concepts are presented as background reading suitable for educators or secondary students. Activities and laboratory exercises provide students with hands-on experiences. Additional resources, films and references are listed.

Unit One, Coastal Geology. 108 pages. Illustrated. \$2.00. **UNC-SG-78-14A.**

Unit Two, Seawater. 76 pages. Illustrated. \$2.00. **UNC-SG-78-14B.**

Unit Three, Coastal Ecology. 100 pages. Illustrated. \$2.00. **UNC-SG-78-14C.**

Unit Four, Coastal Beginnings. 175 pages. Illustrated. \$2.00. **UNC-SG-78-14E.**

Connections: Guide to Marine Resources, Living Marine Systems and Coastal Field Trips. L. Spence and J. Medlicott. 93 pages. Illustrated. \$2. **UNC-SG-8405.**

Includes how to set up and use brackish water and marine aquariums. Describes the state's marine resources and North Carolina field trip sites. Provides information on how to plan a field trip with an understanding of the legal responsibilities.

Ordering Instructions: Make checks payable to University of North Carolina Sea Grant. Send requests and checks to:

Marine Education Specialist
University of North Carolina Sea Grant
College Program
Box 8605
University of North Carolina
Raleigh, NC 27695-8605

Ohio State University
Sea Grant Program
Research Center
1314 Kinnear Road
Columbus, OH 43212
(614) 292-8949

Oceanic Education Activities for Great Lakes Schools (OEAGLS)

Results of studies of student knowledge about the oceans and Great Lakes environments indicate a need for greater awareness of those environments and a greater understanding of the impact they have on the lives of people in the Midwest. OEAGLS (pronounced "eagles") are designed to take a concept or idea from the existing school curriculum and develop it in an oceanic and Great Lakes context, using teaching approaches and materials appropriate for children in grades five through nine. Investigations are characterized by subject matter compatibility with existing curriculum topics; short activities lasting from one to three classes; minimal preparation time; minimal equipment needs; standard page size for easy duplication; student workbook plus teacher guide; suggested extension activities for further information or creative expression; teachability demonstrated by use in middle school classrooms and content accuracy assured by critical reviewers. Each title listed below consists of a student workbook and a teacher guide and costs \$3.00 for the publication, postage and handling.

The Effect of Lake Erie on Ohio's Temperature. J.D. Meinke, B.A. Kennedy and R.W. Fortner. 9 pages. **OHSU-EP-001/S**, 9 pages, and **OHSU-EP-001/T**, 7 pages. \$3.00.

Differences in heat absorption and release by soil and water show how lakes and oceans moderate land temperatures. Laboratory and map activities. Science, geography.

The Effect of Lake Erie on Climate. J.D. Meinke, B.A. Kennedy and V.J. Mayer. **OHSU-EP-002/S** and **OSHU-EP-002/T**, 9 pages each. \$3.00.
Effect of temperature on movement of air; land and sea breezes and how they influence climate and economy near large bodies of water. Demonstration and graphic activities. Science and geography.

Ancient Shores of Lake Erie J. Comiensi and V.J. Mayer. 7 pages. **OHSU-EP-003/S**, 7 pages, and **OHSU-EP-002/T**, 12 pages. \$3.00.
Beach ridges along the lake are evidence of former lake levels related to glaciation. Characteristics of ridges make them valuable for human uses. Map study. Science, geography, history.

How to Protect a River D.L. Hyatt, B.A. Kennedy and V.J. Mayer. 8 pages. **OHSU-EP-004/S**, 8 pages, and **OHSU-EP-004/T**, 8 pages. \$3.00.
River characteristics are compared with standards for water quality and development. A decision is

made about classifying the river as wild, scenic or recreational. Map study, data usage. Science, social studies.

Lake Erie and Changing Lake Levels. C. Farnsworth and V. J. Mayer. **OHSU-EP-005/S**, 9 pages, and **OHSU-EP-005/T**, 9 pages. \$3.00.

Causes and effects of lake level fluctuations lead to a study of problems involved in regulating lake levels. Laboratory and graph interpretation. Science, social studies.

Erosion Along Lake Erie B.A. Kennedy and R.W. Fortner. **OHSU-EP-006/S**, 9 pages, and **OHSU-EP-006/T**: 12 pages. \$3.00.

Determination of recession rate along a shoreline using maps and aerial photos. Effect of coastal erosion on property. Map study, calculations. Mathematics, science, social studies.

Coastal Processes and Erosion . B. A. Kennedy and R.W. Fortner. **OSHU-EP-007/S**, 11 pages and **OSHU-EP-007/T**, 12 pages. \$3.00.

Processes involved in coastal erosion and the effect of erosion on different shore materials. Shore protection devices and how they work Laboratory. Science.

Pollution in Lake Erie - An Introduction. C.P. Basehore and R.W. Fortner. Revised 1987. **OSHU-EP-008/S**, 14 pages, and **OSHU-EP-008/T**, 17 pages. \$3.00.

A 1970 essay is used to illustrate how to read skillfully and critically for facts about water quality in the lake. A current (1980) article updates and clarifies. Reading activity. Language arts, science.

Yellow Perch in Lake Erie. R. W. Fortner, G. Reil and S. Leach. **OHSU-EP-009/S**, 8 pages (revised 1985) and **OSHU-EP-009/T**, 26 pages (revised 1986). \$3.00.
Introduction to fish life cycle and factors affecting population size, used as background for role-play of setting fisheries management policy. Extended to policies for 200-mile limit. Board game and simulation. Science, social studies, mathematics.

Evidence of Ancient Seas in Ohio. S. Leach and V.J. Mayer. Revised 1985. **OHSU-EP-010/S**, 9 pages, and **OSHU-EP-010/T**, 10 pages. \$3.00.
Ohio rocks and minerals give evidence of the seas that formerly covered the state. Locations of economic deposits of minerals are studied. Laboratory and map study. Science, geography.

To Harvest a Walleye. S. Leach, G. Reil and R.W. Fortner. Revised 1986. **OHSU-EP-011/S**, 12 pages,

and **OSHU-EP-011/T**, 20 pages. \$3.00.

Basic concepts of food chains, webs and pyramids with environmental factors and energy transfer. Desirability of using lower trophic levels for human food. Board game and extensions. Science, mathematics.

Oil Spill! R.W. Fortner and S. Ihle. Revised 1987. **OHSU-EP-012/S**, 17 pages, and **OHSU-EP-012/T**, 16 pages. \$3.00.

Sources of oil in water environments and methods for oil spill clean-up. Effect of oil on aquatic life. Laboratory and graphing activities. Science, social studies.

Shipping on the Great Lakes. K. N. Schlard and V.J. Mayer. 1980. **OHSU-EP-013/S**, 10 pages, and **OHSU-EP-013/T**, 10 pages. \$3.00.

Commerce between lake ports illustrates regional products and needs. Cost and energy efficiency of cargo transport methods. Data analysis. Geography, mathematics.

Geography of the Great Lakes. J.L. Timmons and R.W. Fortner. 1980. **OSHU-EP-014/S**, 17 pages, and **OSHU-EP-014/T**, 17 pages. \$3.00.

Location and importance of Great Lakes areas. Distance-rate-time problems and area, perimeter, volume determinations. Map study and laboratory. Geography, mathematics, science.

Ohio Canals. V.J. Mayer and F. Pigman. Revised 1986. **OHSU-EP-015/S**, 6 pages, and **OHSU-EP-015/T**, 12 pages. \$3.00.

Effects of canal building on the population and economy of cities. Canal routes are plotted and life on canal boats is revealed through a song. Map study, data interpretation. Geography, history.

The Estuary - A Special Place. R.W. Fortner and R. Mischler. Revised 1985. **OHSU-EP-016/S**, 14 pages, and **OHSU-EP-016/T**, 16 pages. \$3.00.

Computer map shows land use around estuary. Stimulated sampling techniques reveal life forms in and around water. Influence of people's activities considered. "Dry lab" data analysis. Science, social studies, mathematics.

The Great Lakes Triangle. R.W. Fortner and D. W. Jax. **OHSU-EP-017/S**, 17 pages (revised 1985) and **OHSU-EP-017/T**, 32 pages (revised 1987). \$3.00.

Explores logical explanations for "mysterious" loss of the EDMUND FITZGERALD and other crafts in the Great Lakes. Considers ship construction, storm tracking and uncharted reefs. Map study, weather station models, contour map construction. Geography, science, language arts, music.

Knowing the Ropes. R.W. Fortner and V.J. Mayer. Revised 1985. **OHSU-EP-018/S**, 12 pages, and **OSHU-EP-018/T**, 32 pages. \$3.00.

How ropes are made, what makes them strong, how they are (and were) used on ships. Influence of the

sea on language. Laboratory activities. Science, history, language arts, art.

Getting to Know Your Local Fish. S.M. Hartley and R.W. Fortner. Revised 1987. **OHSU-EP-019/S**, 11 pages, and **OHSU-EP-019/T**, 25 pages. \$3.00.

Construction and use of a dichotomous key to families of fish in Lake Erie. Creative art and writing about the origin of fish names. Science, art, language arts.

Shipping - The World Connection. R.W. Fortner and R. Pauken. 1980. **OHSU-EP-020/S**, 16 pages, and **OHSU-EP-020/T**, 9 pages. \$3.00.

Countries represented by ships using the Port of Toledo indicate the Great Lakes' importance in world trade. How locks work to move vessels through the lakes. Laboratory, map study. Geography.

We Have Met the Enemy. D. Briss and V.J. Mayer. 1980. **OHSU-EP-021/S**, 13 pages, and **OHSU-EP-021/T**, 58 pages. \$3.00.

The War of 1812 in the Northwest, its causes, the role of Lake Erie, and the factors important in winning the war. Board simulation, analysis of original documents. History (high school level).

It's Everyone's Sea - Or Is It? V.J. Mayer and S. Ihle. 1981. **OHSU-EP-022/S**, 14 pages, and **OHSU-EP-022/T**, 19 pages. \$3.00.

Characteristics of the ocean floor and how international boundaries are determined. Simulation of a Law of the Sea conference. Map study, role-play. Social studies, science, history.

PCBs in Fish - A Problem. V.J. Mayer and S. Ihle. 1981. **OHSU-EP-023/S**, 10 pages, and **OHSU-EP-023/T**, 21 pages. \$3.00.

PCBs in Lakes Erie and Ontario and the degree to which they affect consumption of fish. Simulation of state health policies. Graph construction and laboratory demonstration. Science, social studies.

A Great Lakes Vacation. R.W. Fortner and M. Lisowski. 1987. **OHSU-EP-024/S**, 8 pages, and **OHSU-EP-023/T**, 14 pages. \$3.00. Optional computer disk supplement, \$4.00.

Students learn how the resources of the Lake region create attractive recreation opportunities. Small groups serve as travel consultants for various types of vacations. This has a computer disk with runs on the Apple computer with one disk drive and color monitor which is for optional use with the activity. Geography, recreation.

Storm Surges. J. Keirand V.J. Mayer. 1987. **OHSU-EP-025/S**, 9 pages, and **OHSU-EP-025/T**, 12 pages. \$3.00. Why does lake level rise and fall at the ends of Lake Erie in response to storms? Students study the action of storms over the Lake from records and learn the causes and effects of storm surges and seiches. Science.

River Trek. R Eddy and R.W. Fortner. 1987. **OHSU-EP-026/S**, 7 pages, and **OHSU-EP-026/T**, 10 pages; computer disk. \$7.00.

A computer simulation of a flatboat trip down the Ohio River in 1791. Students learn about the perils of river travel and the geography of the Ohio River basin. Modern locations along the river are compared with their 18th century counterparts. The computer program runs on Apple with one disk drive and color monitor. Color graphics and sound add excitement to one of our most innovative activities. River Trek cannot be done as an activity without the computer program. History.

OEAGLets

Three activities are designed for the primary grade range. All three use Lake Erie information applied to all primary subject areas.

Lake Erie -Take a Bow. M. Canning and M. Dunlevy. 69 pages. \$5. **OHSU-EP-031.**

A unit on the geography of the Great Lakes and their importance to people. Includes background readings, worksheets, transparency masters, and activity guides. Designed and tested in Lakewood Schools, where it met with great excitement.

Build A Fish To Scale. M. Canning and M. Dunlevy. 101 pages. \$5. **OHSU-EP-032.**

A unit about the external characteristics of fish and how these characteristics can be used to classify fish. Card games, activities, worksheets, posters and background readings included.

Lake Erie-A Day in the Life of a Fish. M. Canning and M. Dunlevy, edited by R.W. Fortner. 87 pages. \$5. **OHSU-EP-033.**

An 87-page unit on fish behavior, functions of body parts, and adaptations for survival.. Lab activities, worksheets, background readings and transparency masters included.

In publication numbers, S = student material, T = teacher material.

Ordering Instructions: Mail checks, payable to Ohio State University to:

Ohio Sea Grant Program-Publications
Ohio State University
Research Center
1314 Kinnear Road
Columbus, OH 43212



Oregon State University
Sea Grant College Program
Adm. Ser. Bldg. A320
Corvallis, Oregon 97331
(503) 754-2714

Water, Water Everywhere: Marine Education in Oregon. Bill Hastie. 24 pages. \$2.50 plus 50¢ postage. 1986 rv.

A guide to instruction about fresh and salt water, this booklet includes information on using marine education in the classroom and on marine education resources and outdoor school sites in Oregon. Also included, upon request, is a form for ordering instructions for individual activities (i.e. "Studying Your Town's Use of Water," "Comparing the Sizes of Whales," "Water Games," and "Life Cycle of Salmon").

Clean Water, Streams and Fish. Elementary Curriculum. Wendy Borton, Lavonne Bucher, Clair Dyckman, Art Johnson and Bill Way. 292 pages. \$10 plus postage. 1982.

Adapted for Oregon from Washington curricula, this holistic study of watersheds is intended to help people act responsibly toward their life support system - water. Using salmon as a model, this elementary-level curriculum introduces biological and ecological information about salmonids, considers the impact of humans on watersheds, suggests ways in which we can restore and maintain water quality and salmonids, and discusses the role salmonids play in the Northwest.

Clean Water, Streams and Fish. Secondary Curriculum. Wendy Borton, Lavonne Bucher, Claire Dyckman, Art Johnson and Bill Way. 341 pages. \$10 plus postage. 1982.

This secondary-level curriculum contains three sections - "Salmonid Life Cycle and Habitat," "Watersheds," and "Issues." Among the issues presented are water management to prevent erosion, the impact of poaching and recreation on fishing, and the storage water in lakes and wetlands. The appendix describes several field studies.

The Columbia River: Its Future and You. Teacher's Manual for Grades 5-8. Marcia Frost. 1985. 118 pages. \$5 plus postage. **ORES-U-E-85-001.**

The Columbia River: Its Future and You. Teachers Manual for Grades 9-12. Gerald Conrath. 1985. 87 pages. \$5 plus postage. **ORES-U-E-85-002.**

This guide and the one above study the Columbia River from a multidisciplinary approach. Combining social studies and sciences, they contain units on the history of the Columbia and on the river's use for energy, fisheries, agriculture, recreation and navigation.

Gateway to the Pacific: The Columbia River. Teacher's Resource Book. Grades 5-7. Vicki Osis, et al. 1986. 147 pages. \$6 plus postage: \$1 for 1 copy, \$1.50 for 2 copies. **ORES-U-E-86-001.**

Although this curriculum focuses on one port, that of Astoria, Oregon, it serves as a model for the study of ports throughout the Pacific Basin. Indeed, the goal of the Pacific Circle Consortium's Ocean Project, of which this curriculum is a part, is to teach students about the interdependence of the Pacific nations through trade. The curriculum includes lessons in latitude and longitude, ships in the harbor, cargo transfer, harbor careers, natural habitats of the Columbia estuary and a board game, "Cargo," in which students buy and sell commodities traded in countries around the Pacific.

Ordering instructions:

Vicki Osis
Oregon State University Hatfield Marine Science
Center
Marine Science Drive
Newport, OR 97365

Pacific Science Center/ Washington Sea Grant
Marine Education Project
200 Second Ave. N
Seattle, Washington 91809
(206) 625-9333

Elementary Activity Packets

High Tide, Low Tide, Grades 3-4, adaptable for grades 1-2. \$6.00.

This packet introduces students to 12 common rock shore animals: barnacles, mussels, limpets, periwinkles, shore crabs, hermit crabs, sea stars, tide-pool sculpins, blennies, seagulls, sea anemones and sea urchins. It describes life on a rocky shore; how the animals move, gather food and behave at high tide and low tide. The packet emphasizes role-playing as a method of helping children understand the situation of living plants and animals.

Life Cycle of a Salmon, Grades 3-5. \$6.00. Set of 64 slides to accompany unit, \$33.00.

This unit presents important facts regarding the life cycle of salmon in Northwest waters, emphasizing the importance of clean water in our environment. It stresses the unique migration and breeding habits of salmon and relates its constant struggle for survival. This fish is one of our most important natural resources, yet the numbers of natural stock salmon are steadily decreasing in Northwest waters. This activity packet alerts learners to ways in which they can help protect the salmon's natural environment.

Waterbirds, Grades 4-6. \$6.00. Set of 28 slides to accompany unit, \$15.50.

This unit includes information about birds and the ecological factors that affect both birds and people. It stresses the need to understand and appreciate the dependence of birds to their feeding and breeding areas. Lists of resource people, places and reading for students and adults are attached to specific activities.

Whales, Grades 4-6. \$6.00.

This packet consists of six activities; any activity may be done independently of the others. Students are acquainted with Quileute Indian and modern methods of whaling and are invited to compare the two. They investigate the mammalian characteristics of the Cetaceans and learn about some of the aspects of whale biology that suit them to life in the oceans. Students learn techniques and problems of estimating whale populations and finally take part in a simulated television news special, "The Battle Over the Bowhead," which brings together much of what they have learned.

Junior High Activity Packets

Beaches, Grades 7-9. \$6.00. Full set of slides to accompany unit, \$52.00. Partial slide sets available; write for details.

This is an activity packet that introduces students to the physical and biological process of the beach

zone. Activities familiarize students with the beach as a habitat for plants and animals. Students will also examine the physical configuration of beaches and learn to identify and label parts of a beach. They will work toward an understanding of the processes that help form beaches. The final activity examines the impact of human use of the beach on the natural beach processes and habitats.

Beach Profiles and Transects, Grades 8-9. \$6.00.

To obtain useful information about beaches or any other study site, careful measurements must be taken. The activity "Profiles" gives directions for measuring and recording the profile of a slope. In the "Transect" activity students sample populations using a single line transect-quadrant method. This activity is intended to follow up studies of beach zonation in the packet "Beaches." It requires some familiarity with intertidal organisms.

Early Fishing Peoples of Puget Sound, Grades 7-9. \$6.00.

This unit presents the early Puget Sound Indian culture, emphasizing the importance of the water environment on their way of life. It stresses the people's dependence on the natural environment and the outstanding degree to which the Puget Sound region was able to provide for all their needs. As fish were one of the most important natural resources, a study of early fishing technology comprises a major portion of the unit. There are activities comparing fishing then and now, and actually making Indian hooks and lines following authentic methods as closely as possible.

Energy from the Sea, Grades 7-9. \$6.00.

In this unit, students will explore the potential of offshore oil deposits, and proposals for tapping the energy of the tides, winds, currents, and ocean thermal differences. Attention is paid to the economic and environmental impact of exploiting these sources. The energy situation is a complex one with no clean-cut answers; the activities in this unit are correspondingly open-ended.

Literature and the Sea, Grades 7-9. \$6.00.

This packet includes short stories, poems and excerpts from longer prose selections about the sea and a variety of student activities to accompany them. It is divided into six activities. Ideally, the students would progress from Activity 1 through Activity 6. However, each activity may be used separately.

Tides, Grades 7-9. \$6.00.

The Tides activity packet is an introduction to the nature of tides. It includes activities designed to

examine the relationship between the tides and the position of the sun, moon and earth. Other activities teach students to read tide charts and explain how tide predictions are made. The skills students learn are used in a final activity that examines tidal activity in Puget Sound.

Tools of Oceanography, Grades 7-9. \$6.00. Set of 16 slides to accompany unit, \$9.00.

This packet is designed to familiarize the student with tools oceanographers use. It begins with the early tools that sailors developed to help them navigate the seas. It describes the first major scientific expedition and compares the equipment oceanographers use with that used on the Challenger Expedition. Minimum time for the basic activities is four days.

Senior High Activity Packets

American Poetry and the Sea, Grades 10-12. \$6.00.

This activity packet presents a variety of poems about the sea, written by American poets. One section deals exclusively with poems by Pacific Northwest poets. Students are exposed to many different poetic responses to the sea and are expected to read, understand and discuss each selection.

Marine Biology Activities, Grades 7-Community College. \$6.00.

This activity packet introduces students to the major themes of marine biology. Through classroom, laboratory and field trip activities, students develop an understanding of structural adaptation, behavioral adaptation, zonation and habitat. This packet includes teacher background information, student handouts and tests.

Marine Biology Field Trip Sites, Grades K-Community College. \$6.00.

This book provides teachers with the necessary information to select a beach field trip site in the Puget Sound region. A map and an inventory of facilities is given for each location. Checklists and sample letters are provided as models to aid the teacher in planning the field trip.

Marshes, Estuaries and Wetlands, Grades 10-12. \$6.00.

This activity packet introduces students to the watershed system. Activities help students look at both the salt and fresh water environments. An overview activity provides students with an opportunity to make and express their observations about fresh and salt water habitats. It allows them to view watersheds from a holistic perspective. Other activities focus more closely on field and lab investigations of salt marshes and estuaries. Finally, students are given a working model by which they can inventory fresh water wetlands in and near their communities. The inventory, based on the one used by King County Resource Planning Division for their wetlands survey, focuses on the physical,

biological, aesthetic, visual and educational value of wetlands.

Squalls on Nisqually: A Simulation Game, Grades 10-12. \$6.00.

This is a simulation game about land use decision making in a coastal zone environment. The simulation is based on a land use proposal submitted by the Weyerhaeuser Company for the development of land near the Nisqually Delta. The students are given the background to the historical development of the Nisqually Delta and relevant information from the Environmental Impact Studies completed for the Nisqually. Through role-playing, students learn about the socio-political and economic interaction involved in a decision-making process. Students are encouraged to research their roles and determine positions based on the data. This simulation process can be easily adapted for other land-use issues.

Ordering Instructions: Mail checks, payable to Pacific Science Center to:

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* Washington residents add 7.9% sales tax.

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(809) 832-4040

How to Find Information about the Sea in School and Public Libraries / Como Localizar Informacion Sobre Temas Marineos en las Bibliotecas Publias y Escolares. A. Ortiz. PRU-E-1.

The purpose of this pamphlet is to assist students and teachers in the utilization of libraries in their search for marine-related information. Included are: a brief list of marine-related periodicals frequently found in school and public libraries, suggested local educational institutions with library resources concerning the sea, and a compendium of basic scientific names and plant and animal classifications.

Let's Learn about the Sea/Conozcamos el Mar. Vangie F. Hernandez. \$5. PRU-E-8.

This 135-page publication is a textbook designed to be used by junior and senior high school students attending a Sea Grant-operated marine summer camp, Cajaya Marine Festival. The text, a general introduction to the sea, is divided into four sections; the first three concern Marine Inhabitants, Physics of the Sea, and the Coasts of Puerto Rico, while the fourth deals with specific activities conducted at the camp. The text contains a glossary of terms, numerous examples, and illustrations with review exercises at the end of each section.

Voices of the Sea/Vocero del Mar. Loreina Santos-Silva. \$2.50. PRU-E-15.

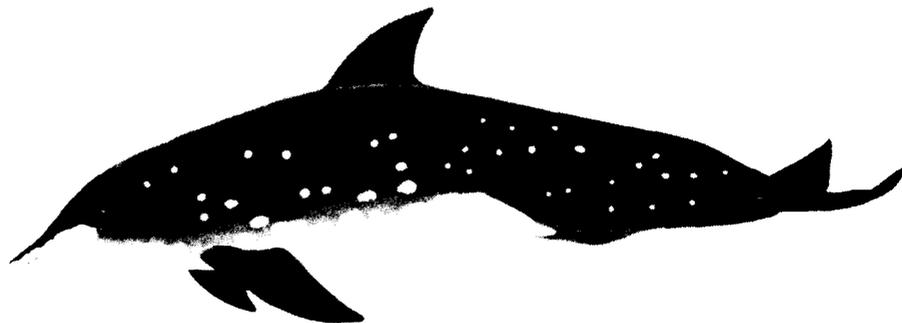
This 70-page book of poetry by Mayaguez poetess Loreina Santos-Silva is a collection of poems based on conversations with Puerto Rico fishermen. Many legends and local sea stories are preserved in these poems of which a number are beautifully illustrated with pen and ink drawings by Alicea, a well-known Puerto Rican artist.

Careers in Marine Sciences/Carreras en las Ciencias Marinas. Marie Beatriz Riesco. PRU-E-16.

This publication serves as a guide to students who are considering a career in marine sciences leaving aside the glamorous aspects and focusing on reality. As a result of erroneous propaganda, this field attracts too many confused students. We hope this publication, presented in the form of questions and answers, will throw some light on the decisions of our future scientists.

Ordering Instructions: Send requests, with checks payable to University of Puerto Rico, to:

Publications
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Department of Marine Sciences
University of Puerto Rico
Mayaguez, PR 00708



Rhode Island Sea Grant
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An Interpretive Atlas of Narragansett Bay. Stephen Olsen, Donald D. Robadue, Jr. and Virginia Lee. 82 pages. **P866**. \$4.

Beautifully illustrated with large colored maps and charts, as well as black-and-white photographs of marine life and historical scenes, this popular atlas summarizes in layman's terms the most interesting and useful information about one of the world's most-studied estuaries. Topics covered include: storms, hurricanes and flooding; plankton; finfish; commercial fishing; shipping; land use in bayfront towns; and pollution.

Cruising Guide to Historic Rhode Island. URI Marine Advisory Service. 2 pages. **P480**. \$2.

This poster-sized guide to over 100 historic points of interest is packed with interesting facts. A map show the location of the sites, all of which either can be seen from a boat or are within one mile of navigable waters. The reverse side is a beautiful reproduction of a 1777 engraved map of Narragansett Bay.

Environmental Education Field Guide to Rhode Island. William Croasdale. 52 pages. **P522**. \$2.

This illustrated guide to 103 field trip sites in Rhode Island was designed especially for teachers, but it could be used by anyone interested in Rhode Island's history, wildlife and geology. Each listing includes a short description of the site, special points of interest and information about fees and prior arrangements.

The American Lobster: The Biology of *Homarus americanus*. J. Stanley Cobb. 31 pages. **P497**. \$2.

This popularized book on the American lobster is for the dedicated fisherman, interested public, and fanatic consumer. It is divided into four sections: general biology, ecology and behavior, fishery and aquaculture. Illustrated with numerous drawings, graphs, charts and photographs, the book incorporates research findings from the University of Rhode Island and around the world. A 181-entry bibliography is provided for readers interested in pursuing the subject further.

Weather Information for Boaters, Cape Cod to Watch Hill. Elisabeth Keiffer. 32 pages. **P905**. \$2.

"Being able to 'read' the weather spells the difference between a rewarding time afloat and a miserable, possibly dangerous, experience," observes the author of this helpful guide for boaters. Beginning with an explanation of weather patterns and forecasting, the booklet goes on to cover wind, fog, tides, waves and storms; how to read weather signs; safety tips for boaters; and conditions in specific

waters along the New England coast. Photographs, maps diagrams, and tables illustrate the discussion.

An Elusive Compromise: Rhode Island Coastal Ponds and Their People Virginia Lee. 82 pages. **P879**. \$5.

Coastal ponds are fragile ecosystems, particularly vulnerable to stresses caused by human activity. Historically, Rhode Island's coastal ponds have been highly productive sources of oysters and fish. Since World War II, humans have altered the ponds in many ways, dredging them for recreational boating, constructing permanent breachways, and building large numbers of houses on pond shores. The effects of human activities on eight Rhode Island ponds are analyzed in this book, which includes maps, photographs, line drawings, tables, and 166 references.

Rhode Islands Salt Pond Region: A Special Area Management Plan. Stephen Olsen and Virginia Lee. 113 pages. **P1007**. \$5.

Based on the results of a four-year study of Rhode Island's coastal salt ponds, this book discusses issues such as declining fish and shellfish stocks; water pollution; and use conflicts among recreational fishermen, commercial fishermen, aquaculturists, and pleasureboaters. The authors propose a management strategy whose goal is to balance competing uses and preserve the salt pond ecosystem.

Introduction to Net Mending. Albert J. Hillier and Conrad W. Recksiek. 42 pages. **P937**. \$4.

This spiral-bound manual provides step-by-step instructions, including more than 100 photographs, for tying the six fundamental knots used to mend fishing nets.

Barrier Beach Brochure. Stephen Olsen and John Jagschitz. 8 pages. **P335**. Free.

Rhode Island's barrier beaches, 12,000 years in the making, are our first line of defense against ocean storms. They are also the most fragile feature of our coast. This brochure, which folds out into a 17-by-22-inch poster, explains how beachgrass stabilizes the dune on the barrier beaches and how human activity is damaging these beaches.

Narragansett Bay Poster. **P1068**. \$5.00.

This brilliantly colored 18-by-24-inch poster, showing the contour of the floor of Narragansett Bay, was produced by 3-D computer modeling.

Overview of Narragansett Bay. 4 pages. **P1065**. \$1.

Everything from what Narragansett Bay looked like 9,000 years ago to the most up-to-date boating and fishing statistics can be found in this fact-filled

summary. The report includes three maps; a table listing 16 of the bay's physical characteristics (volume, deepest point, salinity, etc.); and discussions of biology and pollution in the bay.

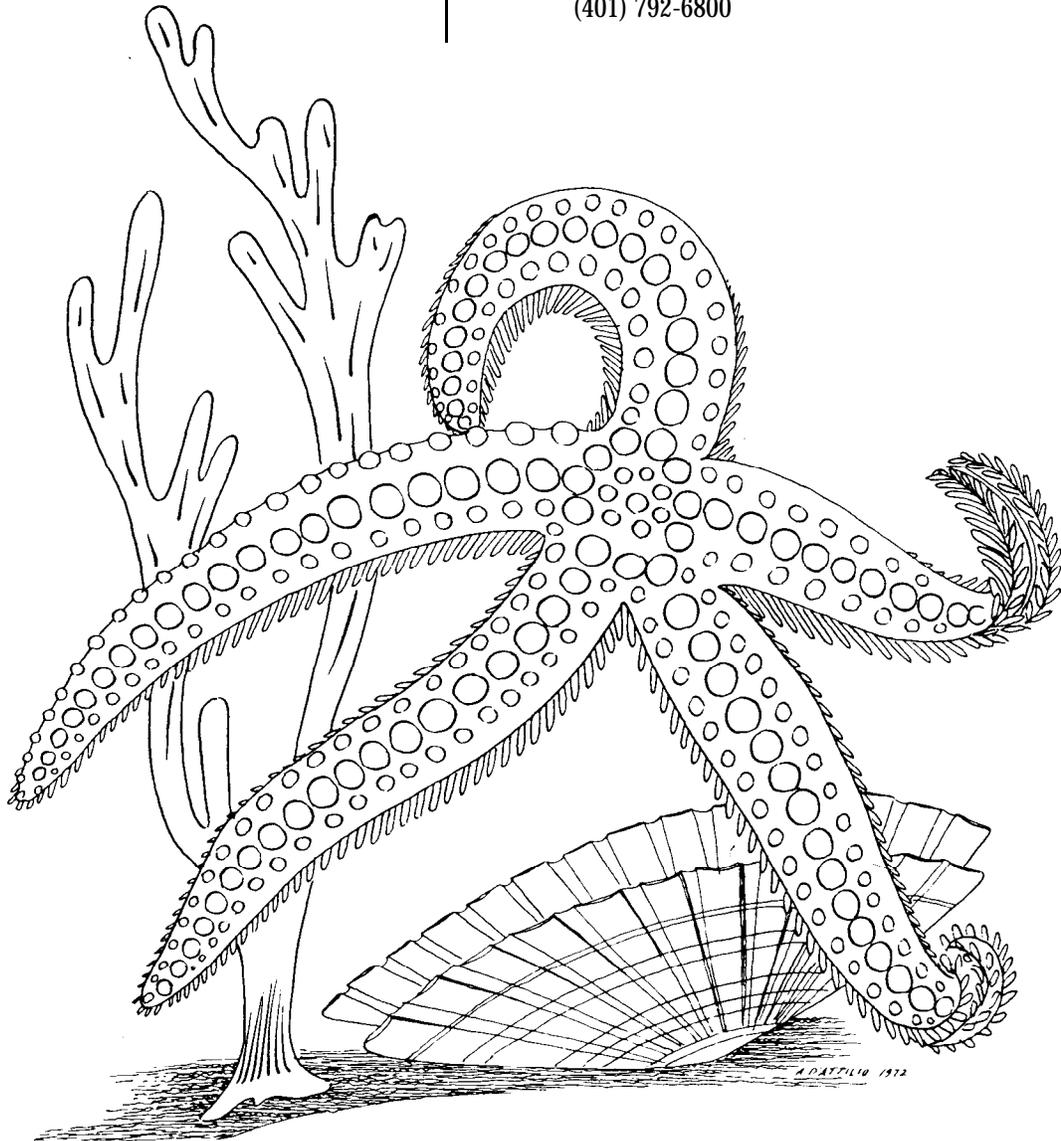
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- Tidepools. P995.
- The Trumpet Worm. P996.

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South Carolina Sea Grant Consortium
287 Meeting Street
Charleston, South Carolina 29401
(803) 727-2078

The Search and Review of Elementary Marine Education Materials. Jeanne M. Liu and Wendy B. Allen. 86 pages. Free. SCSG-TR-82-01.

A comprehensive review of marine educational programs and materials from around the country.

Sea Sampler. Aquatic Activities for the Field and Classroom (Secondary). Wendy B. Allen and Patty O. McLaughlin. 114 pages. Free. SCSG-TR-85-2.

A guide for grades 7-12 to successfully tested aquatic activities for the field and classroom, including how to set up a marine aquarium; how to conduct a beach study, salt marsh study and freshwater marsh study; classroom projects on food chain connections, brine shrimp and more.

Sea Sampler: Aquatic Activities for the Field and Classroom (Elementary). Wendy B. Allen and Patty O. McLaughlin. 118 pages. Free. SCSG-TR-85-1.

A guide for grades K-6 to successfully tested aquatic activities for the field and classroom, including how to explore a pond community, a beach, a marsh; discovering how a clam's siphons work; classifying beings and things; investigative osmoregulation and more.

A Guide to Common Whelks. Arnold G. Eversole and William D. Anderson. 24 pages. Free. SCSG-MEP-85-1.

An illustrated guide to the four species of whelks commonly found along the South Carolina coast, including shell and egg capsule keys and tasty whelk recipes.

A is for Alligators, B is for Beaches: A Guide for Marine Education and Recreation Resources in Charleston County. Stephen Hoffius. 64 pages. Free. An illustrated guide to books, films, classes (including materials for the handicapped) and various activities available in Charleston County which explore the coastal environment.

A Guide to Common Jellyfishes of South Carolina.

Dale R. Calder and Margaret C. Pridgen. 12 pages. Free.

An illustrated guide to these misunderstood inhabitants of our coastal waters with information on their life history, identification, and what to do if you are stung.

Red Tide: The Facts. Mel Goodwin and Virginia Beach. 11" x 17" Poster. Free.

A handy poster for dispelling the myths and promoting the facts concerning red tide.

Coastal Heritage Newsletter. Frances Rogers, Editor. Free.

The quarterly newsletter of the South Carolina Sea Grant consortium covering many topics, ranging from aquaculture to water safety to storm water pollution. Also includes a listing of new publications and current programs.

Ordering Information: Make checks payable to the SC Sea Grant Consortium and send with order to:

Publications
South Carolina Sea Grant Consortium
287 Meeting Street
Charleston, SC 29401

University of Southern California Sea Grant Institutional Program
Marine Education Program
Institute for Marine and Coastal Studies
University of Southern California
Los Angeles, California 90089-0341

Wet & Wild: Six Bilingual Supplementary Marine Curriculum Guides for Teachers, K-6.

Six units, each in English and Spanish, contain introduction of background information for teachers, approximately 25 multidisciplinary lesson plans in each unit and a list of reference books and films. Published by the Evaluation, Dissemination and Assessment Center for Bilingual Education, California State University, Los Angeles.

Unit 1: The Physical Ocean. 171 pp. (USCSG-ME-01-83). \$8.

Unit 2: Ocean Management. 66 pp. (USCSG-ME-02-83). \$6.

Unit 3: Research. 146 pp. (USCSG-ME-03-83). \$8.

Unit 4: The Biological Ocean. 180 pp. (USCSG-ME-04-83). \$20.

Unit 5: The Economic Sea. 150 pp. (USCSG-ME-05-83). \$18.

Unit 6: Marine Ecology. 188 pp. (USCSG-ME-06-83). \$23.00

Complete Set (Units 1-6). \$75.

Tuga the Turtle. Dorothy M. Bjur. USCSG-ME-03-82. \$6.

This children's book is in Grade Two Braille and large letters. It tells the story of a sea turtle who ends up in a tide pool and learns about tidal animals.

Mini-Information Booklets: Tidepool animals/Los animales que viven in las pzas de la marea; Sharks and Other Sea Creatures/Los tiburones y otros animales marinos; Fantastic Marine Animals/Fantasticos animales marinos. USCSG-ME-02-82. \$12. Three booklet set with each booklet containing approximately 50 mini articles, in both English and Spanish, about marine animals, their characteristics and behavior.

Marine Studies Idea Book: For Teachers, Grades K-6. English or Spanish (please specify). USCSG-ME-01-82. \$8.

A resource book of ideas and activities for the development of lesson plans by teachers, available in either English or Spanish for use in bilingual and international programs.

On the Waterfront: Teaching Seaport Management. Jenny Cashman. Reprinted from *Sea Grant Today* 12(1):12-13, 1982. USCSG-R-09-82. \$1.

Gamming with Dorothy Bjur. Stephanie Yoder. Reprinted from *Current, The Journal of Marine Education* 2(4): 16-17, 1981. USCSG-R-09-81. \$1.

Marine Education in Spanish. Shirley J. Hudgins. Reprinted from *Sea Grant Today* 10(3): 12-13, 1980. USCSG-R-03-80. \$1.

Downtown Aquaculture (Inner-City Marine Education). Dorothy M. Bjur. Reprinted from *Current, The Journal of Marine Education* 1(3):11-12, 1980. USCSG-R-02-80. \$1.

Wet and Wild (Marine Studies for the Visually Impaired). Shirley J. Hudgins. Reprinted from *Sea Grant Today* 9(8): 3-5, 1979. USCSG-R-12-79. \$1.

An Innovative Approach to Teaching Marine Sciences. Dorothy M. Bjur. Reprinted from *Revista de Biologia Tropical* 26 (Suppl. 1): 9-13, 1978. Available in English and Spanish. USCSG-R-03-79. NTIS-PB-299130/AS. \$1.

Teaching Marine Studies When You Don't Know a Snipe From a Sea Cucumber. Gail Ellison. Reprinted from *Sea World*, Fall 1977. pp. 33-35. USCSG-R-05-77. \$1.

The Role of Sea Grant Education. Dorothy M. Bjur. Reprinted from the *Journal of Marine Education*, Fall 1976, pp. 10-12. USCSG-R-04-76. \$1.

Marine Education: Five Program Evaluations. Dorothy M. Bjur and Jacqueline B. Rojas. USCSG-ME-09-82. \$2. Evaluations are given on five marine awareness programs, including information on development, organization and implementation. Also indicated are the degree of acceptance and success each program experienced.

Ordering Instructions: Make checks payable, by a U.S. bank, to USC Sea Grant Program. Mail request with check to:

University of Southern California Sea Grant
Marine Education Program
University Park
Los Angeles, CA 90089-0341

Sea Sources. 192 pages. All levels. **TAMU-SG-79-402 (rev).** \$4.

Selected bibliographic and resource materials on children's literature of the sea are gathered in this useful compendium for teachers and librarians. The 192-page book includes 745 titles in 10 categories: Information; biographies/explorer; fiction; picture books; whales and sea mammals; folk and fairy tales; poetry/songs; activities; short stories and selected chapters; and bibliographies.

Aquatic Science: Marine Fisheries Biology. 18 pages, 21 illustrations. Grades 4-12. **TAMU-SG-79-405.** Single copies free.

This illustrated booklet focuses on animal life in the marine areas of Texas and can be used as a handbook for the novice beachcomber or as an educational supplement in the classroom. Information is available on waves, tides and currents; shoreline organisms; estuaries; coastal food chains; fish and shellfish identification (including descriptions and line drawings of fish indigenous to Texas marine waters); and special project ideas related to the life history and management of coastal organisms. A list of related reading materials is included.

Children's Literature-Passage to the Sea. 56 pages, 4 questionnaires. Grades K-7. **TAMU-SG-80-401.** \$2.

This marine awareness learning package is based on eight books by nationally recognized authors. At least one book is appropriate for each elementary grade and all have a sea or coastal setting. Each book is related to interest center activities that allow students to experiment with or express what they have learned. Complete directions for 39 activities are included; related to language arts, music, art, science and social studies.

Marine Organisms in Science Teaching. 192 pages. Grades 4-12. **TAMU-SG-80-403.** \$4.

This laboratory-oriented workbook includes 42 activities for using living marine organisms in existing science programs. The workbook is presented in a discovery type format that includes two sections for the teacher, a pre-lab and a post-lab, and a student investigation section. Student sections are formatted to allow easy duplication on school copying equipment. The activities use such organisms as brine shrimp, oysters, ghost, fiddler and hermit crabs, sea anemones, barnacles and sponges.

Fairy Tales of the Sea. 152 pages, 9 original illustrations. Grades. K-12. **TAMU-SG-81-402.** \$4.50.

This collection of fairy tales includes tales from every inhabited continent - America, Asia, Australia, Europe and Africa - so that American children (and adults) can enjoy their varied heritage. It is

believed that the collection is the only volume of international folk and fairy tales exclusively about the seas. The tales, 25 in all, range from the familiar - such as Hans Christian Andersen's *The Little Mermaid* - to the lesser known - such as Pearl Buck's adaptation of *The Flying Ship*. The book is designed in an easy-to-read format to allow even the youngest readers enjoy the fairy tales. While the collection is complete in itself, there is an accompanying teacher's guide (**TAMU-SG-81-403**) that suggests varied classroom uses.

Fairy Tales of the Sea Teacher's Guide. 28 pages. Grades 409. **TAMU-SG-81-403.** \$2.

The communication potential of *Fairy Tales of the Sea* lends itself to a language arts curriculum. This guide is written with objectives according to the English Language Arts Curriculum Framework suggested by the Texas Education Agency. Activities cover the language arts of listening, reading, speaking and writing. Although designed for grades 4 through 9, there are some activities suitable for younger or older students who are particularly motivated toward study of the sea.

Marine Education - A Seagoing Educational Experience. 28 pages, 3 data sheets. Grades 7-12. **TAMU-SG-83-401.** \$1.

This workbook was prepared as part of a working cruise program for high school students and teachers that is offered by The University of Texas Marine Science Institute at Port Aransas. The book also may be useful to high school and junior college science students and teachers who have access to a research vessel. Included are descriptions of the Corpus Christi Bay area and the study sites, field equipment, analytical procedures and data collection. Detailed instruction for onboard activities are given.

Life on Board American Clipper Ships. 36 pages, 3 photographs, 2 drawings. Grades 7-12. **TAMU-SG-83-402.** \$1.

Author/archivist Charles Schultz has relied on sailors' actual diaries and logs kept by clipper ship captains. The book also includes an introduction that defines the clipper ship era, suggestions for further reading and a glossary. Photographs of American-built clipper ships, supplied by Mystic Seaport Museum, are included, as is a redrawing of an 1850-era world chart that shows the major routes followed by the clipper ships. In addition to its interest to the general reader, this book is intended to supplement English or American history classes in grades 7 through 12. It also can be used with younger, gifted students.

Bird Island Basin Environmental Study Area. 36 pages. Grades 7-12. **TAMU-SG-86-401.** \$2.

The concept of environmental study areas was a direct outgrowth of the 1970s ecology movement. The idea was to designate specific areas where school groups, youth groups or others could be demonstrated. The Bird Island Basin Environmental Study Area, located at Padre Island National Seashore, is just such a place. This guide contains a number of exercises that are designed as points of departure for hands-on learning experiences. Most of the activities are presented in a format similar to high school-level laboratory experiments. Although written with the Bird Island Basin area in mind, they can be easily adapted to other environments. Many of the activities can be done on the school lawn, on the playground or in a nearby park.

Annotated Guide to the Barnacles of the Northern Gulf of Mexico. 36 pages. Grades 9-12. **TAMU-SG-86-402.** \$3.

The 49 species of thoracican barnacles (the goose and acorn barnacles) that are known to occur in the northern Gulf of Mexico are differentiated by a taxonomic key based on external characters, with extensive illustrations and a glossary. The guide also includes an annotated list of these species and three systematically questionable ones, with areal range, bathymetry, substratum type and other data; a list of 16 species that have been found in the southern Gulf of Mexico but not in the northern Gulf; directions for collecting and examining specimens, and a list of references especially useful for further study of particular groups.

Texas Coast Hurricanes. 24 pages. Grades 4-12. **TAMU-SG-86-505.** Single copies free.

Designed to help coastal residents understand, prepare for and recover from the effects of hurricanes, the book includes tracking charts, probability of hurricane occurrence, guidelines for individual responsibility, checklists to help residents plan for safety, hurricane names through 1991, definitions of hurricane-related terms, and descriptions of Texas' most notable storms of the past 20 years. The checklists, definitions and directions for hurricane tracking are in both English and Spanish. The book includes many of the articles and photographs first published in Sea Grant's *Texas Shores* magazine.

Questions About Careers in Oceanography. 18 pages, 5 photographs. Grades 7-12. **TAMU-SG-87-401.** Single copies free.

A handy guide to the field of oceanography, this booklet is a response to inquiries by young people considering a career in the discipline. Questions such as "What is an oceanographer?," "Where does one study oceanography?," and "Who hires and supports oceanographers?" are posed and answered. Additional sources of information are cited in the text, and complete addresses for these agencies and organizations are provided.

Vocational-Technical Marine Career Opportunities in Texas. 22 pages, 7 photographs. Grades 7-12. **TAMU-SG-80-402r.** Single copies free.

This booklet is to assist high school counselors, teachers and students better understand the career opportunities available in the Texas marine industry. It provides background information and descriptions of jobs in the maritime transportation, offshore mineral, oil and gas commercial diving, commercial fisheries and shipbuilding industries. Information about the training needed to enter particular positions also is included. Organizations and schools, with addresses, are listed at the end of each section for reference.

How to Set Up and Maintain a Saltwater Aquarium. 8 pages, 7 illustrations. Grades 3-12. **TAMU-SG-81-504.** Single copies free.

This pamphlet outlines the basic steps to establishing a saltwater aquarium anywhere in the country. Presented in as simple language as possible, with accompanying cartoon illustrations, the guide is designed for young children, but is equally useful for older students and adults. Detailed instructions are given on the materials needed, food preferences, synthetic saltwater, filter systems and potential problems.

Hurricane Warning! 12 pages. Grades K-7. **TAMU-SG-82-401.** Single copies free.

Owlie Skywarn talks about hurricanes in a style written for elementary students. Printed in large type for easy reading, the brochure tells of Hurricane Camille in story form and includes a checklist of do's and don'ts when a storm threatens. There also is a safety certificate (to be signed by a teacher or other adult), signifying that the student knows the appropriate safety rules.

Water: How Safe Are You? 8 pages. Grades 4-12. **TAMU-SG-87-402.** Single copies free.

As the weather turns hot there is nothing so inviting as the thought of cool water and swimming, skiing, boating, fishing, or just lazing away the afternoon. Each year in Texas an average of 650 people get so involved in their activities that the end result is death by drowning. Since most victims are teenaged males between 15 and 19 years old, this bulletin points out some of the more obvious, but often forgotten, safety practices. Written primarily for a teenaged audience, it covers swimming, river recreation and boating. It includes a list of reference brochures, films, books and courses that can be used to supplement water safety instruction.

Law of the Sea Treaty and the United States. 12 pages, 4 illustrations. Grades 7-12. **TAMU-SG-81-506 (rev).** Single copies free.

This fact sheet traces the history of the international negotiations through the United State's decision not to ratify the Law of the Sea Treaty in December 1982. It reviews the key features of the treaty signed

by 117 nations, the events leading to the U.S. rejection of the convention and several areas of uncertainty created by the United States' action.

Field Trips.. Logistics is Key to It All. 4 pages. Grades 7-12. **TAMU-SG-83-402.** Single copies free.

Science field trips provide opportunities for students that can make the teacher's work well worth the effort. The excursion allows students to see and experience things they have never seen or felt before, and creates a hands-on approach to study. To be successful, a field trip must be thoroughly planned. This monograph provides teachers with detailed, step-by-step guidelines to follow in planning a field trip, taking one and following it up in the classroom. Post-trip evaluation guidelines and references also are included.

Venomous Marine Animals. 25 x 18" poster. Grades K-12. **TAMU-SG-82-403.** \$1.

Ten categories of potentially dangerous marine organisms are illustrated on this poster - jellyfish, catfish, rays, sea urchins, toadfish, stargazers, worms, sponges and the octopus. The accompanying descriptions can help people become more aware of how problems with these animals might develop, how they can be avoided and how certain injuries should best be treated if they occur.

Whales and Dolphins Off the Texas Coast. 36x23" poster. Grades K-12. **TAMU-SG-84-505.** \$3.

This poster depicts the five species of whales and dolphins most frequently stranded along the Texas coast. This is a full-color reproduction of a specially

commissioned work by artist Lori Grassman. The Atlantic bottlenosed dolphin, spotted dolphin, pygmy sperm whale, beaked whale and great sperm whale are included, along with a brief description of each species. An accompanying fact sheet includes additional scientific information on these species, and is sent free with all school orders.

Texas Rips! 11x17" poster. Grades K-12. **TAMU-SG-84-506.** Single copies free.

This water safety poster delivers a warning message about the dangerous rip currents along the Texas coast. A high percentage of drownings occur each year when swimmers or waders are caught in rip currents adjacent to rock groins, jetties or piers. The poster also includes a description of how to escape a rip current should a person be caught.

Marine Education. All grade levels. Quarterly Newsletter. \$2.50 per year.

Devoted to marine-related scientific facts, classroom activity suggestions and news items, each issue of this quarterly newsletter contains a marine fact sheet formatted for easy duplication by classroom teachers.

Ordering Instructions: Make checks payable to Texas A&M University. Send check or official purchase order to:

Marine Information Service
Sea Grant College Program
Texas A&M University
College Station, TX 77843-4115

Virginia Sea Grant College Program
Marine Advisory Services
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062
(804) 642-2111

Biology and Identification of Rays in the Chesapeake Bay. Joseph W. Smith and J.V. Merriner. Educational series No. 20, 22 pages. \$.50.

Rays, along with sharks and skates, make up a group of fishes known as elasmobranchs. The skeleton of these fishes is composed entirely of cartilage. You can identify rays either by looking at the illustrations accompanying each species description or by following the key. A key is a table of characteristics for a group of organisms arranged in couplets, one of which you choose. At the end of the chosen characteristic, you are directed to another couplet and again make a choice. The species is eventually reached.

Sensing the Sea: A Curriculum Guide for Grades Two-Three. Ellen Odell-Fisher and Ronald N. Giese. Educational Series No. 21, 53 pages. \$2.

Most education is very land oriented. Children learn shapes, colors, sizes, and textures from materials, plants, and animals found on land. There is another 70 percent of the earth that many people ignore, the sea. If young children are to develop responsible attitudes through total understanding of the earth, they must be exposed to all of its environments.

The overall purpose of this unit is to arouse curiosity and interest in the aquatic divergent questions for which the student proposes possible solutions rather than deciding specific "correct" answers. Throughout these lessons, the process of investigation is most important. Facts about specific content are vehicles for developing interest in the marine environment and for teaching inquiry skills.

Sensing the Sea: A Curriculum Guide for Grades Kindergarten and One. Ellen Odell-Fisher, Ronald N. Giese and Mary E. Sparrow. Educational Series No. 23, 44 pages. \$2.

In this unit, both you and your students will be working together to establish a saltwater aquarium in your classroom. Setting up and maintaining the aquarium should be carried out with and by your students. Draw up the portals and batten down the hatches! Have your students transform your classroom into a submarine preparing for a voyage to "inner space". You may enhance the illusion of a voyage by decorating your classroom windows as portholes and the door as a watertight ship's door.

The Marine Turtles of Virginia. J.A. Musick. Educational Series No. 24, 17 pages. \$1.

The marine turtles are among the most interesting representatives of Virginia's migratory marine

fauna. They include the leatherback (the world's largest living reptile) and four species of hard-shelled sea turtles. The latter are represented by the very large and common loggerhead, the much smaller, less common Atlantic ridley, the rare Atlantic green turtle and the Atlantic hawksbill. This booklet identifies Virginia's marine turtles, describes their habits, habitat, distribution and nesting.

The Chesapeake: A Boating Guide to Weather. John Lucy, Terry Ritter and Jerry LaRue. Educational Series No. 25, 22 pages. \$1.

A more ideal boating area than Chesapeake Bay would be difficult to find along the Atlantic Seaboard. With thousands of miles of sheltered shoreline, good water depth and proximity to major urban centers, the Bay is a boatman's paradise. However, the Bay's many protected harbors and relatively narrow width (a boatman normally can keep at least one shore in sight at all times) tend to produce a feeling of false security about the need to keep a close watch on weather conditions. The purpose of this publication is to remind boatmen that the Bay has many different weather moods, some of which can change quite rapidly. In addition, it should promote a better understanding of how basic weather features develop on the Bay and enable boatmen to enjoy the Chesapeake's unique waterways with fewer weather surprises.

Handle With Care: Some Mid-Atlantic Marine Animals That Demand Your Respect. Jon Lucy. Educational Series No. 26, 13 pages. \$1.50.

Generally speaking, the marine organisms found along middle Atlantic shores are not considered threatening to people. However, some of these animals can cause problems, either upon simple contact with the skin, as in the case of some jellyfish, or through careless handling. Larger inhabitants of coastal waters, such as stingrays and sharks, must always be treated with great respect because of the danger potential and their unpredictable nature. This description of nuisance and potentially harmful organisms is presented to help coastal residents and visitors become more aware of how problems with such marine animals might develop, how they can be avoided and how certain injuries should best be treated if they occur.

Fishy Activities for Your Small Fry. Mary E. Sparrow, Frances L. Lawrence and Ronald N. Giese. Educational Series No. 28, 36 pages. \$2.

This kit is a collection of fishy ideas for use in your classroom. The ideas in this kit are diverse in nature and complexity. Select and adapt objectives and

activities to meet the interests, capabilities and grade level of your students.

Shoreline Erosion in Virginia. S. Hardaway and G.

Anderson. Educational Series No. 31, 25 pages. \$1. This booklet is designed as an introduction to the process of erosion and some of the alternative measures used to combat it. The problem of shoreline erosion is most acute when coastal property with improvements is threatened by a rapidly receding shore bank. Many waterfront properties are bought and developed each year with little or no consideration of the shoreline situation. Consequently, additional money must be spent for erosion protection structures. Virginia's coast is a dynamic and active environment as well as a beautiful place to live. Sound judgement in coastal development is essential to effective control of shoreline erosion.

Nontraditional Marine Education Activities: A Planning Guide. Elizabeth A. Cornell. Educational Series No. 32, 10 pages, plus Marine Science Method (MSM) inserts. \$1.50.

To a classroom teacher, the rising cost of gasoline often means few or no field trips. If trips are still permitted, restrictions on distance maybe imposed and justification required. Therefore, teachers must make any enrichment trip or alternative experience demonstrably accomplish objectives not readily achieved in the classroom. The information contained in the booklet provides guidelines to getting the most from research field trips, museum visits, resource speakers and other non-traditional experiences.

Marine Education Field Trip Sites In Virginia. Susan C. Gammisch. Educational Series No. 33, 10 pages. \$1.

The Marine Mammals of Virginia. R.A. Blaylock. Educational Series No. 35, 34 pages. \$1.

To aid citizens in identification, this guide describes the natural history of marine mammals. This guide is organized by taxonomic orders and families; within a subfamily, species are listed by their frequency of appearance in Virginia waters. Space limits descriptions of the species' habitats and distributions to the western North Atlantic.

Chesapeake Bay Education Resources Directory.

Mary Sparrow, Educational Series No. 36, 39 pages. \$4.

The Chesapeake Education Alliance (CEA) and the Mid-Atlantic Marine Education Association (MAMEA) developed this Directory to assist educators in locating information and developing programs for Chesapeake Bay education. The Directory is divided into eight sections, each dealing with a different type of educational resource. The Directory emphasizes resources which are readily available and particularly useful to educators.

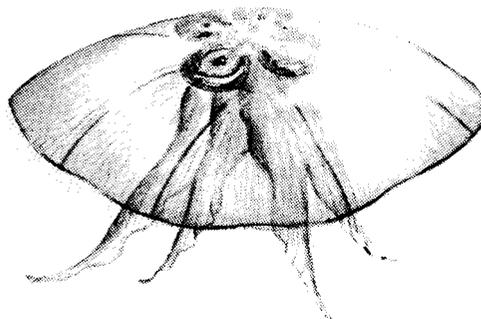
Marine Education Computer Print-out Bibliography.

Specify grade level and topic of interest. \$5 per custom computer search.

Literature searches of the entire MEMS collection can be arranged for just \$5 if request is accompanied with prepayment. A search can be custom designed to meet each individual's need, whether it be by topic, grade level, author, geographic location, type of document or year of publication. Any one or combination of the above will provide the user with an extensive bibliography of MEMS materials, custom designed to the user's needs.

Ordering Instructions: Make checks payable to Virginia Sea Grant at VIMS. Send requests, with remittance if required to:

Sea Grant Communications
Virginia Institute of Marine Science
Gloucester Point, VA 23062



University of Wisconsin Sea Grant
University of Wisconsin-Madison
1800 University Avenue
Madison, Wisconsin 53705
(608)263-3259

Educator's Guide to Great Lakes Materials. 40 pages.
50 ¢

An illustrated bibliography of books, films, maps and pamphlets on Great Lakes-related subjects for classroom use.

Fish of Lake Michigan. 32 pages. 50¢.

A history of Lake Michigan fishery and illustrated descriptions of 21 important species of fish.

Fish of Lake Superior. 32 pages. 50¢.

A history of Lake Superior fishery and illustrated descriptions of 23 important species of fish.

The Coasts of Wisconsin. 34 pages. 50¢.

Describes the physical characteristics, history and early development, and current uses and problems involving Wisconsin's Lake Michigan and Lake Superior coasts.

The Sea Lamprey: Invader of Great Lakes. 8 pages.
50¢.

Describes one of the most devastating eco-disasters in modern history - the invasion of the Great Lakes by ancient parasitic ocean fish.

Green Bay: Portrait of a Waterway. 21 pages. 50¢.

A collection of stories on the importance of Green Bay resources that originally appeared in the *Green Bay Press-Gazette* newspaper in 1978.

Green Bay's Yellow Perch Fishery. 10 pages. 25¢.

An illustrated history of this major Green Bay fishery, its recent problems and attempts to improve it.

The Fisheries of the Great Lakes. 19 pages. \$1.00.

This illustrated book profiles the primeval lakes from before the advent of Europeans to the region and traces the history of the fishery.

Eating Lake Michigan Fish. Fact Sheet. Single copies free, \$4 per 100.

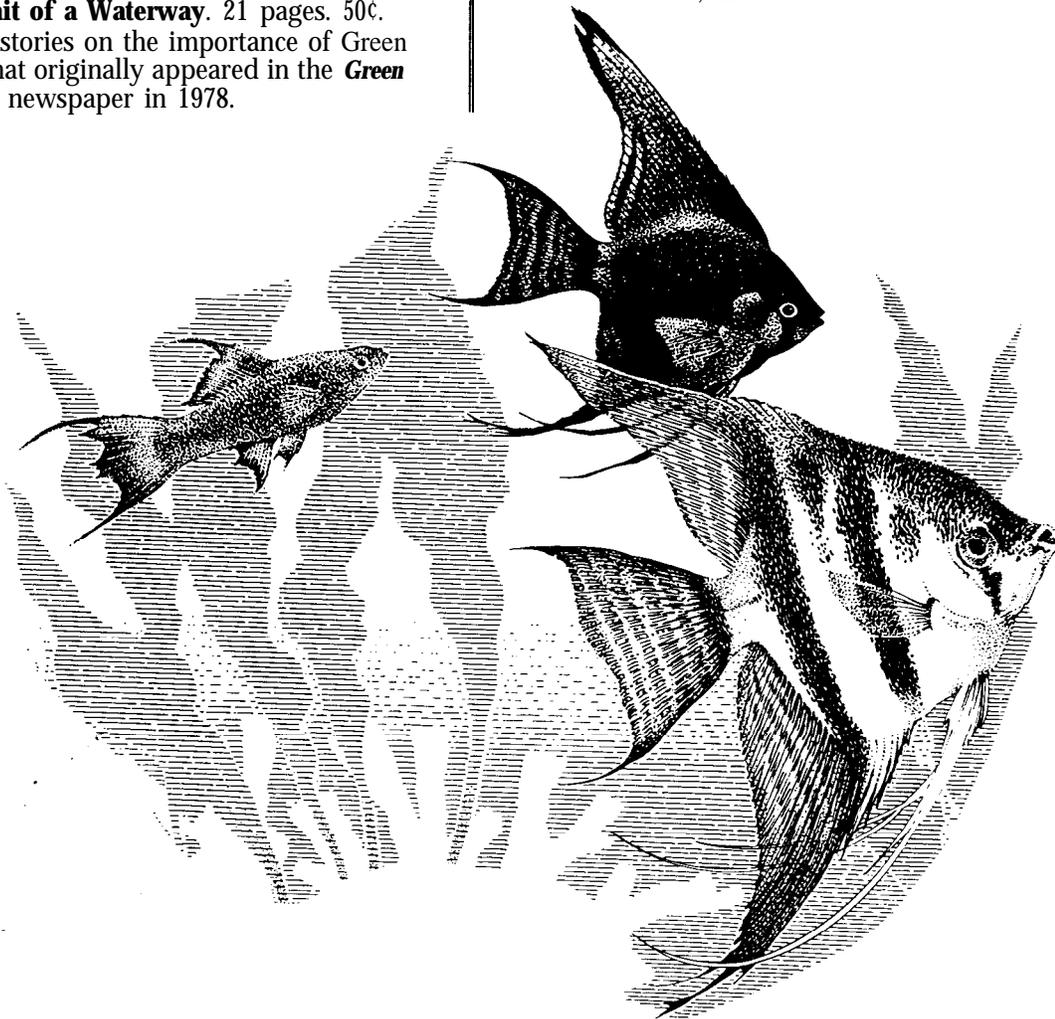
Explains in simple terms the problem of PCB contamination involving certain Great Lakes fish and why children shouldn't eat these fish.

Cleaning Great Lakes Fish. Plastic poster, 11" x 11".
50¢.

Illustration and text describe how to clean fish to minimize contaminant levels.

Ordering Instructions: Make checks or money orders payable to UW Sea Grant Institute, and send to:

Communications Office
UW Sea Grant Institute
1800 University Avenue
Madison, WI 53705



Woods Hole Oceanographic Institution
Sea Grant Program
Woods Hole, Massachusetts, 02543
(617) 548-1400 ext. 2398

International Directory of Marine Science Libraries and Information Centers. Carolyn P. Winn, \$15.

ISBN 0-932939-03-1.

This directory represents network of cooperating libraries and information centers willing to provide assistance not only to other cooperating members, but to any investigator or interested individual seeking information in the marine sciences. The directory is available from the office of the Research Librarian, Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

Introduction to Oceanography. David A. Ross. 474 pages. Available from Prentice-Hall, Englewood Cliffs, NJ 07632, Fourth Edition, ISBN 0-13-491408-2.

This new edition of this popular text adopts a global view of the ocean consistent with environmental issues and advances in technology that have occurred in recent years. Oceanography is explained in a manner understandable for non-scientists. The roles of separate scientific disciplines, including the social sciences.

Instructor's Manual for Introduction to Oceanography. David A. Ross. Available from Prentice-Hall, Englewood Cliffs, NJ 07632.

This instructor's manual was prepared to accompany the new fourth edition of the text described above. The manual draws heavily on Sea Grant materials. It includes a section on tests and testing (on a floppy disk). A set of 88, two-color acetate

transparencies is available to purchasers of 50 or more copies.

Oceanography Reading List for Young Students. 22 pages. Single copies free.

This brochure, compiled by the Office of the Research Librarian of the Woods Hole Oceanographic Institution, lists reading materials in oceanography according to 17 categories.

Oceanography Reading List for Adults. 35 pages. Single copies free.

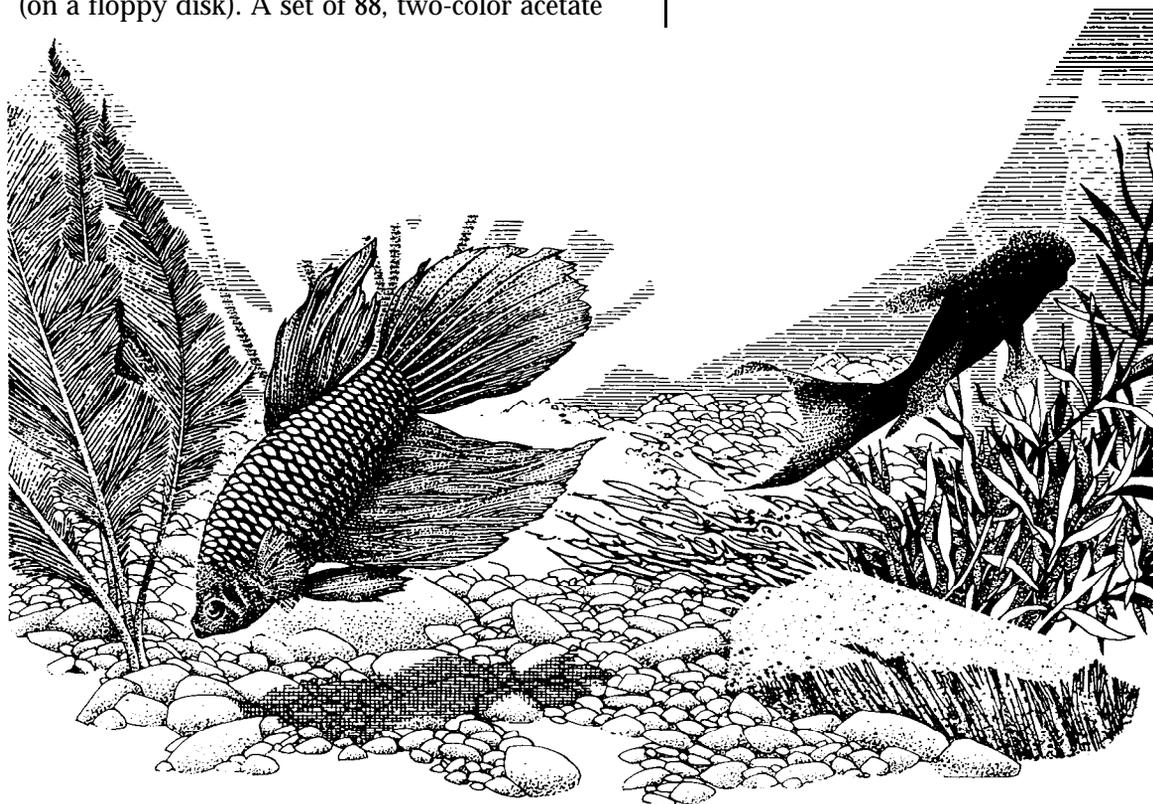
This brochure, compiled by the Office of the Research Librarian of the Woods Hole Oceanographic Institution, lists reading materials according to 22 categories.

Relief Map of the Surface of the Earth. James R. Heirtzler. Single copies free, limited availability.

This 3' x 4' computer-generated, shaded relief map, published by the National Geophysical Data Center, shows depths and elevations of the entire surface of the earth, including oceanic as well as continental areas.

Ordering Instructions: Unless stated otherwise, order from

Sea Grant Program
Woods Hole Oceanographic Institution
Woods Hole, MA 02543



**Single copies free; contact:
Marine Information Service
Sea Grant College Program
Texas A&M University
College Station, TX 77843-4115**

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