

Marine Education

A COOPERATIVE EFFORT OF THE TEXAS A&M UNIVERSITY SEA GRANT COLLEGE PROGRAM AND DEPARTMENT OF EDUCATIONAL CURRICULUM AND INSTRUCTION

Elementary workshop set April 5

Super Ocean Saturday, a one-day, concentrated marine education workshop for elementary teachers is set for Saturday, April 5, 1986, from 9 a.m. until 4 p.m. at Texas A&M University. Activities scheduled for this Sea Grant College Program- and Department of Educational Curriculum and Instruction-sponsored event include a morning-long session demonstrating how the elementary teacher can "marinate" the social studies curriculum, followed by an afternoon of science-related activities. Texas Education Agency approval for six hours of Advanced Academic Training for teacher-participants is pending.

"Sailors, Ships and Stars" is the theme of the social studies agenda. Topics include life of the sailor, sea stories (fairy tales and men, myths and monsters), sea chants, navigational and weather-predicting skills, scrimshaw (the art of scribing on whale teeth), rope making and knot tying, Texas pirates, and buried treasure and mapping skills.

(See Workshop, page 7)

May 11-17 designated National Science Week

A joint resolution has been introduced in Congress designating May 11-17, 1986, as National Science Week. This event was conceived a year ago as a nationwide effort to make Americans more aware of the importance of science in their daily lives. The primary focus of the week is on young people.

The National Science Foundation (NSF) is coordinating the activities, which are expected to include the efforts of thousands of individuals and organizations.

The House Joint Resolution is sponsored by Representatives Don Fuqua (D-FL), Manuel Lujan (R-NM), Doug Walgren (D-PA) and Sherwood Boehlert (R-NY), and requires the co-sponsorship of 218 members of the House for floor action. In the Senate, Joint Resolution 251 was sponsored by Senators Orrin Hatch (R-UT) and Slade Gorton (R-WA).

The joint resolution points out the vital role science and technology plays in improving the quality of life. The resolution also notes that the nation's rate of scientific discovery and technological innovation is growing

more rapidly than ever before, and that our nation's leadership is being increasingly challenged by foreign countries.

While National Science Week '86 is structured to reach many segments of the general public, its primary aim is to communicate with today's young students who will be the scientists, researchers, engineers, teachers and citizens of tomorrow.

NSF is developing and will distribute two different packets of science and technology activities for use by schools throughout the country. An elementary packet, targeted for grades 3 and 4 but adaptable for kindergarten through grade 5, will contain a week's worth of suggested classroom activities that can culminate during National Science Week.

Multidisciplinary in content, the daily activities emphasize integration of science disciplines, and include such topics as weather, food, health, transportation and communication.

The middle and high school packet, designed as a "How to Do It," includes descriptions and demonstra-

(See Science, page 8)

World of Water submissions due May 1

A May 1, 1986, deadline has been set for the third annual National Youth World of Water Awards sponsored by the National Marine Educators Association. This awards program is open to students currently in grades 9 through 12 who are winners in local, state, national or international science fair competitions. Each entry must deal with a topic in marine or aquatic science or engineering.

World of Water Award winners will be invited to Washington, D.C., to participate in a Youth Conference on Marine and Aquatic Science and the

Oceans '86 Conference and Exposition, Sept. 23-25, 1986. Twenty students will be selected for this special recognition by a team of eminent scientists and educators. These students will make poster presentations of their projects at both the Youth Conference and at Oceans '86. The latter is the annual meeting of the Marine Technology Society and the Oceanic Engineering Society of the Institute of Electronics and Electrical Engineers.

These conferences offer an opportunity for student award winners who are recognized for exceptional excel-

lence in marine and aquatic science research to meet with and learn from professional educators and scientists.

Submissions must include:

1. A World of Water entry form, which will include project summary (hypothesis, methodology and results).
2. Certification of an award from science fair officials at which the student received recognition.
3. A photo of the science fair project.
4. For experiments on living ani-

(See Awards, page 7)

James, Zuhn head marine education activities

Dr. Robert K. James, coordinator of Texas A&M University's new Center for Math and Science Education and a faculty member in the Department of Educational Curriculum and Instruction (EdCI), has been named coordinator of marine education activities for the joint project sponsored by EdCI and the Sea Grant College Program. The announcement was made in January by department head Dr. William Peters and by Sea Grant Director Dr. Thomas Bright.

James will be responsible for relating the project to the University's teacher education programs and for leading the planning and development of marine education activities.

James Zuhn, former biology

teacher at LaGrange High School, is now associate coordinator for the project. Zuhn has nine years' experience in science teaching in both elementary and secondary classrooms and in both private and public schools. His experience in curricula and staff development for teachers and in conducting field activities for high school students will be used to develop new project activities.

Former graduate assistant Mary Judd has rejoined the project as a research associate. She will be in charge of developing and implementing teacher workshops, drawing on her background and experience in natural sciences and nature center/museum education.

Port Aransas facilities available this summer

The official university-level summer teaching program has been cancelled at The University of Texas Marine Science Institute at Port Aransas, which means that the marine education visiting class program can continue throughout the summer months. Education coordinator Rick Tinnin said this change means that full dormitory and dining hall services will be available for his program, in addition to research trips aboard the R/V KATY.

"I see this as a unique opportunity to expand the teacher workshop program," Tinnin said. "Although it is difficult to arrange for college credit at this late date, I am sure I can offer Texas Education Agency-approved AAT credit for expanded workshop programs."

Tinnin went on to say he does need some assistance in planning the summer program. Four workshops remain on the spring schedule, one in March for elementary teachers, and two in April and one in May for secondary teachers.

"The March workshop involves

Marine Education (ISSN 0744-0162) is published four times a year (September, December, March, May) by the Sea Grant College Program, Texas A&M University, College Station, Texas 77843-4115. POSTMASTER: Send address changes to *Marine Education*, Sea Grant College Program, Texas A&M University, College Station, Texas, 77843-4115. Second Class postage paid at College Station, Texas.

Marine Education is to inform elementary and secondary teachers about current research and activities in the marine environment. Amy Broussard, editor.

2... *Marine Education*

out-of-state instructors and definitely will be held as scheduled," Tinnin said. "The phytoplankton-zooplankton workshop scheduled for April 11-13 will be held, but the physical-chemical oceanography workshop scheduled April 25-27 will need to be postponed until June. The R/V LONGHORN is in the yard for a major mid-life refit and will not be available then. The seaweeds and seagrasses workshop will be held May 2-4 as scheduled."

Tinnin asked that interested teachers complete the survey form (see

accompanying box) and return it to him as soon as possible.

"I need to make decisions quickly," Tinnin said, "and I value the teachers' input."

Tinnin's workshops are not limited to Texas teachers, and out-of-state teachers are particularly encouraged to participate during the summer months. Survey forms should be returned to Rick Tinnin, Head, Marine Education Services, Marine Science Institute, Port Aransas, Texas 78373. His telephone number is (512) 749-6729.

Summer Workshop Survey

1. I plan to attend the following workshop(s) this spring as scheduled
 March 7-9 April 11-13
 May 2-4
2. I cannot attend the workshops scheduled in the spring, but I would attend if they were rescheduled for the summer.
 Yes No
3. If the workshops are rescheduled for the summer, as the Physical-Chemical Oceanography will be, it would be easier for me to attend if they are held
 Midweek Weekends
4. I would be interested in attending an extended workshop (four days and three nights) that combines two workshop topics, such as Physical-Chemical Oceanography and Barrier Island Geology and Ecology, or Seaweeds and Seagrasses and Phytoplankton and Zooplankton
 Yes No
5. Comments _____

Return this form to:
 Rick Tinnin, Head
 Marine Education Services
 Marine Science Institute
 Port Aransas, Texas 78373

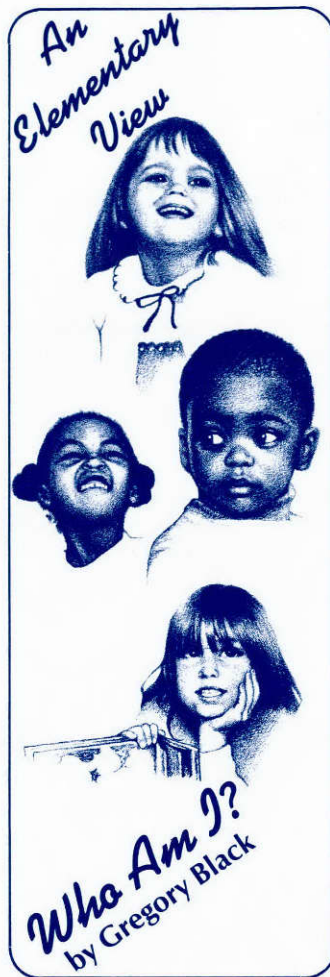
I am a fish that lives in pools along ocean beaches. I creep along, using hundreds of tiny feet on each of my arms. I have five arms—but some members of my family have four, six, seven, eight, twelve or as many as 40 arms!

I breathe through openings called *gills*. These gills are on the upper part of my body. I have no eyes, so I cannot see as other animals do. I use small spots on the ends of each of my arms to find out if I'm heading toward a dark hole or toward the top of an ocean pool.

I like to eat oysters and clams. Since I have no teeth, I open the shells of these animals by squeezing with my strong arms. Then I push my stomach out through my mouth (turning it inside out) and stick it in the opened shells. My stomach has juices that dissolve my meal. See, I really don't need teeth at all!

Some members of my family lay eggs in the ocean water to have babies. Others add new members in an amazing way. A whole new body can grow from just one arm and a little bit of the body. In fact, if a larger fish bites off my arm, a whole new arm grows back.

I am not like most other kinds of fish, am I? Can you guess who I am?



I am a marine animal who lives in the ocean. My name might make you think I come from the Old West. Although I have no teeth, I eat other tiny animals and plants that float in the water. I wrap my tail around brown seaweed called *Sargassum*, and wait for my dinner to come near. The animals have trouble seeing me because I am the same brown color as the seaweed. Bigger fish also have trouble seeing me, which is good, because they might eat me if they find me. All of us—the tiny animals and plants and the bigger fish—belong to the ocean's *food chain*.

When I am about two years old, I will look for another of my kind. Since I am a male, I will search for a female. At this time, I will begin another role. I will become a parent. Most fish lay their eggs in the water, but, in my family, the female places her eggs in a pouch just below my stomach. I will carry these eggs in my pouch for about 25 days or until they are ready to hatch.

What a glorious day! I empty my pouch, and hundreds of new

babies swim away. Some can care for themselves immediately, while others will simply drift away.

I am sure all this seems strange to you, but this is the way I live in my home in the sea. Can you guess who I am?

Tidepool Animals. University of Southern California Sea Grant Program. Institute for Marine and Coastal Studies.

Seahorse. Robert A. Morris and Arnold Lobel, 1972. New York, N.Y.: Harper and Row Publishers.

Marine Animal Mobile

Materials: Colored paper
Scissors
Hole punch
Yarn
White glue

Procedure:

1. Duplicate the coloring page so that each student has a pattern. Glue pictures to colored paper and cut out each animal.
2. Give each student a 4-inch-wide strip of colored paper. Make a small cut in each end of the strip.
3. Fit cut ends of the paper together.
4. Color or decorate the pictures of marine animals.
5. Punch a hole in each marine animal and string with yarn.
6. Punch two holes in the strip of paper and pull yarn through holes and tie together.
7. Balance with paper clips and suspend mobile from the ceiling.

Ideas for the Classroom

Purpose: To introduce marine animals through language arts.

Activities:

1. Read the descriptions aloud while students look at pictures. Have students select the correct answers.
2. Use the words of the song as an oral test to be read or sung while students color the picture. The last verse reinforces the idea that students should put their names on their papers.
3. Complete the Marine Animal Mobile activity.

CHORUS: After 1 and 2

Who Am I?

Words and music by Joyce Martin
Arr. by Henry Berger

In the deep blue sea do you know me what kind of sea crea-ture can I be?

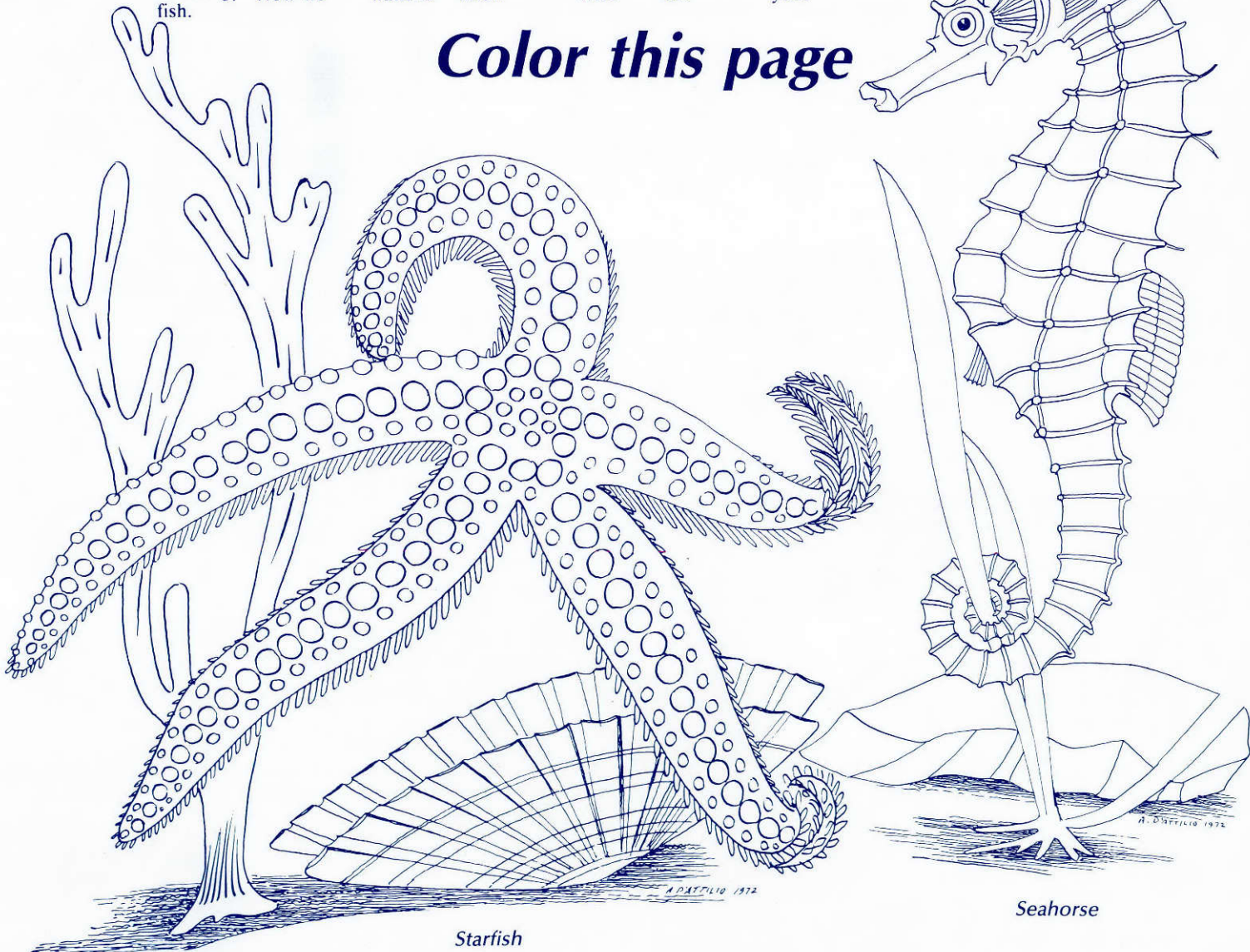
3. In the deep blue sea don't you a-gree There are so ma-ny fish to see

- 1. I've a pony's head and a tail of course Now can you guess I am a sea
- 2. I have five points you can make a wish Now can you guess I am a star
- 3. But we all come from the o-cean blue

Final

horse. 3. Now we want to know Who are you?
fish.

Color this page



Starfish

Seahorse

Marine Facts

Beach represents fragile environment

by James Zuhn

Texas beaches offer more than 350 miles of sun, sea and sand for millions of Texans and even more out-of-state tourists. If the commercial value of the marine transportation and fishing industries is considered along with the tourism revenue, it is easy to see that the coastline and beaches are of great economic importance to Texas. The very attractiveness of the beach, however, can be its own nemesis, and its most attractive features often are the most vulnerable to damage by man or nature. Despite the constant pounding the shoreline receives from wind and waves, it actually is a fragile and tenuous environment.

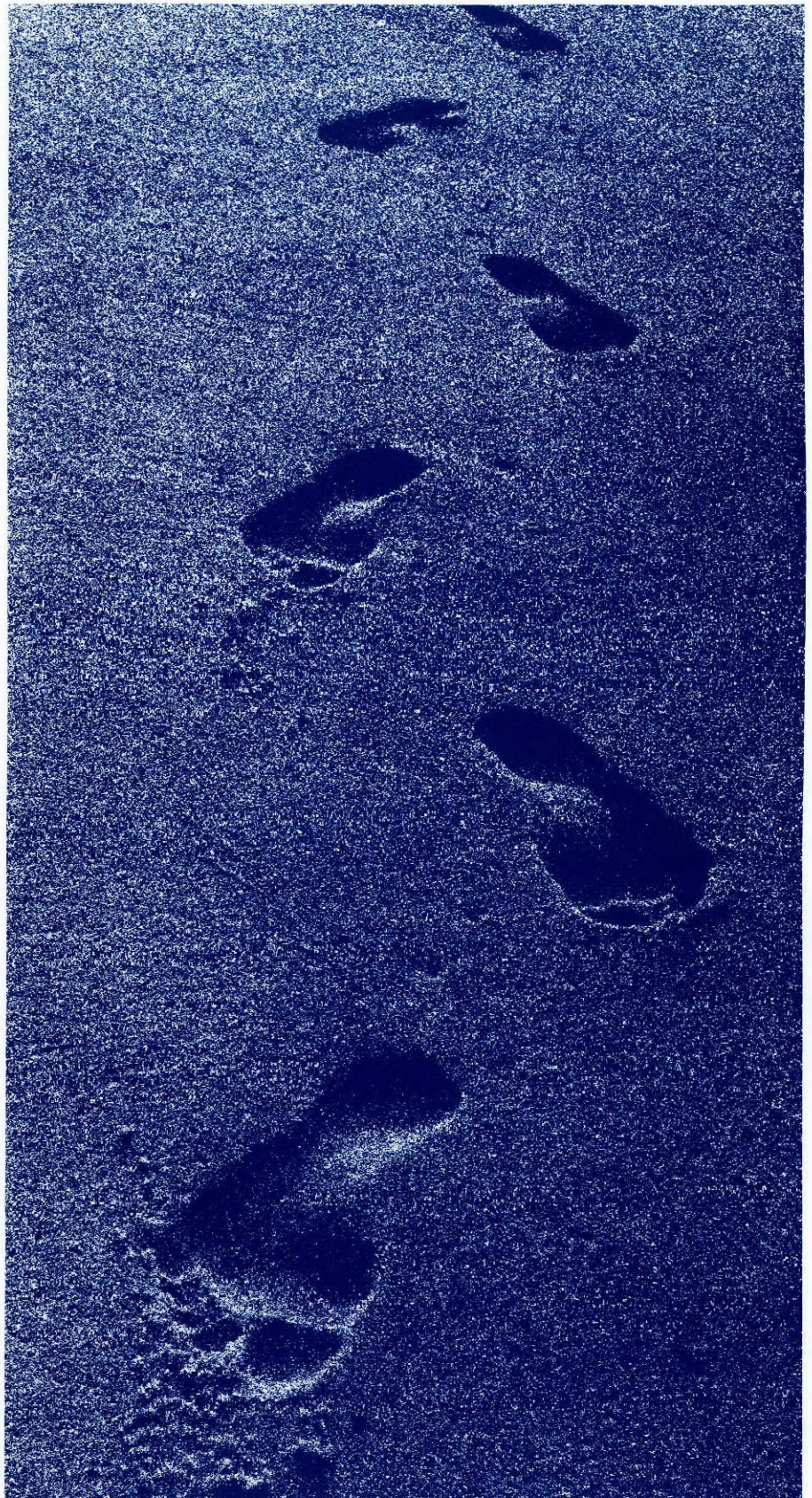
The beach itself is relatively resistant to the combined effects of winds, waves and tides. The long, almost flat expanses of sand are in a stable condition. Winds can blow across wet sands without lifting them and waves can roll across them without carrying them away because the sands lie in a position of little resistance to these forces.

The higher, drier and steeper dunes would soon be eroded by both wind and water if it were not for the pioneer vegetation that holds the sand in place with roots and vines. These mounds of sand, stabilized by vegetation, absorb most of the wind's energy, protecting the inner wetland ecosystems (and estuaries, if the beach is on a barrier island) from the damaging winds and water.

These protected communities have plants on a higher successional scale and are either a beginning of the more terrestrial ecosystems or shield the bay habitats that nurture such young marine animals as shrimp.

When the beach area is viewed in this way, we begin to see the formations serving functions of natural design rather than human convenience. These structures of sand are naturally formed by sand and shell being deposited in one place by the very same forces that eroded those materials from some other location. Knowing that these are natural phenomena, why should we be concerned that the sand removed from one place will be deposited elsewhere?

Hurricane Alicia slammed into the Texas coast at the southern tip of Galveston Island in 1983, with its 115 mile-per-hour winds and 12-foot tides. In one day, more than 100 feet of Galveston's beaches were washed



away in places, leaving trenches more than 5 feet deep where sand once was. Along with the sands went man-made structures—piers, homes and roads were washed away with the beach. The dunes were unable to keep the wrath of the storm away from the once-protected island. The damage done to both natural and man-made environments was immense. Was this simply a display of nature's fury in which some unfortunate people were caught? Obviously, we are not able to subdue or redirect the path of these storms, but are there ways in which we might have interfered with nature to make the beaches less vulnerable to the devastating erosion? Might there also be ways in which we could constructively interfere with nature to protect the shoreline from erosion caused by factors beyond our control?

Other factors that affect beach erosion include wind direction and intensity, ocean currents, sea level or tides, available sediment material, particle size and density, flotsam, the sand's evaporation rate, and the amount and kind of vegetation.

This is a multi-faceted problem; a simplification might be to consider only one use of the shoreline—the recreational use.

Increased use of the beach increases vehicular traffic on the sand; this tends to dry the sand by repeated compression and shifting, and results in more sand being blown by the wind. This can either build up or erode the shore, depending on the direction and intensity of the wind.

Increased vehicular and foot traffic discourages vegetation growth. The dunes' stabilizing plants have long roots and require time to become established. Continuous uprooting or breakage kills the plants faster than they can recover, leaving more dry sand to be blown away or washed away.

Construction activities, either for homes or for roads, frequently affects the dunes, and, prior to enactment of Texas' Open Beaches Act, often meant that the dunes were removed to permit easier access to the water.

While such man-made structures as seawalls or jetties protect cities from high tides by reducing the intensity of wave action, they also may disrupt the flow of sediment material that replenish the beaches.

Essentially, there is an ongoing struggle to determine whether beach usage can continue to benefit a recreational area's economy without destroying that which nature has and continues to provide. Those interested in this struggle need to consider their answers to some perennial problems:

Is it better to remove flotsam from the beaches (including the natural examples of sargassum weed and driftwood and man-made things such as plastic bottles and assorted trash) or leave it to control the return flow of waves and evaporation?

Should oil spills be cleaned by scraping sand from the beach and then dumping it elsewhere?

Should beach access be limited by prohibiting vehicles, charging usage

fees, restricting numbers of users, or by any other means?

Should grasses be planted to start dune development artificially or to replace grasses destroyed by overuse?

Resources

Barrier Islands on the Texas Coast: Existing and Future Recreational Use and Development. Texas A&M University Sea Grant College Program, TAMU-SG-79-203, August 1979.

Hurricanes on the Texas Coast. Texas A&M University Sea Grant College Program, TAMU-SG-75-504.

Texas Shores, Summer 1984. Texas A&M University Sea Grant College Program (quarterly magazine).

Texas Open Beaches Act of 1959 and information on how it was applied in the aftermath of Hurricane Alicia.

Suggested Activities

If you have access to a beach, plan a scavenger hunt to learn what types of refuse can be found along a given stretch of beach. What effects (if any) might these objects have on erosion? Consider all the factors listed above.

While on a beach, walk from the water line toward the land, noting the moisture of the sand, number and types of plants observed, and signs of resulting movement of the sand.

Examine any patch of soil or sand where there is partial vegetation cover. Devise some measurement system for the differences you observe between covered soil and uncovered soil. If possible, try to determine what happens if wind from a fan is blown across both areas, or if water flows across them.

Ideas for the Classroom

Study changing shape of coastline

by Mary K. Judd

A trip to the local library may turn up some interesting old photographs, postcards, nautical charts, geologic survey maps or aerial photographs of coastal regions. If you can locate several of these resources for various time intervals, you may be able to reconstruct the processes of beach building and erosion. The only other materials needed for this activity are tracing paper and colored pencils.

Place the tracing paper over the earliest map, chart or aerial photo that you have. Trace the shore outline. Block in areas of man-made structures. Find at least two points that represent permanent, fixed locations on all maps and charts. Mark these clearly. These locations will serve as

"match up" points for successive maps. After tracing the shore for one year, place the tracing paper on a more recent map. Match the fixed location points, and trace the new shoreline. Label each shoreline with the appropriate date. Again, block in areas of man-made structures. Pay close attention to such structures as seawalls, jetties and groins. Mark these structures clearly. Repeat with maps of successive dates.

Analyze old photographs or postcards. Compare the area's beaches in the old photographs with the present condition. Locate historical accounts of hurricanes and other major storms that affected this coastline. If you live near the coastal region you are studying, local libraries may have Special

Collections that include excellent photo interpretations of major hurricanes. Also check with local historical clubs and museums. History buffs, or grandparents of students, may have collections of old postcards that illustrate beachfronts and other coastal areas. Your community's older citizens who may have experienced major hurricanes are a good resource for a unit on coastal processes.

Describe the changes that have occurred along the shoreline through the years. Which periods of time showed the greatest change? Were these changes associated with natural or man-made structures or events? How did major storms affect the beaches? Try to predict the future of the coastline.

TMEA holds spring meeting in Port Aransas

The Texas Marine Education Association (TMEA) held its spring business meeting and workshop at The University of Texas Marine Science Institute in Port Aransas in February. TMEA president Rick Tinnin reports 51 teachers attended the workshop, with most remaining for the business meeting.

According to Tinnin, members heard a report on NMEA's last annual meeting in Williamsport, Va., and were given registration details for the meeting scheduled in Cleveland in August (see accompanying news item). TMEA members also discussed the idea of dividing the state into membership regions to provide more cohesive assistance for teachers.

All Texas teachers are eligible to join TMEA. The annual dues for state membership is \$4.00; an additional \$18.00 is charged for membership in the National Marine Educators Association. Those interested should contact Rick Tinnin, The University of Texas Marine Science Institute, Port Aransas, Texas 78373.

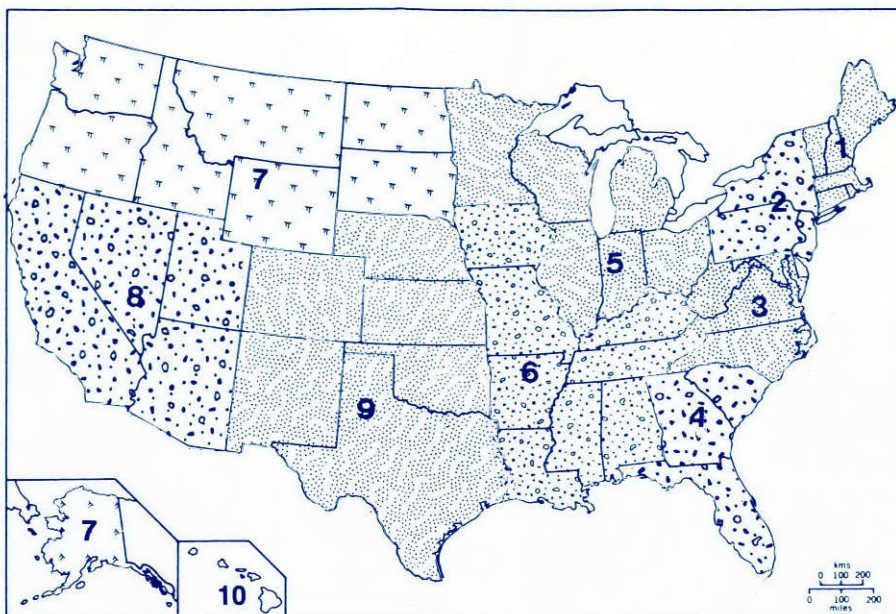
Workshop . . .

(Continued from page 1)

The afternoon session will begin with a hands-on demonstration of setting up and stocking a classroom saltwater aquarium. This will be followed by various experiments involving sea anemones, hermit crabs, fish and other local marine animals. Simulation games and activities that focus on shorebirds, marine mammals and marine plants will complete the activities.

There is a \$7.00 workshop fee, which includes registration, materials and a catered luncheon. In addition to the usual buffet fare, the luncheon will include a selection of seafood delicacies. There also will be a demonstration of shrimp and squid recipes during lunch.

Registrations will be processed on a first-come, first-served basis. Additional information is available by contacting Jim Zuhn or Mary Judd at (409) 845-7969, or by writing the Marine Education Program, Department of Educational Curriculum and Instruction, Texas A&M University, College Station, Texas 77843.



Where to Submit World of Water Entries

Northeast (1)

Peter Burn
c/o Biology Department
Suffolk University
Beacon Hill
Boston, MA 021124

Mid Atlantic Region (North) (2)

Mark K. Masterson
45 Emerson Street
Carteret, N.J. 07008

Mid Atlantic Region (South) (3)

Vicki Clark
School for Math and Science
22401 Hartman Street
Richmond, VA 23223

Southeast Region (4)

Millie Graham
Division of Science Education
University Plaza
Georgia State University
Atlanta, GA 30303

Great Lakes (5)

Susan Leach
1160 Airendel Lane
Columbus, OH 43220

Southern Mississippi Valley (6)

Sharon Walker
Mississippi/Alabama Sea Grant Consortium
Ocean Springs, MS 39564

Northwest (7)

Vicki Osis
Oregon State University Marine Sciences Center
Newport, OR 97365

Southwest (8)

Christopher Dewes
Sea Grant College Program
University of California/Davis
Davis, California 95616

South Central (9)

Rick Tinnin
The University of Texas
Port Aransas, TX 78373

Oceanea (10)

George Curtis
Joint Institute of Marine and Atmospheric Research
1000 Pope Road, Room 312 University of Hawaii
Honolulu, HI 96822

Awards . . .

(Continued from page 1)

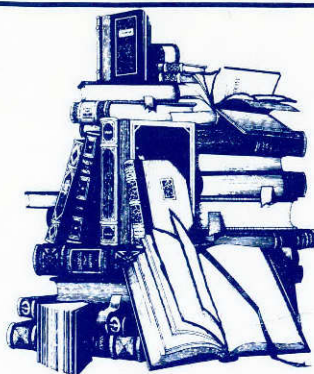
mals, a letter from the supervising teacher must accompany the submission to certify that the experiment was conducted under humane conditions.

For experiments involving anesthetic drugs, pathogenic organisms, ionizing radiation, carcinogens or surgical procedures, a letter from a biomedical scientist

must accompany the submission to certify that the experimenter followed proper procedures.

Submissions are due May 1, 1986, and should be mailed to the regional program coordinator (see box). Entry forms are available from science fair directors or by writing the National Marine Educators Association, P.O. Box 666, Narragansett, R.I. 02882.

books & things



The Ocean: Consider the Connections is a 100-page activity book published recently by the Center for Environmental Education. The book includes a forward by Issac Asimov, and seven chapters on oceanography, ocean animals, marine food chains, ecosystems and humanity's role in conserving ocean life. The book is available for \$4.00 (plus \$2.00 for postage and handling) to the general public, but educators can order it for just the \$2.00 postage and handling fee. Address inquiries to Center for Environmental Education, 624 9th Street N.W., Washington, D.C. 20001.

The December issue of *Marine Education* mentioned Alaska Sea Grant publications. A subsequent letter from that program lists the following publications by grade level and price: *Discovery*, (\$6.50) Kindergarten; *Animals of the Seas and Wetlands*, Grade 1; *Shells and Insects*, (12.50) Grade 2; *Alaska Native Uses of the Sea*, (in process), Grade 3; *Birds*, (in press) Grade 4; *Fish and Fisheries*, (11.50), Grade 5; *Mammals and Marine Issues*, (17.00) Grade 6. Inquiries should be addressed to Alaska Sea Grant College Program, 590 University Avenue, Suite 102, Fairbanks, Alaska 99709.

The annual conference of the National Marine Educators Association will be August 4-9, 1986, at John Carroll University in Cleveland, Ohio. Presentations will cover various aspects of marine and aquatic education, including curricula, programs, research, and cultural and natural history. For registration information, contact Ohio State University, Department of Conferences and Institutes, Fawcett Center for Tomorrow, 2400 Olentangy River Road, Columbus, Ohio 43210, (614) 422-8571.

The Huntsman Marine Laboratory in Brandy Cove, St. Andrews, New Brunswick Canada, is planning a summer marine education institute for teachers. Although preliminary information does not indicate specific dates or if the workshops will be open to teachers other than in Eastern Canada, interested teachers might contact the Laboratory for further details. Write Huntsman Marine Laboratory, Brandy Cove, St. Andrews, New Brunswick, Canada E0G 2X0.

North Texas State University
Libraries, Box 5188
N.T. Station
Denton, TX 76203
TXSH ME A/BC

Science . . .

(Continued from page 1)

tions for groups of students. This packet also is multidisciplinary in scope, and incorporates many of the types of activities already designed by professional societies for use in their Science Olympiads.

Specific information on National Science Week and an order form for the education kits is included in a brochure to be distributed by the National Science Foundation. (*Editor's note—all subscribers to Marine Education will receive a brochure as soon as they are available.*) NSF also will distribute a "how-to" guide with suggestions for ways to participate in National Science Week and a list of other organizations or programs to contact.

The first National Science Week, held in May 1985, involved schools and universities, libraries and museums, professional organizations, businesses, and individuals in all 50 states, plus the territory of Guam. Special exhibits, lectures, student and teacher awards, workshops, research facility open houses, outreach programs and many other activities were planned as part of the Week.

Corporate sponsors for National Science Week include Amoco Foundation, Atlantic Richfield Foundation, The Dow Chemical Company Foundation, DuPont Company, Eastman Kodak Company, the General Electric Foundation and IBM. NSF will maintain close ties with key scientific, professional and civic organizations, such as the State Academies of Sciences and State Science Supervisors, the American Association for the Advancement of Science, the National Science Teachers Association, the Association of Science and Technology Centers, the Triangle Coalition, the National Academy of Science and the U.S. Chamber of Commerce.

Inquiries for more information on National Science Week should be directed to Mary Keeney, National Science Foundation, 1800 G Street, Washington, D.C. 20550, (202) 357-9838.