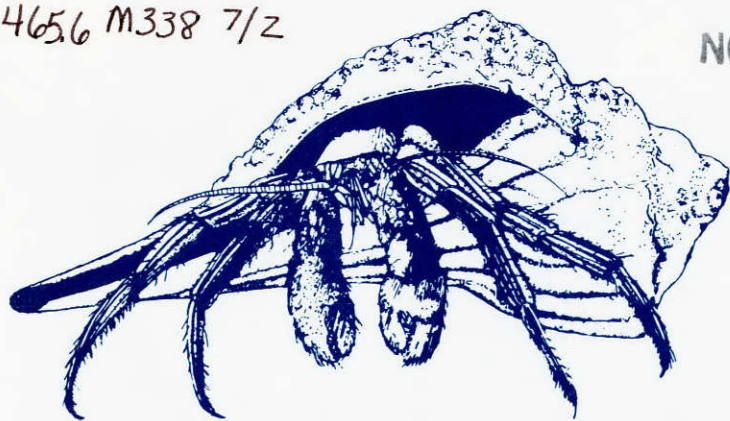


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Marine Education

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

Annual Symposium set for March 7

The Ocean and Issues of Science, Technology and Society is the theme of the eighth annual Marine Education Symposium scheduled for Saturday, March 7, 1987, at Texas A&M University's College Station campus. Morning presentations will focus on what man is learning about the oceans through science and technology, and how man's behavior affects the marine environment.

As in previous years, the Symposium is co-sponsored by the Texas A&M Sea Grant Marine Education Program and the Department of Educational Curriculum and Instruction. It is intended for students in grades 9 through 12, elementary and secondary teachers, and other interested adults.

The full-day event will begin at 9 a.m. with concurrent general sessions, followed by two clusters of seminar sessions featuring presentations on current research in the marine sciences as well as an introduction to some of the more general marine concerns.

Morning presentations will include Dr. Andre Landry, Texas A&M University at Galveston, who will discuss the manned underwater habitat Hydrolab, and Dr. David Owens, from Texas A&M's Department of Biology, whose presentation is entitled, "Man vs. Marine Turtles: Can We Coexist?"

Dr. Gerald North, distinguished professor of meteorology and oceanography and director of the Climate System Research Program at Texas A&M, will

lead a discussion on how the ocean affects the world's climate; biological oceanographer Dr. Douglas Biggs will talk on oceanic zooplankton; and Kari Cobbey will lead an exploration of the commercial uses of marine algae.

Students will be offered a choice of hands-on workshops or tours of various Texas A&M facilities during the afternoon. Teachers will be given the options of attending regular Symposium sessions or a track of presentations and workshops designed specifically for the educator. An application is pending with the Texas Education Agency to provide career ladder credit for teachers for their attendance. Individual teachers must have school district approval of career ladder credit for the Symposium prior to March 7.

The details of the Symposium program are included in a printed program that will be distributed prior to the Christmas holidays. Registration packets will be mailed to all teachers who have attended in previous years, and to those who have requested materials for this year.

Registration is not limited to these schools, however. Individuals, or schools, not receiving a packet can still register by contacting the Marine Education office at (409) 845-7969 or by writing the Marine Education Symposium, Department of Educational Curriculum and Instruction, Texas A&M University, College Station, Texas 77843.

The preregistration deadline is Feb. 6, 1987, and the cost is \$4.00 per person. Registrations received after that date, or at the door, will be \$5.00 each. Career ladder certificates for teachers requesting them will be \$3.00. All registrations are processed on a first-come, first-served basis, and the registration fee is non-refundable.

Summer dates announced for Sea Camp Adventures

Texas A&M University at Galveston is hosting a series of **Sea Camp Adventures** in Summer 1987 for students aged 10 to 12 and 13 to 16. An advanced camp for those aged 14 to 17 is also planned.

The teenaged camps will be June 7 to 13, July 5 to 11 and August 2 to 8, while the camps for younger students will be June 28 to July 4 and July 12 to 18. The advanced camp will be Aug. 2 to 8, and is limited to 20 students. All other camps are limited to 30 students.

Co-sponsored by Texas A&M University at Galveston, Sea-Arama Marineworld and the Texas A&M Sea Grant College Program, **Sea Camp Adventures** provide five days of exploring the Galveston-area marine environment. Using research vessels, oceanographic equipment, laboratory facilities, an oceanarium, an aquarium and

a staff of marine professionals, the camp will enable students to learn about the ocean through first-hand, on-the-water experience.

The camps offer field trips to Galveston Bay and the marsh areas that consist of visits to shoreline study sites, such as marshes, beaches and the bay area where marine organisms, coastal plants and birds can be observed in their natural habitats. Laboratory and classroom programs also are conducted at Texas A&M at Galveston and at Sea-Arama Marineworld.

Because of Sea-Arama's co-sponsorship, both local organisms as well as exotic species from various oceans of the world will be available for observation and study. Sea-Arama also offers behind-the-scenes activities and study programs on training marine

(See *Sea Camp* on page 4)

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Buddies collect 124 tons of debris

Texas beaches finally got a long-awaited overhaul Sept. 20 as more than 2,000 "beach buddies" got themselves out of bed early to lend a hand in cleaning up the Texas coast.

Sponsored by the Center for Environmental Education, the cleanup was the kickoff event of Coast Week '86 and Texas' part of National Beach Cleanup Day. And, "what a success it was,"

Marine biology class meets on weekends

A weekend course for high school marine biology and marine science teachers, **Marine Biology of the Upper Texas Coast**, will be offered during the Spring semester at Texas A&M University at Galveston's Marine Laboratory. The course will stress marine biology concepts and will use the upper Texas coastal biota as examples, particularly those in Galveston Bay and the nearby Gulf of Mexico.

Various physical, geological and chemical characteristics of the marine environment will be discussed, along with the extent to which these factors affect or influence marine organisms. Participants will then be led along a hypothetical transect extending from a river mouth, across a bay and continental shelf and into the abyss. Biological communities and the abiotic factors affecting the biota will be discussed for each type of environment encountered.

According to Graduate Programs Director Dr. Sammy M. Ray, **Marine Biology of the Upper Texas Coast** will be taught each Saturday (See Course on page 8)

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

says Linda Maraniss, CEE's statewide coordinator.

Although a final report is not yet available, Maraniss says 2,772 volunteers showed up to clean the 11 Texas beaches designated for the event. The Brownsville region drew the largest crowd, with 800 volunteers working at Boca Chica and South Padre Island. These beaches were followed by Angleton with 420, Galveston and Bolivar Peninsula, 400 each, Corpus Christi with 300, Bay City with 172, and the Padre Island National Seashore with 100. Port Aransas drew 75 volunteers, while McFadden, the northernmost beach, drew 70, and Port Lavaca, 35.

The coastal area stretched from south Texas in Brownsville up to the Beaumont area and the Louisiana border, and the volunteers faced the task of cleaning 121 miles of beaches.

The volunteers collected 250,000 pounds, or 124 tons, of garbage from 9 a.m. until noon. The beach buddies had filled 7,896 garbage bags donated by Moil Oil Company by the end of the day.

Maraniss says the largest amount of garbage was collected in the Bolivar Peninsula area.

"That area has what we call 'midnight dumpers,'" she says. "They bring their old appliances, refrigerators and couches out to dump on the beach. We ended up needing more trucks and forklifts for the garbage there."

Maraniss says one of the interesting things that occurred was that a number of people noticed the activity as they

drove by in their cars, and stopped to help in the cleanup effort.

Data collected by CEE indicates that plastic bags were the most numerous items found on the beaches. People found rubber gloves, rope, buckets and cigarette lighters along with other types of common garbage.

Garbage wasn't the only thing found, according to Maraniss. Six stranded animals were discovered -- a porpoise, three sea turtles and two birds that had been caught in fishing lines. All were dead.

Foreign garbage also was found scattered along the beaches. There was a milk carton from Germany and another from Holland, but the most common piece of foreign garbage was the Mexican beach bottle. Maraniss says literally thousands of these green, ribbed bottles were found by the volunteers. She theorized these had been discarded off the Mexican coast where they were caught in a strong current and drifted north to Texas.

There also is a chance that the garbage was discarded by foreign ships, Maraniss says. This issue of offshore littering is now the subject of discussion at the state level in Texas.

The State's Land Commissioner, Garry Mauro, is proposing new regulations affecting offshore littering, and also has suggested a statewide "Adopt-a-Beach" program. According to Tom Henderson, an attorney in the Legal Services Division of the General Land Office, the program would be modeled (See *Cleanup*, page 7)

Texas A&M-Galveston plans weekend teacher workshops

The faculty of the Texas A&M Marine Laboratory in Galveston will offer a series of workshops for high school marine biology and marine science teachers beginning in Spring 1987. The day-and-a-half workshops, beginning at 8 a.m. Saturday and ending at noon Sunday, will involve at least 50 percent field or laboratory exercises.

Workshops will include the following subjects, which will be taught at intervals throughout the Spring, Summer and Fall semesters:

Oyster Reef Biology
Sandy Beaches
Rocky Intertidal Biology
Marine Vertebrates
Dune Plants

Marsh Ecology
Zooplankton and Phytoplankton
Algae
Ecology of Marine Benthos
Fish Dissection

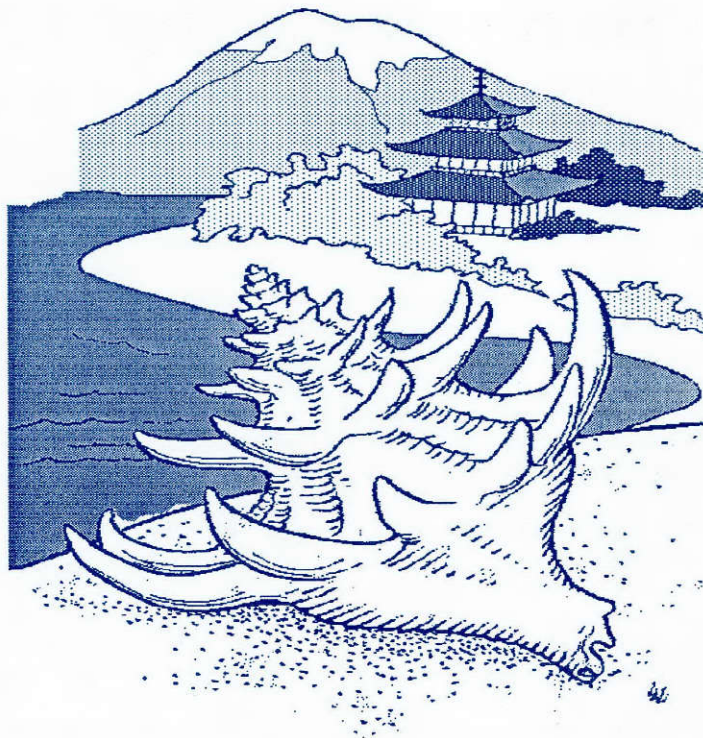
Those interested in receiving further information about these workshops should contact Dr. D.E. Harper Jr., Workshop Coordinator, Texas A&M Marine Laboratory, 5007 Avenue U, Galveston, Tex. 77551.

Marine themes add to reading, art class

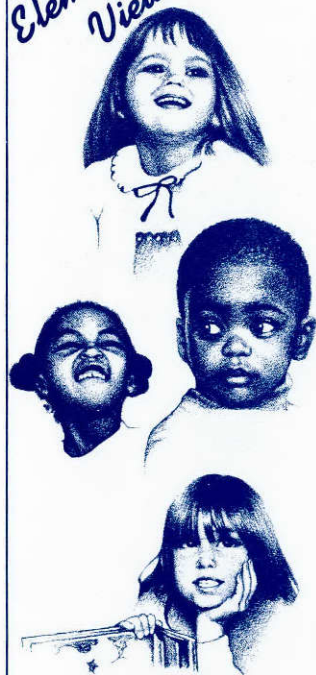
Marine education can be infused into all subject areas in the elementary classroom, particularly in reading and art classes. There are numerous excellent books available today, either in bookstores or in the school or city library, for all student reading levels.

Taro Yashima's **Seashore Story** (Viking Press, 1967, ages 5 and up) is one such book. In the book, Yashima recounts a Japanese legend in which a fisherman, Urashima, saves the life of a sea turtle. In gratitude, the turtle carries Urashima to the bottom of the sea where he lives in a castle more beautiful than he has ever imagined. The day comes when he wants to return to the earth, to his family and the warmth of the sun. When he does, Urashima finds his family and his home long gone, and only the mountain remains the same.

In this excerpt from **Children's Literature--Passage to the Sea** (Norma Bagnall, Texas A&M University Sea Grant College Program, 1980), the author says the colors in Yashima's accompanying illustrations can inspire young artists to explore various art media in their interpretations of seascapes. Two particular art forms that work well with this book are sand painting and wood painting.



An Elementary View



Sand Painting

Materials

Sand in two or more different colors (available from garden centers, nurseries or cement companies)

Paper plates or lightweight cardboard (backs of tablets or shirt cardboards work well)

White glue (mixed half and half with water)

Watercolor brushes

Pencils

Newspapers

Teacher

Cover tables with newspapers to protect the surfaces

Students:

1. Sketch a design on a paper plate or cardboard. Simple designs work best.
2. Brush glue onto one area of the design and cover with one shade of sand. Wait a few minutes, then shake off the excess sand.
3. Continue until you have filled in all areas you want to be that shade of sand.
4. Repeat steps two and three with other colors of sand.
5. Let the picture dry thoroughly before hanging it.

Wood Painting

Materials

Scrap lumber in various sizes

Tempera paints

White glue

Brushes

Teacher

Mix two parts water and one part white glue with dry tempera to help the paint stick to wood and also to give it a slightly glossy finish.

Students:

1. Choose a piece of wood for your painting.
2. Plan your seascape painting.
3. Paint the seascape with the tempera and glue mixture.

A wood painting makes a good paperweight or desk ornament--you might consider giving it to a parent for a special occasion.

NOAA gives \$200,000 grant Mare Nostrum begins film series

The Mare Nostrum Foundation has been awarded a \$200,000 grant by the National Oceanic and Atmospheric Administration (NOAA) to begin production of a nine-part series on man's relationship with the sea entitled "The Blue Revolution." The series, which will air nationwide on the Public Broadcasting System in 1989, will explore the principal uses of the sea throughout history, showing the influence of the sea on civilization and the growing importance of ocean resources to society and the future of mankind.

Luc Cuyvers, President of Mare Nostrum, a non-profit ocean education foundation headquartered in Annapolis, Md., said, "I believe we are now in the midst of a revolution in man's relationship with the sea as the well-being of mankind and the ocean environment become ever more closely linked. NOAA is renowned for providing the basic scientific information about the oceans and atmosphere that is needed to understand and live in harmony with the world's oceans. Since our goal at Mare Nostrum is to improve the public's understanding of the sea, we are delighted with NOAA's support of this project."

The grant was initiated by Senators Ted Stevens (R-Alaska), Lowell P. Weicker, Jr. (R-Conn.) and Warren Rudman (R-N.M.) and is administered by NOAA at the request of Congress. Supporting the appropriation, Sen. Stevens said, "'The Blue Revolution' will highlight man's dependence on the ocean, and go a long way toward increasing understanding and appreciation of the ocean's resources. Through education and thoughtful planning, we will achieve the potential scientific and technological benefits the ocean has to offer, while learning how best to practice careful stewardship."

In addition to the start-up grant, NOAA scientists will serve on technical advisory panels for the production. NOAA will also provide archival film footage and opportunities to conduct research and filming aboard NOAA's fleet of research and survey ships and other facilities from the Atlantic to the Gulf of Alaska and the tropical Pacific Ocean.

Filming for the production will take place on all the world's seas. The series will examine seven major resources and uses of the ocean: fisheries, pharmaceuticals and other nat-

ural products, mineral extraction, ocean energy, marine transportation, ocean waste disposal and defense. Each episode will take an historical perspective by tracing these ocean uses from earliest techniques to modern technologies.

"The Blue Revolution" will consist of nine one-hour segments--The Ocean Planet, Harvest from the Sea, Drugs from the Sea, Quest for Ocean Minerals, Tapping the Ocean's Energy Wealth, The Ocean as a Waste Dump, The Blue Highways, Struggle for the Seas, and The Blue Revolution. Following its PBS release, non-theatrical distribution (for schools, among others) will be handled by the Films Incorporated division of Public Media Incorporated. "The Blue Revolution" will also be developed into a curriculum package integrated with video materials, designed specifically for use by teachers in general science, geography and courses related to ocean studies. Individual programs and accompanying print materials will also be suitable for use in non-science classes in humanities, environmental studies, history, social sciences, and maritime law and policy.

Sea Camp

(Continued from page 1)

mammals and on maintaining marine organisms in captivity, and will present a slide/tape series on the many varieties of fish, invertebrates and marine mammals.

Sea Camp also includes entertainment, as well as trips to local attractions and historical sites.

The cost for each camp is \$450, which includes tuition, room and board and entertainment fees. The advanced camp, which requires some previous marine science experience, will cost \$500.

Those interested in receiving more information should contact Dr. Sammy Ray, Texas A&M University at Galveston, P.O. Box 1675, Galveston, Tex. 77553 (409/740-4525). Registrations are processed on a first-come, first-served basis.

4 ... *Marine Education*

Tinnin reelected TMEA head

Rick Tinnin, educational coordinator at The University of Texas Marine Science Institute in Port Aransas, was reelected president of the Texas Marine Education Association at the organization's annual business meeting held in conjunction with the Conference for the Advancement of Science Teaching (CAST) in College Station.

In addition to Tinnin, new officers include Haidee Anthony, Texas Education Agency Region IV Service Center, as vice president and newsletter editor; Nathan Veatch, South Houston High School, secretary-treasurer; and Jack Clausen, Galveston College, chapter representative to the National Marine Education Association.

Tinnin also is president-elect of NMEA, and will assume office at the August 1987 meeting at the University of Rhode Island.

During the business meeting, TMEA

members considered adopting a new logo using the endangered Kemp's ridley sea turtle, and asked that sample shirts and letterhead be available at the Spring conference.

The Spring meeting will be in Port Aransas Feb. 7 through 8, 1987, with a AAT-credit workshop scheduled for Saturday, Feb. 7, and a business meeting to follow the morning of Feb. 8.

Tinnin said preparations are underway for a joint regional National Science Teachers Association-CAST meeting in San Antonio in November 1987. Those interested in conducting workshops should submit topics to Tinnin by Jan. 15, 1987. Ten TMEA members presented workshops at the 1986 meeting, including Judy Bishop, Caroline Beller, Mary Judd, Vi Lien, Nancy Ramos, Marla Stone, Nathan Veatch, Carol Weston, Jim Zuhn and Tinnin.

Marine Facts

Shrimp are good lab specimens

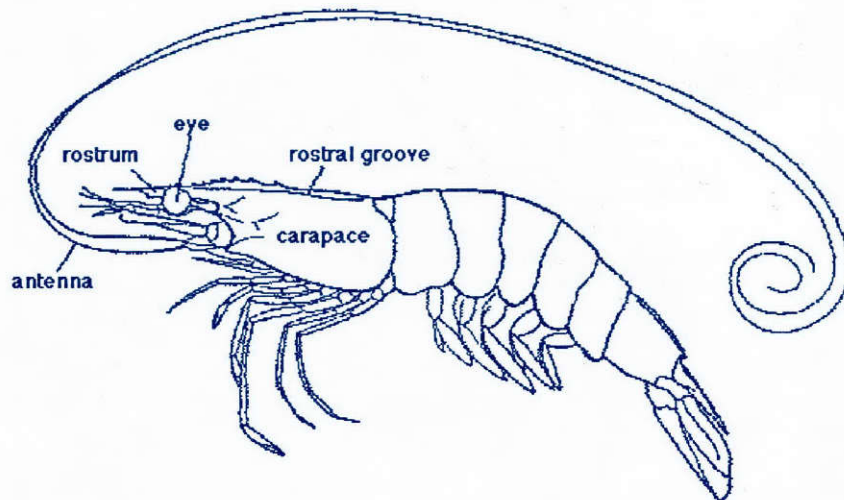
by Randy Cooper
and Gil Naizer*

The highly popular shrimp, still considered a food delicacy by some, is often ignored away from the dinner table. Shrimp are members of the largest group of animals, Phylum Arthropoda, and share close ties with other crustaceans (crabs, lobsters and crayfish). Many biology courses include a detailed study and/or dissection of a crayfish to represent major characteristics shared by all crustaceans and arthropods.

The most abundant species in Texas' coastal waters, *Penaeus aztecus* (brown shrimp) and *P. setiferus* (white shrimp), can offer teachers a living laboratory specimen adaptable to all levels of learning. These species, only two of the many found in the Gulf of Mexico, have the greatest commercial value in Texas.

Brown and white shrimp share similarities, but can be easily identified by their rostrums and activity periods. Color is not a good identifying characteristic, since shrimp may vary their pigments to blend with their surroundings. Brown shrimp have visible grooves running lengthwise along their rostrum (horn-like projection between their eyes), while white shrimp lack these grooves. A simple test of running a fingernail along the rostrum and noting the presence or absence of this groove helps distinguish the species. Keep in mind that while this test works well in the field, it is not 100 percent accurate. White shrimp are most active during daylight hours, while browns burrow in the sand and await nightfall. Most commercial Gulf trawlers fish for brown shrimp at night, while most white shrimp are harvested during the day by bay fishermen.

The life histories of these shrimp are complex, although both follow the same general pattern. Adults spawn offshore in the Gulf of Mexico, with each female releasing between 500,000 to 1,000,000 eggs. Those eggs that are not consumed by predatory plankton hatch within 24 hours. The larval shrimp migrate into the bays



and estuaries with the help of tides and currents, seeking protection in the marshes. These important nursery areas provide food and cover for the postlarval shrimp during the crucial development into the juvenile stage.

Young adults then leave the nurseries to begin the migration through the bays and estuaries to the offshore breeding grounds. These cyclic migrations determine not only the locations for commercial shrimping, but also opportune times for classroom collecting. Late summer or early fall is a particularly good time to collect larger shrimp along the Texas coast.

Shrimp are easily collected in marshes, sloughs, bayous and tidal flats with a wide variety of equipment, such as small seines, cast nets, dip nets or push nets. Shrimping regulations vary with location, season and equipment. Consult the Texas Parks and Wildlife Department for restrictions. If it is not possible to collect the shrimp, live shrimp are usually available from bait shops at a reasonable cost.

A large container and an aerator are required to transport shrimp back to the classroom. Ice coolers or 5-gallon buckets are practical alternatives. The key factor in transporting live organisms is water temperature; cool water holds more dissolved oxygen and will slow the animal's metabolism. Add ice to the container if necessary. It is best to collect specimens and return to school in the same day, as the shrimp should be placed in a well-aerated, con-

ditioned saltwater aquarium as soon as possible.

Shrimp kept in an aquarium must be fed to prevent cannibalism. With sufficient food, as many as 30 to 40 shrimp can be kept in a 10-gallon aquarium, but they will do better in a larger tank. Shrimp can be fed a variety of things, such as brine shrimp, worms, small fish or plant material, and will even do well on dried cat food (particularly the "fish-flavored" variety).

Shrimp can be an important classroom resource, since most student will have eaten or seen cooked shrimp but few will have observed live shrimp in an aquarium. Once established in the classroom, shrimp provide many learning opportunities. Living specimens used in laboratory exercises give students an opportunity to observe the shrimp in its habitat, an opportunity not available with dissections of preserved specimens.

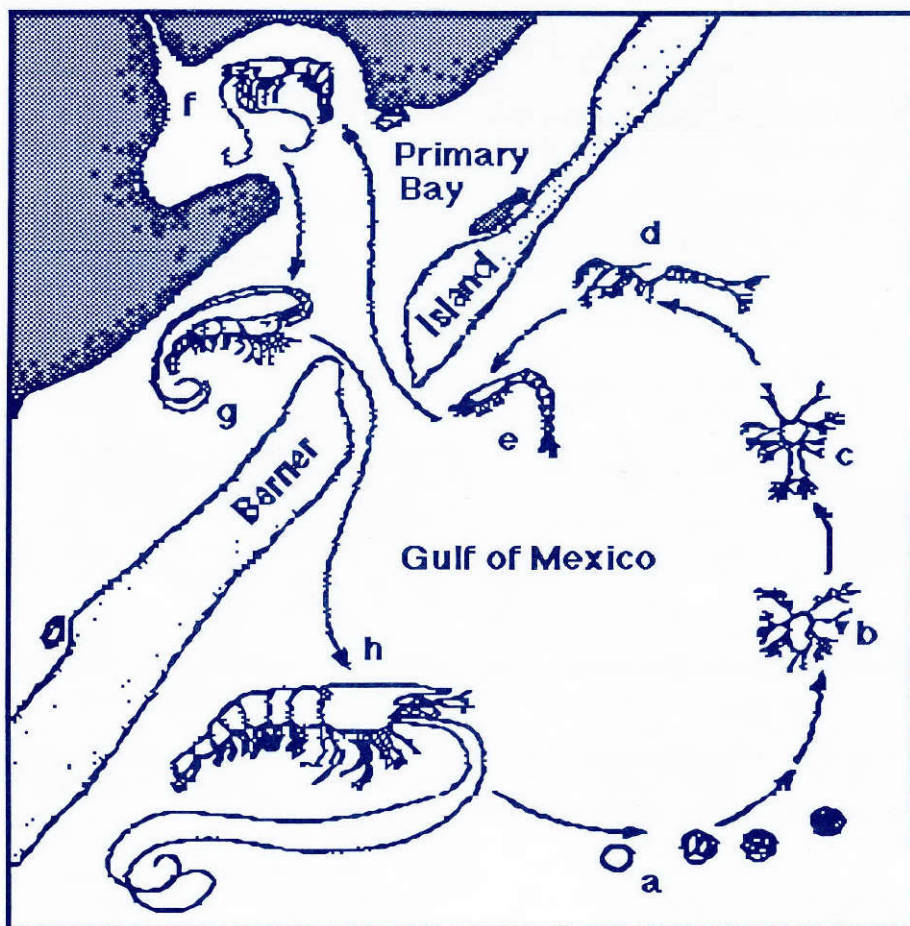
(Teachers located on the Gulf or Hawaiian coasts might check into nearby shrimp mariculture facilities. Field trips to operations such as The Texas A&M University System Shrimp Mariculture Project near Corpus Christi can stimulate additional interest in this often overlooked crustacean.

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(Continued on next page)

*Graduate Assistants, Sea Grant Marine Education Program, Texas A&M University



During virtually every month of the year, some form of adult marine life--fish, shrimp or crab--is migrating from the shallow bays and lagoons through channels and barrier islands into the shallow Gulf shelf to spawn either offshore or in the mouth of the channel. The native Gulf white shrimp, *Penaeus setiferus*, is a typical example.

After hatching from an egg, shrimp begin life offshore as larvae (stages a through d). Being poor swimmers, they are carried by tides and currents through passes into shallow bays and lagoons (e). As postlarvae (f), they take up residence in the rich nursery grounds. Shrimp are omnivorous bottom feeders, and their food consists of algae, molluscs, marine worms and small crustaceans. *P. setiferus* reach adult size after nearly a year in the sheltered bays (g), and begin their annual spring migration back to the open Gulf, using channels and passes through the barrier islands (h). Adult shrimp feed on organic material that they find in the surface layer of offshore sediments. This organic material, called detritus, is made up of rotting vegetation swept out of bays by tides. It also includes remains of other marine plants and animals that have a role in the marine food chain.

(Reprinted from *Marine Education: A Seagoing Educational Experience* by Richard K. Tinnin, TAMU-SG-83-401, 1982, pp. 9-10.)

Shrimp . . .

(Continued from page 5)
and Wildlife Department, Bulletin 50, pp. 39.

Resources

For field trips to the Shrimp Mariculture Facility near Corpus Christi, contact Dr. Addison Lawrence, The Texas A&M University System Shrimp Mariculture Project, 4301 Waldrone Rd., Corpus Christi, Tex., 78418, (512) 749-6748.

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Ideas for the Classroom

Substituting shrimp in labs

1. Substitute live shrimp for crayfish (shrimp don't pinch) in dissection or other activities. The external features are very similar, and comparative studies develop keen observational skills in students.
2. Study internal organs and systems in shrimp. The shell is transparent and many internal organs can be identified in live specimens. Food can be seen passing through the digestive tract easily.
3. Observe the feeding process closely, allowing students to see how shrimp, like crayfish, gather, hold and eat food. Mandibles, maxillae and maxillipedes are easier to understand if students can see them in operation.
4. The molting process includes many opportunities for activities, such as the shrimp's behavior during molt, and long-term growth rate projects. For the latter, molts can be preserved to retain a permanent growth record.
5. Cannibalism, a somewhat rare occurrence in other species, can be observed in shrimp, especially in crowded conditions.
6. Observe the burrowing activity. What factors (light, time of day, type of substrate) determine when shrimp burrow into the substrate?

Other Activities

1. **Development of Research Skills:** Students should be encouraged to ask a question, and then design an experiment to test that question.
2. **Care and Maintenance of Aquaria:** Students should learn basic operations of aquaria, including daily upkeep and record-taking (salinity, oxygen, temperature). Give students an opportunity to care for animals in the lab and realize limitations of animals in captivity.
3. **Field Trip Collecting:** Students can learn and have fun in a day spent collecting shrimp at the coast. Field trips develop skills not realized in the classroom.

Mammal Stranding Network prepares for busy months

by Jeanne Isenberg

Texans are breathing sighs of relief as the state finally escapes its ever-present "summer" heat, but the winter months can be rough times for dolphins, porpoises and whales along the Texas Gulf Coast, and busy times for the Texas Marine Mammal Stranding Network.

Dr. Raymond Tarpley, Network director, says the colder months, generally those from October through March or April, have historically brought with them a greater number of beached marine mammals (cetaceans).

"We're not sure why, but strandings do increase seasonally, and that has held true for the six years (of the Network's operation)," Tarpley says. "It could be the drop in water temperature, it could be just another stress piggy-backing on the mammal."

Already in 1986, 118 cetaceans have beached. Tarpley says that figure is nearly double the total number of beachings for 1985. And as there have been 366 total strandings during the Network's six years, more than one-third of the strandings have taken place in 1986 alone.

While the reasons for strandings are not always clear, research has shown that beached cetaceans often suffer from sickness, parasites, stomach obstructions, trauma or other health problems that may have forced the mammal to beach.

Another theory for strandings is the possibility of navigational errors on the part of the cetacean. Because a number of live cetacean strandings are offshore species, Tarpley says a mammal

may simply have followed a food source or current too close to shore and, being unfamiliar with the territory, it gets caught in the current or on a sandbar and eventually drifts in to shore.

"Offshore species are the least explored of these animals, and any time we find them alive is pretty unique," he says. "Most strandings, however, are in really bad shape and unless they're alive, it's tough to determine why they stranded. Live strandings yield the maximum data."

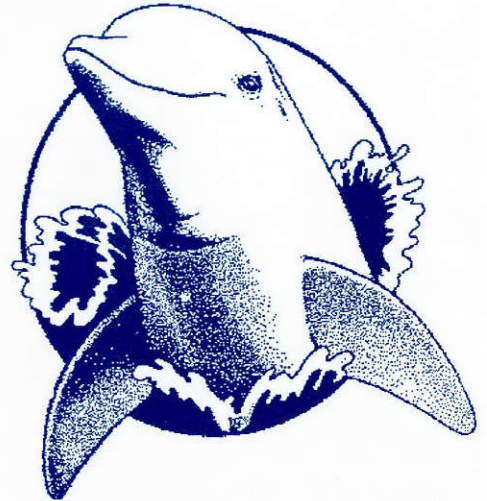
Only 8 percent of the strandings the Network has handled have been alive, and only one cetacean has been released back into the wild, Tarpley says.

But whether an animal strands alive or is found dead, it is an important source for research and education, he says.

"The bottom-line goal is to squeeze as much data as we can from each animal," he says. "We try to use a resource (the cetacean) to generate data we otherwise couldn't get. We utilize these animals that come up on the beach, whether they come up alive, or come up dead, as most of them are."

Tarpley and his associates have been trying to spread word about the Stranding Network, which has seven regional offices from Sabine Pass to Port Aransas, so the public will know who to contact when a stranded cetacean is found.

"The public is important because these are the people who find the animals," Tarpley says. "Response has



been getting better and better for the Network. Dolphins and whales are pretty big animals. It's not like finding a shell or something, and people want to do something about it."

The important thing to remember if a stranded cetacean is alive when found is to keep people and animals away from it and to administer first aid until a Network representative arrives.

Tarpley says after first calling the Network, the finder should keep the mammal washed down and cool because stranded cetaceans tend to overheat. Keep the water away from the mammal's blowhole.

The animal should not be put back into the water, for it probably will strand again. Sunscreen should be applied to keep the animal's skin from drying out.

Above all, Tarpley says people should realize that these mammals are protected from harassment by the federal Marine Mammal Protection Act of 1972.

Cleanup

(Continued from page 2)

after the "Adopt-a-Highway" program that has proven successful in Texas. It would entail an effort of Land Office personnel as well as private and independent companies and civic groups to deal with garbage washing ashore from the Gulf.

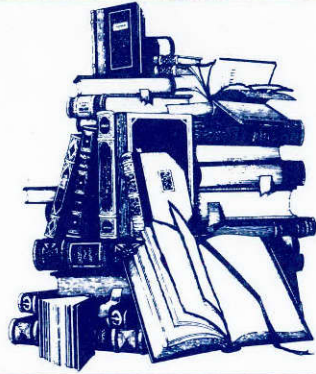
Each group will "adopt" a certain beach or segment of beach. Hender-

son says the Land Office is in the process of appointing a task force to devise guidelines on how frequently the beach or segment of beach should be cleaned, how long the stretch of beach should be, and other standards.

Henderson and Mauro met with U.S. Department of Agriculture officials in November to discuss rules and regulations that specify the types of garbage that can be brought into the United States and the existing methods for

disposal of this garbage. Mauro recently implemented new statewide disposal regulations, which, in simplified terms, says any type of solid waste, particularly nonbiodegradable items, cannot be discarded from offshore oil or gas platforms or seismic vessels. Violators are subject to penalties that include loss of government leases for platform operators and loss of leases to operate vessels or conduct seismic activities.

books



& things

Seven teachers from H.B. Zachry Middle School in San Antonio, Tex., have used marine science to help students look for math in nature. Funded by a grant from General Telephone and Electronics (GTE), Judith Fowles, a science teacher, and Jonnie Patranello, a math teacher, organized additional math and science teachers to develop new ways to use marine science concepts to develop spatial visualization in their students.

The group used such varied materials as topographic maps, aquaria, microscopes and living resources to develop three-dimensional representations of marine and estuarine ecosystems, cell structures and habitats. Marine invertebrates are being used in the classroom to discover geometric patterns in living organisms, and sea shells will be used to organize information according to mathematical patterns.

Texas A&M University at Galveston recently announced a variety of tours and field trips for school groups that are organized under the auspices of the Department of Marine Biology. A walking marine biology field trip enables students to visit various marine and estuarine environments, as well as to collect samples. These trips are scheduled year-round, weather permitting, and one graduate student guide is provided for each 15 to 20 persons. The cost is \$35 per graduate student; contact Jeannie Hamilton, Marine Biology, Texas A&M University at Galveston, P.O. Box 1675, Galveston, Tex., 77553 (409/740-4531) for further details or reservations.

Hamilton also is the contact person for a field trip aboard a research vessel, and tours of the National Marine Fisheries Service Turtle Hatchery and of the Marine Biology laboratories.

The field trip includes a four-hour trip
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aboard the ROAMIN EMPIRE to collect in the Galveston Bay area or in the open ocean. The ecological balance of the area is discussed and exhibited by collecting. The ROAMIN EMPIRE is a 44-foot converted yacht that is used for sampling and biological experimentation. It can accommodate up to 22 people, plus the graduate student guide. The cost is \$35 for the guide and \$15 per hour plus fuel for the vessel.

The NMFS hatchery is open to visitors from 8 a.m. until 4:30 p.m., Monday through Saturday, from July through May. The hatchery consists of Kemp's ridley sea turtles raised from hatchlings (in July) to those ready for release to nature (in May). An accompanying slide presentation details the effort underway to preserve this endangered species. The tour is free, although groups may be limited in size.

Tours of the Marine Biology laboratories can be arranged at virtually any time at the Fort Crockett campus without charge.

One additional tour that can be arranged without charge is of the 473-foot T/S TEXAS CLIPPER, the training ship of Texas A&M at Galveston's Maritime Service licensing program. The CLIPPER was built in 1944 for the U.S. Navy and later converted into a cruise liner for American Export Lines. It has served as a training ship for the University's Corps of Cadets since 1965.

TEXAS CLIPPER tours should be scheduled through John Merritt, Uni-

versity Information Office, P.O. Box 1675, Galveston, Tex., 77553 (409-740-4559).

The award-winning Mr. and Mrs. Fish marine education program is returning to Texas with an all-new show that includes sea turtles, jellyfish and organisms native to the Texas coast. Texas Marine Education Association president Rick Tinnin says tentative plans call for Mr. and Mrs. Fish (otherwise known as Jeff Sandler and Deb Hall) to be available the week of February 16 through 19 in the Houston, Austin and San Antonio areas.

Tinnin plans an elementary teachers workshop at The University of Texas Marine Science Workshop in Port Aransas the weekend of Feb. 28 and 29, and encourages anyone interested in attending or in booking Mr. and Mrs. Fish for separate appearances to contact him at 512/749-6729.

Course . . .

(Continued from page 2)
during the Spring semester and during at least one summer session. Participants will receive four hours' graduate credit from the Department of Biology at Texas A&M University upon completion of the course.

Further information is available by contacting Dr. Ray at Texas A&M Marine Laboratory, 5007 Avenue U, Galveston, Texas 77551.

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