

Catalysts

• This feature will be appearing in the journal as often as a set of suitable articles are received. Its purpose is to present ideas that might *catalyze* the development of similar activities by readers.—*Editor*

MARINE FIELD STUDY ON THE HIGH SCHOOL LEVEL

The value of studying marine science has been increasingly emphasized by educators on all levels in recent years. In the near future, the oceans will be regarded as a valuable source of food, water, and various chemical substances. While Rhode Island may be one of the smallest states in the Union, it is blessed with many miles of relatively unadulterated coastline. Warwick and Cranston are communities with extensive shoreline; it is natural then that their school systems should be interested in incorporating marine-related environmental education into their curricula.

Three locally renowned high school science teachers, Julius Breit, Maurice Blais, and Ernest Slocum, envisioned a program that would be entirely field- and laboratory-oriented to maximize the hands-on approach to science education. Several schools around the country provide their students with a one-day trip on local oceanographic vessels as an extracurricular activity. The Rhode Island educators expanded this concept in their vision to include oceanographically-equipped boats owned by their school systems. The vision became a reality when their concept was brought to the attention of the administrators of Title III ESEA of 1965, who promptly authorized funding. Thus, the Marine and Environmental Studies Program, which focuses on the state's greatest natural resource, Narragansett Bay, began in the high schools of Warwick and Cranston in September 1973.

The program offers full college and graduation credit, with a prerequisite of biology. In groups of seven, approximately 63 students from each community participate weekly in the program for three hours at a time. Because a one-hour block of time would not be appropriate in a program of this nature, the student must miss three hours of other classes. In this regard the course represents an additional course above and beyond the student's normal load.

Each community has a 19-foot Boston whaler, equipped with a depth sounder, stern or gunwale-oriented demountable davit, compensated compass, and VHF ship-to-shore radio. In addition, a twelve-passenger bus in each community provides students with easy access to shore and inland sites, most of which are only 10-15 minutes away. Classrooms at Toll Gate High School and Cranston High School East have been set aside for exclusive use of the project so that when weather conditions prohibit on-site activity, lab-

oratory experiments can be conducted at the on-shore lab site. These labs also house an extensive number of marine aquaria that are established and cared for by the students.

Experts in various marine science areas were consulted and an interdisciplinary course of study that is primarily field-oriented and secondarily laboratory-oriented was assembled. The following are some of the topics of investigation that are covered, each during one three-hour block of time unless otherwise noted:

1. Familiarization with use of an otter trawl (1/4 scale), which is used extensively for deep-water collecting (see fig.).
2. Nekton.
3. Fish tagging.
4. Benthos.
5. Plankton.
6. Salt marshes.
7. Rocky tide pools.
8. Mollusks and marine worms.
9. Water pollution (3 time blocks, 2 for chemical pollution, 1 for bacteriological pollution).
10. Dune and barrier beach study.
11. Navigation (2 time blocks).
12. Tide and current study.
13. Marine algae study.
14. Political investigations (including trips to the Rhode Island General Assembly and visits to sessions of the Coastal Resources Management Council, which is designed to insure ecological use of all coastal lands).



Students examine the contents of an otter trawl, which typically include sponge, mantis shrimp, horseshoe crabs, squid, starfish, lobster, shellfish, flounder, and many other kinds of crab and fish. The trawl has proven indispensable as a means of obtaining a tremendous variety of hard-to-get specimens. After using the net, students gain great appreciation for the productivity of the bay. (*Providence Journal-Bulletin* photo, reprinted with permission.)

15. Economic investigations (including visits to Point Judith Fisherman's Cooperative, a wholesale packing and fillet concern, and visits to the state's hatchery).

16. Familiarization with local educational institutions, principally the University of Rhode Island's School of Oceanography.

17. Familiarization with state agencies including labs of the Rhode Island Department of Health and the Rhode Island Department of Natural Resources).

18. Marine geology.

19. Study of the spring herring run.

20. Visit to the New England Aquarium in Boston.

21. Seining.

It is evident from the topics of investigation that the physical boundaries of the classroom have been extended to include the resources of the community and the state.

All through the second semester, students work on a project of their choosing. This project does not culminate in a term paper; rather it is designed to involve the students physically as well as mentally. Typical topics are an amateur's photographic guide to tide pools, the effects of sulfide on mummichog, potential oyster farming sites in Rhode Island, the learning ability of the green crab in a maze, and a slide presentation on the shellfishing industry in Rhode Island. All program equipment is made available to the students; much program time is devoted to the projects, as, for example, when a student requires access to shore and bay sites or needs to interview a politician.

Program personnel have conducted two workshops on marine science to date; more are planned for the future. The first, held in the fall of 1973, was aimed at introducing the program and its concepts to nonscience high school faculty. Because students in our program must miss classes in other disciplines, we wanted to stress the importance of what the students were doing with the time spent in the field. The involvement and advice of teachers in the social sciences is also of great help in promoting the interdisciplinary aspects of the project. Funds are presently available to provide substitute teachers for those members of the faculty who wish to accompany us on a particular field trip for which their specialty would mesh with program objectives. The second workshop, held in the spring of 1974, was designed to provide training in marine studies to those science teachers in the state who wished to adapt all or some of our activities to their own science programs. This highly successful workshop will be offered again this spring. We are also receiving requests to travel to other areas in the state and actually provide field instruction for students from other communities. This is being handled by using students currently in the program who have already mastered particular field techniques as instructors, with program teachers acting as "consultants." Whenever possible, the requesting communities' own marine resources (for example, a marsh) are studied. On several occasions, we have received requests from out-of-state teachers for advice on how to establish similar programs in their communities, and for curriculum, supply, equip-

ment, and textbook recommendations. In addition to being available for consultation with other communities, we have for distribution a 150-page lab manual and a brochure, and we are currently building a library of half-inch videotapes on field techniques that we will either loan or copy on request.

The interest shown in the project by Rhode Island communities as well as those communities outside the state demonstrates the awareness on the part of educators of the need to protect our valuable ocean and shore environments before it is too late. We believe our program is a positive step in that direction.

David M. Whitaker
Toll Gate High School
575 Centerville Rd.
Warwick, R. I. 02886

A SCIENCE-SOCIAL STUDIES CAMPING COURSE

Students couldn't wait for the course to begin! When it was over they wished it weren't. A teacher's dream? Yes, but the dream became reality last summer when the Rock Island (Ill.) school system combined science and social studies to provide an unusual three-week camping course for students in grades 9-12. In "River Communities—Past and Present" students were involved in geological history, natural history, and the history of man. Traveling in two rented station-wagons with a junior high school social studies teacher and a high school biology teacher, students learned as they traveled and camped in some of the significant areas of the state.

The three-week program was set up in four-day time blocks, with each week's program running Monday through Thursday. With a three-day weekend, both students and instructors had sufficient time to replenish supplies and prepare for the week ahead. During the first week, in the local area, studies were carried on from 8:00 A.M. until 5:00 P.M., and students carried sack lunches. Monday, Tuesday, and Wednesday nights of the following two weeks the group slept in tents at private and state camping areas. Students were responsible for all the cooking, dishwashing, pitching tents, campground cleanup, and so on. Included in the last week's menu were roasted cattails and boiled milkweed flower buds covered with butter.

An effective field program should make use of resource people. During the first week when students were studying the geology, natural history, and history of Indians and early white settlers, a local expert took the class through an original prairie that will be destroyed in a few years for commercial use. The prairie expert also took the class to a transplant prairie where plugs of the original prairie grass have begun to take hold. The effects of the prairie on man and man's effects on the prairie became a very real thing to the students as they walked through it and learned about it first-hand.

During that first week the class went to an early Swedish settlement not far from home. A native of that community was with us to aid our study of its his-