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RHODE ISLAND

MARINE EDUCATION CONFERENCE

November 4, 1983

"Marine Education - A Tool For National Science Literacy"

A SUMMARY REPORT

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## CONFERENCE AGENDA

### Introduction

Prentice K. Stout, Conference Coordinator, Marine Education Specialist, University of Rhode Island Sea Grant Program.

### Welcome

Governor J. Joseph Garrahy

### Opening Remarks

Mr. Walter J. Gray, Assistant Provost for Marine Programs, University of Rhode Island.

### Keynote Address: Marine Education - A Tool for Science Literacy

Dr. Les Picker, Assistant Professor, College of Education, University of Delaware.

### The Role of Marine Education in Today's High School Science Curriculum: A Panel Discussion

#### Panelists:

- o Dr. William Holland, Superintendent, Narragansett School Department
- o Dr. Theodore M. Kellogg, Associate Professor, Department of Education
- o Dr. Joseph Tausta, Chairman, Chemistry Department, North County Union High School, Newport, Vermont.

Moderator: Prentice K. Stout

### Identifying the Scope of Marine Education as An Interdisciplinary Tool In Science Education: Three Discussion Groups Composed of Attendees

### Luncheon

### Establishing a Plan for Marine Science Education: Three Discussion Groups Composed of Attendees

### Plenary Session

Moderator: Prentice K. Stout

### Recapitulation

Prentice K. Stout

## PROCEEDINGS

Prentice Stout: Good morning ladies and gentlemen. Welcome to this conference on marine education. We are about 60 people strong here this morning, representing school administrators, teachers and professors of science education and interested people in general. The roster of participants in this morning's conference is impressive. Your presence here is a testament to your interest in furthering the cause of marine science as a tool for increasing science education in today's school systems. Much has been written and probably more will be said on the lack of proper science and mathematical skills in our public schools. The National Commission on Excellence in Education has issued strong words: "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today we might well view it as an act of war."

Perhaps those words are overstated, but your presence here shows that you are interested in what we are trying to do. The Commission's report, as you know, is contained in a document entitled, "A Nation at Risk." It is a powerful document, and I recommend it to you. We are here today to seek ways in which one small segment of science education, namely that of marine studies, might be found to be a useful tool to the traditional science teachings of our schools. The Sea Grant Marine Advisory Service at URI has long been a leader in the field of marine education, and what we hope to achieve here today is to present to this state and the nation a series of ideas and concepts of just how marine science can best be utilized by educators. Using the curriculum guides that have been created by the Sea Grant people and by others dedicated to marine education we can assist these people. The format of this conference involves you as an active participant--not as a passive listener. Very simply put, we are about to set some standards for the utilization of marine education in this state and in this nation's classroom. You will have a say in these directions. What I hope we will accomplish here today is: 1) Identify and examine the issues of marine science education as a tool for greater science literacy. 2) Establish the priorities to better utilization of existing volumes of marine science curriculum. 3) Pinpoint the concerns and issues that you as administrators and teachers feel are important toward the better utilization of marine science in your schools. Much of what we do and say here today will set the tone for further efforts on the part of science educators. The interest is here as witnessed by your presence. Now it is your turn to be heard.

The next speaker has long been interested in the betterment of education in this state. He has taken time from a full schedule to come here this morning to share with us his perceptions of marine education in the ocean state. His office gives him a unique overall view of the needs of education in Rhode Island. It is with a deep sense of pleasure that I introduce the Honorable J. Joseph Garrahy, Governor of the State of Rhode Island.

J. Joseph Garrahy: Thank you and good morning! I am delighted to be with you this morning. To follow the remarks of Prentice, it seems as though we are all seeing either national or local reports which emphasize the need to link education with science programs. More particularly, we need to rely on the strengths of what we have in our own individual states in order to take advantage of that. Of course, this conference could not come at a better time for the state of Rhode Island and for you as educators concerned about science literacy and programs that will foster marine science. Just recently, you know, the Murray-Magaziner report which is probably one of the most extensive reports of any state economy ever undertaken in the country, took a look at the strengths and weaknesses of Rhode Island. And, of course, one of the strengths they talked about is in the marine science area and its relationship to marine industries. The thrust of that report as it was originally conceived was to take advantage of the strengths of Rhode Island's educational system. A report by the New England Board of Higher Education had indicated that if the Northeast and particularly New England, which is preeminent in education, did not take advantage of that fact and continue to strengthen its educational links with industry, we would be in danger of losing that kind of preeminence. I think it is worthy of extensive analysis by all of you, particularly in light of your interest in education in the marine sciences. Already there are elements in places such as the Graduate School of Oceanography and the kinds of expertise, the kinds of scientists, the kinds of people, the kinds of students who are attracted to this school--along with so many industries that have developed here in Rhode Island as a result of our natural resource of being close to the water and the examination of marine sciences. Already in Rhode Island we have accomplished a number of things to strengthen our whole educational system. I think generally we can be proud of our educational system. Education is the most costly item in the state's budget, whether in higher education or on the local level. We have recently announced what we feel is an important computer initiative here in Rhode Island. We will provide about \$8 million worth of computer hardware and software and teacher-training programs to the local school districts throughout the state. We plan to allocate half of those dollars to higher education. So, I think you see that this state is concerned with education, particularly science education. It is important that we start to produce in our own school systems the scientists and professionals who will be prepared for the changing economic climate we expect. We should be exporting products and not exploiting some of the best minds that have been developed in our school systems. I think that in the past, unfortunately, one of our problems has been that we educated outstanding professionals--and we're not able to provide the job climate to keep them in the state. Thus the programs that are recommended by the Murray Commission Report are designed to provide some 60 thousand new jobs for Rhode Island.

I wish you well in your conference. It could not be more timely. I hope you will take time to examine particular aspects of the Murray-Magaziner report that relate directly to what you are doing here today and make some recommendations to us. I think we are going to be looking to conferences like this for future suggestions. We are going to be looking to scientists here on the Bay Campus, we are going to be looking to universities, and we are going to be looking to educators to develop ideas for government. With this kind of help, the state can develop new industries.

We look forward to the results of your conference, and if the recommendations that come forward today are sent to us, I assure you they will be taken seriously and perhaps incorporated into some of the final plans and goals we are anticipating for Rhode Island.

Thank you very much for inviting me--I am delighted to be with you and wish you well.

Prentice Stout: Thank you very much, Governor Garrahy, for coming here this morning and for sharing with us your ideas and thoughts. I know of no one more uniquely able to do so than you. Walter Gray, Assistant Provost for Marine Programs here at the Graduate School of Oceanography, has long been aware of the work that marine education has undertaken across this country and in this state. He knows of the confusions and successes of our efforts. Mr. Gray's scope of influence, interest and dedication is both wide and deep within the URI Marine Advisory Service Program. I am please this morning to have him here and welcome him. Walter!

Walter Gray: Thank you. My responsibility this morning is to welcome you to the Narragansett Bay Campus. I would again like to thank the Governor for coming here--I know how busy he is and how many things he has to do, and I know the people here at the University would join me in expressing to him the University's gratitude for all the things that he has done for us. It is his encouragement in the face of very difficult fiscal issues that has helped many of us through some trying times. All of us commend him, and I think you join me in saying that we all appreciate him as Governor for his personal integrity and compassion. Thank you for all of that.

I want to talk to you very briefly this morning about the Graduate School of Oceanography and the Narragansett Bay Campus. You are on a site of the Narragansett Bay Campus which is about 165 acres--was a military reservation in World War II--had some Italian prisoners of war located here when graduate student apartments were here, and there are people you'll meet who are the children of early graduate students from 1946, '47, '48 era. There are about 600 people working at the Narragansett Bay

Campus in the Graduate School of Oceanography or for the Rhode Island Atomic Energy Commission, which maintains a two-megawatt nuclear reactor here. They work for the NMFS and they work for the EPA--those two federal labs which are across the street. GSO, the Graduate School of Oceanography, has about 300 employees, including a faculty of about 35. Probably what is best known about the Graduate School of Oceanography is our research vessel. It is a 177-foot ship, called Endeavor, and it left this week for a nine-month trip. It will be gone until July of 1984 and it will cruise the waters of various oceans ending up in South America. On these cruises, many other institutions join in, so it isn't just URI scientists who are on it.

The Graduate School of Oceanography presently has about 165 graduate students, nearly 65 percent of them majoring in biological oceanography. Another 20 percent major in geological oceanography, and the balance is distributed between physical and chemical oceanography. The budget at the Bay Campus is about \$14 million. Eleven of those come from the federal government, primarily from the National Science Foundation, the Office of Naval Research, the Environmental Protection Agency and the National Oceanic and Atmospheric Administration in the Department of Commerce. Overall, marine science and research account for about 65-70 percent of all the federal and private dollars that come University wide. Nearly every college of the university has some activity in the marine area, be it in extension, advisory work, science or teaching. Frequently we are compared to other institutions--how good are you? In the marine science world, there are two institutions that stand out: Scripps Institution of Oceanography, part of the University of California, San Diego, and Woods Hole Oceanographic Institution in Falmouth. After that come the major universities involved in marine science, and they are the University of Washington, Oregon State University, Lamont Doherty at Columbia University, and Texas A&M University and ourselves. URI measures up in terms of students, in terms of the quality of programs, in terms of the diversity of programs that we maintain here. And it is that diversity which gives us a reputation on a national and international basis because it isn't just oceanographic research. We have programs in marine policy, in marine economics and in marine biology and zoology. The Division of Marine Resources, with which I am affiliated, has the responsibility for getting information generated by these programs out to people. The Bay Campus, as I have indicated, is home to the Division of Marine Resources. We run the Marine Advisory Service as part of the Sea Grant Program. We run the Coastal Resources Center which provides the Governor's Office, the Department of Environmental Management, the Statewide Planning Program and primarily the Coastal Resources Management Council with the marine science information needed for decision making. The Sea Grant Depository, which is the repository for all the output of the National Sea Grant Program, is located here in the Claiborne Pell Marine Science Library. In 1986, the

Graduate School of Oceanography will be celebrating its 25th anniversary as a Graduate School at the same time the state of Rhode Island celebrates its 350th anniversary as a state, and I am involved in planning both of those activities.

Thank you. We appreciate your being here today, and we hope that the conference is productive. We are looking forward seriously to suggestions and recommendations that will flow from this group to help us and to help each other inspire future marine programs that all of us can undertake jointly. Thank you very much for coming.

Prentice Stout: Thank you, Walter. Our keynote speaker is a man whose roots are in the ocean and in the classroom. Assistant Professor of Education at the University of Delaware. He is Coordinator of Science Education and Director of Project COAST, an aquatic education curriculum project. Dr. Picker is active in the international aquatic education movement. He is past Editor of The Journal of Marine Education and has served on the Board of Directors of the National Marine Education Association. He has consulted to the Government of Egypt and other agencies and organizations. Dr. Picker is an active photographer and writer for the National Geographic Society and for other magazines and journals. He is a columnist for Oceans Magazine. We are pleased to welcome him here today.

### Keynote Address

Marine Education: A Tool for Scientific Literacy  
Dr. Les Picker, University of Delaware

I would like to thank Prentice Stout for inviting me to address this conference. I would also like to thank Mr. Gray and Governor Garrahy for their interesting descriptions of marine education efforts in Rhode Island.

As I prepared for this talk, I came across some interesting reading which I would like to tell you about. I think it is only fair to say that scientific literacy is not the only educational issue competing for more time on an already overcrowded school schedule. From The Providence Journal in just over a two-week period, I was able to find calls for more time and/or money for language instruction, safety programs, computers and mathematics. Even within the discipline of science, there are calls for more time devoted to energy education, human sexuality education, environmental education, physical science, scientific processes, and so on. And here I am, trying to convince you in 40 minutes that marine education must move to the head of the science class.

In my experience as a teacher, administrator, and teacher educator, I long ago realized that we don't as often deal with opposing arguments as much as simple differences in perspective. Do we teach for scientific literacy or what we call marine literacy? Must it be a choice between two perspectives, or can we combine the two into one perspective? Differences in perspective can be major or minor, depending on how one views them.

Let me start by asking some simple questions, which I will attempt to answer during my talk. First, what IS marine education? Next, why is it needed? Finally, if you will agree with me that it is needed, what can we do about it, especially in light of all the demands made on the science curriculum already?

Simply put, marine education refers to education about water, both fresh and salt. In fact, marine education is a misnomer. Many marine educators, myself included, are trying to shift to the broader term: aquatic education, which by definition includes both fresh and salt water. Of course, marine education comes about as close to being a good substitute for aquatic education as one can get since, amazingly, more than 98 percent of the world's water is salt water.

Marine education is also much broader than just marine science education. As taught in schools today, it takes in virtually all the curriculum areas. Students do art projects related to the water environment; they read literature about the sea, and learn what an enormous amount of our language is derived from water-based expressions. However, though marine educators recognize the importance of infusing marine education into all subject areas, we also recognize that the fundamental base for marine education is, in fact, marine science education.

We now have a better idea of what marine education is. And we must face the question of why bother teaching it at all? I can answer that question very, very simply. Proving it to you may take a bit longer.

Plainly and simply, our planet's waters are in trouble. Serious trouble. Believe me, I am not an alarmist or a doomsayer.

Do we not realize that we live on planet Earth, a fragile spaceship which all too tenuously supports us all? The data clearly shows us that we do not. Most children do not even know that our planet is mostly water. If we look at elementary science textbooks, it is almost as if there were a major conspiracy among science authors and publishers to keep this critical fact from future generations. A study conducted by Project COAST showed that an average of no more than 15 percent of content coverage in elementary science textbooks was on water. Can you imagine an alien coming to our planet and trying to make sense of a seemingly reasoning species calling its water planet, Earth?

When we act in irresponsible ways towards the environment, it has a nasty habit of coming back to haunt us. In terms of our water environment, I have a theory which explains just why we act in this way. I call it my "flat earth theory" and it goes like this: We have not yet internalized the pictures which Neil Armstrong and others have brought back to Earth, showing us that our planet is indeed round and that any toxics we generate have no place else to go. We intellectually know this, but we act as if the Earth is flat. Out of sight, out of mind, as the saying goes. Not one in a million of us has been up high enough to see that the Earth is round. Our daily lives are based on tables, sidewalks and other objects being level. So, is it any wonder that we act as if our wastes follow that flat earth theory?

Where has this theory gotten us? In 1960, when the bathyscape Trieste descended to the deepest part of the Earth, the Mariannas Trench off the Phillipines, what did it find on a ledge near the bottom? Nothing less than an empty Coca-Cola bottle! Just think of it! We have been on Earth for something like a few million years. We have been industrialized for perhaps two hundred years. Coca-Cola has been on Earth for less than one hundred years. Yet we have managed to infuse our pollution to the deepest parts of the planet.

Do we need to teach about aquatic education because of the present problems? Perhaps not. The open ocean can take care of itself to a large extent. However, it is when this pollution threatens the coastal zone that more serious problems arise. According to the Shoals Marine Laboratory of the University of New Hampshire, 2/3 of the world's population lives on only 3 percent of its land area, that area designated as the coastal zone. That coastal zone also supports the nurseries of the oceanic community and the majority of the world's fisheries. Yet it is here that we do most of our damage to the oceans.

So far I have confined my words to salt water. Everything I have said about our oceans is not only more true for our precious fresh water supply, but obviously much more threatening to us as a species. That very water which gives us life, we are poisoning to death. Certainly I do not need to lecture about acid rain.

Sadder still is the fact that we daily drink the by-products of our industries, with what consequences? A recent report in Science News states that "... 63 percent of all Americans drink contaminated and possibly unsafe water, according to a report by Cornell University for the Environmental Protection Agency."

We are also overpumping our groundwater supplies at rates that our planet's natural systems cannot begin to replenish. This has many consequences, such as the production of sinkholes, the lowering of groundwater levels and the concentration of toxic wastes that do manage to seep into our groundwater supplies.

People around the world tend to look at water as the Great Sewer. When technology is primitive and population low, there is usually little impact on water systems, other than very localized one. However, by not understanding water systems we can, and often do, create problems which a little knowledge could have prevented.

What we all have to do, commit ourselves to, is increase the aquatic literacy of our children as we increase their scientific literacy. We have many factors on our side in this job. The main advantage to aquatic education as compared with, let's say, metric education or energy education, is that children come to us already motivated. They love to learn about their world of water. They are enamored of it, excited about it, eager to explore its mysteries. We don't need the proverbial baseball bat to motivate kids in the topic. Is this merely romantic wishful thinking? No. People really do have a romance with the sea and it is as ancient as the first humans who pondered its mysteries. We can capitalize on this love of our waters in our science programs. Research studies have shown that the two science topic areas which interest children most are water-related or space-related.

Unfortunately, most teachers I talk with feel they are alone in their quest for aquatic materials to infuse into their existing course work. Again, this is more a matter of perception than fact. There are countless aids for the classroom teacher and curriculum developer alike, which make infusion of aquatic content into science coursework a relatively painless task.

I hope that by now you agree, at least in part, with my belief in the need to include more aquatic science in our science programs. And I hope you have found some of my comments sobering. Or, at the very least, that you will make a note to the effect of, "Today, when Picker talked to us about marine education, he was sober!"

Thank you for listening.

Prentice Stout: Thank you Dr. Picker.

Our panel this morning consists of three distinguished educators. Each in his own right represents a phase of education that has applicability to the oceans.

Dr. William Holland is the superintendent of schools for Narragansett, Rhode Island. His school system has taken a leadership role in the study of the ocean. As a matter of fact, two of his elementary students will be featured in an upcoming book on the seashore to be printed by the National Geographic Society.

Dr. Joseph Tausta is a Ph.D. graduate in chemistry from the University of Massachusetts. While he teaches in Newport, Vermont, about as far as you can get from the ocean, he still comes back to Rhode Island with some of his wonderful students to take part in the SEASCOPE Marine Studies Center programs.

Dr. Theodore Kellogg, a member of the faculty of the Department of Education at the University of Rhode Island, is a leader in the field of science education. Dr. Kellogg joins us this morning as a thoughtful spokesman, well versed in the knowledge of the requirements of science teacher training.

Welcome, gentlemen.

#### TRANSCRIPT OF PANEL DISCUSSION

Q: Given the increased interest in science education and given the multi-disciplinary nature of marine studies, how do you see marine science as a viable tool in science literacy?

Dr. Tausta: From our point of view in Vermont, marine science has tremendous interest for many of our students and augments their fresh water studies. To compare these fresh water studies with ocean studies, marine science has increased student awareness to science generally. The students love the exposure and they see the need to study such facts as density, graphing, etc., which would be "dry" to them without this marine exposure.

Dr. Holland: I agree with Dr. Picker about the fact that marine science is a real motivator, particularly if it is introduced early. Narragansett is well situated for ocean studies. Because marine science is a synthesizer for biology, chemistry and physics, it is a very valuable tool for science literacy. At the high school level, there are some complexities within the curriculum itself. The problems we are having in serving so many masters, the problems with small high schools and declining enrollment are real. I am not personally satisfied with the integration of marine education in our high school curriculum. There are scheduling problems which prevent us from really capitalizing on marine science education. Our earth science people see earth science as a good place to infuse aquatic education. We must find out how many high schools in this state offer such courses. At the elementary level we are making strides but at the upper levels, we are sluggish.

Dr. Kellogg: My focus is on the secondary level and I am very sensitive to the problems of marine science's place in the curriculum. We have to understand science so that we can better cope with our actions in the world in which we live. It is not so clear to us as to whether we will train people to do that by looking at today's consequences of our actions. We have to do a better job of increasing not just science literacy, but of educating people in the areas of science.

Q: Given the fact we believe in the concepts of science education, where would marine science best fit into the existing curriculum?

Dr. Tausta: We used it in our phosphate studies at the local lake. A law was passed to reduce phosphates, and our study helped students to see that this law was needed and to be aware of how well it was implemented. Because of the data we gathered, the town and state took a real interest. It became a community effort. All phases of the school community became involved as a result of this data. The students enjoyed this project tremendously. Write projects like these into the curriculum whenever possible.

Dr. Holland: The professional literature suggests that the number of high school courses in science should be drastically reduced. (Educating Americans for the Twenty-first Century - NSF). The attention should be directed toward the integration of remaining facts, concepts and principles within each discipline and with other sciences in areas such as math, technology and the social sciences. So we are talking about a great deal of infusion if, in fact, we are going to shrink the curriculum. Also we must better prepare our science teachers to handle these integration techniques. To teach marine science, you need a solid background in biology, and in chemistry. There are feelings that you need longer blocks of time for laboratory work and field experiences. Without these you are doing a rather superficial job of infusion. These are some key questions.

Dr. Kellogg: When someone asks when best to fit a subject into a curriculum, we have to take into account where the labs and facilities are, where our teachers are trained. These are the key questions. What is the background of a teacher to teach a subject? At this point, it is fair to say that other than through their own personal development, formal studies indicate that our teachers are not ready in a meaningful way to grab hold of marine science.

Q: Should we be looking at a new curriculum that integrates more into the existing science curriculum?

Dr. Holland: I guess it depends on whether you are talking about science education for most or all the students, or if you are talking about marine studies for a select group of students in a high school. We should concentrate on integrating with the basic core requirements.

Dr. Kellogg: A special course has many problems in the curriculum. Many of the infusion methods have not been appropriate. Much of the marine education materials that have been generated tend to stand by themselves. We should be taking the existing curriculum and seeing where marine education can

best fit. How do we get textbook publishers to change the typical frog dissection to a shark, for example.

Dr. Holland: The problem of infusion tests the teachers, reflecting their training, and we tend to operate in our own little departments or grade levels. We don't do integration well. National reports are talking about ecological outcomes in terms of secondary curriculum in science. My science department chairman, when asked where marine science could fit, came up with two basic concepts: earth science was one answer and that works because we require it of our ninth grade. As for biology--no way! We have all we can do now to meet the required curriculum.

From the floor: Thayer Shafer: We are talking about educating everyone--not just the graduate students.

Q: How do we get this material to the users?

Dr. Holland: Curriculum centers bother me. To get the best education, we need to take a good look at in-service education, expansion of materials. Teachers have to be involved with the materials. We need more field-based delivery of materials.

Dr. Tausta: I agree. Most of our teachers have gotten involved in the subject through SEASCOPE; visits to various conferences. It has to be working hand in hand with the experts.

Dr. Holland: The value of SEASCOPE is that it has taken some teachers from our system, getting them into hipboots and into the environment. At the end of a full day, they will get some highly useful material that will reinforce their day's work. If the follow-up activities are there, it will motivate the teachers and will affect what they do in science education--that's the value of SEASCOPE.

## GROUP LEADERS AND RECORDING SECRETARIES

- GROUP A. Leader, Dr. William Croasdale, URI.  
Recording Secretary, Mr. Edward Hill, Smithfield High School, Rhode Island.
- GROUP B. Leader. Dr. Theodore Kellogg, URI  
Recording Secretary, Mr. John Driscoll, North Attleboro School System, Massachusetts.
- GROUP C. Leader. Dr. Philip McLaren, Eastern Nararene College, Massachusetts.  
Recording Secretary, Ms. Sandra Ryack, Director, SEASCOPE Marine Studies Center, Rhode Island.

## GROUP PARTICIPANTS

### GROUP A

Dr. Jean A. Marriott  
Mr. James G. Leaf  
Dr. John V. DeGoes  
Mr. Frederick D. Lynch  
Mr. Paul S. Capaldo  
Mr. Julius J. Breit  
Ms. Margaret K. Dyer  
Mr. Michael M. Boesch  
Mr. Michael Peterson  
Mr. Raymond D'Ambra  
Ms. Martha Gorham  
Mr. Frederick Walters  
Mr. Robert King  
Mr. Carl Hyam  
Mr. Lloyd H. Barrow  
Dr. Les Picker

### GROUP B.

Dr. Timothy P. Connors  
Ms. Clive Hulick  
Mr. Louis Azza  
Mr. Al Lombardi  
Mr. Jeff Sandler  
Mr. Nicholas Hunt  
Dr. William Holland  
Dr. Joseph Tausta  
Mr. Wilfred Savard  
Mr. Lawrence E. Cornell  
Ms. Cynthia Tully  
Mr. Gordon McElhaney  
Ms. Linda Poulton  
Ms. Lauren Thompson

### GROUP C.

Mr. Antonio Mastrostefano  
Ms. Johanna Bazzolo  
Mr. Ken Sherwood  
Mr. Richard Potter  
Mr. Anthony A. Capraro  
Mr. Thayer Shafer  
Ms. Adelaida Alvarez  
Mr. Ernest Slocum  
Mr. Gerald Walsh  
Dr. Charles Morris

Mr. Edward Wujcik  
Ms. Harriet E. Souther  
Ms. Jane Hartman  
Mr. Michael Kiser  
Ms. Joyce Fletcher  
Mr. Roger Greene  
Dr. Steve Menatian

## MARINE EDUCATION ISSUES CITED BY THE THREE GROUPS

### GROUP C

1. Communication on a statewide basis
2. Funding for transportation ( for field trips ) and substitute teachers. Audio-visuals could be very helpful.
3. Attitudes - Need a key person to get and keep a marine science program going.
4. Established curriculum - infusion vs. new courses
5. Dissemination of materials ( program information, training programs required. Not enough of them.
6. Cost of available "training programs". No incentive to participate in these programs.
7. Lack of teacher preparation and continuing education. Little variety in the subject matter being taught.
8. Not enough support from the administrators.
9. Perception of the scope of marine science: it goes beyond biology, chemistry, physics, etc.
10. Lack of parental/public support: lack of knowledge among these people as to the scope of marine science.
11. High school science courses very specialized.
12. Absence of science ( and other ) requirements for high school graduation.
13. Absence of communication between administrators and teachers.

### GROUP B

1. Teacher training
2. Teacher materials and how to use them
3. Major publishers should address the issues of aquatic education. Should have a forum to discuss these issues.
4. More undergraduate courses for teachers in marine sciences,
5. Must not overlook the middle school marine science curricula.
6. Money. Not enough. Where to get it and for what purposes.
7. Audio-visual materials. Good sources for classroom to being the ocean to the students are vital.
8. Has the interest level in marine education dropped?
9. Has the Cousteau influence dropped?
10. Presenting the course as an easier alternative to regular science courses.
11. Schools should teach courses with more meaning for later life.
12. Teach curriculum that is basic and relates to surroundings.
13. Expose students to basic science concepts.
14. Teach basic ocean concepts relevant to our lives.
15. Call for national curriculum development.
16. Do not push teachers too hard to teach these courses.
17. Need for a central curriculum resource depository.
18. URI should open up teacher training programs in marine science education.

## GROUP A

1. Teacher update in marine science
2. Compete with other texts
3. Training elementary teachers in science.
4. Need to hold trained teachers and attract new ones.
5. Field trips are "frills". More audio-visuals are needed.
6. Time and scheduling of aquatic education is a problem.
7. Parents are unaware that marine science is a basic.
8. Declining enrollment.
9. Increased emphasis on computers takes away from marine education.
10. Need for support for in-service credit.
11. Failure to match curriculum materials with objectives.
12. Fit all the special interests into the curriculum.
13. School year/day has to be looked at carefully if we are going to add or infuse new courses.
14. Pre-test curriculum before it is used.
15. Careful attention to reading ability.
16. Failure to understand science literacy concept.
17. Teacher apathy and resistance to change.
18. Lack of basic goals.
19. Changes in certification are required.
20. Changes in attitude toward education on the part of both teacher and students are required.
21. No coordination between different science levels.
22. Science must be supported at home.
23. Lack of a systems approach to solving the problems.
24. Students and teacher need to get outside.
25. Is there a role for a state/national curriculum in science?

## GOALS AND STRATEGIES RECOMMENDED BY THE THREE GROUPS

### GROUP C

#### Goals

1. More adequate communication with the educational community.
2. Better utilization of funding and increase in funding.

#### Strategies

1. Greater use of TV channel 36
2. Greater use of radio stations
3. Use of news releases
4. Maximize more professional organizations to "sell" marine science education
5. Involvement of the State department of education in expansion of marine voc-tech. education.
6. More workshops. Take into account teacher motivation, and

rewards for teachers. Watch for correct level and time constraints for the material to be covered. Use SEASCOPE more fully for teacher workshops.

7. Work for more continuing education for teachers.

## GROUP B

### Goals

1. Work with book publishers to index current materials.
2. Increase the extent of audio-visual materials
3. Increase data base of marine materials.
4. Greater teacher training in marine science.
5. Increase monies.

### Strategies

1. Create a forum with publishers at their regular yearly meetings.
2. Index and catalog marine education audio-visual materials and look for weak areas. Teach the technology.
3. Catalog all marine education related data base services.
4. Work with departments of education on more teacher training.
5. Look for local, state, national, and private sources of funding for specific projects.

## GROUP A

### Goals

1. Coordination of resources from kindergarten through twelfth grade.
2. Create a statewide resource inventory for marine science.
3. Offer teacher training institutes.
4. Utilize the Graduate School of Oceanography and the Marine Advisory Service.
5. Coordinate with education departments on the college level.
6. Utilize industry for re-training teachers.
7. Seek newer methods to teach students with more flexible materials.

### Strategies

1. Utilize Marine Advisory Service to locate materials.
2. Utilize the resources of Sea Grant and the National Marine Education Association.
3. See what other states have done in the past.
4. Make teachers more aware of what we have. Better job of advertising.
5. Better inform these people of what is available. Many probably don't know.
6. Perhaps utilize more current magazines, more audio-visual, materials and greater use of computers.

### RANDOM THOUGHTS

These ideas and thoughts were expressed out of the general sessions and constitute additional ideas not expressed in the group discussions.

1. Too much negativism on the part of teachers. The "I can't or won't do thus and so" syndrome.
2. Wait and See Attitude. Let's wait to see what another group will do about some of these problems. Must make first move.
3. Marine Advisory Service educational component should take a strong leadership role in marine education. This role could take the follow format:
  - a. Creation of a marine education infusion format for elementary, middle and upper schools.
  - b. More workshops for teachers in various parts of the State.
  - c. Greater emphasis on teacher resources. Make the teachers more aware of the MEMS collection and the Sawyer Marine Resources Collection.
  - d. Get more material into the public libraries in a special marine education section.
  - e. Audio-visuals. Video is fine but we don't have much in the way of hardware. We want slides with taped narrations ( and lesson plans ) that we can borrow or rent for classroom use.
  - f. Marine field exposures. Both teachers and students should utilize more of the SEASCOPE Marine Studies Center if their budgets can afford the trip.
  - g. Some form of field trip exposure for teachers. Make this useful in the classroom.
  - h. Overcome of the feeling on the part of teachers that they are the downtrodden. Rewards for those taking teacher training courses in marine education.
  - i. Rhode Island does not have a marine education component in the National Marine Education Association. Every other Atlantic seaboard state does.
  - j. We need a teachers' mailing list for better communications among those interested. Marine Advisory Service should be the leader here.

- k. We all realize that marine education must be part of the existing science format. Remember that marine education consists of just more than science.
- l. Need for a junior high school marine-related textbook. There are some good ones for high schools. The elementary schools can't use them owing to their basic structure.
- m. We could use a marine education newsletter? Who would write it and who would distribute it?
- n. Marine education will remain a small part of the total curriculum taught for a long time. We must proceed with care.
- o. Want a marine curriculum outline for each of the major components of kindergarten through twelfth grade.
- p. Have yet to see a good rationale for teaching any phase of marine education in today's schools.

## RECOMMENDATIONS

From this conference, based on recurring themes, have come the following recommendations:

- o Greater emphasis on teacher training at all levels.
- o Acceptance of the fact that marine science education, and all phases of marine education, must be undertaken at the infusion level. A strong documentation effort is urgently required to articulate these infusion methods.
- o Better advertising efforts must be undertaken on the part of U.R.I.'s Marine Education effort, and marine educators as a whole, to make known what is available for infusion. Increased dissemination efforts.
- o Marine science education must relate to the daily lives of both student and teacher. All further curriculum efforts should reflect this goal.
- o Greater emphasis should be placed on audio-visuals properly balanced with written materials. Video could be a problem in some schools with no equipment. Keep it simple.
- o A larger share of funding must be sought for teacher training and the reworking of curricula.
- o More adult/parental awareness is vital.
- o Greater utilization of the expertise of industry at all levels should be sought.
- o Earth science may be the best vehicle for the infusion of marine science.

## RECAPITULATION

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The work undertaken by this conference was the result of the efforts of many. They are listed in the appendices of this paper and to these people I offer my sincere thanks.

This paper will be distributed to a wide range of audiences with the hope that it will generate additional thoughts and ideas. It is further hoped that it will become an ongoing document.

In reviewing the work we accomplished certain recurring themes make themselves felt. I have tried to synthesize them; it has been a challenge.

There is no question that marine education has a part in the curriculum of our schools. The nagging question is "just where". This conference did not produce that answer and perhaps that answer is never to be forthcoming. But we established some solid thinking about the subject.

The term science literacy seemed to cause some confusion. Inherent in this term is the belief that all of our students and teachers should be able to read and write at a comfortable level about the world's aquatic environment. It does not imply that they shall become professionals in the field. Much as a student shall be expected to read and write his or her language, so too it should be expected that they shall be literate in the knowledge of a discipline whose scope covers more than 70% of the world's surface. This environment touches our lives each and every day. We must know how and why.

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