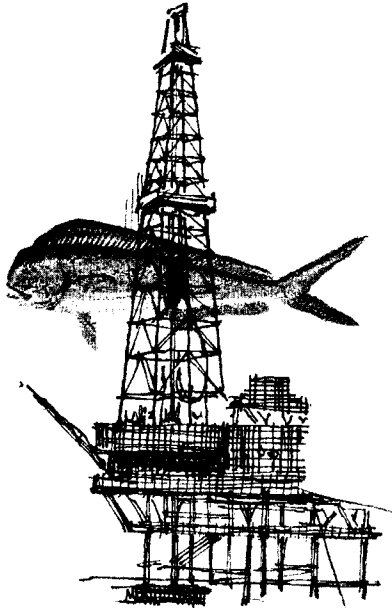


CONFIDENTIAL

# JOINING FORCES WITH INDUSTRY



PROCEEDINGS  
THIRD INTERNATIONAL CONFERENCE ON  
OPEN OCEAN AQUACULTURE  
MAY 10-15, 1998      CORPUS CHRISTI, TEXAS

# Joining Forces with Industry Open Ocean Aquaculture 1998

Proceedings of the  
Third Annual International Conference  
May 10-15, 1998  
Corpus Christi, Texas

Robert R. Stickney, Compiler



A TEXAS SEA GRANT COLLEGE PROGRAM PUBLICATION

The publication is the proceedings of a conference held in May 1998 in Corpus Christi, Texas, sponsored by the Sea Grant Programs in Texas, Hawaii, Louisiana, New Hampshire and Virginia, the National Sea Grant Office, the National Coastal Resources Research and Development



Institute, and Mr. Red Ewald. Publication supported in part by Institutional Grant NA86RG0058 to Texas A&M University by the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Publication TAMU-SG-99-103  
Printed in the United States of America.

\$20.00


For information about Texas Sea Grant College Program publications, contact:

Texas Sea Grant College Program

1716 Briarcrest, Suite 603

Bryan, Texas 77802

or visit <http://texas-sea-grant.tamu.edu>



STATE OF TEXAS  
OFFICE OF THE GOVERNOR

GEORGE W. BUSH  
GOVERNOR

**March 9, 1998**

**Greetings:**

*Welcome to Corpus Christi for the Third International Conference on Open Ocean Aquaculture on May 10-15. This conference, sponsored by the Texas Sea Grant College Program, provides a great opportunity for leaders in government, science and industry to meet, exchange ideas about aquaculture and work together to conserve and promote our marine resources.*

*I am pleased that you have chosen to hold this conference in Texas. The Texas Parks and Wildlife Department has been a leader in using abandoned oil platforms and discarded ships to create artificial reefs off the Texas coast. These reefs provide a home for many species of fish and a major tourist attraction for divers and sportsmen. By encouraging innovative and cooperative approaches between government and industry, we are making Texas a beacon state.*

*Laura joins me in sending best wishes for a successful meeting.*



Sincerely,  
  
GEORGE W. BUSH

# Contents

Introduction .....	1
Agenda .....	3
<b>Session 1: Background—Sociological and Environmental Issues</b>	
Progress and Prospects from the University of New Hampshire Open Ocean Aquaculture Demonstration Project .....	7
Ann Bucklin and Hunt Howell	
The Sociological and Environmental Impacts of Open Ocean Aquaculture .....	31
Joseph McElwee	
Marine Tenure and Offshore Aquaculture in the Gulf of Mexico: A Public Policy Perspective .....	36
Michael Dealessi	
<b>Session 2: Industry Perspectives, Feasibility Studies and Rigs to Reefs</b>	
Platforms and Fish Pens—An Operator's Perspective .....	39
David Dougall	
*Northern Gulf of Mexico Mariculture Project .....	44
Peter M. Smith	
*MMS Liability Issues and Bonding Associated with Offshore Platforms .	46
Bernard J. Kruse	
Mariculture Options with Texas Rigs to Reefs .....	47
Hal R. Osburn and Jan C. Culbertson	
<b>Session 3: Economics and Constraints to Offshore Aquaculture</b>	
Proposed Gulf of Mexico Finfish Mariculture Experiment .....	52
John D. Ericsson	
*Open Ocean Aquaculture—An Oil Company Perspective .....	59
Wilbur Johnson and Bill Breed	
*Constraints of Operating on Petroleum Platforms as It Relates to Mariculture: Lessons from Research .....	60
Charles A. Wilson and David R. Stanley	
*The Move Offshore: Costs, Returns and Operational Considerations from the Entrepreneurial Perspective .....	61
Sebastian Belle	

\*—Abstract

## **Session 4: Legal/Regulatory/Policy Issues/Engineering**

*Offshore Aquaculture Development in Australasia, Four Issues to Overcome .....	62
Neville Thomson	
*NOAA Fisheries and Aquaculture .....	63
Dr. Gary Matlock and Edwin Rhodes	
Design and Analysis of a Self-propelled Open-ocean Fish Farm .....	65
Clifford A. Goudey	
*Recent Practical Experiences with Ocean Spar® Offshore Sea Cages ...	78
Gary Loverich	
Offshore Aquaculture from the Perspective of a State Regulatory Agency .....	80
Ralph Rayburn	

## **Session 5: Biological Candidates for Culture and On-shore Hatchery Support**

Overview of a Modern, Shore-Based Hatchery for Offshore Mariculture Support .....	87
Phillip G. Lee and Philip E. Turk	
Feasibility of Selected Candidate Species of Marine Fish for Cage Aquaculture Development in the Gulf of Mexico with Novel Remote Sensing Techniques for Improved Offshore Systems Monitoring ..	103
Daniel D. Benetti, Andrew M. Clark and Michael W. Feeley	
Research Summary on Potential Mariculture Species for the Gulf of Mexico .....	120
D.A. Davis, C.R. Arnold and G.J. Holt	
Development of Bluefin Trevally ( <i>Caranx melampygus</i> ) and Greater Amberjack ( <i>Seriola dumerili</i> ) for Offshore Aquaculture .....	132
Michael D. Chambers and Anthony C. Ostrowski	
*The Status and Future Direction of the U.S. Department of Commerce/NOAA Aquaculture Plans and Programs .....	142
James McVey	
Joining Forces with Industry .....	143
James McVey and Granvil Treece	
Registrants .....	148

# Introduction


Open Ocean Aquaculture '98 (OOA '98) was the third in a series of what have been annual meetings sponsored by various Sea Grant programs to delve into the state of our knowledge and explore what research and development needs exist to develop a mariculture industry in open waters. The first of these meetings was held in Hawaii, the second in New Hampshire, and OOA '98 in Corpus Christi, Texas.

Exposed culture systems of various types have been designed, tested, and in some cases put into commercial production in Europe and Asia. There has been some experimental work in North America as well. Such systems may float at the surface or they may be fully or partially submerged. Systems have also been designed that float at the surface in good weather but can be partially or fully submerged during storms.


The Gulf of Mexico currently has several thousand oil and gas platforms in place, all of which will at some time in the future be removed, or in some cases, dropped in place. Current Mineral Management Service regulations call for removal of platforms within one year after production ceases (though variances can be obtained when production is stopped temporarily as may occur when the global price of petrochemicals is low). When the wells under a platform become depleted, the structure may still have a useful life that can often be measured in terms of decades (some estimate that a properly maintained platform has a life of 50 years, while production may be terminated in 10 to 15 years). Clearly, the platforms represent a resource that could be of great value to those interested in offshore aquaculture.

Given the location of OOA '98, it seemed logical to have a focus on the potential use of oil and gas platforms as aquaculture sites, and much, though not all of the meeting was devoted to that topic. Of major importance was the need to examine the regulatory environment in both state and federal waters to determine what impediments would be faced by the mariculturist interested in utilizing either a producing platform or one that was out of production but not yet dismantled.

There was a great deal of discussion during OOA '98 about the regulatory environment, both in the formal sessions and in informal conversations. Many left with the idea that the regulatory environment would not be conducive to mariculture in conjunction with production platforms. Yet,



since the meeting, there has been such activity in at least Texas and Louisiana, both in state and federal waters.



Other topics of interest included economics, engineering, candidate species, and various aspects associated with the actual production of fish in net-pens and cages. The meeting was attended by a relatively small number of people, but it was highly successful in that the proper mix of people were in attendance. A flavor for the issues that were covered can be found in the pages that follow. While no follow-on meeting was planned during OOA'98, there continues to be interest in future gatherings of this type and the topic should certainly be revisited in the not-too-distant future. At such time that future Open Ocean Aquaculture meetings are planned, there may even be commercial or, at least, demonstration facilities in place that can provide a clearer picture of what the potential offshore mariculture entrepreneur might expect to face and what profit potential might exist.

Robert R. Stickney, Director  
Texas Sea Grant College Program  
October 19, 1998

# Agenda

## Opening Plenary

Rear Admiral Paul Gaffney, Chief, Office of Naval Research, Arlington, Virginia; Dr. E.W. (Joe) Friday Jr., National Oceanic and Atmospheric Administration; and Dr. Brian Belanger, Deputy Director, Advanced Technology Program, National Institute of Standards and Technology. Moderator — Dr. Robert R. Stickney, Texas Sea Grant College Program Director

## Session 1 Background—Sociological and Environmental Issues

- Moderator — Win Thornton, WINMAR Consulting Services, Inc. Houston, Texas

Ann Bucklin, University of New Hampshire Director, New Hampshire/Maine Sea Grant Program. Progress and Prospects from New Hampshire's Open Ocean Aquaculture Demonstration Project.

Joseph McElwee, Managing Director, Turbard Iarthar Chonamara Teo., Galway, Ireland. The Sociological and Environmental Impacts of Open Ocean Aquaculture.

Michael De Alessi, Center for Private Conservation, Washington, D.C. Marine Tenure and Aquaculture in the Gulf of Mexico.

## Session 2 Industry Perspectives, Feasibility Studies and Rigs to Reefs

- Moderator — Villere Reggio, Minerals Management Service, New Orleans, Louisiana


David A. Dougall, Manager, Environmental Affairs and Safety, Agip Petroleum Co., Inc., Houston, Texas. Platforms and Fish Pens — An Operator's Perspective.

Peter M. Smith, Sc.D., P.E., Waldemar Nelson International Inc., New Orleans, Louisiana. Northern Gulf of Mexico Mariculture Project.

Bernard J. Kruse, Minerals Management Service, New Orleans, Louisiana. MMS Liability Issues and Bonding Associated with Offshore Platforms.

Hal Osborn and Jan C. Culbertson, Texas Parks and Wildlife Department, Austin, Texas. Mariculture Options with Texas Rigs to Reef.

Panel discussion involving speakers from Sessions 1 and 2 moderated by Villere Reggio.



## Thursday, May 14

### Session 3 Economics and Constraints to Offshore Aquaculture

- Moderator — Dr. Russell Miget, Texas Marine Advisory Service

John D. Ericsson, President, Gulf Marine Institute of Technology, Sea Pride Industries, Inc., Gulf Breeze, Florida. Oyster Purging in the Gulf of Mexico and Sea Pride/G.M.I.T.'s Recent Experiences Off the Texas Coast

Dr. John C. Bonardelli, G.R.T. Aqua-Technologies Ltd., Quebec, Canada. Effects of Production Cycle on the Economics of Submerged Longline Technology: Case study for offshore mussel culture.

Wilbur Johnson and Bill Breed, Oxy USA, Inc., Houston, Texas. Open Ocean Aquaculture — An Oil Company's Perspective.

Dr. Charles A. Wilson and Dr. David R. Stanley, Coastal Fisheries Institute, Center for Coastal Energy and Environmental Resources, Louisiana State University, Baton Rouge, Louisiana. Constraints of Operating on Petroleum Platforms as It Relates to Mariculture: Lessons from research.

Sebastian Belle, President, EconAqua, Groton, Massachusetts. The Move Offshore Costs, Returns and Operational Considerations from the Entrepreneurial Perspective.

Panel discussion with speakers from Session 3 and Dr. Gilbert Normand, Secretary of State for Canada, moderated by Dr. Russell Miget.

### Session 4 Legal/Regulatory/Policy Issues/Engineering

- Moderator - Neville Thomson, Marine Production Systems, Ltd., New Zealand

Neville Thomson, Marine Production Systems, Ltd., New Zealand. Offshore Aquaculture Development in Australasia, Four Issues to Overcome. A strategic assessment indicating economic aspects, infrastructure, technology and markets.

Frank Conforti, Solicitor's Office, U.S. Department of Interior, Washington, D.C. Liability, Regulatory, Policy Issues and Concerns Involved in Dedicating Platforms in Mariculture.

Dr. Gary Matlock, Director, Sustainable Fisheries, and Edwin Rhodes, Aquaculture Coordinator, National Oceanic and Atmospheric Administration, Silver Spring, Maryland. NOAA Fisheries and Aquaculture.

Clifford Goudey, Marine Advisory Leader, MIT Sea Grant College Program, Cambridge, Massachusetts. Design and Analysis of a Self-propelled Open-ocean Fish Farm.

Gary Loverich, Ocean Spar Technologies, LLC. Recent Practical Experiences with Ocean Spar® Offshore Sea Cages.

Ralph Rayburn, Director of Intergovernmental Affairs, Texas Parks and Wildlife Department, Austin, Texas. Offshore Aquaculture from the Perspective of a State Regulatory Agency.

Panel discussion with speakers from Session 4 moderated by Neville Thomson.

## **Friday, May 15**

### **Session 5 Biological Candidates for Culture and On-shore Hatchery Support**

- Moderator — Dr. Anthony C. Ostrowski, Oceanic Institute, Hawaii

Dr. Phillip G. Lee and Philip E. Turk, National Resource Center for Cephalopods, Biomedical Institute, The University of Texas Medical Branch-Galveston. Overview of a Modern, Shore-based Hatchery for Offshore Mariculture Support.

Dr. Daniel Benetti, Andrew Clark and Michael W. Feeley, Harbor Branch Oceanographic Institution, Aquaculture and Engineering Divisions, Fort Pierce, Florida. Feasibility of Selected Candidate Species of Marine Fish for Cage Aquaculture Development in the Gulf of Mexico with Novel Remote Sensing Techniques for Improved Offshore Systems Monitoring.

Dr. Allen Davis, Dr. C.R. Arnold and Dr. G.J. Holt, The University of Texas Marine Science Institute, Fisheries and Mariculture Laboratory, Port Aransas, Texas. Research Summary on Potential Mariculture Species for the Gulf of Mexico.

Michael Chambers, Oceanic Institute, Hawaii. Current status on the development of bluefin trevally (*Caranx melampygus*) and greater amberjack (*Seriola dumerilii*) for offshore aquaculture in Hawaii.

Panel discussion with speakers moderated by Dr. Anthony C. Ostrowski.

### **Summary Session**

Dr. James McVey, Aquaculture Program Leader, National Sea Grant Office, Silver Spring, Maryland. The Status and Future Directors of the U.S. DOC/NOAA Aquaculture Plans and Programs and Conference Summary.

