



Post Meeting Summary Report

of the

**Seventeenth Joint Working Group Meeting on
Cooperation in the Field of Marine and Fishery Science and
Technology between the
National Oceanic and Atmospheric Administration of the
United States of America
and
The State Oceanic Administration of the
People's Republic of China**

24-28 April 2007

**Silver Spring MD USA
Florida USA**

INDEX

Summary Report – English	3
Summary Report –Chinese	6
List of Participants (Appendix I)	10
Agenda (Appendix II)	12
Statement of Intent - English (Appendix III)	16
Statement of Intent - Chinese (Appendix III)	17
Outcome of 17th JWG Panel Discussion (Appendix IV)	19
Review of Activities 2005-2006 (2007) (Appendix V)	24
Site Visits (Florida) Trip Report (Appendix VI)	52

ANNEX XVI TO THE PROTOCOL

Report of the Seventeenth Joint Working Group Meeting on
Cooperation in the Field of Marine and Fishery Science and Technology between
the
National Oceanic and Atmospheric Administration of the
United States of America
and
The State Oceanic Administration of the
People's Republic of China

SUMMARY REPORT

In accordance with Annex XV to the Protocol on Marine and Fishery Science and Technology Cooperation between the United States of America and the People's Republic of China, as amended and extended on July 21, 2004, and at the invitation of Dr. Richard Spinrad, Assistant Administrator of the National Oceanic and Atmospheric Administration, Deputy Administrator CHEN Lianzeng, State Oceanic Administration, led a delegation that visited the United States from 24-28 April. Deputy Administrator Chen and Dr. Spinrad co-chaired the Seventeenth Meeting of the U.S.-China Joint Working Group (JWG) on Cooperation in the Field of Marine and Fishery Science and Technology in Silver Spring Maryland, USA on 24-25 April.

On behalf of the American delegation, Dr. Spinrad opened the 17th JWG meeting by extending a warm welcome to the ten-member Chinese delegation. Dr. Spinrad praised many of the accomplishments of the cooperative programs conducted between China and the U.S. since the 16th JWG meeting. He also noted that it was important to continue to evaluate and address areas of common concern in order to ensure the Protocol remains relevant to both organizations.

Deputy Administrator Chen expressed his pleasure to lead the Chinese delegation and to co-chair the 17th JWG meeting. On behalf of the Chinese delegation, Mr. Chen stated that the Protocol was contributing much to both Chinese and American marine and fisheries science and that he looks forward to more excellent science to originate from US and China collaboration. Both co-chairs asked their respective delegations to introduce themselves (delegation participants listed in Appendix I) and then proceeded with their opening remarks.

The co-chairs re-emphasized that, since the Protocol was signed in 1979, NOAA and SOA have built a close partnership in the field of marine and fisheries science and technology. This bilateral framework has brought China and the U.S. closer together to share scientific information, advance our collective understanding of ocean processes and dynamics, and implement best practices for the sustainable use of marine resources.

The delegations agreed to the agenda for the 17th JWG meeting (see agenda in Appendix II). Specific Panel accomplishments from the past two years were highlighted in an update given by Panel Co-chairs. The U.S. and Chinese sides expressed their expectation that this Protocol will continue to provide the means through which activities that support national priorities in the areas of marine and fisheries science priorities will be achieved in the future.

The delegations exchanged views on the "Ocean Research Priorities Plan and Implementation Strategy of the United States" and the "11th 5-Year Plan for the Development of Marine Science and Technology of the People's Republic of China" with a view to guiding the future direction of cooperation. In this connection, a Statement of Intent was signed by the Co-Chairs (Appendix III), to express mutual support for ongoing collaborative efforts, and to continue dialogue to find a suitable mechanism(s) for developing enhanced cooperation that support the Ocean Research Priorities Plan and Implementation Strategy of the United States and the 11th 5-Year Plan for the Development of Marine Science and Technology of the People's Republic of China. As a follow-up action, both sides agree that a "Marine Science Forum" be held in China in Spring 2008, to further explore and identify potential new fields of directions and areas of cooperation.

Both sides also agreed to continue supporting the "Ocean Policy Forum" initiated in Shanghai in 2005 as an established joint mechanism for marine policy coordination among major maritime countries, and will send a high-level delegations to the Ocean Policy Forum to held in Republic of Korea in September 2007. The United States delegation stated that, at this forum, "marine policy" is meant to include data policy. The Chinese delegation stated that existing data policy coordination mechanisms, e.g. IOC, etc, be used to address the data policy issue.

Both sides discussed the Chinese suggestion to explore cooperation in marine law enforcement, and agree to further explore the issue.

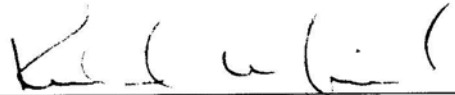
The delegations endorsed continued cooperation under the five existing Panels under the Protocol. Highlights of these discussions are summarized below (Appendix IV).

In his final remarks, Deputy Administrator Chen expressed his appreciation on behalf of the Chinese delegation for the warm hospitality and excellent preparations that have been made by NOAA staff for the meeting. Deputy Administrator Chen and Dr. Spinrad emphasized the need to continue cooperation in the field of marine and fishery science and technology under the auspices of the U.S.-China Science and Technology Agreement.

The Chinese delegation agreed to host the 18th JWG meeting in the China in 2009. The specific venue and date of this meeting will be confirmed by the JWG co-chairpersons through correspondence.

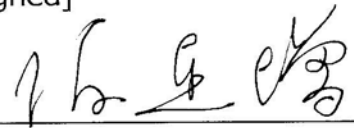
This summary report was signed on April 25, 2007, in Silver Spring, Maryland, USA, in duplicate in English and Chinese, both texts being equally authentic.

[Signed]



Richard W. Spinrad, PhD., CMarSci
Assistant Administrator
National Oceanic and Atmospheric
Administration,

[Signed]



CHEN Lianzeng
Deputy Administrator
State Oceanic Administration

议定书附件十七

中华人民共和国国家海洋局与美利坚合众国国家海洋与大气局 海洋与渔业科技合作联合工作组第十七次会议纪要

根据2004年7月21日修订并延续的《中美海洋与渔业科技合作议定书》附件十五，应美利坚合众国国家海洋与大气局助理局长理查德·斯宾瑞德博士的邀请，中华人民共和国国家海洋局副局长陈连增先生于2007年4月24日至28日率团访问美国。斯宾瑞德博士和陈连增先生共同主持了2007年4月24日至25日在美国马里兰州银泉召开的中美海洋与渔业科技合作联合工作组第十七次会议。

斯宾瑞德博士代表美方代表团欢迎中方代表团十位代表的来访，并宣布会议开幕。斯宾瑞德先生高度评价了中美自第16次联合工作组会议以来合作活动所取得的成果。他同时表示，继续对一些双方共同关注的领域进行评估和探讨非常重要，这将确保议定书对两个部门继续发挥积极作用。

陈连增副局长对率领中方代表团赴美并共同主持第17次联合工作组会议感到十分高兴。陈先生代表中方代表团表示，议定书对中美双方的海洋与渔业科学的发展发挥了很大作用，他期待着通过双方的合作取得更高的科学成果。双方共同主席邀请各自的代表团成员进行了自我介绍（代表团名单详见附件一），并分别进行了开幕致辞。

双方共同主席再次强调，自从1979年中国国家海洋局与美国国家海洋与大气局签署议定书以来，双方在海洋与渔业科技领域建立了紧密的合作关系。这一双边框架使得中美双方能够更好地分享科学信息，加强对海洋过程和动力学的理解，并能够采取最佳的方式进行海洋资源的可持续利用。

双方代表团通过了第17次联合工作组会议的议程（详见附件二）。各组组长回顾了各自小组在过去两年所取得的合作成果。中美双方表达了未来继续在议定书框架下采取合作活动支持双方国家在海洋与渔业科学领域重点和优先计划的期望。

双方代表团就“美国海洋研究优先领域计划和实施战略”和“中国‘十一五’海洋科技发展规划”交换了意见，并同意以此作为今后合作方向的基础。为此，双方主席签署了一份意向书（见附件三），表达了对正在进行的合作活动的支持，继续保持对话以寻求合适的机制，促进双方的合作，支持“美国海洋研究优先领域计划和实施战略”以及“中国‘十一五’海洋科技发展规划”。作为后续活动，双方同意于2008年春季在中国召开“海洋科学论坛”，进一步探讨并确定潜在的合作方向和领域。

双方同意继续支持将2005年在上海发起的“海洋政策论坛”作为主要海洋国家进行海洋政策合作的共同机制，并将派高层代表团参加2007年9月在韩国召开的“海洋政策论坛”。美方表示，海洋政策应包括资料政策；中方表示，应充分利用现有的海洋资料政策机制，如政府间海洋学委员会等来商讨资料政策问题。

双方讨论了中方代表团关于拓展海洋执法领域合作的建议，并同意进一步探讨该项建议。

双方代表团同意在议定书现有五个组的框架下继续开展合作。（详见附件四）。

在闭幕辞中，陈连增副局长代表中方代表团对美方的热情接待和美方工作人员对会议的精心准备表示感谢。陈连增副局长和斯宾瑞德博士强调了在中美海洋科技协定的框架下继续开展海洋与渔业科学合作的

需求。

中方代表团同意于2009年在中国召开第十八次工作组会议。会议的具体时间和地点由双方共同主席通过通讯方式确定。

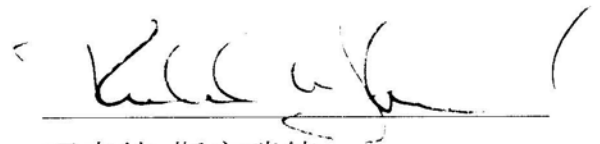
本会议纪要于2007年4月25日在美国马里兰州银泉签署，包括一份中文文本和一份英文文本，两份文本同等效力。

中方主席
国家海洋局代表

美方主席
国家海洋与大气局代表



陈连增
中国国家海洋局
副局长



理查德·斯宾瑞德
美国国家海洋与大气局
助理局长

**APPENDIX I
PARTICIPANTS**

APPENDIX I
PARTICIPANTS

[Underlined name indicates Panel Co-chair]

CHINESE:

CHEN Lianzeng	Deputy Administrator, State Oceanic Administration (SOA)
<u>LI Haiqing</u>	Director General, Department of International Cooperation/SOA
QIU Zhigao	Deputy Director, Department of Science and Technology/SOA
<u>LIN Shaohua</u>	Director General, National Data and Information Service Center/SOA
<u>ZHANG Zhanhai</u>	Director General, China Polar Research Center/SOA
SONG Xuejia	Deputy Director General, National Marine Environmental Forecasting Center/SOA
<u>LI Jieren</u>	Vice President, Chinese Academy of Fishery Sciences
LI Yingren	Director, Division of Foreign Relations and Cooperation
WEI Yan	Program Officer, Department of International Cooperation/SOA
GAO Lin	Program Officer, Department of Marine Environment Protection/SOA
CHEN Linhao	Counsellor, Embassy of China, Science and Technology Office
BIAN, Songbao	Third Secretary, Embassy of China, Science and Technology Office

UNITED STATES:

Dr. Richard W. Spinrad	Assistant Administrator Office of Oceanic and Atmospheric Research (OAR), NOAA
Rene Eppi	Director, Office of International Activities, OAR. (Representing <u>Chet Koblinsky</u>)
Michael Abbey	Program Manager, Office of International Activities, OAR
<u>John Calder</u>	Director of the Arctic Program Office, NOAA
Kathy Crane	Senior Program Manager, Arctic Program Office, NOAA
<u>Andy Lazur,</u>	Director of Marine Aquaculture Program, National Sea Grant Program Office, NOAA
Jim McVey	Co-Chair Emeritus of Living Marine Resources Panel
Robin Tuttle	Office of Science and Technology, NMFS
John Boreman	Director, Office of Science and Technology, NMFS
Rebecca Lent	Director, NMFS International)
Paul Niemier	NMFS International
Nicole Le Bouef	NMFS International
Mark Wildman	NMFS
Jonathan Justi,	Program Office, NOS-International (Representing <u>Clement Lewsey</u>)
Bob Gelfeld,	Program Manager, National Ocean Data Center, NESDIS (Representing <u>Terry Tielking</u>)
Jingjie Chu	Sea Grant Fellow, NOAA Aquaculture Program
Jihong Dai	Sea Grant Fellow, NMFS, Office of Science and Technology
Heather Allen	NOAA's Office of International Activities
Pamela Toschik	NOAA's Office of International Activities
John Broadwater	Program Manager, NOAA's Maritime Heritage Program

APPENDIX II
Agenda

**17th United States-China Marine and Fisheries
Science and Technology Joint Working Group meeting
24-29 April, 2007**

APPENDIX II
Agenda

**17th United States-China Marine and Fisheries
Science and Technology Joint Working Group meeting
24-29 April, 2007**

**23 April
Monday**

SOA delegation arrives at Washington Dulles Airport
pickup by NOAA
Crowne Plaza Hotel
8777 GEORGIA AVENUE
SILVER SPRING, MD 20910
Hotel Front Desk: 1-301-589-0800
Hotel Fax: 1-301-587-4791

**24 April
Tuesday**

Breakfast
0815 SOA delegation meets in Hotel lobby, and travels to NOAA Building 3, 1315 East-West Highway. To be met by NOAA staff at 'Hand Statue' and escorted through security.
0900-1230 Opening of 17th Joint Working Group meeting
Discussion of panels and future cooperation led by Co-chairs Dr. Richard W. Spinrad and CHEN Lianzeng
Room: 11836
0900-0925 Welcome and introduction of US Delegation by Dr. Spinrad
0925-0940 Greeting and introduction of Chinese Delegation by Vice Administrator Chen
0940-1025 Panel Report delivered by panel co-chairs led by Dr. Spinrad
*Data and Information Exchange (Lead: Lin Shaohua)
*Integrated Coastal and Ocean Management (Lead: Jonathan Justi)
*Polar Sciences (Lead: Zhang Zhanhai)
*Role of Ocean and Climate Change (Lead: Rene Eppi)
*Living Marine Resources (Lead: Li Jieren)
1025-1035 Break
1035-1145 Discussion of US and Chinese National Ocean Priorities led by Dr. Spinrad and Vice Administrator Chen
*U.S. Ocean Research Priorities Plan and Implementation Strategy (Dr. Spinrad)
*China's 9 Strategic Marine Priorities (Vice Administrator Chen)
1145-1230 Future direction of Protocol
Discussion including new ideas/new areas of cooperation led by Dr. Spinrad and Vice Administrator Chen
1230-1400 Lunch at Asian Bistro/TBD (US hosts)
8537 Georgia Ave.
Silver Spring, MD
301-589-0123
1400-1730 Panel co-chairs meeting
In Room 11836 or another conference room

Goal: continue discussion on the future direction of their respective panel.

Outcome: A document that affirms the focus of the panel and a list of products/activities/meetings that will ensure the panel is in line with US and China strategic priorities

[Conversation continued on 25 April from 0900-1100, if necessary]

1400-1730 Vice Administrator CHEN to meet with Chinese Embassy

1730-1930 Dinner (**US Hosts**)

Ray's the Classics

8606 Colesville Rd, Silver Spring, MD 20910

Telephone: 301-588-7297

1930 Guests return to hotel

**25 April
Wednesday**

Breakfast

0815 SOA delegation meets in Hotel lobby, and travel to NOAA Building 3, 1315 East-West Highway. To be met by NOAA Staff outside and escort through security.

(Vice Administrator Chen can choose to be driven to NOAA at 1030 in time for the 1100 meeting if he has no other plans to meet with NOAA colleagues)

0900-1100 Co-chairs wrap up, prepare minutes for signing. NOAA counterparts will decide where to meet

[Remarks on all the panels must be submitted to Executive Secretary's Abbey or Wang by 1015]

Room 11836

1100-1230 Joint Working Group closing ceremony

Led by Co-chairs Dr. Spinrad and Vice Administrator CHEN

1100-1130 Discussion of outcomes of panels

1130-1215 Future direction of Bilateral

1215-1230 Final remarks and signing of 17th Joint Working Group minutes and picture

Room 11836

1230 – 1330 Lunch (**China hosts**)

Mi Rancho (Texas-Mexican)

8701 Ramsey Ave.

Silver Spring, MD

301-588-4372

1330 Chinese depart Silver Spring

1430 Arrive Annapolis 90 minute meeting at the Executive Leadership Team-Chinese Deputy remarks and discussion (along the lines of ocean management, common challenges, common interests). There will probably be consecutive interpretation, which cuts the meeting time in half.

1630 Tour of Annapolis for an hour or so.

1830 - Dinner in Annapolis with NOAA colleagues

2100 Return to Hotel

**26 April
Thursday**

Travel to Florida

Depart for Miami, Florida

0445 Leave hotel

Depart Washington DC for Miami, Florida

Depart on DELTA 1415 at 0630 hours (through Atlanta)

Arrive at Miami at 1142 hours

Lunch (**Host: US**)

1400-1530: Cooperative Institute for Marine and Atmospheric Studies (CIMAS)
Guide Dr. Joseph Prospero, Director

University of Miami/Rosenstiel School

4600 Rickenbacker Causeway

Miami, FL 33149-1098

+1 305.421.4000

1600-1800 Southeast Fisheries Science Center (SEFSC)

75 Virginia Beach Drive

Miami, Florida 33149

P.O.C. Peter Thompson, Acting Director

1600-1800 Atlantic Oceanographic & Meteorological Laboratory (AOML)

4301 Rickenbacker Causeway

Miami, FL 33149

P.O.C. Silvia Garzoli, Director, Physical Oceanography Division

1900 Dinner (**Host: China**)

(Including available staff from NOAA)

Drive to Florida Keys

Holiday Inn

KEY WEST

3850 N ROOSEVELT BLVD

KEY WEST, FL 33040 UNITED STATES

Hotel Phone 1-305-2946681

Hotel Fax: 1-305-2945618

27 April

Friday 0800

Breakfast (at hotel)

0900 Depart for site visit

1000-1200 Arrive at the National Marine Sanctuary Program Southeast Region/Florida
Keys National Marine Sanctuary Headquarters Key West

Meet NOAA management of the Florida Keys National Marine Sanctuary
Program

Tour of NOAA's Dr. Nancy Foster Florida Keys Eco-

Discovery Center

1215 **Lunch** (Hosts: US)

1300 **Depart for Conch Harbor**

1330-1800 **Excursion on Tortuga IV**

1900 **Dinner** (Hosts: US)

Drive to Miami

Crowne Plaza Miami Airport

950 NW Le Jeune Road

Miami, FL 33126

PH: 305-929-0106, direct

FX: 305-447-1189

28 April

Saturday

Chinese delegation departs for Beijing from Miami

**APPENDIX III
STATEMENT(S) OF INTENT**


**Statement of Intent
Between the
National Oceanic and Atmospheric Administration of the Department of
Commerce,
The United States of America
And
The State Oceanic Administration
Of the People's Republic of China
On
Cooperation in the Field of Marine and Fisheries Science and Technology**

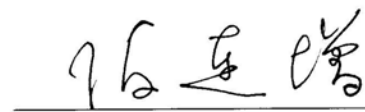
In an effort to address societal needs in ocean, coastal and fisheries science, the U.S. National Oceanic and Atmospheric Administration and the State Oceanic Administration of the People's Republic of China have cooperated over the past 28 years on projects of mutual interest and benefit. Both organizations will continue to benefit from this partnership, and have expressed an interest to identify, and pursue further opportunities to strengthen collaboration on marine and fisheries science and technology activities that align with, and support national ocean science and application priorities.

This Statement of Intent is to express mutual support for ongoing collaborative efforts, and to continue dialogue to find a suitable mechanism(s) for developing enhanced cooperation that support the "Ocean Research Priorities Plan and Implementation Strategy of the United States" and the "11th 5-Year Plan for the Development of Marine Science and Technology of the People's Republic of China".

This Statement of Intent demonstrates the interest of both parties in pursuing a strategy that supports national priorities in marine science, and that designates the United States-China Marine and Fisheries Science and Technology Joint Working Group as a mechanism to achieve greater and sustained success in areas of mutual interest.

This Statement of Intent is signed on April 25, 2007 in Silver Spring, Maryland, United States of America.


Richard W. Spinrad, PhD., CMarSci
Assistant Administrator
National Oceanic and Atmospheric
Administration
United States of America


CHEN Lianzeng
Deputy Administrator
State Oceanic Administration
People's Republic of China

议定书附件十七

中华人民共和国国家海洋局与
美利坚合众国商务部国家海洋与大气局
海洋与渔业科技领域合作意向书

为满足海洋、沿海和渔业科学的需求，中国国家海洋局和美国国家海洋与大气局在过去二十八年开展了互利互益的合作活动。两个部门将继续从现有的合作关系中受益，并表达了确定并寻求机会进一步加强海洋与渔业科技合作的兴趣，以支持国家的海洋科学和应用优先计划。

本意向书表达了对正在进行的合作活动的支持，继续保持对话以寻求合适的机制，促进双方的合作，支持“美国海洋研究优先领域计划和实施战略”以及“中国‘十一五’海洋科技发展规划纲要”。

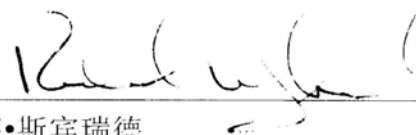
本意向书表达了双方寻求支持海洋科学优先计划的战略，并指定中美海洋与渔业科技合作联合工作组作为机制，以便在共同感兴趣的领域取得更大、更持久的成效。

我们在此签署、接受并将按以上框架，为实现既定的目标共同努力。

本意向书于2007年4月25日在美国马里兰州银泉签署。



陈连增
中国国家海洋局
副局长



理查德·斯宾瑞德
美国国家海洋与大气局
助理局长

APPENDIX IV
OUTCOME OF 17TH JWG PANEL DISCUSSIONS

Appendix IV

The Role of the Ocean in Climate Change

Dr. Song, Xuejia, Deputy Director of the National Marine Environmental Forecasting Center of SOA, and René Eppi, Director of the International Activities Office at NOAA Research, co-chaired the discussion on the Role of the Ocean in Climate. Also in attendance were Dr. Qui, Zhigao, Deputy Director of the Department of Science and Technology, and Dr. Gao, Lin from the Marine Environmental Protection Department from SOA. China presented further information on their seven proposed topics to the U.S., which ranged from ocean research to marine data assimilation, modeling and forecasting. After active discussion, both sides decided that China would provide the U.S. with an expanded description of four proposed topics by the end of May 2007 which included the following: 1) short-term climate prediction modeling, 2) research on El Niño air-sea coupled prediction modeling, 3) reconstruction of the upper ocean and the effects of upper ocean on climate change, and 4) operational ocean forecasting assimilation system in the Pacific Ocean and the China Sea. Upon receipt of the expanded description from China, the U.S. will consider the topics, and respond to China on its proposal. The U.S. might include additional topics of interest to present to China in their response. Both sides agreed that their intended goal is to agree on a few joint topics initially, before revisiting the possible next steps to be taken on the Role of the Ocean in Climate Panel. U.S.

Co-Chair: Rene Eppi, NOAA

Chinese Co-Chair: China: Dr. Song, Xuejia, SOA

Oceanographic Data and Information

The 9th Meeting of the PRC-U.S. Joint Coordination Panel for Data and Information Cooperation will be held in October 2007, Silver Spring, MD. Everything that the 'data and information panel' was designed to accomplish is possible within existing multi-lateral organizations such as IOC/IODE, GOOS and WMO/IOC JCOMM bodies. The 9th Data Panel will continue to explore potential cooperation in the following areas which will address more specifically the following potential topics:

- Argo/GTSPP data processing techniques and data exchange
NOAA/NODC and NMDIS;
- XML Content Technology
NOAA/NODC and NMDIS;
- Data Assimilation Techniques Marine 4DVAR
NCAR and NMDIS;
- Forecasting of sea-level variations and data exchange
NOAA/NODC/U of Hawaii and NMDIS;
- Marine Data reanalysis using numerical ocean model methods;
NOAA/NOS and NMDIS;
- Marine Boundary and Electronic Nautical Charts (ENC);
NOAA/NOS and NMDIS;
- GODAE High Resolution SST Data;
NOAA/NODC and NMDIS;
- Vertical tidal datum database
NOAA/NOS and NMDIS
- Visualization of Marine Fields.
NOAA/NOS/PMEL and NMDIS

U.S. Co-Chair (Acting): Terry Tielking, NOAA/NODC
Chinese Co-Chair: LIN Shaohua, SOA/NMDIS

Living Marine Resources

The LMR Panel agreed that effective collaboration between US and China researchers has existed in previous years leading to a number of research projects of joint interest including numerous publications. It was further agreed that improvements are needed, especially by focusing efforts on identical country goals and strategic plans. Given the critical importance of sustainability of various resources/uses of the marine ecosystem including fisheries and aquaculture, the panel agreed to focus future research on ecosystem based living marine resource management. Within that umbrella research issue exists a number of key sub topics such as ecosystem modeling, economics, environmental friendly feeds, fisheries management, genetics, and nutrient management.

To help provide vision, and guide research, the panel agreed to form an advisory committee consisting of a few additional members with varied expertise enabling a holistic view of ecosystem based management (EBM). In addition, the committee would help foster researcher collaboration within various existing marine resource organizations.

A timeline was developed to identify committee members within one month followed by a committee decision of specific research priorities within the EBM framework prior to a tentative meeting in China in October 2007

U.S. Co-Chair: Andy Lazur, NOAA

Chinese Co-Chair: LI Jieran, Chinese Academy of Fisheries Sciences (CAFS)

Integrated Coastal and Ocean Management

Participants reviewed activities since the 16th Joint Working Group Meeting with satisfaction and discussed both continued and new collaborative priorities. Approximately thirteen proposals were presented and discussed with points of contact identified for each (outlined in appendix #). Priorities for the upcoming period center upon continuation of collaboration in the South Coastal Seas Biodiversity Demonstration Project (2006-2012), Jiulongjiang (Xiamen-Zhangzhou-Longyan) watershed management project, exchange of scientific and technical information on hazardous materials, monitoring standards and metrology, and other areas. The follow-up Ocean Policy Forum will be held in Korea in September 2007 and the Fifth Joint Panel Meeting will be held in China in early 2008. Following discussion, the Chinese side requested that underwater cultural heritage be considered as a continued priority interest area for the upcoming Ocean Policy Forum.

U.S. Co-Chair: Clement Lewsey, NOAA

Chinese Co-Chair: LI Haiqing, SOA

Topics Discussed at the Integrated Coastal and Ocean Resources Management Panel Breakout Session and Points of Contact

Underwater Cultural Heritage

Point of Contact: SOA: Hqli@soa.gov.cn

NOAA: Ole.Varmer@noaa.gov

Sino-American Oceanic Environment Protection Standardization Technical Exchange and Cooperation:

Point of contact: SOA: Aina Wu (Haiyangbiaozhun@163.com)

NOAA: Gunnar.Lauenstein@noaa.gov

Application of Molecular Biology Techniques to HAB Monitoring, Forecasting and Warning

Point of Contact: SOA: Guo Hao (Hguo@nmemc.gov.cn)

NOAA: Pat.Tester@noaa.gov

Marine Environmental Risk Assessment of Land Based Discharge of Hazardous Substances and Total Quality Control:

Point of Contact: SOA: Zfzhang@nmemc.gov.cn

NOAA: Ed.Kruse@noaa.gov

Julian.Wang@noaa.gov

Risk Assessment and Emergency Management in Coastal Disaster

Status: Pending Further Discussion

Unstructured Grid Oceanic Ecodynamic Model Study and its applications along Chinese coastal areas

Status: Pending Further Discussion

Study on Marine Sediment Quality Criteria

Point of Contact: SOA: jywang@nmemc.gov.cn

NOAA: Gunnar.Lauenstein@noaa.gov

Protection and Management of Offshore Ecosystem in Estuary of Yellow River

Point of contact: SOA: North Sea Branch of SOA

NOAA: Jonathan.Justi@noaa.gov (interim)

Survey on Management Work of Marine Spatial Planning in the USA

Status: Pending Further Discussion

Survey on Management Work of Island in the USA

Status: Pending Further Discussion

Integrated Management of Land Source Pollution Based on Ecosystem in Bays

Point of Contact: SOA: Chenbin910@yahoo.com.cn
NOAA: Ed.Kruse@noaa.gov

Availability and Access to Data on Investigating and Monitoring Marine Environment

Point of Contact: SOA: Haiyan Wang (why@xmu.edu.cn)
US: TBD

Study on Monitoring and Evaluation Techniques for Atmospheric Deposition of Biogenic Elements to the Ocean

Point of Contact: SOA: Yang Zhengxian (zxyang@nmemc.gov.cn)
NOAA: Julian.Wang@noaa.gov

The above projects will be pursued pending the availability of resources and, as necessary, further discussed following the Joint Working Group Meeting and before the next Integrated Coastal and Ocean Resources Panel Meeting.

Polar Sciences

The co-Chairs of the Polar Science Panel, Dr. Zhanhai Zhang and Dr. John Calder, agreed that the Panel will continue to emphasize collaborative work during the International Polar Year. Planning is now underway for work to be done in summer 2008 and possibly summer 2009. To meet mutual objectives, additional partnerships, particularly with Canada and Russia will be needed. A 4-country meeting is being planned for July 2007 in Washington D.C. to discuss sharing of a Russian icebreaker during summer 2008. The co-Chairs also agreed to convene a full Panel meeting in October 2007 in Washington D.C. This meeting would be coordinated with a planned U.S.-China IPY Research Roundtable being organized by Texas A&M University, as well as plans for a meeting of the Pacific Arctic Group to be held in Ottawa, Canada. All 3 meetings will be within a 2-week period, making travel for the Chinese visitors very efficient. A teleconference was held with the NOAA Southwest Fisheries Science Center to discuss marine biodiversity monitoring in the Antarctic region, especially in the vicinity of the Chinese Great Wall Station. Further communication by email will be used to develop possible collaborations in this area.

U.S. Co-Chair: John Calder, NOAA

Chinese Co-Chair: ZHANG Zhanhai, SOA/PRIC

APPENDIX V
Review of Activities: 2004-2006 (2007)

APPENDIX V
Review of Activities: 2005-2006 (2007)

Living Marine Resources Panel:

I. Shrimp

A. Endocrinology of shrimp reproduction, maturation and spawning

Project	Endocrinology of shrimp reproduction, maturation and spawning
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences; University of Connecticut
Contacts	China : Prof. Jianhai Xiang : Tel:86-532-82898568 Email: jhxiang@ms.qdio.ac.cn USA : Dr. Hans Laufer, Email : hans_laufer@uconn.edu
Progress	During 2005-2006, Scientist from USA planned to visit IOCAS. According to the request of the scientist, IOCAS signed the invitation letter to Dr. Hans Laufer, But the visit did not become reality due to the busy schedule. Scientists in both sides always keep close contacts.
Problems and Reasons	The project was not performed as planning due to the difficult in budget and time.
Future Plan & Suggestions	Further cooperation is necessary.

B. Development and Introduction of SPF/SPR Shrimp Stocks

Program title	Development and introduction of SPF/SPR shrimp stocks
Institution of China side	Yellow Sea Fisheries Research Institute, CAFS
Contacts	Chinese contacts: Prof. Wang Qingyin, YSFRI, CAFS qywang@public.qd.sd.cn Prof.. Huang Jie, YSFRI, CAFS huangjie@ysfri.ac.cn US contacts: Dr. Gary D. Pruder, The Oceanic Institute, Hawaii sroddy@oceanicinstitute.org Dr. Donald V. Lightner, Veter. Univ. of Arizona dvl@u.arizona.edu Dr. A. L. Lawrence, Texas A&M University smpall@yahoo.com
Summary	The project started since 1994. During 1994 and 1999, under the collaborative effect, YSFRI accepted the delegation led by Dr. A. L. Lawrence from Texas A&M and sent Prof. HUANG Jie and Associate Prof. SONG Xiao-Ling to UA, bringing more than 20 populations of selected post larva of <i>F. chinensis</i> to US side. After re-quarantined in Dr. D. V. Lightner's lab of UA, several SPF candidate populations of <i>F. chinensis</i> were selected for breeding. Due to small population or mature techniques, the breeding project did not succeed.

	<p>Since 2000, the strategy of SPF <i>F. chinensis</i> breeding project was focused on the using of nauplii population. Dr. C. Pantoja from Dr. D. V. Lightner's lab came to YSFRI in 2000 and 2001 to select SPF candidate nauplius populations. More than ten populations were screened and shipped to US side. After re-quarantined in UA, the candidates were sent to Taxes A&M or OI for breeding and growth. Finally, SPF <i>F. chinensis</i> were successfully bred in 7 populations. According to the agreement of Sino-US panel and later consulting between two sides, US side kindly agreed to send back some SPF populations to China side in 2003. Unfortunately, due to the outbreak of SARS, the introduction of SPF <i>F. chinensis</i> was deferred.</p> <p>A paper was jointly published on the development of SPF <i>F. chinensis</i> population on Aquaculture in 2005.</p> <p>Pantoja, C. R., Song, X.-L., Xia, L., Gong, H., Wilkenfeld, J., Noblea, B., Lightner, D. V.. 2005. Development of a specific pathogen-free (SPF) population of the Chinese fleshy prawn <i>Fenneropenaeus chinensis</i> Part 1: disease pre-screening and primary quarantine. <i>Aquaculture</i>, 250, 573–578.</p>
Problem and causes	<p>The introduction of SPF <i>F. chinensis</i> populations was not performed after 2003. The main reasons are as following.</p> <p>The SPF <i>F. chinensis</i> populations were developed on the base of small wild populations of <i>F. chinensis</i>. Due to the populations were not selected by long term breeding program, the genetic properties are close to the original wild populations of <i>F. chinensis</i>. So that immediate introduction of the populations has not significant benefit.</p> <p>The developed populations are currently focused on the specific pathogen free, which is only in an extra genetic living state. Once the populations were introduced back to China, the SPF states will immediately lose.</p> <p>Under the above background, as well the complication of quarantine procedures and unmet budget and facilities for introduction and following cultivation, the introduction of the populations was postponed.</p>
Next plan and proposals	<ol style="list-style-type: none"> 1. Project title: Development of SPR <i>F. chinensis</i> against shrimp virus 2. Responsible Institution: Yellow Sea Fisheries Research Institute, CAFS 3. Contacts: Chinese contacts: Prof. Wang Qingyin, YSFRI, CAFS qywang@public.qd.sd.cn Prof.. Huang Jie, YSFRI, CAFS huangjie@ysfri.ac.cn US contacts: Dr. Gary D. Pruder, The Oceanic Institute, Hawaii sroddy@oceanicinstitute.org Dr. Donald V. Lightner, Veter. Univ. of Arizona dvl@u.arizona.edu Dr. A. L. Lawrence, Texas A&M University smpall@yahoo.com 4. Main purpose:

SPF status of *F. chinensis* is only a living status. Once the animals leave from the strict quarantine environment, the status will lose. As *F. chinensis* is very susceptible to the infection of WSSV, SPF *F. chinensis* populations are what we need, and it will fit to the interest of US side. We look forward to continuing and enhancing the collaboration on the successful development of SPR *F. chinensis* to WSSV under the Panel based on larger population resource pool of *F. chinensis* with the assurance of sharing of intellectual property rights and research achievement on bred SPR *F. chinensis* populations.

Proposal on main collaboration activities:

- (1) Analysis of susceptibility of different *F. chinensis* populations or families to WSSV infection;
- (2) Diversity of cellular receptor of WSSV in different shrimp populations;
- (3) Selection of different populations or families of *F. chinensie* to WSSV infection;
- (4) Breeding of SPR *F. chinensis* populations or families to WSSV infection.

5. Project period:

2007—2012

6. Time schedule

2007—2008: Establishment of the techniques in the activity (1) and (2);

2008—2009: Application of the techniques in the activity (1) and (2);

2009—2012: Collaboration on the activity (3) and (4).

7. Budget:

The international traveling costs of both sides will paid by the sending side, and the domestic accommodation and research budget will paid by the accepting side. Both sides apply the budget from their own government.

8. Collaboration of investigation and material sharing:

- 2—3 scientists or students of China side are sent to US side to accept the technology training or research and establish the techniques on the activity (1) and (2);
- China side accepts 2—3 scientists of US side to give technology advices and aids on the activity (3) and (4);
- The technological establishment for the activity (1) and (2) can be finished in US. And the established techniques can be applied in China;
- The activity (3) is finished in China with participation of US experts;
- The activity (4) is finished in both sides with sharing of achievements.
- Papers under collaborative efforts should be shared by both sides. The contact persons of both sides can be co-corresponding authors.
- SPR *F. chinensis* developed under collaborative efforts should be shared by both sides. China side provides gratis the wild populations of *F. chinensis* for the selection of SPR from larger gene pool. US side transfers gratis all of the bred SPF populations to China side.

9. Expecting output:

- New species or population of SPR *F. chinensis* can be developed;
- More than 6 papers can be published under collaboration efforts;
- 1—2 Ph.D. students or Post Doctor will be trained.

Project	Joint study on molecular genetic markers in penaeid shrimp
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences; Tufts University
Contacts	China : Prof. Jianhai Xiang : Tel:86-532-82898568 Email: jhxiang@ms.qdio.ac.cn USA : Dr. Acarcia Alcivar-Warren
Progress	Not performed
Problems and Whys	Budgets and time problem.
Future Plan & Suggestions	Consulting based on the intents of both sides

II . Shellfish

A. Scallop mass mortality--Mechanism of mass mortality of cultured scallop *Chlamys farreri*

Project	Mechanism of mass mortality of cultured scallop <i>Chlamys farreri</i>
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences Haskin Shellfish Research Lab, Rutgers University
Contacts	Chinese Contact : Dr. Hongsheng Yang, Institute of Oceanology, Chinese Academy of Sciences, 266071 hshyang@ms.qdio.ac.cn US Contact : Dr. Ximing Guo, Haskin Shellfish Research Lab, Rutgers University xguo@hsrl.rutgers.edu
Progress	Flow cytometry was used to detect the haemocyte functional responses, investigated the effects of environmental stress factors on immune parameters of Zhikong scallop. The results showed that air exposure at different temperatures (5°C, 17°C and 25°C) , acute elevated temperature challenge (from 17°C to 28°C) , acute decreased salinity challenge (from 30‰ to 20‰) and 45days starvation stress seriously inhibited haemocyte activities and damaged the membrane system and organelle of haemocyte, which caused the inability of bivalve species to counteract opportunistic pathogens because of a depression of their immune system while exposed to natural or anthropogenic perturbations. In addition, ELISA was used to detect the influence of environment on the concentrations of stress hormone (adrenaline, noradrenaline and dopamine).
Problems and Reasons	No repeat sampling in different seasons because of the limitation of equipment(sic).
Future Plan & Suggestions	Study the mechanism of mass mortality of scallop from molecular biology

B. Ecology and management of the Asian oyster Crassostrea ariakensis in Bohai Sea

Project	Ecology and management of the Asian oyster <i>Crassostrea ariakensis</i> in Bohai Sea
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences Virginia Institute of Marine Science
Contacts	China: Dr. Huayong Que, email: hque@ms.qdioac.cn USA : Dr. Mark Luckenbach, email: luck@vims.edu
Progress	A group of American scholars performed site-investigation on Bohai Bay during 2003-2004, collecting oysters samples and bringing them back to US for further analysis; No activities have been done during 2005-2006.
Problems and Reasons	Lack of research funding for US scholars
Future Plan and Suggestions	For further negotiation

C. Genetic breeding and genetic markers screening in bay scallop

Project	Genetic breeding and genetic markers screening in bay scallops
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences Rutgers University, New Jersey State University
Contacts	China: Dr. Guofan Zhang, email: gfzhang@ms.qdio.ac.cn U.S. : Dr. Ximing Guo, email: xguo@hsrl.rutgers.edu
Progress	A large number of selfed and crossed lines have been established by self-fertilization and pair-crosses, as well as full-and half-sib lines. Positive selective progress for growth has been gained by mass selection in the bay scallop on the base of a stock or a line. 10.20% and 10.63% genetic progress were gained on the base of a stock at the first and second generation, respectively. Hybrid crosses showed positive heterosis for all traits studied, and hybrid production was significantly improved. Genetics of shell color in the bay scallop has been studied by self-fertilization and pair-crosses. The genetic structure and genetic diversity of four cultured populations of the bay scallop were analyzed by AFLP. With AFLP and SSR markers, 15 and 17 linkage groups were identified in the female and male genetic maps, respectively.
Problems and Reasons	The project is progressing as planned with the financial support from China side. It is suggested appropriate financial support be granted from US side for further research.
Future Plan & Suggestions	Both side are satisfied with the progress and agree to move on this project. Further collaboration will emphasize on the following aspects: Breeding of fast-growth lines; Obtaining high density genetic map Suggestions: Priority should be given to this project in view of productive collaboration.

D. The molecular genetic maker technique, genetics and breeding of bivalve molluscs

Project title	The molecular genetic maker technique, genetics and breeding of bivalve molluscs
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences; University of California
Contacts	China : Prof. Jianhai Xiang : Tel:86-532-82898568 Email: jhxiang@ms.qdio.ac.cn USA : Dr. Dennis Hedgecock
Progress	Not performed
Problems and Reasons	There are obstacles in making contact.
Future Plan & Suggestions	Consulting based on the intents of both sides

E. Genomic study of scallop

Project title	Genomic study of scallop
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences; Rutgers University
Contacts	China : Prof. Jianhai Xiang : Tel:86-532-82898568 Email: jhxiang@ms.qdio.ac.cn USA : Dr. Ximing Guo, xguo@hsrl.rutgers.edu
Progress	The project is undergoing. Dr. Liusuo Zhang went to Dr. Ximing Guo's lab to perform genomic research of mollusks. the program progressed well. Received some funding from NSF in China.
Problems and Reasons	None.
Future Plan & Suggestions	Further cooperation is necessary.

III. Finfish

A. The immunology of cobia and redfish and vaccine preparation

Project title	The immunology and vaccine preparation in cobia and red fish
Implementation Institutions	South China Sea Fisheries Research Institute, CAFS. Virginia Institute of Marine Science, College of William and Mary. Gloucester Point, VA 23062
Contacts	U.S. contact: Dr S Kaattari, Virginia Institute of Marine Science, College of William and Mary. Gloucester Point, VA 23062. Chinese contact: Dr. Feng Juan, South China Sea Fisheries Research Institute, CAFS. Guangzhou, 510300

Progress	<p>Research work: we mainly studies on the immunology of cobia in 2006, analyzed the effect of salty on immunity factors of juvenile cobia in short-term and long-term. The development of immune tissues of cobia after hatchery were studied also. Besides we cloned the partly gene of Ig heavy chain.</p> <p>the visiting research and members exchange had been hung up in 2006, for lack of financial support.</p>
Problems and Reasons	<p>The cooperation work lack of necessary financial support and valid connection.</p> <p>indistinct cooperation rules and loose organization made it difficult to explain the cooperation to the US connector.</p>
Future Plan & Suggestions	<p>The research work of immunology of cobia will continue in 2007, including the distribution of Ig+ cells before and after immunized, the location of immune tissue in mucosa, and vaccine of nocadiasis. While the connection with US cooperators will be enhanced.</p> <p>Appropriating a sum to support the run of cooperation, especially the visiting research and exchange.</p> <p>Illustrating cooperation rules and requisitions.</p>

B. Research on Chinese Sturgeon, Acipenser sinensis, in the Yangtze Estuary and Coastal East China Sea

Project Title	Research on Chinese Sturgeon, Acipenser sinensis, in the Yangtze Estuary and Coastal East China Sea
Organizations	S.O. Conte Anadromous Fish Research Center, U.S. Geological Survey East China Sea Fisheries Research Institute, CAFS
Contacts	Dr. Boyd Kynard, S.O. Conte Anadromous Fish Research Center, U.S. Geological Survey Dr. Zhuang Ping, Mobile :+8613918119797,E-mail :Pzhuang@online.sh.cn
Progress	<p>Environment status and seasonal change of Shanghai Yangtze Estuarine Natural Reserve for Chinese Sturgeon had been studied. Environmental gene had been master, including water status and pollution.</p> <p>The diet composition and monthly variation in feeding habits of juvenile Acipenser sinensis had been studied, which were caught in Yangtze River estuary from May to September of 2004. The result showed that they mainly fed on demersal fish, polychaeta and amphipoda as well as some small-sized benthic invertebrates including shrimps, crabs and bivalve. The feeding rate and feeding intensity were high and feeding intensity varied monthly.</p> <p>Habitat preference plays an important role in the life of fish. We studied substrate color preference of juvenile Chinese sturgeon, Acipenser sinensis</p>

	<p>by Single Factor Experiments. The result shows that Juvenile Chinese sturgeon preferred white substrate significantly between white and black substrate. Water Currents, temperature and Illumination intensity have no significant effects on this preference. The preference for white substrate color of juvenile Chinese sturgeon maybe related to feeding behavior. Some Chinese sturgeons had been released into the Yangtze Estuary used Pop-up Tag. It was the first time to use Pop-up Tag in China.</p> <p>(From B. Kynard: The project on Chinese sturgeon movements in the Yangtze Estuary and in marine waters was funded by the Chinese. I went there in July and tagged six fish with satellite pop-up tags using a new technique developed for this research at the USGS Conte lab. We have obtained data from three tags (3 tags out for 6 months) and data analysis is being done now. Expectations are that the study will continue in 2007 or 2008.</p> <p>The project has been a great benefit to me and to the Chinese because it has introduced us to the future of telemetry in the 21st Century. Anything that can facilitate the use of telemetry to study aquatic organisms in China will greatly improve their ability to understand habitat requirements and migrations. The Chinese have paid all funding for the present study, except for the tag attachment development at the Conte Lab. For more than 10 years, I have attempted to introduce telemetry to Chinese aquatic biologists, conducting studies in the Yangtze R. and now the pop-up tag study in the estuary and sea.</p>
Problems and Reasons	Workload was a little great and difficult, so many aspects of Chinese sturgeon need further study.
Future Plan	Study on environmental biology of Chinese sturgeon, <i>Acipenser sinensis</i> , in the Yangtze Estuary and Coastal East China Sea.

C. Functional Genomics and Molecular Marker Assisted Selection of Marine Fish

Project Title	Functional Genomics and Molecular Marker Assisted Selection of Marine Fish
Organizations	Yellow Sea Fisheries Research Institute, CAFS Auburn University
Contacts	Prof.. Zhanjiang Liu, Auburn University Dr. Chen Songlin TEL : +86-532-8584 4606
Progress	In September 2005, Prof.. Zhanjiang Liu came to Shanghai, China to participate in the 2005'Forum on Fishery Science and Technology, and gave an address on the application of biotechnology in aquaculture. In January 2006, Dr. Chen visited Prof. Liu's Laboratory in Auburn University and exchanged the progress of the project. In July 2006 Prof. Zhanjiang Liu visited the Yellow Sea Fisheries Research Institute and

carried out the cooperative research.

Now the project is still under research and going well. The two sides have achieved important progress in the selection of disease resistant molecular markers for Japanese flounder. Two MHC gene markers were got and 2 candidate AFLP molecular markers are under test.

Problems and Reasons No
Future Plan Continue

IV. Virology

A. Study on Virology of Aquatic Organism

Program title	Study on virology of aquatic organism
Responsible institution of China side	Yellow Sea Fisheries Research Institute, CAFS
Contacts	Chinese contacts: Prof.. Huang Jie, YSFRI, CAFS huangjie@ysfri.ac.cn US contacts: Dr. Donald V. Lightner, Veter. Univ. of Arizona dvl@u.arizona.edu
Summary	<p>Early collaboration on shrimp virology study was engaged between the laboratories of YSFRI and UA from 1995 to 2001. Effective collaboration progressed successfully on research on WSSV gene cloning, probe development, pathogenicity of WSSV and time course of infection, cDNA library of WSSV infected gill cells, rapid detection of WSSV, HPV, YHV, IHHNV, and TSV, materials exchange, and academic communication. In the early 2005, China side prepared to organize a delegation from YSFRI and the Zhujiang Fisheries Research Institute, CAFS to visit some laboratories on aquatic animal disease research, including Dr. D. V. Lightner in UA. The scientists in both sides have contacted on the issues of academic and materials exchange for the coming visiting. However, due to the visiting budget issues, the visiting plan aborted. No more collaborative activity continued until the end of 2006.</p> <p>A paper was published in 2002: Song, X.-L., Huang, J., Tang, K. F. J., Yang, B., Lightner, D. V., 2002. The contraction and analysis for cDNA clones of White Spot Syndrome Virus of shrimp. <i>Acta Hydrobiologica Sinica</i>, 26(5): 444—451. Based on the collaborative achievement on the WSSV probe technology, China side continued further research on shrimp virology and published more than 60 papers.</p>
Problem and causes	<p>This project originally is accompanied with the project of “Selection and introduction of SPF shrimp <i>Fenneropenaeus chinensis</i>”. After the preliminary success of SPF <i>F. chinensis</i>, it is provisionally not necessary for US side to introduce <i>F. chinensis</i> from China. The activity of collaboration under this project is impacted.</p> <p>In the early 2005, China side prepared to organize a delegation from YSFRI and the Zhujiang Fisheries Research Institute, CAFS to visit some</p>

	<p>laboratories on aquatic animal disease research, including Dr. D. V. Lightner in UA. The scientists in both sides have contacted on the issues of academic and materials exchange for the coming visiting. However, due to the visiting budget issues, the visiting plan aborted. No more collaborative activity continued until the end of 2006.</p>
Next plan and suggestions	<p>1. Project title: Study on the molecular virology of Penaeid shrimp</p> <p>2. Responsible Institution: Yellow Sea Fisheries Research Institute, CAFS</p> <p>3. Contacts: Chinese contacts: Prof.. Huang Jie, YSFRI, CAFS huangjie@ysfri.ac.cn US contacts: Dr. Donald V. Lightner, Veter. Univ. of Arizona dvl@u.arizona.edu Dr. Kenneth Hasson, Texas A&M University KHASSON@tvmidl.tamu.edu</p> <p>4. Main purpose: Under the support of the National Basic Research Program (973) of China, we are engaged in the research on WSSV attachment protein (VAP) and cellular receptor for 7 years. Right now, the research technology has been established. 4 VAPs of WSSV and its cellular receptor were found. More further research, including WSSV gene variation and shrimp immunology as well, are on going. Based on our above research progress, we wish to continue the deep collaboration with US side for the exchange of persons, technology, academic idea, and materials. We believe that the collaboration will push out the innovation of research in both side and provide new technological base for shrimp viral disease control.</p> <p>Proposal main collaborative activities: (1) Research on the viral attachment protein, cellular receptor, and infection inhibitor for WSSV or other shrimp viruses; (2) Gene variation and infectivity of WSSV; (3) Shrimp immunology and virus resistant mechanism; (4) Shrimp tissue culture and virological research with SPF shrimp.</p> <p>5. Project period: 2007—2012</p> <p>6. Time schedule: 2007—2009: Send 1—2 scientists from China side to US laboratory for the activity (1), (2), and (4); 2008—2009: Send and accept 1—2 scientists or students from both side to the partner side for the activity (2) and (3); 2009—2012: Send and accept 1—2 scientist or students from both sides to the partner side for further research on the well progressive activities.</p> <p>7. Budget: The international traveling costs of both sides will paid by the sending side, and the domestic accommodation and research budget will paid by the accepting side. Both sides apply the budget from their own</p>

	<p>government.</p> <p>8. Collaboration of investigation and material sharing:</p> <ul style="list-style-type: none"> - Sufficient exchange of idea on the research interests for both side. - China side send 2—3 scientists or students to US side for the collaboration in common interested activities and technology training. - China side accept 2—3 scientists or students from US side for the collaboration in common interested activities and technology training or introduction. - Papers under collaborative efforts should be shared by both sides. The contact persons of both sides can be co-corresponding authors. <p>9. Expecting output:</p> <ul style="list-style-type: none"> - Exploring of the molecular infection mechanism of 1—2 shrimp viruses; - Revealing of the impact of molecular variation on the infectivity of WSSV; - Understanding of the mechanism of virus resistance of shrimp; - More than 6 papers can be published under collaboration efforts. - 1—2 Ph.D. students or Post Doctor will be trained.
--	--

B. Study on Diagnostic Technology by Gene Chips for the Virus and Microorganism of Aquatic Organism

Program title	Study on Diagnostic Technology by Gene Chips for the Virus and Microorganism of Aquatic Organism
Responsible institution of China side	Yellow Sea Fisheries Research Institute, CAFS
Contacts	<p>Chinese contacts: Prof.. Huang Jie, YSFRI, CAFS huangjie@ysfri.ac.cn</p> <p>US contacts: Dr. Donald V. Lightner, Veter. Univ. of Arizona dvl@u.arizona.edu</p> <p>Dr. John Stubbs, Professor, San Francisco State University stujod@sfsu.edu</p>
Summary	<p>YSFRI began the contacts with US side on the technology of gene chips in 1997 when a delegation from San Francisco State University led by Dr. J. Stubbs. In 1998, a Chinese delegation was sent to SFSU, including Ms. Bing Yang and Ms. Yan Zhang from YSFRI, for a short course on gene chip technology and molecular biology. Dr. William Liang from SFSU visited Prof. J. Huang to discuss the collaboration on gene chip technology in this year. YSFRI began the research on the gene chip detection techniques for shrimp viruses under the support of 948 projects “Utilization of gene chip technology in the diagnosis of maricultured organism” in 2005. The research are extended to the pathogens of fish and shrimp under the support of 863 project “High throughput diagnostic techniques for maricultured animal diseases” in end of 2006. According to the research progress in Chinese side, the collaborative activity is better to be arranged during 2007—2009. We are looking forward to launching the China-US collaboration on the gene chip diagnostic technology for maricultured organism diseases in the coming schedule.</p>

Problem and causes	<p>The idea about this project was not adequately discussed between both sides. According to the research progress in Chinese side, the collaborative activity is better to be arranged during 2007—2009. We are looking forward to launching the China-US collaboration on the gene chip diagnostic technology for maricultured organism diseases in the coming schedule.</p>
Next plan and suggestions	<p>1. Project title: Chip Diagnostic Technology for Maricultured Animal Diseases</p> <p>2. Responsible Institution: Yellow Sea Fisheries Research Institute, CAFS</p> <p>3. Contacts: Chinese contacts: Prof.. Huang Jie, YSFRI, CAFS huangjie@ysfri.ac.cn US contacts: Dr. Donald V. Lightner, Veter. Univ. of Arizona dvl@u.arizona.edu Dr. Kenneth Hasson, Texas A&M University KHASSON@tvmidl.tamu.edu</p> <p>4. Main purpose: Under the support of the National High Technology Development Program of China (863), we are engaged in the development of the chip diagnostic technology for fish and shellfish diseases. Right now, a gene chip technology for identification of 6 pathogenic bacteria and detection of its pathogenic genes was developed. Based on our above research progress, we wish to extend the collaboration with US side for the exchange of persons, materials, technology, and academic idea, and to establish and improve the chip diagnostic technology for maricultured animal diseases, to verify adequately the technological reliability in different application mode.</p> <p>Proposal main collaborative activities: (1) Material collection and exchange for different pathogens of maricultured animals; (2) Sequencing for the new pathogens of maricultured animals; (3) Sample technology for the application of diagnostic chips; (4) Designing and preparing technology of the diagnostic chips; (5) Application tests for the diagnostic chips.</p> <p>5. Project period: 2007—2010</p> <p>6. Time schedule: 2007—2008: Send 1—2 scientists or students from China side to US laboratory for collaboration; 2008—2009: Send and accept 1—2 scientists or students from both side to the partner side for collaboration; 2009—2010: Joint application tests of the developed chips in the laboratories, hatcheries, farms of both sides.</p> <p>7. Budget: The international traveling costs of both sides will paid by the sending side, and the domestic accommodation and research budget will paid by</p>

	<p>the accepting side. Both sides apply the budget from their own government.</p> <p>8. Collaboration of investigation and material sharing:</p> <ul style="list-style-type: none"> - Sufficient exchange of idea on the research interests for both side. - Both side send and accept 2—3 scientists or students to the partner side for the collaboration and joint application tests. - China side and US side collect the pathogens in China, US side open its pathogen collection to China side for the collaboration on diagnostic chip. - Papers under collaborative efforts should be shared by both sides. The contact persons of both sides can be co-corresponding authors. - Patents under collaborative efforts should be shared by both sides. <p>9. Expecting output:</p> <ul style="list-style-type: none"> - Developing of 1—2 sets of the chip diagnosis technologies; - Sufficient material exchange for pathogen collection; - More than 3 papers can be published under collaboration efforts. - 1—2 Ph.D. students or Post Doctor will be trained.
--	---

C. Virology of haliotis diversicolor Reeve

Project title	Virology of haliotis diversicolor Reeve
Institutions	South China Sea Fisheries Research Institute, CAFS University of Washington
Contacts	Wang Jiangyong, 020-84195177, wjy104@163.com Carolyn Friedman, University of Washington
Progress	No activity
Problems and Reasons	Lack of fund
Future Plan	Continue

V. Algae

A1. Seaweed cultivation, biology and biotechnology

Title of project	Seaweed Cultivation, Biology & Biotechnology Subject
Institute	Shanghai Fisheries University
Contact and way	Peimin He, Tel : 86-21-65710023 Fax : 86-21-65710023 pmhe@shfu.edu.cn
Performing situation of projects	1 The free conchosporangium breeding technologies in <i>Porphyra yezoensis</i> was established. Free conchosporangium of <i>Porphyra yezoensis</i> formation, growth, maturation and conchospores releasing could be carried out completely under the controlled conditions in the laboratory with the principle and technology of seaweed development controlling. Moderate productive breeding experiments were performed at Dayang harbor of Rudong and Lusi harbor of Qidong, Jiangsu Province in 2005-2006. Total about 200 nets (5 mus for cultivation area) were seeded with spores from free-living conchosporangia with the new breeding method. And cultivation experiment in the sea with these seedlings achieved success since October and November (1-2 months later than normal seeding season). Results showed that new breeding technology

	<p>without shells was operable. It will help to prevent decay during cultivation in the sea under high temperature and illustrate a good prospect of application and extension.</p> <p>2 Genetic transformation systems of Porphyra and Enteromorpha were established. Experiments of gene transfer in Porphyra and Enteromorpha are now under way. New Porphyra species with good disease resistance and Enteromorpha, “Energy Seaweed”, with high energy yield are under breeding.</p> <p>3 Gene libraries were constructed using suppression subtractive hybridization (SSH) method with Porphyra yezoensis sporophytes. Nearly 100 ESTs of conchocelis were obtained and 50 ESTs of them were sequenced.</p> <p>4 Book “Seaweed Biotechnology and application” were published in 2006.</p>
Problem and causation	The large-scale popularization of the free conchosporangium breeding technologies in Porphyra yezoensis will require for the reconstruction of traditional breeding farm and provide advantageous conditions to the breeding process.
The next plan and suggestion	<p>1 Rebuilding new breeding farms in Rudong and Lusi, Qidong, Jiangsu Province and popularizing the no-shell breeding technologies gradually.</p> <p>2 Intensifying the efforts on gene transfer studies on seaweed and developing the genetically modified “Energy Seaweed”.</p>

A2

Project	Pilot Integrated Mariculture with Native Porphyra
Implementation Institutions	Institute of Oceanology, Chinese Academy of Sciences; University of Maine, USA
Contacts	Prof. Susan H Brawley Prof. FEI Xiugeng Dr. Jiang Peng
Progress	Based on Chinese Nori cultivation technique with American local nori species as material, the US co-PIs invites 2 Chinese specialist come to US to do joint research. From 2005-05-18 to 2005-09-05 the above project has been successfully conducted on raising seedstock, land based raceway culture and open sea raft culture. Predict schedule was fulfilled.
Problems and Reasons	No
Future Plan & Suggestions	Based on successful cooperation, will promote new project as follows: General effect of global warming on growth and reproduction of intertidal macro algal flora

VI. Harmful Algal Bloom

A. China-US cooperation on the Receptor Binding Assay to detect HAB toxins

Project Name	China-US Cooperation on the Receptor Binding Assay to Detect HAB Toxins
Institutions	First Institute of Oceanography, State Oceanic Administration (SOA), China NOAA, National Ocean Service
Contacts	Prof. ZHU Mingyuan First Institute of Oceanography, SOA, China. E-mail: myzhu@public.gd.sd.cn Ms. ZOU Yinglin, First Institute of Oceanography, SOA, China. E-Mail: ylzou@hotmail.com Dr. Frances Van Dolah, NOAA, National Ocean Service Mr. Tod Leighfield, NOAA, National Ocean Service
Progress	With the help of equipment supply from the IAEA and technique training from the expert laboratory(US NOAA), China have set up the traditional receptor binding assay for PSP and NSP toxins, did some comparative studies on the method, including comparative studies on mouse bioassay and RBA, ELISA and RBA, HPLC method and RBA for PSP toxins, and also applied the assay in some of the analysis for shellfish toxin monitoring and identifying algal toxins for toxic red tide dinoflagellate. During August to September, 2005 China participated in the Southeast Asia interlaboratory calibration of receptor binding assay for PSP toxins. We analyzed 7 blind shellfish samples with different dilutions by the traditional receptor binding assay for three times. Results have been sent to the NOAA lab. The RBA technique is now ready to be transferred to the end users.
Problems and Causes	There are still difficulties in transferring the techniques to the end users such as environmental monitoring agencies and fishery agencies. The main problem is that the tritium labeled saxitoxin standard could not be provided or easily purchased, which greatly limited the development and transfer of the RBA techniques.
Further Plans and Recommendations	Recommendations: 1、 We hope the techniques for tritium being labeled to toxins could also be transferred to each country in the future project, therefore the difficulties and problems of purchasing toxin standards from abroad could be solved, and the RBA technique could spread to more of the end users ; 2、 It is also suggested that more inter-laboratory cooperation activities organized by the IAEA, expert lab or the leading country be carried out. It'll help to keep technical communications among the participants/experts, and to accomplish more research goals.

B. Collaboration between the University of Connecticut and Several Universities in China on HAB Research

1 & 2.

Title of project	(VI) Harmful Algal Blooms
Institute	Shanghai Fisheries University

Person and Contact way	Peimin He, Tel : 86-21-65710023 Fax : 86-21-65710023 pmhe@shfu.edu.cn
Performing of projects	<p>1 Dr. Senjie Lin made two academic surveys and visited Shanghai Fisheries University in 2005 and 2006. He gave tow special lectures about species identification of harmful algal blooms with molecular biology technology and studies on red tides in the world. He visited Lab of Seaweed Biotechnology and Center Lab, gave advice on research projects, postgraduate experiments, as well as direct for manuscript revising and paper publication.</p> <p>2 Dr. Senjie Lin design primers for Rubisco (Ribulose 1, 5-Bisphosphate carboxylase/oxygenase, a key enzyme for photosynthesis) rbcL gene clone with PCR. He also stayed at the lab for several days and gave advice on DNA and RNA extraction for graduator experiment in our study. With PCR technology, partial gene sequence of Rubisco large subunit was got. Further the rbcL cDNA sequence was firstly cloned and isolated with RACE method, and there were 1430bps in the cDNA. And whole length of rbcL was firstly cloned and isolated with Genome Walking and “Nest” PCR technology. It has laid the foundation for further molecular early warning technologies for red tide.</p> <p>3 In lab, the seaweed <i>Enteromorpha clathrata</i> was used to study the inhibition of nutrition competition and allelopathic competition of red tides (<i>Prorocentrum</i> and <i>Phaeodactylum tricornutum</i>). We found that the inhibition rates of nutrition competition and allelopathic competition of <i>Enteromorpha clathrata</i> on <i>Phaeodactylum tricornutum</i> growth reached 74.5% and 84.8% respectively. It indicated that <i>E. clathrata</i> evidently could inhibit the growth of <i>P. tricornutum</i>.</p> <p>4 Three SCI papers have been revised and submitted.</p>
Problem and causation	It is necessary to establish the Multi-PCR technologies for the identification of harmful algal species.
Plan and suggestion in next project	We will analyze the gene sequence of Rubisco in harmful algal species common in China, develop fast test molecular techniques for identifying red tide species applying with Multi-PCR technologies, and prepare for the establishment of the molecular early warning system for red tide.

3.

Project	Estimate in situ growth rate of phytoplankton by means of molecular biology technology
Institutions	Ocean University of China
Contacts	Mi Tiezhu College of Environmental Science and Engineering, Ocean University of China 238,Songling Road, Qingdao, Shangdong, China email:mitiezhu@mail.ouc.edu.cn Tel&Fax:0532-66781940
Progress	In our research team, the PCNA and <i>Cty b</i> genes of <i>Skeletonema costatum</i> were sequenced, based on these sequences, FQ-PCR detection method was established with using TaqMan probes and plasmid standards. The variety of the PCNA and <i>Cty b</i> expression in different growth stages was studied. The results showed that during the algal growth cycle, PCNA gene expression had distinct changes in different phases of alga growth, in the exponential stage, the

	<p>growth rate was higher, the highest growth rate reached to 2.79d⁻¹, and in this stage, the PCNA expression was also higher, the highest growth rate reached to 290copies/cell ; while the growth rate was zero or even negative and the PCNA expression was also got to low value (<0.10copies/cell) .</p> <p>This suggested that the PCNA expression was related to the cell cycle and that the good potential of PCNA as a marker for detecting the growth rate of this red tide alga. In contrast, Cyt b expression was found to vary little with growth phase (200 ~ 274copy/cell, with the CV% of 12%)(Fig 3), which suggests that Cyt b is promising as a good housekeeping gene.</p> <p>Our research team established the enumerating method for relative expression of PCNA. The cell counting was not necessary in this method, and Cyt B was used as housekeeping gene to normalize the PCNA expression, thus the counting error was avoided. Further more, the relationship between the growth rate and the relative PCNA expression amount was studied elementarily.</p>
Problems and Reasons	
Future Plan	<p>The effect of the Synchronous split of <i>S. costatum</i> to the growth rate.</p> <p>Establish the function between the growth rate and the PCNA expression.</p> <p>The siege experiment in situ and the at sea experiment in situ.</p> <p>Study of the relationship between the growth rate and the PCNA expression of more harmful algae.</p>

4.

Project	Using molecular techniques to study copepod grazing on HAB phytoplankton
Institutions	U.S. : University of Connecticut Chinese Contact: Ocean University of China
Contacts	U.S. Contact: Dr. LIN Senjie, University of Connecticut Chinese Contact: Professor Guangxing LIU at Ocean University of China Tel. : 0532-66782672, 82032939 Email: gxliu@ouc.edu.cn
Progress	<p>In order to learn more about the mechanisms of selecting feeding of copepod on phytoplankton and its role in controlling the HABs, we have conducted the research work on using molecular technique to study the grazing of pelagic copepod <i>Calanus sinicus</i> on phytoplankton since 2005. The main progress is as follows:</p> <p>Established the procedure for copepod samples collection, treatment and analysis.</p> <p>Sampling copepod <i>Calanus sinicus</i> from the near shore waters in Qingdao.</p> <p>According to the procedure, cloning the samples and preparing to sequence the clones.</p>
Problems and Reasons	No.
Future Plan	We will continue to study the seasonal variation of the grazing of <i>Calanus sinicus</i> on algae by means of sequencing the clones of the samples collected from near shore waters in different months.

5.

Project HAB research cooperation
 Institutions University of Connecticut
 Xiamen University
 Contacts U.S. Contact: Dr. LIN Senjie, University of Connecticut
 Chinese Contact: Drs. Nianzhi JIAO, Bangqin HUANG, and Yuanshao LIN,
 Xiamen University
 Progress No activity
 Problems
 and Reasons
 Future Plan

VII. Ecosystem Modeling Including Offshore Aquaculture

A. Impact of Large Scale Mariculture on Ecosystem and Environment

Project Impact of Large Scale Mariculture on Ecosystem and Environment
 Institutions Yellow Sea Fisheries Research Institute, CAFS
 Northwest Fisheries Science Center, NMFS,
 Contacts Prof. Fang Jiangguang, Yellow Sea Fisheries Research Institute, CAFS
 Dr. Michael Rust, Northwest Fisheries Science Center, NMFS, NOAA
 Dr. Charles Yarish, University of Connecticut
 Progress No activity
 Problems Lack of fund
 and Reasons
 Future Plan

B. Mathematical modeling on carrying capacity of cage based marine fish farming

Project	Mathematical modeling on carrying capacity of marine fish cage farming
Institutions	South China Sea fishery research institute, CAFS The School of Marine Science & Technology University of Massachusetts-Dartmouth New Bedford, MA 02744
Contacts	Mr. HUANG Honghui Address: 231, West Xin'gang Road, Guangzhou, China E-mail: jxhuanghh@21cn.com Phone: 020-84195173 Fax: 020-84451442 Dr. Changsheng Chen, The School of Marine Science & Technology University of Massachusetts-Dartmouth New Bedford, MA 02744
Progress	No activity
Problems and Reasons	Lack of fund
Future Plan	

C. Marine Eutrophication Bioremediation with Seaweeds

Title of project	Ocean Eutrophication and Bioremediation by Seaweed Cultivation
Institute	Shanghai Fisheries University
Person and contact way	Peimin He, Tel : 86-21-65710023 Fax : 86-21-65710023 pmhe@shfu.edu.cn
Performing of projects	<p>1 Studies and assessment were carried out for bioremediation by the red seaweed <i>Porphyra yezoensis</i> cultivation about 300 ha at Lusi Coast, Qidong, Jiangsu Province in 4 years (2003-2006). Results showed that during the non-cultivation period high expressions of eutrophic conditions had occurred along the Lusi coast. The water quality was lower than the Fifth class national standard and caused massive shellfish deaths. During the <i>Porphyra</i> cultivation period the water quality reached the First to Second class national standard. Sometimes N, P absence occurs in the cultivation area, and farmer must adopt a series of fertilization measures for <i>Porphyra</i> to keep good growth.</p> <p>2 The bioremediation studies were conducted by seaweed (<i>Laminaria</i> and <i>Gracilaria</i>) cultivation in marine fish cage culture area of Xiangshan harbor, Zhejiang Province. Results showed that large-scale cultivation of <i>Laminaria</i> had a marked effect on improving water environment. Best water quality improvement effect was observed by integrating <i>Gracilaria</i> with fish farming, and fish disease rate was reduced in co-culture system.</p> <p>3 The bioremediation studies were carried out by seaweed (<i>Gracilaria</i>) cultivation in the enclosure sea area (about 1.5 km²) of City Beach in Jinshan District, Shanghai. Results showed that large-scale cultivation of <i>Gracilaria</i> succeeded first in Shanghai coastal sea area and played an important part in improving water quality. The water quality reached First to Second class national standard instead of over Fifth class formerly and transparency were six meters. The project set an example to solve the problem of eutrophication in the enclosure sea area of cities on the sea and is important to marine tourism development.</p>
Problem and causation	It is necessary to make further researches into bioremediation by seaweed cultivation in fish cage marine culture area of Xiangshan harbor including optimization of the space-time distribution of seaweed cultivation and best proportion between seaweed and cultured animals in cage.
Plan and suggestion for next project	<p>1 Establishing the bioremediation model of seaweed cultivated in the enclosure sea area of cities on the sea;</p> <p>2 Establishing the bioremediation model of seaweed cultivated in the coastal eutrophic sea areas of China;</p> <p>3 Establishing the bioremediation model of seaweed cultivated in fish cage marine culture area.</p>

VIII. Others

A. Risk assessment of alien marine species invasion

Project Risk assessment of alien marine species invasion
 Institutions Marine Environment Monitoring Center, SOA
 Williams College and Mystic Seaport
 California State University Fullerton
 Contacts Prof. Wang Lijun, Marine Environment Monitoring Center, SOA
 James T. Carlton, Williams College and Mystic Seaport
 Steven Murray, California State University Fullerton
 Progress No activity
 Problems and Reasons No well contact
 Future Plan

B. Discovery of marine microbial drugs and ecology of drug-producing marine microorganisms

Project Discovery of marine microbial drugs and ecology of drug-producing
 marine microorganisms
 Institutions The Third Research Institute, SOA
 Department of Chemistry, University of South Florida
 Contacts Prof. Ye Dezan, The Third Research Institute, SOA 0592-2195223
 Dr. Bill J. Baker, Department of Chemistry, University of South Florida
 Progress No activity
 Problems and Reasons Lack of fund
 Future Plan Keep for 2007-2009

D. Study on adaptation of microorganism to the deep sea environment and exploitation of biogenetic materials

Project Study on adaptation of microorganism to the deep sea environment and
 exploitation of biogenetic materials
 Institutions The Third Research Institute, SOA
 Institution of Oceanography, University of California
 University of Connecticut
 Contacts Dr. Zeng Runying, The Third Research Institute, SOA 0592-2195223
 Dr. Douglas H. Bartlett, Marine Biology Research Division of Scripps
 Institution of Oceanography, University of California
 Prof. Pieter Visscher, University of Connecticut
 Progress No activity
 Problems and Reasons Lack of fund
 Future Plan Cancel

E. Molecular cloning expression and application of the genes involved in the immune defense of marine invertebrates

Project Molecular cloning expression and application of the genes involved in
 the immune defense of marine invertebrates
 Institutions Institute of Oceanology, CAS
 Rutgers University
 Contacts Chinese contact: Dr. Song Linsheng, Institute of Oceanology, CAS
 US contact: Dr. Ximing Guo, Haskin Shellfish Research Laboratory,

Institute of Marine and Coastal Sciences, Rutgers University
 Progress We sequenced 5000+ ESTs for the bay scallop and construct a genetic linkage map for this species. The results are published in the following papers: Song, L., W. Xu, C. Li, H. Li, L. Wu, J. Xiang and X. Guo. 2006. Development of expressed sequence tags from the bay scallop, *Argopecten irradians irradians*.

Problems and
 Reasons
 Future Plan

F. Polypeptide from *Chlamys farrei* (PCF)

Project Polypeptide from *Chlamys farrei* (PCF)

Institutions Yellow Sea Fisheries Research Institute, CAFS
 The University of Illinois at Chicago

Contacts Dr. Tingyu QU, The University of Illinois at Chicago.
 Prof. Sun Mi, Yellow Sea Fisheries Research Institute, CAFS
 0532-85819525

Progress In June 2005, Dr. Tingyu QU visited Prof. Sun's laboratory in Yellow Sea Fisheries Research Institute. The two sides discussed about the procedure for the cooperative research on PCF. In *August* 2006, Dr. Tingyu QU visited the Yellow Sea Fisheries Research Institute again, and exchanged the progress of PCF research in each other's laboratory. Now the project is under research.

[From Dr. QU] The polypeptides isolated from *Chlamys Farrei* (PCF) by Professor Mi Sun of China Yellow Sea Fisheries Research Institute was found to have a protective effects on UV damaged Hela cells in culture, which may be mediated by an antioxidative mechanism. I received several samples of PCF from Professor Sun and performed preliminary studies on cultured human neural stem cells (hNSCs). After adding PCF, hNSCs grow well and their further differentiation seems healthier compared to the control, suggesting that PCF is safe, non-toxic, and beneficial to hNSCs in vitro. However, other proposed collaborative activities were not performed due to the lack of funding. I do hope to continue this research and take a close look into details of PCF's effect on hNSCs if monetary support is available. Since brain aging and cognitive impairments have a close relationship with NSC activity, the effect of PCF on hNSCs deserve to be further examined. I believe that a fraction of the funding should go into exploring PCF and its effects on hNSCs, which can potentially better treat neurodegenerative diseases.

Problems and
 Reasons Short of fund
 Future Plan Continue

IX. Aquaculture Education Exchange

A. Education and Exchange Activities

Project Education and Exchange Activities
 Institutions BRVAS
 University of Connecticut
 Shanghai Fisheries University
 Contacts John Curtis, Director, BRVAS
 Dr. Charles Yarish, University of Connecticut
 Prof. Li Jiale, Shanghai Fisheries University
 Progress No report
 Problems and
 Reasons
 Future Plan

B. Cooperation in the Application of GIS in Fisheries

Project Cooperation in the Application of GIS in Fisheries
 Institutions BRVAS
 University of Connecticut
 Shanghai Fisheries University
 Contacts Xu Liusiong (Address: 334 Jungong Road, Shanghai China 200090: Tel:
 021-65710203, email: lxxu@shfu.edu.cn)
 Progress Invited by NOAA, Shanghai Fisheries University delegation (5 persons)
 headed by vice-president Huang Shuolin attended the NOAA and NASA
 Workshop on integrating Satellite Data into Ecosystem-Based
 management of Living marine Resources at California between May
 2-5 ,2006,during the workshop professor Huang Shuolin made a oral
 presentation on present status of China fisheries. After the workshop,
 vice-president Huang Shuolin, on behalf on Shanghai Fisheries University,
 signed a draft memorandum on establishing “China-US Joint Center for
 Ocean Remote Sensing and Living Marine Resources Management” with
 Mr. Kent HUGHES, the manager of NOAA Coastwatch program at South
 West Fisheries Information Research Center。 Main content of the
 Memorandum includes: Exchange of Satellite remote sensing data, products
 and software technology, new product development, and other scientific
 issues supporting the use of date and products from Chinese environmental
 satellites; Exchange of scientific and engineers, beginning in December
 2006 to support the planned opening ceremony of the Joint Center, Subject
 to the availability of funding up to four trips in Fiscal Year 2007 by NOAA
 personnel will be required to teach remote sensing short courses at SFU;
 effective links between NOAA and China CoastWatch and to foster the
 future development of OceanWatch; Strengthening ties between Chinese
 marine fishery scientists and managers; assisting in the development of
 value-added fishery products of use to local and State marine fishery
 resource managers.
 Under the memorandum, “SFU-NOAA Joint Center for Ocean Remote
 Sensing and Living Marine Resources Management” was established on
 December 3 and Shanghai Fisheries University and NOAA jointly hosted
 the first symposium on integrating satellite data into ecosystem-based
 management of living marine resources at SFU at the same time, about 30

scientists in the marine remote sensing field from NOAA National Environmental Satellite Data and Information Services, Marine Fisheries Service, University of Miami, University of Maryland, Space Bureau of Italy etc participated the symposium, about 20 papers were presented orally, with the three main topics related marine remote sensing, sustainable utilization of marine living resources, application of remote sensing data in fishery.

In March 2007, President Pan Yingjie of Shanghai Fisheries University received a letter from Gregory W. Withee Assistant Administrator for Satellite and Information Services, regarding potential cooperation between the National Oceanic and Atmospheric Administration (NOAA) and the Shanghai Fisheries University (SFU) in support of the potential establishment of the SFU-NOAA Joint Center for Ocean Remote Sensing and Ecosystem-based Management for living Marine Resources under the auspices of the US-China Protocol for Marine Science and Technology. Establishment of the SFU-NOAA Joint Center for Ocean Remote Sensing and Ecosystem-based Management for living Marine Resources through cooperation with NOAA will play an important role in developing marine related disciplines, education and scientific research level of the faculty member of Shanghai Fisheries University, especially improving the academic level in marine remote sensing technology to the international level, application of high and new technology in traditional fishing industry, also in contribution to the Development of Digital Marine programme of Shanghai. The Joint Center will also provide an important platform for scientific exchange between the scientists from home and abroad.

Problems and Reasons Main Problems : only limited to the potential cooperation intent between Shanghai Fisheries University and NOAA Satellite and Information Services. The joint center has been recognized by NOAA Satellite and Information Services, however, an official cooperation agreement has not been signed. At home, the joint Center has not yet recognized or proved by the State Oceanic Administration and Bureau of Fisheries, Ministry of Agriculture.

Future Plan

C. Training Course on Fisheries Management for Chinese Fishery Officers

Project Training Course on Fisheries Management for Chinese Fishery Officers

Institutions University of Rhode Island,. Rhode Island Sea Grant
Shanghai Fisheries University

Contacts Barry Costa-Pierce, University of Rhode Island,. Rhode Island Sea Grant
Prof. Xu Liuxiong, Shanghai Fisheries University

Progress No report

Problems and Reasons

Future Plan

D. Workshop on Introduction of Sea Grant Program and Related Marine Science Higher Education.

Project Workshop on Introduction of Sea Grant Program and Related Marine

	Science Higher Education.
Institutions	University of Hawaii NOAA Research Shanghai Fisheries University
Contacts	Prof. Zhou Yingqi, Shanghai Fisheries University Chuck Helsley, Professor Emeritus, University of Hawaii Michael Abbey, NOAA Research
Progress	No report
Problems and Reasons Future Plan	

X. Living Marine Resources Panel Administration

A. Strategic Planning Team for Living Marine Resources Panel

Project	Strategic Planning Team for Living Marine Resources Panel
Institutions	U.S. contact: Dr. James McVey, U.S. Chairperson Chinese contact: Mr. LI Kexin, Chinese Chairperson
Contacts	U.S. contact: Dr. James McVey, Sea Grant, NOAA Chinese contact: Mr. LI Kexin, CAFS
Progress	In April 2005, the U. S. National Oceanic and Atmospheric Administration's (NOAA) Office of Oceanic and Atmospheric Research, through The Oceanic Institute, and in cooperation with the National Ocean Service (NOS) and the National Marine Fisheries Service (NMFS) held a workshop named The Role of Aquaculture in Integrated Coastal and Ocean Management: An Ecosystem Approach. Experts from US, China and some other countries participated in the workshop. Six Chinese experts from Chinese Academy of Fishery Sciences, State Oceanic Administration and Chinese Academy of Sciences participated in the workshop and provided a country report to the workshop for discussion. In the workshop, experts from US and China discussed about how adopt aquaculture technology to improve ecological function, carrying capacity and economy sustainability, and pointed out that this would be one of the most important topics of living marine resources cooperation between Us and China.
Problems and Reasons Future Plan	

Known Publications from LMR Panel participants:

- Xiao, J., S.E. Ford, H. Yang, G. Zhang, F. Zhang and X. Guo. 2005. Studies on mass summer mortality of cultured zhikong scallops (*Chlamys farreri* Jones et Preston) in China. *Aquaculture*, 250:602-615.
- Xiao, J., S. E. Ford and X. Guo. 2003. Preliminary studies on a parasitic ciliate *Trichodina* sp. of *Chlamys farreri*. *Marine Science*, 27(1):77-80. (In Chinese with English Abstract)
- Zheng, H., G. Zhang and X. Guo. 2006. Heterosis between two stocks of the bay scallop, *Argopecten irradians irradians* Lamarck (1819). *J. Shellfish Res.*, 25(3):807-812.

- Zheng, H., G. Zhang, X. Liu and X. Guo. 2006. Sustained response to selection in an introduced population of the hermaphroditic bay scallop *Argopecten irradians irradians* Lamarck (1819). *Aquaculture*, 255:579-585.
- Zheng, H., G. Zhang, X. Liu, F. Zhang and X. Guo. 2004. Different responses to selection in two stocks of the bay scallop, *Argopecten irradians irradians* Lamarck (1819). *J. Exp. Mar. Biol. Ecol.*, 313:213-223.
- Qin, Y., X. Liu, H. Zhang, G. Zhang and X. Guo. 2007. Identification and mapping of AFLP markers linked to shell color in bay scallop, *Argopecten irradians* (Lamarck, 1819). *Marine Biotechnology*, 9:66-73.
- Wang, Y. and X. Guo, 2004. Chromosomal rearrangement in Pectinidae revealed by rRNA loci and implications for bivalve evolution. *Biol. Bull.*, 207:247-256.
- Li L., Xiang, J., Liu, X., Zhang, Y., Dong, B., and Zhang, X., 2005. Construction of genetic linkage maps for Zhikong scallop, *Chlamys farreri* Jones et Preston and mapping of sex-linked marker, *Aquaculture*. 245:63-73.
- Song, L., W. Xu, C. Li, H. Li, L. Wu, J. Xiang and X. Guo. 2006. Development of expressed sequence tags from the bay scallop, *Argopecten irradians irradians*. *Marine Biotechnology*, 8(2):161-169. (Featured on cover page)
- Wang, L., L. Song, H. Zhang, Q. Gao and X. Guo. 2007. Genetic linkage map of bay scallop, *Argopecten irradians irradians* (Lamarck 1819). *Aquaculture Research* 38 (4):409-419.

Role of Ocean in Climate Change Panel:

Panel Description: Since 1994, U.S.-China cooperation in coupled ocean/atmospheric climate research became dormant primarily due to shift in China's research priorities and the lack of funding at both sides. However, at the 16th JWG Meeting, both sides shared a common understanding that China and the U.S. need to further strengthen their partnership over the next decade to provide enhanced coverage of in-situ ocean observations in the Pacific, the Arctic Ocean, and the Indian Ocean to support the implementation of the ocean components of the Global Earth Observation System of Systems (GEOSS) declared by the Earth Observation Summit. Both delegations recognized a common, global goal of seeking increased support to sustain these technological advancements in ocean science. In this context, both sides agreed to rejuvenate the Role of the Ocean in Climate Change Panel. Currently, NOAA and SOA are communicating regarding the follow ups through correspondence. There has been no meeting of this panel.

U.S. Co-Chair: Chester Koblinsky, NOAA

Chinese Co-Chair: LI Xiaoming, SOA

Chinese Deputy Co-Chair:

Oceanographic Data and Information Panel:

The 9th Meeting of the PRC-U.S. Joint Coordination Panel for Data and Information Cooperation was scheduled to be held on October 31- November 2, 2005, in Mississippi, but due to Hurricane Katrina it has been postponed and subsequently did not meet formally. The U.S. and China Panel chairs (Ms. Lin Shaohua, Director of the National Marine Data and Information Service in Tianjin, China, and Mr. Kurt SCHNEBELE, Deputy Director of the National Oceanographic Data Center of NOAA) were able to meet at the Intergovernmental Oceanographic Commission's Committee on International Oceanographic Data

and Information Exchange Eighteenth Session (IODE-XVIII) at the Kursaal, Ostend, Belgium, between 26 and 30 April 2005. Bob Gelfeld, Zdenka Willis, and Terry Tielking of the NOAA/NESDIS/NODC again during the IODE-XIX meeting in Trieste, Italy, March 2007.

The U.S.-China Data and Information Panel has served as an important mechanism to foster cooperation in data and information exchange between the two countries. Based on the principle of free and open exchange of marine and fishery scientific information, much oceanographic and meteorological data for research and other uses have been exchanged. This has resulted in the World Ocean Database (WOD). The U.S. delegation proposed to begin development of a data atlas for the South China Sea/Sea of Japan/western Pacific using oceanographic profile data. The Chinese delegation agreed to continue exchanging data and personnel to focus on areas such as GTSP (Global Temperature-Salinity Profile Program), ARGO, XML (Extensible Markup Language), satellite data processing, coastal monitoring, and Harmful Algal Blooms, most of which were discussed at the 8th Meeting of the Panel. Both delegations agreed that the resulting data will be shared freely and openly to achieve greater societal benefits.

In addition, the world still lacks a global network of coastal tide gauges capable of providing timely access to complementary data to achieve maximal benefit from tide gauges. Both delegations agreed to collaborate on timely access to “fast-delivery” tide gauge data from Chinese GLOSS (Global Sea Level Observing System) tide gauges as part of the Intergovernmental Oceanographic Commission (IOC) GLOSS, under the auspices of the China-U.S. Protocol on Marine and Fishery Science and Technology.

U.S. Co-Chair (Acting): Terry Tielking, NOAA/NODC

Chinese Co-Chair: LIN Shaohua, SOA/NMDIS

Integrated Coastal and Ocean Management Panel:

The U.S.-China Joint Coordination Panel for Integrated Coastal and Ocean Management held its Third Meeting in Xian, Shaanxi Province, China, November 3-4, 2003, and will hold its Fourth Meeting in Silver Spring, Maryland, USA, in February 2006. Focal areas of this program include: marine biodiversity conservation, environmental monitoring and emergency response, sea area use, integrated coastal management, and enforcement. In 2004-05, NOAA and China's State Oceanic Administration (SOA) participated in several delegation exchanges in areas including sea area use, harmful algal bloom diagnostics and forecasting, ocean policy discussions (in the wake of the President's release of the U.S. Ocean Action Plan), and ocean public education and outreach (in the context of the July 2005 Zheng He Ocean Voyages and Ocean Expo commemoration).

In addition, in late 2005, the U.S. Trade Development Administration (TDA) approved a proposal submitted by SOA for a feasibility study for designing an “Integrated Coastal Management Emergency Response System in the Bohai Sea”. Also, NOAA and SOA are collaborating on the development of a review of China's experiences in marine environmental monitoring since 1972, which should be completed in 2006. NOAA is also working with the Chinese Ocean Press and other publishing organizations to translate and publish key English language publications and reports, including the U.S. Ocean Action Plan, the Pew Ocean Commission Report, and “How is Your Marine Protected Area (MPA) Doing? Evaluating Management Effectiveness” into Chinese language to inform broad audiences in China on the latest thinking in the U.S. on such issues as sustainable marine management and performance evaluation.

In 2005, NOAA and SOA began collaborations to improve access and distribution of publicly available coastal and ocean satellite imagery for the research community in an extension of NOAA's current

Coastwatch and Oceanwatch programs. Finally, in 2005, NOAA, SOA, the United Nations Development Program and Global Environmental Facility launched two major, multi-year programs in China in the areas of marine and coastal management: 1) Marine Biodiversity Management in Coastal Areas of China's Southern Seas and 2) Yellow Sea Large Marine Ecosystem Project. NOAA's contributions to these projects is largely in the area of technical advice and support.

The Joint Coordination Panel for Marine and Coastal Management Cooperation supports capacity building for place-based (integrated and holistic) ecosystem management, seeking to include environmental, scientific/technical, policy/legislative, managerial, and socioeconomic dimensions in the scope of cooperative activities. In this context, both sides agreed to officially rename the Panel the "Joint Coordination Panel for Integrated Coastal and Ocean Management."

Both delegations agreed to hold the 4th Panel Meeting in late 2005 in the United States. At this time, NOS is tentatively considering Boston, Massachusetts, and New Orleans, Louisiana, as potential venues. Specific decisions regarding a date and the venue of the meeting will be made through correspondence of the Panel co-chairpersons in spring/summer 2005 (for more detailed discussions regarding the Bohai Sea project, the Yellow Sea Large Marine Ecosystem project. The joint study between NOAA's Air Resources Laboratory and the Chinese State Environmental Protection Agency (SEPA) will be better defined during the intercessional period through correspondence. (see Appendix IV (4)).

U.S. Co-Chair: Clement Lewsey, NOAA

Chinese Co-Chair: LI Haiqing, SOA

Chinese Deputy Co-Chair: LIN Shanqing and LU Caixia, SOA

Joint Coordination Panel for Polar Sciences

The US-China Joint Coordination Panel for Polar Sciences held its Second Meeting in Shanghai China, in October 2006. The meeting was held consecutive to a symposium of the Pacific Arctic Group (PAG) Focal areas of this program include: (1) Joint research as a part of the International Study of Arctic Change (ISAC); (2) Development of Sino-US project plan for the implementation of Arctic research; (3) Joint study on the linkages between the Arctic ocean circulation and mid-latitude climate change; (4) Bilateral activities during the International Polar Year in 2007-2008; (5) Application of satellite remote sensing in polar research; and (6) Data exchange and sharing.

Discussions at the 2nd meeting focused on plans for IPY activities in summer 2008. China proposed two large projects in collaboration with the U.S. In addition they expressed interest in collaboration with Russia and 3-way (China-Russia-US) discussions are underway. At present, none of the 3 countries has a firm grasp on their financial resources for 2008, but multi-party meetings are scheduled for March 2007 in the US and in April 2007 in South Korea at which plans will be further developed. In addition to plans for 2008 ship-based field work, US-China collaborations through the Polar Science Panel have resulted in NOAA funding to install a pCO₂ system on the Chinese polar research vessel, involvement of a Chinese scientist in a workshop in the US in February 2007, and invitations to Chinese scientists to participate in an NSF-sponsored research cruise in summer of 2007.

U.S. Co-Chair: John Calder, NOAA

Chinese Co-Chair: ZHANG Zhanhai, SOA/PRIC

Chinese Deputy Co-Chair: QIN Weijia, SOA/CAA

APPENDIX VI

Trip Report

**Seventeenth Joint Working Group Meeting
Miami and Key West, Florida, 26-27 April 2007**

Trip Report

Seventeenth Joint Working Group Meeting on Cooperation in the Field of Marine and Fishery Science and Technology between the National Oceanic and Atmospheric Administration of the United States of America And The State Oceanic Administration of the People's Republic of China

Miami and Key West, Florida, 26-27 April 2007

In accordance with Annex XV to the Protocol on Marine and Fishery Science and Technology Cooperation between the United States of America and the People's Republic of China, as amended and extended on July 21, 2004, and at the invitation of Dr. Richard Spinrad, Assistant Administrator of the National Oceanic and Atmospheric Administration, Deputy Administrator CHEN Lianzeng, State Oceanic Administration, led a delegation that visited the United States from 24-28 April. Deputy Administrator Chen and Dr. Spinrad co-chaired the Seventeenth Meeting of the U.S.-China Joint Working Group (JWG) on Cooperation in the Field of Marine and Fishery Science and Technology in Silver Spring Maryland, USA on 24-25 April 2007.

The five panels under the Protocol are: (1) Role of the Ocean in Climate Change, (2) Oceanographic Data and Information Exchange, (3) Living Marine Resources, (4) Integrated Coastal and Ocean Management, and (5) Polar Sciences.

Site Visits

Site visits were carried out in Miami and Key West, Florida on the 26-27 April. The Chinese delegation was accompanied by Michael Abbey of NOAA's Office of Oceanic and Atmospheric Research/Office of International Activities. [A complete list of those attending/presenting for the US side follows write up.] The first site visit was at the Cooperative Institute for Marine and Atmospheric Studies (CIMAS). CIMAS is one of 13 Joint Institutes associated with the Office of Oceanic and Atmospheric Research (OAR) which is responsible for carrying out much of the basic research in NOAA. CIMAS addresses issues of national interest within the context of NOAA's missions of environmental prediction and stewardship. The meeting was led by Dr. Joe Prospero, Director of CIMAS.

The purpose of the visit was to discuss how an institute, like CIMAS, operates, its linkages to NOAA and stakeholders and how it sets research priorities. There was also a discussion about the restoration of the research activities associated with the South Florida Ecosystem Restoration (SFER). The purpose of SFER is to rectify the ecological damage done to South Florida and the Everglades because of water diversion projects carried out to mitigate flood damage from hurricane rains. It is hoped that an introduction to the concept of Joint Institutes assists SOA reach out to more stakeholders for the panels under the Protocol. The purpose of having the discussion about SFER was to initiate a conversation with SOA about future activities that will be encountered as China and SOA move towards greater responsibility of watersheds and marine biodiversity.

Consecutive to the CIMAS meeting, the group split up with the two members of the delegation representing the Chinese Academy of Fisheries Science (CAFS) attending a meeting with NOAA's National Marine Fisheries Service, South East Fisheries Science Center. The discussion was led by Dr. Peter Thompson. There were 3 presentations covering a brief overview of SEFSC; a presentation on bycatch reduction research/devices, and a presentation on off-shore aquaculture and environmental impacts followed by a brief tour of the University of Miami's hatchery. All discussions engendered a much discussion between LI Jieran, Vice Preseident of the CAFS and LI Yingren, Program Manager, International of the CAFS with those present. There was specific interest in the offshore aquaculture research.

Eight members of the Chinese delegation were hosted by Silvia Garzoli, Director, Physical Oceanography Division, NOAA's AOML. The purpose of the meeting was to give them a tour of the Physical Oceanography Division facilities, in particular the Engineer Department where oceanographic instruments are developed, and to introduce them to the AOML Data Acquisition systems (ARGO and Surface Drifters) directly related to the current activities of SOA's GAO Lin and LIN Shaohua..

Friday, 27 April, the delegation spent three hours touring NOAA's Nancy H. Foster complex with the National Marine Sanctuaries Program's Southeast Regional Superintendent, Dr. Billy Causey. The key interest for NOAA in promoting this activity was for the delegation to tour the new Florida Keys Eco-Discovery Center. SOA currently has several projects with NOS including a sister Coral Reef Nature Reserve at Sanya. NOS also partners with UNDP as a consulting organization for the China Marine Biodiversity and Ecosystems Management Training and Education Center located in Xiamen city, China. There was a very brief discussion on marine and sanctuary law enforcement.

Friday afternoon was spent aboard a Catamaran that traveled around the Key. The Chinese delegation departed 28 April, in the morning.

Follow Up Actions related to the site visits. [The 17th JWG meeting held its meeting on 24-25 April. The panel breakout sessions produced many activities that will require follow up. These are listed in the full summary report under each panel's report.]

CIMAS: No follow up actions from US side. There was interest in the Rosenstiel School and Royal Caribbean Cruise Lines, with support from NOAA and NSF, collaboration to study the ocean and atmosphere during routine cruises of the RCCL ship *Explorer of the Seas*.

SEFSC: The Vice President of the CAFS, LI Jieran invited South East Fisheries Science Center management and staff to attend an International Fisheries Scientific Meeting to be held in China in October, 2007. An official invitation would be forthcoming via LI Yingren, Director, Division of Foreign Relations and Cooperation. This Scientific Meeting would provide an opportunity for discussions on specific NMFS-CAFS joint proposals, including projects for evaluating the possible benefits of bycatch reduction technologies in the Chinese fishing fleet.

AOML: No follow up actions from US side

Sanctuaries: No follow up needed as this relationship is relatively mature and well maintained

Colleagues listed below contributed to the success of our 17th Joint Working Group:

Cooperative Institute for Marine and Atmospheric Studies (CIMAS)

Joseph M. Prospero, Director, Cooperative Institute for Marine and Atmospheric Studies

Dr. Molly Baringer, Physical Oceanography Division, AOML

David Enfield, Physical Oceanography Division, AOML
Christopher Kelble, Senior Research Associate I, CIMAS
Frank Marks, Director, Hurricane Research Division
Christopher Mooers, Professor, Applied Marine Physics, University of Miami
Chidong Zhang, Professor, Meteorology and Physical Oceanography, University of Miami
Rod Zika, Professor, Marine and Atmospheric Chemistry, University of Miami
Chunzai Wang, Physical Oceanography Division, AOML

NMFS South East Fisheries Science Center

Robin Tuttle, John Boreman (Silver Spring) assisting in setting up meeting at the South East Science Fisheries Center
Peter Thompson, NMFS, Acting Deputy Assistant Director, South East Science Fisheries Center
Jim Bohnsack, NMFS, Director Protected Resources
Guy Davenport, NMFS, Director Sustainable Fisheries
Sherryan Epperly, NMFS, Sea Turtle Program Lead
Daniel Benetti, University of Miami, Professor, Aquaculture

Atlantic Oceanographic and Meteorological Laboratory

Silva Garzoli, Director, Physical Oceanography Division
Dr. Molly Baringer, Physical Oceanography Division
Reyna Sabina, Physical Oceanography Division
Ulises Rivero, head engineer
Andy Stefanick and Robert Roddy, technicians
Claudia Schmid, Chief scientist, AOML/ CIMAS
(Ms.) Ryan Smith, AOML Research Assistant

NOS/Florida Keys National Marine Sanctuary

[Jonathan Justi (Silver Spring) assisting in arranging the visit]
Billy Causey, NMSP Southeast Regional Superintendent
Leigh Espy, Chief of Staff for the Sanctuary