

**EXTERNAL REVIEW
OF THE
JOINT INSTITUTE FOR MARINE AND ATMOSPHERIC RESEARCH
UNIVERSITY OF HAWAII AT MANOA
HONOLULU, HI**

**SUBMITTED TO THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SCIENCE ADVISORY BOARD
OCTOBER 2015**

SUMMARY

An external review of the research, education, and outreach programs of the Joint Institute for Marine and Atmospheric Research (JIMAR) at the University of Hawaii at Manoa (UH) was conducted on May 28-29, 2015 Honolulu, HI. Guidelines for conducting the review were provided by the Cooperative Institute Program Office within the National Oceanic and Atmospheric Administration (NOAA). The review was conducted under the auspices of the NOAA Science Advisory Board (SAB) and, therefore, is subject to the requirements of the Federal Advisory Committee Act (FACA). A list of review panel members is provided in Appendix I. The review panel's on-site agenda is provided in Appendix II.

OVERVIEW OF JIMAR

The Joint Institute for Marine and Atmospheric Research (JIMAR) was established in 1977. Mark Merrifield is the current director following leadership from former directors Dennis Moore and Thomas Schroeder. The institute is based within the School of Ocean and Earth Science and Technology (SOEST). In the early years the research focused on tsunamis, equatorial oceanography, tropical meteorology, and climate research. A major change occurred in 2011 when the institute was selected, following an open competition, to have a broader focus covering the Pacific Islands Region with a research emphasis on ecosystems, protected species, and fisheries in addition to the earlier established themes. Corresponding to this change was a shift from the OAR to the NMFS line office within NOAA. The primary NOAA associations are with the Pacific Islands Fisheries Science Center (PIFSC) and the Pacific Marine Environmental Lab (PMEL). Current research in JIMAR is concentrated in eight themes: ecosystem forecasting, ecosystem monitoring, ecosystem-based management, protection and restoration of resources, equatorial oceanography, climate research and impacts, tropical meteorology, and tsunami and other long-period ocean waves.

The uniqueness of the institute is reflected in the regional identity imbedded in its name and investigations. It is the largest cooperative institute as measured in terms of ocean area and its research themes reflect the region's issues that are highly tied to a coupled ocean-atmosphere state. The region is ground zero for ENSO (El Nino Southern Oscillation) influences, is characterized by pronounced climate variability such as the PDO (Pacific Decadal Oscillation), currently in a warm phase which is an abrupt departure from the more recent cold phase, experiences high variability in weather systems requiring a variety of forecasts, and is acutely aware and vulnerable to threats associated with tsunamis. The physical coupled ocean-atmosphere state has broad impacts on biogeochemical ecosystem dynamics, sensitive ecosystems and endangered species, fisheries management, civil defense, and tourism.

STRATEGIC PLAN AND SCIENCE MANAGEMENT

JIMAR's mission is to promote innovative basic and applied research that leads to tangible economic, social, and environmental benefits in the Pacific Islands Region. Its position within SOEST is ideal as the school covers the full range of ocean-atmosphere-ecosystem expertise, is a land-grant university that recognizes the value of translation of research results into societal benefit through community engagement, and works across the university with other departments (geography, engineering, etc.). JIMAR provides the connectivity between SOEST and NOAA that helps fulfill NOAA's goal regarding resilient ecosystems, communities, and economies. It does this while

recognizing the particular challenges and opportunities that the Pacific Islands face in achieving a sustainable and prosperous future in changing global environments and regional economies. JIMAR also helps SOEST's goal of training the next generation of scientists, managers, and an environmentally literate society while simultaneously enabling career advancement opportunities for NOAA employees.

JIMAR has four goals:

- provide a sound infrastructure that facilitates innovative collaborative research between scientists at NOAA (primarily through the PIFSC but also with PMEL in the state of Washington) and UH in the JIMAR research theme areas;
- support high quality educational opportunities for basic and applied research in the Earth Sciences at the undergraduate, graduate, and post-doctoral levels;
- encourage the exchange of new ideas and differing views through sponsorship of visiting scientists and scholars at UH;
- promote the effective dissemination of research outcomes for societal benefit in the Pacific Basin region

Overarching Findings: JIMAR's strategic plan is well developed and well-targeted towards a research agenda addressing environmental change in the Indo-Pacific region that bridges UH with several local and remote NOAA laboratories. The science themes are broad and flexible, allowing for the positive development and realization of many independent and overlapping research projects from ecosystems to the physical atmosphere and ocean environments. These research projects provide societal benefits of value across the Pacific Rim. They address and extend the full breadth of NOAA's research and services enterprise very effectively. However, the strategic plan could benefit from a think tank retreat of its Senior Fellows to form a vision of how best to collectively advance into the future.

JIMAR has a flexible and sufficient discretionary budget for enabling new project starts which is consistently being put to good use. However, additional input from a think tank retreat could help direct the discretionary budget towards fitting end goals consistent with the strategy and establish transparency in the allocation of the discretionary funds.

The roles of the Executive Board (EB), Council of Fellows (CF), and Senior Fellow Committee (SF) have not been clearly articulated. The membership of the EB and CF is small and their respective roles are confounded because some members serve on both committees. Furthermore some members also serve on the Senior Fellow Committee. JIMAR Senior Fellow membership is comprehensive, but does not appear to meet or function as a group, a feat that would be daunting to achieve, given its size and the dispersed geographic location of its members (Hawaii and Washington). As a result these committees have not been utilized effectively.

Recommendation 1: UH, PIFSC & PMEL should prioritize their discretionary resources to be consistent with ideas that emerge from a think-tank retreat. The retreat should be facilitated and have stakeholder representation, should reflect on the current alignment of projects and how in aggregate that could be strengthened, identify the potential new opportunities that could be realized with new investments in the institutions that complement the existing strengths in the research and education capabilities.

Collaborative discussions should evaluate:

- Extending JIMAR's reach to other potential UH college/department/program collaborations of value to the Pacific Rim, UH and NOAA, including UH-Hilo.
- Reconfiguring the EB, CF & SF committees to better routinely strategize, integrate and attain buy-in. Members of the committees should not cross function on more than one committee.

Finding: JIMAR has developed a funding stream for Task I that incorporates base Task I funding, return on overhead from the UH based on Task III work, and additional funds provided by Task II projects (which have zero overhead). However, new models for Task I funding are under discussion/implementation at the NOAA Cooperative Institute program headquarters that could reduce this funding stream and negatively impact JIMAR.

Recommendation 2: We caution against tampering with a model that is very successful at JIMAR. The current model(s) of Task I funding provides flexibility and maximizes UH-NOAA's mission targeted productivity.

Finding: Stringent rules regarding foreign nationals at PIFSC have strong negative impacts on JIMAR's and NOAA's ability to achieve research missions most effectively. Preclusion of foreign nationals at PIFSC prevents the utilization of diverse skills and perspectives that multiple cultures and expertise in the Pacific Rim could offer in conducting research in this unique region. This diversity is critical to enable the US to remain a leader in scientific advances. This restriction is not an issue resulting from the location of PIFSC on a Navy base, but rather comes from a Department of Commerce ruling. JIMAR science is not a threat to national security – we're talking about fish, plankton, and their interaction with the ecosystem.

Recommendation 3: NOAA should figure out a way to remove or fix the restriction on foreign nationals and integrate international diversity into its labs as full participants in order to best achieve their vibrant science mission.

Finding: The JIMAR infrastructure allows for a very productive collaboration between UH and NOAA. However, there is underutilized research space at the Inouye Regional Center (IRC), where PIFSC is housed, that could be used to further advance the collaboration and push the research into new frontiers.

Recommendation 4: JIMAR (through the think-tank retreat and other discussion meetings) should evaluate and determine the best means of making the most of this space boon to advance contributions in merging the physical and ecosystem science that would pave the way to the next generation of fisheries science. These tremendous available space resources along with the science strengths of UH, PIFSC, and PMEL position JIMAR to be a leader in this critical and informative knowledge need. Achieving excellence in this area is of critical importance to the Pacific Rim, the United States, and the globe. (See additional discussion below).

SCIENCE REVIEW

The JIMAR scientific portfolio is impressive, productive and fundamentally collaborative with NOAA scientists. It includes a broad multi-disciplinary focus on critically important topics of physical oceanography, climate, biogeochemistry, ecology and resource management in the tropical

and subtropical Pacific and Indian Ocean Basins. The JIMAR research program includes fundamental science studies, long-term monitoring efforts, and societally important applications. The Review Panel particularly noted several outstanding research accomplishments.

Science Highlights

Sea level variations: JIMAR scientists have combined *in situ* long-term sea level measurements from tide gauges with recent satellite observations to identify important long-term changes in sea level. They found that the recent strong increases in sea level that adversely affect island communities in the western tropical Pacific are clearly driven by trends in the trade winds. They also found a remarkable hemispheric asymmetry in the sea level trends of the satellite era, where the Southern Hemisphere ocean is rising faster than the Northern Hemisphere ocean. The connection between global warming and regional sea level change is one of the key challenges facing our planet and JIMAR is an undisputed international leader in providing data and scientific perspective in this arena to a broad group of scientists and policy makers.

El Nino dynamics: JIMAR fellows have identified a unique cross-equatorial sea level signature of the El Nino/Southern Oscillation called 'Taimasa'. It results in high-amplitude sea level depressions that impact Samoa and lag the peak El Nino sea level events by several months. They determined that non-linear ocean-atmosphere interactions between ENSO and the seasonal cycle drive this effect and the results can be used to improve forecasts of sea level variations, which strongly impact key coral reefs in the tropical Pacific.

Monsoon dynamics: The predictability of the Asian summer monsoon rainfall has decreased in recent years. JIMAR researchers used a novel statistical technique called predictive mode analysis (PMA), which provides a consistent approach for assessing seasonal predictability and improving actual predictions. The new method can be applied to a broad range of climate predictability and prediction problems that have societal relevance and impacts.

Coral Reef Ecosystems: Long-term monitoring of coral reefs allows assessments of environmental change that are vital to preserving resources. JIMAR scientists have conducted reef fish surveys around the islands of the western Pacific for more than 15 years using diver census and photographic methods. JIMAR scientists used shark abundance data collected from scientific diver surveys to examine the effects of anthropogenic and environmental factors on reef shark abundances. A baseline of shark abundance at coral reefs in the absence of humans was estimated, and scientists found that reef shark densities declined (3-10%) compared to baseline levels.

Pelagic tracking: Loggerhead turtle tracking data have been used to develop a habitat model for these turtles based on temperature and swimming capability that captures their north-south (but not their east-west) movements.

Marine pollution and trophodynamics: JIMAR scientists have demonstrated that most methylation of mercury occurs in low oxygen waters below the thermocline. This leads to the increasing mercury levels observed in deep-water fishes. This result has significant implications for future fisheries due to increasing mercury inputs to the ocean.

Finding: The diverse physical and biological monitoring activities and field activities of JIMAR scientists related to coral reef ecosystems, pelagic fishes, fisheries, and protected species should be continued. In contrast with JIMAR's coral reef program, monitoring of the pelagic realm and studies of its ecology are a notable gap in JIMAR. The lack of zooplankton and ichthyoplankton time series for the central North Pacific is notable: such time series are maintained by other regional NOAA/NMFS laboratories, and such time series would nicely complement the Hawaii Ocean Time-series (HOT) program, which monitors the regional biogeochemistry.

Recommendation 5: Zooplankton and ichthyoplankton monitoring should be enhanced. Avenues to explore could include enhanced plankton sampling during HOT cruises, as well as fuller analysis of the ongoing HOT zooplankton samples.

Finding: There is considerable influential observational and process-oriented science underway in JIMAR, which provides a wonderful opportunity to better integrate physical and biological datasets using comprehensive physical-biological ecosystem modeling. However, this modeling is currently lacking at JIMAR.

Recommendation 6: JIMAR should pursue activities to develop a major center of ecosystem modeling for tropical (coral) and subtropical (pelagic) systems that can be used for diagnostics and prediction. These studies may also be developed in collaboration with other NOAA/NMFS laboratories and oceanographic centers in the North Pacific.

EDUCATION/OUTREACH

A key function and strength of JIMAR is its facilitation and support of a wide array of education programs and opportunities for graduate, undergraduate, and high school students. Also impressive is JIMAR's commitment to fostering diversity in personnel and ideas and to conducting multifaceted outreach programs.

JIMAR has been instrumental in supporting graduate students' research and facilitating career development through master's programs for NOAA employees, thus fostering intellectual relationships between NOAA and UH. Also, JIMAR has stepped in to provide vital bridge funding for students in the final stages of their research to complete their degrees. The review team endorses the strong fiscal support for students whose research furthers the science mission of NOAA, UH, and JIMAR.

JIMAR has a demonstrated commitment to fostering diversity that we encourage to be enhanced when possible through the creative use of Task I funding. This commitment is manifestly evident in the people (students, staff, and researchers) who constitute JIMAR as well as the topics of research that are being pursued (e.g., coupling natural science with social sciences and indigenous knowledge in completely new and compelling ways).

Finding: JIMAR graduate students are distributed amongst many UH departments and programs, and may also primarily conduct their research at NOAA IRC and other locations away from the UH main campus at Manoa. As a result, JIMAR graduate students may not have the same opportunities to foster relations amongst themselves and with other university scientists compared to more traditional graduate students within a single department or program.

Recommendation 7: JIMAR should foster mentoring and exchange of ideas among students and faculty, perhaps by sponsoring informal events every 3 months or so. These events will help to encourage a sense of camaraderie among JIMAR students and help connect them with the UH community.

Finding: The fisheries cooperative unit was recently moved from UH-Manoa to UH-Hilo. This has reduced the pool of undergraduate students who have historically participated in the summer undergraduate internship program sponsored by JIMAR and NOAA.

Recommendation 8: Establish a partnership between the UH-Hilo campus and JIMAR to continue this relationship between NOAA and the fisheries cooperative unit and its pool of undergraduate students.

Finding: Being linked to NOAA and its science mission, JIMAR graduate students are exposed to the full spectrum of research to applications. The students perceive this as strength in opening up a plethora of career opportunities, from academia to government to industry. However, a natural tension arises between satisfying degree requirements (e.g., novelty of research) and gaining experience in carrying out NOAA's obligations to science, industry, and the public (e.g., weather forecasting).

Recommendation 9: JIMAR should be astute in helping students to navigate these tricky waters between university expectations and NOAA's needs, thus enabling them to successfully complete their degrees and pursue a variety of career options.

Finding: JIMAR has a multifaceted approach to outreach that is wide-ranging and strongly impactful. One prominent example is the Summer Science Camp for high school students, which has been proposed to be expanded into the U.S. territories in the Pacific.

Recommendation 10: Outreach is an unfunded mandate but its impact is very high, so if funding permits, JIMAR should try to expand it in the most powerful ways.

Finding: While strong educational programs exist at UH for physical and ecological sciences, there is a noted lack of faculty and educational programs at UH to train fisheries scientists. The surrounding tropical ecosystem and associated fisheries present unique science questions and unique resource management problems that are not being addressed elsewhere in the U.S., thus impeding NOAA in fulfilling its responsibilities for sustainable fisheries management. The committee recognized a perfect opportunity to push fisheries science into the 21st century by building capacity to integrate quantitative stock assessment with physical oceanography, climate, and ecosystem science, and to train the next generation of fisheries ecosystem scientists.

Recommendation 11: UH should create three tenure track full-time positions in quantitative fisheries to foster development of a novel ecosystem-based graduate education program emphasizing the tropical region and its location within the Pacific Rim natural and political realms. In turn, NOAA should match this university contribution through funding integrative science research programs including graduate student support. To help build this innovative fisheries program, expertise in quantitative fisheries science at UH could be augmented via affiliate faculty appointments for NOAA scientific staff to assist with teaching courses and advising students.

SUMMARY AND CONCLUSIONS

In summary, the review panel finds JIMAR to be a strong cooperative institute addressing the goals of both the University of Hawaii and NOAA through an active research and education agenda. The transition to a regional cooperative institute over the last few years is now yielding new research results that benefit the region. The panel has provided findings and recommendations that provide guidance to further enhance JIMAR in the areas of management, science, and education. We realize that our recommendations require new resources to be provided from the UH and NOAA but believe that these resources will build new innovative science programs that will be exemplars for UH, NOAA, the Nation and Globe. The review panel rates JIMAR as outstanding.

APPENDIX I

LIST OF EXTERNAL REVIEWERS

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Dr. Susan K. Avery received her doctorate in atmospheric science from the University of Illinois in 1974. She is President and Director of the Woods Hole Oceanographic Institution and past director of the Cooperative Institute for Research in Environmental Sciences at the University of Colorado, Boulder. Her research activities include atmosphere dynamics, precipitation, and radar observing systems. She is the author or co-author of more than 90 peer-reviewed articles and reports and has interests in scientific literacy and the role of science in public policy and decision support. Dr. Avery has served on numerous scientific boards, committees and commissions, and is currently serving on the United Nations Scientific Advisory Board to provide guidance about science, technology and innovation for sustainable development. She also serves on the NRC Global Change Research Program Advisory Committee; the NOAA Science Advisory Board; the Massachusetts Global Warming Solutions Act Implementation Advisory Committee; and the Leadership Alliance External Advisory Board. Among professional societies, she is a fellow of the Institute of Electrical and Electronics Engineers, the American Association for the Advancement of Science, and of the American Meteorological Society, for which she also served as president.

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Dr. Michael A. Banks received his doctorate in population genetics from the University of California at Davis in 1994. He is Director of OSU's Cooperative Institute for Marine Resources Studies and Professor of Marine Fisheries Genetics and Conservation within the Coastal Oregon Marine Experiment Station, located in Newport at the Hatfield Marine Science Center. He is recent past chair of the NOAA National Cooperative Institute Executive Committee. His research activities include resolving the genetic basis of life history diversity in salmon and rockfish, with a specific focus on genomic aspects of how fish orient and delineate through time, space and smell. He has also developed computer applications WHICHRUN, WHICHLOCI, WHICHPARENTS, P-loci and SIBLINGS. He is a past editorial board member of *Reviews of Fish Biology and Fisheries*. He has authored and co-authored more than 60 peer-reviewed articles, including a chapter on *Fish Stock Propagation* in the UN World Ocean Assessment. He is Fellow of the American Fisheries Society.

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Dr. Koslow received his Ph.D. in Biological Oceanography from Scripps Institution of Oceanography in 1980. He is currently a Research Oceanographer (equivalent to Full Professor) and a Senior Lecturer in Biological Oceanography at Scripps Institution of Oceanography (UCSD) and is the former Director of the Scripps California Cooperative Oceanic Fisheries Investigations (CalCOFI) Program. His research interests include climate and biological oceanography, ocean observation systems, fisheries, impacts of fishing, the state of the oceans, deep sea ecosystems, particularly the mesopelagic fauna, seamounts and deep sea fisheries, the application of acoustics to fisheries and biological oceanography, the development of ecosystem-based management, the structure of marine communities and food webs. He has published more than 75 refereed scientific papers and the prize-winning book on deep-sea ecology, *The Silent Deep*. He is lead author of the chapter on Seamounts for the UN World Ocean Assessment and is active in PICES.

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Dr. Arthur J. Miller received his doctorate in Physical Oceanography in 1986 at Scripps Institution of Oceanography, UCSD. He is currently a Research Oceanographer (equivalent to Full Professor) and a Senior Lecturer in Climate Sciences at Scripps Institution of Oceanography (UCSD). He is also Director of the Climate, Atmospheric Science, and Physical Oceanography (CASPO) Division. He is a physical oceanographer who studies oceanic influences on climate variability using a combination of computer simulation models and observational analysis. His research extends from basic issues in physical oceanography to a variety of topics in climate dynamics, atmospheric dynamics, data assimilation, regional impacts of global climate change, and oceanic ecosystem response to physical forcing. He currently is an Associate Editor for *Atmospheric Science Letters*. He also serves on the U.S. CLIVAR Scientific Steering Committee as Co-Chair of the Phenomena Observations and Synthesis (POS) Panel, and has served on the U.S. GLOBEC Scientific Steering Committee, the PICES Evaluations of Climate Change Working Group, the Bering Ecosystem Study (BEST) Scientific Steering Committee, and the U.S. CLIVAR Pacific Sector Implementation Panel. He is the author or co-author of more than 80 refereed publications and currently has or has had funding from NSF, NOAA, NASA, ONR, DOE, and the CA Dept. of Boating and Waterways. He typically advises 3-6 Ph.D. students.

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Dr. Smith received a bachelor's degree in Biology, Marine Emphasis, in 1984 from Occidental College, Los Angeles, CA, and a Ph.D. degree in Marine-Estuarine-Environmental Science in 1997 from the University of Maryland, College Park. Dr. Smith is currently a Research Scientist at the University of Miami's Rosenstiel School of Marine and Atmospheric Science, a position he has held for the past 18 years. His research interests are development of the theory and practical applications of ecosystem approaches to fisheries assessment and management. His expertise includes quantitative population dynamics and stock assessment of marine fishes and invertebrates, statistical survey and experimental design, development of fisheries databases and information systems, and statistical estimation theory and application. Over the past decade, he has collaborated with scientists working at the Pacific Islands Fisheries Science Center on a range of projects concerning coral reef fisheries and ecosystem science.

APPENDIX II

Agenda

JIMAR Scientific Review
Joint Institute for Marine at Atmospheric Research
University of Hawaii at Manoa
POST (Pacific Ocean Science Technology) Building, Room 601
1680 East-West Road
Thursday, May 28, 2015 and Friday, May 29, 2015

Thursday, May 28

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|-------|---|---|
| 7:00 | Breakfast at Hawaii Prince Hotel Waikiki -
Introductory Meeting | Review Panel, NOAA CIPO,
Dr. Mark Merrifield, JIMAR |
| 8:00 | Transportation to UH Manoa – Depart Hawaii Prince Hotel Waikiki | |
| 8:30 | Arrive at UH Manoa, Coffee service
Review Panel Executive Session | Dr. Cynthia Decker, NOAA CIPO |
| 8:45 | Welcome and Introduction
SOEST Overview | Dr. Mark Merrifield, JIMAR
Dr. Brian Taylor, Dean of SOEST
and UH Manoa Interim Vice
Chancellor for Research |
| 9:00 | JIMAR Overview | Dr. Mark Merrifield, JIMAR |
| 9:45 | JIMAR and NOAA PIFSC Partnership | Dr. Jeff Hare, JIMAR |
| 10:00 | Morning Break | |
| 10:15 | JIMAR UH Science Presentations | |
| | <ul style="list-style-type: none">▪ Dr. Jeff Drazen - Oceanography<ul style="list-style-type: none">▪ Fisheries▪ Dr. Jamison Gove - Oceanography, now at PIFSC - EOD<ul style="list-style-type: none">▪ Coral ecosystems▪ Dr. Steven Businger - Atmospheric Sciences<ul style="list-style-type: none">▪ Tropical Meteorology/Climate▪ Dr. Douglas Luther - Oceanography<ul style="list-style-type: none">▪ Tsunamis and Long Waves▪ Dr. Phil Thompson - UH Sea Level Center<ul style="list-style-type: none">▪ Sea level and climate▪ Dr. Brian Powell - Oceanography<ul style="list-style-type: none">▪ Equatorial Oceanography | |

- Dr. Puakea Nogelmeier and Paige Okamura - Kawaihuelani Center for Hawaiian Language
 - Ke Ao Mua: The Hawaiian Record - Pictures From The Past
- 11:45 Review Panel Discussion with Graduate Students and Post-docs
- 12:15 Hosted Lunch for Review Panel (Executive Session)
- 1:15 JIMAR PIFSC Science Presentations
Themes: Ecosystem Monitoring, Ecosystem-Based Management, Protection and Restoration of Resources
- Dr. Melanie Abecassis - EOD - Pelagic Ecosystems Program
 - Characterizing a foraging hotspot for short-finned pilot whales and Blainville's beaked whales off the west side of the island of Hawaii
 - Kolter Kalberg - DO - SocioEconomics Group
 - JIMAR Economics Research
 - Dr. Dawn Kotowicz - DO - Human Dimensions Team
 - JIMAR Human Dimensions Research
 - Dr. Felipe Carvalho - FRMD - Stock Assessment Program
 - Improving the stock assessment process for data-limited stocks in the North Pacific Ocean: a case study for the shortfin mako shark
 - Dr. Brett Taylor - FRMD - Life History Program
 - Life history strategies of harvested coral reef fishes and their implications for fisheries management
 - Dr. Adel Heenan - CRED - Fish Team
 - Large scale differences in coral reef environments explains more variation in herbivorous fish assemblages than human impacts
 - Jake Asher - CRED/FRMD
 - A Research and Operational Overview of Baited Remote Underwater Stereo-Video Systems (Stereo-BRUVs)
 - Devon Francke - PSD - Turtle Research Program
 - Sea turtle stranding trends in the Hawaiian Islands
 - Ali Bayless - PSD - Cetaceans Research Program
 - Acoustically monitoring the Hawaii longline fishery for interactions with false killer whales
- 3:15 Afternoon Break
- 3:30 Review Panel Session with Partners / Stakeholders
- 4:00 Review Panel Closed Session with UH Leadership
 Dr. Brian Taylor, Dean of SOEST and Interim Vice Chancellor for Research;
 Dr. Chip Fletcher, SOEST Associate Dean for Academic Affairs; and Dr. Sandy Shor, SOEST Associate Dean for Research
- 4:30 Review Panel Closed Session with CI Leadership and JIMAR UH Senior Fellows
- 5:00 Reception HIG Courtyard

- Informal discussions with JIMAR Leadership, Senior Fellows, Scientists and Partners

6:30 Transportation to Hawaii Prince Hotel Waikiki – Depart UH Manoa

Friday, May 29

8:00 Transportation to NOAA IRC – Depart Hawaii Prince Hotel Waikiki

9:00 Arrive NOAA IRC – Check in and Security Processing

9:15 Tour of NOAA Inouye Regional Center (IRC), Ford Island

- Tour to include highlights and mini-presentations from JIMAR researchers at IRC

10:15 Review Panel Closed Session with NOAA Leadership IRC Room 1564

11:30 Depart NOAA IRC for UH Manoa

12:00 Arrive UH Manoa
Hosted Lunch for Review Panel (Executive Session)

1:00 Closing Remarks / Final Q & A

1:30 Review Panel Executive Session and Report Writing

3:30 Debriefing Session / Preliminary Feedback

4:00 Adjourn

4:15 Transportation to Hawaii Prince Hotel Waikiki – Depart UH Manoa

APPENDIX A: Review Report Format

Friday, May 29

- 8:30 Transportation to NOAA IRC – Depart Hotel
- 9:00 Arrive NOAA IRC – Check in and Security Processing 9:15
- Tour of NOAA Inouye Regional Center (IRC), Ford Island
- Tour to include highlights and mini-presentations from JIMAR researchers at IRC
- 10:15 Review Team Closed Session with NOAA Leadership IRC Room 1564
- 11:30 Depart NOAA IRC for UH Manoa
- 12:00 Arrive UH Manoa
- Hosted Lunch for Review Team (Executive Session)
- 1:00 Closing Remarks / Final Q & A
- 1:30 Review Team Executive Session and Report Writing
- 3:30 Debriefing Session / Preliminary Feedback
- 4:00 Adjourn
- 4:15 Transportation to Hotel – Depart UH Manoa