

**Terms of Reference (TOR) for NOAA Science Program Reviews**  
**2015 Aquaculture Science**

**Background and Purpose**

The National Aquaculture Act of 1980 states that it is “in the national interest, and it is the national policy, to encourage the development of aquaculture in the United States.” The National Oceanic and Atmospheric Administration (NOAA) has a long history of conducting marine aquaculture research, outreach, and international activities within the context of its missions of service, science, and environmental stewardship. Additional statutory basis for NOAA’s aquaculture activities is in the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) [Sec. 3(16)], which regulates aquaculture as “fishing.” Aquaculture activities are also subject to provisions of the National Environmental Policy Act, Marine Mammal Protection Act, Endangered Species Act, Coastal Zone Management Act, National Marine Sanctuaries Act, and the Fish and Wildlife Coordination Act. Under these laws, NOAA is responsible for preventing and/or mitigating adverse environmental impacts of planned or existing marine aquaculture facilities through the development of fishery management plans, sanctuary management plans, permit actions, proper siting, and consultations with other regulatory agencies at the Federal, State, and local levels. Other statutes, including the National Sea Grant College Program Act, the Saltonstall-Kennedy Act, the Anadromous Fish Conservation Act, the Interjurisdictional Fisheries Act, the Merchant Marine Act, and the Agricultural Marketing Act, authorize NOAA to enable and provide assistance for both public and private sector aquaculture. In addition, the Oceans and Human Health Act calls for research related to aquaculture.

The President’s National Ocean Policy Implementation Plan<sup>1</sup> calls for science-based development of sustainable aquaculture. In addition, the White House Office of Science and Technology Policy (OSTP) Interagency Working Group on Aquaculture (IWG-A) produced a federal strategic research plan for aquaculture, directing agencies, including NOAA, to produce aquaculture research implementation plans.<sup>2</sup> The National Strategic Plan for Aquaculture Research, as well as other NOAA activities relating to ocean acidification and shellfish aquaculture, were highlighted by President Obama at the June 2014 international Our Ocean Conference.<sup>3</sup>

The intent and direction given by Congress and the Executive Branch form the basis for the Department of Commerce (DOC)<sup>4</sup> and NOAA<sup>5</sup> Aquaculture Policies. These policies were rewritten, reviewed, and approved in 2011. The policies contain numerous research goals that

---

<sup>1</sup> <http://www.whitehouse.gov/administration/eop/oceans/implementationplan> and [http://www.whitehouse.gov/sites/default/files/nop\\_ip\\_aquaculture.pdf](http://www.whitehouse.gov/sites/default/files/nop_ip_aquaculture.pdf)

<sup>2</sup> [http://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/aquaculture\\_strategic\\_plan\\_final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/aquaculture_strategic_plan_final.pdf)

<sup>3</sup> <http://www.whitehouse.gov/the-press-office/2014/06/17/fact-sheet-leading-home-and-internationally-protect-our-ocean-and-coasts>

<sup>4</sup> [www.nmfs.noaa.gov/aquaculture/docs/policy/doc\\_aquaculture\\_policy\\_2011.pdf](http://www.nmfs.noaa.gov/aquaculture/docs/policy/doc_aquaculture_policy_2011.pdf)

<sup>5</sup> [http://www.nmfs.noaa.gov/aquaculture/policy/24\\_aquaculture\\_policies.html](http://www.nmfs.noaa.gov/aquaculture/policy/24_aquaculture_policies.html)

June 29<sup>th</sup>, 2016

support management, monitoring, improvement, and development of aquaculture. It is DOC and NOAA policy to conduct research to support the Department's economic goals and NOAA's aquaculture mission, while complementing NOAA's other missions for fisheries, natural resources management, protected resources, and the environment in general. A NOAA strategic plan<sup>6</sup> for aquaculture was produced in 2016.

To ensure NOAA achieves its statutory mandates and implements interagency policies effectively, it is necessary to conduct periodic reviews of the scientific programs supporting marine aquaculture. These reviews should include elements of aquaculture science that intersects with other NOAA mission areas, such as sustainable fisheries (defined by NOAA Fisheries to include commercial and recreational fishing and aquaculture), protected resources, and habitat conservation. Reviews include science programs at the National Marine Fisheries Service (NMFS) Science Centers, National Ocean Service (NOS) and other laboratories, and the Office of Aquaculture (OA). This review is being conducted to:

- Evaluate the quality, relevance, and performance of research and development supported by NOAA and conducted at NOAA Science Centers and Laboratories (supported by a variety of NOAA budget lines and external funding).
- Strategically position NOAA in planning effective aquaculture research and development activities.
- Augment the OA Strategic Plan

This science review is focused on NOAA Science Center research conducted with internal funds, although it includes the partnerships and links NOAA labs have to externally funded research programs where appropriate. NOAA also manages external competitive grants to support aquaculture science, including the Saltonstall-Kennedy (SK), Small Business Innovation Research (SBIR), Marine Fisheries Initiative (MARFIN), and Sea Grant Aquaculture Program competitions. However, these extramural grant programs that support research and development of aquaculture at non-NOAA facilities are not a part of this review.

## **Objective**

This review will evaluate NOAA's marine aquaculture internal scientific programs that support the agency's aquaculture mission. The aquaculture science programs addressed in this review cover shellfish, finfish, and marine plants that are cultured, or have the potential to be cultured, in the United States. These programs develop science knowledge and science-based tools in support of NOAA's regulatory, management, and policy missions and foster innovation to support marine aquaculture development. This review will assess the extent to which the NOAA Aquaculture Program is addressing the key research topics identified by OSTP, DOC, NOAA, other federal and state resource managers

---

<sup>6</sup> [http://www.nmfs.noaa.gov/aquaculture/docs/aquaculture\\_docs/noaa\\_fisheries\\_marine\\_aquaculture\\_strategic\\_plan\\_fy\\_2016-2020.pdf](http://www.nmfs.noaa.gov/aquaculture/docs/aquaculture_docs/noaa_fisheries_marine_aquaculture_strategic_plan_fy_2016-2020.pdf)

and industry. It will also provide insight and recommendations regarding the direction and quality of marine aquaculture research conducted by NOAA.

Current marine aquaculture objectives being addressed by the Aquaculture Program include:

- Developing decision-making tools to assist in assessment and management of aquaculture operations to fulfill the agency's regulatory and management mandates.
- Developing aquaculture technologies and methods to transfer to Federal, State, local and Tribal agencies, non-governmental organizations and industry, including developing methods to:
  - support fisheries management;
  - restore depleted, threatened, and endangered species;
  - restore or improve habitat and ecosystem services; and
  - provide economical, safe, and sustainable seafood and other sea-products.
- Providing socioeconomic data and statistics on the marine aquaculture industry.

The focus of this exercise will be for Reviewers to provide advice on the direction and quality of research addressing the objectives above. A variety of other science programs within NOAA Fisheries (e.g. protected species, habitat restoration) that include aspects of aquaculture will also be reviewed as a part of this effort (e.g. oyster habitat and abalone restoration and stock enhancement of king crab). Research NOAA Fisheries conducts on salmon hatcheries and ESA-listed salmon recovery in the Alaska and Western Regions are not a part of this review, however, as these programs are reviewed separately (e.g. by the Hatchery Scientific Review Group<sup>7</sup> and in the NOAA Fisheries 2015 Protected Species Science Program Review<sup>8</sup>). The statistics function will also not be a part of this review.

### **Aquaculture Science Committee**

A NOAA Aquaculture Science Committee (ASC) will be made up of staff from the OA (2 representatives, including the Review Coordinator), ST (1 rep), NOAA Fisheries' Science Centers (1 rep from each Center), and NOS Laboratories (1 rep). The ASC will coordinate the review, making sure the process runs smoothly and that the results are communicated accurately to NMFS administrators. Names and roles for the ASC are listed in Table 1.

Table 1. Membership of the Aquaculture Science Committee.

---

<sup>7</sup> <http://www.hatcheryreform.us/>

<sup>8</sup> <http://www.st.nmfs.noaa.gov/science-program-review/program-review-reports/index>

June 29<sup>th</sup>, 2016

Name	Role
Mark Rath	Review Coordinator
Michael Rust	Office of Aquaculture Rep
Michael Parke	Pacific Islands Science Center Rep
Robert Foy	Alaska Science Center Rep
Walt Dickhoff	Northwest Science Center Rep
Gary Wikfors	Northeast Science Center Rep
James Morris	National Oceans Service Rep
Tom Jamir Replaced by Refik Orhun	Southeast Science Center Rep
Russ Vetter	Southwest Science Center Rep
Stephen Brown	Science and Technology Rep

**Review Panel**

The Scientific Review Panel will include 4-7 independent PhD-level or equivalent scientists with reasonable familiarity with the topic. Panels should include:

- 1 scientist from NOAA,
- 1-2 scientists from another federal agency (optional), and
- 2-5 (the majority) scientists external to NOAA.

NOAA Fisheries requires that the Review Panel Chair is not a NOAA Fisheries employee and encourages that the Chair be a federal scientist external to NOAA. The Program Review Coordinator will attend and provide guidance to the Panel on complying with Federal Advisory Committee Act (FACA, 1972). To ensure a majority of independent reviewers, the use of recently retired and former NOAA Fisheries employees will be limited. The NOAA Fisheries Assistant Administrator or their designee shall approve the Panel selections. Names and contact information for the Review Panel are listed in Table 2.

Table 2. Membership of the Scientific Review Panel.

Role	Name	Organization	Justification
Chair	David Straus, PhD	USDA Agriculture Research Service, Harry K. Dupree - Stuttgart National Aquaculture Research Center	Fulfills the requirement of a non-NOAA Federal Scientist as Chair of the panel. Dr. Straus work focuses on fish health including developing disease models that mimic outbreaks in aquaculture production; determining effectiveness of therapeutants to control pathogens on fish and fish eggs; and determining the acute toxicity of therapeutants to various species of fish and pathogens. He is also an Adjunct Professor in the Department of Aquaculture and Fisheries at the University of Arkansas at Pine Bluff.

June 29<sup>th</sup>, 2016

Member	Bob Rheault, PhD	East Coast Shellfish Growers Association	Dr. Rheault provides a strong voice for the needs of industry, balanced by an academic research career focused on nutrient credits and best management practices. He is also adjunct faculty at the University of Rhode Island.
Member	Mike Tringali, PhD	Florida Fish and Wildlife	Dr. Tringali studies population dynamics and genetic risk assessment of supplementation hatcheries. Has served as PI or co-PI on over \$5 million dollars in grant funded research over the past 20 years.
Member	Bill Walton, PhD	Auburn University Shellfish Laboratory	Dr. Walton is a highly regarded fisheries scientist who has devoted his career to advancing the science and practice of shellfish aquaculture, both for restoration and commercial applications.
Member	Chuck Weirich, PhD	NC Sea Grant	Dr. Weirich has spent his 25+ year career studying a broad swath of issues related to finfish aquaculture. He has contributed to the field as an academic researcher, as a producer, and currently through outreach and technology transfer at NC Sea Grant.
Member	Doug Lipton, PhD	NOAA Science & Technology	Fulfills the requirement of a NOAA scientist on the panel. As NMFS Chief Economist, Dr. Lipton brings a unique understanding of the impact that strong aquaculture science can have on the economic success of the industry. He also understands value of science that can provide protection to the natural habitats and resources that the industry inevitably interacts with.
Member	Cheng-Sheng Lee	Center for Subtropical Aquaculture	Dr. Lee has been the Director of the Center for Subtropical Aquaculture for 19 years. He has extensive experience working with both shellfish and finfish and is an expert on topics such as seafood security, aquaculture technology and the development of sustainable aquaculture worldwide.

**Information Provided to Reviewers**

In addition to assisting with TOR review, planning, and logistics, the ASC members will each provide an overview of their respective marine aquaculture research programs and answer the following questions:

1. What role has NOAA’s marine aquaculture science program played in marine aquaculture management in your region?
2. Who are the clients or users of NOAA aquaculture science in your region?
3. What are the major successes resulting from NOAA’s marine aquaculture science program in your region and what types of support are most limiting for your program?
4. What are the major strengths, weaknesses, opportunities, and threats for NOAA’s marine aquaculture science program and how do you think they could they be addressed?
5. What are the highest priority needs for improving both aquaculture management and science in your region?
6. What is your vision for the future of NOAA marine aquaculture science? Please consider past, present, and future needs, challenges, and successes.

June 29<sup>th</sup>, 2016

ASC members will also be asked to provide key papers (as pdf files) or other products that highlight their aquaculture science. Some of the project information has been consolidated on a [story map](#) and made available to the reviewers and the public.

### **Overarching Questions for Reviewers**

The Reviewers will use information provided, presentations, and any ensuing discussion to advise on the direction of future NOAA marine aquaculture science specific to aquaculture development and management needs in the U.S. Reviewers should answer the following overarching questions:

1. Do current and recently completed (last 5 years) aquaculture science activities:
  - a. fulfill mandates and requirements (as cited in the Background section of this document),
  - b. address the needs of regulatory partners, and
  - c. address the needs of industry?
2. What research questions should be prioritized with regard to marine aquaculture science? Please justify.
3. Do we possess adequate resources (facilities and staff) to address important domestic marine aquaculture science questions? If not, what resources are we lacking?
4. Are the best techniques and approaches being used to meet the objectives?
5. Is marine aquaculture science being conducted properly (experimental design, statistical rigor, standardization, integrity, peer review, transparency, confidentiality, etc.)? If not, what areas could be improved?
6. Are we allocating our resources in the best manner? Is there anything that can be reduced, consolidated or dropped?
7. How well are NOAA-led advances in marine aquaculture science being communicated within and outside of NOAA, and are the appropriate audiences being reached?
8. How well are NOAA-led advances in marine aquaculture science being applied within and outside of NOAA?

### **Review Format**

Two meetings, one on the east coast and one on the west coast, will be conducted over a period of four days each. The meeting on the east coast will convene at the NEFSC Laboratory in Milford, Connecticut, and will focus on marine aquaculture science at the NEC, SEC, NOS, and the OA. The west coast meeting will either convene at the NWFSC Manchester or Seattle Laboratory and will focus on marine aquaculture science at the NWC, AKC, PIC and SWC. Presenters will include key staff from each Science Center, Lab, and Office.

June 29<sup>th</sup>, 2016

Prior to the review, a teleconference will be scheduled for the host NOAA Science Center leadership, ASC, and Review Panel in order to discuss and clarify the objectives, scope, focus questions, background documents, and products of the review.

The following agenda for the face-to-face meetings includes presentations that address topics related to overarching themes.

## **EAST COAST AQUACULTURE SCIENCE REVIEW AGENDA**

### **Tuesday, 19 July**

#### **Aquaculture Science Strategy:**

Presentations: Hilton Garden Inn, Milford

8:30 AM	Welcome	Thomas Noji
8:45 AM	Introduction to the Review Logistics,	Gary Wikfors
9:00 AM	Office of Aquaculture Introduction,	Michael Rubino
9:20 AM	National Aquaculture Science Vision and Strategy,	Michael Rust
10:00 AM	Break	
	Overviews of Regional Aquaculture Science Vision and Strategies:	
10:30 AM	NEFSC Perspective,	Bill Karp
11:00 AM	SEFSC Perspective,	Refik Orhun
11:30 AM	NOS/NCCOS Perspective,	James Morris,
Noon	lunch at Stonebridge Restaurant	
2:00 PM	Milford Aquaculture Laboratory Tour	
4:00 PM	Review Panel private discussion in Milford Lab library	
7:00 PM	Review Panel Dinner, Bistro Basque	

### **Wednesday, 20 July**

#### **Strategy Implementation (completed, current, future):**

Presentations: Hilton Garden Inn, Milford

Northeast Fisheries Science Center Projects

8:30 AM	Microalgal Research & Services	Mark Dixon
8:45 AM	Hatchery Technology	David Veilleux
9:00 AM	Probiotic Bacteria	Diane Kapareiko
9:15 AM	Shellfish Breeding & Genetics	Sheila Stiles
9:30 AM	Shellfish Aquaculture Trophic Interactions	Judy Li May
9:45 AM	Nutrient Bioextraction	Julie Rose
10:00 AM	Break	
10:30 AM	Shellfish Resilience to Environmental Variation and Climate Change	Lisa Milke
10:45 AM	Shellfish Immunology & Health	Gary Wikfors
11:00 AM	Lease Management/Harvest Environment Interactions	Renee Allen

Southeast Fisheries Science Center Projects

June 29<sup>th</sup>, 2016

11:15 AM	Gulf of Mexico Aquaculture Permit	Refik Orhun
11:30 AM	Fish Stock Enhancement	Refik Orhun
11:45 AM	Warm-water International Center	Refik Orhun
Noon	lunch, Hilton Garden Inn	
12:30 – 2:00 PM	poster session	

National Ocean Service/NCCOS Program Review

2:00 PM --	Overview of the NOS Aquaculture Portfolio	James Morris
2:15 PM --	Environmental Interactions assessments	James Morris
2:30 PM --	Coastal Planning and Siting	Lisa Wickliffe
2:45 PM --	Ecosystem services	James Morris
3:00 PM --	Policy and management tools	James Morris
3:15 PM --	Policy and management services	James Morris
3:30 PM --	Aquaculture wet laboratory science	James Morris

4:00 PM -- Review Panel Deliberation (Hilton Garden Inn)

Dinner on your own

**Thursday, 21 July**, All day Review Panel work, Milford Lab library

**Friday, 22 July**

9:00 AM -- Panel and Center Director discuss the results of the review, Milford Lab library

**WEST COAST AQUACULTURE SCIENCE REVIEW AGENDA**

**Aquaculture Science Strategy:  
Tuesday July 26 at Montlake Lab Seattle**

8:00 am	Welcome	John Stein
8:10 am	Introduction to the Review	Michael Rubino
8:20 am	General Overview of National Aquaculture Science	Vision and Strategy Mike Rust
8:50 am	Overview of the Center's Aquaculture Science Perspective	Vision and Strategy – SWFSC Cisco Werner and Russ Vetter
9:15 am	SWFSC Strategy Implementation	Russ Vetter
9:35 am	SWFSC Aquaculture Science Projects Yellowtail Physiology and Trait Improvement	John Hyde
10:00 am	Break (15 min)	

June 29<sup>th</sup>, 2016

10:15 am	Yellowtail genome and Genomics Tollbox	John Hyde
10:40 am	Overview of the Center's Aquaculture Science Vision and Strategy – AFSC Perspective	Bob Foy
11:00 am	AFSC Strategy Implementation	Bob Foy
11:20 am	AFSC Aquaculture Science Projects Crab Culture	Bob Foy
11:45 am	AFSC Aquaculture Science Projects (cont'd) Salmon Culture	John Eiler
12:10 pm	Lunch	
1:00 pm	Overview of the Center's Aquaculture Science Vision and Strategy – PIFSC Perspective	Michael Parke
1:15 pm	PIFSC Strategy Implementation	Michael Parke
1:25 pm	Overview of the Center's Aquaculture Science Vision and Strategy – NWFSC Perspective	John Stein and Walt Dickhoff
1:50 pm	NWFSC Strategy Implementation	Walt Dickhoff
2:10 pm	NWFSC Aquaculture Science Projects Alternate Feeds, Fish Nutrition	Ron Johnson
2:35 pm	Seafood Safety: Vibrio and ESP	Rohinee Paranjpye Linda Rhodes
3:00 pm	Break Review Panel Deliberations	
4:00 pm	Lab Tour	
4:30 pm	Science Posters and Reception	

## WEST COAST AQUACULTURE SCIENCE REVIEW AGENDA

### Wednesday July 27 at Manchester Research Station (return to Seattle in pm)

10:00 am	Welcome and Manchester Overview	Walt Dickhoff
10:15 am	SWFSC Aquaculture Science Projects Abalone Culture	Russ Vetter
10:45 am	NWFSC Aquaculture Science Projects (cont'd) Sablefish Overview	Rick Goetz
11:15 am	Sablefish Larval Studies	Jon Lee
11:40 am	Sablefish Sex Control and growth	Adam Luckenbach

June 29<sup>th</sup>, 2016

12:05 am	Lunch	
12:50 pm	Shellfish	Rick Goetz
1:15 pm	Oyster Habitat	Beth Sanderson
1:40 pm	Station tour	
5:00 pm	Panel Deliberations/depart for ferry to return to Seattle	

### **Thursday July 28 in Seattle**

All day review work by Panel. Room 370 West at Montlake Lab.

### **Friday July 29 in Seattle**

11:00 am PDT Panel and Center Directors discussion of Panel's Assessment  
Room 370 West at Montlake Lab.

## **Briefing and Background Materials**

The Centers, Labs, and Offices will provide presentations made by staff and background materials before or during the presentations in order to facilitate the independent review. All materials (e.g. PowerPoint presentations, word files, pdfs) will be named such that the file names indicate the main topic the material covers.

All presentations will be provided to the Panel following the sessions they are presented in. Briefing books (paper versions of all the main information) may be provided at the request of the Panel Chair.

Two links are provided for pre-reading by the panel at least 10 days prior to the review. 1) [Aquaculture Research Story Map](#), and 2) the NOAA [Aquaculture Strategic Plan](#). The story map covers the breadth of NOAA's internal research program. It is designed to allow the viewer to skim over all the projects, and to go into some depth on any specific project. We are not going to cover all the projects on the map during the review. Instead, we have chosen to go into more depth on a subset of these projects during the in person reviews. Therefore, the story map is the review team's best opportunity to look at the breadth NOAA's aquaculture science at the project level. The NOAA Aquaculture Strategic plan provides context and budget numbers for our science endeavors.

## **Products**

Each Panelist and the Chair will produce a succinct report detailing his or her own observations and recommendations for the themes provided within the TOR for the program review. Individual reports from each Reviewer are required for NOAA to comply with the Federal Advisory Committee Act (FACA). Draft reports will be submitted to the Review

June 29<sup>th</sup>, 2016

Coordinator at the close of the review. Final individual reports will be submitted by the Panelists one week after the final review concludes (August 5<sup>th</sup>) to the Review Coordinator and the Panel Chair. The Panel Chair will summarize the program review proceedings (e.g. what happened, salient issues, and recurring themes from the individual reports) for submission to the Review Coordinator (nmfs.science.aquaculture@noaa.gov) within one week of receiving the individual reviewers reports (August 12<sup>th</sup>). These proceedings do not represent a consensus of Panelists' observations or recommendations (FACA). The Review Coordinator will send reports to the ASC, Centers, ST, and OA leadership as appropriate for a written response.

### **Resources**

NOAA Fisheries (OA) will pay for the travel cost and per diem for all federal Panelists external to NOAA Fisheries and a set fee (\$500) for the services of non-governmental Panelists. The OA will assist Panel members in making travel arrangements. During the review the host Center will provide the Review Panel with wireless broadband services and space to convene closed working sessions. If requested in advance, the Center will, within reason, provide other items (e.g. desktop computers, printers/copiers) to assist the Review Panel with report preparation. The Review Panel will, if needed, be provided 1 full day to write draft review reports at the conclusion of presentations by staff.

### **Agency Response**

The Program Review Coordinator working with the ASC and Center leaders will send the Chair's summary report and the Panel members' individual reports to the Office of Aquaculture Science Advisor, the Director of NOAA Fisheries Office of Aquaculture, the Director of NOAA Fisheries Office of Science and Technology, the NOAA Fisheries Chief Scientist, NOS leadership, and the NOAA Fisheries Science Center Directors as soon as the reports are received. The Center leaders (including NOS CAPES program) will prepare brief responses, including agency actions to the Chair's summary report within 10 weeks of receipt of the review report package. The Aquaculture Science Advisor will work with the Program Review Coordinator to develop a national response, and pull together the Center responses into a single coherent document within 8 weeks of receiving all the Center Reports. The responses can include clarifying information and responses to controversial points within individual reports even if not mentioned in the Chair's summary.

### **Public Review and Input**

Review presentations will be public meetings via web meeting services and advertised. Arrangements for webcasting of presentations will be made available. All final reports, responses and background information will be made available for public review at the conclusion of the review process via the OA web site. Comments from the public will be

June 29<sup>th</sup>, 2016

recorded using the form at [this link](#). A synthesis of public comments will be appended to the final report.

### **Final Review Report and Clearance**

The Director of NOAA Fisheries Office of Aquaculture will send the package on to the NMFS AA for clearance. At end of 90 days of the close of the review, all documents (Chair's summary report, NOAA's response, and individual Reviewers' reports) will be posted on the Office of Aquaculture websites. Authorship of the individual review reports will remain anonymous to the public.

### Appendix 1. Draft Program Reviewer Report Templates

#### **Chair's Summary<sup>1</sup> of Program Review of Aquaculture Science**

##### **Science Center, Address, Dates**

- Name, Affiliation, Chair
- Name, Affiliation, Reviewer (as many as needed)

##### **Background and Overview of Meeting General Observations and Recommendations**

##### **Panel Member's Major Recurrent Observations and Recommendations.**

**Do current and recently completed (last 5 years) aquaculture science activities: (a) fulfill mandates and requirements (as cited in the Background section of this document), (b) address the needs of regulatory partners, and (c) address the needs of industry?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**What research questions are available and should be prioritized with regard to marine aquaculture science? Please justify.**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Do we possess adequate resources (facilities and staff) to address important domestic marine aquaculture science questions? If not, what resources are we lacking?**

- Observations

- Strengths
- Challenges
- Recommendations to address issue

**Are the best techniques and approaches being used to meet the objectives?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Is marine aquaculture science being conducted properly (experimental design, statistical rigor, standardization, integrity, peer review, transparency, confidentiality, etc.)? If not, what areas could be improved?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Are we allocating our resources in the best manner? Is there anything that can be reduced, consolidated or dropped?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**How well are NOAA-led advances in marine aquaculture science being communicated within and outside of NOAA, and are the appropriate audiences being reached?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**How well are NOAA-led advances in marine aquaculture science being applied within and outside of NOAA?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Other**

- Observations
  - Strengths
  - Challenges

June 29<sup>th</sup>, 2016

- o Recommendations to address issue

## **Conclusions**

<sup>1</sup> Notes: This report is a summary by the chair NOT consensus. Summarized findings and recommendations should be reported as "Panel members said" NOT "Panel concluded."

**Reviewer Report on Program Review of Aquaculture Science**

**Science Center**

**Address**

**Dates**

**Background**

**General Observations and Recommendations**

**Key (Specific) Findings and Recommendations (as Reviewer has comments on)**

**Do current and recently completed (last 5 years) aquaculture science activities: (a) fulfill mandates and requirements (as cited in the Background section of this document), (b) address the needs of regulatory partners, and (c) address the needs of industry?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**What research questions are available and should be prioritized with regard to marine aquaculture science? Please justify.**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Do we possess adequate resources (facilities and staff) to address important domestic marine aquaculture science questions? If not, what resources are we lacking?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Are the best techniques and approaches being used to meet the objectives?**

- Observations
  - Strengths
  - Challenges
- Recommendations to address issue

**Is marine aquaculture science being conducted properly (experimental design, statistical rigor, standardization, integrity, peer review, transparency, confidentiality, etc.)? If not, what areas could be improved?**

- Observations
  - Strengths
  - Challenges

June 29<sup>th</sup>, 2016

- o Recommendations to address issue

**Are we allocating our resources in the best manner? Is there anything that can be reduced, consolidated or dropped?**

- o Observations
  - Strengths
  - Challenges
- o Recommendations to address issue

**How well are NOAA-led advances in marine aquaculture science being communicated within and outside of NOAA, and are the appropriate audiences being reached?**

- o Observations
  - Strengths
  - Challenges
- o Recommendations to address issue

**How well are NOAA-led advances in marine aquaculture science being applied within and outside of NOAA?**

- o Observations
  - Strengths
  - Challenges
- o Recommendations to address issue

**Other**

- o Observations
  - Strengths
  - Challenges
- o Recommendations to address issue

**Conclusions**