



United States Department of Agriculture

Research, Education, and Economics
Agricultural Research Service

December 07, 2020

SUBJECT: Panel Chair Report for the National Centers for Coastal Ocean Science (NCCOS), Stressor Detection and Impacts Division's *Fate and Effects of Chemical Contaminants Program* (F&ECCP)

TO: Steven Thur, Acting Deputy Assistant Administrator, NOS
Margo Schulze-Haugen, Acting Director, NCCOS
Joelle Gore, Acting, Deputy Director, NCCOS
Sherri Fields, Deputy, Stressor Detection and Impacts Division, NCCOS
Peter Thompson, Chief, Stressor Detection and Impacts Division, NCCOS

FROM: Alberto Pantoja, Director, Midwest Area
USDA, Agricultural Research Service

ALBERTO
PANTOJA

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Date: 2020.12.07 10:32:26 -06'00'

This represents the Panel Chair report for an independent and expert review and evaluation of the research program conducted by the National Oceanic and Atmospheric Administration (NOAA), National Centers for Coastal Ocean Science (NCCOS), Stressor Detection and Impacts Division's Fate and Effects of Chemical Contaminants Program (F&ECCP). The review was conducted virtually from September 15 to 18, 2020 (Exhibit 1) was in accordance with the Procedural Handbook for NOAA Administrative Order (NAO) 216-115A: Research; NOAA Administrative Order 216-115: Strengthening NOAA's Research and Development Enterprise; and followed the evaluation factors and charge of the panel as defined in Exhibit 2. The review and the reports (Exhibit 3) validated the scientific integrity, merit, caliber, performance and relevance of NCCOS, F&ECCP and was found to be in the best interest of the National Oceanic and Atmospheric Administration.

8 Attachments:

Exhibit 1: Agenda

Exhibit 2: Evaluation Factors and Criteria to selecting program review panel members

Exhibit 3: Panel reports:

Michel C. Boufadel, Director, Center for Natural Resources, New Jersey Institute of Technology
Jan Matuszko, Director, Environmental Fate and Effects Division, Office of Pesticides, US EPA

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Bob Schuster, Bureau Chief, Bureau of Marine Water Monitoring, New Jersey DEP
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USACE

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

we deliver ecosystem science solutions to sustain thriving coastal communities and economies

Fate and Effects of Chemical Contaminants Program (F&ECCP) Review Agenda

(---Click on Agenda Items to Access Presentations---) **Updated--Sep 15, 2020 Version**

TUESDAY 9/15

Session 1: Introduction, Leadership Remarks & Program Overview

Welcome and Introductions (01)

9:00 am (Margo Schulze-Haugen)

Overview of Fate and Effects of Chemical Contaminants Program (F&ECCP) (02)

9:15 am (Peter Thompson)

Organizational Structure & Resources of the Fate and Effects of Chemical Contaminants Program (03)

9:30 am (Sherri Fields)

Session 2: Ecotoxicology

Ecotoxicology in Coastal Ecosystems: An Overview of the Ecotoxicology Branch (04)

9:45 am (Marie DeLorenzo)

Developmental and Reproductive Effects in Grass Shrimp (*Palaemon pugio*) Following Acute Larval Exposure to a Thin Oil Sheen and Ultraviolet Light (05)

10:00 am (Pete Key)

Ecotoxicity of Perfluorooctane Sulfonate & Fluorine-Free Fire Fighting Foams to Estuarine Organisms (06)

10:20 am (Pete Key and Ed Wirth)

10:40 am ----- BREAK -----

Analysis of Floating Oil Under UV Light at Different Environmental Conditions: A Pilot Study (07)

11:00 am (Ed Wirth)

Field-Based Mesocosms: In Situ Deployments for Assessing Impacts of Chemical Spills in Coastal Areas (08)

11:20 am (Paul Pennington, Pete Key)

Defining Protocols for Replanting as an Oil Spill Response Tactic in Coastal Marshes (09)

11:40 am (Paul Pennington)

12:00 pm *Additional Ecotoxicology Questions by Panel*

12:10 pm ----- LUNCH -----

National Institute of Standards and Technology Partnership (12)

1:10 pm John Kucklick, National Institute of Standards and Technology, DOC

Southern California Coastal Water Research Project Partnership (11)

1:25 pm Ken Schiff, Southern California Coastal Water Research Project

Office of Restoration and Response Partnership (10)

1:40 pm Lisa DiPinto, Office of Response & Restoration, NOS, NOAA

Session 3: Monitoring and Assessment

Monitoring & Assessment of Coastal Contaminants: Overview (13)

1:55 pm (Felipe Arzayus)

2:30 pm **END of DAY's Session**

WEDNESDAY 9/16

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| 9:00 am | Welcome Peter Thompson |
| 9:05 am | National Mussel Watch: Long-term Contaminant Monitoring Program (14) (Dennis Apeti) |
| 9:25 am | Mussel Watch: Current Approach (15) (Mary Rider) |
| 9:45 am | Place Based Assessments: Case Studies to Illustrate Tools, Partners and Data Users (16) (Dave Whitall) |
| 10:05 am | New Approaches for Monitoring & Assessment (17) (Annie Jacob) |
| 10:25 am | Data Management Evolution (18) (Kimani Kimbrough) |
| 10:45 am | BREAK |
| 11:00 am | Department of Fish and Wildlife, Washington, Partnership (19) James West (Department of Fish & Wildlife, Washington) |
| 11:15 am | Coral Reef Conservation Program Partnership (20) Jennifer Koss (Coral Reef Conservation Program Director, NOAA) |
| 11:30 am | Office of Research and Development, USEPA, Partnership (21) Marc Mills (Office of Research and Development, EPA) |
| 11:45 am | A Quantitative Adverse Outcome Pathways Process in Monitoring and Assessment of Biological Stress (23) Erik Davenport |
| 12:00 pm | Charleston Laboratory Virtual Tour (22) Marie DeLorenzo |
| 12:10 pm | Overview of Charleston Lab Integration Sean Morton |
| 12:20 pm | -----END of DAY's Session----- |

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| 9:00 am | Welcome Peter Thompson |
| | Session 4: Key Species and Bioinformatics |
| 9:05 am | Assessing the Ecological Impacts of Marine Stressors Through Key Biological Indicator Species (24) Jeff Guyon |
| 9:20 am | Effects of two Remediation Strategies on the Indigenous Microbial Communities In Response to a Simulated Hydrocarbon Release Using an Experimental Mesocosm System (25) Thomas Greig |
| 9:35 am | Sediment Quality Benchmarks for Assessing Oil-Related Impacts to the Deep-Sea Benthos (26) Len Balthis |
| 9:55 am | Effect of Louisiana Sweet Crude Oil on a Pacific coral, <i>Pocillopora damicornis</i> (27) Lisa May |
| 10:15 am | Effects of Ammonia on Corals and Sea Urchins (28) Cheryl Woodley |
| 10:35 am | -----BREAK----- |
| 10:50 am | Chemical Contaminants in Marine Mammals (29) Wayne McFee |
| 11:05 am | National Park Service Partnership (30) C. Anna Toline (National Park Service, DOI) |
| 11:20 am | College of Charleston Partnership (31) Barbara Beckingham (Department of Geology and Environmental Geosciences, College of Charleston) |
| 11:35 am | Florida Keys National Marine Sanctuaries Partnership (32) Andy Bruckner (Florida Keys National Marine Sanctuaries, NOS, NOAA) |
| 11:50 am | -----LUNCH----- |
| 12:50 pm | F&ECCP Future Directions (Comments) Peter Thompson and Sherri Fields |
| 1:00 pm | <i>Questions by Panel on Any Aspect of F&ECCP</i> |
| 1:20 pm | Wrap Up (Comments) Margo Schulze-Haugen |
| 1:25 pm | Preliminary De-Brief by Panel Panel |

PANEL MEMBER DUTIES

- **Tasks/Duties of the Panel Chair**

- ✓ Per the [Procedural Handbook for NOAA Administrative Order \(NAO\) 216-115A: Research and Development in NOAA](#), that governs External program Reviews: *“The panel should be chaired by a Federal employee to comply with the FACA, and the individual should also be from outside NOAA to avoid conflicts of interest. Per these guidelines, the panel’s final report should summarize panelists’ individual findings, rather than seek consensus of the panel”*
- ✓ The Chair:
 - Will evaluate the Program Review Process using the attached evaluation criteria and provide recommendations for improving future Program reviews.
 - Will prepare a Summary Report that collates the recommendations of Panel members by securing individual reports from Panel members.

- **Tasks/Duties of Panel Members**

- ✓ Each Panel Member will use the attached Evaluation Criteria and conduct an independent evaluation of the Fate & Effects of Chemical Contaminants Program.
- ✓ These individual reports (prepared without consultations with other Panel Members or the Chair) will be based on an evaluation of :
 - The Program Review Briefing Book
 - Presentations provided during the Program Review

- **Deliverables & Due Dates (Chair and Panel)**

- ✓ Panel Member Reports will be written and provided in electronic format (in Microsoft Word) to the Chair and NCCOS Point of Contacts two weeks after the conclusion of the Program review (i.e. by September 30, 2020).
- ✓ The Chair will provide a Summary Report by October 14, 2020.

- **NOAA Requirements**

- ✓ After the conclusion of the Program Review, information on the Review will be posted to the NCCOS Website and will be available to the public.
 - All Panel members and the Chair will be identified. A brief biographical sketch for each Panel member and the Chair will be drafted by NCCOS and approved for posting by each Panel member
 - The full Report of each Panel Member will be posted online with public access, however, Panel member attribution by name or affiliation etc. will not be included.
 - The full Report of the Chair will be posted online with public access. Given the unique and singular role of the Chair, the Chair will be identified by name & affiliation.

Evaluation Factors and Charge to Panel

| EVALUATION CRITERIA | | CHARGE TO PANEL CHAIR |
|--|---|---|
| Instructions to the Panel | | a) Are the instructions, charge provided to the review panel clear? |
| Briefing Book | | b) Is the information provided sufficiently detailed and complete given the charge of the Review Panel? c) Are there areas of the Program that should have been reviewed, and are not covered by the Panel's charge? |
| Presentations | | d) The quality/utility of information/presentations? e) The quality of exchanges between Panel members and presenters (e.g. questions answered; issues clarified, informative exchanges?) |
| Special Topic Panel Discussions | | f) The utility and value of the Omics Panel discussion? |
| Review Panel Reports | | g) Did Review Panel reports meet the requirements of the Panel's charge? |
| CRITERIA (equal weights) | SUB-CRITERIA (equal weights under each criteria) | CHARGE TO PANEL MEMBERS |
| QUALITY (The Scientific Merit of the Work/Value to Scientific Community) | <i>Scientifically Sound, Reproducible Products & Services</i> | a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing? |
| | <i>Scientific Leadership and the Delivery of Scientific Products & Services</i> | b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature? c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g. - timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery? |
| RELEVANCE (The Value of Science to Users Beyond the Scientific Community) | <i>Alignment with NCCOS, SDI Priorities, Mandates</i> | d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment? |
| | <i>Impact of Work</i> | e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved? f) Are there research areas that should/should not be pursued and if so, why? |
| PERFORMANCE (Effectiveness & Efficiency in Delivering Products & Services) | <i>Leadership & Workforce Management</i> | g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership? h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives. i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant? |
| | <i>Science Investments and Infrastructure</i> | j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why? k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support? |
| | <i>Stakeholder Involvement</i> | l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged? |

EXHIBIT - 3

PANEL MEMBER REPORTS

**Panel Member Reports are not presented in the
order listed in the Chair's Memo/Report**

PANEL MEMBER #1 REPORT

Panel Member # 1 Response to Charge Questions to Panel Members

Evaluation Factors and Charge to Panel

| EVALUATION CRITERIA | | CHARGE TO PANEL CHAIR |
|---|---|---|
| Instructions to the Panel | | a) Are the instructions, charge provided to the review panel clear? |
| Briefing Book | | b) Is the information provided sufficiently detailed and complete given the charge of the Review Panel? c) Are there areas of the Program that should have been reviewed, and are not covered by the Panel's charge? |
| Presentations | | d) The quality/utility of information/presentations? e) The quality of exchanges between Panel members and presenters (e.g. questions answered; issues clarified, informative exchanges?) |
| Special Topic Panel Discussions | | f) The utility and value of the Omics Panel discussion? |
| Review Panel Reports | | g) Did Review Panel reports meet the requirements of the Panel's charge? |
| CRITERIA (equal weights) | SUB-CRITERIA (equal weights under each criteria) | CHARGE TO PANEL MEMBERS |
| QUALITY (The Scientific Merit of the Work/Value to Scientific Community) | <i>Scientifically Sound, Reproducible Products & Services</i> | a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing? |
| | <i>Scientific Leadership and the Delivery of Scientific Products & Services</i> | b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature? c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g. - timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery? |
| RELEVANCE (The Value of Science to Users Beyond the Scientific Community) | <i>Alignment with NCCOS, SDI Priorities, Mandates</i> | d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment? |
| | <i>Impact of Work</i> | e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved? f) Are there research areas that should/should not be pursued and if so, why? |
| PERFORMANCE (Effectiveness & Efficiency in Delivering Products & Services) | <i>Leadership & Workforce Management</i> | g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership? h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives. i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant? |

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|--|---|---|
| | <i>Science Investments and Infrastructure</i> | j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why? k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support? |
| | <i>Stakeholder Involvement</i> | l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged? |

Charge Question a: How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing?

Response: Based on the studies presented to the panel, I would characterize the scientific quality of the products and services to be high. The studies presented to the panel were generally scientifically sound. This is supported by the program's well-defined process of internal review for scientific communications as referenced in Chapter 2 of Volume 1: Introduction and F&ECCP Overview (Ensuring Science Quality and Transparency). In addition to describing the process, the document provides a checklist for that internal review that supports scientifically sound and reproducible products. In particular, the policy requirement that a lack of scientific merit is the only basis for disapproval (including some information on what constitutes a lack of scientific merit) helps ensure scientific quality, integrity, and transparency. In addition, the documentation provided to the panel demonstrates an appropriate level of QA/QC, SOPs, etc. Furthermore, the program's scientists publish regularly in peer reviewed journals, participate in conferences, and professional societies which provides a forum for external review and input on enhancing scientifically sound, reproducible products. Lastly, the program's partnerships with various universities is another forum for external review and input to support scientifically sound products.

The program may want to consider joining the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM). ICCVAM is composed of representatives from U.S. federal regulatory and research agencies that require, use, generate, or disseminate toxicological and safety testing information. As explained on their website, the purpose of ICCVAM is to : increase the efficiency and effectiveness of U.S. federal agency test method review; eliminate unnecessary duplication of effort and share experience among U.S. federal regulatory agencies; optimize utilization of scientific expertise outside the U.S. federal government; ensure that new and revised test methods are validated to meet the needs of U.S. federal agencies; and reduce, refine, or replace the use of animals in testing where feasible. Active participation in ICCVAM would likely serve to enhance the program's scientific standing.

Charge question b: Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature?

Response: The program is clearly a scientific leader nationally in certain areas. For example, the program is a leader in the area of monitoring coastal U.S. waters. It is one of the few programs that monitors coastal environments and the program fills a unique niche in the nation's contaminant monitoring

program. In particular, the Mussel Watch program (bivalves and sediment) is a unique source of long-term nationwide monitoring data for U.S. coastal waters. Furthermore, The Center for Coastal Environmental Health and Biomolecular Research (CCEHBR) building and associated structures that house the ecotoxicity testing laboratories, live shallow coral aquaria and research building, marsh replication mesocosm, marine mammal necropsy lab and aquatic species rearing building are likely fairly unique to the program and enable it to provide leadership for studying the effects of pollutants on coastal waters.

In addition, the program also provides leadership to its partners. Multiple partners presented to the panel on the program's leadership, particularly in support of addressing specialized or localized research questions where there is a unique need by state, and local officials, often in partnership with a non-profit organization.

As noted above, the program may wish to join other federal agencies performing similar science and actively participate in ICCVAM as this may also serve to enhance the program's scientific leadership. See additional information in response to charge question a.

The program can also enhance its scientific stature with enhanced communication with its potential customers, particularly state and federal Agencies that may be able to effect change on the land-based contaminants affecting US coasts. According to the briefing materials, this is the major "route" for the exposure of marine ecosystems to a host of contaminants, contributing up to 80% of the contaminants. Moreover, the program may want to consider better educating the public on their activities so that the public has a better understanding of the leadership the program provides. Continuing to connect and partner with applicable research universities with also enhance the scientific nature. It is unclear how industry views the program's products based on the information presented and it does not appear the program generally collaborates with industry. Finally, continuing to demonstrate the utility of the program's science to effect change is key to demonstrating leadership and utility.

As the materials did not readily address leadership internationally, I am not able to provide a response to that portion of the question.

Charge question c: Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g.- timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery?

Response: Based on the information provided to the reviewers, the program delivers products and services to the scientific community that are sufficiently detailed, etc. Generally other scientists are looking for quality and sufficiently detailed products. As discussed in an earlier response, the internal review processes the program has in place helps ensure the program produces quality products. Uncertainties, often around a lack of data, also affect the utility of a product. The program appears to be data rich compared to many other programs of which I am aware. To the extent the program's data is

not already readily available in a database in a form that makes it readily available for use by the scientific community, this is an area where the program should strategically focus to maximize utility.

Charge question d: How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment?

Response: As explained in the materials, NOS advances three priorities: Safe and Efficient Transportation and Commerce; Preparedness and Risk Reduction, and Stewardship, Recreation, and Tourism. NCCOS delivers science solutions: a) for the stewardship of ocean and coastal resources; and b) that support thriving coastal communities and economies. A review of NCCOS's current strategic plan indicates that the program supports two strategic priorities: 1) Stressor Impacts and Mitigation which includes Harmful Algal Bloom Detection and Forecasting; and Biological Effects of Contaminants and Nutrients. In particular, the strategic plan notes the program's efforts to: provide the science to help managers understand the biological effects of contaminants and nutrients and evolve actions over time, or respond quickly to avert a crisis; conducts national or long-term research to understand the effects of contaminants, 12 nutrients, and hypoxia; measure contaminants in mussels and oysters, or the breadth of the Gulf of Mexico's dead zone. The plan also discusses more specialized or localized research questions where there is a unique need by Federal, tribal, state, and local officials, often in partnership with an industry or non-profit organization.

It's clear that the specific products mentioned above in support of the strategic plan are aligned with NOAA's mission, legislative mandates and priorities. What is less clear is the extent to which the specialized research questions align with the program's priority areas. Further, the breadth of the efforts described above is extensive. This is exacerbated by the generalized nature of the specialized research questions and could expand the breadth of the program even more. It is unclear how the program prioritizes the key long-term efforts versus the specialized research and how the program ensures the specialized research is in alignment with the priority areas. For example, it appears that supporting mitigation actions may be considered in this category. While valuable, that does not appear to be an action that fits within the strategic priorities.

In addition, while the program has identified strategic priorities, the program also provided information on five science themes and supporting objectives. It is clear how some of those themes support the priority areas and less clear about others. The criteria for theme 5 are quite extensive and may benefit from additional prioritization with a focus on the application to the strategic priorities.

Charge question e: To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved?

Response: Based on the materials presented to the panel, the program's products have utility to the larger community. As an example, I offer the ability to employ equipment in the field in real time to

assess toxicity in the wake of oil or chemical spills (and have a well-developed SOP, etc). This approach will be timely, understandable, and will further the larger understanding of survivability and the resulting effects on the survivors. Presenters offered other examples of products that were/are timely, understandable, etc such as research to evaluate: the effects of UV light on oil spills, the effects of additives to treat oil spills, the effects of oil spills on sediment, and the toxicity of oil spills to marine life; the toxicity of AFFF alternatives; protocols for effective restoration of marshes following an oil spill; the effects of stressors on mammals; and the effects of nutrient pollution on coral reefs.

The program indicated its intent to move towards omics. In particular, the program gave a presentation regarding a pilot state-of-the-art bioeffects surveillance program they are performing in the Great Lakes. While that is an area that may be readily understandable to scientists familiar with that arena, it is not readily understandable by the customers. Similarly, the program noted its intent to move towards machine learning and artificial intelligence capabilities. The program will need to concentrate on communicating about the program, the results and what they mean, in a manner that its users can understand and have confidence in the resulting information.

Moreover, the information on the projects presented to the panel demonstrates an understanding of the real-world applications (or potential applications). This helps to ensure the products are relevant and useful. Ultimately, understanding how the information will likely be used is key to ensuring an effort is “fit-for-purpose.” While scientists like to push the boundaries and explore cutting edge technologies, that does not appear to be NOAA’s mission. Fit-for-purpose efforts will ensure the program’s efforts meet the needs, further the mission, and similarly conserve resources. This should not be interpreted to mean that cutting edge technologies are not the most appropriate way to address a goal, it is simply an acknowledgement that I believe the impact of the work beyond the scientific community needs to remain front-and-center to the program’s planning.

While it’s clear that certain resource managers are utilizing the program’s products, what’s less clear is the extent to which they are being used throughout the United States and if they are not, why not. To the extent that resource managers more generally are not utilizing the program’s products, that may simply be to a lack of awareness on their part or that may lead the program to re-think some of its efforts.

In many cases, the program is evaluating effects that have already occurred and/or mitigating those effects. The program should consider how its efforts could be used by state and federal Agencies that may have the authority to impact the contamination from occurring in the first place as that has the potential to significantly support NOAA’s mission. At a minimum, strengthening partnerships with EPA and other federal agencies with similar missions should be considered.

Charge question f: Are there research areas that should/should not be pursued and if so, why?

Response: Considering the breadth of the program's strategic priorities, the program should continue to evaluate where science needs exist that are not filled by another NOAA, Federal, State or local entity that need to be met. The program may wish to more fully consider the extent to which the efforts by other entities may be applicable to coastal ecosystems. For example, the program noted it conducts national or long-term research to understand the effects of contaminants and does research to understand the biological effects of contaminants and nutrients. The contaminants noted are the same contaminants of concern that many other Agencies, states, and non-profit organizations are studying. Similarly, there are many federal Agencies exploring method development for emerging contaminants including PFOA/PFOS.

Given the large number of chemicals that the program is trying to evaluate (a challenge area the program identified), the amount of data the program has been generating to date is substantial. While the program is considering the work being done by others, there may be additional ways to bridge the information already collected by the program and other federal Agencies/stakeholders without collecting additional new data or as much new data. For example, the program has a wealth of existing data and information and is attempting to address an exhaustive list of potential contaminants. The program may wish to explore structure-activity relationship (SAR) and quantitative structure-activity relationship (QSAR) models - collectively referred to as (Q)SARs - mathematical models that can be used to predict the physicochemical, biological and environmental fate properties of compounds from the knowledge of their chemical structure. In a similar manner, the program may wish to consider looking at receptor-binders in mammals and consider the extent to which coastal life has the same receptors. The above are examples of "new approach methodologies" (NAMs), a general term often used to reference to any non-animal-based approaches that can be used to provide information in the context of chemical hazard and risk assessment. These new approaches include integrated approaches to testing and assessment (IATAs), defined approaches for data interpretation, and performance-based evaluation of test methods. This is an area that many other federal agencies are actively pursuing.

Charge Question g): Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership?

Response: The five-year strategic plan establishes clear overarching priorities and guidance and is a planning approach the program should continue to utilize moving forward. This affords the entire leadership team clear vision and direction and can be used to identify internal (and external) areas of collaboration and prioritization. Regarding the separate locations and organizational structures, while this could appear to be a barrier, it need not be. The monthly meeting with the managers is a step in the right direction. The program may wish to consider having weekly or bi-weekly management team meetings to more fully integrate the management team to collectively work towards the priority areas and support each other more fully as a team. The program should consider implementing this with the NCCOS Director meeting with the Division Directors and each Division Director meeting with their

Branch Chiefs. In addition for awards for innovation, the program may wish to consider awards that focus on collaborative team achievements.

The current working environment has demonstrated and enhanced the ability to work collaboratively and effectively no matter where a person is physically located. Organizational structure is only a barrier if the leadership and/or culture of the organization sees it as such. Separate branches need not be an impediment to the formation of cross-branch teams. In other words, the people on the teams that a manager oversees do not need to be limited to the people that branch chief supervises. Many organizations and private companies function well using a matrix-management approach. What's critical in making this work is good communication among the leadership team and a team culture regardless of branch or location. While it appears this internal cross-collaboration is occurring, this is an area that the program identified as a challenge area.

Regarding spurring innovation, innovation need not be movement into an entirely different area or represent state of the art science. Often innovation occurs when staff and management are encouraged to look at the issue through a slightly different lens. Small changes can make a big difference. For longer term efforts, the people closest to the effort may have difficulty seeing beyond what has become the standard. Collaboration with other divisions and other agencies performing similar task would be helpful for that purpose.

Charge Question h): Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives.

Response: In general, the information provided regarding the formal education and experience of the staff demonstrates high quality. The program provided detailed information about the federal staff in the ecotoxicology branch and the monitoring and assessment branch. There does appear to be a difference in the branches with respect to formal education with the PhDs in one program largely being in public health while PhDs in the other branch are in science/engineering degrees. Information provided for the Key Species & Bioinformatics Branch listed the staff's education level (e.g. BS) and the associated university/college but did not provide information regarding the area of study. I also note that many of the approaches I have suggested the program consider would necessitate skill sets that the program does not appear to have. In addition to scientists/engineers, the program would need staff with expertise in database management, coding, etc.

Moving forward, I have some concerns about the program's ability to maintain its high level of scientific quality let alone enhance it. It is critical that the program is staffed with federal employees that have the skills and expertise in key areas that drive the program now and will continue to drive the program into the future. It is concerning that the branches saw a loss of 4 federal scientists by the end of FY2019, especially considering the breadth of the activities in the program. Furthermore, while the program needs to maintain scientific expertise in its current focus areas, the projected movement into Omics and big data will likely require a different skill set. To the extent that the program is not already doing so, it

should consider focusing on staff with needed skill sets in the next five to ten years. In addition, the ratio of managers to staff seems to be weighted too high towards managers. Three branch chiefs for a staff of 21 yields a 1:7 ratio. In my experience, the branches can easily accommodate at least 10 scientists and maintain an appropriate manager to staff ratio. I do not recommend contract support to address core skills that are fundamental to the program's scientific quality over the longer term. Contract support, however, is a great way to supplement capabilities for long-term efforts that are already well-developed and well defined or for short term needs (e.g. where expertise is needed in a particular area for a particular study).

Charge question i): What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant?

Response: Lack of training does not readily appear to be determinative in terms of the scientists' skills. Training in team building, communicating complex science efforts to non-scientists may be helpful going forward. In addition, the leadership may wish to explore opportunities for leadership training such as training provided by the Federal Executive Institute.

Charge question j): Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why?

Response: A review of the information on current investments demonstrates that the program invests about 50% of its total funding in the monitoring and assessment branch, about 30% in the ecotoxicology branch, and the remainder in the key species branch. The percentage of the base, discretionary, and other funding that each branch receives appears to be +/-10%. Due to the breadth of the long-term studies in terms of locations, timing, and number of contaminants the program is trying to evaluate, it is not surprising that the monitoring and assessment branch receives more funds than the other branches. While the long-term monitoring program has already taken steps to reduce its costs (regional sampling), as described in earlier responses, there are approaches the program may wish to consider that could reduce the program's costs without fundamentally undermining the goals of the long-term monitoring program.

Charge question k): How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support?

Response: The Center for Coastal Environmental Health and Biomolecular Research (CCEHBR) building and associated structures are likely unique to NCCOS and enable NCCOS to provide leadership for studying the effects of pollutants on coastal waters. The program is also supported by the Hollins Laboratory which houses analytical equipment. Laboratories and scientific equipment are costly (e.g. GC, mass spec). State of the art equipment such as NMRs are even more costly to purchase (\$500K to 1 million) and maintain. Yet, access to fit for purpose scientific equipment is critical to maintaining or

enhancing scientific integrity. According to the materials provided, “in FY 2019, NCCOS/SDI began targeting aged equipment for replacement. For FY 2017-2019, total investment by SDI toward equipment updates or replacement totaled approximately \$342,700. Note that this figure includes equipment that may fully or partially support the Harmful Algal Bloom programs of SDI.” This investment appears to be woefully inadequate to ensure staff have standard equipment at their disposal (*e.g.* mass specs, etc). Furthermore, according to the materials provided, the last major investment in equipment for HML and CCEHBR dates back approximately 15 years. Ultimately, the program does not have the funding to maintain the existing equipment and purchase more costly, advanced state-of-the-art equipment. A focused life-cycle analysis of the needed equipment to carry out the expected research now and into the future would clearly demonstrate the current path is not sustainable and help the program better understand the extent of the challenge they are facing. Merging the two Charleston laboratories into a single building and identifying and establishing partnerships to pool and sharing of resources is a step in the right direction but will likely not resolve the issue.

The program simply must look at ways to reduce long-term data collection while maintaining the value of the effort. See response to charge question e for some ideas on ways to accomplish this. In addition, the program could also consider retrospective analyses of the existing data to narrow the breadth of pollutants being analyzed. Many of the approaches that I have described for cutting back on the number of contaminants being evaluated and/or the timeframe between evaluations would necessitate skill sets that the program does not appear to have. In addition to scientists/engineers, the program would need staff with expertise in database management, computer modeling, coding, etc. While the Key Species Branch noted that in the materials, the Data and Monitoring Branch would also benefit from additional expertise in this area as well.

Charge question I): What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged?

Response: The program participates in various conferences; contributes to various databases; has members of or serve on various science societies; collaborates with a variety of federal (*e.g.*, Corp of Engineers, National Park Service, DOI), state (*e.g.* SC, FL, WA, AK, CA, PR) and local organizations (*e.g.*, Southern California Coastal Water Research Project); and universities (local and non-local and adjunct professors and/or on projects). What is less clear is how the program identifies and strategically prioritizes such collaborations. Establishing an outreach plan with criteria for evaluating potential collaborations to ensure the collaborations are aligned with the program’s strategic priorities would likely strengthen and focus these efforts. As described above, the program would benefit from joining other federal Agencies within ICCVAAM.

PANEL MEMBER #2 REPORT

PANEL MEMBER DUTIES

- **Tasks/Duties of the Panel Chair**

- ✓ Per the [Procedural Handbook for NOAA Administrative Order \(NAO\) 216-115A: Research and Development in NOAA](#), that governs External program Reviews: *“The panel should be chaired by a Federal employee to comply with the FACA, and the individual should also be from outside NOAA to avoid conflicts of interest. Per these guidelines, the panel’s final report should summarize panelists’ individual findings, rather than seek consensus of the panel”*
- ✓ The Chair:
 - Will evaluate the Program Review Process using the attached evaluation criteria and provide recommendations for improving future Program reviews.
 - Will prepare a Summary Report that collates the recommendations of Panel members by securing individual reports from Panel members.

- **Tasks/Duties of Panel Members**

- ✓ Each Panel Member will use the attached Evaluation Criteria and conduct an independent evaluation of the Fate & Effects of Chemical Contaminants Program.
- ✓ These individual reports (prepared without consultations with other Panel Members or the Chair) will be based on an evaluation of :
 - The Program Review Briefing Book
 - Presentations provided during the Program Review

- **Deliverables & Due Dates (Chair and Panel)**

- ✓ Panel Member Reports will be written and provided in electronic format (in Microsoft Word) to the Chair and NCCOS Point of Contacts two weeks after the conclusion of the Program review (i.e. by September 30, 2020).
- ✓ The Chair will provide a Summary Report by October 14, 2020.

- **NOAA Requirements**

- ✓ After the conclusion of the Program Review, information on the Review will be posted to the NCCOS Website and will be available to the public.
 - All Panel members and the Chair will be identified. A brief biographical sketch for each Panel member and the Chair will be drafted by NCCOS and approved for posting by each Panel member
 - The full Report of each Panel Member will be posted online with public access, however, Panel member attribution by name or affiliation etc. will not be included.
 - The full Report of the Chair will be posted online with public access. Given the unique and singular role of the Chair, the Chair will be identified by name & affiliation.

Evaluation Factors and Charge to Panel

| EVALUATION CRITERIA | | CHARGE TO PANEL CHAIR |
|--|---|---|
| Instructions to the Panel | | a) Are the instructions, charge provided to the review panel clear? |
| Briefing Book | | b) Is the information provided sufficiently detailed and complete given the charge of the Review Panel? c) Are there areas of the Program that should have been reviewed, and are not covered by the Panel's charge? |
| Presentations | | d) The quality/utility of information/presentations? e) The quality of exchanges between Panel members and presenters (e.g. questions answered; issues clarified, informative exchanges?) |
| Special Topic Panel Discussions | | f) The utility and value of the Omics Panel discussion? |
| Review Panel Reports | | g) Did Review Panel reports meet the requirements of the Panel's charge? |
| CRITERIA (equal weights) | SUB-CRITERIA (equal weights under each criteria) | CHARGE TO PANEL MEMBERS |
| QUALITY (The Scientific Merit of the Work/Value to Scientific Community) | <i>Scientifically Sound, Reproducible Products & Services</i> | a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing? |
| | <i>Scientific Leadership and the Delivery of Scientific Products & Services</i> | b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature? c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g.- timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery? |
| RELEVANCE (The Value of Science to Users Beyond the Scientific Community) | <i>Alignment with NCCOS, SDI Priorities, Mandates</i> | d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment? |
| | <i>Impact of Work</i> | e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved? f) Are there research areas that should/should not be pursued and if so, why? |
| PERFORMANCE (Effectiveness & Efficiency in Delivering Products & Services) | <i>Leadership & Workforce Management</i> | g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership? h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives. i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant? |
| | <i>Science Investments and Infrastructure</i> | j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why? k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support? |
| | <i>Stakeholder Involvement</i> | l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged? |

QUALITY

The Scientific Merit of the Work/Value to Scientific Community

Scientifically Sound, Reproducible Products & Services

How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing?

Overall, I would characterize the scientific quality of the research programs, products and services delivered by the NCCOS program as very high. Alignment with legislative mandates is strong. Recommendations to enhance the program's scientific standing are:

1. Strengthen strategic collaborations with other federal agencies, especially US EPA and USGS, especially with respect to the evolution of contaminant monitoring programs. Monitoring programs could be better targeted, harmonized and coordinated to leverage the technical strengths of the various agencies and to provide a more comprehensive view of the environmental quality of both terrestrial, riverine, and coastal ecosystems in the US. For example, US EPA has established endocrine disruption testing methodologies for compounds. For example, glyphosate was recently assessed, and EPA determined that glyphosate is not an endocrine disruptor. Better collaboration between agencies, and movement to a risk assessment paradigm (considering both hazard and exposure) rather than a hazard assessment paradigm in monitoring programs would improve the standing of those programs. For example, in pilot studies to measure contaminants of emerging concern, scientists report the number and frequency of detection, and discuss the potential hazards of detected compounds. More consideration of both exposure and risk to aquatic organisms will make this work more impactful. It is good to see the MWP move towards bioindicators of exposure. This type of approach for perhaps fewer compounds, identified using a collaborative approach with other agencies and stakeholders, would enhance the value of the work especially to regulators and policymakers.
2. On non-target monitoring, US EPA ORD have established the CompTox Chemicals Dashboard (<https://comptox.epa.gov/dashboard>). From their website "The CompTox Chemicals Dashboard is a one-stop-shop for chemistry, toxicity and exposure information for over 875,000 chemicals. Data and models within the Dashboard also help with efforts to identify chemicals of most need of further testing and reducing the use of animals in chemical testing." Coordination and collaboration with this team at EPA would also be helpful in prioritizing future monitoring efforts.
3. Many of the compounds monitored are associated with agriculture, and terrestrial sources are mentioned as important to coastal pollution, but collaborations with USDA are not mentioned. USDA-ARS has established a Long Term AgroEcosystem Research network which includes assessment of conservation practices to protect water quality. This may be an opportunity to collaborate on monitoring efforts and to examine those conservation practices that are most valuable for protecting coastal ecosystems.

Scientific Leadership and the Delivery of Scientific Products & Services

Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature?

The NCCOS program scientists provide excellent leadership in the scientific community in their programmatic areas.

The Ecotoxicology branch is recognized nationally for their work on Ecotox testing of coastal species both in laboratory, mesocosms, and in field settings. Very few fully functional aquatic Ecotox laboratories focused on marine and estuarine species exist outside of industry. They publish regularly in high quality peer-reviewed journals. Their most recent work related to the impact of oil spills on marine species including corals will be valuable for scientists working in other regions of the US and internationally. This work is quite difficult and labor-intensive. Ecotox work requires excellent analytical support. Updated analytical equipment and laboratory support will increase the impact of this research. Increasing the move towards digital laboratory notebooks etc. and minimizing manual data input would improve efficiency and reduce time to publish results or to make them available on-line. Seeking international partners working on similar projects (e.g., oil spills, microplastics) over and above the federal and local partners listed will also increase the impact of the research coming out of this branch.

The Monitoring and Assessment Branch produces highly valuable long-term monitoring data of many different types of contaminants. This team has worked to add environmental indicators and biomarkers to their assessments. This addition increases the depth of knowledge obtained from these monitoring programs beyond exposure measurements to include biological effects. The decision to move to 5-year sampling cycles for Mussel Watch and to increase engagement with local partners was an admirable pivot in the face of budget constraints. This type of creativity and flexibility will be needed moving forward. The move to establish machine learning and artificial intelligence tools for data mining is a natural progression and should be prioritized.

The Key Species and Bioinformatics Branch also provide valuable and unique research capabilities for the study of Corals, Marine Mammals, and Benthic invertebrates. The work of this branch compliments the work of the other two teams. Further investments into Genetics/Genomics and Bioinformatics and Modeling are encouraged to increase the impact of this work.

Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g.- timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery?

Scientists in NCCOS are working at a high level of engagement with the scientific community via peer-reviewed publications, reports and presentations at conferences. Increased use of non-traditional scientific platforms to transfer information about their work. Interactive websites, videos, webinars, Ted-style talks (as mentioned on pg 40 of Vol. 1), educational materials would work to increase visibility and impact of the research products.

RELEVANCE

The Value of Science to Users Beyond the Scientific Community

Alignment with NCCOS, SDI Priorities, Mandates

How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment?

From the materials and presentations provided, the products and services provided by NCCOS appear to be highly aligned with legislative mandates. There is always more that can be done, but with limited resources the leadership of NCCOS have done a good job of maintaining focus on high priority research topics of relevance to coastal and ocean health while also exploring future topics of critical importance like microplastics.

Impact of Work

To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved?

All the work of NCCOS is relevant to coastal and ocean resource managers to assess contaminant risk and impacts. It is unclear to this reviewer how these could be improved without further detailed information on current interactions with resource managers.

Are there research areas that should/should not be pursued and if so, why?

The research areas described by the three branches appear well aligned with the mission of NOAA and the legislative mandates.

PERFORMANCE

Effectiveness & Efficiency in Delivering Products & Services

Leadership & Workforce Management

Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership?

Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives.

What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant?

The high quality of materials and presentations provided for this review, and the large number of stakeholder presentations provides a strong indication that NCCOS is working well as a team. Without knowing what practices are currently in place to support employee engagement, it is difficult to make suggestions. However, the lab consolidation may provide some opportunities for team building activities and brainstorming about how to overcome challenges with moving into shared space. Short term assignment – exchanges between personnel in Charleston with those in Silver Spring could be helpful to enhance communications. There were several comments related to the need to bring on new talent at the Ph.D. level. This could be accomplished with recruitment of post-docs.

Science Investments and Infrastructure

Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why?

How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support?

From the materials and presentations provided, it appears that the move to consolidate laboratory space in the HML will increase efficiency and lead to better communication between branches. From the short briefing on equipment funding, it appears that investments in research and science are adequate.

Stakeholder Involvement

What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged?

Presentations provided during this review indicate several fruitful and long-term collaborations with stakeholders. Little was mentioned of international partners. There appears to be opportunities to extend collaborations internationally using virtual tools and participating in virtual international conferences and workshops.

PANEL MEMBER #3 REPORT

QUALITY

(The Scientific Merit of the Work/Value to Scientific Community)

- Scientifically Sound, Reproducible Products & Services

a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing?

It is clear from the briefings that the products and services delivered by the Program are of very high quality. I appreciate all the briefings and all the briefing books, which were detailed and very informative. The Program certainly involves an impressive amount of work with a relatively small budget and team.

- Scientific Leadership and the Delivery of Scientific Products & Services

b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature?

The Program is well recognized within the national scientific community, and the researchers are certainly performing at a high level. Nevertheless, it is a bit unclear from the briefings how much leadership there is at the international level. The Program seems to be very US-focused and therefore not too involved in international efforts. It might be of interest to the Program to attend more international meetings (assuming those will happen again in the near future), as well as maybe pursuing some international collaborations, and getting involved in international efforts.

c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g. - timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery?

It would be useful to ensure that all the manuscripts are published in open access. Management could support that effort with some special funding for example (if it is not already in place). There are many productive collaborations with other agencies and particularly with universities. Those are very useful, especially if they involved students (i.e. PhD thesis), and outreach efforts with universities and the public. The Program already has excellent examples of outreach, which involve the public and college students. Promoting that kind of outreach would be extremely beneficial for the program. Further efforts engaging more minority students, underserved populations, and HBCU institutions would also be beneficial and impactful for society.

RELEVANCE

(The Value of Science to Users Beyond the Scientific Community)

- Alignment with NCCOS, SDI Priorities, Mandates

d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment?

The products and services presented during the F&ECCP review are well aligned with NCCOS legislative mandates and priorities.

- Impact of Work

e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved?

It seems like the Program products are well considered by resource managers and regulatory agencies. There is already a well-established collaboration with other agencies, particularly with regulatory agencies such as the EPA, which ensures that the data obtained by the Program informs decision-making. Promoting this kind of collaboration with other agencies or sections of the agencies further would increase the impact and relevance of the Program.

f) Are there research areas that should/should not be pursued and if so, why?

While I believe all the research areas are very relevant and should be pursued, there are a few areas that are not clearly addressed and might help strengthen the Program and future research.

For instance, understanding Mixtures is a very important issue of global concern. That would include not only CECs, but also their combinations and other secondary stressors. The Program does not seem to specifically address mixtures.

Due to the Program's large mission and geographical area, there is a big need to address very diverse environments and climates, especially when looking at microbial communities or maybe chemicals (i.e. cold regions areas versus tropical climates). For instance, microbial communities, physical-chemical properties, weather, among others, can be extremely diverse, particularly in very different geographical areas (i.e., Alaska, and the Gulf). Those conditions can affect not only microbial function and distribution, but also chemical deposition, degradation, bioaccumulation, dispersion, etc. This might be of particular interest with climate change and constantly changing conditions throughout the country, including extreme events.

It would also be good to include in the Program some more efforts on species extrapolation, as biomonitoring is so time consuming and expensive (for endangered species, environmental health, and maybe even to inform human health at some point).

While there seems to be an interest in Omics technologies, it is mostly focused on metabolomics and metagenomics. Other omics would also be very informative, and there are many efforts in other agencies to better understand the linkages and their potential use. This could be a good area for further collaboration in order to start bringing the expertise in house.

PERFORMANCE

(Effectiveness & Efficiency in Delivering Products & Services)

- Leadership & Workforce Management

g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership?

While the lack of funding seems to be an issue sometimes, researchers have done a great job finding partnerships to bring extra funds and expertise. There is also a good collaboration between branches, which should be further acknowledged and promoted. Researchers have also been finding the needed expertise by collaborating and partnering with other agencies, academia and industry.

It would be important to have redundancy in some areas, in order to ensure robustness and resilience. This could also be applied to continuity. It is important to ensure that the developed expertise stays within the agency by constantly training younger researchers and managers.

I think the awards such as the Innovation Incentive Awards Program are very useful and a great way to acknowledge the efforts and success of the researchers. If not already available, maybe expanding the award selection would be useful.

It is also important to consider, particularly in this uncertain times, how the workforce and the work place might be changing. That can happen not only with younger generations that are more inclined to change positions, but also with potentially new ways to work (such as remote employees or telework). Understanding these needs and dynamics might help recruit and maintain a diverse and robust workforce that can rapidly adapt to changes.

h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives.

There seems to be a big need to further develop inside expertise. This might be particularly relevant on the chemistry side, but also on the need to bring new approaches to the Program (i.e., omics, adverse outcome pathways, etc). Furthermore, many crucial positions are filled with contractors instead of federal workers, which could endanger the work and the continuity. It would be important to turn those contract positions into federal positions to ensure that the expertise is not lost.

The lack of positions and funding might be also be an issue that could be helped with temporary training positions (such as Orise postdocs, or graduate students). This would also be a good way to recruit qualified younger researchers. There needs to be a balance between federal and contractor positions in order to maintain a core function and the ability to create an agile workforce that can easily adapt to new technologies and needs.

The Program is definitely a good place for collaboration with others, and the researchers are encouraged to find and expand extramural funding, but it is still important to ensure that there are qualified researchers within the Program that can understand the different languages and disciplines (ie genomics, bioinformatics, synthetic biology, ecotoxicology, etc) to ensure that things are relevant and useful, improve interdisciplinary efforts, and keep bringing the needed expertise and infrastructure. Information is key, but understanding the needs, the meaning, and knowing what to do with it is also very important.

i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant?

Researchers have been finding the needed expertise by collaborating and partnering with other agencies, academia and industry. Nevertheless, it is important to have some of that expertise in-house, even if it is just to be able to communicate with others and really understand the best path forward, what can be done, and what the data mean. It would be useful to allow researchers to find and attend those particular trainings relevant to their specific areas. Also, in these uncertain times any training that can help deal with new technologies, teleworking, remote employees, stress, and the new reality in general might be useful. This might be particularly relevant for project management and leadership.

- Science Investments and Infrastructure

j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why?

The allocations seem adequate, and evolving with increasing external funding sources. Acquisition of expensive equipment and potential hiring of experts to ensure expertise in novel areas and technologies might impact future allocations, but it does seem appropriate for now.

k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support?

There is definitely high quality research going on. However, some of the equipment appears to be very outdated. It is important to have the adequate equipment when trying to do state-of-the-art research. While sometimes it is better to outsource or contract to an external laboratory, it is also important to have some of the adequate equipment in house (i.e. untargeted chemistry). It is definitely a challenge and trade-of, as some of that equipment can be very expensive to buy and to maintain (i.e., service contracts, etc.).

- Stakeholder Involvement

l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged?

Some of those strategies have been previously mentioned. The researchers have really done an outstanding job finding outside collaborations and funding. However, when there is a need to look for external funding, there is also the danger to start moving away from the Program's mission. Therefore, it would be important to ensure internal funds can really support the Program mission, and then identify other efforts and collaborations, both national and international, that could be complementary and enhance and support NOAA's mission.

PANEL MEMBER #4 REPORT

QUALITY (The Scientific Merit of the Work/Value to Scientific Community)

Scientifically Sound, Reproducible Products & Services

The quality of the products and services is good with respect to the work that is performed. The projects in many cases are limited in scope and may not be able to be scaled up to the real-world environment, this is true with respect to the mesocosm experiments. Lab work in many cases does not translate to the real-world environment.

When asking of the value to the scientific community, we need to clearly define what the scientific community is. Is this referring to researchers at universities, agencies within the federal government or is it inclusive of all State water quality managers. If it includes all of the mentioned groups, the work would be more effective, if methods of analysis are shared and documented for others to adopt and use, with the goal of making it useful to decision makers, such as State Water Quality managers that have specific requirements under the Clean Water Act. A recommendation is to make sure that the work being performed can be applied to decision making. With limited budgets, we need to get the most out of any products and services. To enhance the scientific standing, a clear intention of the products must be made up front, research projects that cannot develop a useful tool is not helpful and costly.

Scientific Leadership and the Delivery of Scientific Products & Services

Based on the presentations and documents supplied, there is a high level and caliber of leadership provided to the scientific community nationally. More work needs to be done on the international level for the program, this is at a low level. Recommendation is to publicize the work that is being done; until being a panel member, and given the briefing documents and presentations, I was not aware of the science that was being conducted.

The scientific products & services appear to only be delivered to the scientific community that was engaged in the activity and only maximizes their utility, not necessarily the whole scientific community nationally. What is needed: better publicizing of what information and reports that are available, and clearly define the benefit and use of the product. Access to the data used in a project in a timely manner, and in an accessible format would be helpful, does any of the data go to the Water Quality Portal developed by EPA and USGS and the National Monitoring Council? If not this would be a place to put relevant data, for others to utilize for projects and assessment of local conditions, understanding that not all forms of data can go to the portal.

RELEVANCE

Alignment with NCCOS, SDI Priorities, Mandates

The science aligned with the SDI priorities, from a basic research standpoint, as it can show impacts of stressors.

Impact of Work

To make the information more useful to groups outside the academic and research scientists, the work would need to be more focused on an applied research, this would foster the use of the research to formulate local water or sediment quality criteria that could be used for use attainment for the Integrated Report required for States by the USEPA under the clean water act, with the goal of fishable and swimmable. Fishable, links to other areas within Federal and State Agencies dealing with fisheries, and is a priority, especially with the growth of aquaculture. Good sediment and water quality free from chemicals is necessary for the growth of aquaculture and sustainability of the natural fisheries. The focus of research areas should be decided on by polling problems found to be affecting the ecosystem both nationally and internationally; and designed to address specific impacts that are causing issues in use attainment of the areas. Mussel Watch information is a good example of what works, this information was able to be used for potential shellfish consumption impacts, as well as shellfish health impacts, has been used after major storms with flooding or after oil or chemical spills, and with the addition of contaminants of emerging concern to the analysis, this generates practical useable data. Summary is that the research performed should be applied research, designed with a clear use endpoint or at least a clear direction to an endpoint, the basic research is not useable by resource managers for decision making, it does not give the ability to lead to local regulations of environmental quality.

PERFORMANCE

Leadership & Workforce Management

The program leadership clearly worked as a team and promoted the engagement of staff. The p clearly promoted innovation, as there were many instances of development of new analytical and sampling techniques. Collaboration can be improved upon, in most instances the collaboration was near NOAA facilities, work for other groups within NOAA, or by major programs that NOAA is involved as a partner already. A lot of the Collaboration needs to expand out nationally with more work with State agencies, to meet the needs of use attainments, mentioned above.

The expertise of the scientific staff is very impressive, a list of PhDs, that all have a handle on method development and the key research techniques. To better achieve the goals and objectives, it would be beneficial to understand what is needed by others for generated information to be used, such as in the development of regulations, the theme is applied research.

Training is always needed when dealing with changes in laboratory instrumentation, especially when new instruments are developed. At our laboratory we have sent staff for training on NexGen sequencing, to be prepared for our new instrument. Attendance at key meetings is also useful, the National Water Monitoring Council, Interstate Shellfish Sanitation Conference, etc., are examples of where new monitoring and sample analysis techniques are discussed, as well

as, a discussion of new emerging national concerns. These meetings include most States and Federal agencies. This type of information will help guide and focus the research projects for NOAA.

Science Investments and Infrastructure

The relative allocation of funds seems to be changing in a good direction, as the Monitoring and Assessment group has seemed to increase over the 2017-2019 timeframe. This trend should continue to increase, monitoring and assessment tied to a clear outcome or decision for action, makes a clear justification of the allocation. The ecotoxicology and key species groups data should be collected to lead to a clear assessment and use.

The facility services, equipment, information technology and administrative services support could be improved upon, running facilities and keeping up with maintenance and changes in instrumentation, as well as IT infrastructure is always difficult, due to the high associated costs. As mentioned above, producing high quality useable products, applied research, is the best way to gain monetary support to ensure the long-term operations.

Stakeholder Involvement

The current strategy seems to be on the weak side, and can use improvement, little is known about the research or monitoring that is being performed, until I saw some of the presentations on the work, I was unaware of most of the work, and some of it was relevant to work that we are planning. Improvement would come from better communication on a national and international level of priority work, or as mentioned above to reach out and poll to find what research or monitoring is a priority. States for example, all have monitoring programs, with laboratory capabilities and field staff collecting a wide variety of samples, partnerships could use the States field sample collection and lab analysis component as a supplement to NOAA lab analysis, each performing work will increase the amount of data collected and a larger number of parameters analyzed to make for a more robust assessment. Partnerships and leveraging assets is a key for every group moving forward, all are going to likely all experience have lower amounts of future funding. Attendance at key meetings is also useful, the National Water Monitoring Council, Interstate Shellfish Sanitation Conference, etc., are represented by so many potential monitoring partners, from NGO's, USGS, EPA, and many States.

PANEL MEMBER #5 REPORT

October 29, 2020

Dr. Peter Thompson
Director, Stressors and Mitigation Impact Division
National Center for Coastal Ocean Science (NCCOS)

Subject: Review of three branches of the Stressors and Mitigation Impact Division

Dear Dr. Thompson,

I have reviewed the work of three Stressors and Mitigation Impact (SMI) branches through reading the documents and attending the talks. The three branches are: Ecotoxicology, Monitoring and Assessment, and Key Species, and Bioinformatics. This document contains 12 pages (including this one) containing my assessment. Please feel free to contact me if you have any questions.

Warm Regards, Panel Member #5

Review of the F&ECCP

Each branch has contributed considerably in their area of research/service. But the branches seem to have different strengths or maybe different philosophies. The Ecotoxicology Branch has the strength of conducting research and publishing the results peer and non-peer reviewed documents. The Monitoring and Assessment Branch has the strength of providing service to a large group of stakeholders. The Key Species and Bioinformatics branch has the strength of unique expertise in working with and sampling from animals and addressing policy implications (e.g., nutrient), albeit in a less fundamental way than the Ecotoxicology Branch. Ideally, each branch should conduct research based on major policy decision or towards a major policy promulgation, and to involve various stakeholders to leverage expertise. The research of each branch should lead to publications in various outlets (peer reviewed, conferences, reports, pamphlets, etc.). Fortunately, the expertise demonstrated in these branches is phenomenal, and I would like to think that making some adjustments would be achievable.

In terms of resources, the total number of positions (Federal and contractor) is around 40 at total budget of salaries of \$4.5M. The number and budget of positions are reasonable but could benefit from an increase by 20 to 40% considering the various tasks conducted by the three branches, and the need to account for retirement of senior personnel and the training of new personnel.

I was not able to understand well the data in Figure 6. Are the yearly values differential or total? If they are differential, then why not reporting the values directly without reporting the y-axis? Also, why would the base expenditure change that much from year to year? Note in particular Ecotoxicology and Key Species.

The discretionary project funding for the three branches has been around \$1.0M, with more than half in Monitoring and Assessment. As this is an internal competition (within NCCOS), I believe that the decrease in funding to one branch results in increases to the other branches. It is not obvious what is “earmarked” and what is based on new projects/topics. But based on the presentations, it seems that Ecotoxicology and to a lesser extent Key Species get the incidental funding while Monitoring and Assessment received a steady (earmarked) funding.

The relation with the Charleston Lab appears to be productive in terms of bringing new ideas, publications, and the training of students. The same could be said (though to a slightly lesser degree) on the relation with NIST. This probably has to do with the different mission of each entity. But it is suggested herein that the relation with the two entities is strengthened and outreach to additional research entities is pursued. Evidently, the new collaborations are not expected to be at the same level, but interaction with various groups is likely to increase the impact of NCCOS to stakeholders (primary mission) and the scientific community. But scientific collaboration would be needed to remain at the cutting edge.

The presentation by NIST emphasized the work and expertise of NIST personnel with the Fate and Effects of Chemical Contaminants (F&ECC) program within NCCOS. It also gave specific example of products that it delivered to F&ECC, such as proteomics markers in corals. It would

have been more elucidating to explain the daily regular interactions, and the role of F&ECCP staff within these analyses. As it stands, it seems that the work was done by NIST. The publication in Geohealth with one co-author from NOAA seems to support this observation. In the presentation of NIST, the strengths and challenges should have been those of F&ECCP rather than those of NIST.

The presentation by the Southern California Coastal Water Partnership explained, in general terms, the work of SCCWP rather than how it interacted with the F&ECCP. It demonstrated that F&ECCP provides technical support to the SCCWP and that the SCCWP provides guidance to F&ECCP and leveraging from the State of California. However, more details would have been helpful.

The presentation by the Office of Response and Restoration (ORR) made clear the importance of F&ECCP to the work of NOAA and ORR. It gave examples, such as the Taylor platform leak in the GOMEX. It also indicated that ORR provides a major funding to the program.

I discuss below each Branch in detail using both the reports and the presentations. I used the matrix of criteria that was provided, and I answered most of the questions for each branch. I did not answer some questions because my answer was provided in a different form for another question. Thus, the lack of an answer should not have any technical value.

Ecotoxicology Branch

QUALITY

(The Scientific Merit of the Work/Value to Scientific Community)

Scientifically Sound, Reproducible Products & Services

a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing?

Researchers in the Branch have a superior expertise in conducting toxicological studies (acute and chronic) from multiple stressors under various conditions. Much of their research has been on the impact of oil spills and dispersants on microbial communities with some work on the impact of PFOA.

The work is of high quality in terms of execution and setting up of complex experiments and/or field studies, and articles have been published in journals with impact factor ranging from 1.0 to 4. Thus, these are well-respected journals. Not the highest rank in the field, where IF > 6, but this probably reflects the applied nature of the work. The staff of the ecotox branch should be commended on these publications and hopefully they can keep up such a high pace of publication.

Improvements could be made by reaching out to experts/practitioners in these areas, and to synthesize the existing knowledge prior to conducting the works. For example, I commend NCCOS for the implementation of the project "Field-based mesocosms: in situ deployments" as the project required skilled researchers who understand both biology and field studies. Very few

labs/centers have such an expertise. However, it would have been helpful to provide a summary of existing works on the topic (was the cubic cage considered in prior studies?) and maybe to discuss with a fluid mechanics expert who works on fish motion.

Scientific Leadership and the Delivery of Scientific Products & Services

b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature?

The Ecotox Branch has superior capabilities in conducting both laboratory and mesocosm studies, and has personnel with superior expertise in field studies in coastal systems. The work produced by the Ecotox Branch is of high quality and provided guidelines in the field of oil spills.

The program can improve its scientific stature by conducting hypothesis-driven research. For example, what was the hypothesis for the project on the toxicity of photooxidized oil. Obviously, the researchers hypothesized that photooxidized oil is more toxic. But this should be stated at the beginning along with the justification of the hypothesis (e.g., other studies, or that the aromatics becomes more soluble and thus more bioavailable).

c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g.- timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery?

The Ecotox Branch has produced a large number of peer reviewed publications that would undoubtedly make an impact. In terms of the work on oil spills, it would have been good for the researchers to present in oil spill related conferences, such as the now over Gulf of Mexico Research Initiative conference (GOMOSSES) or Clean Gulf or the International Oil Spill Conference. They would have received a rich input that would have made the studies more impactful.

RELEVANCE

(The Value of Science to Users Beyond the Scientific Community)

Alignment with NCCOS, SDI Priorities, Mandates

d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment?

The products and services are highly relevant to the mission of NOAA of evaluating the toxicity of various contaminants. The work could be made more impactful by interacting more with experts/practitioners in the field.

Impact of Work

e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved?

It is not obvious that the Ecotox Branch works closely with regional or State entities or with Federal agencies such as the EPA.

f) Are there research areas that should/should not be pursued and if so, why?

The quality of the ecotox branch research is very good. However, I would imagine that a group such as F&ECCP would make a bigger impact by being practical (i.e., solving major problems) while collaborating with experts.

PERFORMANCE (Effectiveness & Efficiency in Delivering Products & Services)

Leadership & Workforce Management

g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership?

h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives.

i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant?

The Ecotoxicology Branch researchers appear to work closely together on various projects. This has led to high productivity in terms of scientific publications. I don't believe that the scientists need "training" as they are highly skilled. I have the impression that they followed closely the Statement of Work of some projects, but the SOW was not in the main stream.

Science Investments and Infrastructure

j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why?

The optimization of resources is a difficult task, and I would leave it up to the leadership of NCCOS to address.

k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support

The equipment available for the exotox branch seems adequate, but some of it outdated, as written in Volume2. Besides that, the base-support seems to be relatively small (less than \$100K) and to vary a lot between years. Thus, it would not be prudent for me to weigh in on it.

Stakeholder Involvement

l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged?

There does not seem to be a framework for the ecotox branch for maintaining or establishing relations with stakeholders beside the initiative and the energy of the staff. This could be due to a prior policy (or practice) by the ecotox branch. This is not necessarily a negative or a plus, as it depends on the culture within NCCOS and/or within the Stressors Impact and Mitigation (SIM) division.

Monitoring and Assessment Branch

QUALITY

(The Scientific Merit of the Work/Value to Scientific Community)

Scientifically Sound, Reproducible Products & Services

a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing?

The MA branch has provided reliable and timely data to various stakeholders and has a broad reach within the USA. The mussel watch program is outstanding providing timely data to various stakeholders. The program's scientific standing could be improved by having the MA branch involved in setting up hypotheses for its projects. For example, on the topic of mercury in the GOM, the study compared to FDA guidelines, but did not seek to understand the reason for the high Hg values at certain locations.

Scientific Leadership and the Delivery of Scientific Products & Services

b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature?

I believe the MA branch has focused on service, and I am not sure that scientific leadership was a part of the culture. This could be due to the mission and practice of the program, or that it is understaffed.

c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g.- timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery?

I think that the products to stakeholders were delivered effectively and in a timely fashion. It is not obvious that the goal was to deliver to the scientific community at large, as one could

conclude based on the publications. The MA branch published some journal articles in addition to book chapters, NOAA Tech Memos, and many conference presentations. Please note below some observations/comments on this topic:

cc

Volume 1: Page 36 (Monitoring and assessment)

The list of 9 Journal Publications contains four technical reports. Publication number nine should list the name of the authors first and not the title.

Volume 1, page 36/37.

The NOAA technical reports list contains Journal publications. Also some of these Journal publications were reported earlier under Journal Articles. For example, publication 12 by Jaruga et al..

Volume1: page 37\

“1. An Assessment and Characterization of Legacy and Emerging Contaminants in the Great Lakes Basin Coastal Zone (Dissertation - 2020)

2. A Multi-matrix Assessment of Legacy and Current-use Pesticides (CUPs) Occurrence and Distribution in the Lower Maumee and Ottawa Riverine System (Dissertation Section - 2020)”

For dissertations (and all publications), it is common to list the author’s name first, then the title, and the Department/College/University, and the year.

cc

RELEVANCE

(The Value of Science to Users Beyond the Scientific Community)

Alignment with NCCOS, SDI Priorities, Mandates

d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment?

I think the MA branch is most aligned with the NOAA and NCCOS legislative mandate, as it provides essential services to various communities.

Impact of Work

e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved?

There is always a benefit for broadening the list of “customers”, and this would occur through major workshops and the broadcasting of results. Teaming up with academia or other government centers focused on data management and publications could help. I believe NIST plays an important role in terms of the data management and housing. This should continue, but maybe supplemented with outreach to various groups.

f) Are there research areas that should/should not be pursued and if so, why?

If possible, the underlying processes of observations should be elucidated. If this cannot be achieved due to resource limitations, then collaboration with researchers in Academia should be explored.

PERFORMANCE (Effectiveness & Efficiency in Delivering Products & Services)

Leadership & Workforce Management

g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership?

Individual staff from the MA have been involved in projects with stakeholders. There does not seem to be major collaboration between the MA staff, which is probably due to the wide variety of things to monitor; mussel, COC, etc.. I do not see this as a weakness in terms of product delivery, but without forming a cluster that self criticizes, it would be difficult to elevate the science.

h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives.

i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant?

Science Investments and Infrastructure

j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why?

The funding of MA has been strong. It could be due to earmarks or due to a strong customer service culture in that branch. The answer to this would come from within the F&ECCP.

k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support

Stakeholder Involvement

l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged?

As it appears, the MA branch has a strong outreach and collaboration with stakeholders at various levels (NOAA ORR, EPA, USGS, Alaska, GOM, etc). The leveraging could be

increased, especially that the goal is to collect data for various stakeholders, which is a direct task (not to say in a way that it is a simple task).

Key Species and Bioinformatics Branch

QUALITY

(The Scientific Merit of the Work/Value to Scientific Community)

Scientifically Sound, Reproducible Products & Services

a) How would you characterize the scientific quality of the products and services delivered by the Program and what steps would enhance the program's scientific standing?

The Key Species and Bioinformatics (KSB) branch has unique expertise in analyzing and monitoring various marine animals, and in conducting experiments in mesocosms. The tissue sampling expertise that the team possesses is impressive. Its research has been published in well-respected journals with impact factors ranging from 2.0 to 5.0 (Scientific Report). In addition to book chapters, NOAA Tech Memos, and conferences.

Scientific Leadership and the Delivery of Scientific Products & Services

b) Describe the level and caliber of leadership provided to the scientific community (both nationally and internationally) by the Program, and how can the Program enhance its scientific stature?

The team provides a visible leadership in the area of corals and toxicity on fish and mammals. The work on oil spills seems to be driven by ORR, and it seems that the staff of KSB implemented a particular Statement of Work (SOW). It is a difficult position; on the one hand the staff needed to deliver a product and on the other hand the impact of the product could be have been improved by positioning the project more in the practical realm.

c) Are scientific products & services delivered to the scientific community in a manner that maximizes their utility (e.g.- timely, understandable, sufficiently detailed, and readily accessible format) and what actions would enhance their delivery?

The KSB branch has been prolific, producing various journal articles, tech reports, and conference presentations. I think they should be commended on their level of productivity.

RELEVANCE

(The Value of Science to Users Beyond the Scientific Community)

Alignment with NCCOS, SDI Priorities, Mandates

d) How and to what extent are products and services aligned with NOAA, NCCOS legislative mandates and priorities, and what actions would improve this alignment?

Most of the work on corals, fish, and oil spills seems closely aligned with the goals of NOAA and NCCOS.

Impact of Work

e) To what extent do those beyond the scientific community, including resource managers, use Program products and services to mitigate contaminant impacts and how can the relevance and usefulness of products and services be improved?

It depends on the projects: The work on the total ammonia nitrogen (TAN) is also important and the findings from the branch are of immediate value to coastal communities. The fact that TAN toxicity increases with temperature (EC50 decreases from 0.07 mg/L to 0.05 mg/L) for 2°C increase, as correctly pointed out by the document.

The project on evaluating the impact of oil bioremediation products seems to be a bit theoretical (or pure research). While the impact of bioremediation products on the microbial communities is an important goal in and by itself, there have been considerable studies on the topic (which should have been noted in the presentations and/or the report), and more importantly, bioremediation of oil spills is rarely conducted on oil in open water, but rather on oil trapped in sediments. Therefore, while microbiologists would appreciate the findings, oil spill researchers would not immediately benefit from the research. In addition, while the study revealed major changes in the microbial community due to treatment (and the team used the latest techniques to accurately characterize the microbial community), it would have been good if oil biodegradation was also measured so that one may associate the effectiveness of amendments versus their adverse effect. Also, it would have been good to know how long it took the community to return to background composition (or whether this ever occurred).

Similarly, the work on sediment quality benchmark seems to be major leap because the relation between polycyclic aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH) is not unique. This is due to the fact that even when starting from the same oil, the pathways of weathering and degradation could result in the same TPH but different total PAHs, and 90% of the toxicity comes from the PAHs and not from other compounds (saturates, resins and asphaltenes). Thus, estimating toxicity based on TPH alone is for all practical purposes an elusive goal.

Also, please note on Page 36 of Volume 4:

“chemical processing via burning, and the application dispersants. However, these measures are rarely effective in capturing more than a third of the released crude.”

Burning and application of dispersants are not intended to capture the oil. I think it is just an oversight in the writing. But considering the litigations surrounding oil spills, it is advisable to tread carefully when writing about oil spill response.

f) Are there research areas that should/should not be pursued and if so, why?

The quality of KSB research is very good in and by itself. However, I would always recommend that a group such as the F&ECCP focuses on the practicality of the research. Also, sometimes it might be better to address mechanisms rather than generalizing the results.

Genomics is the future of quantifying microbial (and viral) activities, and thus it is important for the NCCOS personnel to rely on it. But there is a distinction between using omics as a tool and conducting research to advance them. For NCCOS, it is expected that omics would be used as a tool to address the goals (environmental stressors). However, one needs to be cognizant that discouraging research in an emerging area might not allow NCCOS to attract and/or to keep top microbiologists. But considering that the publications are not in fundamental journals (e.g., such as Applied Environmental Microbiology), one might think that a balance of 70/30 or 60/40 (applied/fundamental) would be appropriate.

PERFORMANCE (Effectiveness & Efficiency in Delivering Products & Services)

Leadership & Workforce Management

g) Describe how Program leadership functions as a team, including the degree of guidance and what aspects of management practices foster collaboration, support employee engagement, and promote innovation to ensure the effective & efficient delivery of scientific products and services? What actions would strengthen leadership?

It appears that the KSB staff work with various researchers outside of NCCOS, which should be commended and encouraged. But there is a need to build an internal team to self-check, which is needed to build a national center of excellence.

h) Characterize the level and mix of the Program's technical and scientific expertise, and what steps if any should be taken to ensure the achievement of Program goals and objectives.

i) What training, if any, should be provided to staff to ensure their skills and capabilities remain up-to-date & relevant?

For the KSB branch, I believe they need to dedicate resources (time, funding) to reach out to experts prior to conducting new research even if the SOW is provided.

Science Investments and Infrastructure

j) Characterize the relative allocation of investments in research/science areas. Would you suggest changes? If yes, why?

The KSB receives little funding in comparison with Monitoring and Assessment, but I am not sure I can address the allocation of resources.

k) How would you describe the quality and caliber of support provided to the Program's scientific activities in the areas of facility services, equipment, information technology and administrative services, and what recommendations would secure needed support.

Stakeholder Involvement

l) What types and caliber of strategies does the Program have for identifying, establishing & maintaining relationships with stakeholders, the-external community (including internationally) and what steps would expand and strengthen relationships and ensure they are effectively leveraged?

The KSB branch has been collaborating with external researchers in excellent expertise in marine science. However, they would need to dedicate efforts to reach out to chemists and engineers, which would help them developing/publishing on the mechanisms of impairments.