

**FRAMEWORK FOR AN EXTERNAL REVIEW OF  
NOAA's ECOSYSTEM RESEARCH AND SCIENCE ENTERPRISE**

**Prepared by the NOAA Internal Ecosystem Research and Science Task Team<sup>1</sup>**

**Background:**

The NOAA Research Review Team (RRT), under the auspices of the NOAA Science Advisory Board, conducted a "Review of the Organization and Management of Research in NOAA." The team's report, along with the SAB transmittal letter accompanying the report, are posted at [http://www.sab.noaa.gov/Other\\_Documents/Other\\_Documents.html](http://www.sab.noaa.gov/Other_Documents/Other_Documents.html).

The RRT report questions where ecosystem research activity is located in NOAA. It contains the following recommendation:

"...NOAA should establish an external Task Team to evaluate and strengthen the structure and function of ecosystem research in, and sponsored by, NMFS, NOS and OAR."

Extracts from NOAA Research Review Team's report relevant to the location of ecosystem research are given in Appendix I (from pages 16-18 of the Report).

NOAA agrees with the recommendation of the RRT for an external review on ecosystems. NOAA has decided that the review should be broad enough to address the entire ecosystem research and science enterprise<sup>2</sup>.

NOAA conducts mission oriented research and scientific activities on a diverse range of topics, on time scales ranging from decadal scale studies of system processes to short term studies for immediate application. NOAA's entire ecosystems research and science enterprise includes:

- Scientific advice and information products tailored to user needs,
- Observational systems to assess and characterize changes in ecosystems and ecosystem uses,

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<sup>1</sup>The NOAA Internal Ecosystem Research and Science Task Team was established by the NOAA Research Council. Its members are Michael Sissenwine (chair), Peter Ortner, Jean Snider, Sennen Salapare, John Janowiak (Melvyn Gelman, alternate), and Michael Ford.

<sup>2</sup> The NOAA ecosystem research and science enterprise is the set of NOAA supported activities (internal and external) that adds to the body of scientific knowledge and translates it into products and services that support the Agency's mission.

- Applied research (not tied to immediate user needs) to better understand processes in order to improve the capability of observing systems and the quality of information products (including scientific advice),
- Development based on results of applied research, of new science tools, conservation technologies, and production technologies.

Appendix II elaborates on these categories of scientific activity.

The NOAA ecosystem research and science enterprise needs to support the NOAA Strategic Plan (<http://www.spo.noaa.gov/pdfs/NOAA%20Strategic%20Plan.pdf>), which is based on stakeholder input and internal assessments of NOAA’s mandates and mission. The Strategic Plan has four mission goals including an **Ecosystem Goal** to “Protect, restore, and manage the use of coastal and ocean resources through an ecosystem approach.” To fulfill the Strategic Plan, NOAA adopted a Planning, Programming, Budgeting, and Execution System (PPBES, <https://www.ppbs.noaa.gov/about.html>). NOAA organized its activities into forty four Programs ([https://www.ppbs.noaa.gov/PDFs/program\\_manager\\_list.pdf](https://www.ppbs.noaa.gov/PDFs/program_manager_list.pdf)), including nine Programs that address the Ecosystem Goal (1) ecosystem research, (2) ecosystem observation, (3) protected species, (4) fisheries management, (5) aquaculture, (6) coastal and marine resources, (7) habitat, (8) corals, and (9) enforcement. Some of the Programs are managed by a single NOAA Line Office (for the LO structure see <http://www.noaa.gov/pdf/noaa-org-chart030804.pdf>), while others are “matrix managed” across LOs. Most of the NOAA’s Ecosystem Research and Science Enterprise is within the Ecosystem Goal. However, the Ecosystem Goal benefits from scientific activities of other Strategic Plan Goals, which, for example, provide environmental information that can be used to help predict ecosystem changes.

What is an ecosystem?

For NOAA’s purposes, an *ecosystem* is defined as a geographically specified system of organisms (including humans), the environment, and the processes that control its dynamics.

What is an ecosystem approach to management?

For NOAA’s purposes, an *ecosystem approach* to management is management that is adaptive, specified geographically, takes into account ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse social objectives.

This document offers a framework for conducting the external review. It suggests:

- Terms of Reference,
- Size of the review team and reviewer qualifications,
- A method for selecting review team members,
- An approach for conducting the review.

## Terms of Reference

The purpose of the review is to answer the following questions:

1. Is the mix of scientific activities conducted and/or sponsored by NOAA appropriate for its mission needs, including its legislative and regulatory requirements, in terms of
  - Subject matter,
  - Distribution along the continuum from long term research to products for immediate use (including mandated scientific advice),
  - Internal and external (to NOAA) balance?
  - Links to international science programs?
2. How should NOAA organize its ecosystem research and science enterprise, in terms of
  - The relationship to non-ecosystem science activities (e.g., weather, climate or mapping), which is in part an artificial separation,
  - The continuum from long term research to information products for immediate use (including mandated scientific advice),
  - Line Office distribution,
  - Program Structure used in NOAA's Planning, Programming, Budgeting, and Execution System,
  - Other categorization schemes, such as by scientific discipline, mission area or mandate (implicitly including all sectors that are users of science advice), ecosystem or region, internal/external, etc.

In answering these questions, the review should include the following:

1. Strengths and weaknesses of existing organizational structures used by NOAA, and by other entities with missions similar to NOAA's (domestic, foreign and multinational).
2. Advantages and disadvantages of requiring that all scientific activity within a category of research (e.g., long term or short term) be organized in the same way.
3. How well organizational structures and approaches facilitate the transition from research to operations and information products,
4. How well organizational structures and approaches facilitate the transition from research to operations and information products.
5. How well organizational structures and approaches enhance the relevance, responsiveness, quality and credibility of scientific advice and products.

6. Cost implications of organizational structures, including the transition costs of change,
7. Ecosystem related implications of the report of the report of the US Commission on Ocean Policy and the President's Ocean Action Plan.
8. Ecosystem implications of international agencies of which the US is a member (groups including but not limited to regional fisheries management organizations, such as ICES, PICES, CITES, and various UN agencies such as FAO and UNESCO).

### **Size of the review team and reviewer qualifications**

NOAA's ecosystem research and science enterprise is large and diverse. Thus it requires a relatively large review team to do justice to the Terms of Reference. The review team should have at least seven members with a variety of backgrounds (recognizing that even with seven reviewers, it will not be practical to have all backgrounds represented), such as:

1. Scientific disciplines of physical sciences, biological sciences including fisheries science, and social sciences,
2. Experience in academia, within mission oriented government agencies, Non-Governmental Organizations (NGOs), and the private sector,
3. Familiarity with NOAA's mandates,
4. Being a science provider to key generic groups of stakeholders, science interpreter to groups of stakeholders, science user, or stakeholder with a history of interaction with science providers.

The reviewers should have the following qualifications:

1. National and international professional recognition,
2. Knowledge of the scientific information needs to support NOAA's ecosystem stewardship missions, coupled with broad familiarity with NOAA's total mission,
3. Knowledge of, and experience with, the organization and management of complex mission oriented scientific programs,
4. No perceived or actual vested interest or conflict of interest that might undermine the credibility of the review.

It is of note here that except for qualification criteria 4, the criteria are not absolute requirements. The qualifications of some individuals are expected to be outstanding enough with respect to one

or more of the criteria, that being unqualified with respect to another criteria, would not necessarily make them ineligible. Because of the limited size of the review panel, management organization expertise must include expertise on ecosystem science or the very special features of science applied to government decision-making.

### **A method for selecting review team members**

Nominations should be submitted to the NOAA Science Advisory Board (SAB) with justifications that address the candidate's background and qualifications (specifically for the categories above). The nominations should indicate if the candidate has expressed a willingness to serve, if selected.

The results of the review have the potential of being controversial because the results of the review (if implemented) may have direct consequences on social and economic opportunities and/or quality of life of some of NOAA's stakeholders. This is a key reason for providing stakeholders the opportunity to nominate review team members. Moreover, it is important that stakeholders have the opportunity to provide input to the review team, and that the process of selecting reviewers be transparent. Accordingly, nominations will be solicited by a notice in the Federal Register, which summarizes the information in this document. Anyone (from within or outside NOAA) should be eligible to nominate. Individuals may self nominate. However, employees of NOAA or persons currently funded by NOAA should be ineligible to serve as a review team member.

It will be up to the SAB to evaluate the nominees and select the review team members. The intent is to select from the nominees. However, the SAB should retain the prerogative to name people to the review team that were not nominated if it deems it necessary to achieve the desired balance. The SAB will post the review panel, with abridged resumes, for public information, to close the loop on transparency.

### **An approach for conducting the review**

There are several aspects of the review approach that need to be specified, including:

1. Role of the NOAA Internal Ecosystem Research and Science Task Team,
2. Source of data about NOAA's ecosystem research and science enterprise, how it is organized and how other Agencies (US and foreign) organize similar types of scientific activities,
3. Site visits,
4. Mechanism for public input,

5. “Ground truthing” the review,
6. Timetable.

These aspects are addressed below.

**Role of the NOAA Internal Ecosystem Research and Science Task Team:** The internal task team will work with the Ecosystem Research and Science Review Team to facilitate gathering data and arrangements for review activity, as one source of ideas and insights, and to act as a sounding board for ideas. The communications between the Internal and External teams should be two-way. A “sounding board” suggests the internal team merely responds to ideas from the external team; whereas it is expected that the internal team will already have enormous expertise regarding the issues specified in the Terms of Reference. The internal team will be encouraged to propose ideas (about both problems and potential solutions), not just respond to ideas from the external team. However, it will be solely the role of the “External Ecosystem Research and Science Review Team” to formulate conclusions and recommendations.

**Source of data about NOAA’s ecosystem research and science enterprise, how it is organized and how other Agencies (US and foreign) organize similar types of scientific activities:** Data assembled for the NOAA Research Review (<http://review.oar.noaa.gov/>) will be updated and refined to serve the specific needs of an ecosystem review. The data will include descriptions of:

1. Ecosystem research and science program elements including budgets and staffing levels,
2. Current organizational structures,
3. Partnerships including university relationships,
4. Scientific activities by facility (e.g., laboratory) and organizational structure,
5. Science user needs, given that the needs of users of “ecosystem science” are expected to be a complex issue.
6. Government Performance and Results Act (GPRA) requirements,
7. Planning and programming documents (e.g., 5-Year Research Plan, 20-Year Vision, Program Baseline Assessments),
8. Other subjects of interest to the External Ecosystem Research and Science Review Team.

It is also important for the Review Team to gather information about organizational approaches of other organizations that have similar missions to NOAA’s ecosystem stewardship mission.

This might be done by sampling websites (which usually describe organizations), conducting a survey, and/or by interviewing leaders of organizations other organizations. The international experience is particularly important. It is likely that NOAA can profit by learning how other national and multi-national groups are successfully conducting applied marine ecosystem science.

**Site visits:** The Review Team should make site visits to representative locations (e.g., in terms of Line Office activities, mission areas, scientific disciplines) where ecosystem research and science activities are conducted. These visits should sample activities of NMFS, NOS and OAR. Seattle and South Florida are obvious candidates to be visited, as these are areas where ecosystem sciences are concentrated. Given the relatively large number of NMFS facilities, additional site visits to key facilities are suggested (Woods Hole and La Jolla are good candidates). Charleston is a location where NOS ecosystem science activity is concentrated such that it is a good candidate for a site visit.

**Opportunity for public input:** Meetings should be arranged with stakeholders, Congressional staff and officials of the Office of Management and Budget. It should be feasible to coordinate stakeholder meetings with the aforementioned facility site visits. Written input might also be solicited by Federal Register Notice. Phone interviews of key constituency spokespersons might be conducted. The draft report will be made available for public comment by publishing it in the Federal Register.

**“Ground truthing” the review:** There is always a risk that the external review team will come to conclusions or make recommendations that are clearly invalid or unworkable. This usually occurs because the reviewers lack some information or background. Unfortunately, such situations tend to discredit reviews and they are used to dismiss even sound conclusions and recommendations. Therefore, it is prudent to have a knowledgeable group provide feedback on conclusions and recommendations before the report of the review is finalized. This is a role that the Internal Task Team can fulfill at the discretion of the external review team. The external review team may also seek feedback from elsewhere. Ultimately, the conclusions and recommendations must be solely the responsibility of the external review team.

**Timetable:** The External Review of NOAA’s Ecosystem Research and Science Enterprise should be conducted according to the following schedule:

1. Review “clock” starts when SAB agrees to Framework for the review;
2. By day 10, Federal Register Notice (FRN) soliciting nominations published;
3. By day 30, nominations due to SAB;

4. By day 45, members of the external review team selected;
5. By day 75, initial meeting of external review to become familiar with their charge, and to decide on a course of action;
6. Approximately every 45 days after the initial meeting throughout the period of the review, external review team meetings. The internal task team will be available to participate;
7. By day 100, data about NOAA's ecosystem research and science enterprise collected;
8. By day 150, information on organizational structures used by other entities with similar ecosystem stewardship missions to NOAA's collected;
9. By day 150, site visits and constituency input sessions have been conducted,
10. By day 150, progress report submitted to SAB;
11. By day 180, interim report submitted to SAB;
12. By day 195, interim report made available in Federal Register for public comment;
13. By day 215, FRN public comments due;
14. By day 230, feedback from SAB to external review team;
15. By day 260, external review team finalizes its report, including "ground truthing;"
16. By day 285, SAB reviews and approves report;
17. Days 286-300, set aside as a contingency in case of unavoidable delays.



## **Appendix I. Extracts from NOAA Research Review Team report relevant to the location of ecosystem research**

“We also find that there is a difference between operational responsibilities and regulatory responsibilities. ...In mission areas like fisheries, coastal zone management, or more generally ecosystem-based management, NOAA must provide the best advice on which to base management and regulatory decisions. This scientific advice (e.g. fisheries stock assessment) is best based on work in a research environment. ... NOAA must exercise caution to ensure that the research program is not unduly influenced by regulatory responsibilities, but at same time, it is essential to ensure that the best science is available and responsive to policy and management needs including the regulatory process.”

“Maintaining the research program within NOS and NMFS with appropriate safeguards for the higher-risk, more basic research efforts can do this. It can also be accomplished by having the research in a separate organizational structure with clear and unambiguous responsibility to meet management and regulatory needs. The Review Team notes that the former approach facilitates the provision of scientific advice for management, but the latter approach may provide a more integrated research effort and enhance extramural involvement.”

“...we note that the research being conducted in NMFS and NOS could migrate to OAR, *but only* if the scientific advice associated with ecosystem-based regulatory responsibilities went with the research role.”

“NMFS organization into regional fisheries Science Centers is a useful model for interaction and management of laboratories within regions. In each of the fisheries Science Centers there are several laboratories, each with a specific focus area, but they are managed and administered collectively through the Center. This model could, also, be an effective means of integrating the science and research efforts across the line offices.”

## Appendix II: Categories of scientific activity

**Observational systems:** Ecological observations are the core of the research and science enterprise. They are reoccurring measurements of ecosystem variables (which throughout this document should be understood to including the human dimension) that build time series. Standard procedures (including protocols for quality assurance and data management) are in place for research and scientific activity in this category. The data is used for a variety of purposes, such as input into advice on resource management decisions. While some of the data is used for documents published in the scientific literature, it is also found in advisory products aimed a decision makers, distributed in technical reports, and made accessible in databases.

**Scientific advice and information products:** These are science-based analyses (both qualitative and quantitative) aimed at reporting on the state of ecosystem variables, the consequence of human activities, and the implications of alternative management decisions. Generally, assessments are tailored to the needs of non-scientific users. They depend heavily on observations and understanding of ecosystem processes obtained through applied research. Assessment results are usually reported in technical documents tailored to user needs. They are also used by researchers conducting syntheses on the state of ecosystems and case studies on the performance of resource management.

**Applied Research:** This research is mission inspired even though it may be long term without an immediate connection to non-scientific users. It is aimed at advancing understanding of aspects of marine ecosystems with a view at enhancing the capability give scientific advice and provides information products. This research tends to focus on processes that govern populations and ecosystems. It also includes research that improves understanding of technologies, thus leading to development that supports the mission. The primary outlet for this research is the scientific literature. Other scientists are typically the users.

**Development:** This activity uses the increased understanding produced by the Agency's applied research, and any other pertinent research, to create new tools or methods to increase the capability and/or capacity to provide scientific advice and services to non-researchers. Nevertheless, successful development is usually documented in the scientific literature. It does not include development primarily aimed at research applications (this activity is part of strategic research). There are three subcategories of Development:

- Development of Science Tools: Development of science tools provides new applications of technology for observing or new methods (such as models) for assessments.

- **Development of Conservation Technologies:** This development is of new technologies that help to minimize undesirable impacts of human activities on marine ecosystems. This development provides new options for regulating human activities to achieve conservation objectives, without undue negative impact on benefits from the regulated activities.
- **Development of Production Technologies:** This activity provides new options for deriving benefits from human activities associated marine ecosystems. If successful, these technologies will be adopted by the private sector without regulatory requirements (e.g., the private sector has an economic incentive to use the technologies).