

NOAA Administrative Order (NAO) 216-115: Strengthening NOAA's Research and Development Enterprise

Procedural Handbook

Table of Contents

Chapter 1 – Introduction of NAO Procedural Handbook Page 3

Chapter 2 – Planning of the NOAA Research and Development PortfolioPage 6

Chapter 3 – Monitoring the NOAA Enterprise R&D Project PortfolioPage 14

Chapter 4 – Evaluation of the NOAA R&D Enterprise PortfolioPage 18

Chapter 5 – Reporting of the NOAA R&D Enterprise PortfolioPage 32

NAO 216-115 Procedural Handbook: Strengthening NOAA's Research and Development Enterprise

Issuing Office: NOAA Research Council, National Oceanic and Atmospheric Administration (NOAA)

Release Date:

1. **Explanation of Material Transmitted:** This Handbook establishes procedures for the planning, monitoring, evaluation and reporting of the NOAA Research and Development (R&D) Enterprise Portfolio in support of NAO 216-115.
2. **Filing Instructions:**
Remove: NAO 216-115, Procedural Handbook, dated: 11/16/2011
Insert: NAO 216-115, Procedural Handbook, dated: 04/28/2014
3. **Information:**
 - For information on the content of the Handbook, contact the issuing office listed above.
 - To access the Handbook chapters and appendices online, follow the links available from this URL:
http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_216/216-115.html

Procedural Handbook Chapter 1 – Introduction of the “Handbook to the NAO for Strengthening NOAA's Research and Development Enterprise (NAO 216-115)”

A. Purpose

This chapter serves as an introduction for connecting the Handbook to the NAO on Strengthening NOAA's Research and Development Enterprise (NAO 216-115), which it was specifically developed to support.

B. Policy Background

NAO 216-115 establishes the principles, policies, and responsibilities for planning, monitoring, evaluating, and reporting research and development (R&D) activities comprising the entire NOAA R&D enterprise. NOAA will use this Order to strengthen the quality, relevance, and performance of its R&D portfolio.

The NAO and Handbook provide the mechanism for implementing NOAA's Strategy Execution and Evaluation (SEE) System for the Holistic Understanding of the Earth System (HUE) Enterprise Objective of NOAA's Next Generation Strategic Plan.

This Handbook is established in accordance with NAO 200-3 which specifies that NOAA handbooks and manuals containing policy or procedures be elements of the NAO series, providing in-depth coverage of those subjects so complex or extensive as to benefit from coverage in the form of a handbook or manual.

NOAA handbooks and manuals establishing policy and responsibilities shall be authorized by an NAO and shall have the same force and effect as that NAO.

C. Introduction to the Other R&D NAO Chapters

The remaining chapters of this Handbook provide the details needed to implement the four fundamental policy components of NAO 216-115: Planning, Monitoring, Evaluation, and Reporting (Figure 1).

1. Planning

The Planning Chapter provides the details needed to ensure the R&D enterprise is relevant to and optimally aligned with current and future generations of the NOAA Strategic Plan and other relevant documents as appropriate (e.g., Annual Guidance Memoranda (AGM), Annual Operating Plans (AOP), the Department of Commerce (DoC) Strategic Plan, court orders, Executive Orders, appropriations, and statutory requirements). In particular, the Planning Chapter describes the development of NOAA's Five-Year R&D Plan. The Planning Chapter sets the context for subsequent chapters; planning is the basis for monitoring, evaluation, and reporting, such that NOAA's

understanding of what it is doing and how is based upon an understanding of what it should be doing and why.

2. Monitoring

The Monitoring Chapter provides the implementation details for collecting and tracking NOAA's R&D project and performance data that are essential to managing NOAA's research portfolio, as well as the transition portfolio managed by the Line Office Transition Managers (see NAO 216-105). Systematic monitoring of NOAA's R&D through a Project Portfolio Management System (PPMS) is essential for improving the efficiency and effectiveness of the organization and evaluating and reporting on the research enterprise. The data will enable NOAA to make informed investment decisions, optimize the project portfolio, and track advancements in quality, relevance, and performance.

3. Evaluation

The Evaluation Chapter provides the implementation details for conducting the evaluations that are critical for determining program success in achieving intended outcomes. Evaluations are performance management tools used to inform strategic planning and decision-making regarding execution of future R&D activities, and to report on the status of NOAA's R&D enterprise. Rigorous independent evaluations are a key resource in determining whether R&D programs are delivering high quality scientific advancements and achieving their intended outcomes. These evaluations will enable policy makers and agency managers to strengthen the science enterprise (OMB, 2009c). NOAA's evaluations comply with Administration (including the Office of Management and Budget (OMB)), Congressional, DoC, and other requirements for evaluations at all levels of execution. The chapter describes periodic evaluations, laboratory/science center/program evaluations, portfolio reviews, and benchmark evaluations.

4. Reporting

The Reporting Chapter provides the details for implementation of NOAA's standardized, representative reporting for its R&D enterprise to document the current state of the enterprise, highlight strategic R&D investment needs for the future, and communicate the return-on-investment and overall benefits to society derived from its current R&D portfolio. Implementation requirements for the State of NOAA Research Report (SONR) are provided.

D. Procedures

1. Schedule

- a. The Handbook will be reviewed by the NOAA Research Council (RC) every two years to determine if any revisions are appropriate. Such revisions will be considered for approval in September of each review year.
- b. Key users will be notified of revisions within one week of changes via web based

notices and emails to registered users.

2. Responsibilities

The responsibilities for the Handbook are as follows:

- a. The Handbook is under the overall oversight of the RC Chair.
- b. The RC will be responsible for conducting annual reviews of the Handbook and drafting recommended revisions as appropriate.
- c. The RC will be responsible for formally approving the official version of the Handbook.
- d. The RC will be responsible for providing guidance and clarification on matters contained in the NAO and Handbook.
- e. The RC will be responsible for posting the most recent formal version of the Handbook on the RC web site.
- f. The RC will be responsible for sending out notices of any updates to the Handbook.

E. References

Please see Appendix 1.2: References for NAO Procedural Handbook (alphabetical order)

F. Abbreviations

Please refer to Appendix 1.3: Abbreviations Used in NAO Procedural Handbook

Procedural Handbook Chapter 2: Planning of the NOAA Research and Development Portfolio

A. Purpose

This chapter establishes a framework for the Research Council to conduct corporate planning of the NOAA R&D portfolio, which includes programs, projects, and activities (hereafter referred to collectively as “activities”) conducted in NOAA’s Line Offices (LOs) and Staff Offices (SOs). NOAA’s individual LOs/SOs, programs, and projects are also encouraged to use this framework to plan their own portfolios.

B. Relationship to other Chapters

The Planning chapter sets the context for subsequent chapters; planning is the basis for monitoring, evaluation, and reporting, such that NOAA’s understanding of what it is doing and how is based upon an understanding of what it should be doing and why. What is being planned, monitored, evaluated, and reported are the logical elements of execution (inputs, activities, outputs, and outcomes), as well as their measurable qualities and quantities. Planning defines these elements and how they will be measured, then sets performance expectations and resource requirements.

1. **Monitoring.** Planning sets performance expectations and resource requirements for R&D activities to be confirmed (or disconfirmed) by data collected in monitoring the execution of those activities.
2. **Evaluation.** Planning sets the logic for how R&D is supposed to work by relating inputs, activities, outputs, and outcomes in a model of causation. Evaluation determines how well R&D works according to this model (using data collected in monitoring and from other relevant sources), and whether this model itself is valid.
3. **Reporting.** Planning supports reporting in conjunction with monitoring and evaluation. As communication tools, plans establish a framework within which stakeholders (internal and external) can expect to have the results of monitoring and evaluation reported.

C. Scope

The scope of this chapter is limited to planning. “Planning” includes strategic planning (for long-term, ultimate goals), implementation planning (for near-term objectives), and execution planning (for annual milestones, performance targets, and resource requests). It does not include budgeting, monitoring, evaluation, or reporting activities.

The scope of planning shall be the activities of NOAA as an organization, including both its activities to conduct programs as well as those to manage and support them. It shall also include activities to support the programs of other organizations though the distribution of resources, as

well as the conduct of those external programs that NOAA supports.

The scope shall also be limited to the continuum of exploratory and innovative activities commonly referred to as “research and development,” or “R&D.” This term shall be inclusive of basic research, applied research, development, and deployment activities (per the definitions in NAO 216-115 and to the extent that these activities apply to NOAA's portfolio), as well as to the transfer of knowledge and technology created in the conduct of R&D.

NOAA abides by the Federal definitions of research and development set by the National Science Foundation (NSF). Research is the “systematic study directed toward a more complete scientific knowledge or understanding of the subject studied.” Development is the “systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes.”¹

Rather than trying to distinguish between basic and applied research, NOAA strives for “use-inspired” R&D, *simultaneously* intended to improve fundamental understanding of the world *and* yield applications that are useful and used.² Use-inspired research does not generate basic knowledge under the assumption that it might be applied later, somehow, by someone. Rather, specific uses are understood up front, and those uses are what direct R&D, including the generation of new knowledge.

D. The Purpose of Planning

To achieve its mission, NOAA must continually strengthen the quality, relevance, performance of its R&D products, and balance its portfolio of activities required to produce them. The purpose of R&D planning is to establish objectives, priorities, performance expectations, and resource requirements for R&D activities. In so doing, it enables consistent and coordinated management of these activities, both within and across organizational units.

The activity of planning builds a shared understanding of the purpose and direction for an enterprise. NOAA’s Science Advisory Board (SAB) has found that “the major challenge for NOAA is connecting the pieces of its research program and ensuring research is linked to the broader science needs of the agency.” And further, that “the overall research enterprise should be viewed as a corporate program. Explicit linkages between research efforts across organizational lines must be forged and maintained for the agency and the nation to obtain the full benefit from research” (Moore et al., 2004). Planning is the process that forges these necessary linkages.

The products of planning (i.e., plans) codify and communicate programmatic cause-and-effect, thus providing a structure for monitoring and evaluation. R&D plans can also serve as an

¹ <http://www.nsf.gov/statistics/nsb1003/definitions.htm>

² Stokes, D. (1997). *Pasteur's quadrant: Basic science and technological innovation*. Washington D.C.: Brookings Institution Press.

important tool to communicate the importance and value of NOAA science to the Administration, DoC, the Congress, academia, regulated and user communities, and the public at large. In this capacity, they serve to foster and sustain strategic partnerships with the external research community, whose valuable contributions are critical to meeting NOAA's mission.

E. Alignment

1. Process alignment. Planning for R&D shall be a part of NOAA's corporate planning process (not independent of it or in addition to it) so R&D is managed within the context of NOAA's strategy as an agency; so that analyses and decisions of the research community are accurately reflected within corporate administrative processes; and so that R&D planning activities are not unnecessarily duplicative or burdensome, given corporate administrative requirements.
2. Outcome alignment. Within NOAA's corporate planning process, and so that it is spending public money purposefully and responsibly, R&D activities shall be planned toward the outcome-oriented goals and objectives of the NOAA Strategic Plan (with annual adjustments per the priorities and constraints identified in the AGM). Planning for R&D shall be nested within NOAA strategy such that:
 - a. There are direct, evidence-based links between planned R&D activities and R&D-specific outcomes within the NOAA R&D Plan. These outcomes should be responsive to particular R&D challenges and opportunities within and beyond NOAA (for example, answers to overarching research questions, findings that address grand science challenges, technologies developed and deployed, etc.).
 - b. There are direct, evidence-based links between the R&D-specific outcomes from the NOAA R&D Plan and corporate strategic objectives from the NOAA Strategic Plan. This connection ensures that R&D activities are relevant to NOAA's mission, and, ultimately, to social and environmental outcomes deemed most important to NOAA.
3. Coordination. Planning shall be coordinated at all levels of the agency, from corporate NOAA to offices to laboratories to programs and projects. Project-, program-, and laboratory-specific plans shall be aligned with the NOAA-level plans, so that all are hierarchically aligned – with increasing detail at lower levels – just as authority to budget and execute is hierarchically aligned. Planned activities at lower levels shall be valid with respect to those at higher levels. In the planning process, strategy and guidance shall flow down, options and information shall flow up.

F. Documents

1. The NOAA Strategic Plan establishes a Mission and Vision for the agency based upon an understanding of the agency's statutory and regulatory duties, Administration priorities, the demands and concerns of internal and external stakeholders, and assessments of possible developments in NOAA's external environment over the

long-term. The Vision is detailed by a series of clearly defined long-term, outcome-oriented Goals. In the near term, the Strategic Plan establishes five-year, outcome-oriented Objectives. The NOAA Strategic Plan is updated approximately every four years by the NOAA Office of Program Planning and Integration.

2. The NOAA Research & Development Vision is a vivid description of the desired outcome of NOAA R&D 20 years from the time of writing. Its purpose is to inspire and direct all NOAA R&D to a common, long-term end point. The R&D Vision has the same timeframe as NOAA's corporate Vision, per the NOAA Strategic Plan, however its scope is limited to NOAA's activities of research and development and their particular outcomes. The NOAA R&D Vision may offer additional detail to corporate strategy as laid out in NOAA's Strategic Plan, but it should be consistent with it.
3. The Five-Year NOAA Research and Development Plan guides NOAA's R&D activities over a five year period. It provides a common understanding among NOAA's leadership, its workforce, its partners, constituents, and Congress on the value of NOAA's R&D activities. As such, the Plan is a framework with which NOAA and the public can monitor and evaluate the Agency's progress and learn from past experience. The Plan builds upon the strategic foundation laid by NOAA's Next Generation Strategic Plan and the NOAA 20-Year Research Vision.

The Plan focuses attention on outcomes rather than activities – ends rather than means – as the basis for making rational investment choices, aligning requirements, and clarifying roles and responsibilities. Goals and enterprise objectives are NOAA's highest-level outcomes, as specified in the Agency's Next Generation Strategic Plan. On the path to achieving these goals and enterprise objectives, there are gaps in NOAA's knowledge and capability. Key questions highlight these gaps and frame NOAA's strategic needs for R&D. R&D objectives under each question represent major steps that NOAA and its partners must take in meeting those needs. Targets under each R&D objective are the basis for monitoring progress, evaluating approaches, and learning from experience. R&D objectives and targets will be codified in the relevant implementation plans (IPs), which associate outcomes, outputs, activities, and inputs with specific metrics, targets for those metrics, and budget units.

The R&D objectives and targets provide the link to NOAA's corporate process for Strategy Execution and Evaluation (SEE) and, as such, represent the desired outcomes for decisions in Agency-wide planning and budgeting. They explain what the Agency will strive to do – in coordination with partners in academia, industry, the non-profit sector, and government institutions at the federal, international, state, tribal, and municipal levels. Some key questions will be difficult to answer. Some objectives are less certain than others. Some targets may not be met. Still, NOAA shall act knowing that success may only be partial; this is the nature of R&D. The prospect of failure does not stop the Agency from setting bold targets, nor from stating such ambitions publicly.

The Plan is reviewed and updated approximately every four years by the NOAA Research Council to ensure consistency with the NOAA Strategic Plan, and to incorporate changes in the NOAA R&D enterprise's external environment, stakeholder input, legislative and regulatory mandates, Administration policy priorities, accomplishments to date, evaluations of performance to plan, and related factors.

4. Implementation Plans (IPs) detail how NOAA, through the activities of its component line and staff offices, will implement strategy for particular objectives over a seven year period, starting with the immediate execution year. They are created approximately every four years (per updates to the NOAA Strategic Plan), and revised annually by senior executives accountable, as designated by the NOAA Deputy Under Secretary for Operations.

Thus, R&D activities can (and, indeed, should) appear in all of the IPs for corporate strategic objectives toward which those activities are simultaneously directed. This is because there are many reasons for conducting activities: they can serve immediate objectives for R&D, penultimate objectives for the improvement of NOAA's other enterprise capabilities, as well as ultimate objectives that matter to NOAA stakeholders. R&D activities should demonstrate "relevance" by linking not only to direct R&D-related outcomes, but also the social-economic-environmental outcomes present in the IPs of goal-objectives, or the capability-oriented outcomes present in the IPs of enterprise-objectives.

An IP should detail R&D activities that are directed to strategic objectives. This is the basis for demonstrating relevance of R&D activities. Further, the IP should demonstrate how activities address the outcomes identified in the NOAA R&D Plan. Because the reasons for conducting R&D are often multiple, a single activity may be directed to more than one objective or outcome. Metrics should be distinguished as outputs (including, but not limited to scientific "quality" measures), outcomes (which aggregate up to NOAA-level objectives to demonstrate "relevance"), and efficiency (to indicate how well NOAA operates as an organization to produce outputs and outcomes, given the assets at its disposal).

5. The Annual Guidance Memorandum (AGM) focuses agency attention on the NOAA Administrator's Priorities and identifies fiscal assumptions for planning. The Office of Program Planning and Integration prepares the AGM every year on behalf of the Administrator. In the determination of corporate priorities, the Research Council can offer recommendations to the Administrator from the perspective of the R&D enterprise, based upon evaluations conducted (program, portfolio, benchmark, or other) and other input from LOs/SOs and their respective programs.
6. The Corporate Portfolio Analysis (CPA) is a review of NOAA's ability to achieve the AGM priorities. The CPA considers IPs based on AGM priorities and fiscal realities. The analysis determines what can be achieved (i.e., what products/services are

possible, and what benefits would result); what are the gaps and risks (i.e., what products/services are not possible, and what benefits would be foregone); and what are the priority solutions (i.e., which gaps should be closed). This analysis establishes budget strategy and priorities for budget formulation.

7. Annual Operating Plans (AOPs) address how, on an annual basis, the objectives of the NOAA Strategic Plan are achieved. Though organized according to LOs and SOs rather than by corporate strategic objectives, the content of the AOPs are directly tied to the IPs. Within the AOP, LOs/SOs describe the IPs' first execution year using guidance from the AGM. The AOP is a contract between the LO/SO and NOAA senior leadership, forming the basis for management accountability for budget execution as well as LO/SO performance. The LO/SO Senior Executive Performance Plans must include a version of the milestones reported in the AOP.
8. Program- and Project-Level Plans should align to the AOPs of their respective LOs/SOs, and thus align to objective-based IPs, the NOAA R&D Plan, and the NOAA Strategic Plan. Monitoring and evaluation with respect to these plans should be the basis for monitoring and evaluation at the LO/SO level, as well as the corporate NOAA level.
9. Transition Plans identify the comprehensive activities necessary to transfer a research result, per NAO 216-105. The Transition Plan shall identify stakeholders, define criteria for when a project will be transferred, provide funding profiles for operational implementation, information service delivery, and/or follow on research. Transition Plans shall be approved by the Assistant Administrator(s), or their designees, from the impacted LO(s). The NOAA Executive Council (NEC) reserves the authority to approve any Transition Plan. The Transition Plan shall be updated at least once a year or as needed to reflect necessary changes resulting from fiscal, policy, or other decisions.

G. The Planning Process

1. Strategic planning for R&D occurs on a multiannual basis, typically every four years. The NOAA Strategic Plan establishes a long-term strategy for NOAA as a whole, and IPs then detail near-term strategies to achieve corporate strategic objectives. The Five-Year NOAA R&D Plan responds to the NOAA Strategic Plan and the long-term (20-year) NOAA R&D vision by detailing a near-term strategy for the agency's R&D enterprise. The strategy represented in the R&D Plan should be reflected in the R&D components of the relevant IPs.

The strategy represented in the NOAA R&D Plan should be developed in coordination with relevant stakeholders (particularly NOAA's operational units). They should be informed by the NOAA Strategic Plan, portfolio and baseline evaluations of NOAA's R&D enterprise, as well as assessments of the possible developments in science and technology over the long-term.

2. Annual planning establishes priorities within strategy. It typically begins by analyzing the strategic context for NOAA R&D, and how it may have changed over the year. Change can be exogenous, such as in scientific or technological capabilities, economic or budgetary context, political or legislative context, environmental conditions, and evolving stakeholder demands. Change can also be endogenous, such as recent and historical performance with respect to strategy. Evaluations of R&D projects, programs, and portfolios (internal and externally conducted), as well as the State of NOAA Research report (SONR), provide key input for the purpose of assessing strategic context on an annual basis.

If the context for R&D has changed, then the priorities for R&D should change accordingly. Priorities should, however, remain within the bounds of strategy, as established by R&D Plan. The AGM is the document at the corporate NOAA level that states the Administrator's priorities in order to focus attention on a few areas. Priorities within the R&D enterprise can be determined by the NOAA Research Council, per the analysis of strategic context described above, for inclusion in the AGM. An annual statement of recommended R&D priorities may be submitted by the Research Council to the Office of Program Planning and Integration (PPI) in preparation for the AGM.

Based upon corporate priorities in the AGM, R&D priorities determined by the Research Council, an understanding of program-level capabilities and recommendations from program managers, LOs and SOs coordinate to determine portfolio options. This includes setting performance expectations and resource requirements for inclusion in IPs and AOPs. Expectations and requirements will serve as a basis for monitoring in execution and evaluation after execution. They should also serve as the basis for updates to program- and project-level plans.

H. Roles and Responsibilities

1. The NOAA Research Council provides a venue for the leadership of multiple LOs and SOs (or their designees) to coordinate the planning, budgeting, execution, monitoring, reporting and evaluation toward corporate strategic objectives. It provides advice and counsel to the NEP and NEC, as appropriate, through all phases of the Strategy Execution and Evaluation (SEE) process. Within planning, Research Council duties include development of the NOAA R&D Plan and the recommendation of corporate R&D priorities for the formulation of the AGM. The Chair of the Research Council is responsible for these duties.
2. The Office of Program Planning and Integration (PPI) coordinates NOAA's corporate planning through the SEE process. On behalf of the NOAA Administrator, it develops the NOAA Strategic Plan, the AGM, CPA, and guides the development of IPs and AOPs.
3. Line and Staff Offices, under the leadership of Assistant Administrators and other

senior executives, and supported by staff for planning and budgeting, will coordinate as appropriate on the Research Council to develop the R&D Plan and IPs. Based upon these documents, they will also develop AOPs particular to their execution responsibilities.

4. Program Offices, coordinate with LO planning and budgeting units, as well as with each other, as appropriate, to align their plans with IPs and AOPs. They develop analysis and recommendations for annual updates to these plans.
5. Transition Teams are responsible for preparing Transition Plans, conducting transition activities, and identifying, reporting, and responding to significant deviations in the execution of the Transition Plan.

I. References

Please see Appendix 1.2: References for NAO Procedural Handbook (alphabetical order)

J. Abbreviations

Please refer to Appendix 1.3: Abbreviations Used in NAO Procedural Handbook

Procedural Handbook Chapter 3 – Monitoring the NOAA Enterprise Research and Development (R&D) Project Portfolio

A. Purpose:

This chapter establishes procedures for monitoring of the NOAA R&D Enterprise. The appendices address the requirements for and the content of the NOAA Enterprise R&D Portfolio.

B. Relationship to Other R&D NAO Chapters:

This Monitoring chapter supports and is integrated with the three of the other chapters under the R&D NAO.

1. **Planning:** Monitoring is designed to track what research NOAA is doing, its execution, and the outputs and linkages to targeted outcomes developed in planning documents.
2. **Evaluation:** Evaluations will incorporate data tracked in this chapter. Evaluation will consist of analysis and review, including progress reviews, of data monitored on a quarterly to annual basis.
3. **Reporting:** Monitoring data will be reported in quarterly, mid-year and annual reports, the State of NOAA Research Report the Annual Operating Plan, and other venues (see the Handbook Chapter 4: Reporting). The monitoring is done at the project level and the project principal investigator or point of contact listed in the NOAA Enterprise R&D Portfolio is responsible for reporting on the measures of progress of his/her project.

C. Policy Background:

Monitoring in support of implementing this NAO involves tracking of NOAA's internal and externally supported R&D projects, performance measures, workforce management information, such as education and training, infrastructure, platforms and equipment, budget information, and of other information relevant to the needs of the evaluation and reporting chapters. The Reporting Chapter (Chapter 5) requires a variety of aspects of NOAA's R&D enterprise be monitored, and many of these aspects are monitored and reported beyond the requirements of NAO 216-115 and its Handbook. Those reports will be used to the maximum extent possible without duplicating these existing reporting mechanisms to inform the evaluation and reporting of NOAA's R&D enterprise. This chapter, therefore, primarily focuses on the procedures, requirements and content of what will likely be the most prominent source for monitoring, the R&D PPMS

In accordance with NAO 216-115, it is the policy of NOAA to collect, track, and analyze R&D projects using cost/benefits and performance data to manage the research and transition projects portfolio, the latter managed by the Line Office Transition Managers (refer to NAO 216-105).

This PPMS will enable NOAA to make informed investment decisions, optimize the R&D project portfolio, track advancements in quality, relevance, and performance, and support and enable NOAA's Policy on Transition of Research to Application (NOAA, 2008).

D. Procedures:

1. **Scope:** NOAA develops and maintains a PPMS. The functional requirements are presented in the "Drivers, Benefits, and Functional Requirements Definition" (Appendix 1).
2. **Schedule:** The PPMS is initially populated (i.e., new projects or updates to ongoing projects) within the first month (October) of each fiscal year (FY) with all project data including expected appropriations and funding distributions. Where appropriate, actual executed funding from the previous FY is also updated at this time. After passage of the current FY appropriations bill, a second update may be necessary to adjust project data in response to actual appropriations. In the event of a FY-long continuing resolution with periodic funding revisions throughout the fiscal year, quarterly project adjustments may be required, including adjustments to quarterly milestones justified by budget revisions. Even without periodic budget adjustments throughout the FY, tracking progress on meeting milestones and outputs will require quarterly updates (e.g., to update the Annual Operating Plans). Appropriate security controls will be placed on other fields that should not be altered at certain times, such as the milestone and output targets themselves without appropriate justification due to budget changes.
3. **Responsibilities:** The responsibilities for the R&D PPMS are as follows:
 - a. The NOAA R&D PPMS is under the overall oversight of the NOAA Research Council.
 - b. The NOAA Research Council is the owner of and has overall responsibility for the PPMS.
 - c. The R&D Enterprise Committee (RDEC) is responsible for changes to the core and common database fields (additions or deletions), upgrades to the PPMS, and other modifications approved by the NOAA Research Council.
 - d. The NOAA Office of Oceanic and Atmospheric Research (OAR) Assistant Administrator (AA) appoints a NOAA R&D PPMS manager to operate and maintain the PPMS and LO-specific portions of the PPMS, their access authorization, and security at a central computing site and a backup site. The NOAA PPMS manager follows the specifications in the Requirements Definition (Appendix 2.1) and responds to any changes to the core and common PPMS fields (additions or deletions), ensures the integrity of the PPMS, including ensuring that the fields are properly and approximately filled in, upgrades the PPMS, and performs other modifications and improvements approved by the NOAA Research Council.
 - e. A PPMS coordinator in each NOAA LO appointed by the LO's AA is responsible for ensuring data are populated into his/her LO's portion of the core

and common database fields (see Appendix 2.2) and that those data are reviewed for quality, accuracy, and currency. Each LO, through its PPMS coordinator, provides a first evaluation of the measures of progress to evaluate their adequacy. The Handbook Chapter 4: Evaluation provides more information on the post-assessment of the measures of progress. The LO PPMS coordinator provides suggestions to the NOAA PPMS manager on monitoring process improvements.

- f. Each LO AA determines who will populate the core, common, and LO-specific fields. A best practice is for entries to be made by project principal investigators or points of contact that control the resource expenditures for the project.
 - g. Quality control of the individual field entries is the responsibility of the LOs and each LO establishes a process for such control which is reviewed and approved by the NOAA R&D PPMS manager.
4. **Content:**
- a. The PPMS consists of the NOAA-wide core and common fields plus additional fields at each LO AA's discretion (LO-specific).
 - b. More content information in Appendix 2.2: NOAA Enterprise Research and Development Projects Portfolio Management Data Fields.

5. **Distribution and Access:**

- a. The core and common fields are accessible to individuals with NOAA credentials for read-only access.
- b. Access to LO-specific portions, in addition to the core and common fields of the database is at the discretion of the LO AA.
- c. Public read-only access is granted to the core and common database fields only via a public facing website.
- d. Write access is under the control of the NOAA PPMS manager and is open to authorized data entry personnel during the first month of each fiscal year and later in each fiscal year for updates.
- e. The NOAA PPMS manager has write access to the entire database at all times and upon request and at the manager's discretion, grants temporary access to LO PPMS coordinators as needed.

E. References:

Please see Appendix 1.2: References for NAO Procedural Handbook (alphabetical order)

F. Definitions:

Core field: Required

Common field: Not required

For additional definitions, please refer to Appendix 1.1: Glossary for NAO Procedural Handbook

G. Abbreviations:

Please refer to Appendix 1.3: Abbreviations Used in NAO Procedural Handbook

Procedural Handbook Chapter 4 - Evaluation of the NOAA Research and Development Enterprise Portfolio

A. Purpose

This chapter establishes policy and procedures for evaluating the quality, relevance, performance of science and balance of the scientific portfolio within the NOAA Research and Development (R&D) enterprise. Scientific evaluations assess the strength and appropriateness of R&D endeavors, and make recommendations for improving scientific innovation and output. They are often a component of programmatic evaluations. These performance management tools are broader in scope than science-specific evaluations, targeting strategic and/or operational objectives at a variety of levels (across programs, goals, objectives, and both internal and external to NOAA), determining priority R&D execution activities, and ultimately helping to achieve NOAA's mission. Rigorous independent evaluations within a framework of informative performance data connect planning to execution to validate whether government programs are achieving their intended outcomes. They provide an opportunity to learn what is working well and how performance can be improved in the future. Together, effective scientific and programmatic evaluations can aid scientists, policy makers and agency managers in strengthening NOAA's science enterprise.

B. Relationship to Other R&D NAO Chapters: This Evaluation chapter supports and is integrated with the other three chapters under the R&D NAO.

1. **Planning:** Evaluation practices must be designed and written to meet the planning objectives of NOAA research as well as indicate how the research contributes to NOAA's goals.
2. **Monitoring:** Evaluation information such as performance measures will be tracked in the R&D PPMS.
3. **Reporting:** Evaluation results such as reviews will be reported in quarterly, mid-year and annual reports, the State of NOAA Research Report, and in other venues.

C. Policy Background

In accordance with NAO 216-115, it is the policy of the National Oceanic and Atmospheric Administration to use consistent processes across the organization for planning, monitoring, evaluating, and reporting on NOAA's R&D. **NOAA will use both independent, expert peer review and internal review consistent with the highest standards and integrity to evaluate the quality, relevance, performance, and balance of its R&D enterprise.** Evaluations detailed in this handbook will cover four categories: periodic NOAA-wide evaluations and performance measures, Program evaluations (encompassing Programs, Laboratories, Science Centers, and science themes), NOAA Portfolio reviews (Relevance Reviews), and Benchmark evaluations. The NAO Handbook for R&D and NOAA-wide evaluation guidance will be adapted as needed to ensure clarity for practitioners.

D. Interrelationships Among Evaluations

1. **Summary:** NOAA's R&D Enterprise Portfolio will be evaluated on a regular and

recurring basis. NOAA employs evaluation methods that range from peer review of professional manuscripts and assessment reports to comparisons of the entire NOAA research enterprise with peer agencies. While no individual evaluation activity can adequately address the scope of NOAA's R&D Enterprise, the evaluation components outlined in this handbook collectively seek to address all levels of scientific evaluation to provide adequate holistic assessments of the entire enterprise and seek its continuous improvement.

2. Evaluation activities roll up hierarchically from the individual principal investigator to the corporate level.
 - a. Peer Review is conducted on NOAA research projects and evaluations.
 - b. Periodic evaluations track execution progress and inform annual and long term planning activities.
 - c. Program evaluations examine quality, relevance and performance at a rolled up level of a laboratory, center, program, or science theme.
 - d. Portfolio reviews incorporate the Program evaluations to examine NOAA-wide performance issues, the relevance of NOAA's research enterprise to its strategic and research goals, and the balance of the NOAA research portfolio relative to those goals, priorities, and characteristics critical to strategic planning.
 - e. Benchmark evaluations use the NOAA Portfolio reviews to compare the NOAA's portfolio and performance to national and international peer institutions.

3. Evaluation is an integral component of the strategic planning, execution and budgeting processes. Periodic and Program evaluations assess execution relative to Implementation Plans, Annual Operating Plans and other strategic documents (Chapter 2) and support recurrent NOAA reporting activities (Chapter 5). Program, Portfolio and Benchmark evaluations inform future planning efforts (e.g., Annual Guidance Memoranda, Implementation Plans, Program and NOAA-wide strategic plans, and the Five-Year R&D Plan).

Table 1: Overview of R&D evaluations described in the handbook

Evaluation	What is being evaluated?	Purpose	Who conducts evaluation?	Criteria	Relative to which plan?	Methods	How often?
Periodic	LO/Goal current FY execution	Determine the state of execution relative to plans for a given FY (AOP)	PPI/NEP/NEC	Variable	IP or AOP	Process evaluation	Variable
Laboratory / Science Center / Program	All entities conducting or funding research	Evaluate criteria relative to research within a Program	Independent review panel	Quality, Relevance, Performance of science	Program Strategic or R&D Plan	Outcome evaluation	Every five years
Ad Hoc	Variable	Evaluations outside the normal cycle to address specific topics or science themes	Variable	Variable	Variable	Variable	As needed
R&D Progress-to-Plan	NOAA R&D enterprise	Evaluate critical/timely priorities in the science portfolio relative to the R&D plan	NOAA Research Council	Quality, Relevance, Performance, Balance	NOAA R&D Plan	Process & Outcome evaluations	Every two years
Portfolio Review	NOAA R&D enterprise	Evaluate the entire research portfolio relative to the R&D plan to inform subsequent strategic and R&D plans	NOAA Research Council	Relevance, Performance, Balance	NOAA R&D Plan	Process & Outcome evaluations	Every four years
Benchmark	NOAA R&D enterprise	Evaluate NOAA's research enterprise relative to its external peers	Science Advisory Board	Relevance, Performance	NOAA Strategic and R&D Plans	Process evaluation	Every four years

E. Peer Review

1. **Policy Overview:** It is the policy of NOAA that review and evaluation of research follow the peer review principles set forth by the OMB Bulletin (2004) and the Information Quality Act (Public Law 106-554). NOAA has adapted the policies set forth by the National Research Council (2000) for peer review and conflicts of interest in the Handbook for the NAO on Scientific Integrity (NAO 202-735D). The

full conflict of interest policy can be viewed on the NOAA Chief Information Officer (CIO) website: http://www.cio.noaa.gov/Policy_Programs/NOAA_PRB_COI_Policy_110606.html. The NOAA Framework for Internal Review and Approval of Fundamental Research Communications ([available on the NOAA Research Council website](#)) sets guidance for Line and Staff Offices on the internal review of manuscripts to be submitted to the peer-reviewed scientific literature.

2. **Applicability:** The conflict of interest policy applies to non-Federal peer reviewers who sit on NOAA review panels outlined in this document. Federal employees must comply with applicable Federal ethics requirements.

F. Performance Measurement

1. **Summary:** Performance measurement is integrated into the four phases of the research and development enterprise under this NAO. Performance measurement is used to evaluate progress toward achieving objectives set in planning. Performance measures and milestones (also referred to as metrics) are monitored over time and reported periodically.
2. **Purpose**
 - a. Management
 - i. To gauge whether work done is producing desired outputs and achieving desired outcomes on the desired schedule
 - ii. Early warning system – to identify the need for targeted improvements or adjustments, thereby improving execution
 - iii. To understand interdependencies among performance targets
 - iv. To understand the resource requirements and risks of not resourcing a capability
 - b. Messaging to NOAA, DoC, OMB, Congress, the SAB, and others
 - i. To quantify and justify Federal budget requests and current programs
 - ii. To communicate program goals and achievements
3. **Relationships with other chapters:** Performance measures are primarily evaluation tools, but are closely integrated within the other chapters:
 - a. **Planning:** Performance measures must be designed to measure the planning objectives of NOAA research and the research enterprise, as well as to indicate how the research contributes to NOAA's overarching goals.
 - b. **Monitoring:** Performance measures and other metrics will be tracked in the R&D PPMS.
 - c. **Evaluation:** Performance measures and milestones will be examined and used to evaluate a research program's progress toward meeting its objectives, as well as to evaluate the quality and relevance of its research. Performance measures will be used at multiple levels of evaluation, including:
 - i. Project evaluation
 - ii. Program/Laboratory/Science Center evaluations

- iii. Overall NOAA research portfolio evaluation
 - d. Reporting: Performance measures and milestones will be reported in quarterly reports, the State of NOAA Research Report, LO mid-year and end-of-year briefings, and other reports.
- 4. **Application**
 - a. Where practical and commensurate with the size and importance of the work, performance measures should be developed for key aspects of activities. A variety of topics may be informed by performance measures, such as:
 - i. Research and development achievements
 - ii. Quality of research and products
 - iii. Relevance of research to NOAA mission/goals/objectives
 - iv. Response to customer/user needs (usage of research and products)
 - v. Efficiency and/or cost benefit analyses
 - vi. Output achievements
 - vii. Outcome achievements
 - b. Performance measures should include a baseline, an endpoint or target, a unit of measure, and a timeframe to achieve the target(s). They should also include an explanation if the meaning and importance will not be clear to a non-specialist.
 - c. Performance measures will be an important part of the evaluation process. It is useful to have a broad set of performance metrics that address multiple levels of NOAA’s research activities (e.g., milestones, outcome, output, efficiency). Intuitive measures with an outcome orientation are critical to communicating the overall intent of the program and its priorities.
 - d. Measures should integrate hierarchically. Specific performance measures at the program level (e.g., milestone or output measures) should contribute to broader measures at the NOAA, DoC or Federal government level to provide information on broader outcomes.
- 5. **Reference and guidance documents:** Documents and references that will assist in the development of performance measures are included in Appendix 3.4.
 - a. Logic Model Development – Develops the context for performance measures.
 - b. Performance Measure Guidelines – How to develop and write a performance measure.
 - c. Performance Measure Training: Fundamentals of Performance Measures
 - d. Thinking Strategically: The Appropriate Use of Metrics for the Climate Change Science Program (NRC 2005) – Although the subject focus is on Climate, this is also applicable to science and research in general. Box 6.1, “General Metrics for the CCSP,” is a list of evaluation criteria for science and research.
 - e. Preparation and Submission of Strategic Plans, Annual Performance Plans, and Annual Program Performance Reports (OMB Circular No. A-11, Part 6, 2010)

G. Periodic and Ad Hoc NOAA-wide Evaluations

1. **Overview and Purpose:** This section provides general guidance and policies for

conducting periodic and ad hoc review of NOAA research. These criteria and methods are intended to derive from and evaluate planned activities and be communicated in, e.g., the State of NOAA Research Report (Chapter 4).

2. **Periodic Reviews:** Such reviews often focus on progress toward meeting the performance expectations documented in the Implementation Plans and Annual Operating Plans (AOP). They may include evaluating Line Office (LO) performance metrics relative to their targets, such as milestones, performance measures, OMB GPRA measures, and contributions to DoC performance reporting. Many of these monitoring data will be tracked in the R&D PPMS (Chapter 3). Guidance and responsibilities will be developed and distributed by the Office of Program Planning and Integration (PPI). Current examples include quarterly, mid-year and year-end execution reviews.
3. **Ad Hoc Evaluations:** These evaluations are conducted on an as-needed basis in response to a particular need, mandate, or event. Jurisdiction for these reviews will vary per their unique terms of reference or mandate. Evaluations concerning or related to R&D activities should be considered in broader strategic planning initiatives as any other regularly scheduled evaluation would be (e.g., contributing to revisions of the Annual Guidance Memorandum and strategic and R&D plans).
4. **Research Progress to Plan Evaluation (P2P):** The Research P2P review is a component of the strategic planning and evaluation process that shall review NOAA's progress toward achieving NOAA R&D Plan objectives. The P2P will be used to inform the Annual Guidance Memorandum, Implementation Plan revisions, and future NOAA R&D Plans.
 - a. **Responsibilities:** The NOAA Research Council (RC) is responsible for leading every two years an evaluation of progress toward the relevant research Implementation Plan (currently, *Science and Technology Enterprise: Holistic Understanding of the Earth System Through Research*).
 - b. **Scope:** While the entire scope of the NOAA R&D Plan is subject to evaluation every two years, the RC may choose to evaluate specific components of the plan which address critical cross-LO priorities or emerging issues. Prior to the development of the next iteration of the NOAA R&D Plan, the P2P evaluation will be a more complete Portfolio Review (See [Section J](#)).
 - c. **Core Evaluation Criteria:** Progress will be measured relative to the milestones or benchmarks established in the NOAA R&D Plan.
 - d. **Implementation:** The RC will implement a process for the Research P2P review that supports both the short- and long-term evaluation cycles. The Research Council may designate a group working on its behalf to conduct the review and provide an assessment and recommendations to the RC for consideration.
 - e. **Dissemination and Transparency:** As this is an internal planning process, evaluation results and recommendations will remain internal to NOAA. Final documentation will be made available on the RC intranet site.

H. Program/Laboratory/Science Center Evaluations (Program Evaluations)

1. **Scope:** An evaluation will cover the quality and relevance of the R&D and the performance of the program/laboratory/center conducting that R&D. The primary benchmarks upon which to evaluate these criteria are the NOAA strategic and R&D plans, and their associated derivatives (e.g., a goal's Implementation Plan, a laboratory strategic plan). As a component of "performance" (see core evaluation criteria below), evaluation of the internal management and administrative components of a program that affects the R&D is required via this mechanism. LOs have the flexibility to expand (but not reduce) the scope of the evaluation per their internal needs.
2. **Applicability:** For purposes of this document, "Program evaluations" shall cover all major internal NOAA entities that conduct or fund scientific research and development: laboratories, science centers, program offices, matrix programs, etc. The list of applicable entities subject to Program evaluations will be developed and routinely updated by the NOAA Research Council and kept as an addendum to this handbook. For evaluation of external partnership programs (e.g., Cooperative Institutes, Cooperative Science Centers, State Sea Grant programs), see Section I.
3. **Schedule:** Each Line Office will arrange for evaluations of its Programs on a regular and recurring basis (not less frequently than once every five years).
4. **Responsibilities:**
 - a. In the absence of a specific programmatic home, the Research Council is responsible for recommending a lead for science theme evaluations.
 - b. The Assistant Administrator (AA) of each Line Office is responsible for administering evaluations of each Program. The AA is responsible for appointing and charging the review team, receiving the review panel's report, making final decisions on actions to be taken as a result of the report, and providing the results of evaluations to the Research Council.
 - c. Within each Line Office, the AA may delegate authority for implementing Program evaluations per internal policies; however, authority for the evaluation should not be delegated to the individual responsible for (or residing under) the organization being evaluated.
5. **Peer Review Panel**
 - a. The AA should ensure representation of distinguished and expert scientists, science administrators, and stakeholders who are qualified to evaluate the quality, relevance, and performance of the science covered. Experts should be chosen via an objective process and provide adequate coverage of the science topics under review. If NOAA employees are considered for the review panel, they should be employed by a different Line Office or Financial Management Center and have no vested interest in the work within the Program.
 - b. For those Programs with Federal Advisory Committee Act (FACA) committees, the AA should charge that committee with conducting the science evaluation using the guidelines established in this policy, unless elements of this policy fall

outside the terms of reference for the committee. The committee should discharge its duties in compliance with FACA and other relevant statutes.

- c. Conflict of Interest: Reviewers should have no financial or professional conflict of interest with the Program being evaluated and must submit a conflict of interest disclosure form prior to participating.
 - d. 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. Alternatively, a chair who is not a Federal employee can provide a summary report of review proceedings along with the individual review reports from each panelist.
6. **Core Evaluation Criteria:** All Programs will be evaluated on the following core elements. For Programs with multiple research themes, offices, or other appropriate divisions, these criteria should be addressed for each group. Additional criteria may also be established that are specific to the program being evaluated. A detailed description for each criterion is listed in Appendix 3.1.
- a. **Quality:** Assess the scientific and technical strength of the R&D. Evaluate the quality of the R&D outputs (and education/outreach, if applicable) of the Program. Assess progress toward meeting the goal of conducting preeminent research. The following indicators of preeminence may support the assessment.
 - i. Publications/Bibliometrics
 - ii. Science and technologies transferred (including to resource management applications)
 - iii. Patents
 - iv. National and international leadership, partnership activities, collaborations, or cooperative efforts
 - v. R&D applications and results of distinction in national and international contexts
 - vi. Awards and recognitions
 - b. **Relevance:** Assess the degree to which the R&D matters to NOAA's mission, strategic plan, administrator priorities, users, and the state of science and technology.
 - i. Addresses NOAA strategic, policy, or R&D documents and priorities
 - ii. Addresses social, economic, and environmental outcomes
 - iii. Engages customers and incorporates their needs and requirements
 - c. **Performance:** Assess how effectively and efficiently R&D activities are organized, directed, and executed given the resources provided, to meet the objectives of the current NOAA research and strategic plans and the needs of the nation.
 - i. Research leadership and planning: Does the Program have clearly documented scientific objectives, a process for evaluating and prioritizing activities, and methods for ending or transitioning projects?
 - ii. Program efficiency and effectiveness: Is the Program organized effectively; implementing a strategic plan that is specific, yet flexible to changing circumstances; and integrated into NOAA's planning, execution and

budgeting processes (Chapter 2)? Does it appropriately leverage partners and the scientific community and integrate across Line Offices and related scientific programs, projects, and efforts?

- iii. Transition of research to applications: How effective is the Program at delivering products/outputs to applications or operations?

7. **Implementation**

- a. Materials presented at the review should allow review panelists to effectively evaluate the Program. Review panelists must be provided with summaries of Program scope and research activities, access to project information in the NOAA R&D PPMS (Chapter 3), any relevant research evaluations that have been completed in the period prior to the Program evaluation, access to indicators of preeminence and performance measures, and other appropriate documentation.
- b. LOs should develop general procedures for organizing and conducting Program evaluations. Discretion for who will organize and plan an evaluation is left to the AA, though convening authority rests with the AA.
- c. Current procedure documents must be revised to meet the guidelines of this NAO. Examples of these plans are provided in Appendix 3.4 to this handbook.

8. **Reporting**

- a. Oral Report: Before the end of the evaluation, the panel must report on their preliminary findings and recommendations to Program and LO leadership.
- b. Review Panel Report
 - i. Reviewers will provide individual evaluations of the topic they are assessing. Evaluations should address what is working well and what needs improvement, along with a prioritized list of recommendations. The Federal chairperson will combine individual reports into a summary report for submission to the AA. This report shall not be a consensus report, except where the committee is a FACA-compliant oversight group.
 - ii. The summary report should include at a minimum: an executive summary; an introduction; evaluations and recommendations on quality, relevance and performance by topic; a table or bulleted list of all recommendations; a conclusion highlighting the final assessments.
 - iii. Assessment: Each review panelist should provide a rating for each Program topic evaluated. These ratings should be noted in the final summary report. In the case of a FACA committee, the panel may develop consensus ratings.
 - *Exceeds Highest Expectations* – Program goes well beyond expectations and is outstanding in all areas.
 - *Exceeds Expectations* – In general, Program goes beyond what would be required to simply meet expectations.
 - *Meets Expectations* – In general, Program meets, but does not exceed expectations.
 - *Needs Improvement* – In general, Program does not reach expectations. The reviewer will identify specific problem areas that need to be addressed.
 - iv. The review panel chairperson shall provide a final report within 60 days of the

end of the review.

- c. **Program Response:** The Program shall develop and submit to the AA a formal response to the Review Panel Report within 90 days of receiving it. The response should include further clarifying information where necessary and recommended actions to be implemented by the Program in response to the report. The AA must approve the report and Program actions to be implemented.
- d. **Program Final Report:** The Program shall report back to the AA on completed actions from the response report. The report should include at a minimum: an introduction, the bulleted or tabular list of recommendations and completed actions, a written response to each recommendation including completed actions. The report shall be due no later than one year after approval of the Program Response actions.

9. **Dissemination and Transparency**

- a. Copies of all reports shall be sent to the review panelists, made available to all employees within the Program, and submitted to the Research Council.
- b. Each LO shall maintain a central repository for all review reports that is accessible across NOAA and to external audiences.
- c. Reports and indicators of preeminence shall be made available to the NOAA Research Council for review and integration into its annual State of NOAA Research report and subsequent enterprise planning.

I. **External Partnership Program Evaluations**

1. **Applicability:** External partnership programs refer to those non-NOAA organizations that have a formalized institutional relationship with NOAA and receive NOAA funding to conduct research or administer grant programs. Examples include Cooperative Institutes, Cooperative Science Centers, and State Sea Grant programs.
2. **Scope:** Evaluation shall cover the quality and relevance of the scientific R&D and the performance of these non-NOAA organizations conducting that R&D. The primary benchmarks upon which to evaluate these criteria are the NOAA strategic and R&D plans, their associated derivatives, and other requirements for evaluation, as set forth in the charter and financial agreements between the program and NOAA. Depending on the partnership program, evaluations may cover material beyond the scope of this NAO for research.
3. **Schedule:** Evaluations shall be conducted per the schedule set forth in the partnership program agreement.
4. **Responsibilities**
 - a. The Director of the office overseeing the partnership program (e.g., the Sea Grant Director) or the appropriately charged FACA committee (i.e., the convening authority) shall be responsible for administering evaluations, appointing review team members, receiving the final review team report, and approving the partnership program's response plan (if required).

- b. The partnership program director (e.g., Maine Sea Grant Director) shall be responsible for organizing and conducting the evaluation and responding to and implementing recommendations.
5. **Peer Review Panel:** The convening authority should ensure representation of high-ranking and broadly experienced scientists, science administrators, and stakeholders who are qualified to evaluate the quality, relevance, and performance of the science covered in the review, and shall appoint a chairperson to ensure completion of the review and submission of the report. Review Team members shall have no conflict of interest with the partnership program.
 6. **Core Evaluation Criteria:** The core evaluation criteria for research shall be quality, relevance, and performance as discussed in Section H.
 7. **Dissemination:** Reports should be provided to the Research Council and made available to internal and external audiences.
 8. **Current External Partnership Program Reference Documents**
 - a. Cooperative Science Center
Evaluation: http://www.epp.noaa.gov/csc_evaluation_page.html
 - b. National Sea Grant College Program
Evaluation: <http://www.seagrant.noaa.gov/other/admininfo/documents/ppe/sea%20grant%20program%20evaluation%20-%20final%20-%202011-13-09.pdf>
 - c. NOAA Cooperative Institute Interim Handbook: <http://www.nrc.noaa.gov/ci/policy/docs/handbook.pdf>

J. NOAA Portfolio Reviews

1. **Scope:** Reviews will evaluate the strategic balance of NOAA's R&D Enterprise and progress toward achieving the objectives in the NOAA 5-Year R&D Plan.
2. **Interrelationships with Evaluations and Plans**
 - a. The NOAA R&D Plan will be the basis for evaluations of the research portfolio. NOAA Program Reviews, Implementation Plans, Annual Operating Plans, science workshops, other corporate planning and visioning activities, and performance metrics shall provide supporting documentation for this evaluation.
 - b. The Portfolio Reviews will be conducted by NOAA, internally, but will provide baseline assessments upon which the NOAA Science Advisory Board (SAB) can conduct NOAA Benchmark evaluations and make recommendations on the strategic direction and alignment of resources.
 - c. Portfolio Review findings will guide future planning and execution efforts (e.g., Annual Guidance Memoranda, Implementation Plans, Strategic Plans)
3. **Schedule.** NOAA will conduct a Portfolio Review once approximately every four years, depending on the frequency of which the NOAA Research and Strategic plans are revised. Reviews should precede and inform the formulation of the next strategic

- plan and R&D plan.
4. **Responsibilities**
 - a. The NOAA Research Council (RC) Chair is responsible for administering Portfolio Reviews.
 - b. RC members representing each LO or goal shall be responsible for contributing the data necessary for conducting the review.
 5. **Core Evaluation Criteria.** The core evaluation criteria will be established in the NOAA R&D Plan (Chapter 2).
 - a. Key questions to consider include:
 - i. Has NOAA made expected progress toward achieving its R&D Plan objectives? If not, why; and how can this be improved?
 - ii. Relevance: Is the current set of NOAA R&D portfolio priorities relevant to its mission, strategic plan, administrator priorities, and the state of science and technology? If not, how should priorities be realigned?
 - iii. Portfolio Balance: Is the balance of the R&D portfolio aligned to expectations in the NOAA R&D Plan?
 - b. Within NOAA's portfolio, some of the characteristics of R&D activities to consider (see Appendix 3.2 for more detail):
 - i. Alignment with strategic objective; proportionality among mission goals
 - ii. Research type: basic (understanding), applied, development, transition
 - iii. Intramural and extramural
 - iv. Near-term versus long-term
 - v. Evolutionary and revolutionary; incremental versus high risk/high reward
 - vi. Disciplinary versus interdisciplinary
 6. **Implementation:** The RC's RDEC shall develop the procedures for conducting the Portfolio Review. The plan will include developing a final report that will inform current strategic planning and the next iteration of the R&D Plan.
 7. **Dissemination and Transparency**
 - a. The NOAA Research Council chair shall deliver the final report to and brief NOAA senior leadership.
 - b. If requested, a briefing shall be given to NOAA strategic plan and R&D plan development teams.
 - c. The Report shall be archived as an internal document on the NOAA Research Council intranet.

K. NOAA Benchmark Evaluations

1. **Scope.** NOAA Benchmark evaluations are intended to provide NOAA and its external stakeholders 1) an overview of how NOAA's research enterprise compares to that of its contemporaries and 2) external recommendations to guide strategic decisions about NOAA's R&D enterprise. Evaluations will assess NOAA research relative to that going on in similar organizations – nationally and internationally,

highlight evidence of progress toward NOAA's R&D plan and vision, and assess how NOAA conducts and evaluates its R&D in relation to these organizations. The evaluations will support research enterprise structure, infrastructure, and policy; research gap analyses; and the development of future Annual Guidance Memoranda, Strategic Plans, and Implementation Plans.

2. Frame of Reference

- a. Benchmarking should use the most recent NOAA Portfolio Reviews, relevant legislation mandating research, and other relevant documents as their basis for comparison of NOAA R&D to other research entities. Program evaluations should provide supporting documentation for the reviews.
- b. A sample of peer agencies and international organizations with R&D for comparison to NOAA R&D are listed in Appendix 3.3.

3. Schedule

- a. NOAA will request a Benchmark evaluation approximately every four years.
- b. A review request should follow and build on the NOAA RC's Portfolio Review.

4. Responsibilities

- a. Benchmark evaluations are to be administered by the NOAA Science Advisory Board (SAB).
- b. The NOAA RC is responsible for developing the charge and relevant criteria for the SAB review.

- 5. Core Evaluation Criteria:** The NOAA RC should propose to the SAB a series of charge questions that address 1) NOAA's research priorities and outcomes for the future relative to its mission and mandates (Relevance), and/or 2) best practices from external sources that may improve NOAA's research enterprise (Performance). Charge questions should be tailored to solicit specific advice that NOAA requires for strategic planning and improving the NOAA research enterprise. Example charge questions addressing these criteria are detailed in Appendix 3.3.

6. Implementation and Reporting

- a. NOAA RC develops the charge to the review team, provides a list of external experts for SAB consideration, and provides a brief to the SAB outlining the charge, questions to be addressed, and sources of information available for the review (e.g., NOAA Portfolio Review, Program evaluations).
- b. The SAB administers the Benchmark evaluation following its established procedures, requesting line office information and analyses, consulting with external experts, developing an analysis and recommendations, and reporting its findings to NOAA.

7. Dissemination and Transparency

- a. The SAB shall submit the final report to NOAA per its chartered responsibilities and policies.
- b. The report should be posted on the SAB and NOAA RC review websites for

public access.

L. References

Please see Appendix 1.2: References for NAO Procedural Handbook (alphabetical order)

M. Abbreviations

Please refer to Appendix 1.3: Abbreviations Used in NAO Procedural Handbook

N. Appendices

Appendix 3.1: Evaluation Descriptions for Quality, Relevance, and Performance of NOAA Research Programs

Appendix 3.2: Potential Evaluation Questions for NOAA Portfolio Reviews

Appendix 3.3: Supplemental Information for NOAA Benchmark Reviews

Appendix 3.4: Additional Documentation

Procedural Handbook Chapter 5 - Reporting of the NOAA Research and Development Enterprise Portfolio

A. Purpose:

This chapter establishes procedures for reporting on the NOAA R&D Enterprise Portfolio. In conjunction with the Planning, Evaluation, and Monitoring chapters of the Handbook, implementation of this chapter is designed to provide a complete picture of NOAA's R&D Enterprise Portfolio for use in planning and budget development, as well as to provide information to external partners, stakeholders, and the interested public.

B. Relationship to Other R&D NAO Chapters:

This Monitoring chapter supports and is integrated with the other three chapters under the R&D NAO.

1. **Planning:** Reporting informs the next planning cycle by highlighting successes and critical gaps. The State of NOAA Research will be a vehicle for informing planning.
2. **Monitoring:** Monitoring data will be reported in quarterly, mid-year and annual reports, the State of NOAA Research Report, and other venues.
3. **Evaluation:** Results of evaluations will be summarized in the State of NOAA Research Report.

C. Policy Background

In accordance with NAO 216-115, it is the NOAA policy to conduct standardized, representative reporting for its R&D enterprise to document the current state of the enterprise, highlight strategic R&D investment needs for the future, and communicate the return-on-investment and overall benefits to society derived from its current R&D portfolio.

D. Reporting Procedures

1. **Scope**
 - a. At a minimum, NOAA will prepare, complete, and disseminate an annual State of NOAA Research Report (SONR) to describe the quality, relevance, and performance of the NOAA R&D Enterprise Portfolio.
 - b. The NOAA Research Council (Research Council) and/or the Office of the NOAA Chief Scientist may also request additional reports (e.g., Annual Operating Plan quarterly reporting and prior year R&D accomplishments for the NOAA Budget Blue Book) throughout the year to provide a more complete picture of the R&D Portfolio. Clear justification and cost/benefit analysis for additional reporting should be provided.
 - c. This chapter covers the detailed requirements for producing the SONR. Other reporting requirements should be provided by the requesting source at the time of the request.

2. **Schedule**
 - a. End-of-year reporting should be completed in time to inform both the budget cycle and the next planning cycle.
 - b. Interim reporting will be completed in the timeframe requested by the Research Council or the Office of the Chief Scientist.
3. **Responsibilities**
 - a. The Office of the Chief Scientist will be responsible for oversight of NOAA's R&D reporting activities.
 - b. The Research Council will oversee and approve all R&D reporting products.
 - c. The Research Council, in coordination with Line Office Communications staff, will be responsible for gathering and reporting annual research accomplishments to NOAA Budget for development of the Blue Book.
 - d. Line Office Chief Financial Officers will be responsible for gathering and reporting R&D financial information for the development and defense of the NOAA budget.

E. The State of NOAA Research Report (SONR)

1. **SONR Scope**
 - a. The primary audience of the SONR is very broad (NOAA leadership, the Department of Commerce, the Office of Management and Budget, the Office of Science and Technology Policy, Congress, NOAA partners and stakeholders, and the public), so the report should provide a high-level snapshot, written in clear, non-scientific language, and not to exceed 50 pages.
 - b. The report will focus on a single fiscal year (FY) but also will include limited coverage of other years, in order to adequately capture the long-term nature of R&D.
 - c. The SONR will provide limited project-level analyses, as necessary, to highlight specific priority areas outlined in the Annual Guidance Memorandum or arising due to circumstances outside the normal planning process (e.g., natural disaster, oil spill.).
 - d. The data gathered and presented in this report constitute the minimum level needed to provide a useful reporting of the adequacy of quality, relevance, and performance.
2. **Schedule:** The SONR will be completed in time to inform the next planning cycle (Winter/Spring).
3. **Responsibilities:** The responsibilities for the SONR are as follows:
 - a. The Office of the Chief Scientist will be accountable for requiring its completion and submittal to NOAA Leadership and partners.
 - b. The Research Council will conduct reviews and clearance of the document.
 - c. The Research and Development Enterprise Committee, staff of the Office of the Chief Scientist, and staff of the NOAA Research Line Office will prepare the document and the supporting data and portfolio analysis.
 - d. Representatives from NOAA's Line Offices, Staff Offices, and Objective Teams will provide necessary information to the RDEC and Office of the Chief Scientist staff as requested. (See the Monitoring Chapter of this handbook for more

information about specific tracking requirements.)

4. **Content:** The content of the SONR will include:
 - a. Front Matter
 - i. Message from the Chief Scientist
 - ii. About this report
 - iii. R&D scope
 - b. Introduction. A snapshot of NOAA's R&D Enterprise.
 - i. Organization and Program Activities
 - ii. Requirements/Drivers for NOAA R&D
 - NOAA Strategic Plan
 - R&D 5-Year Plan
 - Annual Guidance Memorandum
 - Unplanned Drivers (e.g., natural or environmental disasters)
 - Significant changes during reporting period
 - Analysis of any significant shifts in priorities
 - iii. Quality, Relevance, and Performance
 - c. **Quality.** This refers to the merit of R&D within the scientific community. Assessing the quality of scientific and technical work done involves the time honored tradition of peer review. Bibliometric data on peer-reviewed publications and citations, as well as awards and other professional recognitions, are critical to understanding the research quality of individuals, and organizations, particularly for benchmarking against other organizations of similar size and scope.
 - i. NOAA-level bibliometrics,
 - ii. Individual accomplishments: professional awards and recognitions, Leadership roles in professional societies
 - iii. Results of quality reviews, if any (as components of Lab/Program reviews or as conducted by external partners, e.g., Science Advisory Board)
 - d. **Relevance.** This refers to value of R&D to users beyond the scientific community. Relevance includes not only hypothetical value, but actual impact. Assessing NOAA's relevance involves measuring the broader benefits of the work. It answers the question, "What would not have happened if the R&D did not exist, and how much would society have missed?" The impact of R&D can be realized through the application of scientific knowledge to policy decisions, through the improvement of operational capabilities in NOAA's service-oriented line offices, or by patenting and licensing of inventions for commercial use.
 - i. Assess progress-to-plan (re: outcomes for society), or establish baseline in the first year after a new NOAA R&D Plan
 - Analysis of outcome-based performance metrics (including those from

the NOAA R&D Plan, Implementation Plans, and Annual Operating Plans)

- Partnership highlights for specific performance metrics
 - ii. Results of relevance/impact reviews, if any (as components of Lab/Program reviews or as conducted by external partners, e.g., Science Advisory Board)
 - iii. Research to Applications: activities and accomplishments
 - Overview of transition activities during the period
 - Selected transition accomplishments during reporting period
 - Patents, licenses, licensing revenue, etc.
- e. **Performance.** This refers to how effectiveness and efficiency with which R&D activities are organized, directed, and executed. Assessing performance involves ensuring that the work it performs supports NOAA's goals and that it has the kind of workforce, infrastructure, and leadership necessary to achieve those goals. This necessarily involves understanding the quality of management, including interaction with stakeholders, clear articulation of strategic direction, as well as the balance of the R&D portfolio across time frames and intended applications.
- i. Assess progress-to-plan (re: inputs, activities, outputs), or establish baseline in the first year after a new NOAA R&D Plan
 - Analysis of input-, activity-, and output-based performance metrics (including those from the NOAA 5-Year R&D Plan, Implementation Plans, and Annual Operating Plans)
 - Partnership highlights for specific performance metrics
 - Analysis and assessment of effectiveness (re: inputs, activities, outputs, and outcomes for society)
 - ii. Analysis of R&D budget, portfolio balance, and associated changes over time:
 - For each NOAA line office and R&D execution unit (program, laboratory, or center)
 - For each NOAA goal and R&D objectives (per NOAA R&D Plan, recognizing that a single R&D activity may support multiple goals or objectives to different degrees)
 - For all NOAA R&D vs. other NOAA activities (where the former distinguishes among: research, development, transition and operations, per NAO 216-105)
 - For intramurally vs. extramurally conducted R&D (where the latter distinguishes among: grants, contracts, cooperative agreements, and other award types)
 - For each broad type of productive function (e.g., observing, modeling, predicting, assessing, etc.)
 - For combinations of the above, where needed.
 - iii. Platforms and Infrastructure
 - Overview of major changes during the period (e.g., new facilities/platforms/systems or shuttering of existing facilities/platforms/systems)
 - Highlight any anticipated future gaps, shortfalls, or significant needs

based on current/future drivers and requirements

- Analysis and recommendations
- iv. Workforce
 - Trends with NOAA workforce based on education, age, diversity, distribution of expertise, and other key factors
 - Highlight anticipated future gaps, shortfalls or significant needs based on current/future requirements
 - Analysis and recommendations
- v. Partnerships and Grants
 - Highlight significant changes during the reporting period
 - Highlight significant R&D accomplishments with partners
 - Indicate anticipated future gaps, shortfalls or significant needs based on current/future requirements
 - International partnership activities and collaborations
 - Other significant national and international leadership or cooperative activities

f. **Conclusion**

- i. Summary of Adequacy of Relevance, Quality, and Performance
- ii. Recommendations for future planning cycles

- g. **Appendices:** Appendix material should include the data from which the analysis in the preceding sections is based.

5. **Distribution:** The final SONR will be made broadly available via:

- a. A briefing to NOAA Leadership by the CS
- b. A briefing to the NOAA Science Advisory Board by the CS
- c. Permanent posting to the NOAA RC website
- d. Email distribution of the SONR link on the RC website to all of NOAA.
- e. Email distribution of the SONR link on the RC website to key NOAA R&D partners and stakeholders.

F. References

Please see Appendix 1.2: References for NAO Procedural Handbook (alphabetical order)

G. Definitions

For definitions, please refer to Appendix 1.1: Glossary for NAO Procedural Handbook

H. Abbreviations

Please refer to Appendix 1.3: Abbreviations Used in NAO Procedural Handbook