



# **In the Nation's Best Interest: Making the Most of NOAA's Science Enterprise**

A Presentation to the  
NOAA Science Advisory Board

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SAB R&D Portfolio Review Task Force

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# Outline



- Charge
- Members
- Process
- Findings and Recommendations
- SAB Comments and Next Steps



# Charge



1. What portfolio of R&D activities does NOAA need to achieve its vision and strategic goals?
  - What R&D portfolio does it currently have?
  - What are the differences?
  - What changes should be made?
  - What changes take priority?
  
2. How should NOAA's R&D portfolio be organized and managed to achieve its vision and strategic goals? Is NOAA's expertise appropriate?
  - How is it organized and managed now? What expertise does it have now?
  - What are the differences?
  - What changes should be made?
  - What changes take priority?



# Task Force Members



## *Co-Chairs*

- Roberta Balstad, Special Research Scientist, Columbia University
- Peter Kareiva, Chief Scientist, The Nature Conservancy (SAB Member)

## *Members*

- Susan Avery, President, Woods Hole Oceanographic Institution (SAB Member)
- Lesley-Ann Dupigny-Giroux, Associate Professor of Geography, University of Vermont; VT State Climatologist
- Frank Kudrna, Principal Water Resource Engineer, URS Corporation, Chicago
- Berrien Moore, Dean, University of Oklahoma College of Atmospheric & Geographic Sciences
- James Neil Sanchirico, Professor, University of California, Davis (SAB Member)
- Jerry Schubel, President and CEO, Aquarium of the Pacific (SAB Member)
- John Snow, Regents Professor of Meteorology, University of Oklahoma

## *Ex-Officio*

- Ray Ban, Ban and Associates and Chair, SAB

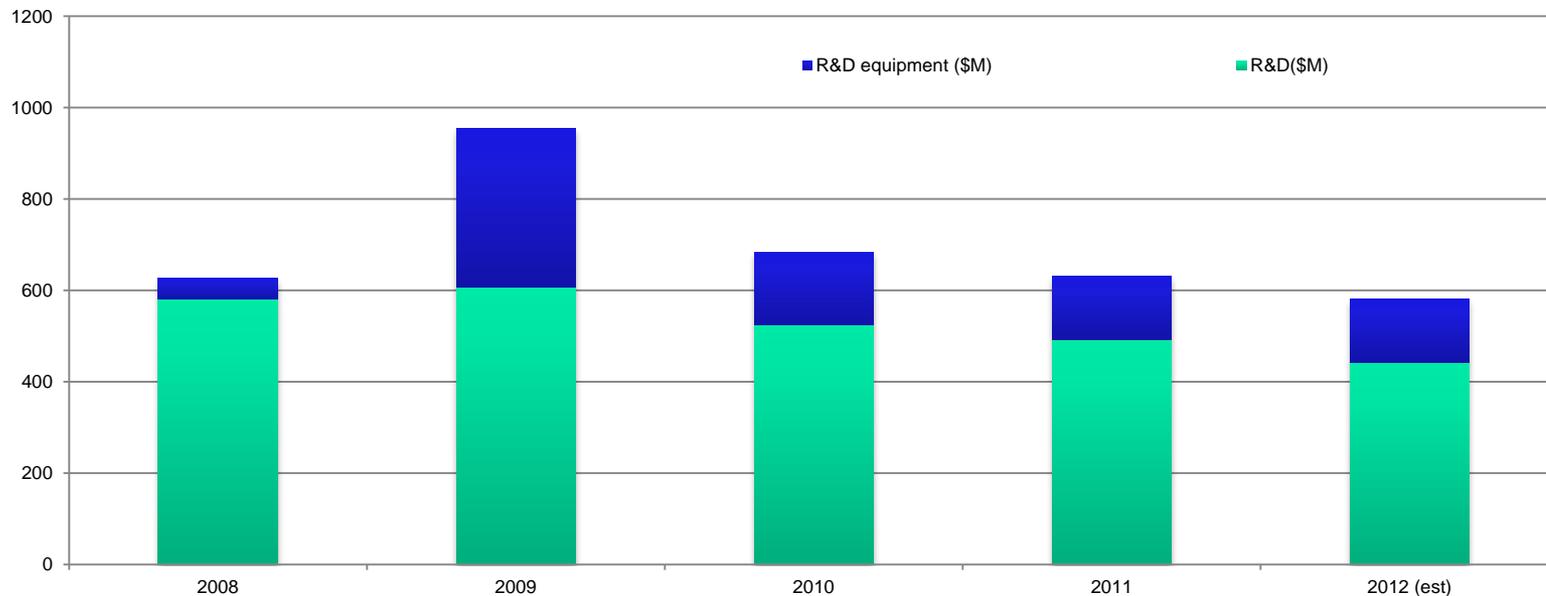


# Process

- Beginning 5 January 2012: 5 in-person meetings and 4 teleconference meetings (Appendix III);
- Members also participated in calls with former NOAA Administrators, NOAA fellows, Cooperative Institute Executive Council, social scientists, Presidential Early Career Award Winners and others (Appendix IV);
- A questionnaire was sent out to 2720 people identified as bench scientists (including federal, university and contractor scientists): 803 people responded to the survey; and
- The Task Force requested and reviewed a large amount of information related to its charge from NOAA (Appendix VII)



# NOAA R&D Budget



**Figure 1.** NOAA's R&D budget, including equipment.



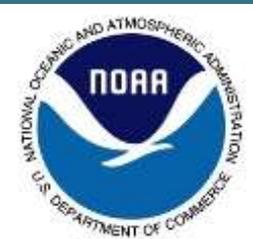
# Summary of Findings and Recommendations



- NOAA R&D is world class and critical to the nation's security, economic growth, and environmental health; its importance will expand as the nation continues to be exposed to coastal flooding and extreme weather.
- NOAA requires an R&D portfolio that is more sharply focused on key areas essential to improving its services to the nation and meeting the requirements of its Next Generation Strategic Plan.
- Given fiscal realities, NOAA can meet its mandate only if it significantly changes the management of its R&D portfolio and is given flexibility to allocate its R&D budget to its highest priorities.
- In this report, we focus on broad research directions and management needs rather than on prescribing specific research topics.



# Summary of Findings and Recommendations



- Develop a strong research capability internally and externally in the socioeconomic and integrated ecosystem sciences, and ensure the nation's needs are met by NOAA's observation and data sharing systems
- Maintain a strong core of internal scientists whose skill sets fit with the agency's strategic priorities is essential.
- Increase the agency's scientific breadth and flexibility by leveraging the contributions of partners in the academic, public and private sectors.
- Replace the current Chief Scientist position with a Deputy Under Secretary of Commerce for R&D who has responsibility for research across the agency and has the necessary budget authority to direct all NOAA research.
- Implement these changes by eliminating or consolidating duplicative R&D and research unrelated to NOAA's strategic priorities and by working more closely with the Administration and Congress to find ways to manage its R&D funds more flexibly and efficiently.
- The Task Force recommends that NOAA implement the management and organization recommendations by September 30, 2015



# Findings and Recommendations for NOAA's R&D Portfolio



## Socioeconomic Sciences:

- Although NOAA has made scientific advances in many areas, its work could be significantly improved by increasing its capacity in the socioeconomic sciences
- NOAA needs to increase its investment in this research to meet the goals of its strategic plan.
- Examples of needed R&D include research on communication of weather and climate events; decision making under uncertainty; behavioral and economic impacts of extreme weather, demographic and economic trends in coastal communities.
- Two previous SAB reports have recommended that NOAA increase its investment in the socioeconomic sciences, yet these fields still account for a miniscule 0.6% of NOAA's overall budget (2008).



# Findings and Recommendations for NOAA's R&D Portfolio



## Ecosystem Sciences

- The National Ocean Policy recommended that NOAA implement an ecosystem approach to management and coastal and marine spatial planning. NOAA currently lacks both the staffing and organization to meet this high priority research need, and also misses opportunities for leveraging ongoing ecosystem science research in EPA and USGS.
- There is a tendency to refine single stock assessments and management, while failing to switch attention to ecosystem management, which may ultimately yield greater benefits.



# Findings and Recommendations for NOAA's R&D Portfolio



## Strengthening Research to Operations and Operations to Research

- NOAA focuses on science, service and stewardship to meet its mission; unless the science is transitioned to operations, NOAA will fail in its mission.
- NOAA must make certain that the end uses of the scientific information are understood from the start by its researchers and that end-user needs are explicitly incorporated into problem formulation.
- Ways to enhance this process include forging new partnerships of researchers and end users and making the transition process a specific metric in performance evaluations.



# Findings and Recommendations for NOAA's R&D Portfolio

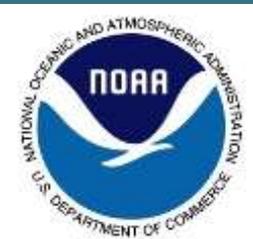


## Maintaining Critical Observation Strategies

- Although NOAA's observing systems, including ships, satellites, sensors, data networks and cutting-edge informatics are integral to the nation's science enterprise and NOAA's work on Earth observations, there is room for improvement in both effectiveness and cost-efficiency. The lack of an integrated coastal observing system is a concern.
- The Task Force did not have the resources to examine NOAA's current observing systems and how they should evolve, and the PRTF recommends that the SAB form a special task force to review existing observing capabilities, examine options for more cost-effective observations and data sharing strategies and discuss the evolving needs and sustainable approaches for new observations and technologies.



# Recommendations for Changes in the Organization and Management of R&D



## New Research Leadership

- The Task Force finds that the leadership of NOAA R&D is fragmented and warrants a stronger, more centralized approach.
- The Task Force recommends that the Chief Scientist position be replaced by a Deputy Undersecretary of Commerce for R&D who has both line and budget responsibility for the functions organized under OAR, R&D in other line offices, and the Research Council.



# Recommendations for Changes in the Organization and Management of R&D



## Consolidation of R&D Entities at NOAA

- Extant R&D efforts should be consolidated and some labs should be eliminated to cut costs so resources can be freed up for more effectively transitioning research to operations and for initiating new research activities.
- New, consolidated R&D units should be held accountable for the relationship of R&D to service, operations and stewardship activities within NOAA.



# Recommendations for Changes in the Organization and Management of R&D



## Changes in the Portfolio of the Scientific Staff

- NOAA should take steps to eliminate or redirect research that does not meet its highest strategic priorities. To do this, NOAA should increase its reliance on extramural research because it is more flexible than permanent in-house R&D staff.
- At the same time, NOAA should hire individuals with needed new research skills and expertise.
- We do not recommend that NOAA cut extramural research investments to reduce expenses because that would interfere with its ability to meet its mission and to leverage the work of its internal core science staff.



# Recommendations for Changes in the Organization and Management of R&D



## External Collaborations and Leveraging

- The NOAA research portfolio is currently too heavily weighted toward internal R&D; NOAA should increase its support of extramural research to better leverage its R&D investment with the resources of the nation's leading universities. Such leveraging could result in faster scientific advances at lower costs, particularly in new areas of research, and would provide NOAA with greater flexibility than would hiring new permanent staff to conduct research.
- External scientists should be treated like the valuable partners they are. When NOAA cut extramural programs in the past, this caused uncertainty in the scientific community about NOAA's commitment to research and led to poor relations with other agencies and the university research community.

# Recommendations for Changes in the Organization and Management of R&D



## Fostering Creativity and Excellence in Interdisciplinary Research

- To make the most of its existing talent, NOAA should promote learning and opportunities for increased interactions with universities to maintain cutting-edge interdisciplinary science. Within NOAA, a modest amount of discretionary funding could be used to create incentives for interdisciplinary research and research across line offices.
- The travel restrictions the federal government has adopted cut its scientists off from the rest of the world in ways that could seriously hinder NOAA's ability to meet its service mission in the medium and long term.
- Partnerships with other Federal science agencies and with private organizations (non-profit or corporate scientists) can stimulate NOAA's scientists and leverage their work.



# NOAA's Political Context



- Implementing priorities for R&D at NOAA is not a straightforward process. It is shaped by numerous external, administrative and political influences that result in a process often governed more by political necessity than by overall agency priorities. The budget and appropriation process, as currently organized, provides NOAA with little flexibility to change its R&D activities to implement the Next Generation Strategic Plan priorities.
- The Task Force recommends that NOAA work closely with the Commerce Department, the Office of Management and Budget, and the Congress to find ways to manage its R&D more flexibly and efficiently and to implement its new research priorities over a period of several years.
- It will be essential to have an R&D firewall in place to protect NOAA's R&D funding as the agency systematically goes through the changes recommended in this report.



# Conclusions

- In spite of considerable challenges, NOAA remains a global science leader in atmospheric and ocean systems and in translating science to service. To maintain this position, “business as usual” is not an option. Either NOAA makes thoughtful internal changes to manage its R&D, or external factors could force rapid, possibly damaging, changes on the agency.
- Budget flexibility within NOAA is needed for effective management of its complex R&D enterprise.
- A few changes stand out as the highest management priorities:
  - New top-level R&D leadership position with budget authority;
  - Investment in social science and ecosystem science;
  - Retaining a core scientific capability while consolidating institutes and centers;
  - Increasing and leveraging research by academic and government partners; and
  - Working closely with Congress, DOC, and OMB to enable NOAA to manage its R&D funds more flexibly and efficiently.



# Summary of Recommendations



1. *The PRTF recommends that NOAA develop a strong capacity in the socioeconomic and integrated ecosystem sciences and reinforce its emphasis on operations and integrated observing systems so that new knowledge can be rapidly used to benefit the nation.*
2. *The PRTF recommends that funding be reallocated from R&D in other fields of science at NOAA in order to build both an in-house capacity in the socioeconomic sciences and extramural capacity in these fields.*
3. *The PRTF recommends NOAA both bolster and concentrate its ecosystem science activities to establish the critical research capacity it needs in integrated ecosystem sciences.*
4. *The PRTF recommends that NOAA place greater emphasis on connecting research and operations in both the research to operations (R2O) direction and the operations to research (O2R) direction.*
5. *The PRTF recommends that as a way of enhancing the transitioning of research into operations/applications, NOAA forge new partnerships of researchers and end-users at the outset of projects, and continue these partnerships until the project is complete. This also applies to partnerships among NOAA personnel and university and NGO researchers through extramural programs.*



# Summary of Recommendations

6. *The PRTF recommends that NOAA make effectiveness in transitioning research to operations an explicit metric in annual performance evaluations of all NOAA scientists, laboratory and center administrators, and other relevant personnel.*
7. *The PRTF recommends that the SAB form a special task force to review existing observing capabilities, examine options for more cost-effective observation and data sharing strategies, and discuss evolving needs and sustainable approaches for new observations and technologies.*
8. *The PRTF recommends that the current Chief Scientist position be replaced by a Deputy Undersecretary of Commerce for R&D. The incumbent in this position should have both line and budget responsibility for R&D and responsibility for the functions currently organized under the OAR, research functions in other line offices, and the Research Council.*
9. *The PRTF recommends that NOAA retain a strong, productive internal scientific staff in its laboratories and centers.*
10. *The PRTF recommends that concomitant with maintaining a strong internal science staff, NOAA's many research units and groups should be consolidated to the maximum extent possible, and duplicative or low-priority enterprises eliminated.*



# Summary of Recommendations

11. *The PRTF recommends that NOAA reexamine the Cooperative Institutes in terms of their scientific focus and funding and staffing levels to insure that the CIs have sufficient support to adequately leverage NOAA's investment. This will likely mean closing some CIs and shifting the savings to the highest priority CIs as judged by alignment with strategic priorities.*
12. *The PRTF recommends that in order to initiate high priority new research and consolidate existing research, NOAA should alter its distribution of R&D funds and allocation of scientific staff within the agency.*
13. *The PRTF recommends adjusting the ratio of in-house to extramural research in a manner that allows flexibility and rapid adjustments to emerging priorities such as social science, ecosystem science, and observing systems.*
14. *The PRTF recommends that NOAA increase its support of extramural research.*
15. *The PRTF recommends that NOAA make the most of its existing talent by investing in programs for accelerated learning and professional development for its science staff.*
16. *The PRTF recommends that NOAA work closely with the Department of Commerce Department, the Office of Management and Budget, and with the Congress to find ways to manage its R&D funds more flexibly and efficiently and to implement its new research priorities over a period of several years.*
17. *The PRTF recommends that NOAA establish an R&D firewall so that as the agency systematically goes through the changes recommended in this report, R&D funding is protected. If a healthy NOAA research enterprise is not maintained, property, livelihoods, and people will unnecessarily be placed at risk.*



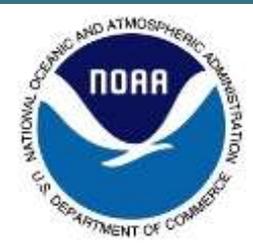
# SAB Comments and Next Steps



- The Task Force requests comments on the draft report from the SAB
- After comments are received, the Task Force will incorporate comments into the report and provide the new draft report for a 30-day public comment period.
- Members will then review the public comments, make changes as appropriate, and prepare a final report for the February 2013 teleconference of the SAB.



# Discussion



- Questions? Comments?