



Final Report of the Task Force on NEON Performance and Plans

National Science Board
Task Force on NEON Performance and Plans

NATIONAL SCIENCE BOARD

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EXECUTIVE SUMMARY

This report documents the activities and contributions of the *ad hoc* Task Force on NEON Performance and Plans (NPP). From August 2015 to May 2016, NPP provided additional Board oversight of the National Ecological Observatory Network (NEON), a Major Research Equipment and Facilities Construction (MREFC) project that the National Science Board (Board, NSB) approved in 2010. NPP's work helped the Board fulfill its fiduciary responsibility for MREFC projects and bring this important project for the biological sciences back on track.

This report describes how NSB and National Science Foundation (NSF) Senior Management partnered to address the challenges facing NEON, the Board's lessons learned, and how NPP set the stage for full Board action and catalyzed improvements to address its findings. This report and its recommendations are intended to be useful to the Committee on Programs and Plans, the Subcommittee on Facilities, to NSB, and to NSF.

It is also hoped that this final report, by memorializing the Task Force's work at a time of transition in NSB leadership, contributes in some measure to addressing one of NPP's key findings: the need to enhance documentation and transmittal of institutional memory of past Board discussions and actions pertaining to large facilities.

BACKGROUND: NPP ESTABLISHMENT AND CHARGE

In August 2015, NSF leadership provided the Committee on Programs and Plans (CPP) with an update on the status of the National Ecological Observatory Network (NEON), a Major Research Equipment and Facilities Construction (MREFC) project that began over a decade ago and whose construction the Board authorized in 2010. That update informed the Board that NSF was descoping NEON to ensure it would stay on budget and on schedule, since recent oversight activities had determined the project was on a course to be approximately \$80 million over budget and delayed by as much as 18 months. The Board was informed that the descoping plan had been developed by a panel of experts that included Biology Directorate (BIO) Program Staff, NEON Inc. staff, members of the NEON Inc. Board of Directors, representatives from NEON Inc.'s Science, Technology and Education Advisory Committee (STEAC), and science community experts involved in the original NEON design.

The August 2015 CPP discussion also surfaced significant challenges relating to reporting on the status of large facility projects and internal communication both within NSF and between NSF and the Board. Responding to the Director's urgent efforts to get the NEON project back on track and the need to address associated process and communications-related challenges, NSB Chair Dan Arvizu tasked NSB Vice Chair, Kelvin Droegemeier, with leading an *ad hoc* Task Force on NEON Performance and Plans (NPP).

The seven-member NPP Task Force was formed in late August 2015 and charged¹ to receive "frequent reports from NSF on the current performance and future plans of the entire NEON project," to "coordinate its oversight and monitoring activities with NSF leadership, other NSF Offices and Board Committees," and "assist NSF through activities not limited to reviewing and evaluating NEON-related materials, making suggestions, and posing questions." Over time, NPP took on the role of considering "NSB Lessons Learned," an activity designed to complement NSF's externally-contracted "root cause analysis." After NSF decided to seek a new management organization for NEON in December 2015, NPP played a key role in preparing the Board for the vote authorizing an award to a new management organization.

Exploration of process and communications challenges, a task originally given to SCF, was put on hold pending the outcome of NSF's "root cause analysis." A report on NSF's "root cause" analysis is anticipated at the Board's May 2016 meeting. It is the hope of the NPP Task Force that NSB will revisit these matters, and if necessary consider steps beyond those already taken, once the results of the "root cause analysis" are in hand and time-sensitive issues are addressed.

¹ See Appendix A: Charge to the NSB *ad hoc* Task Force on NEON Performance and Plans

PRINCIPAL ACTIVITIES

Between September 2015 and May 2016, NPP served as the focal point for the Board's NEON-related activities. A list of NPP's meetings is in Appendix D. Activities included:

1. Conducting regular project oversight. NPP received regular updates from NSF leadership and the NPP Chair on the latest project developments and NSF's response. It also reviewed and discussed over 60 written documents including those generated by NSF, NEON, Inc., the Office of the Inspector General, and other parties. See Appendix B and NPP meeting minutes for further details. These discussions delved into the timeline and origin of challenges, looked at NSF's management structure and roles, considered the Foundation's options, and carefully examined reports on how planned descoping could impact costs and science goals.
2. Preparing the Board following NSF's decision on December 11, 2015 to seek a new management organization for NEON. The Task Force asked questions and gathered information about potential new management organizations, selection and vetting plans, engagement of the research community, and how NSF was managing morale at NEON, Inc.
3. Exploring the Board's History with NEON and developing NSB "Lessons Learned." NPP looked at past NSB minutes, transcripts, information items, and resolutions to trace and understand the Board's oversight of this project, to determine lessons learned for NSB, and to identify possible improvements to NSB's processes. In particular, the Task Force tracked the issues raised in past Board discussions and reviewed the quality and timeliness of information presented to the Board. To assist, NSBO staff examined minutes and transcripts of NSB's NEON discussions from 2007-present and developed a chronology that looked at how discussions proceeded from one meeting to the next.
4. Helping disseminate information to the full Board and in public sessions.

FINDINGS AND OUTCOMES

The Task Force's examination of past NSB actions helped to identify several areas for improvement. Some of these have been addressed by the Director's parallel initiatives, and others are currently being addressed as NSB and the Director act on the recommendations of the jointly commissioned National Academy of Public Administration (NAPA) report *National Science Foundation: Use of Cooperative Agreements to Support Large Scale Investment in Research*.²

First, NPP found a need for more timely, decision-quality information, including advisory and external reports. The newly created committee processes and protocols for regular and timely sharing of information³ should help address some of these concerns, but NSB members also need to critically evaluate all of the information that accompanies Board actions.

Second, it became readily apparent that a need exists to more effectively promote a culture where sharing of bad news is seen as important to effective management and where bad news can without fear be brought quickly to NSF senior management and the Board. The Task Force notes that the Director has taken a number of positive steps, including through the Large Facility Office, to encourage such a culture.

Third, NPP found that NSB needs to attend to both the science and management aspects of facility projects when making award decisions. The Board's ongoing efforts to add members with management and business expertise, as recommended by the NAPA report, will help address this finding.

Fourth, NPP found that NSB could benefit from deeper understanding of how NSF uses cooperative agreements to manage large facilities. Developing this expertise within a subset of the Board, such as the Subcommittee on Facilities, would likely be most effective.

Finally, NPP found a need for greater continuity in its large facility oversight and management. Large facilities require periodic Board action over timescales of 40 or more years. However, Board members have six-year terms, and many members of NSF senior management are on four-year Intergovernmental Personnel Act (IPA) appointments. To enhance institutional memory and track facility issues over time and across NSB cohorts, NSBO is developing a précis of past NSB discussions for each large facility. These documents are becoming a routine part of the NSB lead reviewer process for action items before CPP.

Among the principal outcomes of the Foundation's work are a new Board authorization (NSB-2016-16)⁴, a new management award for NEON, plans for continued NSB monitoring and oversight of NEON, as well as a model for how NSF and NSB can jointly address a troubled facility project.

² <http://www.napawash.org/2015/1785-national-science-foundation-use-of-cooperative-agreements-to-support-large-scale-investment-in-research.html>

³ Facility Portal and Bi-monthly Facility Reports

⁴ See Appendix G

RECOMMENDATIONS

Based on our findings and our “Lessons Learned,” NPP offers the following recommendations:

Recommendation 1: *NSF and NSB should continue to explore best ways to create a culture of information sharing and to furnish NSF senior management and the Board with timely, decision-quality information, including advisory and external reports.*

Recommendation 2: *NSB should develop and maintain a précis for each large facility as a means of fostering institutional memory. Continue to make the facility précis a standard part of CPP processes to ensure that issues raised in past Board discussions are addressed.*

Recommendation 3: *NSB should continue moving toward a risk-based approach to facilities, with NSB devoting more time to oversight of projects with significant or perceived management risks. This should include attention to emerging risks. As part of developing a risk-based approach and sharing decision-quality information, ensure that facility reports to the Board and Senior Management include information on trends that speak clearly and directly to identified facility challenges.*

Recommendation 4: *Re-integrate NEON into NSB’s normal committee processes for large facility oversight and action.*

Recommendation 5: *The Board, its committees, and NSF senior management should consider and, as appropriate, address the findings and recommendations related to the pending NSF root-cause analysis.*

Recommendation 6: *In light of the extraordinary steps taken by the Foundation to get the NEON project back on track, the nominal expiration of the Board’s authorization of initial operations (NSB-13-7)⁵ in August of 2017, and the Board’s revised policy on the recompetition of major facilities (NSB-2015-46), NSF Senior Management and the Board should jointly consider the optimal time to recompetete NEON management.*

Recommendation 7: *NSF senior management and NSB should jointly consider how NSF should respond to potential significant increases in project costs or changes in scope of the NEON project.*

⁵ See Appendix F

APPENDIX A: CHARGE TO THE NSB AD HOC TASK FORCE ON NEON PERFORMANCE AND PLANS

On behalf of the National Science Board, the *ad hoc* Task Force on NEON Performance and Plans will receive frequent reports from NSF on the current performance and future plans of the entire NEON project, including NSF management activities, and NEON Inc., including NEON's management and its Board of Directors. In so doing, the Task Force will coordinate its oversight and monitoring activities with NSF leadership, other NSF Offices and Board Committees as appropriate, and report regularly to the Board, Board Chairman, Board Executive Committee, and NSF Director. The Task Force will assist NSF through activities that include but are not limited to reviewing and evaluating NEON-related materials, making suggestions, posing questions, and visiting NEON facilities and sites, including NEON Inc. corporate headquarters, as necessary. The Task Force does not serve the role of approving or denying NSF actions, or making decisions on behalf of the Board, and will exist until discharged by the Board Chair.

APPENDIX B: TIMELINE OF NEON-RELATED ACTIVITIES AUGUST 2014-PRESENT

August 2014

- NSF-NEON, Inc. agree to replan to bring project in within cost and schedule

November-December 2014

- NSF begins to think that project de-scoping may be necessary

February 2015

- CPP briefed on NEON; no reference made to project difficulties

May 2015

- NSF sends warning letters to NEON, Inc. concerning delays and cost overruns

June 2015

- NSF learns that NEON is on a trajectory to overspend by approximately \$86M

July 2015

- De-scoping plan developed by NSF, NEON, Inc., the NEON, Inc. Board, and the STEAC chair to constrain costs and ensure timely delivery
- De-scoping letter issued

August 2015

- NSB and Congress briefed on projected over-runs, de-scoping plan
- NSB decides to create NPP Task Force

September 2015

- Project moved from Biology Directorate's Central Office to the Division of Biological Infrastructure
- NPP Task Force holds initial meetings with focus on document review
- NEON, Inc. CEO fired
- General Abrahamson hired to conduct a root cause analysis
- BIO AC subcommittee begins study on descope's impact on NEON science
- NEON Inc. submits a draft efficiencies plan
- OIG issues Alert Memo
- House Science, Space, and Technology Subcommittees holds hearing
- NSF Director establishes "Watchlist" and adds NEON to it

October 2015

- NEON submits revised project planning documentation to NSF
- OIG announces inspection into NSF oversight of NEON's contingency spending
- NPP continues to review documents and holds full Board telecon

November 2015

- NSF review of project documentation continues
- Results of BIO AC subcommittee report received
- NAPA Phase II study report received
- NPP considers Board “lessons learned” and updates full Board and the public on its activities at November meeting
- Business Systems Review of NEON, Inc./ evaluation of viability

December 2015

- NEON, Inc. submits revised Total Project Cost proposal on 12/1
- NSF reviews cost reasonableness
- NSF announces intent to seek new management entity for NEON; NPP briefed that day
- NSF begins implementing process for expedited search for a new management entity

January 2016

- NSF Director makes site visit to NEON, Inc.
- NSF Senior Leadership are on site as prospective management entities visit NEON, Inc. as part of preparation of white papers
- NPP briefed on these developments in a teleconference

February 2016

- NSF receives and reviews final whitepapers and selects preferred new management entity
- NSF and NSB develop plan for Board action regarding a new management entity
- NPP provides full Board Briefing to NSB
- NPP members serve as lead reviewers for modified selection process
- NSB furnished with the full package of materials from the modified

March 2016

- NSB approves award
- NSF makes initial award to Battelle Memorial Institute to cover a 90-day transition period
- NSF receives results of cost estimate

May 2016

- NSB receives update on Battelle transition, financials, and the results of the root cause analyses

August 2016

- Approximate end of the NSB-authorized 5-year initial construction award.

August 2017

- Approximate end of the NSB-authorized 3-year initial operations award.

APPENDIX C: NSB ACTIVITIES RELATED TO NEON JULY 1999-FEBRUARY 2015

<u>Date</u>	<u>Activity</u>
July 1999	NSB briefed on NEON as part of MRE/Infrastructure discussion
June 2000	Written Information Item on NEON (<u>NSB/CPP-00-10</u>)
August 2000	CPP (<u>NSB/CPP-00-18</u>) briefing on NEON
October 2001	Resolution on NSB Major Research Equipment Priorities (<u>NSB-01-180</u>) set NEON as one of the three highest priorities in the budget.
April 2003	NSB report <i>Science and Engineering Infrastructure for the 21st Century</i> (<u>NSB-02-190</u>) cited NEON as a needed “major distributed research platform.”
March 2003	Plenary Session science presentation on NEON (<u>NSB-03-58</u>)
May 2004	NEON Summary for NSB, for CPP discussion of large facilities prioritization
March 2005	NEON included in <i>NSF Facility Plan</i> , March 2005
May 2005	NEON Summary for NSB, for CPP discussion of large facilities prioritization
March 2006	Presentation on NEON
July 2006	CSB informed of NEON rebaselining, including higher funding levels in FY 2008 and out-years
August 2006	CPP discussion of 2006 <i>NSF Facility Plan</i> and re-examination of priority order of MREFC candidates
July 2007	MREFC and R&RA Funding for NEON, data provided by Budget, Finance, and Award Management (BFA) as part of Recompetition Briefing Book for NSB
December 2007	Resolution: Organizational and Project Management Support to Complete NEON (<u>NSB-07-133</u>)
August 2008	Extensive discussions over year on MREFC oversight
August 2009	CPP Information Item: NEON – notify board in final design expect two actions in 2010
December 2009	CPP Information Item: NEON finished and passed FDR in Nov. 09; action expected in Feb. 10 for one year bridge funding prior to begin of construction

February 2010	Resolution: Award for Final Pre-Construction activities for the NEON Project (<u>NSB-10-6</u>)
May 2010	Resolution: Award for Construction of the NEON (<u>NSB-10-40</u>)
February 2011	CPP Information Item: Update on Airborne Observation Platform, NEON
July 2011	CPP Information Item: Update on NEON construction
July 2012	CPP Information Item: Update on construction, notification of O&M award in February
February 2013	Resolution: NEON Operations and Maintenance (<u>NSB-13-7</u>)
February 2014	CPP Written Information Item: Update on Construction
February 2015	CPP Information Item: Update on Science Engagement, Construction, and NSF Oversight

APPENDIX D: LIST OF NPP MEETINGS

September 4, 2015
September 11, 2015
September 17, 2015
October 3, 2015
October 28, 2015 (Full Board invited)
November 18, 2015 (Full Board present)
November 19, 2015 (Full Board present)
December 11, 2015
January 28, 2016 (Full Board invited)
February 17, 2016 (Full Board present)
May 5, 2016 (Full Board present)