

The National Ecological Observatory Network

\$0.00

The FY 2010 Budget Request does not request MREFC funds for the construction of the National Ecological Observatory Network (NEON).

Appropriated and Requested MREFC Funds for the National Ecological Observatory Network

(Dollars in Millions)

| | FY 2007 | FY 2008 | FY 2009 | FY 2010 | |
|-------------------------|----------|---------------|----------|----------|---------------|
| | | | | Request | Total |
| Regular Appropriations | \$4.00 | \$3.00 | - | - | \$7.00 |
| Rescission ¹ | -\$4.00 | - | - | - | -\$4.00 |
| ARRA | - | - | - | - | - |
| Total, NEON | - | \$3.00 | - | - | \$3.00 |

¹\$4.0 million of the FY 2007 appropriated funds for NEON were rescinded per PL 110-161.

Baseline History: In 2004 the National Research Council (NRC) evaluated the original NEON design of loosely confederated observatories and recommended that it be reshaped into a single integrated platform for regional to continental scale ecological research. Congress appropriated MREFC funding for NEON in FY 2007 and FY 2008. Project planning will continue through FY 2010; a Preliminary Design Review (PDR) is expected in June 2009 and Final Design Review (FDR) in early FY 2010. Confirmed baseline estimates for construction are anticipated during FY 2010. A formal baseline review will occur in FY 2010 as part of a Final Design Review (FDR). Assuming a successful FDR, NSF will request additional MREFC construction funding for NEON in a future budget submission.

NEON would consist of geographically distributed field and lab infrastructure networked via cybertechnology into an integrated research platform for regional to continental scale ecological research. Cutting-edge sensor networks, instrumentation, experimental infrastructure, natural history archive facilities, and remote sensing would be linked via the internet to computational, analytical, and modeling capabilities to create NEON's integrated infrastructure.

Total Obligations for NEON

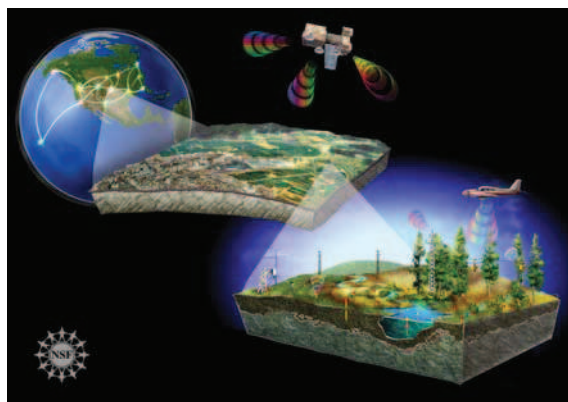
(Dollars in Millions)

| | Prior Years | FY 2008 Actual | FY 2009 Plan | FY 2010 Request | ESTIMATES | | | | |
|---------------------------------------|----------------|----------------|----------------|-----------------|----------------|---------------|---------------|----------|----------|
| | | | | | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 |
| <i>R&RA Obligations:</i> | | | | | | | | | |
| Concept & Development | \$17.75 | \$13.83 | \$13.30 | \$13.50 | \$13.73 | \$7.00 | \$3.00 | - | - |
| Management and Operations | - | - | - | - | - | - | - | - | - |
| Subtotal, R&RA Obligations | \$17.75 | \$13.83 | \$13.30 | \$13.50 | \$13.73 | \$7.00 | \$3.00 | - | - |
| <i>MREFC Obligations:</i> | | | | | | | | | |
| Implementation | - | - | - | - | - | - | - | - | - |
| Subtotal, MREFC Obligations | - | - | - | - | - | - | - | - | - |
| Total: NEON Obligations | \$17.75 | \$13.83 | \$13.30 | \$13.50 | \$13.73 | \$7.00 | \$3.00 | - | - |

Totals may not add due to rounding.

Since NSF supports 63 percent of the fundamental environmental biology research at U.S. academic institutions, advances in the field of ecology and the infrastructure to enable those advances depend largely on support from NSF. Current research infrastructure is inadequate to enable studies to address the complex phenomena driving ecological change in real time and at the scales appropriate for studying many grand challenge questions in ecology. As a continent-wide research instrument, NEON will support a large and diverse group of organizations and individuals; foremost are the scientists, educators, and engineers who will use NEON infrastructure in their research and educational programs. A NEON cyberinfrastructure gateway will provide resources to support formal and informal public education and provide opportunities for citizens to participate in scientific investigations. Data from standard measurements made using NEON will be publicly available.

Coordination with other federal agencies occurs through the NEON Federal Agency Coordinating Committee. A Memorandum of Understanding (MOU) between NSF and the U.S. Geological Survey (USGS) will facilitate the sharing of satellite remotely sensed data, in-situ verification, and archival storage of NEON aerial remote sensing data by USGS. NEON infrastructure deployment sites are located on USDA Forest Service, USDA Agricultural Research Site, Bureau of Land Management, and National Park Service lands. These agencies are cooperating agencies on the NSF (Lead Agency) environmental assessment. Discussions about collaboration have also taken place between NSF and several other federal agencies, including: Department of Energy (DOE), National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA). In addition, the Jet Propulsion Laboratory (JPL) is designing the hyperspectral sensor for the NEON airborne observation platform.



NEON will be a collaborative research platform of geographically distributed infrastructure connected via the latest information technology. By combining in-situ sensing with remote sensing observations, NEON will address pressing environmental questions on regional to continental scales. *Credit: NSF.*

Private organizations, e.g., the Heinz Center, Nature Serve, and the Science and Engineering Alliance, participated in the NEON design and development activities. While the bulk of NEON's infrastructure and instrumentation will be "commercial off the shelf", NEON's scientific and networking design requires certain technological innovations. Consequently, BIO is providing funds for advanced R&D activities in the areas of sensors and cyberinfrastructure.

Project Report:

Management and Oversight:

- **NSF Structure:** The NEON Program is managed in the Office of the Assistant Director (OAD) as part of Emerging Frontiers. OAD/BIO provides overall policy guidance and oversight, and the location of the NEON program in Emerging Frontiers fosters its interdisciplinary science connections. The NEON program is managed by a dedicated program officer. A business oversight team chaired by the NEON program officer advises and assists with the business framework of the project. A BIO-NEON committee, which includes the Deputy Director for Large Facility Projects in the Office of Budget, Finance and Award Management (BFA), and a cross-NSF Program Advisory Team (PAT) formulates program planning for NEON. The NEON program officer is the COTR for the NEON environmental assessment and is assisted by the NEON Environmental Assessment Team (EA) that

provides technical advice on environmental assessment, NEPA compliance, and NSF environmental policy.

- **External Structure:** The NEON Project is funded through cooperative agreements with NEON, Inc. The NEON, Inc.'s CEO provides overall leadership and management. A project manager at NEON, Inc. oversees all aspects of the project design, review, construction, and deployment. The NEON, Inc.'s director of computing is responsible for oversight of the cyberinfrastructure and embedded sensor development. The NEON, Inc. Board of Directors, a Science, Technology, and Education Advisory Committee (STEAC) and a Program Advisory Committee (PAC), composed of members of the NEON user community, help ensure that NEON will enable frontier research and education.
- **Reviews:**
 - **Technical reviews:** The NEON Observatory Design (including site selection and deployment design) Review was successfully completed in February 2009.
 - **Management, Cost, and Schedule reviews:**
 - The Conceptual Design Review (CDR) was held in November 2006.
 - A combined PDR/ FDR of the airborne observation platform was successfully completed in February 2009.
 - A PDR for entire project will be held in June 2009.
 - An FDR is scheduled for the first quarter of FY 2010.

Current Project Status:

The NEON, Inc. Project Office is currently completing the final design, NEON project execution plan (PEP), and maintenance and operations plan. The site selection and associated deployment plan is complete and has been merit reviewed. The NEPA environmental assessment is underway through an NSF contract with CH2 M Hill. In FY 2010 the final design and baseline, scope, schedule, and the risk-adjusted cost will be reviewed. Sufficient contingency will be built into the project design and budget to cover known risks.

Cost and Schedule:

Prior to certification of construction-readiness following a final baseline review, support is requested through the R&RA account for the NEON Project Office, for the NEON, Inc. Consortium that is the implementing organization for the project, and for ongoing R&D projects. The appropriated FY 2008 MREFC funds will continue to be carried over. In FY 2010, based on the outcome of the FDR and approval of a construction award by the NSB, these MREFC funds will be used to begin construction of a Fundamental Instrumentation Unit and embedded cyberinfrastructure in one NEON domain core site. Additional MREFC construction funding will be requested in a future budget submission.

Risks:

- **Technical:** Dependence on commercial off-the-shelf technology will be mitigated by long-lead purchase orders and alternative vendors. Production quality, embedded and system-level cyberinfrastructure (CI) will be addressed by a combination of "In-house" design, commercial, contracts, and targeted research (e.g., cyber-dashboard).
- **Deployment:** Environmental assessment and permitting may impact schedule and costs. These risks are being addressed through the direct contracting of the environmental assessment by NSF. In

addition two national firms have been hired by NEON, Inc. for engineering and permitting, NEON, Inc. has alternative sites if the primary sites have significant risk, the US Forest Service allocated two FTEs to assist with environmental compliance issues on Forest Service lands, and local scientists are involved in site selection and analysis.

- Remote Sensing: A potential risk is the long-term availability of satellite (e.g., LANDSAT and MODIS) borne sensors. This risk is mitigated through a partnership with the USGS EROS Data Center that has the federal responsibility for curation and management of LANDSAT and MODIS images and having alternative satellite sensor sources to purchase images (e.g., SPOT - France, AWIFS – India, Terra and Aqua - US). The proposed NEON airborne observatory platform sensor system design and aircraft availability provide technical and implementation risk. To minimize this risk the design is being developed by JPL; similar instrument packages are being prototyped by NASA and Carnegie Mellon Institute at Berkley University. The designed sensor system fits multiple aircraft, including commercial aircraft. Experienced flight design engineers from Conklin & de Decker Aviation Company are contracted by NEON, Inc. to provide the baseline operations plans, aircraft analysis, and assessment of commercial companies that could support NEON flight operations and experienced research aircraft pilots serve on the design team.

Future Operations Costs

Management and operations costs are being finalized and will be reviewed at the PDR and subsequent FDR. NEON is reliant on sensors and cyberinfrastructure that have a defined lifecycle. Operations costs include scheduled replacement and refreshing of sensor, instrumentation and cyberinfrastructure technology.