

From: <Twombly>, Saran <stwombly@nsf.gov>
Date: Tuesday, June 9, 2015 8:47 AM
To: David Foster <drfoster@fas.harvard.edu>
Subject: Harvard Forest LTER mid-term review report

Dear Dr. Foster,

On behalf of NSF and the review team, I thank you and the entire Harvard Forest LTER staff for your hospitality, well-orchestrated field tours, and informative presentations during the recent mid-term review. We all appreciated and were impressed by the staff, students, and researchers who participated in the review and by your collective efforts to provide an informative and engaging visit. I particularly appreciated your efficient use of time, focusing on key components of the current award rather than attempting to present the entire range of current LTER research.

The report of the site review team is attached. It provides a thorough evaluation of the progress the Harvard Forest LTER project has made on activities proposed in 2012. It also includes recommendations for your consideration over the coming three years. Because the time available for the review of your project was limited, the review team and I may have missed important details or misinterpreted some of the information provided. You may, but are not required to, respond to the report or to comments in this cover letter. If you wish to respond, we ask that you do so within 60 days. Your response should highlight any misinterpretations in the report or cover letter along with constructive responses to the recommendations provided. The mid-term report, this cover letter, and any response you choose to make will become part of the award record. The text of the report will not be provided to panelists for the next review, but the nature of any concerns or recommendations will be communicated by Program Directors as appropriate.

The 2015 review team was very supportive of all aspects of your ongoing research, and NSF agrees with the strengths they highlight. We were uniformly enthusiastic about the innovative approaches you are implementing to link long-term data and experiments with models using the scenarios framework, which fully integrates ecological research with outreach and education. This is one of several innovations that derive from outstanding intellectual leadership by a relatively small group of internationally recognized ecologists. Ongoing research significantly advances the fields of landscape ecology and biogeochemistry, among others, and continues to provide new insights into major ecological processes that are important across biomes. The team recognized important contributions that Harvard University makes to this research. The relationships among Harvard University, the Harvard Forest, and LTER research are clearly of mutual benefit. Harvard support is critical to new pursuits, interdisciplinarity, and information management, all of which are ingredients of success; this investment is repaid by research that has garnered international recognition, and the close alignment of Harvard Forest with LTER research has translated into national and international acclaim in ecological research, teaching, and outreach. We appreciate your creative additions to core LTER research areas, particularly research on soil warming and hemlock wooly adelgid invasion.

We were similarly impressed with the ways in which the Harvard Forest LTER has broadened the impacts of your research. The Schoolyard program comprises K-12 activities that are used across the region, generate data relevant to Harvard Forest research, and provide teachers the skills and the means to visualize data. The team's recommendation that these activities be expanded to include data synthesis is valuable; such synthesis

could enhance teachers' engagement and show students how their data compare with data collected in other years across the region. Your successful REU program also falls at the intersection of research and education. Participants contribute significantly to core LTER data; the program develops the next generation of researchers with skills in teamwork, data analysis, statistical methods, synthesis, and modeling; and recruitment to the program, while highly competitive, targets students from non-traditional institutions. Graduate student contributions to research are strong, even though many of them come from institutions other than Harvard. We all learned a lot about the different model for graduate student support at Harvard University; NSF views the review team's recommendation concerning graduate student involvement as fairly minor and understandable given the constraints at play. Information management at Harvard Forest is, quite simply, excellent.

The report makes two primary recommendations: First, that the landscape scenarios process and its integration of scientific data be described more completely in the future; and second, that Harvard Forest researchers pay close attention to incorporating and communicating uncertainty as a key component of the scenarios modeling. I am confident that you and your colleagues will incorporate these recommendations as appropriate.

NSF recognizes several of the review team's recommendations as valuable, but does not view them as critical to your success over the coming three years. My comments below expand on strengths of the Harvard Forest LTER. From a programmatic perspective, the Harvard Forest LTER has made major contributions to ecological theory, manipulative field experiments, data synthesis, and modeling. These have added value because they extend beyond a particular biome or ecosystem type to reveal how organisms interact in and with an ever-shifting landscape. Human contributions to this shifting landscape are essential. Your ability to shift research foci across funding cycles, highlighting different components of the Harvard Forest LTER research, adds dynamism and flexibility to a long-term research program. Use of landscape scenarios as synthesis tools in LTER V is a strong example of developing new frameworks within which to synthesize and evaluate long-term data. In this way, a very diverse research portfolio that ranges from paleo reconstructions to moose herbivory advances without becoming diffuse or unfocused.

NSF shares the review team's enthusiasm for using landscape scenarios as integrative tools that incorporate uncertainties and scientific data with human decisions. This is a creative mechanism to identify new research questions and to tap new sources of knowledge. Landscape scenarios integrate citizens, stakeholders, teachers, policy makers, and society with research in unparalleled ways. It is hard to imagine a clearer way to communicate societal benefits than to show how human decisions about land use will influence the future. The team's report is short on its discussion of scenarios. NSF considers this approach a transparent translation of scientific research into societal consequences that should be a model across LTER projects.

NSF appreciates Harvard University's generous support of Harvard Forest LTER research. Your success may not have occurred with LTER support alone, or with Harvard support alone, but has resulted from shared goals, vision, and focus. In response, the Harvard Forest LTER adds a unique feather to the University's cap through the international prominence your ecological research has earned. The Harvard Forest is an ideal place for Harvard to showcase interdisciplinary research and to advance its reputation in the fields of ecology and ecosystem studies. Similar complementarity exists between Harvard Forest's mission and the Harvard Forest LTER project. These two have moved forward in concert over the past three decades, and have derived

strength from each other.

These synergies underscore the importance of pending leadership changes. LTER research has thrived for its close alignment with Harvard Forest's focus on landscape transformation - not surprisingly, given that you lead both. NSF encourages a leadership transition of the LTER project early in LTER VI, while you are still active in research and available to provide advice and mentoring. This overlap will ensure continued strength and growth of LTER research. NSF also understands that you plan to step aside as Director of the Harvard Forest in the next decade, a change that will influence the future of the Harvard Forest LTER. NSF encourages plans to appoint an Assistant Director who might assume the Directorship when you step down. Your ability to oversee a transition in the LTER leadership and to work with an Assistant Director to ease transition at the Harvard Forest promises continuity of mission, vision, and management. Should a single individual continue to fill these two key positions? From our perspective, that would be ideal, provided that the right individual were chosen. NSF appreciates that your responsibilities could be shared between two individuals with a similar vision for the Harvard Forest, who can work together to realize this vision, and who will maintain the scientific prominence you have worked so continuously to achieve. The leadership transitions are critical, and we appreciate the care with which you approach them.

My comments are offered to support your highly successful LTER project over the next three years. NSF's concludes that you are making impressive progress toward understanding the interactive effects of climate change, biological processes, and human land-use on ecosystem dynamics, processes, and the services they provide. This progress includes innovative ways to integrate research, education, community involvement, and information management that serve as a model for the entire LTER program.

My thanks to you and your colleagues again for a productive mid-term review. Please let me know if you wish to discuss any aspect of the report or my cover letter.

Regards,
Saran

Saran Twombly, Program Director Population and Community Ecology Division of Environmental Biology,
National Science Foundation, 4201 Wilson Boulevard, Suite 635, Arlington, VA 22230. 703.292.8133 (voice);
703.292.9064 (fax)