REPORT OF THE SITE REVIEW COMMITTEE

FOR THE LTER NETWORK OFFICE

May 8, 2000

Summary

The site review committee (SRC) met in Albuquerque, NM on May 8, 2000, at the request of the National Science Foundation (NSF) to review the activities of the Long-Term Ecological Research (LTER) Network Office (NET). The purpose of this review is to provide feedback to NET administration and personnel regarding activities for the past three years since the start of the award from NSF, which funds the NET.

The purpose of the NET is to support, facilitate, and enhance the research, information dissemination, and outreach activities developed by the LTER Coordinating and Executive Committees. In addition, the NET plays a leadership role in developing and implementing data and information management standards, and protocols for the NET as well as the broader community of ecological scientists.

The following report summarizes the comments of the SRC following an analysis of the web page, documents, and the day-and-a-half-long presentation by NET staff. The comments are divided in to five major areas corresponding to NET activities (1) Publications, (2) Information Management, (3) New Technology, (4) Interactions, and (5) Office Operations.

The SRC unanimously recognizes the impressive list of accomplishments by the NET. NET personnel are dedicated and hard working, and clearly are national and international leaders in promoting the LTER network and management of ecological data. The SRC also recognizes the unique and potentially delicate position of the NET because of the nature of its two primary and potentially conflicting roles; the NET must be responsive to the LTER Network and the Coordinating and Executive Committees while also providing leadership in promoting Network level activities. As a result, the NET is often in a reactive rather than proactive mode as it responds to the needs or requests of the Network. This can give the impression that priorities are not being set by the NET. The need for the LTER Network and the NET to establish clear priorities was noted by the LTER National Advisory Board in their 1998 report of the review of the LTER Network. The SRC believes that the NET Executive Director has the opportunity to balance these conflicting roles of the NET by actively assuming a proactive stance in working with the Coordinating and Executive Committees. **The SRC strongly recommends that the NET Executive Director, working with the LTER Executive Committee, establish a clear set of goals to be achieved by the deadline for the submission of the NET renewal proposal**

to NSF. The need to establish priorities is a recurring theme in our review of specific NET functions.

In encouraging the NET to become less reactive and more proactive, the SRC does not want to discourage the NET from taking on special projects such as new publications, new technologies, or interactions with other organizations, as they arise that clearly meet a need or can fulfill the NET's leadership role. Clearly, a balance is required in order to take advantage of serendipitous activities without having these activities overwhelm the priorities of the NET. **The SRC recommends that the Executive Director working in consultation with NET staff and the LTER Executive Committee establish a clear set of guidelines to be used in determining which projects to take on that fall outside a formal list of NET priorities.**

A significant responsibility falls on the LTER Network to help the NET fulfill its dual functions of leadership and support in the LTER Network. As noted below, for example the ability of the NET to fulfill its leadership and support role in Information Management can not be met without the full cooperation of the network of LTER sites. The SRC notes, in particular, the lack of any formal mechanism for evaluating or providing feedback to the NET. Absence of such feedback necessarily makes our review of the NET incomplete. **We strongly encourage such a mechanism to be established and in operation well in advance of the submission of the NET renewal proposal.**

Publications

The NET should be commended for its involvement in the myriad projects designed to promote the NET's sites and activities. The SRC would like to acknowledge the NET's website in both its design and its broad reach to the LTER community and the scientific community in general. In addition, the SRC made special note of the Publication Specialist's efforts in disseminating information and facilitating communications within and outside of the LTER.

The SRC felt that the area for improvement with data dissemination lies in the need for a prioritized plan for publications over a set period of time. As mentioned in the Summary, it appeared to the SRC that many of the publication projects centered around a reactive stance rather than a proactive one. The SRC feels that a prioritized plan would help maintain a focus for data dissemination activities.

Included in this publications plan should be approximated time constraints for the duration of each project and the necessary personnel hours to complete each project. (Staffing concerns in the publications area are discussed further in the Office Operations section.) A line-item for "special projects" could be written into the plan so that the NET has the freedom to take on unforeseeable projects, which appear to arise regularly. The NET's Executive Director in collaboration with the Chair of the Publications Committee should develop this plan and set the priorities.

The SRC discussed the merits of a few particular projects, specifically:

- Although an important project in its own right, the "History of Ecology" series (video of oral histories of leading ecologists) was considered by the SRC to fall outside the primary mission of the NET and to be a low priority item as compared to the other publications projects;

- The NET should continue to distribute its newsletter, *The Network News*, in both electronic and hardcopy formats;

- It is important to continue the hardcopy format of the personnel directory, at least in limited copies for interested parties.

Information Management

The NET Information Management office has primary responsibility for addressing the following goals of environmental data management:

1. Identifying the needs, capabilities, and limits of the participants

2. Development of and adherence to appropriate data collection protocols

3. Development and implementation of procedures for data quality assurance and quality control (QA/QC)

4. Development of and adherence to guidelines for metadata and system documentation, and

5. Development and maintenance of an information dissemination hub.

The NET Information Management office should be recognized for its past and ongoing leadership efforts in promoting environmental data management and providing access to data collected under the LTER program. The SRC recommends that the NET, in conjunction with the Coordinating Committee and the Data Management Committee, should examine their objectives for facilitating environmental data management and promoting data sharing and access, and prioritize activities to ensure that the stated goals are met. The following specific comments are provided to address identified strengths and weaknesses of the NET in meeting the stated goals.

1. Identifying the needs, capabilities, and limits of the participants:

The NET is responsible for identifying the hardware, software, communications, and personnel needs of LTER sites in support of site-level data management and in support of network-wide initiatives. Although no evidence of a completed user-needs assessment was presented, there is supporting evidence to suggest that the NET is adequately working with sites to ensure that the necessary hardware, software, and communications capabilities exist at each site to allow for on-site data management and connectivity with the NET. The definition of "site" should be clarified. It is unclear whether site is consistently defined as the field site (e.g., Sapelo Island) or the host site for the LTER (e.g.,

University of Georgia).

The NET has implemented a number of solid mechanisms for promoting discussion and facilitating interaction between the NET and individual sites as related to the status of data management activities. These include an annual data managers' meeting, listservs with an emphasis on data management issues, and supporting email and telephone technical support. The NET is encouraged to utilize the Data Management Committee and the Coordinating Committee to keep abreast of site-level capabilities and needs. Further, the NET should review their plans for providing both off-site and on-site technical assistance and ensure adequate resources are available to provide such services.

2.   Development of and adherence to appropriate data collection protocols:

From both an ecological science and resource management perspective, a major strength of the LTER program is the development and management of long-term environmental data sets. At a minimum, these data sets can provide for the analysis of long-term trends and short-term variability of environmental conditions. With an adequate level of standardization these data sets can also facilitate comparative studies of physiographic influences and anthropogenic impacts across ecosystems. Standardization of data collection procedures across multiple, independent sites each with a differing set of environmental landscapes and research foci is a daunting task. Both the NET and the 1998 National Advisory Board (NAB) report have recognized the need for and importance of the development of standardized procedures for cross-site data collection. Recognizing the inherent differences in individual LTER data collection efforts, the SRC strongly encourages the NET to promote the importance and development of standards for data collection. In order to provide LTER cross-site comparisons and to maximize the utility of these data to researchers and resource managers outside of LTER, at least a minimal level of standard data collection protocols must be developed and adopted. This will not be an easy task, but as pointed out in the NAB report, the NET "… does not have the luxury of ignoring data-sharing responsibilities."

Related to the issue of data collection protocol development is the establishment of a plan for future coordinated system-wide data collection efforts. To the greatest extent feasible, the NET is encouraged to work with the Coordinating Committee and the Data Management Committee to promote the development of a long-term system-wide data collection plan. Ecological science and resource management, rather than technology, should drive the data collection efforts.

3.   Development and implementation of procedures for data quality assurance and quality control (QA/QC):

Currently, individual LTER sites are responsible for the development of and adherence to procedures for QA/QC. There does not appear to be system-wide guidelines or requirements for data QA/QC. As stated in the NAB report, if LTER, through the NET, is to promote the use of collected environmental data "within the LTER community and beyond" guidelines for data "QA/QC must be established and promulgated throughout the system." The NET is strongly encouraged to work with the Coordinating Committee and the Data Management Committee to implement measures at both the site- and NET-level that will ensure the quality of data and metadata made available by the LTER program.

4.   Development of and adherence to guidelines for metadata and system documentation:

LTER and the NET have clearly taken a leadership role in promoting the importance of metadata to ensure the short-term and long-term usability of environmental datasets. This is by no means a small accomplishment on the part of the NET, and their efforts should be recognized. The NET is encouraged to continue as both a model and an advocate for requiring metadata development for all LTER-sponsored data collection efforts. Recognizing the potential limitations of developing system-wide data collection and data QA/QC protocol, the preparation of high-quality metadata is of absolute importance. Metadata should comply with accepted standards (e.g., FGDC) for data documentation.

5. *Development and maintenance of an information dissemination hub:*

On a system-wide basis, the NET has demonstrated leadership in promoting the use of the World Wide Web as a means of disseminating data, metadata, and related informational products. These efforts have focused not only on meeting the needs of LTER researchers, but also on supporting data and information dissemination to broader audiences of researchers, resource managers, education institutions (K-12 and above), and the general public. The NET is encouraged to continue these efforts, with a primary focus on ensuring widespread access to high quality environmental data and associated metadata.

New Technology

An important leadership activity of the NET is the promotion and dissemination of new technologies relevant to long-term ecological research throughout the Network. The narrative of the original University of New Mexico proposal to NSF focused on remote sensing and GIS, although other technologies such as visual modeling and molecular and microbial techniques were also mentioned. The annual reports for 1997, 1998, and 1999 mainly discussed remote sensing and GIS, plus initiatives with the San Diego Super Computer Center (SDSC). The 1999 report also presented new video systems on the web. A survey of LTER sites regarding their use of new technologies in microbial ecology applications was also reported in 1999.

The presentation by NET personnel to the SRC focused on remote sensing. It is clear that remote sensing does and will play an important role in the LTER program. The NET initiatives to explore new remote sensing data products and to provide standardized remote sensing data for the sites are commendable. The original proposal, however, indicated a broader scope of 'new technologies' including microbial ecology. Although the links with Center for Microbial Ecology have not developed yet as originally planned, perhaps this will occur during the next three years of the award. It may be appropriate during this time to revisit the scope of the new technology thrust to bring the actual scope in line with the planned.

Whatever the final scope of the new technology thrust, we must be careful to avoid having a technology looking for an application rather than a defined research need that directs selection of a technology to meet that need. It is critical, therefore, that there is a strong and ongoing dialog between the technology leaders in the NET and the site scientists and support teams. The forum for this communication is the Technology subcommittee of the Coordinating Committee. The Committee has not been active until a recent meeting, which produced a listing of several technology areas, but the areas were not prioritized. The SRC has two concerns. First, the makeup of the Committee appears to be site data managers and remote sensing scientists. It was not clear how the broader research needs of the LTER community were being brought to the committee. Second, it was not clear how these research needs and their technologies were to be prioritized and selected.

The SRC recommends that the composition and role of the Technology Committee be reviewed and strengthened to ensure that there is a defined process whereby the research needs of the LTER scientists are brought to the NET and translated into technology requirements and matched against new technology opportunities. An assessment should be made of the feasibility and effort level required to evaluate and implement the technology, and prioritized against the other research/technology needs and opportunities. A choice would then be made on which projects to pursue. The scope of this process should be based on the results of the reappraisal recommended in the previous paragraph, and should include but not be limited to remote sensing and GIS.

While the NET must respond to the stated needs of the LTER sites, the NET must also play a leadership role in promoting new technology and opportunities that may not be articulated through the science-driven technology evaluation described above. There are several ways in which new technology can be brought forward. The formalized process above should be balanced with opportunistic stimulation of new ideas that may originate from individual PI's or the NET. The NET must develop a balanced mix, such that the NET is responding directly to immediate science needs, while also free to explore and develop new initiatives.

Interactions

The NET has developed an impressive set of interactions with groups outside the LTER Network, including the Organization of Biological Field Stations (OBFS) and the International LTER (ILTER). It is clear that the NET will continue to be sought out by other organizations for the expertise that the NET can provide in such interactions. With that in mind the NET should have clearly established guidelines that are used to decide which interactions to pursue and which to resist. For example, the SRC thinks the NET should be very careful in investing much effort in the "History of Ecology" series as it is not clear how this video falls within the mission of the NET. Additionally, although it is likely that the LTER Network will be involved to some extent in the upcoming NSF initiative, NEON, the NET should think very hard before assuming a significant role in this activity. Finally, in the original proposal the NET proposed to establish interactions with the Santa Fe Institute and the Center for Microbial Ecology. The interactions have not developed as planned, which may be appropriate given other interactions that have developed. The NET should reevaluate the desirability of pursuing the interactions between these two entities as originally proposed especially in light of the guidelines to be established.

The SRC was particularly impressed with the role of the NET in promoting the development of the ILTER. This has been a tremendous contribution to the science of ecology and global sustainability, while also enhancing the role of the LTER Network. The NET must resist becoming the ILTER Network Office, and the SRC was pleased to hear that individuals from other countries are assuming leadership roles in the expansion and regionalization of the ILTER. Nevertheless, we are concerned about the future of this activity given the departure of NSF Program Officer, Christine French, from the NET, and her return to NSF. Who will take up the duties that she has performed so well? If NSF believes that the development of the ILTER is an important component of the NET mission, it should provide additional resources to the NET (e.g., personnel or funding) to ensure the NET's core activities are not diminished.

To paraphrase the National Advisory Board 1998 review of the LTER Network, the NET is in danger of becoming a victim of its own success. Given its expertise, many groups will contact the NET for advice and support and this could endanger the NET's ability to achieve its primary mission. It is imperative that the NET be given the support needed to resist some calls for its assistance. NSF can play a role here by not overloading the NET with referrals and travel requests.

Office Operations

The SRC recognizes and commends the University of New Mexico for its continuing support of NET personnel and facilities. The SRC noted with approval plans to move the NET office to a site on main campus. This move will achieve a significant objective outlined in the NET proposal, which was to provide enhanced opportunities for interdisciplinary activities.

As has been stated previously, an overarching concern of the SRC is related to the need for the NET to set priorities. The Executive Director should immediately draft a set of guidelines based upon the goals in the proposal to NSF that could be used to set priorities among existing office activities and new opportunities. This should be done at the staff level and then refined with NSF and the Coordinating Committee. Our concern with an apparent lack of criteria to set priorities is not ours alone. The National Advisory Board raised a similar concern in their 1998 report. The NAB indicated that the NET should "consciously set priorities for its commitment of time and resources." In May of 2000, this task remains to be accomplished, and hence our call for immediate action.

As part of the process of developing guidelines, the NET should develop a mission statement that articulates the vision of the office as well as describes NET functions and responsibilities. The Governance structure of the LTER should be clearly articulated especially as to interactions with the NET.

The SRC was impressed with the expertise of the NET staff and noted an impressive list of accomplishments. We note, however, our concern about the burgeoning workload for current staff. Establishing the guidelines mentioned above should help to set priorities related to staffing needs. The SRC noted that:

· In the near future, international activities will lose staff detailed from NSF. The ILTER has also benefited from the publications, information management, and administrative staff. The ILTER staff from NSF should be replaced and the NET should not hesitate to request additional staff support as new activities are undertaken.

· Administrative staff is responsible for accounting and general administrative tasks as well as responding to information requests and assisting with committee logistics. It appears that one staff person perhaps with a work-study student could carry out accounting and general administrative functions. The SRC encourages the NET to keep close track of this situation.

· The publications staff of two is responsible for a growing set of activities. The priority setting mentioned above should assist in choice of activities.

Extra funds for staffing can be used for work-study students or part time efforts if a full time position is not developed. As priorities are established, such extra hands can be used to develop office activities beyond those related to technology and database management.

Respectfully submitted,

Taber D. Allison, Director, Rocky Mountain Biological Lab

Mary Barber, Director, Sustainable Biosphere Initiative, Ecological Society of America

Carolyn G. Chapman, Managing Editor, *The American Naturalist*

Dwayne Porter, Dept. of Environmental Health Sciences and the Baruch Institute, University of South Carolina

T. H. Lee Williams, Vice-President for Research and Graduate Dean, University of Oklahoma