TABLE OF EXTERNAL EVALUATIONS

The Table on the following pages provides information on program assessments and evaluations other than Committee of Visitor and Advisory Committee assessments.

The Table lists other types of evaluations, not used in GPRA performance assessment, that were completed in FY 2005. These reports, studies, and evaluations are frequently used in setting new priorities in a field or in documenting progress in a particular area. The reader is encouraged to review the reports for additional information on findings and recommendations that are beyond the scope of this report.

Reports (other than COV reports) produced by NSF are available online at http://www.nsf.gov/pubs/start.htm using the NSF's online document system and the publication number indicated.

Information on obtaining reports produced by the National Research Council or National Academy of Sciences can be found online by searching www.nap.edu or from the National Academy Press, 2101 Constitution Avenue, N.W., Lockbox 285, Washington, D.C. 20055 (1.800.642.6242).

Evaluations Completed in FY 2005	
	Directorate for Biological Sciences (BIO)
Report of a Workshop, "Education and Recruitment into the Biological Sciences: Potential Role of Field Station and Marine Laboratories"	**Findings** A group of researchers and educators convened at the NSF, and examined the potential role of Field Stations and Marine Laboratories (FSMLs) in improving education and recruitment into the biological sciences. From the standpoint of education, important features of FSMLs include: (1) Long-term research efforts that facilitate repeated teacher, student involvement; (2) Experiential learning opportunities which are ideal for self-defined question-driven learning; (3) Well-developed organizations (Organization for Biological Field Stations, National Association of Marine Laboratories) that provide effective mechanisms for sharing successful learning and recruitment models; (4) Broad geographical distribution, with many close enough to urban/suburban areas to provide opportunities for community interaction/involvement; and (5) Access, in some cases, to areas of unusual beauty or scientific interest that can stimulate the curiosity of students and researchers. **Recommendations:** 1) Initial exposure to inquiry investigation in field biology needs to begin early and be continued in order to improve the recruitment of underrepresented minorities into ecology and other field biology disciplines. 2) To facilitate field experiences for students at community colleges, linkages between FSMLs and community college faculty and students must be improved. 3) Partnerships between FSMLs and minority serving institutions should be considered. 4) FSMLs need to develop new, innovative undergraduate courses that integrate molecular and organismal biology, and that take account of the total environment in which organisms live. This can best be done through inquiry based learning in the organisms natural environment. The Course, Curriculum and Laboratory Improvement Program at NSF is particularly suited for the development of such courses/programs. Additionally, professional development opportunities for teachers, undergraduate faculty, and administrators could facilitate the development of such courses and curricula. 5) The Research Experiences for Undergraduates Program could be diversified to include: the development of pre-REU programs that allow for increasing amount of background preparation prior to getting into a research environment; a new type of REU or IGERT-like program that combines the intense coursework characteristic of a FSML course with field research experience; and greater emphasis on the undergraduate/ graduate student interactions as a way of providing both groups with positive education opportunities. 6) Expansion of the planning grant use guidelines in the NSF FSML infrastructure and facilities program. 7) NSF should consider a competition for funding of education programs and coordination at FSMLs. As part of this, consideration could be given to establishing consortia of field stations with a shared education coordinator. 8) A detailed survey of the current education programs at all FSMLs is required. 9) Common evaluation instruments need to be developed for use at all FSMLs. The existing infrastructure of OBFS and NAML provide a means for the development and testing of such instruments. **Availability:** http://www.obfs.org/ed/

Integrative Developmental Biology Workshop Report	**Findings**: A deep understanding of development, arguably the most complex problem in all of biology, will require research programs that integrate molecular, cellular and physiological approaches. There are three challenges in building research programs that integrate genetic and physiological approaches: (1) raising awareness and interest in such integrative approaches; (2) facilitating the transfer of technology, expertise, and information among scientists belonging to traditionally separate research communities; and (3) establishing sources of financial support for research and for graduate and post-doctoral training. **Recommendations:** As a first step towards reaching these goals, recommendations include: (1) publication of review articles that articulate a vision for Integrative Developmental Biology, (2) a series of symposia at national conferences that focus attention on Integrative Developmental Biology within the disparate communities that contribute to it, and (3) creation of a "cyber community that provides a forum for exchanging ideas and should also develop a database of willing expert advisors (and potential collaborators) who can help investigators incorporate new approaches in their research program. In the longer term, it will be important to provide financial and logistic support for research and training. As Integrative Developmental Biology grows and matures as a field, it is anticipated that the disciplinary programs at NSF will likewise grow and adapt to accommodate the new opportunities for research and scholarship in this changing field. For the immediate future recommendations include: (1) Establishing a program to support post-doctoral training in interdisciplinary research by young investigators. These postdoctoral fellows can then act as bridges between more traditionally-oriented laboratories. (2) Establishing a program of mid-career sabbaticals for established investigators who want to develop a more integrative or synthetic research program and need to gain expertise with relevant methods of analysis. **Availability:** http://www.nsf.gov/pubs/reports/idbwsreport.pdf
Frontiers in Evolutionary Biology (Report of a Workshop prepared for the National Science Foundation March 2005)	**Findings:** The workshop had four specific goals: to identify emerging tools essential to evolutionary research; to identify and illustrate research themes of particular promise; to summarize major institutional resources available to support evolutionary research; and to suggest infrastructural needs and opportunities for enabling the next generation of advances in our understanding of evolution. **Recommendations:** Advances in phenotypic analysis, e.g., high-throughput, high-precision techniques for measurement of characteristics in large numbers of individuals in both the field and in controlled laboratory environments, are needed. Also, NEON, and additional genomic resources, and analytical resources (databases and computational tools). **Availability:** this report is available from the Division of Environmental Biosciences in the Directorate for Biological Sciences.

Review of the Joint National Institutes of Health / National Science Foundation Ecology of Infectious Disease Program, July 18th-20th, 2005	**Findings:** Since 1999, the Ecology of Infectious Diseases (EID) initiative has been a competitive research grant program administered jointly by NIH and NSF, with the goal of encouraging development of predictive models and discovery of principles for relationships between anthropogenic environmental change and transmission of infectious agents. In 2005, as part of its ongoing program review procedures, the Fogarty International Center (FIC) convened a panel of experts to review the achievements of the EID program to date and to make recommendations about its future. Fields of expertise represented on the panel included infectious diseases, epidemiology, public health, ecology, environmental science, and biostatistics. The panel met June 18th–20th, 2005. Interviews were conducted in-person and via telephone with EID principal investigators, EID key personnel, NSF and NIH program partners, EID program officers, and outside experts with relevant knowledge. In these interviews, the panelists explored the appropriateness of the program mission, management, partnerships, communication, and results. The Panelists also reviewed key program data including: current and former Request for Applications (RFAs) and Program Solicitations, annual progress reports, funding data, publication data, key personnel data, and other historical program documents. Overall, the panel concluded that the first five years of the EID program have been successful and productive. A total of 34 projects have been funded, and all of them have been both interdisciplinary and appropriately targeted at the development of new concepts and methods to predict and respond to emerging or re-emerging infectious diseases. In addition, at least 566 individuals from 123 institutions in 23 countries around the world have served as key personnel on the grants; more than 228 journal articles, 95 abstracts, and 11 book chapters already have been attributed to the EID program; and although it is not a training program it has considerable potential for impact with respect to capacity building, especially in the area of human capital. **Recommendations:** NIH and NSF should continue and expand the Ecology of Infectious Diseases (EID) program; the program should add a special emphasis on those infectious diseases that are serious pandemic threats; the program should foster translational research in order to develop public health interventions based on research findings; given its inherently interdisciplinary nature, the program should continue to evolve as a model for interagency cooperation; the EID program should nurture the development of a community of scientists interested in the ecology of infectious diseases. **Availability:** This report is available from the Fogarty International Center, NIH or from the Directorate for Biological Sciences.

	CISE-Division of Computer and Network Systems
Outcomes and Impacts of the National Science Foundation's Cyber Trust Program	**Findings:** The NSF-CISE Cyber Trust program was reviewed by the President's Information Technology Advisory Committee (PITAC) as part of a larger evaluation of current Federal cyber security research and development activities. The committee's findings were published in its February 2005 report to the president entitled "Cyber Security: A Crisis of Prioritization." In their report, PITAC members offered the following assessment : The Cyber Trust program is the only substantial Federal program in civilian cyber security R&D, one area of paramount importance to securing the Nation's IT infrastructure. Although the program is having positive results, it is seriously under-funded relative to the need for cyber security research for the nation. The of the committee developed its conclusions based on the following facts: • The program's FY 2004 success rate of 8% is a factor of three lower than the NSF wide average. • In peer review, at lease 25% of the proposals submitted were judged worthy of support. • In order to attain a success rate of 8%, the majority of the proposals supported had to be funded at levels significantly below those requested by PIs. **Recommendations:** A quadrupling of the Cyber Trust budget (an increase of approximately $90 million in new funding to the program) could be employed on high-quality research that would lay the foundation for critical improvements in the nation's cyber security. Because much of the fundamental work in "other" CISE areas is beneficial to cyber security, an increase in the Cyber Trust budget should not be funded at the expense of other parts of the CISE directorate. **Availability of report: PITAC**

	Directorate for Engineering
Impact on Industry of Interaction with Engineering Research Centers - Repeat Study	**Findings:** - The most frequent and important reason for firms to become associated with ERCs was access to new ideas and know-how, rated by 78 percent of representatives of member firms as "very important" or "extremely important," followed by gaining access to faculty and to ERC technology, and having prior connections or relationships with individuals at one or more ERCs. - Member firm representatives reported that their firms received a broad range of benefits from their ERC involvement. For example, 90 percent reported gaining access to ideas and know-how and 60 percent reported that the involvement led to improving or developing new products and processes. Less frequent reasons included reported licensing center-produced technology or software; access to center equipment, facilities, and/or testbeds; and the ability to leverage the firm's investment in an ERC with funding from other ERC sponsors. - Forty percent of firm representatives reported that their firm had hired center students or graduates. This was the most highly rated benefit of ERC involvement. These firm representativealso rated their ERC hires on a wide range of job performance dimensions. A large majority of ERC students or graduates hired were rated "somewhat better" or "much better" than comparable non-ERC hires at their firms. - Three quarters of firm representatives reported that the value of benefits matched or exceeded the costs; the same proportion reported that center membership had increased their firm's competitiveness. - Factors important for realizing ERC-derived benefits are numerous and include company issues (e.g., management support of the ERC and the existence of a "champion"), ERC-specific features (e.g., responsiveness of ERC faculty/researchers to company needs), and the nature of ERC-member interaction (e.g., ERC efforts to communicate with members). - Firms whose research agenda was influenced by participation in an ERC were most likely (compared to firms receiving other benefits) to report a positive benefit/cost rating and most likely to expect continued membership in the center in 2003. Product or process improvements were also associated with high benefit/cost ratings as well as with greater likelihood of renewal for 2003. - Obtaining technical advice/consulting services from center faculty, using the results of fundamental research and enabling technology research, and hiring students and graduates were all predictive of higher benefit/cost ratings. - Barriers to the realization of benefits by member firms are not serious, and they continue to relate mostly to firm policies and environments, not ERC activities.

Impact on Industry of Interaction with Engineering Research Centers - Repeat Study	**Recommendations:** - Results show the need for program flexibility to continue, allowing center directors, Industry Liaison Officers (ILOs), and other members of center management teams to adjust to different conditions, e.g., changes over time and variations in policies among ERC lead institutions and their environments. -In the next generation of centers, relationships with small businesses, especially start-ups based on ERC technology, are likely to continue to grow in importance. ILOs will need to balance (a) fostering creation of internal start-ups and nurturing them, with working effectively with non-member small firms in the region, (b) recruitment and retention of fee-paying members, and (c) encouraging lower-level firms to become full members. Flexibility in member fee and benefit structures and in the membership agreement are especially critical. **Availability:** http://www.sri.com/policy/csted/reports/sandt/documents/ERC2004REPORT.pdf

Evaluation of the Research Experiences for Teachers (RET) Program	**Findings:** - Participants were considerably more likely than K-12 teachers nationwide to have obtained an advanced degree. - Most participants were enthusiastic about their RET experiences overall: between about 70% and 75% were "very satisfied" with their experience as a whole and felt that the amount of time spent on hands-on research and curriculum development was "about right." However, participants' experience involved much more watching, listening, and developing classroom plans than on hands-on research - 84% of participants spent at least 4 weeks on site (the average was almost 6 weeks); RET was essentially a full-time experience. - Graduate students coming into the classroom and doing hands-on demonstrations." - The amount of follow-up varied substantially, and twice as many 2003 participants reported no or only a little follow-up as reported a great deal of follow-up. - Having done at least something that seemed like "real research" and having participated in a variety of project activities were most highly correlated with satisfaction with the experience's relevance to the classroom. Over 80% of respondents also reported positive effects on their students. Most common were students' increased awareness of STEM career options (56%), more positive attitudes about STEM subjects in general (53%), and greater interest in the respondents' classes (52%). **Recommendations:** -Consider ways of promoting the goal of develop long-term relationships between researchers and K-14 teachers, explicitly. -Increase participant awareness and understanding of the Program by preparing and requiring PIs to distribute a brochure outlining the Program goals and requirements. -Encourage PIs to focus on making the summer experience relevant to participants' K-14 classroom needs and to include a variety of activities, one of which must be hands-on research. -Look for ways to ensure that academic-year follow-up activities take place. -Work to ensure that adequate funds are available for materials and equipment needed to translate RET experiences for classroom instruction and learning. **Availability: Provide websites** http://www.sri.com:8000/policy/csted/reports/university

	Directorate for Education and Human Resources (EHR)
The Advanced Technological Education program is evaluated annually by external evaluation of PI-supplied survey data, and the evaluator (The Evaluation Center at Western Michigan University) issued a report of the 2004 data in November 2004. *Division of Undergraduate Education, Advanced Technological Education (ATE)*	**Scope:** With an emphasis on two-year colleges, the Advanced Technological Education (ATE) program focuses on the education of technicians for the high-technology fields that drive our nation's economy. The ATE evaluation seeks to assess the impact and effectiveness of the ATE program by addressing these four questions: To what degree is the program achieving its goals? Is it making an impact and reaching the individuals and groups intended? How effective is it when it reaches its constituents? Are there ways the program can be significantly improved? **Findings (selected)** Seventy-four percent of ATE projects were hosted by 2-year colleges. ATE projects have established large numbers of collaborative partnerships with other ATE grantees and non-ATE institutions. These partnerships provide monetary and in-kind support to the ATE projects. ATE projects are producing large quantities of materials, providing professional development opportunities for educators, developing programs across numerous locations, serving students, and providing students pathways to higher-level technological education. More than 20,000 students participated in ATE project programs during the past year. ATE projects report a total of 295 articulation agreements across 517 institutions, which served matriculation needs for 1,001 students during the reporting period. **Recommendations:** In large measure the ATE program's efforts related to projects appear to be on target. This suggests that the program should continue its current course. The suggestions below should be treated as items to explore rather than as mandates for change. 1. Encourage the ATE projects to narrow their focus of work activities. Approximately a third of the projects attempt to address all four categories of project work: materials development, professional development, program development, and articulation partnerships. That number is quite high given the program expectation that projects have a narrow focus. The lower level of success among the projects supports narrowing the focus a bit. We encourage limiting projects to three areas of emphasis at most, with clear priority given to one. Our findings suggest that strong success is usually in one area, and the added impetus may help projects plan better for success.

	2. More strongly encourage the ATE projects to conduct assessments of workforce needs. One way to do this is to include needs assessments as part of evaluation expectations for projects. Including such needs assessments certainly can be accommodated without stressing the evaluation budgets of the projects (at least not beyond recommended NSF bounds). These assessments likely will strengthen the projects and the program as a whole, since timely knowledge of the local, regional, and national workforce needs will guide and inform project efforts across all program-related activity areas (e.g., materials development, program improvement). 3. Encourage studies of recruitment and retention of female and minority students. In this and previous reports we have consistently noted the difficulties in meeting the challenges of gender and ethnicity recruitment. This continues to be an area of program underachievement. We are not sure what additional steps should be taken. We encourage study (research) of this problem. Perhaps this is an area where collaborative relationships, an area of program strength, can be employed in conjunction with this focus to improve results. **Availability:** http://www.wmich.edu/evalctr/ate