Present: Koenig (chair), Filtz, Francis, Harter, McCandless, McLain, Proebsting, Rettig, Rockey, Sanchez, Tadepalli, and Unsworth

Absent: Gitelman, Gupta, McMullen

Guests: Robert McGorrin, Bill Boggess, Courtney Campbell

1. Forest Engineering Follow-up Review Report

Robert McGorrin (Food Science & Technology) presented a follow-up report of the Forest Engineering Graduate Council Program Review. The original graduate program and CSREES reviews took place April 14, 2003. Robert McGorrin and Kenneth Williamson revisited the department on April 5, 2006. McGorrin reported that in a meeting with the department head, Steve Tesch, and several of his faculty, they collected the following information (report appended here):

Since the 2003 review, the Department’s allocated budget from the College of Forestry (COF) has been relatively flat. The Department was successful in obtaining gifts from alumni and friends to establish a new endowment to offset the salary of an existing faculty member, and to support unendowed student fellowships. The faculty ranks have been stable during this time period; newer faculty at the time of the review have built new programs and recruited new students.

The review stimulated the faculty to have a number of conversations about the future of the Department; their reaction to shifting priorities in education, research, and the profession; and how to remain relevant within the College of Forestry, OSU, and their disciplines of interest. What follows are the FE Department’s responses to the review team’s specific recommendations:

1. Continue to maintain Departmental and College strengths, including premier faculty and research activities, facilities, great working relationships between the COF departments and with other OSU colleges and departments.

The FE faculty have been operating at full productivity since the review. Four faculty who were relatively new when the review was conducted have settled into their teaching, advising, and research programs. They are now providing many contributions to departmental teaching, scholarship, grantsmanship, service, and disciplinary leadership.

Since the review, some metrics include:

- Number of enrolled graduate students: 33 (fall 2005), up from 24 in 2003
- Percentage of PhD students: 61% (20), up from 54% (13) in 2003
- Established new graduate concentration in forest soil science
• Refereed journal articles: 33 (2004, data from annual reviews, 2005 now being compiled), up from 23 in 2002 (data from annual review)
• Books or book chapters published: 7 (2004), up from 2 in 2002
• Publications in press or review: 47 (2004 data), up from 22 in 2002
• Faculty research presentation: 94 (2004), up from 47 in 2002
• Research grants and contracts received: $1.26 million in 2005 (calendar year) up from $1.07 million in 2002.
• Fall term 2005, awarded $131,252 in gifted departmental fellowships to fully-support 7 graduate students. Two more were funded by a COF endowment. Students also received supplement fellowships from Departmental, COF, and OSU sources that add to this total. This is the largest amount of donor-supported assistance for graduate students at OSU according to recent summary from the Graduate School.

2. Work toward a more timely process of Graduate Advisory Committee member identification to expedite development of course of study. In addition, graduate advisors should help monitor course offerings so as to minimize delay in curricular completion.

Most students adhere to Graduate School guidelines. The FE Grad Program advising guide is available on their Web page, as are OSU projections for future course offerings (though these are often subject to change.)

Increasing numbers of incoming graduate students arrive in early summer and work for a major professor. This enables them to get their feet on the ground and especially to meet fellow students who often have the best knowledge of professors’ courses to favor, information about Department culture and procedures, etc.

At the fall FE orientation, the Department encourages incoming students to form their committee and plan courses for their program as soon as possible. Also it strongly encourages students to talk with other students about courses and instructors.

3. If a mismatch exists between the graduate student and major professor, work toward resolving the differences or facilitate identification of an alternative director of the graduate student.

This topic is now included in the FE fall orientation. It clarifies that the Department Head is person to see if there is a conflict, and that concerns will be taken seriously. There have not been any issues since the review.

4. Address the student concerns of lack of rigor in course work by reviewing the offering of 4xx/5xx courses and assure a graduate level of learning.

The FE Graduate Committee examined this issue carefully as the 50/50 rule was implemented. The slash-class issue is not a concern for hydrology and soils students, but remains a challenge for those in the harvesting and forest operations graduate program,
especially Master of Forestry (MF) students. These MF students will be the most directly affected by the 50/50 rule also. The Department still has too few students in this area to justify substantial numbers of stand-alone graduate courses. The Department is pilot testing an approach to clarify the graduate learning component by adding a 1-credit stand alone 5xx or 6xx graduate credit to supplement a traditional slash course. As it gains more experience with this approach, FE may eliminate the slash designation.

It is not an option to drop the graduate program in the harvesting area because OSU FE is the primary educational program for future faculty in the world.

5. **Requirements and expectations for the MF degree as described in the Graduate Student Handbook need to be followed or if changed, they need to be better communicated to the applicants and incoming students. Alternatively, convert the MF option to a course work-only program to allow completion by self-funded students within as little as one year.**

The Department had lengthy discussions about the philosophical differences between the Master of Forestry (MF) and Master of Science (MS) degrees and some differences of opinion remain among the faculty. The FE Grad Advising Guide has been revised to clarify the intended differences so there is clearer “truth in advertising.” Most faculty agree the MF is a terminal professional degree, but some believe the primary difference is with the experimental rigor of the project required. One point of view is that an MF is appropriate if the project is a case-study with limited statistical rigor.

A Coursework-only MF has been discussed as a potential means to attract more graduate students, but has received lukewarm reception from the FE Department Advisory Committee.

6. **Provide a college-level orientation for incoming students to gain understanding of forestry and activities within the College.**

An All-College graduate student orientation program was started in fall 2004. The FE Department orientation is held the same week to clarify some issues and “build community” among students advised by FE faculty (including Western Regional Graduate program (WRGP) and Environmental Sciences (ENSC) students.)

7. **The Department needs to focus on increasing its diversity. The “grow your own” philosophy to expand faculty diversity is not perceived as the best approach. The department should develop a strategy to determine how to attract outside faculty hires and inquire of other Forestry departments to determine how they were able to achieve “new blood.” Commitment to diversity may require hiring of an individual who doesn’t match the current departmental mold and could lead to the bonus of expansion of research interests.**
Faculty diversity remains a challenge. The Department has not had an open faculty position since the last review. It tried to retain a recent female PhD graduate to improve gender diversity, but she was very aggressively recruited elsewhere and left to obtain a better position. The Department has several women PhD students currently in-progress; it believes that it can educate them, send them off to gain experience and recruit them back to campus in the future. Virtually no other programs are educating women with PhDs in forest operations.

When future tenure-track faculty openings occur in the forest hydrology and soils area, this is the most probable opportunity for the Department to quickly build gender and ethnic diversity, given the observations above. The recommendation of the reviewers is that the FE Department, with the support of the College of Forestry, needs to proactively work towards hiring a woman on its faculty at the earliest occasion.

The Department has been more successful in hiring women for post-doc and FRA positions, and has worked to engage students with these folks in the research area.

To assist in recruiting more diverse international students, the Department had its Graduate Student Recruitment Brochure translated into Spanish. This was distributed at technical conferences.

8. **Maximize the utility of the Department web site for recruitment to build diversity in the student population.**

   b. **Enhance visibility of the programs by participating in outreach programs and professional organizations to encourage women and minorities in science.**

The Departmental website is a continual work-in-process, and is supplemented by individual lab group or faculty web sites. Most FE faculty agree that this is an effective means of communicating with prospective students.

FE allocates $6,000 each year to assist graduate students in traveling to professional meetings to present thesis research, interact with students and scientists from other organizations, and otherwise enhance their professional development. This is a good opportunity for its female students to serve as ambassadors for its graduate program.

9. **Establish a mentoring program for the female graduate students.**

This is a work in progress that will be significantly better if it can hire a woman on the faculty. Most faculty who advise females make it a practice to include at least one woman on the graduate committee.

FE also encourages and financially supports student participation in professional meetings and conferences where women role models are likely to be present. In recent years, it have supported travel for women students to the Oregon Women in Higher Education Conference; National Association of University Forest Resources Programs

10. a. **Continue to maintain levels of funding for graduate students including nominating students for competitive college and university-wide fellowships.**

b. **Pursue options for GTA positions for those students interested in teaching.**

FE is the number-one department at OSU for fellowship support. According to recent Graduate School summary, FE students received nearly $200,000 in fellowship and scholarships in 2005. The FE graduate committee is charged with recommending candidates to the DH for departmental awards and oversees the nomination process for COF and OSU awards. In the past two years, FE students have been nominated for every fellowship/scholarship available.

FE encourages engagement with teaching for those students who express an interest. Faculty have elected not to develop a policy that requires all students to have some form of teaching experience as a part of their graduate education.

There is some confusion about labels because the culture in the COF is not to award GTAs, but rather to employ them as GRAs (typically on a 12-month basis) and modify their position descriptions for the terms they engage in teaching. FE has provided opportunities for several PhD students to engage in meaningful team or independent teaching experiences since the last review. In at least two cases, women were selected for lower-division course assignments to provide role models for the UG women. Most PhD students are also encouraged to take courses designed to introduce students to teaching methods and course administration as a broadening requirement. It was suggested that for those students who do receive teaching experiences, there should be written documentation of their teaching evaluation, their effectiveness in the classroom, etc. This will be a valuable reference, should they decide to pursue an academic career.

11. **Expedite the admissions process.**

FE has worked hard to be responsive to prospective students, and to keep them apprised of their status via E-mail. It is continually challenged by its dependence on timely actions by others across campus. Actions required by the Graduate School and the Admissions office both frequently delay the Department’s ability to make timely decisions regarding acceptance of a student. Internally it now converts all applications to a PDF for easy electronic review by faculty. It provides timely feedback to applicants about financial aid decisions in February, March, and April. There is probably room for continuous improvement, especially for early fall applicants when departmental financial aid decisions are not made for several months, and individual faculty do have grant funds
readily available at that time. Prospective students are informed of the FE departmental timelines on their website.

12. Be more proactive in identifying long-term research needs that integrate a wider range of resource issues and values and expand the hydrology and watershed research to involve all land-use regions, embracing the “ridges-to-reef” perspective identified in the OSU 2007 discussions.

Most FE faculty recognize and embrace a broader and more diverse mission for the Department, while also acknowledging that its primary unique strength is in planning for and designing forest operations, and understanding potential soil and water impacts. The broader mindset is well reflected in the proposal for a department name change, as well as revisions to the mission and vision statements in the FE strategic plan that it has worked to align with the COF and OSU strategic plans.

There are several success stories that include efforts to lead development of the PNW hydrologic observatory, the multi-land use studies within the Calapooia watershed, the LTER collaborations at the HJ Andrews, and the multi-disciplinary work underway in Hinkle Creek and soon in the Trask Watersheds. Several FE faculty are engaged in the new Institute for Water and Watersheds on campus, as well as the Water Resources and Environmental Sciences interdisciplinary graduate programs.

13. Recognizing that the research activities conducted by graduate students serve as the foundation of the Department’s research program, it needs to attract additional M.S. and Ph.D. students to maintain and strengthen its program. Current resource levels in the FE Department could support an additional five to six graduate students per year.

As noted in #1, the Department has worked to attract new students and its enrollment has grown as newer faculty developed OSU programs.

14. Greater emphasis on multi-collaborator competitive grant funding is needed in the future. Development programs and rewards are suggested to encourage faculty to compete for larger research projects that integrate many natural resource issues and require long-term, major funding. Collaborations with investigators either at OSU or elsewhere that have had past grant success might improve competitive grant acquisition.

As noted in #12, the Department has a number of multi-disciplinary and multi-collaborator projects underway. Some projects include OSU collaborators, others have local and regional agency collaborators, and a number of projects have national or international linkages.

Competitive grants remain rare, but most faculty are very capably supporting their research programs. COF Research Cooperatives and agency cooperative agreement funding remain the primary means of support for much of that work.
In some cases, the Department has not provided sufficient incentive to faculty to seek large competitive grants. Faculty have ample funds to support a modest research and graduate program and choose to pursue leadership roles instead of large-grant-generating infrastructures.

In other cases, FE has faculty eager to invest their energy in proposals and they have struggled to find targeted federal programs that include forest engineering themes. This has been demoralizing for some faculty who observe very limited opportunities from more obvious programs. The review committee’s suggestion for successfully pursuing a major NSF grant was to collaborate with a PI known by the agency, which will tremendously increase the odds of funding. It takes time for faculty to build their reputation, establish a strong publication track-record, and to increase the reviewers’ confidence that their project proposal will deliver as promised.

In summary, it is our assessment that the Department of Forest Engineering faculty have attempted to address the issues raised by the review team during the Graduate Program external review in Spring, 2003. We were informed that the recommendations made during the review stimulated considerable productive discussions among the FE faculty about the future of the Department. We also believe that despite the fiscal constraints on the Department, good progress has been made. It is our expectation that the Department will continue to work against these recommendations in the future.

Theresa Filtz (Pharmacy) asked McGorrin for more information on FE’s efforts to improve faculty diversity. She was interested to know if the unit had thought to hire a consultant or requested assistance from professionals on campus to learn how they can become more attractive to the people they want to hire. McGorrin responded that he knew that the FE faculty had meetings to discuss how they could improve their attempts to recruit a female but he was not sure if they had contacted a consultant. Tom McLain (Forestry) added that faculty diversity is a major issue for the entire college and that units may need to consider hiring foreign female faculty as there are virtually no US females trained in the field (outside of OSU).

Michael Unsworth (Atmospheric & Oceanic Science) asked McGorrin about the progress made towards compliance with the Graduate School’s 50% rule. McGorrin responded that the Master of Forestry students continue to be challenged in this regard and that the department does not have the teaching resources to open additional graduate standalone courses at this time. Bruce Rettig (Graduate School) suggested that a possible solution could be to utilize courses from other related departments to fulfill the requirement. Perhaps coursework from the new Water Resources interdisciplinary program can be considered.

Unsworth and Sally Francis (Graduate School) inquired if the negative publicity the department received recently is affecting graduate admission numbers and/or graduate student retention this year. McGorrin replied that it seemed too early to tell and that his discussion with the department chair did not delve deeply into the controversy or its effects.
There was additional discussion regarding the Forest Engineering controversy and how the Council could encourage appropriate and successful mentor/student relationships in all the colleges. Unsworth felt that it is too soon for this discussion but he suggested that the dean of the College of Forestry should be invited to provide the Council an update (to inform the Council members of the progress the College has made toward addressing the issues) at an appropriate time. He suggested that fall would be soon enough. Rettig added that since Prasad Tadepalli (Engineering) and his review team is currently preparing a review report of the recent graduate program review of Forest Science, he will have the opportunity to bring attention to the need for better mentoring in the College as he discusses the subject as it relates to the Forest Science program.

A motion was made and seconded to approve the Forest Engineering Follow-up Review Report. All voted in favor. Motion passed.

2. Review of letters of intent for NSF GK12 programs

The Council members discussed the merits of the two letters of intent submitted.

A motion was made and seconded to select the “Be a Scientist” project. All voted in favor. Motion passed.

3. Code of Responsible Conduct/Ethics in Graduate Education/Mentoring Initiatives

Francis introduced Bill Boggess, President of the Faculty Senate, and Courtney Campbell (Philosophy) and explained that both men had participated in the recent Public Forum on Scientific Ethics, which was held in Valley Library on March 1. The Forum, sponsored by the Spring Creek Project at OSU and the university’s Philosophy Department was conducted to explore the process of science and public policy, which has drawn national attention following controversy about a group of faculty in Forestry who attempted to delay the publication in a scientific journal of research by a graduate student and several faculty co-authors. Francis then informed the Council that the Council of Graduate Schools (CGS) is offering small grants to fund training in the Responsible Conduct of Research (RCR). She asked the Council to consider whether or not OSU should pursue this funding and if so who would write the proposal and what type of program would be proposed. The deadline for proposals is August 14, 2006.

Discussion ensued. It was generally agreed that there is a need for training and that now is the ideal time to respond as a campus to the issue of responsible conduct. Council members brought forward ideas and concerns. Including:

- How is responsible conduct and mentoring taught? Do we develop workshops, seminars, coursework modules, web-based resource depositories, other?
- There will always be excuses not to train. We are too busy, we already participate in other mandated training, there is no room in the curriculum, etc.
- The training would have to be general so that it would be applicable to students and faculty from all fields. Or many different programs addressing the needs of individual research fields would need to be implemented.
- How do we ensure campus-wide participation?
- Could this be tied to the Graduate Program Review process?
- Do we engage in this training even without CGS support?

Discussion ended with Francis telling the Council members that she would be visiting with the Provost’s Council and the Graduate Student Senate to measure levels of interest and support for submitting a proposal.

Meeting adjourned
April 13, 2006

MEMO TO: Sally K. Francis
Dean, Graduate School

FROM: Robert J. McGorrin
Department Head, Food Science & Technology

Kenneth J. Williamson
Department Head, Construction, and Environmental Engineering
Department Head, Chemical Engineering

SUBJECT: Three-year Follow-up Review Summary, Department of Forest Engineering

As external reviewers of the Department of Forest Engineering’s (FE) Graduate Program in Spring, 2003, we are responding to your request to provide a synopsis of the Department’s responses to the review team’s recommendations. In a meeting with the Department Head, Steve Tesch and several of his faculty on April 5, 2006, we were able to collect the information summarized in this report.

Since the 2003 review, the Department’s allocated budget from the College of Forestry (COF) has been relatively flat. The Department was successful in obtaining gifts from alumni and friends to establish a new endowment to offset the salary of an existing faculty member, and to support unendowed student fellowships. The faculty ranks have been stable during this time period; newer faculty at the time of the review have built new programs and recruited new students.

The review stimulated the faculty to have a number of conversations about the future of the Department; their reaction to shifting priorities in education, research, and the profession; and how to remain relevant within the College of Forestry, OSU, and their disciplines of interest. What follows are the FE Department’s responses to the review team’s specific recommendations:

1. **Continue to maintain Departmental and College strengths, including premier faculty and research activities, facilities, great working relationships between the COF departments and with other OSU colleges and departments.**

   The FE faculty have been operating at full productivity since the review. Four faculty who were relatively new when the review was conducted have settled into their teaching, advising, and research programs. They are now providing many contributions to departmental teaching, scholarship, grantsmanship, service, and disciplinary leadership.

   Since the review, some metrics include:
   - Number of enrolled graduate students: 33 (fall 2005), up from 24 in 2003
   - Percentage of PhD students: 61% (20), up from 54% (13) in 2003
   - Established new graduate concentration in forest soil science
• Refereed journal articles: 33 (2004, data from annual reviews, 2005 now being compiled), up from 23 in 2002 (data from annual review)
• Books or book chapters published: 7 (2004), up from 2 in 2002
• Publications in press or review: 47 (2004 data), up from 22 in 2002
• Faculty research presentation: 94 (2004), up from 47 in 2002
• Research grants and contracts received: $1.26 million in 2005 (calendar year) up from $1.07 million in 2002.
• Fall term 2005, awarded $131,252 in gifted departmental fellowships to fully-support 7 graduate students. Two more were funded by a COF endowment. Students also received supplement fellowships from Departmental, COF, and OSU sources that add to this total. This is the largest amount of donor-supported assistance for graduate students at OSU according to recent summary from the Graduate School.

2. **Work toward a more timely process of Graduate Advisory Committee member identification to expedite development of course of study.** In addition, *graduate advisors should help monitor course offerings so as to minimize delay in curricular completion.*

Most students adhere to Graduate School guidelines. The FE Grad Program advising guide is available on their Web page, as are OSU projections for future course offerings (though these are often subject to change.)

Increasing numbers of incoming graduate students arrive in early summer and work for a major professor. This enables them to get their feet on the ground and especially to meet fellow students who often have the best knowledge of professors’ courses to favor, information about Department culture and procedures, etc.

At the fall FE orientation, the Department encourages incoming students to form their committee and plan courses for their program as soon as possible. Also it strongly encourages students to talk with other students about courses and instructors.

3. **If a mismatch exists between the graduate student and major professor, work toward resolving the differences or facilitate identification of an alternative director of the graduate student.**

This topic is now included in the FE fall orientation. It clarifies that the Department Head is person to see if there is a conflict, and that concerns will be taken seriously. There have not been any issues since the review.

4. **Address the student concerns of lack of rigor in course work by reviewing the offering of 4xx/5xx courses and assure a graduate level of learning.**

The FE Graduate Committee examined this issue carefully as the 50/50 rule was implemented. The slash-class issue is not a concern for hydrology and soils students, but remains a challenge for those in the harvesting and forest operations graduate program, especially Master of Forestry (MF) students. These MF students will be the most directly affected by the 50/50 rule also. The Department still has too few students in this area to justify substantial numbers of stand-alone graduate courses.
The Department is pilot testing an approach to clarify the graduate learning component by adding a 1-credit stand alone 5xx or 6xx graduate credit to supplement a traditional slash course. As it gains more experience with this approach, FE may eliminate the slash designation.

It is not an option to drop the graduate program in the harvesting area because OSU FE is the primary educational program for future faculty in the world.

5. **Requirements and expectations for the MF degree as described in the Graduate Student Handbook need to be followed or if changed, they need to be better communicated to the applicants and incoming students. Alternatively, convert the MF option to a course work-only program to allow completion by self-funded students within as little as one year.**

The Department had lengthy discussions about the philosophical differences between the Master of Forestry (MF) and Master of Science (MS) degrees and some differences of opinion remain among the faculty. The FE Grad Advising Guide has been revised to clarify the intended differences so there is clearer “truth in advertising.” Most faculty agree the MF is a terminal professional degree, but some believe the primary difference is with the experimental rigor of the project required. One point of view is that an MF is appropriate if the project is a case-study with limited statistical rigor.

A Coursework-only MF has been discussed as a potential means to attract more graduate students, but has received lukewarm reception from the FE Department Advisory Committee.

6. **Provide a college-level orientation for incoming students to gain understanding of forestry and activities within the College.**

An All-College graduate student orientation program was started in fall 2004. The FE Department orientation is held the same week to clarify some issues and “build community” among students advised by FE faculty (including Western Regional Graduate program (WRGP) and Environmental Sciences (ENSC) students.)

7. **The Department needs to focus on increasing its diversity. The “grow your own” philosophy to expand faculty diversity is not perceived as the best approach. The department should develop a strategy to determine how to attract outside faculty hires and inquire of other Forestry departments to determine how they were able to achieve “new blood.” Commitment to diversity may require hiring of an individual who doesn’t match the current departmental mold and could lead to the bonus of expansion of research interests.**

Faculty diversity remains a challenge. The Department has not had an open faculty position since the last review. It tried to retain a recent female PhD graduate to improve gender diversity, but she was very aggressively recruited elsewhere and left to obtain a better position. The Department has several women PhD students currently in-progress; it believes that it can educate them, send them off to gain experience and recruit them back to campus in the future. Virtually no other programs are educating women with PhDs in forest operations.

When future tenure-track faculty openings occur in the forest hydrology and soils area, this is the most probable opportunity for the Department to quickly build gender and ethnic diversity, given the observations above. The recommendation of the reviewers is that the FE Department,
with the support of the College of Forestry, needs to proactively work towards hiring a woman on its faculty at the earliest occasion.

The Department has been more successful in hiring women for post-doc and FRA positions, and has worked to engage students with these folks in the research area.

To assist in recruiting more diverse international students, the Department had its Graduate Student Recruitment Brochure translated into Spanish. This was distributed at technical conferences.

8. **a. Maximize the utility of the Department web site for recruitment to build diversity in the student population.**

   **b. Enhance visibility of the programs by participating in outreach programs and professional organizations to encourage women and minorities in science.**

The Departmental website is a continual work-in-process, and is supplemented by individual lab group or faculty web sites. Most FE faculty agree that this is an effective means of communicating with prospective students.

FE allocates $6,000 each year to assist graduate students in traveling to professional meetings to present thesis research, interact with students and scientists from other organizations, and otherwise enhance their professional development. This is a good opportunity for its female students to serve as ambassadors for its graduate program.

9. **Establish a mentoring program for the female graduate students.**

   This is a work in progress that will be significantly better if it can hire a woman on the faculty. Most faculty who advise females make it a practice to include at least one woman on the graduate committee.

   FE also encourages and financially supports student participation in professional meetings and conferences where women role models are likely to be present. In recent years, it have supported travel for women students to the Oregon Women in Higher Education Conference; National Association of University Forest Resources Programs (NAUFRP) Conference; Council on Forest Engineering Annual Meeting (COFE); American Water Resources Association (AWRA) Annual Meeting; American Geophysical Union (AGU) Annual Meeting, Agronomy-Crop Science-Soil Science Society of America Annual Meeting; Canadian Operations Research Society Annual Conference; and 2nd International Conference on Mechanisms of Organic Matter Stabilization and Destabilization in Soils.

10. **a. Continue to maintain levels of funding for graduate students including nominating students for competitive college and university-wide fellowships.**

    **b. Pursue options for GTA positions for those students interested in teaching.**

    FE is the number-one department at OSU for fellowship support. According to recent Graduate School summary, FE students received nearly $200,000 in fellowship and scholarships in 2005. The FE graduate committee is charged with recommending candidates to the DH for
departmental awards and oversees the nomination process for COF and OSU awards. In the past two years, FE students have been nominated for every fellowship/scholarship available.

FE encourages engagement with teaching for those students who express an interest. Faculty have elected not to develop a policy that requires all students to have some form of teaching experience as a part of their graduate education.

There is some confusion about labels because the culture in the COF is not to award GTAs, but rather to employ them as GRAs (typically on a 12-month basis) and modify their position descriptions for the terms they engage in teaching. FE has provided opportunities for several PhD students to engage in meaningful team or independent teaching experiences since the last review. In at least two cases, women were selected for lower-division course assignments to provide role models for the UG women. Most PhD students are also encouraged to take courses designed to introduce students to teaching methods and course administration as a broadening requirement. It was suggested that for those students who do receive teaching experiences, there should be written documentation of their teaching evaluation, their effectiveness in the classroom, etc. This will be a valuable reference, should they decide to pursue an academic career.

11. Expedite the admissions process.

FE has worked hard to be responsive to prospective students, and to keep them apprised of their status via E-mail. It is continually challenged by its dependence on timely actions by others across campus. Actions required by the Graduate School and the Admissions office both frequently delay the Department’s ability to make timely decisions regarding acceptance of a student. Internally it now converts all applications to a PDF for easy electronic review by faculty. It provides timely feedback to applicants about financial aid decisions in February, March, and April. There is probably room for continuous improvement, especially for early fall applicants when departmental financial aid decisions are not made for several months, and individual faculty do have grant funds readily available at that time. Prospective students are informed of the FE departmental timelines on their website.

12. Be more proactive in identifying long-term research needs that integrate a wider range of resource issues and values and expand the hydrology and watershed research to involve all land-use regions, embracing the “ridges-to-reef” perspective identified in the OSU 2007 discussions.

Most FE faculty recognize and embrace a broader and more diverse mission for the Department, while also acknowledging that its primary unique strength is in planning for and designing forest operations, and understanding potential soil and water impacts. The broader mindset is well reflected in the proposal for a department name change, as well as revisions to the mission and vision statements in the FE strategic plan that it has worked to align with the COF and OSU strategic plans.

There are several success stories that include efforts to lead development of the PNW hydrologic observatory, the multi-land use studies within the Calapooia watershed, the LTER collaborations at the HJ Andrews, and the multi-disciplinary work underway in Hinkle Creek and soon in the Trask Watersheds. Several FE faculty are engaged in the new Institute for
Water and Watersheds on campus, as well as the Water Resources and Environmental Sciences interdisciplinary graduate programs.

13. Recognizing that the research activities conducted by graduate students serve as the foundation of the Department’s research program, it needs to attract additional M.S. and Ph.D. students to maintain and strengthen its program. Current resource levels in the FE Department could support an additional five to six graduate students per year.

As noted in #1, the Department has worked to attract new students and its enrollment has grown as newer faculty developed OSU programs.

14. Greater emphasis on multi-collaborator competitive grant funding is needed in the future. Development programs and rewards are suggested to encourage faculty to compete for larger research projects that integrate many natural resource issues and require long-term, major funding. Collaborations with investigators either at OSU or elsewhere that have had past grant success might improve competitive grant acquisition.

As noted in #12, the Department has a number of multi-disciplinary and multi-collaborator projects underway. Some projects include OSU collaborators, others have local and regional agency collaborators, and a number of projects have national or international linkages.

Competitive grants remain rare, but most faculty are very capably supporting their research programs. COF Research Cooperatives and agency cooperative agreement funding remain the primary means of support for much of that work.

In some cases, the Department has not provided sufficient incentive to faculty to seek large competitive grants. Faculty have ample funds to support a modest research and graduate program and choose to pursue leadership roles instead of large-grant-generating infrastructures.

In other cases, FE has faculty eager to invest their energy in proposals and they have struggled to find targeted federal programs that include forest engineering themes. This has been demoralizing for some faculty who observe very limited opportunities from more obvious programs. The review committee’s suggestion for successfully pursuing a major NSF grant was to collaborate with a PI known by the agency, which will tremendously increase the odds of funding. It takes time for faculty to build their reputation, establish a strong publication track-record, and to increase the reviewers’ confidence that their project proposal will deliver as promised.

In summary, it is our assessment that the Department of Forest Engineering faculty have attempted to address the issues raised by the review team during the Graduate Program external review in Spring, 2003. We were informed that the recommendations made during the review stimulated considerable productive discussions among the FE faculty about the future of the Department. We also believe that despite the fiscal constraints on the Department, good progress has been made. It is our expectation that the Department will continue to work against these recommendations in the future.
Letter of Intent -- 2006 GK-12 Solicitation

Project: Clustering Computer Science with Science, Mathematics, and Engineering for the Enhancement of STEM Learning in Oregon’s Middle and High Schools

PI Margaret Burnett (Electrical Engineering and Computer Science (EECS), COE)
Co-PIs: Carlos Jensen (EECS, COE); Maggie Niess (Science and Mathematics Education (SMED), COS); Skip Rochefort (Chemical Engineering, COE, also OSU Precollege Programs); Tom Plant (EECS, COE); Janine Trempy (COS); Weng-Keen Wong (EECS, COE)

Faculty advisors and departments involved: Computer Science Fellows recruited from EECS and Content Fellows recruited from any all science & engineering depts at OSU.

Number of graduate fellows per year: Nine (9) fellows per year distributed as 3 (EECS), 6 (COS, COE, COAS, CoAg) plus 9 undergraduate students per year from the same areas.

Number of K-12 classes anticipated to be served per year: 6 classes per year, 30 over 5 years.

Number of K-12 teachers working with the fellows per year: 6 teachers per year, 30 over 5 years.

School District Partners: Corvallis; Albany; Lincoln (Siletz Charter & Early College High School); Alsea; Salem; Lebanon; Sweet Home

Target Audience of the Project Middle School and High School

Setting Urban, suburban and rural

NSF supported disciplines or theme(s) involved: Science, Math, Engineering, and Technology

PROJECT DESCRIPTION

a. Goals and Objectives

The goals and objectives of this project are many given the large number and diversity of stakeholders involved. Given the brevity of this pre-proposal we will only touch on the core goals and objectives. Roughly speaking, these can be divided into goals for the Fellows, goals for the schools, and goals for the departments and colleges involved.

OSU Schools, Departments & Colleges

• Diversity of students: This program is an ideal opportunity to recruit and support diversity, especially in the school of EECS and Engineering, which are dominated by male technology focused students. This program will support and emphasize human-centric computing and engineering opportunities, hopefully attracting a more diverse student population.

• Interdisciplinary experiences: In a time when funding agencies like the NSF is increasingly valuing interdisciplinary collaboration, this program represents a golden opportunity to start and promote interdisciplinary research on campus from the “grass-roots” level (i.e. graduate students), better preparing our students for the future as well as giving faculty advisors and mentors opportunities for joint research efforts.

• Extension & outreach: This program and the close contact it brings with local schools provide opportunities to make a real impact on the community. By engaging the local educational community we can ensure that our research is adopted, and that it remains relevant. We will also examine successful approaches to technology integration in STEM disciplines, and disseminate these nationally.

Schools & Teachers

• Assistance to teachers in developing and teaching hands-on, inquiry-based problem-based learning activities integrating computers and technology instruction. This is a change mandated in all K-12 education; teachers are expected to teach both with and about technologies as part of their specific STEM curricula, something which many teachers have
not been prepared to do. The Fellows will therefore provide important and needed support to teachers by serving as technology and content advisors.

- **Enriched opportunities for students**: By showing how technology and computers are part of every aspect of STEM, and through interaction with the graduate students, we will show K-12 students that computing, science, and engineering are dynamic and interesting, and change stereotypes about these fields. By targeting middle and high-schools we seek to intervene when research shows students start to shun science and technology education.

**Fellows**

- **Interdisciplinary opportunities**: Employers and funding agencies are increasingly emphasizing the importance of interdisciplinary research and the skills to work effectively as a team. As part of this program the fellows will be required to work together in interdisciplinary clusters, as well as with teachers and K-12 students.

- **Real-world focus**: By working with schools, teachers and students to develop and present curriculum, our students will gain valuable and unique experience with real world problems.

- **Improved communication skills**: Fellows will receive specific instruction in communication and pedagogy as part of this program and engage in extensive research and reporting activities. This will enable them to not only become more confident and skilled communicators, but give them valuable insight into the learning process, in particular with learning with and about technology (computer science).

**b. Project Plan.** Our goal is to engage Fellows in the delivery of science, engineering and mathematics curriculum to a broad audience of students and teachers, with a very specific and focused attention to the novel integration of computers in the delivery and explanation of this content. This focus mirrors the needs of K-12 schools, currently seeking to integrate technology education into each subject area. Thus teachers are now expected to teach both with and about technologies integrated in their specific STEM curricula. Unfortunately, current teachers have not been prepared for this additional requirement and the assistance of the Fellows will provide important and needed support. Fellows will be appointed for a period of one year. Their activities in that year will be divided into three phases (see figure below): I) Training and Preparation, II) In-school Engagement, and III) Outreach. It should be noted that Phase III spans the entire period of involvement by the Fellows, as the extensive outreach programs available at OSU will be used for Fellow training in the summer prior to their in-school activities, and also to encourage their lifelong involvement in education through connections with K-12 outreach programs at OSU.

A unique aspect of this proposal is the **School Cluster Model** composed of Fellows, K-12 teachers (middle or high school), and undergraduates. Each cluster contains two teachers, three undergraduates, and three Fellows. Each cluster has two types of Fellows; two **Content Fellows** (from appropriate STEM disciplines), and a **Computer Science** (CS) Fellow. The **Content Fellows** work directly with a teacher in his/her content area to develop curriculum, while the **CS Fellow** seeks to enhance the presentation and delivery through the integration of computers and technology. This instruction will involve technology education (for Fellows, teacher, and K-12 students) combined with innovative uses of computer science techniques (data-mining,
visualization, simulation, etc.). A SMED RA (who is NOT a GK-12 Fellow) will be brought in to work with all the clusters, providing guidance and support for the fellows, and assisting in the evaluation and data gathering. The undergraduates will provide additional assistance and be mentored by the Fellows. The undergraduates will train in the first year, and then assume a more active role of teacher support as the graduate Fellow moves to another classroom. This provides some support for teachers once the Fellows move on to other classrooms and teachers.

**School Cluster Model**

Each cluster is assigned as a school team for the academic year. Each Fellow will spend a minimum of 10 teaching hours per week at the school and five hours per week in preparation. The clusters will collaborate to develop and implement hands-on, inquiry-based, problem-based learning activities. The Project Coordinator and SMED RA will observe in-class activities and provide feedback on performance and effectiveness. K-12 Teachers will monitor the Fellows and communicate directly with the Leadership Team. During spring term, the clusters will hold a Symposium highlighting the progress in their schools. This Symposium will be used for encouraging additional participation as well as to jump-start efforts for the following year.

Each Fellow must take 6 graduate credits summer workshop (directed by the SMED faculty and graduate assistant, with the support of the K-12 teachers) to develop relations within their cluster, explore problem-base learning, and plan lessons and activities for the upcoming academic year with their teacher. This workshop will include:

- Team-building activities in support of clusters and among clusters
- Experiences in hands-on, inquiry-based, problem-based learning
- Experience and instruction in the scientific and engineering processes and traditions.
- Exploring process learning skills, constructivism, cooperative learning, inquiry, and effective questioning strategies effective in problem-based learning
- Exploring lessons that integrate technology instruction along with a focus on science and mathematics curriculum identified in their proposed school placements
- Designing curricular ideas focus on alignment with national, state, and local standards for mathematics, science, and technology education, with a special focus on teaching science and mathematics with and about instructional technologies
- Practice teaching with their peers and students in various outreach programs
- Reflecting and refining plans for instruction in the Fall

**c. Recruitment and Selection.** *CS Fellows* will be recruited specifically from Computer Science and *Content Fellows* from any other STEM graduate program at OSU. Graduate students (M.S. and Ph.D. candidates) in their second and third years of graduate school will be targeted. First year graduate students are not recruited because they typically take heavy course loads and their content knowledge is not as well developed. In January of each year, a broad call for applications will be sent by email to all eligible students in the OSU STEM departments. Faculty will be invited to nominate candidates and all graduate students with disabilities or who are
underrepresented in their programs (including African American, Hispanic, and Native American students in all programs and women in engineering, physics, and mathematics) will receive a personal invitation to apply.

Selection of graduate students is one of the most critical steps to the success of the program, and we will build on the experience of a previous GK-12 program in developing this process. The selection committee will consist of two teachers, two faculty members from the participating graduate programs, and one faculty member from SMED, will reviews applications. Interviews will be conducted with top candidates to make the final selection. Primary criteria for selection of fellows includes: 1) expressed and demonstrated interest in science outreach and interdisciplinary work, 2) expressed or demonstrated interest in teaching, 3) ability as indicated by curriculum vitae, letters and other information, 4) “fit” to selected schools and grade levels, 5) disciplinary fit, and 6) contribution of the applicant to the diversity of the cadre of fellows. The first three criteria address the qualification of the applicant. The final three primary criteria address our desire to have a balanced cadre of Fellows that reflects 1) the breadth of our project (computing, sciences, engineering, and mathematics), 2) our desire to place fellows in middle and high schools, and 3) supporting and promoting diversity.

Selection of GK-12 Teachers will be based on recommendations of school principals, and ongoing working relationships with OSU faculty. This simple selection procedure proved to be highly successful in the previous GK-12 program and will be continued.

d. Organization, Management and Institutional Commitment. This proposal was developed in a series of meetings involving the PIs and Co-PIs. This Collaborative Team will be actively involved in the program administration along with a Program Coordinator (to be named) and the External Evaluator (NWREL) to complete all program assessments to demonstrate progress with the program goals and objectives. Within the overall grant, separate accounts will be established, with funds allocated as described in the budget document for this proposal. An Internal Advisory Board will consist of key administrators (deans, associate deans, and department chairs from both colleges.

e. Evaluation. The Northwest Regional Educational Laboratory (NWREL) will provide the external evaluation services for this project through the Research and Evaluation unit of the Center for Teaching and Learning (Edith Gummer, Director). NWREL staff will determine the evaluation components needed to provide evidence of work toward the project goals and objectives and of the sustainability of the program. NWREL staff will conduct yearly site visits and focus group interviews to prepare a report about what is working and what is not. Each yearly report will be formative in nature to assist the project participants in moving forward with successful programs. Over the five years, NWREL will work with the project staff and participants to provide a summative evaluation providing evidence of the sustainability of the program.

f. List of Faculty Participants (not including PI and co-PIs). Lundy, COE, Associate Dean; Arp, Bot & Plant Pathology; Wright, Geosciences; Dick, Mathematics; Bogley, University Honors College (Mathematics); Flick, SMED; Momsen, COE, Director, Women and Minorities in Engineering; Haak, Chemistry; Metoyer, EECS; Bailey, EECS.
Title of Project: Oregon State University GK-12: ‘Be A Scientist’ in Rural Oregon

PI/Co-PI: Sujaya Rao / Ed Jensen

Faculty advisors and departments involved:

<table>
<thead>
<tr>
<th>Name</th>
<th>Role in Project</th>
<th>Discipline / Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Rao</td>
<td>PI</td>
<td>Entomology / Crop and Soil Science</td>
</tr>
<tr>
<td>E. Jensen</td>
<td>co-PI</td>
<td>Ecology &amp; education / Forest Resources</td>
</tr>
<tr>
<td>D. Wooster</td>
<td>Faculty Resource</td>
<td>Aquatic ecology / Fisheries and Wildlife</td>
</tr>
<tr>
<td>E. Sulzman</td>
<td>Faculty Resource</td>
<td>Soil ecosystems/ Crop and Soil Science</td>
</tr>
<tr>
<td>H. Stotz</td>
<td>Faculty Resource</td>
<td>Post harvest technology / Horticulture</td>
</tr>
<tr>
<td>J. Noller</td>
<td>Faculty Resource</td>
<td>Soil mapping / Crop and Soil Science</td>
</tr>
<tr>
<td>M. Dragila</td>
<td>Faculty Resource</td>
<td>Hydrology/ Crop and Soil Science</td>
</tr>
<tr>
<td>P. Hayes</td>
<td>Faculty Resource</td>
<td>Plant breeding / Crop and Soil Science</td>
</tr>
<tr>
<td>R. Halse</td>
<td>Faculty Resource</td>
<td>Botany / Botany and Plant Pathology</td>
</tr>
<tr>
<td>S. DeBano</td>
<td>Faculty Resource</td>
<td>Ecology / Fisheries and Wildlife</td>
</tr>
<tr>
<td>E. Davis-Butts</td>
<td>Collaborator</td>
<td>Education / SMILE Program</td>
</tr>
<tr>
<td>M. Dalton</td>
<td>Collaborator</td>
<td>Education / School of Education</td>
</tr>
<tr>
<td>R. Collay</td>
<td>Collaborator</td>
<td>Education / SMILE Program</td>
</tr>
<tr>
<td>S. Bottoms</td>
<td>Collaborator</td>
<td>Education / SMILE Program</td>
</tr>
</tbody>
</table>

Number of graduate fellows per year: 10

Number of K-12 classes anticipated to be served per year: 15-20

Number of K-12 teachers working with the fellows: 10-15

School District Partners: (SD = School District; Superintendents in parenthesis): Alsea SD (J. Larson); Central Linn SD (M. Harrell); Hermiston SD (J. Nelson); Falls City SD (P. Tarzian); Grant SD (N. Cleaver); Great Albany SD (P. Bedore); Lebanon Community SD (J. Robinson); Monroe SD (R. Crowson)

Target audience of the project (middle, high or elementary grades): Elementary and Middle School

Setting (urban, suburban or rural): Rural

NSF supported disciplines or theme(s) involved: Biological Sciences (Organismal and suborganismal), Environmental Sciences
Project Description: In the Track I GK-12 program (2002-2005), OSU Fellows developed and implemented inquiry-based hands-on activities in rural schools near Corvallis. In the current proposal we will build on our Track I successes and extend the program regionally, nationally, and globally. OSU Fellows will provide rural students with a scientist’s experience to generate excitement about science, change stereotypic perceptions of scientists, and provide rural youth access to advances in science and technology to prepare them for tomorrow’s global competition. OSU Fellows will develop and implement inquiry-based hands-on, experiential activities that are: 1) based in the environments surrounding participating schools, and involving local communities (place-based), 2) connected with OSU research, and 3) linked to schools globally.

This is a resubmission of the 2005 Track II proposal which was Recommended for Funding by the review panel but not funded. Reviewer comments include: “The panel was impressed with both the intellectual merit and broader impact of proposal”; “Breadth of STEM areas that were included in the effort was impressive”; “The focus on rural schools and the reach that the Track I had were viewed as strengths”; “The Science Blitz effort was considered to be a “creative addition”, “an important model for rural initiatives” and an approach “that other programs with an opportunity to serve remote areas might emulate”; “the willingness of local communities to provide accommodation for fellows is also indicative of a high level of community support”. The evaluation plan was considered to be “first-rate” by one reviewer as “qualitative and quantitative metrics are tied directly to the goals, objectives and activities”. The NSF Program Manager encouraged resubmission; she indicated that the proposal had merit but was not funded due to funding limitations. As with other programs, many proposals funded in 2005 represented resubmissions. She also indicated that, while universities can submit New Awards in the future, this is last year for submission of renewals (‘Continuing Projects’), such as the current proposal.

Goals and objectives: Goals for each of the diverse groups collaborating in the project are to:

1. (OSU graduates) Add value to their graduate experience by enhancing science communication skills and professional development opportunities
2. (Rural K-12) Enrich rural science education by integrating scientific inquiry with landscapes surrounding schools, with university research, and with international schools
3. (Rural Teachers) Involve rural science teachers in professional learning communities and professional development workshops
4. (OSU faculty) Institutionalize GK-12 opportunities at OSU for program sustainability

Project Plan: Ten OSU Fellows will be selected each year and provided the following training in the summer: 1) Three-week summer course covering inquiry-based learning, rural community characteristics, student engagement, curriculum design, etc., 2) Week-long team building workshop organized by SMILE, and 3) Three-day planning retreat with teachers for discussions on schedules, classroom resources, dress codes, etc. In addition, during a Special Topics course each term, topics covered in summer will be revisited, and challenges faced will be addressed.

Place-based Approach and Integration with University Research: OSU Fellows will be placed in rural schools for developing lessons that will involve the local landscape and be connected with university research. To provide rural students with a scientist’s experience, they will guide them through activities that scientists engage in: asking questions, designing experiments, conducting investigations, collecting data, drawing conclusions, and presenting results to peers.

This approach was piloted in 2005-2006 in 3 schools through the Discovering Partners in Nature Program funded by Toshiba America Foundation (TAF). An OSU graduate student
guided students as they collected flowers and trapped bees around schoolyards, and developed these into a permanent collection at each school. Students visited the scanning electron microscope at OSU to compare pollen samples from bees and flowers to discover which bees pollinate which flowers. They will present their results during a campus conference on May 18th 2006 to be attended by university/school administrators, parents, stakeholders, and the TAF President. This program has the added value of being part of a larger OSU research study on bee diversity. The pollination project will be used as a model for developing similar lessons on OSU research topics of local relevance such as invasive species, salmon, and non point source pollution in Oregon Rivers, for integrating OSU research with rural science education.

Program Extension-Regional: In rural schools a distance away from Corvallis, a Science Blitz, suggested by teachers in John Day, will be adopted. In each term, select OSU Fellows will initially spend 3 weeks in intense planning, then travel to remote schools and spend 3 weeks providing science instruction in as many classrooms as possible. Fellows will then proceed to another remote school and provide a similar Science Blitz. Lessons will cover the ecology of the school surroundings, such as the fossil beds in John Day and agroecosystems in Hermiston. Accommodation for the Fellows will be provided by the community.

Program Extension-National: In collaboration with a national NSF program, we will develop an interface for submission of K-12 curricular items developed by OSU Fellows to a National Science Digital Library that will enable us to align our lessons not only to Oregon standards but to national standards as well, thereby increasing their availability to teachers nationwide.

Program Expansion-International: We will partner with OSU’s Corroboree 4-H Across the Sea Program, a web-based curriculum through which students in the U.S. and Australia participate in hands-on activities related to local habitats, and exchange results via the web. Corroboree will be implemented by OSU Fellows in the GK-12 program to provide rural students with a global perspective of the environment, and to build technology skills in teachers for program sustainability. It will also be expanded to include new partners in China and India.

Program Impacts: OSU Fellows will gain experiences in scientific communication and team work. Each Fellow will make a presentation on their experiences in a department seminar, and prepare a peer-reviewed manuscript. Rural students will gain unique opportunities to explore nature and make discoveries in their communities. The lessons will expose them not only to science, but to OSU as well. It will provide a diversity of role models (particularly women and minorities), enabling rural students to envision themselves as future college students, and scientists. The close interaction with OSU, strengthened by involving rural youth in university research, and visits to technological facilities on campus, will facilitate changes in stereotypic perceptions of scientists, alleviate fears about science, and motivate students to consider science careers. For teachers, a Professional Learning Community will be initiated to help alleviate their isolation, and to provide mentorship. Teachers will also participate in grant writing and action research workshops to be organized at OSU. For program sustainability at OSU, a Rural Science Education Fund has been established in CSS, and additional grants have been received / submitted. In addition, a new course on Science Education and Outreach is being offered.

Recruitment and Selection: Graduate students will be selected from science disciplines based on merit, enthusiasm, and performance in an interview. As per NSF specifications, no graduate student pursuing a degree in science education will be recruited, and Fellows will be supported for no more than 2 years. Preference will be given to underserved minority students and to those from rural communities. Using these criteria, in Track I we recruited 39 Fellows (18 graduate and 21 undergraduates) of which 2.5 % were Native American, 2.5 % African
American, 10% Hispanic; 77% Women). Teachers will be recruited in consultation with school administrators and review of applications. Criteria for selection will include: location, subjects taught, and willingness to mentor OSU Fellows and participate in campus activities.

**Organization, Management and Institutional Commitment:** The PI and co-PI will be responsible for overall management of the project, and accomplishment of program goals. Faculty resource members will attend the Special Topics course each term and work with OSU Fellows on development of activities pertaining to their areas of expertise. A Project Coordinator will be hired to coordinate OSU Fellows activities, and assist with the internal evaluation, reports, webpage, and longitudinal tracking of impacts on current and alumnus Fellows.

Annual OSU commitments include: 1) One GTA from the College of Agriculture, 2) $20,000 from the Research Office to be used towards Project Coordinator’s salary (part), 3) CSS and SMILE staff time for delivery of the Science Education and Outreach course, 4) CSS, SMILE and the School of Education staff time for OSU Fellow and teacher training, and 5) Faculty Advisor time (diverse departments) for mentoring OSU Fellows.

**Evaluation:** Formative and summative evaluation will incorporate a “mixed methods” approach for ensuring validity of findings through triangulation of data. Internal evaluation will include 'before' and 'after' science content quizzes to determine student impact. A “Draw-a-Scientist-Test”, coded to determine if the students’ include aspects of themselves or of the OSU Fellows, will be used to assess K-12 student perceptions of scientists. As in Track I, feedback from mid and end year evaluation workshops will be incorporated for program improvement. The external evaluation will include classroom observations, interviews, focus groups, and surveys administered each year in fall and again in spring to K-12 students, K-12 Teachers, current and alumni Fellows, and faculty advisors. Qualitative data will be coded for themes based on program objectives, and triangulated with quantitative data from the surveys. The external evaluator will provide interim reports for formative evaluation. Annual summative evaluation reports will summarize and interpret results, and provide recommendations.

**List of Faculty Participants:** The OSU faculty team will consist of faculty with diverse backgrounds from science and education related departments: S. Rao (Entomology); E. Jensen (Forest Resources); P. Hayes (Plant Breeding); E. Sulzman (Soil Ecosystems); M. Dragila (Hydrology); J. Noller (Soil Mapping); H. Stotz (Post Harvest Technology); S. DeBano (Terrestrial Ecology); D. Wooster (Aquatic Ecology); R. Halse (Botany); M. Dalton (Education); E. Davis-Butts (Education); S. Bottoms (Education); Ryan Collay (Education).

**School District Involvement:** School administrators will assist with: 1) proposal development and selection of teachers, 2) funding for substitute teachers when participating teachers attend program-related activities, 3) scheduling to enable participating teachers train other teachers in the schools for program sustainability, 4) organization of events to showcase OSU Fellows-rural students achievements in local communities, and 5) contacting their districts and local businesses to seek supplemental funding. In remote areas, teachers will provide accommodations for OSU Fellows implementing the Science Blitz.

**Bridging Track I and the Renewal:** Track I success was largely due to the strong OSU-rural school partnerships that were established between 2002-2005. These also enabled us to sustain the program at a reduced level in 2005-2006, without a break, and without NSF funding. OSU students continued to enrich rural science education through support from Toshiba, CAS, Honors DeLoach Scholarship, and the Science Education and Outreach course. For 2006-2007, a grant has been received from Wells Fargo and additional proposals have been / will be submitted to Autzen, Toshiba, OSU Extension, the OSU Rural Initiative, and other agencies.