

ANNUAL REPORT: June 1, 2011 – May 31, 2012
(i.e., Summer 2011, AY 2011-2012)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: _____ Thomas R. Horton _____

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

| | Course No. | Title | Credit Hrs. | No. Students | No. of Lab. Sections |
|---------|------------|-----------------|-------------|--------------|----------------------|
| SUMMER: | | | | | |
| FALL: | EFB 320 | General Ecology | 4 | 278 | 10 |
| SPRING: | | | | | |

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT. For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning. EFB courses currently listed with service-learning components include: 416/6/1, 486, 518, 521, 532, 446/646.

| | | | | | |
|--------|---------|---------------------|---|----|--|
| Spring | EFB 496 | Cons Bio in Ecuador | 1 | 14 | |
|--------|---------|---------------------|---|----|--|

The students went to two villages in Ecuador, one in the Amazon and one in the Galapagos Islands. They helped host families understand and apply sustainable practices and helped build an elementary school. The trip was during winter break. During the spring semester we met on a weekly basis and discussed issues involved with ecotourism, comparing conditions in the Amazon and the Galapagos. A big thanks goes to Whitney Lash who too the lead in the spring course. It was clear that the students gained a great appreciation of the different constraints of dealing with and utilizing tourism in the two locations.

2. Non-Scheduled Course Offerings (e.g., 496, 899, 999)

| | Course No. | Title | Credit Hrs. | No. Students | |
|------|------------|------------------------------|-------------|--------------|--|
| Fall | EFB 420 | Internship/EFB | 5 | 1 | |
| Fall | EFB 496 | Adv. Mycology:Basidiomycetes | 3 | 11 | |
| Fall | EFB 498 | Research Problems/EFB | 2-3 | 4 | |
| Fall | EFB 796 | Adv. Mycology:Basidiomycetes | 3 | 2 | |
| Fall | EFB 899 | Masters Thesis Project | 1-6 | 2 | |
| Fall | EFB 999 | Doctoral Thesis Project | 1-6 | 2 | |
| Fall | ESF 420 | Internship/BTC | 3 | 1 | |
| Fall | ESF 499 | Honors/Thesis Project | 3 | 1 | |

| | | | | |
|--------|---------|----------------------------------------------|------|---|
| Spring | EFB 296 | Research Exp/Molecular Ecology | 1-2 | 3 |
| Spring | EFB 420 | Internship/EFB | 3 | 2 |
| Spring | EFB 495 | Undergrad Exp/College Teaching | 1 | 1 |
| Spring | EFB 497 | Evolution of Mycorrhizal Symbioses (Hayward) | 1 | 5 |
| Spring | EFB 498 | Research Problems/EFB | 3 | 1 |
| Spring | EFB 797 | Buller: A Phenomenal Mycologist | 1 | 2 |
| Spring | EFB 899 | Masters Thesis Project | 1 | 1 |
| Spring | EFB 999 | Doctoral Thesis Project | 1-12 | 2 |

3. Continuing Education and Extension (short courses, workshops, etc.)

4. Guest Lecture Activities

| Course No. | Title | No. of Lectures |
|-------------|---------------------------------|-----------------|
| EFB 311 | Principles of Evolution | 1 |
| EFB 445/645 | Plant Ecology and Global Change | 1 |

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor 22 and unofficial advisor 3

B. Graduate Students: (Name, degree sought, starting date, month & year; if a degree was completed, please give date and full citation for the thesis or dissertation).

MAJOR PROFESSOR

Hayward, Jeremy, PhD, August 2010

Holmes, Elisabeth, MPS, January 2011

Tourtellot, Samuel, MS, August 2009

Walling, Rebecca, MS, January 2011

Orlousky, Marian, MPS, August 2009, Finished December 2011

Rivera, Yazmin, PhD, August 2007, Finished May 2012, *Anthropogenic effects on ectomycorrhizal fungi at the population and community levels.*

Vineis, Joseph, MS, May 2008, Finished December 2011, *Links between the community structure of ectomycorrhizal fungi and nitrogen availability.*

CO-MAJOR PROFESSOR

MEMBER, STEERING COMMITTEE (other than those listed above)

Arrigoni, Jim PhD (Gibbs)

Daniels, Russell MS (Diemont)

Diggs, Franklin MS (Yanai)

Dowie, Nick, PhD (Miller) elevated to candidacy Spring 2012, University of Wyoming

Mobius-Clune, Daniel, PhD, (Pawloska) Defended May 2012, Cornell

Oakes, Allison PhD (Maynard)

Quinn, Christina, PhD (Fernando) Defended December 2011.

Soka, Geoffrey, PhD (Ritchie) Syracuse University

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Candidacy Exam Chair

Lu, Zhenyu, Pass (Im)

Pasi, Nidhi, test date pending (Smardon)

Yan, Jipeng, Pass (Liu)

Examiner

Bae, Kikang, Fail (Yanai) (Retook but I am no longer on the committee)

III. RESEARCH COMPLETED OR UNDERWAY

A. Departmental Research (unsupported, boot-legged; title - % time spent)

B. 1. Grant-supported Research (source, subject, amount - total award and current year, award period starting and ending dates; list graduate research assistants supported by each grant)

Horton, TR. ESF Seed Grant Program. Ectomycorrhizal Compatibility: Evolutionary and Biogeographic Patterns. \$6,905. Jun 2012 – Jun 2013. Jeremy Hayward (PhD).

Horton TR. NSF-REU associated with Simberloff grant. Specificity of N-fixing *Frankia* in native and introduced *Alnus* in Argentina. \$7,500. 2010 – 2013. Max Reitman, selected undergraduate from Juniata College.

Horton, TR. Mianus River Gorge Preserve. The effects of invasive earthworms on soil microbes and nutrient cycling in hemlock forests. \$21,000 total award, \$7,000 annually. June 2012 – May 2015. Rebecca Walling (MS).

Horton, TR, Baroni T. INECOL/CONACYT. Diversity of macrofungi in tropical and subtropical relict forests from Veracruz: Initiative for documenting the occurrence of Agaricales, Russulales and Boletales focusing on ectomycorrhizal species. \$5,000. Dec 2011 – Dec 2012.

Yanai R, Horton TR. USDA-CREES/McIntire Stennis program. Sustainable nutrient supply after forest harvest: Characterizing the fungal link from soils to roots. 8/21/2011 – 9/30/2013. \$54,105.

Simberloff D, Nuñez MA, Horton TR. NSF Population and Community Ecology panel. Collaborative Research: Determinants of ectomycorrhizal fungal spread and its relation to Pinaceae invasion. Total award = \$571,637; Total award to ESF = \$242,040; \$75,732 2009/10, \$83,226 2010/2011, \$83,082 2011/2012. 2010 – 2013. Jeremy Hayward (PhD).

2. Research Proposals pending (include information as in B.1., above).

3. Research Proposals submitted, but rejected (include information as in B.1., above)

Horton TR. NSF Population and Community Ecology panel. Preliminary proposal: Ecological patterns in ectomycorrhizal invasions: the role of biogeography and phylogenetics. Budget TBA.

IV. PUBLICATIONS (Full bibliographic citation, i.e., do not use "with Jones," or "Jones, et al."; please list only publications published, in press, or actually submitted during this reporting period --- **do not list manuscripts in preparation**).

A. Refereed Publications

Leduc SD, Lilleskov EA, Horton TR, Rothstein DR. (*In revision*) Ectomycorrhizal fungal succession coincides with shifts in organic nitrogen availability and canopy closure in post-wildfire jack pine forests. *Oecologia*.
Hayward JA, Horton TR (online first) Edaphic factors do not govern the ectomycorrhizal specificity of *Pisonia grandis* (Nyctaginaceae). *Mycorrhiza* DOI 10.1007/s00572-012-0442-2
Hazard C, Lilleskov EA, Horton TR. (online first) Is rarity of pinedrops (*Pterospora andromeda*) in eastern North America linked to rarity of its unique mycorrhizal host? *Mycorrhiza*. DOI 10.1007/s00572-011-0414-y

The following were in press on the 2010/2011 annual report

Galante TE, Horton TR, Swaney D (2011) 95% of basidiospores fall within one meter of the cap- a field and modeling based study. *Mycologia*. 103:1175-1183.

Karpati AS, Handel SN, Dighton J, Horton TR (2011) *Quercus rubra*-associated ectomycorrhizal fungal communities of disturbed urban sites and mature forests. *Mycorrhiza*. 21:537-547.

B. Non-refereed Publications

Voitk A, Hayward J, Horton T. 2011. False Truffles of Newfoundland and Labrador. *FUNGI* Volume 4:5:12 -15.

C. Papers Presented at Science Meetings (give title, date, occasion, and location)

Rivera Y, Horton TR. Ectomycorrhizal pine invasion on Puerto Rico: who are the partners in crime? Oral presentation. Annual meeting of the Mycological Society of America, August 1-6, 2011. Fairbanks, Alaska.

Horton, TR. Structure and function of mycorrhizal networks: A complex foundation for plant communities. Invited symposium presentation *in*: Incorporating microbes into plant community ecology. Annual meeting of the Botanical Society of America, July 9 – 13, 2011. St. Louis, Missouri.

D'Amico K, Horton T, Maynard C, Powell W. Assessing ectomycorrhizal associations and transgene expression in transgenic *Castanea dentate*. IUFRO Tree Biotechnology Conference, June 26 – July 2, 2011. Abraira D'Ajuda, Bahia Brazil.

Multiple posters with students at the 2012 Spotlight on Student Research – SUNY-ESF

D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance)

Horton TR, Want to Find Truffles in NY? Look for an Invasive Orchid!! Central New York Mycological Society, April 16, 2012. ~20 attendees.

Numerous mushroom forays and meetings with the Central New York Mycological Society, average attendees 10 – 20/event.

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):
2. Industrial and Commercial Groups, etc.

B. Unfunded Service to Governmental Agencies, Public Interest Groups, etc.

Faculty advisor for the Central New York Mycological Society

Vincent Neil Mushroom Festival at Beaver lake. A joint program with myself as faculty advisor, members of the CNYMS, Mid-York Mycological Society and Beaver Lake Nature Center. September 18, 2011. ~100 attendees.

VI. PROFESSIONAL DEVELOPMENT

A. Professional Honors and Awards (for teaching, research, outreach, etc.)

B. 1. Activities in Professional Organizations (offices held, service as chairman, member, participant or consultant)

2. Professional Society Membership

Botanical Society of America
 International Mycorrhiza Society (Life member)
 Mycological Society of America

3. Other Professional Activities

a. Editorial activity

| | |
|--------------------|-----------------------|
| <u>Journal (s)</u> | <u>Responsibility</u> |
| Mycorrhiza | Editorial Board |

Other (books, symposia, etc.)

I am sole editor for a new contributed author book, provisionally titled Mycorrhizal Networks with Springer Ecological Studies Series.

b. Reviewer

| | |
|-------------------|---------------------------|
| <u>Journal(s)</u> | <u>No. of manuscripts</u> |
| Mycorrhiza | 4 |
| Ecology | 1 |
| Botany | 1 |
| Fungal Ecology | 1 |

| | |
|---------------|-------------------------|
| <u>Agency</u> | <u>No. of proposals</u> |
|---------------|-------------------------|

Other

c. Participation (workshops, symposia, etc.)

| | | |
|-------------------------------|-------------|--------------|
| <u>Name of workshop, etc.</u> | <u>Date</u> | <u>Place</u> |
|-------------------------------|-------------|--------------|

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

Sent two of my graduates students to the Bayesian Analysis workshop.

D. Foreign Travel (Where, When, Purpose)

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

Graduate Program Advisory Committee

Mentor for Dovciak, Fierke, Newman, Ryan

Faculty in charge of growth chambers in Illick room 308.

Mycology/Forest Health Awards committee – Chair (Lowe-Wilcox, Zabel, Morell awards)

Provided reviews of four EFB Assistant Professors as part of the P&T files

Provided review of dossier for an Assistant Professor at University of Washington, Tacoma

B. College-level

Academic Research Building committee

I teach General Ecology which is a core course for multiple departments

C. University-wide, including Research Foundation

Faculty in charge of growth chambers in Illick room 308.

VIII. SUMMARY OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS DURING THIS REPORTING PERIOD, ESPECIALLY THOSE MOST NOTEWORTHY AND RELATIVE TO THE COLLEGE'S AND DEPARTMENT'S MISSION. One paragraph on each of the following would be most helpful:

this past year, what have you done for our students, department/college, and self professionally? NOTE: The information in this section (along with the supporting specific information elsewhere in this report) should be your strongest case for being considered for a discretionary raise, which I'll continue to award based on your contributions to the department and college this reporting period.

Students:

My greatest interaction with students comes with the teaching of General Ecology. This past fall I had approximately 280 students distributed into 10 lab sections. Like last fall, this cohort of students was wonderful with strong student engagement. I am happy to report that the overwhelming majority of student evaluations were high, ranging on average from 4 – 4.5 out of 5 for any given aspect of the course. I like getting lectures to that location of human knowledge, that place where in a 300 level course we are delving into the unknown. To me, this is where inquiry based learning is at its best (at least in such a large class), and the best students appreciate that. Sometimes I know exactly what I am doing and I take the class there. Often, it is a student's question that gets us to this point. One graduating student wrote me a wonderful card this spring sharing that she was inspired by a professor who could say, 'I don't know'. It 'got her thinking', and I can ask for no better compliment! While it is bittersweet, I am happy to report that undergraduate students who gained research experience in my lab have finished their degrees and have joined graduate programs in EFB, the University of Idaho, University of North Carolina, University of Kansas, and the University of Buffalo, among others. Several students will be working as technicians or field assistants with colleagues in some excellent labs at the University of Utah and Stanford, among others. One student who finished here several years ago spent her time since graduation working on various projects and traveling. This fall she applied to three graduate programs and got into all three. These are bright young researchers and I enjoy keeping in touch with them as they make progress on their career path. I also enjoyed working as the Faculty Advisor for the Student Conservation Biology club. This year the group again self organized a winter break trip to Ecuador, visiting a village in the Amazon

as well as the Galapagos Islands. These students are amazing as they not only visit some very interesting locations, but they help local communities develop sustainable technologies and other activities such as building a school house. In the spring the group met for a weekly seminar where they explored issues with ecotourism and human impacts on the fragile ecosystems in places like the Amazon and Galapagos. As a group they explored the interconnections between a places like the Galapagos or the Amazon and Syracuse, how things we do here impact lives there (wasting gasoline, buying cheap tropical wood furniture), and vice-versa (forcing a premium on tourism to increase sustainability). This is a neat course because it is largely self-taught and with such a great group, I can sit on the sides and watch it all unfold, though I find it hard not to pitch in sometimes. Of course, I am also very engaged in working with my own graduate students. Yazmin Rivera was my first Ph.D. student to finish (this May) and she is already getting job interviews for faculty positions at four-year colleges. Jeremy Hayward had a very successful year, taking the lead on two grant proposals that we landed (NSF REU \$7500 and ESF Seed grant \$6905). Jeremy also cranked out a manuscript with some samples collected while on vacation that resulted in a paper now in press with Mycorrhiza. Jeremy has been a great help training various undergraduate and graduate students who need help with the molecular approaches we employ (this will look great on his CV!). He also ran the Mycorrhizal Symbiosis seminar course this spring. Rebecca Walling joined my lab this spring. Before she even started she took the lead on a successful grant proposal with the Mianus River Gorge Preserve that will fund her travel and supplies for her project for three years (\$21,000). I also enjoy interacting with students of other professors as they filter through my molecular lab to use various pieces of equipment (ultra cold freezer, freeze dryer, nanodrop, etc.). Sam Tourtellot is now writing up his Masters thesis on whether transgenic chestnuts resistant to fungal pathogens remain capable of associating with mycorrhizal fungi belowground (yes!). Elisabeth Holmes is an MPS student working on a dual degree with the SU teaching program. She is progressing nicely and should be finished by next spring. Lastly I will mention that I took on leadership in an award committee that honors our best undergraduate and graduate students in mycology and forest health. This year we were able to give out about \$20,000, split among 10 outstanding students!

Department/college:

As suggested above, I view my primary activity for the department and college as the teaching of a solid General Ecology course (see student section for some details). This past year also found me assessing learning outcomes for our Environmental Biology majors in General Ecology – no small task and an important one. Last year I was at the top of the EFB Faculty list in terms of teaching load, largely because of General Ecology. I also enjoy helping young faculty navigate their first years here in EFB. When things are going smoothly this is an easy task. When things get a little bumpy, it can be a challenge to provide helpful advice to work through the issue. But I like doing this and hope to continue to be successful in this role. I also manage the growth chambers in room 308. This is mostly a function of managing a game of musical chambers because we never seem to have enough chambers for the experiments that *could* be running (but always enough for those that *are* running!). It can be more taxing when a chamber fails, but let me state that John Suresi's service was top notch in this regard. There was also the extra duty this year of communicating our growth chamber needs and specifications to the ARB (Academic Research Building) committee. Speaking of the ARB committee, I spent many hours on that committee, watching the details of the building unfold.

Self professionally

My papers continue to receive attention and influence the field as evidenced by the high numbers of citations. I am pleased to report that my former student Sara Ashkannejhad's paper has now been cited 66 times (Google scholar since 2006) and my paper with Nuñez and Simberloff has already been cited 42 times (Google scholar since 2009). I had a great year in terms of seeing current and former students getting their work published: Karpati et al. (2011), Galante et al. (2011), Hazard et al. (in press), Hayward & Horton (in press). Similarly, it was a great year in terms of securing funding, with a number of small grants totaling over \$40,000 (\$5000 INECOL/CONACYT; \$21,000 MRGP; \$7500 NSF REU; \$6905 ESF Seed). My student Jeremy Hayward and I also submitted an NSF preproposal that did not get an invitation for a full proposal, but the reviews suggest it is worth another submission on this one. I am happy to report that Dan Simberloff, on of the collaborator on my funded NSF project, was elected a to the National Academy

of Science this spring – it is an honor to work with him. We are gathering quite a bit of data in the field and lab on our work down in Argentina and will be peeling off manuscripts by this time next year. We are close to submitting the first data paper showing that the dispersal of ectomycorrhizal fungal spores by introduced boar and deer is facilitating invasion by pine and Douglas-fir in Bariloche, a follow up to our 2009 Ecology paper. Other papers will follow. But the big news for me is the initiation of a book. Springer accepted my idea for an edited volume on Mycorrhizal Networks for their Ecological Studies series. I have a great list of international authors for chapters and their contributions are now coming in. This will give my lab and ESF more visibility with respect to the work we do on mycorrhizal ecology. The final draft of the book is due January 2013, so this summer and fall will see me pretty tied up with this project. Fortunately, my courses and my lab are running along nicely with great students.

IX. A. FUTURE PLANS, AMBITIONS, AND POTENTIAL CONTRIBUTIONS FOR YOUR OWN PROFESSIONAL DEVELOPMENT AND THE ENHANCEMENT OF THE PROGRAM IN ENVIRONMENTAL AND FOREST BIOLOGY (brief summary)

My most daunting task that is also unique to this coming year is the completion of the book project with Springer. Chapters from contributed authors are coming in now and I must read them, give the first crack at reviewing the science and English, find external reviewers and generally shepherd the project through its completion in spring 2013. I am also writing one chapter as sole author and another as a coauthor. While this is going on, I have two teams with manuscripts in the ‘response to reviewers’ stage that will be turned around shortly. I also will be writing and revising manuscripts for submission focused on the Argentina project with Nuñez, Simberloff and Hayward. Also, it is likely that Jeremy Hayward and I will resubmit a revised version of our NSF preproposal, and I expect to submit a second preproposal with a collaborator at the University of Miami, Ohio. I accepted the invitation to join the EFB Promotion and Tenure committee, which will be challenging but critically important for the department. I often tell colleagues how fortunate we have been with a strong cohort of assistant professors being hired since I started in 2001. Well, now they are lining up for promotion and tenure and it is my desire to see that the process is fair and constructive for those being reviewed as well as the department. I will also remain engaged in the planning of the Academic Research Building and the managing of our growth chambers in Illick Hall.

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2009

a. Course(s) to be offered

b. Proposed research activity

1. Help Sam Tourtellot complete his M.Sc. thesis on mycorrhizal interactions of American and transgenic chestnut.
2. Work with Jeremy Hayward on my NSF funded project on microbial controls of plant invasions in Argentina with Dan Simberloff and Martin Nuñez. Guide Max Reitmann, NSF REU student recruited from Juniata College, Pennsylvania. They are in Bariloche, Argentina for the month of June.
3. Work with Becka Walling on her MRGP funded project on the effects of invasive earthworms on soil biogeochemistry, soil profiles, and belowground niche partitioning of ectomycorrhizal fungi.
4. Review chapters as editor for Mycorrhizal Networks project with Springer.
5. Work with Tim Baroni as he visits Vera Cruz, Mexico to initiate our fungal diversity project under the INECOL/CONACYT funding.
6. Revise two chapters (one sole author and one co-author) for *Mycorrhizal Networks* project.
7. Revise *Arbutus menziesii* plays a major legacy role in forest succession by maintaining high *I* mycorrhizal fungal diversity and host plant connectivity, with Peter Kennedy, Dylan Smith and Randy Molina as co-authors.
8. Revise *An assessment of ectomycorrhizal inoculum potential for American chestnut in Northeastern forest soils under laboratory and field settings* with Kris Dulmer (MS student) and Stephen LeDuc as co-authors.
9. Revise NSF Preproposal, Ecological patterns in ectomycorrhizal invasions: the role of biogeography and phylogenetics.

c. University, professional society, and public service

Academic Research Building committee

EFB Promotion and Tenure committee

Faculty Advisor for Central New York Mycological Society

2. Fall Semester 2009

a. Course(s) to be offered

EFB 320, General Ecology

EFB 428/628, Mycorrhizal Ecology

Various EFB 420, 496, 498, 899, 999

b. Proposed research activity

1. Work with Jeremy Hayward on my NSF funded project on microbial controls of plant invasions in Argentina with Dan Simberloff and Martin Nuñez. Guide Max Reitmann, NSF REU student recruited from Juniata College, Pennsylvania. Shift gears to writing manuscripts.
2. Work with Becka Walling on her MRGP funded project on the effects of invasive earthworms on soil biogeochemistry, soil profiles, and belowground niche partitioning ectomycorrhizal fungi.
3. Review chapters as editor for Mycorrhizal Networks project with Springer.
4. Work with Tim Baroni on our fungal diversity project under the INECOL/CONACYT funding. Process samples from his collecting trip through the molecular lab for preliminary data for additional funding.
5. Revise NSF Preproposal, Ecological patterns in ectomycorrhizal invasions: the role of biogeography and phylogenetics.
6. Coauthor NSF preproposal with Melanie Fisk at University of Miami focused on mycorrhizal fungi and nutrient cycling.

c. University, Professional society, and public service

EFB Faculty meetings

Graduate Program Advisory Committee

Academic Research Building committee

EFB Promotion and Tenure committee

Faculty Advisor for Central New York Mycological Society

Faculty advisor for the Vincent Neil Mushroom Festival at Beaver lake. A joint program with myself as faculty advisor, members of the CNYMS, Mid-York Mycological Society and Beaver Lake Nature Center. September 2012.

3. Spring Semester 2010

a. Course(s) to be offered

Various EFB 420, 496, 498, 899, 999

EFB 797: Some kind of seminar focused on plant fungal symbioses

b. Proposed research activity

1. NSF funded project on microbial controls of plant invasions in Argentina with Dan Simberloff and Martin Nuñez. Guide NSF REU student recruited from Juniata College, Pennsylvania. Coauthor manuscripts.
2. MRGP funded project on invasive earthworms on soil biogeochemistry, soil profiles, and belowground niche partitioning ectomycorrhizal fungi.
3. Review chapters for Mycorrhizal Networks, a book I am editing for Springer's Ecological Studies Series.
4. Revise two chapters (one sole author and one co-author) for Mycorrhizal Networks book.
5. Submit NSF preproposal, Ecological patterns in ectomycorrhizal invasions: the role of biogeography and phylogenetics.

6. Submit NSF preproposal, Nutrient cycling and mycorrhizal fungi

c. University, professional society, and public service

EFB faculty meetings

Graduate Program Advisory Committee

Academic Research Building committee

EFB Promotion and Tenure committee

Faculty Advisor for Central New York Mycological Society