

**ANNUAL REPORT: June 1, 2009 – May 31, 2010**  
**(i.e., Summer 2009, AY 2009-2010)**  
**DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY**  
**SUNY-ESF**

**NAME:** Thomas R. Horton

**I. INSTRUCTIONAL ACTIVITIES**

1. Regular Course Offerings

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>	<u>No. of Lab. Sections</u>
SUMMER:					
FALL:	EFB 320	General Ecology	4	249	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.

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

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>
	BTC 420	Internship	3	1
	EFB 420	Internship	3	3
	EFB 495	Undergrad Exp/Coll Teaching	1	1
	EFB 496	Adv Mycology:Basidiomycetes	2	12
	EFB 498	Undergrad Res Experience	2-3	5
	EFB 796	Adv Mycology:Basidiomycetes	2	4
	EFB 796	Teaching Experience	3	1
	EFB 797	Mycorrhizal Symbiosis	1	4
	EFB 898	Professional Experience	5	1
	EFB 899	Masters Research Experience	1-11	4
	EFB 999	PhD Research Experience	6-9	2

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

#### 4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
BTC 132	BTC Freshman Seminar	1
EFB 445/645	Plant Ecology	1
EFB 535	Flowering Plants: Diversity, Evolution, and Systematics	1
EFB 796	Graduate Core course	1
Cornell	Plant Pathology Dept. “Mycorrhizal Ecology”	1
University of Georgia	Plant Biology/Ecology Depts “Seedlings and mycorrhizae	1

## II. STUDENT ADVISING

- A. Number of undergraduates for whom you are the student’s official advisor   21   and unofficial advisor   2+
- 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

Galante, Tera: M.S., August 2007. Factors influencing dispersal of ectomycorrhizal fungi and establishment of ectomycorrhizae and host *Pinus contorta* seedlings in a primary successional ecosystem. Thesis (M.S.) - State University of New York. College of Environmental Science and Forestry. Syracuse, N.Y. Defended December 2009.

Knowlden, Samantha: M.P.S., August 2009. Completed MPS in Applied Ecology May 2010.

Vineis, Joe: M. S., May 2008

Rivera, Yazmin: Ph.D. Co-advised with Dr. Annette Kretzer.

Sopchak, Lorien: M.P.S., August 2008.

Sam Tourtellot: M.S. August 2009.

### CO-MAJOR PROFESSOR

#### MEMBER, STEERING COMMITTEE (other than those listed above)

Brian Hoven, MS ( Parry) – Defended December 2009

Kathleen Pitcher, MS (Kretzer) – Defended July 2009

Brienne Meyer, MS (Weir) – Defended Fall 2009

Amy Karpati, PhD (Morin, Rutgers) – Defended May 2010

Sara Scanga, PhD (Leopold) – Defended October 2009

Murray, PhD (Frank, Syracuse University) – Defended December 2009

Stephen LeDuc, PhD (Rothstein, Michigan State University) – Defended Fall 2009

Katherine D’Amico, MS (Powell)

Allison Oakes MS (Maynard)

Nick Dowie, PhD (Miller, University of Whyoming)

Sharron Crane, PhD (Dighton, Rutgers)  
Alix Contasta, PhD, (Serita Frey, University of New Hampshire)  
Dan Moebius-Clune PhD (Teresa Pawlowska, Cornell University)  
Janice Hornbeck, MS (Leopold)  
Fang Zhou, PhD (Wier)

#### CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Graefe, David. Qualifying exam - FNRM, February 2010.  
Sikes, Ben, Ph.D. defense. Integrative Biology, University of Guelph, April 2010.

### **III. RESEARCH COMPLETED OR UNDERWAY**

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

Mycorrhizal ecology of *Epipactis helleborine* – 0.5%.

#### 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)

Simberloff D, Nuñez MA, Horton TR. 2010 – 2013. Collaborative Research: Determinants of ectomycorrhizal fungal spread and its relation to Pinaceae invasion. NSF Population and Community Ecology panel. Total award = \$571,637; Total award to ESF = \$242,040; \$75,000 2009/10. Seeking PhD student.

Powell WA, Maynard CA, Leopold DP, Horton TR, Perry D. 2008 – 2011. Evaluating environmental impacts of transgenic American chestnut trees to chestnut trees produced by conventional breeding. USDA – NRI, BRAG program. \$380,00. Funding used for Sam Tourtellot (MS).

Hobbie E, Ollinger S, Varner, R, Frey S, Horton TR. 2006 – 2009 w/ No-cost extension to August 2010. Collaborative Research: Relationship between carbon allocation to mycorrhizal fungi and organic nitrogen use in temperate forests. NSF – Ecosystems panel. Total award = \$775,000, with \$188,127 to Horton. Supplemental funding awarded July 2009 for \$13,090 through August 2010. Funding used for Joe Vineis (MS).

Horton TR, 2006 – 2010. Fungal Biodiversity and Community Dynamics in the Oregon Coastal Dune Ecosystem. USDA-Forest Service, \$30,000. Funding used for Tara Galante (MS).

Horton TR. 2006 – 2010. Facilitated succession towards a climax community at MRGP. Mianus River Gorge Preserve. \$21,000. Funding used for Michael O'Brien (MS). This project is now terminated and spent out.

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

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

### **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

- Molina R, Horton TR, Trappe JM, Marcot BG (in review) Addressing uncertainty: how to conserve and manage rare and little-known fungi. *Fungal Ecology* (Special issue on Conservation of Fungi).
- Lilleskov EA, Horton TR, Hobbie E (in review) Patterns of fungal species response to elevated soil N. *Fungal Ecology* (Special issue on Conservation of Fungi).
- van der Heijden MGA, Horton TR (2009) Socialism in soil? The importance of mycorrhizal fungal networks for facilitation in natural ecosystems. *Journal of Ecology* 97:1139-1150. (Special feature on facilitation in plant communities).
- Núñez MTA, Horton TR, Simberloff D (2009) Lack of belowground mutualisms hinders Pinaceae invasions. *Ecology* 90:2352-2359.

**B. Non-refereed Publications**

- Horton TR (2010) Book Review: *Phaeocollybia of Pacific Northwest North America*, by Lorelei L. Norvell, Ronald L. Exeter. *Inoculum* 61(1): 16.

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

- Horton TR, Parker VT, O'Brien MJ\*. Ectomycorrhizal networks in plant communities: a Gleasonian point of view. MSA/BSA Annual Meetings, Snowbird, Utah, July 2009. Contributed talk.
- Galante TE\*, Horton TR, Swaney DP. 95% of spores fall within 45 cm of the cap: A field and modeling based study. MSA/BSA Annual Meetings, Snowbird, Utah, July 2009. Contributed talk. Highlighted in a recent comment in *New Phytologist* by Peay et al 2010 on page 878.
- Conrad AO, Horton TR. An initial survey of fungi in the cloud forests of Honduras with a focus on edibles. MSA/BSA Annual Meetings, Snowbird, Utah, July 2009. Poster presentation.
- Vineis JH\*, Horton TR, Hobbie EA. Ectomycorrhizal communities in temperate forest ecosystems: Does diversity decrease along an increasing natural nitrogen gradient? ESA Annual Meeting, Albuquerque, New Mexico, August 2009. Invited oral presentation (OOS 27). Highlighted *Bulletin of the Ecological Society of America* (Vol. 91, No. 1, pp. 68-79)
- O'Brien MJ\*, Horton TR. Using neighborhood models to examine the role of ecto and arbuscular mycorrhizal forest communities on Eastern hemlock seedling establishment. ESA Annual Meeting, Albuquerque, New Mexico, August 2009. Contributed talk.

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

- Mushrooms of the Oregon Dunes. Central New York Mycological Society, Syracuse NY, 2009. ~15
- Mushrooms of the Oregon Dunes. Mid-York Mycological Society, Utica NY, 2009. ~25

**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.**

- Organized 1<sup>st</sup> Annual Mushroom Fair with CNYMS members, Beaver Lake Nature Center. September 2009. Facilitated by members of the Syracuse and Utica Mycology clubs and my Basidiomycetes class, ~150 visitors from public during the day long fair.

## 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)

Chair - Program Committee, Mycological Society of America (2009-2010)

This a major responsibility: I am organizing the program for the 2010 meeting in Kentucky (June 28 - July 1) and write the program. We are expecting 350 to attend the conference.

Counselor – Ecology and Pathology (elected position, August 2009 – July 2011)

2. Professional Society Membership

Mycological Society of America

International Society of Mycorrhiza (life member)

3. Other Professional Activities

a. Editorial activity

Journal (s)  
Mycorrhiza

Responsibility  
Editorial board

Other (books, symposia, etc.)

b. Reviewer

Had to turn a number of requests this year with the work involved in planning the 2010 MSA meeting.

<u>Journal(s)</u>	<u>No. of manuscripts</u>
Fungal genetics and biology	1
ISMEJ	1
Mycorrhiza	3
New Phytologist	3

<u>Agency</u>	<u>No. of proposals</u>
NSF – United States	1
NSF – Switzerland	1

Other

Book review for Mycological Society of America. Review appeared in *Inoculum* - Horton TR (2010) Book Review: *Phaeocollybia* of Pacific Northwest North America, by Lorelei L. Norvell, Ronald L. Exeter. *Inoculum* 61(1): 16.

c. Participation (workshops, symposia, etc.)

<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
Ecological approaches to analyzing complex community datasets – FESIN workshop. 2009 Annual meetings of MSA/BSA, Snowbird Utah. Workshop attendee.		
Conservation Biology of Fungi. 2009 MSA/BSA annual meetings, Snowbird Utah. Co-organized symposium with Anne Pringle and Erik Lilleskov. Led to special issue in Fungal Ecology.		

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

FESIN Workshop at the 2009 Mycological Society of America meeting in Snowbird Utah. Workshop covered advances in methods for utilizing the volumes of sequence data we generate using molecular tools. These advances in bioinformatics are targeted at using the information for ecological questions.

D. Foreign Travel (Where, When, Purpose)

I travelled to Honduras to teach a Molecular Techniques course at a remote research station in Cusuco National Park. In addition to teaching the course, I was using this as an opportunity to develop a research project on biodiversity of fungi in one of the southernmost stands of native Pinaceae. Unfortunately, I have found this project to require more time than I can devote to it, and will let it drop after this summer.

I served as an outside reviewer on a PhD committee at the University of Guelph in April, 2010.

## VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

Search committee to fill the Smart/Kretzer lines. This led to the successful hire of Dr. Lee Newman.

Early career mentor for Melissa Fierke and Martin Dovciak

Took over responsibilities formerly covered by Larry Smart: Maintenance/operation of the water purifier, maintenance/operation of the two new growth chambers (5 and 6).

GPAC committee.

B. College-level

Review panel for choosing the firm that will build the new Biology building.

C. University-wide, including Research Foundation

## 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:** I continue to get lots of mileage out of direct interactions with undergraduate students in my coursework and through their contributions working on my lab. I enjoyed teaching General Ecology after my sabbatical leave. I had an excellent cohort of TAs working on the labs. The students in lecture were very engaged and I expect to hear good things about these students from other professors as they move through the program. I am proud to say that this group actually clapped on the last day of lecture, as much a reflection of their good nature as my ability to make the course enjoyable (I hope!). This year I facilitated connecting the students in EFB 320 with two field research opportunities. The first was with Operation Wallacea where about 30 students signed on with real interest and about five are headed to summer experiences at field sites such as a cloud forest in Honduras and a wildlife preserve in Africa. I also

connected students interested in outdoor education with a DEC representative who signed up several of our students to work at field camps this summer. I offered Advanced Mycology: Basidiomycetes for the first time last fall and the students really responded. This course included collecting fungi during weekend forays including a camping trip near Newcomb that was a big hit. A cohort of my advisees graduated this spring, including the student who finished with the highest GPA in EFB. I identified the potential of this student four years ago and I helped facilitate her navigation through the program and to help her gain excellent research experience in several labs. I enjoyed helping her and another former undergraduate student network at last summer's annual meeting of the Mycological Society of America in Snowbird Utah and was pleased to learn that both have landed graduate positions. I have a close connection I had with many of this year's graduating students through my classes and their performances at the Coffee Haus Concerts. One of my advisees wrote a successful proposal for a CLBS Undergraduate Research Fellowship to investigate mycorrhizal ecology of spruce. Two of my graduate students finished their MS degrees and are working to get their papers out despite starting Phd programs (University of Zurich, O'Brien; University of Wisconsin, Galante). Tera Galante's talk at last year's MSA meeting was highlighted in a comment published in the New Phytologist. Joe Vineis project is progressing well and his talk at last year's ESA meeting was highlighted in the Bulletin of the Ecological Society of America. One way to quantify success with students is recognition of their research after they finish and I note here that Sara Ashkannejhad's (MS 2006) paper in New Phytologist (2006) has now been cited 48 times according to Google Scholar.

**Department/college:** I took over the responsibility of maintaining the two new growth chambers on the third floor. I also took over maintaining the water purifier on the fourth floor. I serve on multiple graduate student committees, the GPAC committee, and served on the search committee that resulted in the hire of Dr. Lee Newman. I am very pleased with her hire for her energy, applied research, and her ability to strengthen plant sciences in our department. I also served on a committee to review proposals from firms hoping to be selected to build our new biology building. I also enjoy mentoring faculty as they move along the tenure track. I advise students who have an interest in becoming science educators and facilitate their entry into the dual program with SU that leads to an EFB B.S. and New York certification in Secondary Science Education. Given the recent turn-over in the office of Instruction and Graduate Studies, I wound up being one of, if not the, most knowledgeable individual on campus about the dual program and helped Dean Shannon understand how our students navigate both their ESF degrees and the Science Education coursework at SU, as well how best to facilitate communication between the two campuses. I also make significant contributions through my teaching, research and outreach. I teach General Ecology (249 students, 10 labs, 5 TAs), a major course for the department and the college and it is solely my charge to deliver the lectures and run the labs. In terms of research, I see my productivity benefitting the department and college. I brought in \$253,000 (new NSF award + an NSF Supplementary Authorization). Two of my papers were published during the last annual report period and two additional manuscripts are in review.

**Self:** I had a good time teaching General Ecology last fall and was rewarded with great interactions with the students. One of my objectives has been to build a strong mycology program and there were a number of steps that I took towards this end. First, I taught Basidiomycete taxonomy, which I will alternate with Mycorrhizal Ecology each fall. Second, I organized the 1<sup>st</sup> Annual Mushroom Fair at Beaver Lake Nature Center in September. The Nature Center was very impressed with our turnout and immediately invited us back to do it again this year. Third, I co-organized a symposium at last summer's MSA/BSA on Conservation of Fungi that led to a special issue in Fungal Ecology (I have two papers in review for this issue). There is no doubt that students are interested in conservation issues but education about fungi is sadly neglected. Raising the awareness on campus and beyond about conservation of fungi will continue to be a focus of mine, both as a teacher and researcher. I received a \$240,000 NSF award from the Population and Community Ecology panel this spring. The fact that this award was funded *in full* suggests the panel felt this proposal was among the top tier of those submitted. This NSF award follows a paper published in Ecology with Dr. Dan Simberloff, one of the world's preeminent ecologists and I look forward to our continued collaboration. This was funding was in addition to a \$13,000 Supplementary Authorization from NSF to support the final stages of my work on an NSF award originally funded in 2006 with collaborators at UNH. My papers continue to be cited. My 21 peer

reviewed publications have now been cited 1226 times, with an average of 58.38 citations per item and my H-index = 14. I am proud of the attention my work receives both nationally and internationally.

### **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)**

One of the tricks with research is keeping up with the literature and identifying high quality projects that are feasible for graduate students and will make an impact on the science. I believe the next annual report will include a paper on spore dispersal by Tera Galante will be important and cited often. I also believe the work by Joe Vineis showing a major group of mycorrhizal fungi are locally extirpated under conditions of high nitrogen availability is some of the first work getting at the functional ecology in mycorrhizal fungi and will also be cited often. Obviously the work with Dan Simberloff is likely to pay off and will ramp up this year. I was recently interviewed for a highlight on this study for the SUNY Research Foundation web page. Lee Newman is starting this fall and she and I submitted a 1 page preproposal to the USDA and are now wrapping up the full invited proposal on the use of bacterial root endophytes and mycorrhizal fungi to enhance biofuel feedstocks and carbon sequestration. The public and student awareness of fungi is ...mushrooming, and we have a strong legacy of this field in our department. I will continue building our mycology program through my teaching, research and outreach.

### **B. PROJECTED ACTIVITIES FOR NEXT YEAR**

#### 1. Summer 2009

##### a. Course(s) to be offered

##### b. Proposed research activity

Initiate NSF project with Martin Nuñez and Dan Simberloff in Argentina.  
Recruit a high quality PhD student for the 'Argentina' project.  
Advise Yazmin Rivera and Sam Tourtellot on their projects.  
Return to OpWall Honduras site.  
Submit Grant Proposal with Lee Newman, due June 14.  
Submit manuscript to Plant Soil with Michael O'Brien as lead author.  
Work with Joe Vineis as he prepares to defend July/August 2010.

##### c. University, professional society, and public service

Chair the Program Committee of the Mycological Society of America (MSA); term ends July 2010.  
Organize schedule and write the program for MSA/ISFEG 2010 in Kentucky  
Serve on MSA Council: Ecology and Pathology  
Advise Central New York Mycological Society (CNYMS) and Mid-York Mycological Society (MYMS)  
Organize Mushroom fair with CNYMS and MYMS at Beaver Lake Nature Center September 19.

#### 2. Fall Semester 2009

##### a. Course(s) to be offered

EFB 320, General Ecology  
EFB 428/628, Mycorrhizal Ecology  
Non-scheduled course offerings



b. Proposed research activity

Work on NSF project with Martin Nuñez and Dan Simberloff in Argentina. Critically, I need to recruit a high quality PhD student for this project.

Work with Sam Tourtellot in his work assessing whether transgenic American chestnut and back-crossed hybrids developed to resist foliar pathogens have a negative effect on mycorrhizal fungi below ground.

Finish revising and submit manuscript to New Phytologist with Tera Galante as lead author.

Finish revising and submit manuscript to Mycologia? Am. J. Bot.? With Chris Hazard as lead author.

c. University, Professional society, and public service

MSA Council: Ecology and Pathology

Facilitate interactions exchange of ideas between ESF and SU faculty and grads through the Behavior Ecology and Evolution Seminar series, Co-organized with Kari Segraves.

Advise Central New York Mycological Society and Mid-York Mycological Society

3. Spring Semester 2010

a. Course(s) to be offered

EFB 797      Advanced Mycology: Invasion biology

Other, non-scheduled course offerings

b. Proposed research activity

Work on NSF project with Martin Nuñez and Dan Simberloff in Argentina.

Work with Sam Tourtellot in his work assessing whether transgenic American chestnut and back-crossed hybrids developed to resist foliar pathogens have a negative effect on mycorrhizal fungi below ground.

c. University, professional society, and public service

MSA Council: Ecology and Pathology

Facilitate interactions exchange of ideas between ESF and SU faculty and grads through the Behavior Ecology and Evolution Seminar series, Co-organized with Kari Segraves.

Advise Central New York Mycological Society and Mid-York Mycological Society