

ANNUAL REPORT: June 1, 2012 – May 31, 2013
(i.e., Summer 2012, AY 2012-2013)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: Tom 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	228	10
	EFB 428	Mycorrhizal Ecology	3	21	1
	EFB 628	Mycorrhizal Ecology	3	6	1

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.

I did not include any formal service-learning activity in my courses this year.

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>
FALL:	EFB 495	Undergrad Exp/Coll Teach	1	1
	EFB 498	Independent Research/Envrn Bio	1-3	4
	EFB 796	Teaching Exp/Mycorrhizal Ecol	3	1
	EFB 797	Origin of Species	1	16
	EFB 899	Masters Thesis Research	1-5	2
	EFB 999	Doctoral Thesis Research	5	1
	ESF 499	Honors Thesis/Project	1	1
SPRING:	EFB 296	Research Exp/Molecular Ecology	1	2
	EFB 298	Research Internships/Envrn Biology	1-3	4
	EFB 498	Independent Research/Envrn Bio	1-2	3
	EFB 898	Professional Experience	1	5
	EFB 899	Masters Thesis Research	1-3	2
	ESF 499	Honors Thesis/Project	2-3	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>
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 19 and unofficial advisor 3

B. Graduate Students: (list 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. Finished May 2013. The impact of transgenic American chestnuts (*Castanea dentata*) on ectomycorrhizal fungi in open-field and mature forest sites. Thesis (M.S.) - State University of New York. College of Environmental Science and Forestry. Syracuse, N.Y. 2009.

Walling, Rebecca, MS, January 2011

CO-MAJOR PROFESSOR

MEMBER, STEERING COMMITTEE (other than those listed above)

Arrigoni, Jim PhD (Gibbs)

Diggs, Franklin MS (Yanai)

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

Oakes, Allison PhD (Maynard)

Soka, Geoffrey, PhD (Ritchie) elevated to candidacy Spring 2012, Syracuse University

Walling Dale, MS (Powell)

Zimmern-Kahan, Tiferet (Folta)

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Pandit, Karun (Bevilacqua)

Yan, Jipeng (Liu)

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 (With Jeremy Hayward). NSF-DEB. Preliminary proposal: Investigating the role of biogeography and phylogenetics in invasions of ectomycorrhizal symbionts.

Horton TR (With Jeremy Hayward). NSF Doctoral Dissertation Improvement Grant. Long-Distance Effective Dispersal of Ectomycorrhizal Fungi in Hawaii. \$18,285.

Green M, Pruyn M, Horton T, Yanai R. NSF-DEB. Preliminary Proposal: RUI: Causes of Nutrient-Enhanced Transpiration in Northern Hardwoods: Leaves, Stems, Roots, or Mycorrhizal Fungi?

Walling R, Horton TR, Alteio L. NSRC Graduate Research Grant. The effects of invasive earthworms on soil microbes and extracellular enzyme activity. October 2012. \$10,000.

Walling R, Horton TR, Alteio L. Loewy-Mohonk Preserve Fellowship. The effects of invasive earthworms on decomposition through soil microbe and enzyme activity. December 2012. \$8,898.

I also served as an advisor for the following preproposal:

Segraves, K. NSF-DEB. Preliminary Proposal: Plant polyploidy and the evolution of interactions with arbuscular mycorrhizal fungi.

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

The following were in revision or in press for the 2011-2012 annual report. They are now published.

Hazard C, Lilleskov EA, Horton TR. (2012) Is rarity of pinedrops (*Pterospora andromeda*) in eastern North America linked to rarity of its unique mycorrhizal host? *Mycorrhiza* 22: 393-402.

Hayward J, Horton TR. (2012) Edaphic factors do not govern the ectomycorrhizal specificity of *Pisonia grandis* (Nyctaginaceae). *Mycorrhiza*. 10.1007/s00572-012-0442-2. *Mycorrhiza* 22: 647-652.

LeDuc SD, Lilleskov EA, Horton TR, Rothstein DE (2013) Ectomycorrhizal fungal succession coincides with shifts in organic nitrogen availability and canopy closure in post-wildfire jack pine forests. *Oecologia* 172: 257-269.

The following are new publications.

Kennedy PR, Smith DP, Horton TR, Molina RJ (2012) *Arbutus menziesii* (Ericaceae) facilitates regeneration

dynamics in mixed evergreen forests by promoting mycorrhizal fungal diversity and host connectivity. *American Journal of Botany* 99:1691-1701.

Horton TR, Hayward J, Tourtellot SG, Taylor DL (2013) Uncommon ectomycorrhizal networks: richness and distribution of *Alnus*-associating ectomycorrhizal fungal communities. *New Phytologist* 198(4): 978-980.

The following are in press or provisionally accepted following minor revision.

Dulmer KM, LeDuc SD, Horton TR (in revision) Ectomycorrhizal inoculum potential of northeastern U.S. forest soils for American chestnut restoration: results from field and laboratory bioassays. *Mycorrhiza*.

Horton TR, Swaney DP, Galante TE. (In press) Dispersal of ectomycorrhizal basidiospores: the long and short of it. *Mycologia*.

Núñez M, Hayward J, Horton TR, Amica GC, Dimarco RD, Garcia-Barrios N, Simberloff D. (Accepted) Exotic mammals disperse exotic fungi that promote invasion by exotic trees. *PLOS ONE*.

B. Non-refereed Publications

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

Hayward J, Horton TR. Thelephoroid symbionts of *Pisoniae* are limited to a small group of closely related taxa throughout the range of the plant tribe. *Mycology Society of America Annual meeting*. July 2012, Yale University, Connecticut.

Horton TR, Núñez MA, Rivera Y, Amico G, Dimarco RD, Barrios MN, Hayward J, Simberloff D. On the role of ectomycorrhizal fungi in *Pinaceae* invasions. *Mycology Society of America annual meeting*. July 2012, Yale University, Connecticut.

Giner JL, Ceballos H, Horton TR, Okoniewski JC. 2012. Sterols of the white nose bat fungus. *Planta Med* 78(11), 8th Joint Meeting of AFERP, ASP, GA, PSE and SIF, July 28 - August 1, 2012, New York, New York.

Núñez MA, Hayward J, Horton TR, Amico GC, Dimarco R, Barrios-Garcia N, Simberloff D. Non-native mammals disperse non-native fungi that promote invasion of non-native trees. *Ecological Society of America 97th annual meeting*. August 2012. Portland, Oregon.

Walling R, Horton TR. The Effect of Invasive Earthworms on Soil Nutrient Distribution and Ectomycorrhizal Diversity. 10th Annual Symposium in Plant Biology - War or Peace? Interactions between plants and microbes. October 6, 2012. University of Massachusetts, Amherst, Massachusetts.

Walling R, Horton TR. Earthworms as ecosystem engineers: effects on soil properties and implications for ectomycorrhizal fungi. *Northeast Natural History Conference*. April 13-15, 2013. Springfield, Massachusetts

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

Horton TR. Three things you should not avoid: Death, taxes...and DNA! Or, "Nothing in Biology Makes Sense Except in the Light of (DNA) Evolution. *Central New York Mycological Society monthly meeting*. April 15. ~10 attended (taxes were due at midnight!).

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

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. ~100 attendees.

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.

Scientific advisor – Central New York Mycological Society

Scientific advisory board – Mianus River Gorge Preserve

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

Ecological Society of America

Mycological Society of America

International Mycorrhiza Society

3. Other Professional Activities

a. Editorial activity

Journal (s)
Mycorrhiza

Responsibility
Editorial Board

Other (books, symposia, etc.)

Mycorrhizal Networks: Springer Ecological Studies Series

I am sole editor for this contributed author volume.

I reviewed 10 chapters this year. They have been revised, reviewed again and are now out for external review.

b. Reviewer

<u>Journal(s)</u>	<u>No. of manuscripts</u>
Mycorrhiza	2
Mycologia	1
New Phytologist	3

<u>Agency</u>	<u>No. of proposals</u>
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Other

c. Participation (workshops, symposia, etc.)

<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
FESIN Workshop, North American Mycoflora	July 14-15	MSA annual meeting, Yale

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

D. Foreign Travel (Where, When, Purpose)

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

Faculty mentoring committees: Martin Dovciak, Melissa Fierke, Lee Newman, Sadie Ryan
Promotion and Tenure Committee
Chair - Toxicology Search Committee
Graduate Program Advisory Committee (member through fall 2012)

B. College-level

Academic Research Building Committee

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 (**i.e., three paragraphs total**) 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 (when available), which I'll continue to award based on your contributions to the department and college this reporting period.

Students:

This past fall I had 228 students distributed into 10 lab sections. Every semester I learn so much from the students in this course. I get a lot of mileage out of teaching this course. It is wonderful to get to know each new cohort of ESF students as they pass through this course. I learn a great deal from them and thoroughly enjoy working with them. I also enjoy working with select undergrads as they gain research experience in my lab. Their primary contact is with a graduate student, but I have also get to advise and help them understand the research endeavor. Of course, I am also very engaged in working with my graduate students. Sam Tourtellot successfully completed and defended his master's thesis. The primary chapter on mycorrhizal interactions with transgenic lines of American chestnut is largely ready for submission and will prove useful for chestnut restoration efforts. I also learned that Sam is a great artist. I asked him to draw a mycorrhizal network for an invited commentary I was writing for *New Phytologist*. The next morning a draft figure was on my desk and the editors agreed that it was so effective we should include it in the paper. This created a great mood in the lab as Sam and Jeremy Hayward were coauthors and it was great to see the lab getting press in an international journal. Jeremy Hayward also had a successful year, starting with passing his candidacy exam in the fall. He also took the lead on two grant proposals that were unfortunately not successful (NSF DDIG and NSF Preliminary Proposal, both with the DEB Population and Community Ecology Panels). Rejection is always hard even in these highly competitive funding agencies, but the funding climate is incredibly difficult these days. His preproposal received very good reviews and I feel strongly that the experience will help Jeremy down the line. Jeremy was also a coauthor on two new manuscripts, one in *New Phytologist* on mycorrhizal networks and one in *PLOS ONE* on spore dispersal by mammals that highlighted Dan Simberloff's ideas about biological invasions. Jeremy has also largely taken

the lead on a chapter in my Mycorrhizal Networks book that focuses on specificity interactions between plants and their fungi. Becka Walling (MS) has also been very successful. She was lead author on a number of small to medium sized proposals and some of the successful one are not listed here because they are really hers. She presented her earthworm invasion work at a number of venues this past year that generated phone calls from the press and research community. I am very happy to see how well she mentors undergraduate students in the lab. They are helping her with her project and she is doing a wonderful job giving them real experience. Elisabeth Holmes (MPS) made significant progress on her degree. She has tapped into her excellent artistic abilities and worked with Beth Folta to help design interpretive signage at Clark Reservation. I also had quite an army of undergraduates in the lab this throughout the year and it was great to see the lab so active. I advised two honors students this year. Matt Cleere conducted a phylogenetic study of several putatively novel species from Mexico in collaboration with Tim Baroni at SUNY-Cortland. Jennifer Sun collected a bioluminescent fungus from Taiwan and used molecular techniques and a literature search to demonstrate that it had never been documented in western literature from Taiwan. Lauren Alteio recently received funding for her Honor's thesis that stems from her interest in soil microbial ecology. Caitlyn Muller is pursuing her interest in Forest Health as she uses GIS to map earthworm invasions. Other students have had less interest in doing independent work, but have played a huge role keeping the research and lab running smoothly. It is wonderful to work with this group of motivated graduate and undergraduate students.

Department/college:

I view my primary activity for the department and college as teaching a solid General Ecology course (see student section for some details). It is an incredibly important course and the topic encompasses what most of us do in EFB and at ESF in one form or another. Addressing everyone's interests and needs is not trivial, but I do my best. I also enjoy helping young faculty navigate their first years here in EFB. I am a faculty mentor for several of our newer faculty and I am thoroughly committed to helping all faculty succeed. This is so important I accepted the invitation to serve on the Promotion and Tenure (P & T) committee. The P & T committee had a full slate this year that included reviewing dossiers of several colleagues up for promotion and/or tenure. The P & T committee also spent a considerable amount of time taking a serious look at our criteria and we made an attempt to add some transparency to the process. This is not trivial and is controversial but I strongly believe that this effort will pay off for everyone. Just as important as the work of the P & T committee for our department is the hiring of new faculty. This spring I accepted the charge to chair the Toxicology search committee. I was fortunate to have an engaged and effective committee and department, and we had very strong candidates. I also chaired the awards committee for the Lowe-Wilcox, Zabel, Morrell and Silverborg scholarship awards. I put this here because in addition to being a real treat to honor our best students with these awards, the awards are named in honor our emeritus faculty. The awards ceremony and graduation is probably the best day of the year for me. This year's ceremony was especially poignant for me because of the passing of Dr. Hugh Wilcox this past spring. I am contributing to an obituary with Dr. June Wang and the family and students of Dr. Wilcox to be submitted to the appropriate outlet later this summer.

Self professionally

My papers continue to receive attention and influence the field as evidenced by the high numbers of citations. I had a great year in terms of seeing three papers move from 'in press' to '2012' or '2013'. Even better, I am an author on five new papers that were accepted for publication (one in revision). I also am pleased to note that the journals are strong: New Phytologist, PLOS ONE, Oecologia and American Journal of Botany. Two of these papers were labors of love that have been languishing in vials of DNA in my lab for years. The Kennedy et al. paper incorporates data I collected from my postdoc back in 1998. Similarly, the Dulmer et al. paper reports data from Kris Dulmer's masters project signed off back in 2006. Some things take a while to mature! The project with Dan Simberloff and Martin Nuñez is rolling along nicely and we are peeling off manuscripts now. Jeremy has two that are in the final stages of molecular work and I am confident that new manuscripts will be landing on my desk shortly. The book on Mycorrhizal Networks with Springer (Ecological Studies series) is also moving along nicely. I have received and reviewed most of the chapters. The authors have revised the chapters and I am now soliciting outside reviewers. I will be very happy to bring this big project to a close this coming year.

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)

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2013

a. Course(s) to be offered

b. Proposed research activity

Move forward on the final stretch of the Mycorrhizal Networks book
Manuscripts
Advise undergraduate students as needed
Advise graduate students as needed

c. University, professional society, and public service

Promotion and Tenure committee
Review manuscripts and proposals as requested and time allows
Faculty advisor for the Central New York Mycological Society

2. Fall Semester 2013

a. Course(s) to be offered

EFB 320 – General Ecology
EFB 496 – Advanced Mycology:Basidiomycetes
EFB 797 Section 13 - Translating Sci:Wrt/Broader Audience. Rebecca Walling lead.
EFB 797 Section 18 - A History of Ecosystem Thought. Craig See lead.
Various undergraduate and graduate nonscheduled course offerings including 298, 420, 495, 498, 899, 999.

b. Proposed research activity

Move forward on the final stretch of the Mycorrhizal Networks book
Manuscripts
Revise and resubmit NSF preproposal with Green M, Pruyn M, Horton T, Yanai R. Causes of Nutrient-Enhanced Transpiration in Northern Hardwoods: Leaves, Stems, Roots, or Mycorrhizal Fungi?
Advise undergraduate students as needed
Advise graduate students as needed
Recruit new graduate student(s) for Fall 2014

c. University, Professional society, and public service

Promotion and Tenure committee
Review manuscripts and proposals as requested and time allows
Faculty advisor for the Central New York Mycological Society
Vincent Neil Mushroom Festival at Beaver lake

3. Spring Semester 2014

a. Course(s) to be offered

Various undergraduate and graduate nonscheduled course offerings including 298, 420, 498, 797, 899, 999

b. Proposed research activity

Submit final manuscript for Mycorrhizal Networks book

Manuscripts

Advise undergraduate students as needed

Advise graduate students as needed

c. University, professional society, and public service

Promotion and Tenure committee

Review manuscripts and proposals as requested and time allows

Faculty advisor for the Central New York Mycological Society