ANNUAL REPORT: June 1, 2016 – May 31, 2017
(i.e., Summer 2016, AY 2016-2017)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: William A. Powell

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

Course No.	Title	Credit Hrs.	No. Students	No. of Lab. Sections
SUMMER:				
FALL:				
EFB307	Principles of Genetics	3	191	
EFB307	Genetics Lab	1	189	9
BTC132	Orientation Seminar:	1	19	
EFB797	Impacts, Management, & Mitigation of Emerging Tree Diseases	1	11	
SPRING:				
EFB797	Presenting Research to the Public	1	10	

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.

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

Course No.	Title	Credit Hrs.	No. Students
BTC298	Research Apprenticeship Biotech	5	2
EFB420	Internships in EFB	3	1
BTC420	Internships in Biotechnology	7	3
EFB495	Undergrad Exp/Coll Teach	2	1
EFB498	Research Problems/ EnvBio	3	1
BTC498	Research Problems/ Biotech	13	3
EFB798	Reseach Prob/Env &For Bio	2	1
EFB899	Masters Thesis Research	44	6
EFB999	Dissertation Research	10	1

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

Hosted 4 High School interns over the 2016 summer: Bethany Regan, Nicholas Paciorek, Kyra LoPiccoto (Skaneateles High School students), and Natalia Chalupczak (from a High School in Chicago).

4. Guest Lecture Activities

Course No.	Title	No. of Lectures
BTC426	Plant Tissue Culture Methods	1

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor _22___ and unofficial back-up advisor __65_ (as coordinator of Biotechnology major)___

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

1. Tyler Desmarais, MS, started August 2014
2. Vernon Coffey, MS, started August 2015
3. Yokshitha Reddy Bathula, August 2015
4. Dakota F. Matthews, MS, August 2015
5. Erik Carlson, MS, August 2016
6. Xueqing (Shellie) Xiong, August 2016
7. Andrew Newhouse, Ph.D., August 2015

CO-MAJOR PROFESSOR

MEMBER, STEERING COMMITTEE (other than those listed above)

1. Gabrielle FanFan, MS, Jan. 2014
2. Wenjun Cai, PhD, started May 2011
3. Ashley Pirovano, MS, start ?

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

1. Erich Dvovek (MS defense, Chair)

VISITING SCHOLARS:

III. RESEARCH COMPLETED OR UNDERWAY

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

Starting some preliminary work on Ozark Chinquapin, which was also devistated by chestnut blight. Looking for future funding. Approximately 1% of time.
Research using *Bacillus amyloliquefaciens* and another Endophyte to determine effect on growth of American chestnut. Approximately 1% of time.

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)

1. USDA-Biotechnology Risk Assessment Grant program (BRAG), Evaluating Environmental Impacts Of Maturing Transgenic American Chestnut Trees Relative To Chestnut Trees Produced By Conventional Breeding. Total $500,000, **current year $38,900** (9/1/12-8/31/14 – **no cost extension to 8/31/16**). PI with co-PIs, Dr. Maynard, Dr. Parry, Dr. Briggs, Dr. Nowak, and Dr Tschaplinski (ORNL). Two graduate assistants.
2. Forest Health Initiative. Preparing for Long-term, Landscape Level Studies of American Chestnut Forests – travel and collaborator's conference grant. **$25,000** (10/1/16 – 9/30/17). PI.
3. USDA IR-4 project. Regulatory studies for the transgenic American chestnut. $44,000 total, **current year $15,000** (5/1/15-6/31/17). PI. Asking for a no cost extension to 9/30/17. One ½ time graduate student.
4. New Crowd Funding Campaign, 10,000 Chestnut Challenge. **$130,000 (no term date).** PI.
5. The American Chestnut Foundation, Stanback Grant. The American chestnut research. Total funding $530,000, **current year $250,000** (7/1/16-6/30/17). PI. (being renewed this year, 2017, with possible renewals for 3 more years). Four graduate assistants.
6. New York State legislation line item. American chestnut research and restoration project. Total $200,000, **current year $100,000** (7/1/15 – 6/30/17, renewed this year, 2017, for another $100K). One graduate student. PI.
7. Mississippi Fish & Wildlife, Testing for deregulation of blight resistant American chestnut. Total $120,000, **current year $60,000** (9/1/16-8/30/18). One graduate student. PI.

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

Templeton World Charity Foundation, invited submission, Restoration of the American Chestnut Tree – regulatory preparation. Total $190,000 (8/1/17 – 7/31/18)

Working with the ESF development office and TACF to find donors to the Chestnut Project. Goal is to raise a multi-million dollar endowment to support the chestnut project and establish a **Tree Restoration Center at ESF.**

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

USDA-Biotechnology Risk Assessment Grant program (BRAG), Environmental Impacts of GE and Conventionally Produced American Chestnut. Total $1,000,000. PI with co-PIs, Dr. Parry, Dr. Horton, Dr. Beier, Dr. Folta, and Sara Fitzsimmons (TACF). Submitted and rejected because the priority area was discontinued. We plan to modify this proposal for next year's cycle under a different program area and at the capped $500,000 level and seek the rest of the funding from other sources.

DOE Bioenergy Research Center – 2016 competition. Title: **T**riangle **RE**newable **E**nergy **S**cience – **C**enter (TREES-C) based at North Carolina State University. This was a collaboration between 10 universities and research centers. Total budget was to fall between $15 and $20 million. ESF's portion covered the American chestnut and was calculated to be $1,010,000. I had to withdraw after working for 3 months on the project; mainly due to the NYS governor's travel restrictions to North Carolina that made it impossible to collaborate during the two planning meetings at NC State. Tried to join in by phone, but it didn't work the same as face-to-face meetings with all the collaborators over several days. I haven't heard if the center was funded.

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

Steiner, Kim C., Jared W. Westbrook, Fredrick V. Hebard, Laura L. Georgi, William A. Powell, Sara F. Fitzsimmons. 2017. Rescue of American chestnut with extra-specific genes following its destruction by a naturalized pathogen. New Forests. 48:317-336

Oakes, Allison D., Tyler R. Desmarais, William A. Powell, Charles A. Maynard. 2016. "Ex vitro rooting of American chestnut improves acclimatization survival and plantlet quality". Journal of Environmental Horticulture. 34:75-79.

Chen, Shuangshuang, Yu Xing, Teng Wang, Qing Zhang, Wenya Yu, Kefeng Fang, Andrew E. Newhouse, Linda D. McGuigan, Kristen Russell Stewart, Charles A. Maynard, William A. Powell. 2016. Ectomycorrhizae symbiosis in *Castanea mollissima* improves phosphate acquisition through activating gene expression and H+ efflux. Scientia Horticulturae, 210: 99–107.

B. Non-refereed Publications

Powell, W.A. Nut Production Orchards. Chestnut (The Journal of the American Chestnut Foundation) Fall 2016 Issue, p13.

Interviews leading to **22** (possibly more) popular press articles, blogs, radio and TV shows (there were 38 last year and 31 the year before for a total of 91+ articles in the past 3 years):

The Chestnut Project in the News links (6/3/16 – 5/15/17)

- Penn State Blog: Return of the Ents
- Toronto Star: Science finds a way to bring back the American chestnut tree
- The Winnower: Science AMA Series: ESF American Chestnut Project
- Crop Biotech Update: ESF Scientists Develop Transgenic American Chestnut Trees
- Christian News Today: Science finds a way to bring back the American chestnut tree
- Cape Cod Times: Frontiers in biotechnology hold vast promise
- Cornell Alliance for Science: Restoration forest project will showcase GMO chestnut trees
- ScienceDaily: Mighty American Chestnut poised for return to America's forests
- Mighty American Chestnut Poised for Return to America’s Forests
- ScienceLine: The American chestnut tree has a good shot at making a comeback
- Transgenic News: Transgenic Chestnuts Roasting on an Open Fire
- Phys.org: Spread by trade and climate, bugs butcher America's forests
- Planet Forward: Chestnut revival: How genetics could bring back an American giant
- Genetic Literacy Project: Genetic engineering could help restore endangered trees and boost natural ecosystems
- North Country Public Radio: Can GMOs save the wild American chestnut tree?
- WSKG: Can Science Resurrect The American Chestnut?
- WRVO: Can science help the American chestnut make a comeback?
- Cedar Rapids Gazette: Chestnuts link American past with Iowa future
- National Geographic: How the DNA Revolution Is Changing Us
- Olean Times Herald: Two trees with connections to Flight 93 planted at Nannen Arboretum
- Entomology Today: Can Genetically Modified Trees Save American Forests?
- Genetic Literacy Project: Biotechnology could save trees decimated by invasive insects, disease

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

Note: not listing the many meetings and presentations given by chestnut team members. Just listing my presentations.

1. Using the Tools of Genetic Engineering to Help Save the American Chestnut. 5/31/16-6/3/16. Invited speaker. 2016 North American Forest Insect Working Conference. Washington, DC.

2. Using the Tools of Genetic Engineering to Help Save the American Chestnut. Invited speaker. American Chemical Society 252nd National Meeting, 8/21/16 -8/24/16.

3. Using the Tools of Genetic Engineering to Help Save the American Chestnut. Invited speaker. Cornell Alliance for Science teaching conference. 9/14/16. ~20 international students attending.

4. Where There Be Mountains, There Be Chestnuts. Invited Speaker. Tree Canopy Conference. Haverford, PA. 10/12/16 - 10/13/16

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

1. DEC tours of chestnut project field sites, greenhouses, and labs. 6/8/16 (small group of representatives)

2. Ozark Chinquapin Foundation annual meeting. Presentation: Using the Tools of Genetic Engineering to Help Save the American Chestnut. 7/5/16 – 7/6/16. Tahlequah, OK. ~ 40 attending.

3. U.S. Fish and Wildlife Service (first contacts) webinar presentation: American Chestnut Research & Restoration Project. 9/26/16. ~ 10 attending.

4. Hosted the USDA NE-1333 Chestnut meeting on the ESF campus with presentations and tours. 9/30/16 – 10/1/16. ~ 40 attending.

5. Homer Garden club. Invited speaker. Where There Be Mountains, There Be Chestnuts. 10/6/17. Homer, NY. ~60 attending.

5. U.S. Fish and Wildlife Service, Endangered Species Consultation Branch Coordinators, webinar presentation: American Chestnut Research & Restoration Project. 10/27/16. ~ 10 attending.

6. Updates on the American chestnut Project and presented workshops. Annual meeting of the New York Chapter of The American Chestnut Foundation. 10/28/16 – 10/29/16. Ithaca, NY, approximately 50 attending.

7. U.S. Fish and Wildlife Service, Recovery Branch Coordinators, webinar presentation: American Chestnut Research & Restoration Project. 11/8/16. ~ 10 attending.

8. TACF board meeting – presenting 3BUR report. 11/10/16 – 11/12/16. Louisville, KY. ~ 40 attending.

9. Meeting with U.S. Forest Service and leaders in Natural Resources Conservation Service. American Chestnut Research & Restoration Project Presentation given to FS. 2/8/17. Washington, DC. ~ 25 attending.

10. Webinar/phone conference with the EPA to discuss regulatory procedures. 2/16/17. ~10 attending.

11. TACF Chapter's Science meeting. Presented an update on our chestnut research and discussed implementation of 3BUR agreement. 2/23/17- 2/25/17. Pittsburg, PA. ~ 40 attending.

12. 10,000 Chestnut Crowd-funding Campaign. 3/6/17 – 3/20/17.

13. Reddit "ask me anything". 3/17/17. 1,239 people responded with 89% upvoted.

14. NASA Langley Research Center – two presentations on our American chestnut project. 4/4/17. Hampton, VA. ~ 40 attending.

15. TACF spring board meeting – discuss 3BUR agreement. 4/6/17-4/8/17. Abingdon, VA. ~ 30 attending.

16. Two presentations about the chestnut project at Harvard's Arnold Arboretum. 4/16/17 -4/18/17. Boston, MA. ~ 50 attending.

17. One presentation on the chestnut project and two Q&A sessions at the Indian Nations Leaders Conference. 5/9/17 – 5/10/17. Syracuse, NY. ~ 30 attending.

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):

Served on USDA NIFA Biotech Risk Assessment Grant panel, 6/21/16 – 6/23/16

2. Industrial and Commercial Groups, etc.

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

Advisor to the NY chapter of The American Chestnut Foundation

Science advisory board member of the national American Chestnut Foundation. Chair of the 3BUR committee whose charge is to find ways to integrate biotechnology, biocontrol, and breeding programs.

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
American Phytopathological Society
American Association for the Advancement of Science
International Society for Horticultural Science
American Society for Microbiology

3. Other Professional Activities

a. Editorial activity

Journal (s)	Responsibility
Other (books, symposia, etc.)	

b. Reviewer

Journal(s)	No. of manuscripts

Agency	No. of proposals
USDA APHIS BRAG program – review panel	7
Other	
McIntire-Stennis (ESF)	1
Lowe-Wilcox/Zabel award student proposals	9

c. Participation (workshops, symposia, etc.)

Name of workshop, etc.	Date	Place
Presented		

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

Coordinator for the undergraduate Biotechnology major

Awards Ceremony: Presented the Distinguished Scholar Award in Biotechnology.

B. College-level

Served on the Applied Environmental Tree Physiologist (AETP) search committee which successfully hired an outstanding new faculty member.

Director of the American Chestnut Research and Restoration project

Director of the Council on Biotechnology in Forestry

Roosevelt Wild Life Station Scientist in Residence

IBC (Institutional Biosafety Committee) member

C. University-wide, including Research Foundation

D. Foreign Travel (Where, When, Purpose)

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:
I continue to provide a quality education through my classes such as my large Principles of Genetics course. But this year I decided to try something new and teach a graduate level course on how to present research to the public. I was never trained to do this when I attended graduate school and had to learn it from my 27 years of experience presenting my chestnut research to the general public and teaching large classes. The course went very well and the students were able to turn difficult subjects into presentations meaningful to the general population. But in addition to my direct teaching, probably more important are the "learn-by-doing" opportunities my research provides. The American chestnut project continues to grow and provide hands-on research opportunities for our students as well as giving them the satisfaction of contributing to the historical restoration of the American chestnut. In addition to supporting seven graduate students, the project also provides paid jobs for seven undergraduate students and academic credit based research opportunities (BTC420, 498, EFB420, 498) for eight additional undergraduates. As in previous years, we have also provided four high school students with summer internships. My hope for the future is for this project to expand to rescuing other tree species, which will provide even more opportunities for our students in the future.

Department/College:
Again, the biggest contribution to our department and college is the success of the American chestnut project. One metric that demonstrates the program's growth over the past three years is the annual extramural expenditures. In 2015 it was $161,630, in 2016 it was $203,549, and in 2017 it was $307,854. The size of the project has nearly doubled in three years and has the potential to keep rising. But the impact goes beyond extramural funding. This success brings positive publicity to our college through my pubic and professional presentations with about an equal number given by my students. Popular press articles continue to be high, as they have for the past three years, totaling in over 90 to date. The funding and presentations are cyclical, one leading to another. For example, my TEDx talk three years ago lead initially to a donor giving $30,000 to the project. That same donor is now contributing $250,000 per year. This year I was invited by the Templeton Foundation to submit a proposal, which will likely lead to a $190,000 grant to help with the regulatory process. This invitation only came because the president of the foundation read about the research in a popular press article. Getting the word out sometimes requires taking advantage of new and unique opportunities. For example, last year I wrote an article for The Conversation that initially received over 20 thousand reads. Which was a good initial outcome. But because of a Reddit discussion in January of this year, the number of readers has now jumped to over 71,000. This is great advertising for both our department and college. My hope is that this and other forms of outreach will help ESF to establish itself as a tree restoration center, and support spin-off projects such as the rescue of the Ozark Chinquapin and developing a blight resistant European chestnut in the near future, and working with other trees as the time goes on. Once we have regulatory approval, I hope ESF can establish the first demonstration of a Chestnut/Oak restoration forest planted on ESF property and containing all the species associated with the American chestnut. Our students can follow this forest over the next century, continuously providing research opportunities as it matures.

Professionally:
As I stated last year, nobody on our campus understands the regulatory process for genetically engineered plants, so I have had to take on the task to educate myself. I am doing this along with my Ph.D. student by meeting with the three regulatory agencies in person and through phone conferences and webinars. We are also visiting companies with experience with the review process to gain insights that the regulators might not offer. Lastly, we have sought out several "pro-bono" regulatory consultants to help, with one of the key people being Michael Braverman from the IR-4 project. We have learned that by working with the USDA's IR-4 project, we can avoid $200,000 to $300,000 in EPA

fees. Also, from this "self-education" process, we have learned that you not only need to interact with the federal regulators. But you also have to actively engaged the regulator's advisors in the Forest Service, the Fish and Wildlife Service, the Natural Resources Conservation Service, and hopefully soon the National Park Service. We have also been engaged with the general public and leaders of Indigenous Peoples. This is necessary because we are doing something very new and unique, which is using the tools of genetic engineering to save a species. Because this is new, we have to gain the support of the various stakeholders. I believe we will be successful and will probably help change some of the public's opinion about genetic engineering and how it may be used to benefit the environment. But it will not be easy and there will likely be challenges to overcome as we go forward. But we are ready.

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 2016

a. Course(s) to be offered

I will continue to offer research projects at the graduate, undergraduate, and high school.

b. Proposed research activity

I will continue to work with the government regulators (USDA, EPA, and FDA) to Sheppard the American chestnut tree through the review process.

We are also expanding our seed orchards so that we can mass produce the blight resistant American chestnut trees once we have approval. It takes about 5 years for these orchards to start significant production, so this is the start.

c. University, professional society, and public service

Same high standards as before.

2. Fall Semester 2016

I will be taking my Sabbatical Leave this semester to finalize the regulatory applications and hopefully submit them by year's end. This is not a trivial process and requires hundreds of pages of documentation.

3. Spring Semester 2017 –

a. Course(s) to be offered

EFB797 Presenting Research to the Public.

b. Proposed research activity

I will continue all my research as before and will begin the submission of the blight resistant American chestnut to the Canadian regulators for review.

c. University, professional society, and public service

as before