Research team name: Forest Biodiversity Team

Research team mentors:

Principal Investigator: Jonathan Myers, PhD (Biology), Research Mentor
Faculty page: https://wubio.wustl.edu/myers
Myers Lab: http://www.myersecologylab.com

Post-doctoral research associate: Joe LaManna, PhD (Wildlife Biology), Research Mentor
Research website: http://www.lamannalab.org

Graduate student: Chris Catano, MS (Conservation Biology), Research Mentor
Research website: http://chcatano.wixsite.com/ecology

Graduate student: Dilys Vela, MS (Plant Systematics), Research Mentor
Research website: http://dilysvela.weebly.com

Technician: Becky Roper, MS (Biology), Research Mentor & Field Team Leader

Research focus for summer 2017:

Biodiversity is one of the most striking features of life on earth and has implications for a wide range of issues facing society, including human health, the production of renewable resources, and global climate regulation. However, human activities are profoundly altering biodiversity worldwide through habitat destruction and changes to climate, disturbance regimes, and ecosystem productivity. A key challenge at the interface of ecology and conservation is to predict the effects of human activities on biodiversity and environmental sustainability.

Our research team explores three questions that integrate concepts and approaches from biogeography, community ecology, and conservation:

1. **Biodiversity & Environmental Change**: How does environmental change (e.g., drought, fire & net primary productivity) influence biodiversity at different spatial scales, both within and across trophic levels (e.g., plants, herbivores & pollinators)?
2. **Biogeography, Community Ecology & Conservation**: How do regional changes in biodiversity (e.g., species diversity & trait diversity) influence local community assembly and ecological restoration of human-altered (e.g., fire-suppressed) ecosystems?
3. **Community Assembly from Local to Global Scales**: How do fundamental processes of community ecology (speciation, dispersal, niche selection & ecological drift) interact to determine the assembly, diversity, and dynamics of communities across temperate and tropical ecosystems?

We explore these questions using a combination of field experiments, large-scale and long-term observational studies, and modeling approaches in plant communities spanning temperate and tropical ecosystems. Our research at Tyson Research Center focuses on two projects:

1. A long-term study of tree diversity and dynamics in a large Ozark-forest plot that is part of the Smithsonian Center for Tropical Forest Science-Forest Global Earth Observatory (CTFS-ForestGEO), a worldwide network of 63 temperate and tropical forest-dynamics plots spanning 24 countries: http://www.forestgeo.si.edu
2. A landscape-scale restoration experiment in which we are testing how regional changes in plant species and trait diversity interacts with a pervasive ecological disturbance (fire), environmental variation (net primary productivity & soil resources), and natural enemies (seed predators & herbivores) to create variation in the composition and diversity of native plant communities in human-altered ecosystems.

Skills/techniques/methods:

The large-scale nature of our research projects requires a large and diverse research team. As a member of our team, you will develop field, research, and teamwork skills useful for a wide range of careers:

- **Plant Identification**: At the start of the field season, you will participate in a multi-day workshop on plant identification where you will learn basic plant taxonomy, how to use tree- and seed-identification keys, and how to identify plants in the field.
- **Biodiversity Surveys**: You will learn how to survey tree communities at all stages of forest development including seed dispersal, seedling establishment, tree growth and mortality. You will learn how to: 1) establish permanent tree and seedling plots; 2) tag, identify, measure and map trees and seedlings; 3) survey changes in experimental seedling plots in burned and unburned forests; 4) measure leaf, stem and root traits important for plant growth and survival; and 5) measure variability in environmental conditions including fire heterogeneity, soil moisture, soil nutrients, and light levels.
- **"Big Data"**: You will learn how the data from our projects are being used by scientists to address questions about biodiversity, forest change and conservation, and ecological restoration at local to global scales.
- **Ecological analysis**: You will gain experience with data entry and analysis of large databases using Excel and R.

Research conditions:

Our team will have the opportunity to spend most of the summer working outdoors in the forest! We will also occasionally spend time in the lab and greenhouse identifying seeds collected from the forest, measuring plant traits, and entering data. Although temperatures under the forest canopy are cool relative to more-open habitats, members of our team must be comfortable working outdoors under arduous conditions that include walking across steep terrain, hot/humid weather, working in the rain, and mosquitoes and ticks. All members of our team will receive training in 'best-practices' for fieldwork and field safety. Our overarching goal is for everyone to have a fun and safe field experience!

Team structure and opportunities for independent research:

Our team will consist of ~15 people, including four primary research mentors (Jonathan Myers, Joe LaManna, Chris Catano & Becky Roper), two additional research mentors (seasonal

field technicians), up to six undergraduate students, and four high school research fellows (two in June and two in July). During most of the field season, our entire team will work collaboratively in smaller sub-teams supervised by research mentors. All team members will have the opportunity to experience all of the projects described above. Undergraduate researchers will have the unique opportunity to be near-peer mentors for high school fellows. We encourage motivated students to pursue independent research projects. These can include: 1) data collection, data analyses, and/or data syntheses that lead to a research poster presentation at the Washington University Undergraduate Research Symposium (https://undergradresearch.wustl.edu/symposium); 2) independent research for course credit (BIOL 200 or BIOL 500) in the fall or spring semesters; and 3) senior honors theses that lead to research presentations at professional conferences and/or peer-reviewed publications. Students interested in senior honors theses should contact Jonathan Myers (jamyers@wustl.edu) prior to the start of the field season.