INTERNSHIP - SUMMER 2018

COVER IT UP! USING PLANTS TO CONTROL BUCKTHORN

**Duties:** We are hiring two UMN student interns to take key roles in a suite of ongoing field experiments in the Department of Forest Resources funded through the Minnesota Invasive Terrestrial Plants and Pests Center. The experiments, established in spring 2017 following large-scale buckthorn removals, ask how to use native plant species – both seed mixes in large plots and dense plantings of seedlings/saplings in small plots – to improve restoration and recovery of buckthorn-invaded woodlands and forests. They also assess the role of deer exclusion. Primary duties will be to re-locate the plots and transects; plant buckthorn seeds into the plots and track their performance to measure how the native plantings suppress them; weed small plots; measure light availability and soil moisture multiple times through the season; measure plant species composition; maintain deer fences; and remove fallen trees. The two interns will work as a team, supervised by two post-doctoral researchers.

*Optional independent research opportunities:* The post-docs are willing to mentor interns in independent research projects utilizing the existing experimental design, if the interns choose to. The best funding opportunity for this is the Undergraduate Research Opportunities Program (UROP), due 19 February 2018 for funding in summer or fall 2018. See reverse for project ideas. Interns are welcome to participate in lab meetings of the Forest Ecology research group on the St. Paul campus.

**Dates:** mid May – August 31, 2018, with some flexibility. Extension through October may be possible if not taking a high class load, because we will also recruit a team of two for September-October to re-survey buckthorn abundance in permanent transects and harvest buckthorn seedlings.

**Pay Range:** $11.00 - $15.00 per hour, depending on experience and duties

**Hours:** Approximately 40 hours per week

**Required qualifications:**
- Interest in biology, ecology, forestry, or environmental science
- Dependable, motivated, with integrity and a strong work ethic
- Strong skills in communicating and working with other team members across differences
- Flexible team structure: interns will work as a pair, or with one or both post-docs, for different tasks
- Attention to detail in repetitive work, and diligent adherence to standardized protocols
- Flexible work hours: light readings need uniform sky conditions, and gray days are typically too few, so pre-sunrise or post-sunset readings will be needed on up to 21 days through the season; potentially a few long day-trips to measure buckthorn in a forest diversity experiment at Cloquet
- Willing to work with plants in a wide range of field conditions across the Twin Cities, including varied weather, steep terrain, and biting insects
- Strong organizational skills, and proficiency in Google Drive for data management
- Previous work experience

**Preferred qualifications (not essential):**
- Plant identification skills
- Extensive experience identifying herbaceous and woody plants in Twin Cities area woodlands
- Access to a reliable vehicle to reach the multiple field sites, up to 34 miles from the University of Minnesota St. Paul campus.

**Contact Person/Email:** If you are interested, please send resume/CV directly to:
Mike Schuster & Peter Wragg, Department of Forest Resources, Email: coveritup@umn.edu
Review of applications will begin immediately. We aim to fill the positions by early-mid February 2018.
**COVER IT UP!**
IDEAS FOR ADD-ON PROJECTS, 2018 (OPTIONAL)

*Under which conditions do each forest herb (grass/wildflower/sedge) and woody species do best?*
Performs more detailed species level vegetation surveys to relate the performance of the 33 species seeded in the big plot experiment to canopy & soil characteristics, to enable guidelines for more effective & efficient restoration of diverse and functional woodland understories. Assess woody species by measuring growth rates of native shrubs and trees in the small plot experiment and comparing them with canopy & soil characteristics.

*Do pre-seeding treatments (e.g. raking away leaf litter or woody debris) improve the effectiveness of seeding by increasing seed-to-soil contact?*
Practitioners have different views. Test this using additional small subplots next to the seeding experiment.

*How does an inexpensive mix of low-growing forage grasses compare with the expensive native mix used in the big experiment in terms of suppressing buckthorn regeneration?*
Could the forage grass mix be as effective, or even more effective?

*Does fertilizing with nitrogen advantage buckthorn or herbaceous competitors?*
Buckthorn might be expected to be advantaged over competitors given its fast growth rate in high nutrient conditions. Alternatively, fertilizing could help control buckthorn by promoting herbaceous plants, as has been observed with other woody species in grasslands. Test this using additional small subplots.

*Does planting seeds of native species suppress other invasive species besides common buckthorn (glossy buckthorn, Tatarian & Morrow's honeysuckles, garlic mustard, etc.)?*
Test this by planting seeds of other invasive species (under controlled conditions!) and assessing their performance in plots with and without native seeding.

*Does seeding in the big plots reduce the effectiveness of follow-up herbicide control of buckthorn by obscuring small buckthorns?*
Assess this by measuring herbicide effectiveness and detection probability of buckthorn in seeded versus unseeded plots.

*How does buckthorn fruit production vary with plant size (do the top 20% largest individuals produce 80% of the seeds?) and light availability?*
This could guide managers in which buckthorns to remove first to limit seed production. This project would be done in the fall, at sites where buckthorn has not yet been removed.

*Does the supply of mycorrhizal hosts limit expansion of buckthorn into stands of other trees?*
Mutualisms with soil microbiota are important components of many tree species’ niches, and may therefore play an important role in their dispersal into new habitats. Test this using inoculated soils in the lab.

*Why do we see more buckthorns under oaks than in surrounding open areas?*
Determine the role of shade, propagule pressure, herbaceous competition, and soil moisture on common buckthorn establishment under oaks in grasslands.