

2018 Coweeta LTER Winter Meeting Notes

1-2 February 2018

LTER and NSF Updates (Jackson)

- No discussion at NSF in adding new LTER sites, though did start 3 new ocean sites last year.
- The LTER All-Scientists Meeting (ASM) is Sept 30 – Oct 4 and will be at the Asilomar Conference Center in Pacific Grove, CA near Monterey. NCO will pay up to 7 people from each LTER site. Rhett has funding to increase that to about 17 people to travel to CA. Rhett will let PIs know if, when there is a call for working group members.
- Annual Report – published 30 papers, 2 book chapters, 5 theses and dissertations. Even though Coweeta LTER is being defunded, we are still publishing a lot of papers and graduating students.
- REU proposals – can fund 3-4 REU. Send Rhett a 1 page proposal – guidelines are in email that Rhett sent earlier. Rhett needs proposals by March 26th.
- Wind down gave us 2 years of funding spread over 4 years. Can keep spending money out towards the end of 2020.

Overview of USFS Coweeta Hydrologic Lab activities (Miniat)

- For Coweeta (RWU4353), our mission is to
 - Conduct long-term hydrologic and ecological research
 - Develop knowledge, methods and guidelines to evaluate the effects of natural resource management on forested watersheds
 - Develop a fundamental understanding of the structure and function of forested watersheds
- Staff updates
 - New staff: Dani Thornton (technician with University of Minnesota working on wildfire project); Kai Duan (post-doc with University of Minnesota working with Pete Caldwell on continent-wide “forests to faucets” project); Kyle Coleman (LTER lab technician)
 - Post-doc Sandra Hawthorne and her husband Dave Hawthorne have moved back to Australia (Hawthorne worked with Miniat on forest ecohydrology sap-flow related projects); Stephanie Laseter is now a permanent employee under Jim Vose and works out of the Nantahala District Office
- Budgets keep shrinking
 - In FY16, USFS had a workforce of 32,000 full-time employees and annual budget of \$5.68 billion; R&D comprised 1,746 full-time employees
 - In FY18, the USFS proposed budget from the President reduces the workforce to 30,189 full-time employees with an annual budget of \$4.73 billion, which is a reduction of approximately 17%; R&D would be comprised of 1,554 full-time employees
 - Since 2010, Coweeta has seen its budget shrink from \$3,547,815 to \$2,527,569, which is a reduction of \$1,020,246 or approximately 29% since 2010
 - Soft money now contributes about half of the Coweeta budget, compared to 20% in the 1980s
- Recently completed projects

- Watershed 7 Nitrogen Flux – research examined the long-term nitrogen dynamics in Watershed 7, which was clear-cut in 1977
 - Webster, J.R., Knoepp, J.D., Swank, W.T., and Miniati, C.F. 2016. Evidence for a regime shift in nitrogen export from a forested watershed: biological vs. hydrologic control. *Ecosystems*: 1–15.
 - Jackson C.R., Webster J.R., Knoepp J.D., Elliott, K.J., Emanuel, R.E., Caldwell, P.V., and Miniati, C.F. Unexpected ecological advances made possible by long-term data: A Coweeta example. *WIREs Water*. 2018;e1273.
- Forest mesophication effects on long-term streamflow – research examined weir data and long-term forest plot data from 6 reference watersheds at Coweeta. Research shows that streamflows are declining over time since the 1970s that is driven by species change (mesophication).
 - Caldwell, P.V., Miniati, C.F., Elliott, K.J., Swank, W.T., Brantley, S.T. and Laseter, S.H. 2016. Declining water yield from forested mountain watersheds in response to climate change and forest mesophication. *Glob Change Biol*. doi:10.1111/gcb.13309
- Species changes drive deviation from expected streamflow during old-field abandonment – research compared WS6, which was converted to pasture in the early 1960s, to WS14 (reference). Water yield remains below expected values over 45 years following forest regeneration.
 - Elliott, K.J., Caldwell, P.V., Brantley, S.T., Miniati, C.F., Vose, J.M., and Swank, W.T. 2017. Water yield following forest-grass-forest transitions. *Hydrology and Earth System Sciences* 21: 981-997.
- Cold-air drainage during clear-sky conditions can increase forest NEP by 10%
 - Novick, K.A., Oishi, A.C., and Miniati, C.F. 2016. Cold air drainage flows subsidize montane valley ecosystem productivity. *Global Change Biology* 22: 4014-4027.
- Warmer temperatures reduce NEE but not forest water use – research uses 5 years of eddy flux tower data to show that warmer temperatures reduce carbon uptake and not water use
 - Oishi, A.C., Miniati, C.F., Novick, K.A., Brantley, S.T., Vose, J.M., and Walker, J.T., Warmer temperatures reduce net carbon uptake, but do not affect water use, in a mature southern Appalachian forest. *Agricultural and Forest Meteorology* (in press)
- Soil moisture dynamics may buffer downslope communities during dry years – research showed that daily drawdown of soil moisture was greater in coves, particularly in the dry year. Moreover, overnight soil moisture recovery was greater in the wet year and greater in cove areas.
 - Hawthorne, S.N.D. and Miniati, C.F. 2017. Topography may mitigate drought effects on vegetation along a hillslope gradient. *Ecology* doi: 10.1002/eco.1825
- Fungal communities change along an elevation, N, and moisture gradient – soil samples from the Coweeta terrestrial gradient plots and 3 site in Great Smokies Mountains NP were analyzed for fungi. Results showed that fungal communities differed among location and were correlated with all chemical variables.

Saprotroph abundance increased with elevation and ectomycorrhizae declined with total N and soil pH and increased with total C and PO₄. Plant pathogens increased with total N and decreased with total C.

- Veach AM, Stokes CE, Knoepp J, Jumpponen A, Baird R. 2017. Fungal Communities and Functional Guilds Shift Along an Elevational Gradient in the Southern Appalachian Mountains. *Microbial Ecology* 1-13.
- Projects nearing completion:
 - Cofer, T.M., Elliott, K.J., Bush, J.K., and Miniati, C.F. Rhododendron maximum impedes seed bank dynamics following eastern hemlock loss in riparian forests. *Ecosphere* (in review)
 - Lapham, M.L., Miniati, C.F., Mayfield, A.E., Jetton, R.M., Brantley, S.T., Zietlow, D.R., Brown, C.L., and Rhea, J.R. Shade and hemlock woolly adelgid infestation increase eastern hemlock foliar nutrient concentration. *Forest Science* (in review)
 - Knoepp, J.D., See, C.R., Vose, J.M., Miniati, C.F., and Clark, J.S., Total C and N pools and fluxes vary with time, soil temperature, and moisture along an elevation, precipitation and vegetation gradient in southern Appalachian forests. *Ecosystems* (in review)
 - Bolstad, P.V., Elliott, K.J., and Miniati, C.F., Forests, shrubs and terrain: top down and bottom-up controls on mature deciduous forest structure. *Ecosphere* (in review)
 - Caldwell, P.V., Jackson, C.R., Miniati, C.F., Younger, S.E., Vining, J.A., McDonnell, J.J., and Aubrey, D.P., Woody bioenergy crop selection can have large effects on water yield: A southeastern United States case study. *Biomass and Bioenergy* (in review)
 - Singh, N.K., Emanuel, R.E., Nippgen, F., McGlynn, B.L., and Miniati, C.F. Hierarchical influences of shallow groundwater responses to storms in forested headwaters. *Water Resources Research* (in review)
- New projects
 - Whole-watershed manipulation to facilitate transition from mesophytic dominance to xerophytic dominance using fire. This is the rhodo removal experiment in WS31 (WS32 as the reference). First whole watershed experiment since WS7. See Chelcy if you are interested in using this
 - Caldwell, P.V., Elliott, K.J., Knoepp, J.D., Oishi, A.C., and Miniati, C.F. “Managing forest system diversity to enhance resilience and ecosystem services” Funding by the USDA National Institute of Food and Agriculture (NIFA) Agriculture and Food Research Initiative (AFRI) Foundational Program for a five-year period (2017–2021) is \$494,789.
 - Caldwell et al. 2017-2020. Benefits of water from forested lands across the conterminous US. USDA FS NPL Watershed Science. \$250K.
 - Caldwell et al. 2017-2018. Benefits of state and private forest lands for water supply in the southern US. Southern Group of State Foresters. \$183K.
 - Elliott et al. 2017. Wildfire effects on water quality. The Nature Conservancy. \$6K
 - Caldwell et al. 2017-2020. Managing for resilient forests. The Nature Conservancy. \$41K

- Elliot and Vose. 2017-2018. Effects of 2016 wildfires on vegetation, soils, and streams. WO, FS R&D, Toral Patel-Weynand, Director Sustainable Forest Management Research. \$50K
- Miniat. 2016-2021. Managing and operating ambient air monitoring network (CASTNET V). Clean Air Status and Trends Network (CASTNET), National Atmospheric Deposition Program (NADP). \$28K

Coweeta participation in Little Tennessee Watershed Conference (Love)

- In 1993, the first Little Tennessee Watershed Conference was held in Franklin. It was a two-day conference that featured speakers/participants from the USFS Coweeta Hydrologic Laboratory and the Coweeta LTER.
- This conference served as the catalyst for the formation of the Little Tennessee Watershed Association and the Land Trust for the Little Tennessee; both of these organizations combined in 2012 and the resulting organization is known as Mainspring Conservation Trust
- Love is serving on a planning committee with Mainspring and Forward Franklin, a progressive non-partisan organization based in Franklin, to organize a 25th anniversary watershed conference to be held June 16th, 2018
- Coweeta LTER has been asked to participate; Love has been consulting with Jackson who has agreed help lead a presentation on how humans have impacted water quality in the Little T, including our findings from the intensive and hillslope stream studies. This would be a 45 minute presentation. We have also been asked to co-lead a presentation with the non-profit Mountain True, on how climate change might impact our region.
- Love will follow-up with PIs to see if others might be interested in participating in this conference

Status and Planning of Non-Archived Datasets (Herndon)

- CWT has 196 datasets in the EDI Data Portal and 223 datasets in the Coweeta LTER site database
- Differences in numbers due to embargoed datasets and datasets that are incompatible with EDI database requirements
- Project final repository of 240-250 datasets
- Embargoed datasets have only the metadata that are publicly available
- There are currently 23 embargoed datasets and all but 1 are from the Hillslope and Intensive Sites Study
- Majority of these have data collections that ended in 2013 and some as far back as 2011
- NSF policy states that data needs to be made publicly available after 2 years of data being collected but doesn't address turnaround time of lab analyses and QA/QC
- Herndon will contact PIs individually for outstanding and expected datasets
- Existing and ongoing data collections of active projects:
 - Rhodo removal study – need to discern between USFS and LTER data and determine whether any project data will be processed and released before the end of the wind-down
 - Sensor Network Data – will be determined by working group. Data are already available to public through the streaming data portal

- Graduate Student Data – will generate a list of current (or future) student research and anticipated completions
- All available data will be needed by the end of 2018 due to time needed for data processing and inevitability of staff and PI attrition
- The Coweeta LTER website will not be active after the grant period is over
- LTER Network Communications Office (NCO) or Georgia Coastal Ecosystems (GCE) will host final static webpages
- Final webpage should encompass breadth of the nearly 40 years of Coweeta LTER research
- Potential content of final web pages:
 - History/timeline of research
 - Research and findings through the major themes
 - Arranged by LTER five core areas of research?
 - List of core datasets
 - List of significant publications
 - List of all PIs, students, staff, and others who contributed
 - Schoolyard and other outreach summary
 - Gallery of pictures

Presentations

- Warming temperature homogenizes landscape vegetation patterns at the catchment scale (Hwang)
- Competition for hillslope water: green and blue water (Band)
- Strong soil microbial response to *Rhododendron maximum* removal (Osburn)
- Chemistry data from the intensive and hillslope sites. What are we going to do with all these data? (Webster)
- The paradox of low baseflow DIN in Watershed 7 (Jackson)
- Nitrogen fixation facilitates forest recovery after repeated disturbances. Soils and watersheds exhibit long memories of nitrogen fixation by *Robinia* (Wurzburger)
- Warmer temperatures reduce net carbon uptake, but do not affect water use in a mature southern Appalachian forest (Oishi)

Break-out sessions

There were two primary break-out sessions: *Rhododendron* removal and Hillslope. The Hillslope group focused on much of their time on figuring out which 3 hillslope sites (representing ag, developed, and forest) should be incorporated into the RHESSys modelling.