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Preview of Award 1637522 - Annual Project Report

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Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1637522
Project Title:	LTERR: Examining Long-term Southern Appalachian Ecosystem Dynamics through Interactions and Indirect Effects
PD/PI Name:	C R Jackson, Principal Investigator Nik Heynen, Co-Principal Investigator John C Maerz, Co-Principal Investigator Nina Wurzburger, Co-Principal Investigator
Recipient Organization:	University of Georgia Research Foundation Inc
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Submitting Official (if other than PD\PI):	C R Jackson Principal Investigator
Submission Date:	02/08/2018
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	C R Jackson

Accomplishments

* What are the major goals of the project?

During the wind-down funding period, following NSF's decision to discontinue funding CWT, our particular goals are as follows:

- 1) completing projects that were ongoing but not completed at the time of the decision to terminate CWT (most notably the rhododendron removal experiment described in the 2014 and 2016 proposals);
- 2) supporting the ongoing graduate students to help them complete their degree projects;
- 3) continuing our most important long-term core data collections for approximately two additional years;
- 4) continuing the monitoring of the Regional Observation Network which became fully operational in the Spring of 2016 in order to collect enough data to make this investment useful;

- 5) synthesizing existing CWT datasets;
- 6) removing field monitoring supplies and equipment from the forests and streams of the study area;
- 7) transferring our data to publicly-available long-term repositories;
- 8) Developing static web pages to describe the CWT LTER after NSF-funded activities cease; and
- 9) Continuing our Schoolyard and REU programs.

Most of the PIs named in the 2016 proposal are no longer receiving funding from the CWT LTER, but many continue to do research within the broad research question that has defined CWT as follows.

How do natural disturbances, topography, climate variability, and human activities interact with ecological processes and ecosystem states in temperate montane deciduous forests?

In this report for 2017, we broadly summarize many accomplishments under the specific wind-down goals and continued research addressing the broader guiding question.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

In 2017, CWT investigators and their graduate students published 30 journal articles, two book chapters, and five dissertations or theses. Select findings from these publications will be highlighted in the “significant results” section below. We delivered 19 conference presentations or posters, including presentations at AGU, EGU, ESA, the Annual meeting of the American Ornithological Society, and the Geological Society of America Annual Meeting. We gave 42 tours of the Coweeta Hydrologic Laboratory, and hosted and conducted scientific workshops.

We accomplished the following activities as specified in the wind-down objectives listed previously.

1. We continued the previously planned monitoring and data analysis for the rhododendron removal project outlined in the 2014 proposal. As part of the rhododendron removal study, we continue to support three graduate students as well as part-time technician support. All planned treatments of the rhododendron removal study have been completed except for the “burn-only” riparian treatment for which burn conditions have never been appropriate. Functionally, this has left us with two reference stream segments to go with the “cut and burn treatment” and the “cut and remove” treatment for rhododendron. We also continued to fund or partly fund several graduate students and technicians working on other ongoing research projects including the RHESys modeling of several regionalization questions, the monitoring of focal bird species, and the assessment of temporal and spatial variability in ecosystem services.
2. We continued monitoring of our core datasets, and we developed a timetable and plan for the removal of sensor networks and for the transfer of certain sensor networks to the USFS.
3. We continued monitoring of the Regional Observation Network (RON), which went operational in the spring of 2016, and will maintain the RON through the end of the wind-down period in order to acquire the longest possible dataset for analysis.
4. We conducted syntheses of long-term climate, streamflow, and water chemistry data from CWT, and we participated in cross-site data syntheses to evaluate large-scale spatial patterns in ecological processes. E.g. Jennifer Knoepp is leading efforts to use long-term soil data from the gradient sites to assess variation in carbon and nitrogen inputs and pools along an elevation, precipitation and vegetation gradient in southern Appalachian forests and working with ORNL and the University of Mississippi to characterize how fungal guilds and community composition vary across environmental gradients in the southern Appalachian Mountains. Jackson et al. (2017) revisited the lengthening post-harvest records from the 1977 Watershed 7 clearcut experiment to glean new insights.
5. Fourteen new datasets and five long-term existing datasets were processed and uploaded to the LTER Network data repository. These datasets encompass research from sensor stations, project investigators, and graduate or undergraduate researchers. The information management team began working on the development of static web pages that will document the history of Coweeta LTER.

6. The CWT Schoolyard Program held 14 events serving 1140 Middle and Elementary School students from 13 different schools or youth organizations in the region. The Schoolyard Program includes field-based environmental education and classroom support for teachers and students. Our REU program provided summer field-based research experiences for four undergraduate students.

Beyond these activities specific to the wind-down period, CWT researchers also pursued many lines of research motivated by our overarching question, *“How do natural disturbances, topography, climate variability, and human activities interact with ecological processes and ecosystem states in temperate montane deciduous forests?”*

Paul Bolstad collected forest inventory and remotely sensed data on overstory forest structure (LAI, biomass, species) to evaluate how forest traits vary with respect to terrain and soil moisture. He is collaborating with the rest of the regionalization group to model how terrain and vegetation interact to affect basin-scale transpiration and streamflow. Larry Band and Taehee Hwang and their students refined the RHESys ecohydrologic model and employ it to assess how vegetative composition, species traits, climate change, and land use change will alter hydrologic fluxes at regional scales. Ryan Emanuel continued to analyze archival and new stream and shallow groundwater samples for stable isotopes of H and O. His group analyzed and interpreted datasets to characterize plant and soil water sources (recent precipitation versus groundwater) and relative ages. The group also continued to analyze and interpret multi-year time series of shallow groundwater levels to understand how storm characteristics influence hydrologic responses in Coweeta watershed. David Leigh collected floodplain stratigraphy to reconstruct paleoflood records, with interest in how floods change through time and how changing flood regimes affect the region. Leigh and Ted Gragson continued research comparing human impacts on mountain landscapes in the Pyrenees with landscapes of the southern Appalachians having very different histories and time lengths of human influence.

Kim Novick conducted intensive campaigns to collect leaf-level, species-specific observations of carbon uptake and water use from dominant species in the Coweeta flux tower footprint, and from the dominant grass species in the newly installed Rabun Gap pastureland flux tower sites. Kim also served as a steering committee member for a workshop designed to identify synergies between LTER and NEON; this workshop is supported by an NSF grant (PI Peter Groffman). Kim also organized a workshop (held at Coweeta) attended by observationalists and modelers interested in using ecosystem-scale flux observations to better understand energy and carbon cycling in the Southeastern US. A key product emerging from this workshop is a synthesis of southern pine flux tower observations.

Jennifer Fraterrigo continued to evaluate questions regarding how hemlock mortality has affected soil carbon storage. Under the wind-down funding, Jennifer and graduate student Matt Candeias are studying how forest understory herbs respond to climate variability. They are using a trait-based framework, field observations, field transplant experiments, and integral projection modeling, to enhance understanding of how the functional characteristics of individual species and understory communities vary with climate and how this variation affects fitness. Major activities for this project year involve collection of plant trait data in the field, and statistical modeling of traits with respect to gradients of moisture and temperature.

Robert Warren and his students investigated the role of ants in southern Appalachian ecosystems, focusing this past year on the response of ant communities to rhododendron disturbance and the distribution and thermal tolerance of a non-native ant, particularly in high-elevation habitats.

Meredith Welch-Devine and Brian Burke continued work to understand how local residents perceive biodiversity change, specifically whether knowledge and perceptions of local biodiversity influencing understanding of global environmental change.

We have completed the final draft text for a children's book to add to the LTER Schoolyard Series. "Shady Stream, Slippery Salamanders" follows the adventures of two young boys as they search for salamanders in the southern Appalachian Mountains. They team up with a fisheries biologist and an LTER graduate student to learn how shade and vegetated riparian corridors benefit the aquatic ecosystem. The book is guided by CWT research. To publish the book we are partnering with Mainspring Conservation Trust which received a TVA grant providing approximately \$13,500 to help pay the illustrator and designer.

Specific Objectives: Within the larger research question guiding CWT research, our research groups and individual researchers are currently motivated by many specific objectives, hypotheses, and questions. Among these are the following.

We seek to understand how species-specific water use strategies determine the sensitivity of tree productivity and water use to variations in soil moisture content and atmospheric humidity. Understand the sources of variability (in space and time) of ecosystem carbon uptake and water use in the highly productive southeastern US. Specifically, how will increasing temperature and increasing variability in precipitation observed in the southern Appalachians affect primary productivity, carbon sequestration, and water use in managed and unmanaged forests? How is forest structure and water use mediated terrain-driven micro-environmental variation? How does hillslope vegetation influence the translation of rainfall to runoff in a steep and humid environment? To assist with these questions, we seek to develop remotely-sensed estimators for overstory species composition and density, soil moisture, and understory density.

We hypothesize that Rhododendron removal will alter ground and stream energy budgets, community composition, trophic dynamics, and rates of nutrient cycling, primary production, and decomposition. Specifically, sunlight penetration and nutrient mobility will increase in both terrestrial and stream ecosystems.

We continue to develop an ecohydrologic model, RHESys, along with associated ecological and biogeochemical models, to improve our ability to extrapolate findings from specific ecological experiments and observations to the region. Incorporate spatial biodiversity of Coweeta watersheds derived from plot measurements and spatial extrapolation in models of patch, hillslope and catchment spatial and temporal patterns of coupled water, carbon and nutrient cycling. We will employ the Terrestrial Regional Ecosystem Exchange Simulator (TREES), to incorporate impacts of different xylem anatomy and stomatal functions traits on patch, hillslope to watershed ecohydrologic function, under limiting soil moisture and vapor pressure conditions, and extension and testing of coupled terrestrial/aquatic nutrient cycling modules

We seek to improve access to regional ecohydrologic modeling capabilities. Therefore we are developing web services for multiple CWT researchers and collaborators to operate RHESys from cloud platforms, facilitating interaction and synthesis. Furthermore, we are regionalizing the RHESys models to watersheds covered by the soil moisture network.

We seek to identify and characterize the drivers of population dynamics of cool-adapted bird species in the Southern Appalachians, at the southern edge of their ranges. Our work has the more specific objective of discovering causes for declines in these species. A number of competing hypotheses are under investigation, but because populations of most of these species are not declining at the core or northern edge of their ranges, a number of our hypotheses point to climate change as an ultimate causal factor.

Through construction of paleo flood records and analysis of regional USGS data, we seek to understand how floods, as disturbances on aquatic ecosystems, are influenced by human activities and climate variability in the Appalachian Mountains. We ask how various human activities manifested at watershed and reach scales affect the geomorphic template of stream habitat.

In this exurbanizing landscape, our objective is quantify the impacts of habitat fragmentation, climate, land-use change, and non-native species on native species in the Southern Appalachian region. We hypothesize that aquatic communities in the Southern Appalachian region are homogenizing over time in response to riparian forest removal, nutrient subsidies, increased sedimentation, and climate change.

To predict how plant communities will respond to climate change, we seek to characterize trait-environment-fitness relationships for understory herbs in the southern Appalachian Mountains. Intraspecific variation, which includes phenotypic plasticity, may play an important role in plant responses to environmental variation, yet most studies examining trait-environment relationships assign a single, fixed mean trait value to each species.

We seek to understand how ecosystem level response to disturbance, both long-term

disturbance (climate and atmospheric deposition) and shorter-term (tree mortality and wildfire), affect nutrient cycling in terrestrial and aquatic environments.

We seek to examine and characterize lay observations of biodiversity change, the ways that people are using these place-based observations to understand climate change, and the possibilities that people envision for adaptation. Recognizing that plants and animals are central to people's experiences of their environment, this research uses biodiversity as a window onto broader environmental and climate change.

Significant Results:

With 30 journal articles and 5 theses published last year, CWT research findings are too numerous to summarize in 8000 characters, so here we highlight select findings from published and as-yet unpublished ongoing research.

Forest compositional changes in the southern Appalachians continue to reflect forest mesophication and species invasion (Elliott et al. 2017). CWT researchers advanced our understanding of how soil and watershed biogeochemistry respond to such changes in forest composition. Wurzburger and Brookshire (2017) experimentally tested the hypothesis that N acquisition by arbuscular (AM) and ectomycorrhizal (ECM) fungi would lead to different soil carbon stocks using mesocosms with mineral soils spiked with ^{13}C and ^{15}N enriched organic matter. Mycorrhizal stocks explained more variance than did species, and AM seedlings significantly reduced soil C and N relative to the control. Craig and Fraterrigo (2017) tested the hypothesis that the invasive *Microstegium vimineum*, now common in the region, outcompetes native plants and accelerates soil N and C cycling. They found evidence of both, with *Microstegium* enhancing microbial N demand, leading to increased flux of organic to inorganic N with reduced soil carbon. Ongoing research by our regionalization group is revealing bottom-up controls of ericaceous understory species on overstory forest structure. This varies across terrain, with greatest impacts on ridges and at lower elevations, and lowest impacts in coves and at higher elevations. Incorporation of the spatial distribution of forest canopy biodiversity in terms of water use traits provides a significant improvement of runoff and soil moisture simulation.

Hillslope position strongly affects soil chemistry and fungal communities (Veach et al. 2017). Hawthorne and Miniati (2017) found that trees in cove positions were buffered against drought effects. Taehee Hwang's group related a nearly 30-year Landsat Thematic Mapper image record, spanning a period of recorded warming since the mid-1980s, to hydrologic behavior. All hydrologic metrics clearly indicated increased localized water use and subsequent decreased hydrologic connectivity at the catchment scale. Contrary to expectation, upslope vegetation showed greater response to warming. This study suggests that drought conditions decrease downslope subsidies in a nonlinear manner.

Jennifer Fraterrigo is finding that community-level interspecific variation along environmental gradients studied is much greater than intraspecific variation, indicating that changes in trait composition of understory herbs in the southern Appalachian Mountains are largely driven by species turnover. Plants growing on north-facing slopes exhibit considerably more variation in functional trait values than plants growing on south-facing slopes. Soil temperature and moisture, were strong predictors of trait distributions on south-facing slopes but not north-facing slopes. This suggests that harsh climatic conditions act as strong filters on understory plant communities.

CWT researchers continue to pursue questions about how forest composition affects basin-scale evapotranspiration and streamflow. Analyzing LT data, Chris Oishi is finding annual evapotranspiration is relatively consistent in mature, mixed-species deciduous southern Appalachian forests, despite high interannual variability in precipitation. Thus variability in precipitation translates directly into changes in streamflow. In contrast, interannual variability in net ecosystem carbon uptake is high. During recent warm years, carbon uptake was reduced by ~40% compared to cooler years, due to higher respiratory losses. While increasing precipitation variability will likely affect forest water use and total photosynthesis only during extremely dry years, increasing temperatures will likely reduce net carbon sequestration by these forests (Oishi et al., In Press). Kim Novick and student Justine Missik have found that branch excision lowers gas exchange rates of mature deciduous trees. It is common practice to excise branches from tall trees in order to perform leaf-level gas exchange measurements, with the assumption that branch cutting does not affect the fluxes themselves. This research

shows significant excision-related biases are widespread across species and biomes (Missik et al. under review).

CWT researchers engaged in several efforts to synthesize existing LT data. Burt et al. (2017) reinforced earlier findings of increased rainfall variability in the region, and Daly et al. (2017) used spatially intensive precipitation measurements to validate the accuracy of the PRISM spatial model of rainfall that CWT researchers frequently use to assess precipitation gradients across the region. Scaife and Band (2017) examined stormflow response thresholds using LT flow data from three reference watersheds varying in elevation and drainage area. These thresholds exhibited non-stationarity, particularly during the growing season, suggesting that hydrologic responsiveness was a function of forest canopy response to water stress.

Ryan Emanuel is similarly finding that storm intensities and magnitudes must exceed a high threshold before eliciting a shallow groundwater response. Storm characteristics are changing in the southern Appalachian Mountains, and this work suggests that hydrologic responses will respond in nonlinear fashion. Approximately two-thirds of root zone water (0 - 60 cm) is less than about two months old. As inter-storm periods lengthen in the southern Appalachian Mountains, shallow rooted plants could be the first to experience stress and death, and the data suggests that 2 months represents an ecologically important drought duration.

Streams in the study region are experiencing N subsidies, warming due to riparian forest removal, and potentially increasing late summer drought frequency. Experimentally elevated stream N concentrations accelerated leaf litter breakdown and produced greater energy fluxes to higher trophic levels, with ramifications for the availability of early fall basal resources (Bumpers et al. 2017; Kominoski et al. 2017; Manning et al. 2017). Experimental reductions in streamflows revealed higher leaf mass loss rates in wet sections, so that reach-scale mass loss was lower and winter shredder densities were higher in manipulated reaches (Northington and Webster 2017). Streamflow changes associated with climate change will alter aquatic ecosystem processing of leaf inputs.

CWT participated in a X-site synthesis of temperature sensitivity of leaf litter breakdown in streams and rivers that indicated temperature increases of 1-4C would increase leaf litter breakdown rates by 5-21%, less than predicted by metabolic theory (Follstad Shah et al. 2017).

Martin et al. (2017) used the RHESSys ecohydrologic model to investigate the joint effects of climate and land use change on regional streamflows, finding that increased precipitation will lead to increasing streamflows, with climate change effects masking land use change except at high levels of urbanization.

Ongoing bird surveys indicate black-throated blue warbler populations at CWT have declined over a fifteen year period while Hubbard Brook populations remained stable. Coweeta declines were characterized by low recruitment of new breeders, an aging population, and lower realized survivorship because of older age structure. Hubbard Brook populations were maintained by high recruitment of new breeders despite lower average survivorship. Future work will focus on hypotheses concerning physiological thresholds and spatio-temporal variation in food resources. Bird nesting accelerated the dispersal of grasses, including invasive grasses (Warren et al. 2017). CWT researchers are also finding *Solenopsis invicta*, the southern fire ant, can acclimate and persist in high-elevation mountain habitats which were believed to be too cold for the warm-adapted species.

Key outcomes or Other achievements:

*** What opportunities for training and professional development has the project provided?**

The CWT LTER Schoolyard program directly engaged with 1,140 students and adults from North Carolina and Georgia on 14 separate occasions and from 13 different schools/organizations. CWT LTER Schoolyard program coordinated and led the 8th annual "Migration Celebration" where we collaborated with the non-profit Southern Appalachian Raptor Research (SARR) and Mainspring Conservation Trust to lead 332 6th grade students from Mountain View Intermediate in activities concerning migration, including tagging Monarch butterflies, banding migratory songbirds, and learning the different strategies that animals use to cope with scarce resources. We pull in research from the CWT LTER program, particularly the long-term songbird demography work of Robert Cooper as part of the lessons for this field trip. We also continued our Kids in the Creek events for surrounding counties. These field trips meet 8th grade science

curriculum standards, focusing on the hydrosphere and water quality as part of the North Carolina Standard Course of Study (see competency goal 3: <http://www.ncpublicschools.org/curriculum/science/scos/2004/21grade8>). We had our first Bioblitz event at South Macon Elementary for 95 4th grade students. The event was a big success and helped to introduce students and teachers to their schoolyard environment. Mainspring Conservation Trust and SARR assisted with this event. The Science Study Boxes continued to be utilized by local teachers and were checked out a total of 10 times during the 2017 calendar year, serving 1,903 students. Three undergraduate students from Bennington College completed a 1 ½ month internship at Coweeta. The students helped measure trees on the terrestrial gradient plots and helped collect and process forest floor and soil samples on the rhododendron removal plots. We hired a local high school student, Rosie Young, as a summer research intern. Rosie took part in hands-on research at Coweeta, from measuring trees and collecting leaf litter samples, to learning how to make and install sap flow probes. Rosie is now a 5th year student at Macon Early College, where she will graduate with both a high school diploma and an associate degree from Southwestern Community College.

USDA Coweeta scientists and Coweeta LTER staff led a total of 42 tours at Coweeta Hydrologic Laboratory, reaching a total of 608 individuals. These tours included 18 university and college groups (203 individuals), 2 high school groups (25 individuals), and 3 K-8 school groups (229 individuals).

In the summer of 2017, Kim Novick co-organized and CWT hosted Flux Course, a two-week workshop for early career scientists studying land-atmosphere interactions. (www.fluxcourse.org). Flux Course is attended by a number of graduate students and post-docs with connections to environmental observation networks, including LTER. In addition to providing students with the opportunity to learn state-of-the-art observation and modeling approaches, it also gives them the chance to growth their own personal network of future colleagues and collaborators.

Larry Band taught a joint advanced undergraduate/graduate course in Watershed GIS in Spring 2017. Term projects made use of the Jupyter notebook implemented RHESys model and students carried out original research on the record 2016 drought on ecosystem processes and soil moisture patterns.

A PhD. student incorporated and extended cloud based RHESys modeling, and integration of RHESys with TREES model to investigate the impact of soil moisture stress on xylem conductance, and resulting effects on seasonal transpiration and runoff generation. Experience was gained with python based Jupyter notebooks, and with models of stem anatomy and canopy feedbacks in carbon and water cycling. Post-doctoral student developed and carried out numerical experiments coupling terrestrial biodiversity in water use traits, and in cascading impacts of terrestrial and aquatic nitrogen cycling. The students developed conference presentations, training material for others to use these systems, and journal manuscripts from the research.

Our investigators trained numerous graduate students, undergraduate students, and technicians in the course of conducting their research.

*** How have the results been disseminated to communities of interest?**

Coweeta LTER research has helped informed the “Shade Your Stream” educational campaign being led by Mainspring Conservation Trust and other regional watershed organizations. These organizations maintain a website to help educate landowners about the importance of maintaining shade in the form of trees and vegetation along riparian corridors: <http://shadeyourstream.org/> CWT LTER is partnering with Mainspring Conservation Trust and Forward! Franklin, a non-partisan organization whose mission is to “promote social justice and progressive values through education, advocacy, and political action,” to organize a conference/forum concerning the upper Little Tennessee River. The first such conference was held 25 years ago to help identify threats to the river, as well as opportunities to expand sustainable uses of the river. The conference is scheduled for June 16th and Coweeta LTER researchers will be involved as both presenters and forum participants.

Matt Candeias (Univ. of Illinois graduate student on the project) engages in several outreach activities. He has given presentations to local groups about plant biodiversity and bird-pollinated plants. He also shares his knowledge and appreciation for plant diversity via his blog "In Defense of Plants" and podcasts (<http://www.indefenseofplants.com>).

Our bird researchers presented a number of public presentations to lay audiences interested in nature and especially birds. The information presented increased awareness of the eastern hardwood forest ecosystem and its components. Abernathy, H.A. Learning From the Past: Examining How Historic Hydroclimate Impacts Current Songbird Abundance in Southern Appalachia. Featured Presentation, Georgia Ornithological Society Winter Meeting, Tybee Island, GA. February 13-16, 2017. Chitwood, R.W., R.B. Chandler, J.L. Hatt, M.H. Cline, K.W. Stodola, and R.J. Cooper. 6 Oct 2017. A Bird's Eye View of Climate Change: Black-throated Blue Warblers at the warm edge of their range. Georgia Ornithological Society Fall Meeting*, Jekyll Island, GA. Chitwood, R.W. and S.A. Merker, R.J. Cooper, and R.B. Chandler. 2 Feb 2017. Range shifts and migratory songbirds in the southern Appalachians. Oconee Rivers Audubon Society October Meeting*, Athens, GA. Cooper, R. J., R. W. Chitwood, R.W., R.B. Chandler, J.L. Hatt, M.H. Cline, and K.W. Stodola. 14 Sept 2017. A Bird's Eye View of Climate Change: Black-throated Blue Warbler populations in the Southern Appalachians. HighlandsBiological Station Zahner Conservation Lecture.

In the past year, our site staff has compiled the first comprehensive list of vertebrates for the 5,400 acre Coweeta Hydrologic

Laboratory. Site Manager Jason Love started the process of searching museum records, online data sets, publications, and online citizen science databases such as eBird to inventory vertebrate species that have been found at Coweeta. Camera traps were installed as part of the North Carolina Candid Critters project to document large to medium-sized mammals that are found at Coweeta. Mr. Love plans to publish this work in a regional journal such as *Southeastern Naturalist*

The Coweeta Hydrologic Laboratory provided site tours to increase public knowledge about current CWT science and role of long-term research at Coweeta, including historical importance of this work at local, regional, and global scales. In addition to formal tours, different groups of individuals stop by the Coweeta office at an approximately weekly basis to inquire “what goes on here?” Our on-site presence helps to explain the overview of work, the role of the Forest Service and university collaborators associated with the LTER, the sources of funding and numbers of people employed.

*** What do you plan to do during the next reporting period to accomplish the goals?**

A core group of investigators remains committed to place-based research in the southern Appalachian Mountains. We will continue to facilitate their activities and continue to hold two CWT investigator meetings each year. The Scientific Advisory Committee will continue to prioritize resources and efforts.

Products

Books

Gergel, S. E. and M. G. Turner (2017). *Learning Landscape Ecology A Practical Guide to Concepts and Techniques Second*. Gergel, S. E. and M. G. Turner. Springer. New York, NY. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: 10.1007/978-1-4939-6374-4

Book Chapters

Baker, M.A., and J.R. Webster (2017). Conservative and Reactive Solute Dynamics. *Methods in Stream Ecology Third*. 2. F. Richaerd Hauer, Gary A. Webster. Academic Press. 129. Status = PUBLISHED; Acknowledgement of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: San Diego, CA.

Leigh, D.S. (2017). Holocene anthropization of mid-elevation landscapes around Pic d'Orhy, Western Pyrenees. *Archaeology Of Mountain Landscapes: Interdisciplinary Research Strategies of Agro-Pastoralism 1*. 1. SUNY Press. Binghamton, New York. . Status = UNDER_REVIEW; Acknowledgement of Federal Support = Yes ; Peer Reviewed = Yes

Inventions

Journals or Juried Conference Papers

View all journal publications currently available in the [NSF Public Access Repository](#) for this award.

The results in the NSF Public Access Repository will include a comprehensive listing of all journal publications recorded to date that are associated with this award.

Veach, Allison M. and Stokes, C. Elizabeth and Knoepp, Jennifer and Jumpponen, Ari and Baird, Richard. (2017). Fungal Communities and Functional Guilds Shift Along an Elevational Gradient in the Southern Appalachian Mountains. *Microbial Ecology*. . Status = Deposited in NSF-PAR [doi:10.1007/s00248-017-1116-6](https://doi.org/10.1007/s00248-017-1116-6) ; Federal Government's License = Acknowledged. (Completed by Jackson, null on 12/05/2017) [Full text](#) [Citation details](#)

Tor-ngern, Pantana and Oren, Ram and Oishi, Andrew C. and Uebelherr, Joshua M. and Palmroth, Sari and Tarvainen, Lasse and Ottosson-Löfvenius, Mikael and Linder, Sune and Domec, Jean-Christophe and Näsholm, Torgny. (2017). Ecophysiological variation of transpiration of pine forests: synthesis of new and published results. *Ecological Applications*. 27 (1) 118 to 133. Status = Deposited in NSF-PAR [doi:10.1002/eap.1423](https://doi.org/10.1002/eap.1423) ; Federal Government's License = Acknowledged. (Completed by Jackson, null on 11/29/2017) [Full text](#) [Citation details](#)

Burt, T. P. and Ford Miniati, C. and Laseter, S. H. and Swank, W. T.. (2017). Changing patterns of daily precipitation totals at the Coweeta Hydrologic Laboratory, North Carolina, USA: COWEETA DAILY RAINFALL. *International Journal of Climatology*. . Status = Deposited in NSF-PAR [doi:10.1002/joc.5163](https://doi.org/10.1002/joc.5163) ; Federal Government's License = Acknowledged. (Completed by Jackson, null on 11/29/2017) [Full text](#) [Citation details](#)

Baas, Peter and Knoepp, Jennifer D. and Markewitz, Daniel and Mohan, Jacqueline E.. (2017). Areas of residential development in the southern Appalachian Mountains are characterized by low riparian zone nitrogen cycling and no increase in soil greenhouse gas emissions. *Biogeochemistry*. 133 (1) 113 to 125. Status = Deposited in NSF-PAR [doi:10.1007/s10533-017-0318-9](https://doi.org/10.1007/s10533-017-0318-9) ; Federal Government's License = Acknowledged. (Completed by Jackson, null on 11/29/2017) [Full text](#) [Citation details](#)

Graves, Rose A. and Pearson, Scott M. and Turner, Monica G.. (2017). Landscape dynamics of floral resources affect the supply of a

- biodiversity-dependent cultural ecosystem service. *Landscape Ecology*. 32 (2) 415 to 428. Status = Deposited in NSF-PAR [doi:10.1007/s10980-016-0452-0](https://doi.org/10.1007/s10980-016-0452-0) ; Federal Government's License = Acknowledged. (Completed by Jackson, null on 01/12/2018) [Full text](#) [Citation details](#)
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Licenses

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Cooper, R. J., R. W. Chitwood, R.W., R.B. Chandler, J.L. Hatt, M.H. Cline, and K.W. Stodola (2017). *A Bird's Eye View of Climate Change: Black-throated Blue Warbler populations in the Southern Appalachians*. Highlands Biological Station Zahner Conservation Lecture. Highlands, NC. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Chitwood, R.W., R.B. Chandler, J.L. Hatt, M.H. Cline, K.W. Stodola, and R.J. Cooper (2017). *A Bird's Eye View of Climate Change: Black-throated Blue Warblers at the warm edge of their range*. Georgia Ornithological Society Fall Meeting. Jekyll Island, GA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Bumpers, P.M., A.D. Rosemond, J.P. Benstead, L. Demi, J.S. Kominoski, J.C. Maerz, D.W.P. Manning (2017). *A little bit of algae goes a long way: Nutrient enrichment stimulates algal growth in heavily shaded streams*. 63rd Annual Society for Freshwater Science Annual meeting. Raleigh, NC, USA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Leigh, D. S., Gragson, T. L. (2017). *Anthropic changes to the biotic factor of soil formation from forests to managed grasslands along summits of the western Pyrenees Mountains, France*. European Geosciences Union General Assembly. Vienna, Austria. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

M. Welch-Devine (2017). *Anthropology Matters for Climate Change: New Theoretical and Methodological Approaches*. 116th meeting of the American Anthropological Association. Washington, D.C.. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

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Wurzburger, N., K.J. Elliott, and C.F. Miniat (2017). *Nitrogen fixation facilitates forest recovery after repeated disturbance*. Ecological Society of America (ESA) Annual Meeting. Portland, Oregon. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

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Chitwood, R.W. and S.A. Merker, R.J. Cooper, and R.B. Chandler (2017). *Range shifts and migratory songbirds in the southern Appalachians*. Oconee Rivers Audubon Society October Meeting. Athens, GA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Zhang, Yulong; Novick, Kimberly A.; Song, Conghe; Zhang, Quan; Hwang, Taehee (2017). *Representation of physiological drought at ecosystem level based on model and eddy covariance measurements*. American Geophysical Union Fall Meeting. New Orleans, LA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Jackson, R. (2017). *Shallow subsurface stormflow (interflow): Functioning to extend variable source areas upslope*. LIST Water Lectures Seminar. Luxembourg Institute of Science and Technology (L. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

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Ballantyne, F., C. Song, J. Ruegg, A.D. Rosemond, W.K. Dodds (2017). *Thermal performance curves for whole ecosystem metabolism reveal pronounced thermal optima*. 63rd Annual Society for Freshwater Science Annual meeting. Raleigh, NC, USA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Singh NK, Emanuel RE, McGlynn BL (2017). *Variability in isotopic composition of baseflow in two headwater streams of the southern Appalachians*. American Geophysical Union annual meeting. New Orleans, LA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Farrell, K.J., A.D. Rosemond, F. Ballantyne, J.S. Kominoski, S.M. Bonjour, J. Ruegg, L.E. Koenig, C.L. Baker, M.T. Trentman, T.K. Harms, K.R. Sheehan (2017). *Variation in resource stoichiometry signals differential carbon to nutrient limitation for stream consumers across biomes*. Ecological Society of America Annual meeting. Portland, OR. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Steady, C., Welch-Devine, M., Burke, B.J., Rzonca, S. (2017). *When I was young we never needed air conditioning: Examining the value of local environmental knowledge for climate adaptation in southern Appalachia*. 77th meeting of the Society for Applied Anthropology. Santa Fe, New Mexico. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Other Products

Other Publications

Leigh, D. S., Milewski, A.M., Speakman, J., (2017). *Paleofloods in the Tennessee River Basin: Pilot Demonstration by The University of Georgia*. Paleofloods in the Tennessee River Basin: Pilot Demonstration by The University of Georgia. University of Georgia Geomorphology Laboratory Research Report 6 Submitted to the Electrical Power Research Institute (EPRI). Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Patents

Technologies or Techniques

Thesis/Dissertations

Chitwood, R.W., R.B. Chandler, R.J. Cooper, J.L. Martin, and T.S. Sillett. *Demographic drivers of black-throated blue warbler population dynamics at the trailing edge and core of the species' range*. (2017). University of Georgia. Acknowledgement of Federal Support = Yes

Merker, Samuel A.. *Factors limiting the distributions of trailing-edge populations in the Southern Appalachian Mountains*. (2017). University of Georgia. Acknowledgement of Federal Support = Yes

Abernathy, Heather N.. *Large and fine scale drivers of insectivores in the Southern Appalachian Mountains: using inference regarding biological interactions to build a better habitat suitability model*. (2017). University of Georgia. Acknowledgement of Federal Support = Yes

Kaitlin Farrell. *Quantitative assessment of drivers of ecosystem functions in headwater stream networks*. (2017). University of Georgia. Acknowledgement of Federal Support = Yes

Graves, R. A.. *Spatial dynamics of biodiversity-based ecosystem services in the Southern Appalachian Mountains*. (2017). University of Georgia. Acknowledgement of Federal Support = Yes

Eliason, Kevin M.. *The Short Term Responses of Benthic Macroinvertebrates to the Removal of Riparian Rhododendron in Southern Appalachian Streams*. (2017). University of Georgia. Acknowledgement of Federal Support = Yes

Websites

Coweeta Customizable RHESSys/Jupyter Notebook

<http://www.hydroshare.org/resource/081cbdb68415450b8ac99a5fe3092b5c>

This HydroShare resource contains the Jupyter Notebook for building and running RHESys models for watersheds at the Coweeta Hydrologic Laboratory. There are detailed, step-by-step instructions in this notebook that assist users in building their own watershed models.

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Jackson, C	PD/PI	2
Heynen, Nik	Co PD/PI	1
Maerz, John	Co PD/PI	1
Wurzburger, Nina	Co PD/PI	1
Band, Lawrence	Co-Investigator	1
Barrett, John	Co-Investigator	3
Benfield, Ernest	Co-Investigator	1
Bolstad, Paul	Co-Investigator	1
Bradford, Mark	Co-Investigator	1
Caldwell, Peter	Co-Investigator	3
Depken, Craig	Co-Investigator	6
Elliott, Katherine	Co-Investigator	6
Fraterrigo, Jennifer	Co-Investigator	1
Hwang, Tae Hee	Co-Investigator	1
Jackson, Charles	Co-Investigator	2
Knoepp, Jennifer	Co-Investigator	3
Leigh, David	Co-Investigator	3
Miniat, Chelcy	Co-Investigator	6
Novick, Kimberly	Co-Investigator	1
Oishi, Andrew	Co-Investigator	12
Pearson, Scott	Co-Investigator	1
Pringle, Catherine	Co-Investigator	2

Name	Most Senior Project Role	Nearest Person Month Worked
Rice, Jennifer	Co-Investigator	0
Shepherd, Marshall	Co-Investigator	0
Strahm, Brian	Co-Investigator	1
Warren, Robert	Co-Investigator	4
Welch-Devine, Meredith	Co-Investigator	1
Wenger, Seth	Co-Investigator	1
Rosemond, Amy	Faculty	0
Gaddis, Amanda	K-12 Teacher	1
Love, Jennifer	K-12 Teacher	1
Duncan, Jon	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Hawthorne, Sandra	Postdoctoral (scholar, fellow or other postdoctoral position)	9
Lin, Laurence	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Brown, Cindi	Other Professional	9
Clinton, Patsy	Other Professional	6
Flowers, Kathy	Other Professional	3
Fowler, Randy	Other Professional	1
Herndon, Brian	Other Professional	12
Hopey, Mark	Other Professional	1
Johnson, Virgil	Other Professional	12
Krupp, Kevin	Other Professional	2
Love, Jason	Other Professional	12
Meador, Jason	Other Professional	1
Moore, Callie	Other Professional	1
Benson, Michael	Technician	1
Bower, Katherine	Technician	12
Coleman, Kyle	Technician	12
Danner, Andrew	Technician	1

Name	Most Senior Project Role	Nearest Person Month Worked
Gregory, Sheila	Technician	12
Harper, Carol	Technician	12
Kirk, Shanon	Technician	1
Lampl, Katie	Technician	1
Marshall, Charles	Technician	6
Melear, Nathan	Technician	1
Orr, Keren	Technician	2
Schaner, Jessica	Technician	2
Scott, Joel	Technician	6
Sobek, Christine	Technician	3
Thornton, Danielle	Technician	4
Zietlow, David	Technician	6
Swank, Wayne	Staff Scientist (doctoral level)	1
Brockman, Lauren	Graduate Student (research assistant)	1
Candeias, Matt	Graduate Student (research assistant)	11
Carpenter, Dana	Graduate Student (research assistant)	1
Cathey, Sara	Graduate Student (research assistant)	0
Denham, Sander	Graduate Student (research assistant)	2
Dudley, Maura	Graduate Student (research assistant)	5
Eliason, Kevin	Graduate Student (research assistant)	2
Justus, Savannah	Graduate Student (research assistant)	0
Lapham, Marika	Graduate Student (research assistant)	4
Lovette, John	Graduate Student (research assistant)	4
Missik, Justine	Graduate Student (research assistant)	1
Osburn, Ernest	Graduate Student (research assistant)	2
Pena, Glenia	Graduate Student (research assistant)	3
Phillips, Carly	Graduate Student (research assistant)	2

Name	Most Senior Project Role	Nearest Person Month Worked
Scaife, Charles	Graduate Student (research assistant)	6
Solomon, Kelsey	Graduate Student (research assistant)	5
Sorrells, Robert	Graduate Student (research assistant)	1
Sullivan, Jeremy	Graduate Student (research assistant)	3
Zhang, Yuqian	Graduate Student (research assistant)	3
Bayba, Sonya	Undergraduate Student	2
Dunn, Rachel	Undergraduate Student	1
Hitzelberger, Michael	Undergraduate Student	2
Lee, Katherine	Undergraduate Student	1
Nordyke, Alexandra	Undergraduate Student	2
Peterson, Madeline	Undergraduate Student	2
Smith, Kaitlyn	Undergraduate Student	1
Vergundia, Louis	Undergraduate Student	1
Young, Rosie	High School Student	3
Hufstetler, Cody	Research Experience for Undergraduates (REU) Participant	2
Hales, T.C.	Other	0

Full details of individuals who have worked on the project:

C R Jackson

Email: rjackson@warnell.uga.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: Managed the project as PI. Helped continue the riparian rhododendron manipulation study. Installed water level sensors and temperature loggers in these streams. Published a new synthesis of LT data from WS7. Published findings from cross-landscape evaluation of flows, suspended sediments, and specific conductance in intensively monitored streams distributed across the study area.

Funding Support: Non-NSF

International Collaboration: No

International Travel: No

Nik Heynen

Email: nheynen@uga.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: Eco-Sociology Co PD/PI

Funding Support: this project only

International Collaboration: No

International Travel: No

John C Maerz

Email: jcmaerz@uga.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: Investigated the effects of terrestrial and aquatic environmental change, particularly the effects of nonnative species invasions, land use, and climate on the ecology of amphibians and reptiles, how variation in the abundances of animals affects terrestrial and freshwater ecosystem processes. CWT Science Advisory Committee.

Funding Support: this project only

International Collaboration: No

International Travel: No

Nina Wurzburger

Email: ninawurz@uga.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: Studied mycorrhizal effects on soil carbon, long term forest growth and nitrogen fixation, Cowee throughfall experiment

Funding Support: This project only

International Collaboration: No

International Travel: No

Lawrence E. Band

Email: leb3t@virginia.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Integrating measurement and modeling of watersheds in the southern Appalachians, including feedbacks between ecological, hydrological, geomorphic and climate processes. Partial support for activities from Coweeta LTER.

Funding Support: this project only

International Collaboration: Yes, United Kingdom

International Travel: No

John Edward Barrett

Email: jebarre@vt.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 3

Contribution to the Project: leading soil ecology portion of rhododendron removal project

Funding Support: Virginia Tech and this project

International Collaboration: No

International Travel: No

Ernest F. Benfield**Email:** benfield@vt.edu**Most Senior Project Role:** Co-Investigator**Nearest Person Month Worked:** 1**Contribution to the Project:** Overall supervision and field sampling participation**Funding Support:** This project only**International Collaboration:** No**International Travel:** No

Paul Victor Bolstad**Email:** pbolstad@umn.edu**Most Senior Project Role:** Co-Investigator**Nearest Person Month Worked:** 1**Contribution to the Project:** primary research analysis, study design, authorship**Funding Support:** Minnesota Agricultural Experiment Station for salary, research equipment, supplies, and technician support from LTER grant**International Collaboration:** No**International Travel:** No

Mark Bradford**Email:** mark.bradford@yale.edu**Most Senior Project Role:** Co-Investigator**Nearest Person Month Worked:** 1**Contribution to the Project:** Collaborator (from Yale University) was co-author on research paper published in 2017.**Funding Support:** This project only**International Collaboration:** No**International Travel:** No

Peter Vernon Caldwell**Email:** pcaldwell02@fs.fed.us**Most Senior Project Role:** Co-Investigator**Nearest Person Month Worked:** 3**Contribution to the Project:** Research Hydrologist**Funding Support:** USDA Forest Service**International Collaboration:** No**International Travel:** No

Craig Depken**Email:** cdepken@uncc.edu**Most Senior Project Role:** Co-Investigator**Nearest Person Month Worked:** 6**Contribution to the Project:** Social science research focusing on applied economics and applied econometrics.**Funding Support:** this project only**International Collaboration:** No

International Travel: No

Katherine Elliott

Email: kelliott@fs.fed.us

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 6

Contribution to the Project: egeatation dynamics to ecosystem, processes, climate change, land use and other organisms

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Jennifer Fraterrigo

Email: jmf@illinois.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Empirical research on trait responses of understory plant communities to climate change

Funding Support: this project only

International Collaboration: No

International Travel: No

Tae Hee Hwang

Email: taehee@indiana.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Ecohydrologic analysis and simulation of distributed carbon, water and nitrogen cycling, forest growth, spatialpatterns of canopy LAI and root depth and strength.

Funding Support: This project only

International Collaboration: No

International Travel: No

Charles Rhett Jackson

Email: rjacks@uga.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 2

Contribution to the Project: Managed the project as PI. Helped continue the riparian rhododendron manipulation study. Installed water level sensors and temperature loggers in these streams. Published a new synthesis of LT data from WS7. Published findings from cross-landscape evaluation of flows, suspended sediments, and specific conductance in intensively monitored streams distributed across the study area.

Funding Support: Non-NSF

International Collaboration: No

International Travel: No

Jennifer Donaldson Knoepp

Email: jknoepp@fs.fed.us

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 3

Contribution to the Project: biogeochemical cycling research, and consultation to co-pis and students

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

David Leigh

Email: dleigh@uga.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 3

Contribution to the Project: basic research concerning human and climate impacts on geomorphic systems

Funding Support: Univeristy of Georgia

International Collaboration: No

International Travel: No

Chelcy Miniati

Email: cfminiat@fs.fed.us

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 6

Contribution to the Project: Administrative, scientific

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Kimberly Novick

Email: knovick@indiana.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Data collection, analysis, publication, mentoring.

Funding Support: NSF-DEB (Award 1552747); Dept of Energy - AmeriFlux Management Project Subcontract;

International Collaboration: No

International Travel: No

Andrew Christopher Oishi

Email: acoishi@fs.fed.us

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 12

Contribution to the Project: Quantified forest-atmosphere exchange of water, carbon, and energy. Assessed plant and ecosystem response to daily, seasonal, and interannual variability in climatic drivers.

Funding Support: USFS

International Collaboration: No

International Travel: No

Scott Pearson

Email: spearson@mhu.edu

Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: data analysis, manuscript preparation, and mentoring of graduate and undergraduate students on research focused on landscape-level patterns of ecosystem service.

Funding Support: This Project Only

International Collaboration: No
International Travel: No

Catherine Pringle
Email: cpringle@uga.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: planning and coordination of graduate students to continue algal sampling in Rhododendron removal experiment; mentoring 3 graduate students in data analyses, dissertation writing and manuscript preparation.

Funding Support: This project only

International Collaboration: No
International Travel: No

Jennifer Rice
Email: jlrice@uga.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 0

Contribution to the Project: Social organization, environmental activism, and climate change perceptions of citizens in SW North Carolina

Funding Support: This project only

International Collaboration: No
International Travel: No

Marshall J. Shepherd
Email: marshgeo@uga.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 0

Contribution to the Project: Macro and mesoscale climate systems

Funding Support: This project only

International Collaboration: No
International Travel: No

Brian Strahm
Email: brian.strahm@vt.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Biogeochemical fluxes

Funding Support: Virginia Tech Institute for Critical Technology and Applied Science

International Collaboration: No

International Travel: No

Robert Warren

Email: warrenrj@buffalostate.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 4

Contribution to the Project: Project supervision, data management, data analysis

Funding Support: this project only

International Collaboration: No

International Travel: No

Meredith Welch-Devine

Email: mwdevine@uga.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Oversaw efforts to understand connection between people's observations of biodiversity change and their theories of climate change. Submission of journal articles on the topic, and organization of discussions at professional meetings. Synthetic activities with collaborators in France, Zimbabwe, and Cameroon.

Funding Support: NSF Award BCS 1558929, Agence Nationale de la Recherche (France) ANR-13-JSH1-0005

International Collaboration: Yes, France, Zimbabwe

International Travel: Yes, France - 0 years, 0 months, 5 days

Seth Wenger

Email: swenger@uga.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: stream ecosystems and fish population analysis

Funding Support: this project only

International Collaboration: No

International Travel: No

Amy Daum Rosemond

Email: rosemond@uga.edu

Most Senior Project Role: Faculty

Nearest Person Month Worked: 0

Contribution to the Project: nothing to report

Funding Support: none

International Collaboration: No

International Travel: No

Amanda Gaddis

Email: agaddis@hayesvillems.org

Most Senior Project Role: K-12 Teacher

Nearest Person Month Worked: 1

Contribution to the Project: Collaborator (from Hayesville Middle School) assisted with outreach and education associated with

Coweeta LTER Schoolyard program.

Funding Support: This project only

International Collaboration: No

International Travel: No

Jennifer Love

Email: jennifer.love@macon.k12.nc.us

Most Senior Project Role: K-12 Teacher

Nearest Person Month Worked: 1

Contribution to the Project: Collaborator (from Macon County Schools) assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Funding Support: This project only

International Collaboration: No

International Travel: No

Jon Duncan

Email: jmduncan@email.unc.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 2

Contribution to the Project: Ecohydrologic analysis and simulation of distributed carbon, water and nitrogen cycling, forest growth, spatial patterns of canopy LAI and root depth and strength. Intercomparison of NYC Watershed with CWT. Development of ecosystem restoration priorities for NC DEQ Division of Mitigation Services, including LT.

Funding Support: NSF BES LTER, NSF Coastal SEES, NYC DEP, NC DENR

International Collaboration: No

International Travel: No

Sandra Hawthorne

Email: sndhawthorne@gmail.com

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 9

Contribution to the Project: Post Doctoral Associate

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Laurence Lin

Email: hrlauren@email.unc.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 2

Contribution to the Project: Ecohydrologic analysis and simulation of water, carbon and nitrogen patterns, coupling of terrestrial and aquatic ecosystem models, intercomparison of ecohydrology of CWT and NYC watershed catchments

Funding Support: NSF WSC, NYC DEP

International Collaboration: No

International Travel: No

Cindi Brown**Email:** clbrown@fs.fed.us**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 9**Contribution to the Project:** Laboratory manager**Funding Support:** USDA Forest Service**International Collaboration:** No**International Travel:** No**Patsy Clinton****Email:** pclinton@fs.fed.us**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 6**Contribution to the Project:** Hydrologic Technician**Funding Support:** USDA Forest Service**International Collaboration:** No**International Travel:** No**Kathy Flowers****Email:** kflowers@fs.fed.us**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 3**Contribution to the Project:** Administrative**Funding Support:** USDA Forest Service**International Collaboration:** No**International Travel:** No**Randy Fowler****Email:** dlfowler@fs.fed.us**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 1**Contribution to the Project:** Biological Scientist**Funding Support:** USDA Forest Service**International Collaboration:** No**International Travel:** No**Brian Herndon****Email:** bherndon@uga.edu**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 12**Contribution to the Project:** Data & Information Management**Funding Support:** this project only**International Collaboration:** No**International Travel:** No

Mark Hopey**Email:** bigbaldbanding@gmail.com**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 1

Contribution to the Project: Collaborator (from Southern Appalachian Raptor Research) assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Funding Support: This project only

International Collaboration: No

International Travel: No

Virgil Johnson**Email:** vedjohns@uga.edu**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 12

Contribution to the Project: Data & Information Management

Funding Support: this project only

International Collaboration: No

International Travel: No

Kevin Krupp**Email:** KRUPPKT01@mail.buffalostate.edu**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 2

Contribution to the Project: Data collection, project management

Funding Support: this project only

International Collaboration: No

International Travel: No

Jason Patrick Love**Email:** jplove@uga.edu**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 12

Contribution to the Project: Perform duties as Site Manager, including managing 25-bed dormitory, 6 field vehicles, and supervising 2 field and 3 lab technicians. Communicate with lead-PI and Co-Pis to coordinate research projects. Assist with field work and data archiving related to the Coweeta LTER. Supervise undergraduate and high school interns. Coordinate the Schoolyard LTER program. Co-author research papers.

Funding Support: This project only

International Collaboration: No

International Travel: No

Jason Meador**Email:** jmeador@mainspringconserves.org**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 1

Contribution to the Project: Collaborator (from Mainspring Conservation Trust) assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Funding Support: This project only

International Collaboration: No

International Travel: No

Callie Moore

Email: cmoore@hrwc.net

Most Senior Project Role: Other Professional

Nearest Person Month Worked: 1

Contribution to the Project: Collaborator (from Hiwassee River Watershed Coalition) assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Funding Support: This project only

International Collaboration: No

International Travel: No

Michael Benson

Email: micbenson@indiana.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 1

Contribution to the Project: Data collection, analysis, and manuscript preparation

Funding Support: Dept of Energy - AmeriFlux Management Project subcontract

International Collaboration: No

International Travel: No

Katherine Bower

Email: kebower@uga.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 12

Contribution to the Project: Perform duties as field technician for core Coweeta LTER projects, including measuring trees, assisting with the maintenance of sensor stations, collecting and processing leaf litter, soils, and forest floor, and collecting and sorting seeds for long-term forest demography project.

Funding Support: This project only

International Collaboration: No

International Travel: No

Kyle Coleman

Email: kyle.coleman@uga.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 12

Contribution to the Project: Perform duties as Laboratory Technician I, including washing sample bottles, glassware, beakers, and other lab equipment following established protocols. Assist with prepping samples prior to analysis. Help with field work occasionally.

Funding Support: This project only

International Collaboration: No

International Travel: No

Andrew Danner**Email:** akdancebot@gmail.com**Most Senior Project Role:** Technician**Nearest Person Month Worked:** 1**Contribution to the Project:** field collections and laboratory processing of samples**Funding Support:** USDA Forest Service cooperative agreement with Univ of MN**International Collaboration:** No**International Travel:** No**Sheila Gregory****Email:** shgregor@uga.edu**Most Senior Project Role:** Technician**Nearest Person Month Worked:** 12**Contribution to the Project:** Perform duties as Laboratory Technician II, including operating instrumentation to analyze soil, forest, and water samples for micro and macro-nutrients.**Funding Support:** This project only**International Collaboration:** No**International Travel:** No**Carol Harper****Email:** chharper@uga.edu**Most Senior Project Role:** Technician**Nearest Person Month Worked:** 12**Contribution to the Project:** Perform duties as Laboratory Technician II, including operating instrumentation to analyze soil, forest, and water samples for micro and macro-nutrients.**Funding Support:** This project only**International Collaboration:** No**International Travel:** No**Shanon Kirk****Email:** shannonk@uga.edu**Most Senior Project Role:** Technician**Nearest Person Month Worked:** 1**Contribution to the Project:** Assisted with data collection in rhodo streams.**Funding Support:** this project only**International Collaboration:** No**International Travel:** No**Katie Lampl****Email:** lamplkat@uga.edu**Most Senior Project Role:** Technician**Nearest Person Month Worked:** 1**Contribution to the Project:** Assisted with data collection in rhodo streams.**Funding Support:** Non-NSF

International Collaboration: No

International Travel: No

Charles Marshall

Email: cmarshall01@fs.fed.us

Most Senior Project Role: Technician

Nearest Person Month Worked: 6

Contribution to the Project: Hydrologic Technician

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Nathan Melear

Email: nmelear@uga.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 1

Contribution to the Project: Rhododendron temperature collection. Assistance with other sampling in rhododendron streams.

Funding Support: Non-NSF

International Collaboration: No

International Travel: No

Keren Orr

Email: keren.orr5@gmail.com

Most Senior Project Role: Technician

Nearest Person Month Worked: 2

Contribution to the Project: Provided assistance with field work on trait responses to climate change

Funding Support: this project only

International Collaboration: No

International Travel: No

Jessica Schaner

Email: shagbarksummer@gmail.com

Most Senior Project Role: Technician

Nearest Person Month Worked: 2

Contribution to the Project: Provided assistance with field work on trait responses to climate change

Funding Support: this project only

International Collaboration: No

International Travel: No

Joel Scott

Email: joelscott@fs.fed.us

Most Senior Project Role: Technician

Nearest Person Month Worked: 6

Contribution to the Project: Field Technician

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Christine Sobek

Email: cmsobek@fs.fed.us

Most Senior Project Role: Technician

Nearest Person Month Worked: 3

Contribution to the Project: Hydrologic Technician

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Danielle Thornton

Email: drthorn@umn.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 4

Contribution to the Project: Perform duties as field technician for core Coweeta LTER projects, including measuring trees, assisting with the maintenance of sensor stations, collecting and processing leaf litter, soils, and forest floor, and collecting and sorting seeds for long-term forest demography project.

Funding Support: This project only

International Collaboration: No

International Travel: No

David Zietlow

Email: davidrzieflow@fs.fed.us

Most Senior Project Role: Technician

Nearest Person Month Worked: 6

Contribution to the Project: Field Technician

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Wayne Swank

Email: wswank@uga.edu

Most Senior Project Role: Staff Scientist (doctoral level)

Nearest Person Month Worked: 1

Contribution to the Project: Research Support

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Lauren Brockman

Email: laurene@uga.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Assisted with data collection in rhodo streams.

Funding Support: this project only

International Collaboration: No

International Travel: No

Matt Candeias

Email: candeia2@illinois.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 11

Contribution to the Project: Empirical research on trait responses of understory plant communities to climate change

Funding Support: this project only

International Collaboration: No

International Travel: No

Dana Carpenter

Email: dana.carpenter@uga.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Assisted on study of long term forest growth and nitrogen fixation

Funding Support: This project only

International Collaboration: No

International Travel: No

Sara E. Cathey

Email: catheyse@vt.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 0

Contribution to the Project: Training in macroinvertebrate identification

Funding Support: This project only

International Collaboration: No

International Travel: No

Sander Denham

Email: sodenham@indiana.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 2

Contribution to the Project: Data analysis and manuscript preparation

Funding Support: Indiana University; NASA ROSES Carbon cycle Science

International Collaboration: No

International Travel: No

Maura Dudley

Email: mdudley3@uga.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 5

Contribution to the Project: data analysis for her dissertation and writing up dissertation chapters

Funding Support: This project only

International Collaboration: No
International Travel: No

Kevin M. Eliason

Email: eliasonk@dewv.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 2

Contribution to the Project: sampling, and identification of invertebrates

Funding Support: This project only

International Collaboration: No
International Travel: No

Savannah R. Justus

Email: sjustus1@vt.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 0

Contribution to the Project: Training in macroinvertebrate identification

Funding Support: This project only

International Collaboration: No
International Travel: No

Marika Lapham

Email: malapham@iu.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 4

Contribution to the Project: Sapflux measurements for species level ecohydrological modeling

Funding Support: Indiana Grand Challenge Initiatives

International Collaboration: No
International Travel: No

John Lovette

Email: jplovette@gmail.com

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 4

Contribution to the Project: Design, coding and testing of ecosystem functional based evaluation and prioritization of restoration potential at HUC 8 levels, including the Little Tennessee

Funding Support: NC DEQ

International Collaboration: No
International Travel: No

Justine Missik**Email:** justine.missik@wsu.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 1**Contribution to the Project:** Manuscript preparation**Funding Support:** this project only**International Collaboration:** No**International Travel:** No

Ernest Osburn**Email:** eosburn@vt.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 2**Contribution to the Project:** processing samples for rhododendron removal project**Funding Support:** Virginia Tech GTA, and this project**International Collaboration:** No**International Travel:** No

Glenia Pena**Email:** glepena@indiana.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 3**Contribution to the Project:** Data collection and analysis**Funding Support:** NSF-DEB (Award 1552747)**International Collaboration:** No**International Travel:** No

Carly Phillips**Email:** cphil@uga.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 2**Contribution to the Project:** Assisted on study of long term forest growth and nitrogen fixation**Funding Support:** this project only**International Collaboration:** No**International Travel:** No

Charles Scaife**Email:** cis9zg@virginia.edu**Most Senior Project Role:** Graduate Student (research assistant)**Nearest Person Month Worked:** 6**Contribution to the Project:** Supported investigations into integrating measurement and modeling of watersheds in the southern Appalachians, including feedbacks between ecological, hydrological, geomorphic and climate processes. Partial support for activities from Coweeta LTER.**Funding Support:** University of Virginia

International Collaboration: No

International Travel: No

Kelsey Solomon

Email: kelsey.solomon25@uga.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 5

Contribution to the Project: collection of dissertation data (algal sampling) on Rhododendron Removal Project

Funding Support: This project only

International Collaboration: No

International Travel: No

Robert Sorrells

Email: rsorrells@uga.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: tangential research concerning stream bank erosion

Funding Support: Univeristy of Georgia

International Collaboration: No

International Travel: No

Jeremy Sullivan

Email: jeremysullivan@gmail.com

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: completed writing his dissertation which he will defend in May 2018

Funding Support: This project only

International Collaboration: No

International Travel: No

Yuqian Zhang

Email: yz89@indiana.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Data collection and analysis

Funding Support: NSF-DEB (Award 1552747)

International Collaboration: No

International Travel: No

Sonya Bayba

Email: baybas01@mail.buffalostate.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Data collection, project management - REU

Funding Support: this project only

International Collaboration: No

International Travel: No

Rachel Dunn

Email: rdunn@unca.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: contributed to research and received training in basic field work techniques

Funding Support: USDA Forest Service

International Collaboration: No

International Travel: No

Michael Hitzelberger

Email: michaelhitzelberger@bennington.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Serve as a winter intern at Coweeta and contribute to field research related to the rhododendron removal study and terrestrial gradient forest demography project.

Funding Support: This project only

International Collaboration: No

International Travel: No

Katherine Won Lee

Email: katewon@vt.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: processing samples

Funding Support: This project only

International Collaboration: No

International Travel: No

Alexandra Nordyke

Email: alexandranordyke@bennington.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Serve as a winter intern at Coweeta and contribute to field research related to the rhododendron removal study and terrestrial gradient forest demography project.

Funding Support: This project only

International Collaboration: No

International Travel: No

Madeline Peterson

Email: madelinepeterson@bennington.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Serve as a winter intern at Coweeta and contribute to field research related to the rhododendron removal study and terrestrial gradient forest demography project.

Funding Support: This project only

International Collaboration: No

International Travel: No

Kaitlyn Smith

Email: kaits15@vt.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: processing samples

Funding Support: This project only

International Collaboration: No

International Travel: No

Louis Vergundia

Email: lverg8@vt.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: processing samples

Funding Support: This project only

International Collaboration: No

International Travel: No

Rosie Young

Email: roseflower2469@yahoo.com

Most Senior Project Role: High School Student

Nearest Person Month Worked: 3

Contribution to the Project: Serve as a summer intern at Coweeta and assist with projects such as measuring trees, building and installing sap flow probes, sorting leaves and seeds, and assisting in the maintenance of sensor stations. Rosie is a student at Macon Early College.

Funding Support: This project only

International Collaboration: No

International Travel: No

Cody Hufstetler

Email: codler25@uga.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 2

Contribution to the Project: summer project with graduate student, Kelsey Solomon, on Rhododendron Removal Project

Funding Support: This project only

International Collaboration: No

International Travel: No

Year of schooling completed: Sophomore

Home Institution: University of Georgia

Government fiscal year(s) was this REU participant supported: 2017

T.C. Hales

Email: HalesT@cardiff.ac.uk

Most Senior Project Role: Other

Nearest Person Month Worked: 0

Contribution to the Project: Collaboration on measurement of root cohesion and structure, analysis of spatial distribution of root properties, simulation of landslide distributions

Funding Support: other

International Collaboration: Yes, United States

International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Appalachian State University	Academic Institution	Boone, NC
Bennington College	Academic Institution	Bennington, VT
Mars Hill University	Academic Institution	Mars Hill, NC
North Carolina State University	Academic Institution	Raleigh, NC
Southern Appalachian Raptor Research	Other Nonprofits	Mars Hill, NC
USFS Coweeta Hydrologic Laboratory	State or Local Government	Otto, NC
University of Illinois at Urbana-Champaign	Academic Institution	Urbana, IL
University of Minnesota	Academic Institution	St. Paul, MN
University of North Carolina	Academic Institution	Chapel Hill, NC
University of North Carolina at Charlotte	Academic Institution	Charlotte, NC
University of Virginia	Academic Institution	Charlottesville, VA
Virginia Tech University	Academic Institution	Blacksburg, VA
Buffalo State	Academic Institution	Buffalo, NY
Yale University	Academic Institution	New Haven, CT
Cardiff University	Academic Institution	London, England
Duke University	Academic Institution	Durham, NC
Hayesville Middle School	School or School Systems	Hayesville, NC
Hiwassee River Watershed Coalition	Other Nonprofits	Murphy, NC

Name	Type of Partner Organization	Location
Indiana University Bloomington	Academic Institution	Bloomington, IN
Macon County Schools	School or School Systems	Franklin, NC
Mainspring Conservation Trust	Other Nonprofits	Franklin, NC

Full details of organizations that have been involved as partners:
Appalachian State University

Organization Type: Academic Institution

Organization Location: Boone, NC

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Bennington College

Organization Type: Academic Institution

Organization Location: Bennington, VT

Partner's Contribution to the Project:

Personnel Exchanges

More Detail on Partner and Contribution: Undergraduate student internships

Buffalo State

Organization Type: Academic Institution

Organization Location: Buffalo, NY

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Cardiff University

Organization Type: Academic Institution

Organization Location: London, England

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Collaboration on measurement of root cohesion and structure, analysis of spatial distribution of root properties, simulation of landslide distributions

Duke University

Organization Type: Academic Institution

Organization Location: Durham, NC

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Hayesville Middle School**Organization Type:** School or School Systems**Organization Location:** Hayesville, NC**Partner's Contribution to the Project:**

Collaborative Research

More Detail on Partner and Contribution: Collaborator assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Hiwassee River Watershed Coalition**Organization Type:** Other Nonprofits**Organization Location:** Murphy, NC**Partner's Contribution to the Project:**

Collaborative Research

More Detail on Partner and Contribution: Collaborator assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Indiana University Bloomington**Organization Type:** Academic Institution**Organization Location:** Bloomington, IN**Partner's Contribution to the Project:**

Collaborative Research

More Detail on Partner and Contribution:

Macon County Schools**Organization Type:** School or School Systems**Organization Location:** Franklin, NC**Partner's Contribution to the Project:**

Collaborative Research

More Detail on Partner and Contribution: Collaborator assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Mainspring Conservation Trust**Organization Type:** Other Nonprofits**Organization Location:** Franklin, NC**Partner's Contribution to the Project:**

Collaborative Research

More Detail on Partner and Contribution: Collaborator assisted with outreach and education associated with Coweeta LTER Schoolyard program.

Mars Hill University

Organization Type: Academic Institution
Organization Location: Mars Hill, NC

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

North Carolina State University

Organization Type: Academic Institution
Organization Location: Raleigh, NC

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

Southern Appalachian Raptor Research

Organization Type: Other Nonprofits
Organization Location: Mars Hill, NC

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborator ssisted with outreach and education associated with Coweeta LTER Schoolyard program.

USFS Coweeta Hydrologic Laboratory

Organization Type: State or Local Government
Organization Location: Otto, NC

Partner's Contribution to the Project:
In-Kind Support
Facilities
Collaborative Research
Personnel Exchanges

More Detail on Partner and Contribution:

University of Illinois at Urbana-Champaign

Organization Type: Academic Institution
Organization Location: Urbana, IL

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

University of Minnesota

Organization Type: Academic Institution
Organization Location: St. Paul, MN

Partner's Contribution to the Project:
Financial support

Collaborative Research

More Detail on Partner and Contribution:

University of North Carolina

Organization Type: Academic Institution

Organization Location: Chapel Hill, NC

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

University of North Carolina at Charlotte

Organization Type: Academic Institution

Organization Location: Charlotte, NC

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

University of Virginia

Organization Type: Academic Institution

Organization Location: Charlottesville, VA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Virginia Tech University

Organization Type: Academic Institution

Organization Location: Blacksburg, VA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Yale University

Organization Type: Academic Institution

Organization Location: New Haven, CT

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

What other collaborators or contacts have been involved?

Nothing to report

Impacts

What is the impact on the development of the principal discipline(s) of the project?

Our past and ongoing work continues to confirm the high dimensionality of drivers of ecosystem change in the Southern Appalachian Mountains. Responses to past and ongoing disturbances are layered upon one another and are mediated by mesoscale climatic variations and small-scale topographic and soil variations. Forest mesophication and species invasions continue and both interact with climate change to affect forest composition, hydrologic fluxes, and biogeochemical cycling. In the broader landscape, fertilization, livestock production, habitat fragmentation, and riparian forest removal more strongly affect stream water quality and biodiversity than do ecosystem dynamics within the forest itself.

What is the impact on other disciplines?

Nothing to report.

What is the impact on the development of human resources?

Nothing to report.

What is the impact on physical resources that form infrastructure?

Nothing to report.

What is the impact on institutional resources that form infrastructure?

Nothing to report.

What is the impact on information resources that form infrastructure?

Besides dataset processing and archiving, [BH1] more than three million new records of sensor data were harvested and made available for public access via the streaming data portal on the CWT LTER website. Quality Assurance practices were applied daily to all harvested data and routinely evaluated for Quality Control. These data serve as a resource for measurements of soil moisture, microclimate, and weather data at the plot, watershed, local, and regional levels. The data from the sensor network comprehensively provide both long-term and near real-time data streams.

New, cloud based simulation tools were developed and posted on both Github and the NSF funded Hydroshare project (www.hydroshare.org)

We shared data collected at the Rabun Gap site with the AmeriFlux network.

Chris Oishi is preparing data from Coweeta eddy covariance tower to be shared on Ameriflux network, pending final publication of a manuscript using this data (accepted).

What is the impact on technology transfer?

Nothing to report.

What is the impact on society beyond science and technology?

Social networks have implications for those seeking to address environmental change. First, it is likely that including local residents of all statuses could result in better knowledge production. Different groups see different patterns and changes in the environment as a result of their differing social and spatial relationships to species – including them both could result in more complete and nuanced understandings of change. Furthermore, our research somewhat calls into question the assumption that long-term knowledge is necessarily better. The high level of focalization on certain species leads us to believe that multigenerational residents may have become less attuned to certain types of species. Our work underscores the need for inclusive environmental planning. Other work in the region (Rice et al., 2015) has shown that newcomers tend to be more involved in environmental advocacy. However, the concerns, values, and needs of multigenerational residents may be quite different, and inclusive action must look across the residential spectrum and to different ways of occupying this space to avoid committing injustices. Third, it is likely stronger constituencies for addressing environmental change could be built by carefully attending to the differences in what people care about and the ways in which they care about them. Highly place-specific lay environmental knowledges may indeed provide a stronger foundation than formal knowledge for the diverse communities of action necessary to address pressing issues of environmental and climate change because they are grounded in popular knowledge, beliefs, values, and everyday practices.

Changes/Problems

Changes in approach and reason for change

Nothing to report.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.