Hello to All Coweeta LTER Co-PIs, Staff, Students, and Guests,

Welcome to the June 2001 Coweeta LTER Science Meeting!

Lunches will be on your own on both Tuesday and Wednesday at the UGA Campus. There are several on campus and off campus options for lunch. If you are not familiar with locations, please ask. Dinner on Tuesday evening is also on your own. Again, if you are unfamiliar with options, please ask. All people are responsible for their own meal costs.

We will have a social hour with brewed beverages during the poster session at the Institute of Ecology at the University of Georgia on Tuesday afternoon at 4:00 PM.

Please bring your coffee mug since it will help to reduce the stack of unrecyclable supplies that we will need to use for morning and afternoon breaks.

Thanks, Brian Kloeppel

June 2001 Coweeta LTER Science Meeting Agenda
Tuesday 26 June 2000
Location: Institute of Ecology Auditorium, University of Georgia in Athens, GA

9:00 Opening Remarks and Introductions (Dave Coleman, Brian Kloeppel, Jim Vose, and Ted Gragson)

Project Presentations
9:15 Matt McTammany et al.
9:30 Mark Riedel
9:45 Chris Mitchell et al.
10:00 Wyatt Cross et al.

10:15- 10:30 Morning Break

10:30 Ron Rouhani - Information and GIS Management - Status and Future Priorities
10:45 Aaron Cooper et al.
11:00 Susan Steiner et al.
11:15 Matt McTammany and Fred Benfield

11:30 - 1:00 Lunch Break

Project Presentations (continued)
1:00 Cathy Pringle et al.
1:15 Dave Coleman et al.
1:30 Mark Hunter et al.
1:45 Brian Kloeppel et al.
2:00 Jim Vose

2:15 Brian Kloeppel - Facilities Improvement Update

2:30 - 2:45 Afternoon Break

2:45 to 4:00 Coweeta LTER V: 2002-2008 Proposal Group Discussion
Topic: Review of Central Themes

4:00 to 6:00 Poster Session and Social Hour (brewed refreshments provided) at the University of Georgia Institute of Ecology

The cardboard stands that we have used in the past will be provided. The overall poster dimensions are 3 feet high by 4 feet wide. The width is divided into two side panels that are one foot wide and a central panel that is two feet wide. Of course, if you have other poster stands that better serve your poster needs, please use them.

Poster: Gregory Bonito et al.
Poster: Amanda Brennan et al.
Poster: Jeff Diez and Ron Pulliam
Poster: Bruce Haines and James Vose
Poster: Brian Kloeppel
Poster: Amy Panikowski et al.
Poster: Mitch Pavao-Zuckermann and Dave Coleman
Poster: Scott Pearson et al.
Poster: Andrew Sutherland et al.

Wednesday 27 June 2000
Location: Institute of Ecology Auditorium, University of Georgia in Athens, GA

8:15 Announcements (Brian Kloeppel and Dave Coleman)

8:30 Coweeta LTER V (2002-2008)
Review of Project Integration and Investigator Miniproposals

10:00 to 10:15 Morning Break

10:15 Coweeta LTER V (2002-2008)
Review of Proposal Budget Considerations

11:45 to 1:00 Lunch Break

1:00 to ?? Proposal Discussion, Breakout Groups, Integration Efforts, etc.

Coweeta LTER June 2001 Meeting Presentation Abstracts
compiled and edited by Brian D. Kloeppel

* = presenter

Co-PIs not attending:
Paul Bolstad
Barry Clinton
Lloyd Swift
Monica Turner
Jack Webster

Co-PIs attending, but not presenting:
Jim Clark
Dac Crossley
Katherine Elliott
Gary Grossman
Ron Hendrick
Jennifer Knoepp
David Newman
David Wear
Alan Yeakley

Poster Presentation
BONITO, GREGORY M.[a,] *, MIGUEL L. CABRERA[a], DAVID C. COLEMAN[a], BRUCE L. HAINES[b]. [a]Institute of Ecology, University of Georgia, Athens, GA 30602, [b] Department of Botany, University of Georgia, Athens, GA 30602. Modeling the Nitrogen Budgets of an Oak Pine and Northern Hardwood Stand

Nitrogen (N) mineralization rates typically decrease with decreasing temperatures. Temperatures decrease with increasing elevation, therefore N mineralization rates are predicted to decrease with increasing elevation. However, previous studies at Coweeta Hydrologic Laboratory in NC, have shown that nitrogen (N) mineralization rates are over an order of magnitude higher at a high elevation forest stand compared to a lower elevation stand. Elevated N deposition has been suggested to explanation this phenomena. Previous work synthesizing N budgets for these two sites has shown that the total N pool at the high elevation site is twice as large as that of the lower elevation site. Nitrogen fluxes at the high elevation site are twice as large as well. In this study N cycles for both sites was modeled using STELLA 6.0 to determine which factors are most important in controlling N mineralization rates for these two sites. Simulations were run for 200 year iterations and patterns of N cycling, with and without variation of sensitive parameters, was described. Model results show N deposition cannot account for the larger N pool size or faster N

mineralization rate at the high elevation site. N mineralization was most sensitive to soil temperature, moisture, and soil N pool size. Inherent differences of N mineralization constants between both sites was also found to be important in explaining present day N cycling. The high elevation site has a faster N mineralization rate constant than the lower elevation site, perhaps due to higher quality substrate, differences in microbial communities, or land disturbance history.

Poster Presentation

BRENNAN, AMANDA L.*[1], STEPHANIE MADSON[2], AND BARBARA C. REYNOLDS[1]. [1]Department of Environmental Studies University, University of NC-Asheville, Asheville NC 28804 ; [2]Institute of Ecology, University of Georgia, Athens GA 30604. Effects of Canopy Gaps on Soil Microarthropod Communities.

An ongoing field of research in forest ecology is the effect of gap size on forest dynamics. Evidence is mounting that the current "gap dynamic" model, using gaps 30 m in diameter, is insufficient to explain diversity in many forests. A study being conducted at Coweeta by Jim Clark et al. will examine the effects of larger gaps on the dynamics of forest stands. Our studies on soil microarthropod communities will take advantage of the experimental gap creation to examine the effects of different size gaps on populations of common soil microarthropods. Preliminary analyses of soil cores from July and November, 2000, indicate that the average number of collembola and oribatid mites per soil core is significantly greater in July than in late fall/winter conditions. For most of the individual sites in July, there is no significant difference in numbers or Collembola or oribatid mites among the sites. For November, 2 of the 5 sites appear to have significantly lower numbers of collembola and one has lower numbers of oribatid mites. We predict that the largest gaps will have fewer numbers of soil microarthropods, and that a shift in community structure will occur.

Oral Presentation

COLEMAN, DAVID*[1] C., MARK D. HUNTER[1], CATHERINE M. PRINGLE[1], SINA ADL[1], NATALIE POWEL[1], and XIAOMING ZOU[2]. [1]Institute of Ecology, University of Georgia, Athens, GA 30602, and [2]University of Puerto Rico, San Juan, PR. A Comparison of Stream and Terrestrial Decomposition at Luquillo and Coweeta LTER Sites: Initial Results from **Terrestrial** Experiments.

In this initial one-year pilot study, we hypothesized that effects of exclusion and high nitrogen concentrations of litter would favor litter decomposition. Data from Coweeta support this hypothesis, with macrofaunal exclusion reducing the rate of nitrogen immobilization from soil to litter. Data from Luquillo do not support it; *Guarea*, with by far the highest N content, decomposed slowly.

We also hypothesized that fast decomposing litter will favor microbe-feeding fauna and their predators. Ancillary hypotheses regarding exclusion, and mesofaunal food-processing were also considered, across four groups of microarthropods: Collembola, Oribatida,

Prostigmata, and Mesostigmata, and nematodes. Bacterial and fungal-feeding nematodes did not follow any of the patterns shown by the microarthropods, possibly due to litter quality and bacterial effects on the nematodes. We occasionally found textbook-like examples of faunal responses to litter quality ("bottom up") at Coweeta, most notably for the predatory Mesostigmata, which reflected enhanced numbers of microbivores on higher-quality litter. Despite replication in habitats and time, this preliminary investigation, funded on a supplemental "shoestring," will definitely benefit by being repeated across two or more sites, for several years, with more biotic complexity (e.g., fungi), with the assistance of the NSF cross-site program.

Oral Presentation

COOPER, AARON R.[1]*, BRIAN D. KLOEPPEL[2], WAYNE T. SWANK[2], JAMES M. VOSE[2], and THOMAS R. WENTWORTH[1]. [1]Botany Department, North Carolina State University, Raleigh, NC; [2]Coweeta Hydrologic Laboratory, Otto, NC 28763. The Fundamental Differences between Evergreen and Deciduous Communities and the Implications of Southern Pine Beetle in the Southern Appalachians.

Productivity, biomass, and nutrient cycling are important functions in understanding community structure and stability. The objectives of this study are: 1) to investigate the changes in biomass, productivity and density of two white pine stands (dead and living stems) over the past 35 years, 2) to investigate the innate differences in productivity, biomass, and diversity between hardwood and evergreen systems, 3) to study the possible implications of southern pine beetles on white pine stands in terms of hydrology and nutrient cycling, and 4) to investigate resistance of white pines to pine beetles using resin flow techniques. This proposed study is currently underway at Coweeta Hydrologic Laboratory in Otto, North Carolina. One facet of this study involves the resampling of 40 0.2 acre plots throughout watersheds 1 and 17 to determine the changes in stand structure over time (other survey dates include 1967, 1969, 1972, 1984, and 1989). Additionally, other plots will be established (or utilize existing plots) in the adjacent hardwood watershed 18 to examine the effects diversity has on standing biomass, nutrient cycling, and productivity. Another component of this study will be the use of resin flow techniques to examine the environmental parameters (primarily water availability and topographic position) influencing susceptibility of these white pine watersheds to pine beetle attack. Currently, both watersheds 1 and 17 have pine beetle infestations present. Consequently, the data gathered can be used to relate long term effects of changes in community structure on hydrology, productivity, and nutrient cycling.

Oral Presentation

CROSS, WYATT F.*[1], J. BRUCE WALLACE[1,2], SUE. L. EGGERT[1,2], and E. R. SILER[2]. [1]Institute of Ecology, University of Georgia, Athens, GA, 30602, [2]Department of Entomology, University of Georgia, Athens, GA, 30602. Variation in Secondary Production of Headwater Streams at Coweeta: Estimating the Importance of Biotic and Abiotic Factors.

We analyzed 16 years of secondary production data collected from 3 unmanipulated headwater streams at Coweeta Hydrologic Laboratory in North Carolina. Our main objectives were: 1) to quantify inter-annual variation in whole-community and functional feeding group-specific secondary production, 2) to examine relationships between predator and prey secondary production, and 3) to relate biotic (benthic organic matter) and abiotic (discharge) factors to secondary production. Annual secondary production averaged 8.5 g m^{-2} yr^{-1} across all streams. Variation in secondary production was relatively low among years (CV ~ 25%), but did not differ significantly among streams. Excluding scrapers, the rarest group, the proportion of secondary production contributed by various functional feeding groups was extremely consistent among years (CV's ~ 10-20%). Predator production was strongly and positively related to prey production in both mixed substrate habitat (cobble-pebble-gravel-sand) and bedrock outcrops. Abiotic factors (i.e. discharge) explained 40% of the variation in benthic leaf litter. Biotic factors (i.e. leaf litter standing stock) explained a significant amount of the variation in shredder, predator, and total mixed-substrate production. Overall discharge may have primacy in affecting secondary production because of its strong influence on organic matter.

Poster Presentation

DIEZ, JEFF* and H. RONALD PULLIAM. University of Georgia, Athens, GA 30602.

Species Distributions and Plant-Fungus Interactions across Environmental Gradients.

The Coweeta Basin and the larger area of the LTER Regionalization Study are characterized by strong gradients in abiotic conditions and species distributions. We are attempting to understand how understory plant species respond to climatic and land use gradients by studying the distributions and demography of six understory forb species exhibiting a range of life history characteristics (*Tipularia discolor, Goodyerea pubescens, Polygonatum biflorum, Smilacina racemosa, Hepatica americana, and Hexastylis arifolia*). The particular project described here focuses on the abiotic and biotic interactions of a terrestrial orchid, *Goodyera pubescens*. Long-term study plots have been established along a gradient from Athens to Coweeta, encompassing a wide range of environmental conditions and temperature, soil moisture, light levels (PAR), and soil nutrients are monitored at each plot. The terrestrial orchids are unique among the forest herbs in their absolute reliance upon particular groups of fungi in order to germinate and reach photosynthetic stage. However, very little is known about the distribution of the fungi, which for *Goodyera* belong to the basidiomycete genus *Tulasnella*. Through surveys, environmental monitoring, and seed introductions, with and without the co-introduction of suitable fungi, we are testing for fungal limitation of orchid recruitment, and exploring how plant and fungal distributions interact with environmental conditions. Additionally, the effect of the observed spatial structure on the ecological functioning of the symbiosis is being assessed via lab germination experiments and reciprocal transplant studies in the field. Of primary interest is the potential for local adaptation among the fungi, and the likelihood of selection pressures on the orchids leading to diversification or specialization among symbionts.

Poster Presentation

HAINES, BRUCE L.[1], WAYNE T. SWANK[2], JAMES M. VOSE[2]. [1]University of Georgia, Athens, GA; [2]Coweeta Hydrologic Laboratory, Southern Research Station, USDA Forest Service, Otto, NC. Long-Term Nitrogen Dynamics of Coweeta Forested Watersheds in the Southeastern USA.

Long term data (25 years) were analyzed for trends and dynamics of NO_3 and NH_4 deposition and loss for mature mixed hardwood forest stands. Watershed N saturation was evaluated in the context of altered N cycles and stream inorganic N responses associated with management practices (cutting prescriptions, species replacement and prescribed burning) and with natural disturbances (drought and wet years, insect infestation, hurricane damage, and ozone episodes). Reference watersheds were highly retentive of inorganic N with deposition of < 9.9 kg ha^{-1} yr^{-1} and stream water exports below 0.25 kg ha^{-1} yr^{-1}. Reference watersheds were in transition between stage 0 and stage 1 of watershed N saturation as evidenced by significant time trend increases in annual flow-weighted concentrations of NO_3 in stream water and increases in the seasonal amplitude and duration of NO_3 concentrations during 1972-1994. These stream water chemistry trends were partially attributed to significant increases in NO_3 and NH_4 concentrations in bulk precipitation over the same period and/ or reduced biological demand due to forest maturation. Evidence for stage 3 of N saturation, where the watershed is a net source of N rather than a N Sink was found for the most disturbed watershed at Coweeta.

Oral Presentation

HUNTER, MARK D., CATHERINE M. PRINGLE*, AND DAVID C. COLEMAN. Institute of Ecology, University of Georgia, Athens, GA 30602. Links Among Land-Use Change, Litter Inputs and Litter Processing: an Integrative Approach to Our Future Research at the Coweeta LTER Site.

We propose to combine monitoring and experimental procedures to explore the interactive effects of litter quality, microclimate, and biota on the decomposition of plant litter along gradients of land-use in the southern Appalachians. We will employ an integrative approach versus a habitat-specific approach (stream versus riparian versus upland) that address the following questions in both aquatic and terrestrial environments: (1) Do the relative roles of litter quality, microclimate, and biota on rates of litter processing vary along gradients in land-use?; and (2) How do interactions among these key variables change along gradients in land-use? Specifically, we will work in replicated units of oak hardwood; plantation forestry; production agriculture; suburban parkland and urban housing development. At each site we will explore patterns of decomposition in both streams and soils by: measuring natural variation in the quality of litter inputs (C, N phenolics, lignin) and key abiotic variables (temperature, moisture, pH stream flow, sedimentation, etc.); manipulating access to litter by macroconsumers (mesh size, electric exclosure); transferring a standard "reference" litter to each field site; and transferring natural litter from each site to a "common garden" and "common stream." We will also use the "hazard sites," established

during the last Coweeta LTER funding cycle, to initiate a series of longterm estimates of litter input and liter processing. As land-use at these sites changes as predicted, we will have time-series data of changes in the quality of litter inputs and changes in the processing of leaf litter.

Oral Presentation
KLOEPPEL, BRIAN D.* University of Georgia, Athens, GA 30602. Collaborative Ecological Research in Poland.

The International Long-Term Ecological Research (ILTER) Program has provided the opportunity to conduct collaborative research in many regions around the world. This presentation summarizes the current status of my collaboration after one field visit to Poland in August 2000. Opportunities exist in many countries for interested scientists and especially graduate students and post-docs.

Poster Presentation
KLOEPPEL, BRIAN D.* University of Georgia, Athens, GA 30602. Overview of the Organization of Biological Field Stations (OBFS) and Coweeta Hydrologic Laboratory.

The Coweeta Hydrologic Laboratory and LTER Program has been a member of the Organization of Biological Field Stations (OBFS) since 1997. The OBFS is an association of more than 200 field stations and professionals concerned with field facilities for biological research and education, primarily in North America and Central America. This poster is a professional product and travelling endorsement for OBFS and its members. OBFS also generates a "Field Studies Opportunities" poster each year that has included Coweeta since 1997. In the last few years, there has been increasing collaboration and networking between the OBFS and LTER networks. The current National Ecological Observatory Network (NEON) initiative discussion has been promoting the collaboration of these two networks to provide more thorough coverage of research and natural areas and to involve more scientists and educators in the NEON initiative. OBFS also maintains a large web site that contains numerous resources (http://www.obfs.org/). In addition, OBFS also conducts an annual meeting each September.

Oral Presentation
MCTAMMANY, MATT E.* and E. FRED BENFIELD. Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061. Recovery of Stream Ecosystems from Agriculture: Preliminary Results of a Region-Wide Study.

Land cover across the southern Appalachian landscape is changing due to a number of socioeconomic factors, and reforestation of agricultural land is a major trend in the past 50 years. Previous stream research suggests a legacy of agricultural impact despite reforestation of watersheds. We are studying streams in watersheds with varying degrees of

historical and current agriculture to determine which factors are recovering and which factors remain impacted by historical watershed conditions. Sites were selected using a regional watershed database that includes land cover in three time steps (1950, 1972, 1993). Watersheds were categorized into one of seven categories based on land cover over the past 50 years (forested, light agriculture, moderate agriculture, heavy agriculture, reforesting, recovered). After intensive field reconnaissance to ensure accuracy of watershed categories and ancillary site characteristics (stream size, gradient, permission), five streams were chosen in each category (30 streams total). In November 2000, we began monitoring chemistry, suspended solids, algal biomass, temperature, and flow at each site. In addition, we started a wood breakdown and microbial biofilm respiration experiment. Initial results from these components of the research will be presented. We sampled macroinvertebrates from each stream in April 2001 and plan to measure metabolism (primary production and respiration) in each stream this summer.

Oral Presentation

MCTAMMANY, MATT E.*[1], JACKSON R. WEBSTER[1], E. FRED BENFIELD[1], and DAN J. SOBOTA[2]. [1]Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061; [2]Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon 97331. Seasonal and Longitudinal Trends of Metabolism in a Southern Appalachian Mid-Sized River.

We measured ecosystem metabolism (primary production and respiration) seasonally over 3 years at four sites along a 37-km reach of the Little Tennessee River, North Carolina, using the single-station, diurnal oxygen change method. Reaeration was estimated using energy dissipation and nighttime regression methods. Mean annual discharge ranges from 11.1 m^3/s at the upstream site to 30.4 m^3/s at the downstream site. Over all reaches and dates, gross primary production (GPP) averaged 0.65 $gC/m^2/d$, which is similar to values reported for other mid-sized rivers. GPP was highest in summer and lowest in winter and spring, but neither respiration nor P:R showed seasonal patterns. GPP was significantly higher downstream, while respiration was significantly higher upstream. P:R was higher downstream indicating increased autotrophy downstream. Reaeration coefficients calculated using the nighttime regression method were higher than those calculated using the energy dissipation method, which resulted in significant differences in estimates of GPP and respiration between the two techniques. However, P:R ratios were not significantly different between the two reaeration techniques suggesting that each method can consistently provide information about the trophic state of the stream reach. Our results suggest that this reach of river is a metabolic transition from allochthonous to autotrophic dominance.

** Oral Presentation**

MITCHELL, CHRIS E.[1], MONICA G. TURNER[1], and SCOTT M. PEARSON*[2]. [1]Department of Zoology, University of Wisconsin, Madison WI; [2]Biology Department, Mars Hill College, Mars Hill NC 28754. Effects of Land Use and Forest Fragmentation on Myrmecochores and Ant Communities in the Southern Appalachian Highlands.

The purpose of this study was to examine a potential mechanism, the presence and diversity of seed-dispersing ants, that might explain the reduced abundance and diversity of myrmecochores (ant-dispersed plant species) in small forest patches with high intensities of past land use. Small patches (<25 ha) of forest that had experienced high past land use intensity harbored a greater abundance and diversity of myrmecochorous ants, but a lower abundance and species richness of myrmecochores than did large patches (>200 ha) with minimal past land use. Overall, sites with greater myrmecochore species richness and abundance had less diverse ant communities and a lower abundance of ants. Ant species composition varied most between patches that differed in size. Large patches were dominated by one ant species, *Aphaenogaster fulva*, whereas small patches supported less *A. fulva*, but higher numbers of *Aphaenogaster rudis* and two *Camponotus* species. An absence of seed-dispersing ants cannot explain the reduced numbers of myrmecochores in small patches with high past land use because the mechanism of seed dispersal by ants still appears to be available in those patches. Land use legacies or fragmentation effects may be overriding any advantages offered by the increased diversity and abundance of ants at those sites. It is possible that the reintroduction of adult myrmecochores might reverse extirpation in locations that currently support low numbers and diversities of these herbs.

Poster Presentation

PANIKOWSKI, AMY E.[1], SCOTT M. PEARSON[1], and NORMAN HICKS[2]. [1]Biology Dept., Mars Hill College, Mars Hill NC 28754; [2]Museum of Natural History, University of Georgia, Athens GA 30602. The Abundance of Gastropods in Forests with Different Land-Use Histories.

The abundance, spatial pattern, and disturbance history of forest community types can affect populations of native species. This study focused on the abundance of gastropods captured in the mesic forests in Western North Carolina. The abundance of snail families was compared for forested sites having different land-use histories, and for sites located in small (<50 ha) versus large (>500 ha) patches of forest. All families demonstrated strong seasonal trends in abundance. The abundance of the families Polygyridae and Endodontidae were correlated with land-use history. We also tested for correlations between snail abundances and habitat characteristics such as levels of coarse woody debris and the characteristics of vegetation in the overstory, understory, and herb layers. We hypothesized that the highest abundances of gastropods would be at moist sites, sites with greater herb abundance, and sites with low land-use intensity. All snail families were more abundant at sites having more coarse woody debris and tree communities dominated by mesophytic species.

Poster Presentation

PAVAO-ZUCKERMAN, MITCHELL A.* and DAVID C. COLEMAN. Institute of Ecology, University of Georgia, Athens, GA 30602. Soil Ecology along An Urban to Rural Land Use Gradient in the Southern Appalachians.

Due to the nature of urban geography, researchers have suggested that a gradient approach is an appropriate design for the study of urban ecology. This study is designed to investigate the effects of urban land use on the soil environment, soil organisms, and ecosystem processes utilizing a gradient approach. A transect was established, originating in Asheville, NC, and extending into the Pisgah National Forest, and used to select 12 forest plots in which to conduct the study. Soils are sampled seasonally to estimate populations of decomposer organisms, and for chemical analyses. Soil temperature is continually monitored with buried data loggers. A leaf litter decomposition study was initiated to determine the effects of the urban environment on decomposition rates of a reference leaf litter. Some preliminary results from this study are presented here.

** Poster Presentation**

PEARSON, SCOTT M.[1] and BARBARA C. REYNOLDS[2]. [1]Biology Department, Mars Hill College, Mars Hill NC 28754; [2]Department of Environmental Studies, University of NC-Asheville, Asheville NC 28804. Monitoring Effects of Gap-creation on Avian Communities.

The creation of canopy gaps represents the most common, and perhaps influential, natural force of disturbance and change in Southern Appalachian forests. We are monitoring the effects on bird communities of a manipulative experiment that will create canopy gaps in the Coweeta Basin. Bird communities are being monitored using fixed radius point counts. These points are located in and around the forest stands that will be manipulated and in nearby “control” stands. Counts will be conducted before and after the manipulations. In addition, bird habitats will be assessed before and after gap creation by measuring changes in the three-dimensional structure of the vegetation. We predict that the gap manipulation will result in an increase in the abundance of edge- and shrub-nesting species, such as Chestnut-sided Warblers and Indigo Buntings, in the manipulated area. Canopy- and ground-nesting species, such as Ovenbirds and Blue-headed Vireos, are predicted to decrease after these manipulations.

Oral Presentation

PRINGLE, CATHERINE M.*[1], NATALIE POWELL[1], MARK D. HUNTER[1], DAVID C. COLEMAN[1], EFFIE GREATHOUSE[1], SINA ADL[1], and XIAOMING ZOU[2]. [1]Institute of Ecology, University of Georgia, Athens, GA; [2]University of Puerto Rico, Rio Piedras, Puerto Rico. A Comparison of Stream and Terrestrial Decomposition at Luquillo and Coweeta LTER Sites: Initial Results from Coweeta **Stream** Experiments.

The heterogeneity of leaf litter entering aquatic and terrestrial ecosystems provides different qualities of food resources available to consumers, which is potentially reflected by the magnitude of consumer impacts on leaf decomposition rates. Accordingly, we hypothesized that exclusion of macrobiota from leaf litter in stream and terrestrial environments at the Coweeta and Luquillo LTER sites would: (a) decrease rates of leaf litter breakdown; (b) have a proportionately greater impact on high quality than low quality litter; (c) delay colonization of litter by microbial-feeding mesofauna; and (d) have less of an effect at Luquillo where high temperatures and humidity should favor rapid decomposition by microbes.

While stream experiments conducted at the Luquillo site are still being analyzed, stream experiments at the Coweeta site generally supported our hypothesis that basal resource quality sets the stage for the actions of top-consumers on lower trophic levels: consumers had a greater impact on higher quality food resources. For example, we found increased influence of crayfish on leaf decay of high quality leaf litter (tulip poplar) versus intermediate- (chestnut oak) and low-quality (rhododendron) leaf litters. Omnivorous crayfish negatively affected both lower trophic levels (insects and leaves). Leaf decomposition rates (as affected by crayfish consumers) and insect colonization appear to be linked to leaf quality characteristics such as C:N ratios and condensed tannins.

Oral Presentation

RIEDEL, MARK S.* Coweeta Hydrologic Laboratory, Otto, NC 28763. Sediment Loading in the Chattooga River – Issues of TSS, SSC, Organic Matter and Bed Material Load.

The Chattooga River Watershed is part of the USDA Forest Service Large Scale Watershed Restoration initiative. As part of this project, we have been monitoring water quality and streamflow as it relates to EPA 303(d) listing status. The EPA established suspended sediment TMDLs for streams in the Chattooga Watershed using a soil erosion model and observed TSS. We have instrumented one benchmark stream, two threatened streams, and one impaired stream with continuous flow, pumping samplers. The original experimental design was to determine the role that TSS played in stream water quality and 303(d) listing status. However, initial results and supporting field observations indicate that TSS may not be the best variable with which to represent stream impairment. High TSS loadings have been found to occur on all streams during storm events. The nature of the observed TSS hysteresis, chroma of the TSS filtrates, and field observations suggest that TSS in the benchmark stream is largely organic matter (OM) while that on the impaired and threatened streams is mineral based. Consequently, separate analyses of organic and mineral solids have begun. In addition, it has been observed that the sand fraction of bed material load, rather than TSS, is having a greater impact on stream quality by reducing substrate habitat. Scour and deposition pins have been installed on one threatened stream to obtain measurements of bed material transport during storm events. Due to the highly transitory nature of sand transport, these data will be used to calibrate estimates of cumulative bed material load obtained with a process based transport model. This will allow us to account for transport via bedform migration, saltation, and suspension. In the future, we will

differentiate between legacy and contemporary sediments through analyses of historical stream substrates.

Oral Presentation
STEINER, SUSAN M.* and BRIAN D. KLOEPPEL. University of Georgia, Athens, GA 30602. Activities and Results of the Coweeta Schoolyard LTER Initiative, 1998 through 2001.

The Schoolyard LTER initiative has been funded annually since the 1998 school year by a grant from the National Science Foundation, supplemental to the core Coweeta LTER grant. This program is to formally provide instruction, field research experiences, and data summary and analysis experiences to K-16 students and instructors using Coweeta LTER research projects as an example. Coweeta LTER scientists and staff have been providing middle school, high school, and community college students "hands on" field and laboratory research experience for the last three years. The types of activities include assisting on current research projects such as the leaf litter collection on the gradient plots, stem respiration measurements for the carbon flux component of the LTER Regionalization project, and collection of overland flow samples for the Riparian Zone Restoration project. Other activities have been custom designed to minimize the "bigfoot" researcher effect on our long term sites, affording students and teachers optimal research experience emphasizing data collection and analysis techniques while dovetailing into current projects. These custom activities include a revegetation inventory and a macroinvertebrate survey for the Riparian Restoration project, plus an LTER network and weather patterns lesson. The students and instructors speak the best for the initiative; their comments and photos are presented here.

Poster Presentation
SUTHERLAND, ANDREW*[1], NED GARDINER[1], MARK SCOTT[1], JUDY MEYER[1], CATHY PRINGLE[1], GENE HELFMAN[1], FRED BENFIELD[2], and MATT MCTAMMANY[2]. [1]University of Georgia, Athens, GA 30602, Virginia Tech, Blacksburg, VA 24061. Long-Term Research on the Biology, Chemistry and Geomorphology of Southern Appalachian Streams at High Risk for Development.

Many aquatic ecosystems in the southern Blue Ridge have low productivity due to low light, low temperature, high gradient, and low nutrient levels. Human activities can alter each of these important drivers of ecosystem structure and function. Historic land use carries important implications for present and future biological and physical conditions. The purpose of the hazard project is to document the response trajectory of streams to changing land use patterns in the watershed by collecting data at streams whose watersheds are at high risk of development in the near future. In summer 2000 we assessed current conditions at sites whose watersheds were in (1) reference conditions, (2) forested land use, and (3) agricultural land use. The latter two are projected to move toward second home development and suburban land uses, respectively. Medium sized watersheds (10-40 sq.

km) were chosen using Wear and Bolstad's hedonic model, and land use projections were derived from regression models based on past and present land cover and terrain information. Biotic and abiotic parameters were measured at these hazard sites and will be collected every five years for the next 30 years. Ordination based on principal components analysis of fish relative abundance in the hazard sites and those sampled by Scott and Helfman, suggests that the study sites are clustered into two distinct groups. This can be related to 1970 and 1993 land use. Relative abundance of benthic crevice and gravel spawners at the hazard sites are very different in the two stream groups as is 1970 and 1993 land use in the watersheds. Chlorophyll-a is negatively correlated with canopy cover ($r^2 = 0.44$; $p = 0.07$), and fish density is positively correlated with chlorophyll-a ($r^2 = 0.80$; $p = 0.003$). Fish species richness is correlated more strongly with mean temperature ($r^2 = 0.76$; $p = 0.005$). Finally, scores from two visual assessment protocols (developed by EPA and NRCS) were strongly correlated ($r^2 = 0.88$; $p < 0.001$). This is a work in progress. Data analyses to be completed this summer include identification of macroinvertebrates, stream cross-section geomorphology, and substrate embeddedness. Results to date suggest that these streams are starting from different points based in part on land use in the watershed. What remains to be seen is if the trajectory of ecosystem response to disturbance will also differ.