Annual Report for Period: 09/2001 - 09/2001
Submitted on: 10/10/2001
Principal Investigator: Coleman, David C.
Award ID: 9632854
Organization: U of Georgia Res Fdn Inc
Title:
Long-Term Studies of Disturbances as They Affect Ecological Processes in Landscapes of the Southern Appalachians

Project Participants

Senior Personnel

Name: Coleman, David
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Vose, James
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Benfield, E. Fred
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Bolstad, Paul
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Clark, James
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Clinton, Barton
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Crossley, D.A.
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Elliott, Katherine
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Gragson, Theodore
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Grossman, Gary
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Helfman, Eugene

Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Hendrick, Ronald
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Hunter, Mark
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Knoepp, Jennifer
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Meyer, Judith
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Newman, David
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Pearson, Scott
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Pringle, Catherine
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Pulliam, H. Ronald
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Swank, Wayne
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Swift, Lloyd
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Turner, Monica
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Webster, Jackson
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Yeakley, J. Alan
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Kloeppel, Brian
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Wallace, J. Bruce
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Haines, Bruce
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Wear, David
Worked for more than 160 Hours: Yes
Contribution to Project:

Post-doc

Name: Hubbard, Rob
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Riedel, Mark
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Adl, Sina
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Paul, Michael
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Benstead, Jonathan
Worked for more than 160 Hours: Yes
Contribution to Project:

Graduate Student

Name: Bathala, Neeti
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Bonito, Gregory

Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Cooper, Aaron
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Crenshaw, Chelsea
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Cross, Wyatt
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Dietz, Michael
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Diez, Jeff
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Eggert, Sue
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Farr, Mark
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Gibson, Cathy
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Giladay, Itamar
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Greenwood, Jennifer
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Harris, Robert
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: HilleRisLambers, Janneke
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Huddle, Anne
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Ibanez, Ines
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Ipser, Reid
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Johnson, Brent
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Jurgelski, William
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: LaDeau, Shannon
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Little, Julie
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Madritch, Mike
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Madson, Stephanie
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Martin, Harold
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: McDaniel, Kathleen
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: McTammany, Matthew
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Mitchell, Katherine

Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Neatrour, Matt
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Rachel, Gary
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Ravagendran, Ashok
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Rosi, Emma
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Salmore, Alissa
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Sanzone, Diane
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Schofield, Kate
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Scott, Mark
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Sutherland, Andrew
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Wagner, Michael
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Wagner, Paul
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Walker, John
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Wilcox, Heidi
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Wolosin, Michael
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Zuckerman, Mitchell
Worked for more than 160 Hours: Yes
Contribution to Project:

Undergraduate Student

Name: Dextrase, Dawn
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Linker, Will
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Seader, Kate
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Sorrow, Andrea
Worked for more than 160 Hours: Yes
Contribution to Project:

Research Experience for Undergraduates

Name: Burchfield, Chad
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Cripliver, Jennifer
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Ward, Josh
Worked for more than 160 Hours: Yes
Contribution to Project:

Organizational Partners

USDA Forest Service - Southern Forest Experiment Station

The USDA Forest Service has been one of the two main collaborating institutions for the Coweeta LTER Program since the LTER program started at Coweeta in 1980.

Virginia Polytechnic Institute and State University
Researchers from Virginia Tech have been active at Coweeta since the LTER Program started at Coweeta in 1980. Some of the research projects predate the LTER program back to 1971.

Duke University
The primary collaborator of the Coweeta LTER Program from Duke University has been Jim Clark.

Mars Hill College
The primary collaborator of the Coweeta LTER Program from Mars Hill College is Scott Pearson.

University of Minnesota-Twin Cities
The primary collaborator with the Coweeta LTER Program from the University of Minnesota is Paul Bolstad.

Portland State University
The primary collaborator with the Coweeta LTER Program from Portland State University is Alan Yeakley.

University of Wisconsin-Madison
The primary collaborator with the Coweeta LTER Program from the University of Wisconsin - Madison is Monica Turner.

University of Georgia
The University of Georgia is the academic home of the Coweeta LTER Program and one of the two primary institutional collaborators of the Coweeta LTER Program.

Other Collaborators or Contacts

Numerous researchers and educators from other institutions work at Coweeta or utilize research conducted in the Coweeta LTER Program. Many of these institutions are mentioned on the Research Team web page of the Coweeta LTER Program (coweeta.ecology.uga.edu).

Activities and Findings

Research and Education Activities: (See PDF version submitted by PI at the end of the report)
Please see the attached PDF Report of the Coweeta LTER Progam for the Research and Education Activities.

Findings: (See PDF version submitted by PI at the end of the report)
Please see the attached PDF Report of the Coweeta LTER Progam for the Findings from the Research and Education Activities.

Training and Development:
Please see the attached PDF Report of the Coweeta LTER Progam for the Training and Development Activities.

Outreach Activities:
Please see the attached PDF Report of the Coweeta LTER Progam for the Outreach Activities.

Journal Publications

Simons, Theodore R.; Pearson, Scott M.; Moore, Frank R., "Application Of Spatial Models To The Stopover Ecology Of Trans-Gulf Migrants", Studies in Avian Biology, p. 4, vol. 20, (2000). Published

Hansen, Randi, A., "Effects Of Habitat Complexity And Composition On A Diverse Litter Microarthropod Assemblage", Ecology, p. 1120, vol. 81, (2000). Published

Hansen, Randi, A., "Red oak litter promotes a microarthropod functional group that accelerates its decomposition", Plant and Soil, p. 37, vol. 209, (1999). Published

Mitchell, Katherine, A.; Bolstad, Paul V.; Vose, James M., "Interspecific and environmentally induced variation in foliar dark respiration among eighteen southeastern deciduous tree species", Tree Physiology, p. 861, vol. 19, (1999). Published

Elliott, Katherine J.; Hendrick, Ronald L.; Major, Amy E.; Vose, James M.; Swank, Wayne T., "Vegetation dynamics after a prescribed fire in the southern Appalachians", Forest Ecology and Management, p. 199, vol. 114, (1999). Published

Vose, James M.; Swank, Wayne T.; Clinton, Barton D.; Knoepp, Jennifer D.; Swift, Lloyd W, "Using stand replacement fires to restore southern Appalachian pine-hardwood ecosystems: effects on mass, carbon, and nutrient pools", Forest Ecology and Management, p. 215, vol. 114, (1999). Published

McNab, W. Henry; Browning, Sara A.; Simon, Steven A.; Fouts, Penelope E., "An unconventional approach to ecosystem unit classification in western North Carolina, USA", Forest Ecology and Management, p. 405, vol. 114, (1999). Published

Ford, William M.; Menzel, M. Alex; McGill, David W.; Laerm Joshua; McCay, Timothy S., "Effects of community restoration fire on small mammals and herpetofauna in the southern Appalachians", Forest Ecology and Management, p. 233, vol. 114, (1999). Published

Schaberg, Rex H.; Holmes, Thomas P.; Lee, Karen J.; Abt, Robert C., "Ascribing value to ecological processes: an economic view of environmental change", Forest Ecology and Management, p. 329, vol. 114, (1999). Published

Flebbe, Patricia A., "Trout use of woody debris and habitat in Wine Spring Creek, North Carolina", Forest Ecology and Management, p. 367, vol. 114, (1999). Published

Rauscher, H. Michael., "Ecosystem management decision support for federal forests in the United States: a review", Forest Ecology and Management, p. 173, vol. 114, (1999). Published

Harper, Craig A.; Guynn, David C., Jr., "Factors affecting salamander density and distribution within four forest types in the Southern Appalachian Mountains", Forest Ecology and Management, p. 245, vol. 114, (1999). Published

Clinton, Barton D.; Vose, James M., "Fine root respiration in mature eastern white pine (Pinus strobus) in situ: the importance of CO2 in controlled environments", Tree Physiology, p. 475, vol. 19, (1999). Published

Reich, Peter B.; Ellsworth, David S.; Walters, Michael B.; Vose, James M.; Gresham, Charles; Volin, John C.; Bowman, William D., "Generality of leaf trait relationships: a test across six biomes", Ecology, p. 1955, vol. 80, (1999). Published

Walker, John F.; Miller, Orson K., Jr.; Lei, Tom.; Semones, Shawn.; Nilsen, Erik.; Clinton, B.D., "Suppress of ectomycorrhize on canopy tree seedlings in Rhododendron maximum L. (Ericaceae) thickets in the southern Appalachians", Mycorrhiza, p. 49, vol. 9, (1999). Published

Swift, Lloyd W., Jr.; Burns, Richard G., "The three R's of roads: redesign, reconstruction, and restoration", Journal of Forestry, p. 40, vol. 97, (1999). Published

Bolstad, Paul V.; Mitchell, Katherine; Vose, James M., "Foliar temperature-respiration response functions for broad-leaved tree species in the southern Appalachians", Tree Physiology, p. 871, vol. 19, (1999). Published

Elliott, Katherine, J.; Vose, James M.; Swank, Wayne T.; Bolstad, Paul V., "Long-term patterns in vegetation-site relationships in a southern Appalachian Forest", Journal of the Torrey Botanical Society, p. 320, vol. 126, (1999). Published

Vose, James M.; Bolstad, Paul V., "Challenges to modelling NPP in diverse eastern deciduous forests: species-level comparisons of foliar respiration responses to temperature and nitrogen", Ecological Modelling, p. 165, vol. 122, (1999). Published

Wright, Christina J.; Coleman, David C., "The Effects Of Disturbance Events On Labile Phosphorus Fractions And Total Organic Phosphorus In The Southern Appalachians", Soil Science, p. 391, vol. 164, (1999). Published

Heneghan, Liam,; Coleman, David C.; Crossley, D.A., Jr.; Xiaoming, Zou., "Nitrogen dynamics in decomposing chestnut oak (Quercus prinus L.) in mesic temperate and tropical forest", Elsevier Science, p. 169, vol. 13, (1999). Published

Pearson, Scott M.; Turner, Monica G.; Drake, Jason B., "Landscape change and habitat availability in the southern Appalachian Highlands and Olympic Peninsula", Ecological Applications, p. 1288, vol. 9, (1999). Published

Webster, J.R.; Benfield, E.F.; Ehrman, T.P.; Schaeffer, M.A.; Tank, J.L.; Hutchens, J.J.; D'Angelo, D.J., "What happens to allochthonous material that falls into stream? A synthesis of new and published information from Coweeta", Freshwater Biology, p. 687, vol. 41, (1999). Published

Hunter, Mark D., Forkner, Rebecca E., "Hurricane damage influences foliar polyphenolics and subsequent herbivory on surviving trees", Ecology, p. 2676, vol. 80, (1999). Published

Nilsen, Erik T.; Walker, John F.; Miller, Orson, K.; Semones, Shawn W.; Lei, Thomas T.; Clinton, Barton, D., "Inhibition Of Seedling Survival Under Rhododendron Maximum (Ericaceae): Could Allelopathy Be A Cause?", American Journal of Botany, p. 1597, vol. 86, (1999). Published

Heneghan, L; Coleman, D.C.; Zou, X; Crossley, D.A.; Haines, B.L., "Soil Microarthropod Contributions To Decomposition Dynamics: Tropical-Temperate Comparisons Of A Single Substrate", Ecology, p. 1873, vol. 80, (1999). Published

Wallace, J. Bruce; Eggert, S.L.; Meyer, Judy, L.; Webster, J.R., "Effects Of Resource Limitation On A Detrital-Based Ecosystem", Ecological Monographs, p. 409, vol. 69, (1999). Published

Huryn, Alexander D.; Wallace, J. Bruce., "Life History And Production Of Stream Insects", Annu. Rev. Entomol., p. 83, vol. 45, (2000). Published

Wright, C.J.; Coleman, D.C., "Cross-site comparison of soil microbial biomass, soil nutrient status, and nematode trophic groups", Pedobiologia, p. 2, vol. 44, (2000). Published

Vose, James M.; Swank, Wayne T.; Harvey, Gregory J.; Clinton, Barton D.; Sobek, Christine., "Leaf Water Relations and Sapflow in Eastern Cottonwood (Populus deltoides Bartr.) Trees Planted for Phytoremediation of a Groundwater Pollutant.", International Journal of Phytoremediation, p. 53, vol. 2, (2000). Published

Wyckoff, Peter H.; Clark, James S., "Predicting tree mortality from diameter growth: a comparison of maximum likelihood and Bayesian approaches", Canadian Journal of Forest Research, p. 156, vol. 30, (2000). Published

Clinton, Barton, D.; Baker, Corey R., "Catastrophic windthrow in the southern Appalachians: characteristics of pits and mounds and initial vegetation responses", Forest Ecology and Management, p. 51, vol. 126, (2000). Published

Clark, J.S.; Beckage, B.; Camill, P.; Cleveland, B. ; HilleRisLambers, J.; Lichter, J.; McLachlan, J.; Mohan, J.; Wyckoff., "Interpreting Recruitment Limitation In Forests", American Journal of Botany, p. 1, vol. 86, (1999). Published

Clark, James S.; Silman, Miles; Kern, Ruth; Macklin, Eric; HilleRisLambers, Janneke., "Seed Dispersal Near And Far: Patterns Across Temperate And Tropical Forests", Ecology, p. 1475, vol. 80, (1999). Published

Nilsen, E.T.; Clinton, B.D., Lei, T.T.; Miller, O.K.; Semones, S.W.;
Walker, J.F., "Does Rhododendron maximum L. (Ericaceae) Reduce the Availability of
Resources Above and Belowground for Canopy Tree Seedlings?", American Midland Naturalist, p. 325, vol. 145, (2001). Published

Peterson, Bruce J.; Wollheim, Wilfred M.; Mulholland, Patrick J.;
Webster, Jackson R.; Meyer, Judy L.; Tank, Jennifer L.; Marti,
Eugenia; Bowden, William B.; Valett, H. Maurice; Hershey, Anne E., "Control of Nitrogen Export from Watersheds by Headwater Streams.", Science, p. 86, vol. 292, (2001). Published

Petty, J.T.; Grossman, G. D, "The effects of an underwater fish observation technique on stream macroinvertebrates at two spatial scales.", The Ecology of Freshwater Fish, p. 145, vol. 9, (2000). Published

Thompson, Andrew R.; Petty, J. Todd; Grossman, Gary D., "Multi-scale effects of resource patchiness on foraging behavior and habitat use by longnose dace, Rhinichthys cataractae.", Freshwater Biology, p. 145, vol. 46, (2001). Published

Ford, W. Mark; Menzel, Michael A.; McCay, Timothy S.; Laerm, Joshua., "Contiguous Allopatry Of The Masked Shrew And Southeastern Shrew In The
Southern Appalachians: Segregations Along An Elevational And Habitat
Gradient.", The Journal of the Elisha Mitchell Scientific Society, p. 20, vol. 117, (2001). Published

Rincon, P.A.; Hughes, N.F.; Grossman, G.D., "Landscape approaches to stream fish ecology, mechanistic aspects of habitat selection and behavioral ecology.", Ecology of Freshwater Fish, p. 1, vol. 9, (2000). Published

Swank, W.T.; Vose, J.M.; Elliott, K.J., "Long-term hydrologic and water quality responses following commercial clearcutting of mixed hardwoods on a southern Appalachian catchment.", Forest Ecology and Management, p. 163, vol. 143, (2001). Published

Beckage, Brian; Clark, James S.; Clinton, Barton D.; Haines, Bruce L., "A long-term study of tree seedling recruitment in southern Appalachian
forests: the effects of canopy gaps and shrub understudies.", Canadian Journal of Forest Research, p. 1617, vol. 30, (2000). Published

Reynolds, Barbara, C.; Hunter, Mark D.; Crossley, D.A., Jr., "Effects of Canopy Herbivory On Nutrient Cycling In A Northern Hardwood Forest In Western North Carolina.", Selbyana, p. 74, vol. 21, (2000). Published

David C. Coleman, "Soil Biota, Soil Systems, and Processes. In: Simon Levin, eds.
Encyclopedia of Diversity, vol. 5.", American Press (book chapter), p. 305, vol. , (2001). Published

Knoepp, Jennifer D.; Coleman, David C.; Crossley, D.A., Jr.; Clark,
James S., "Biological indices of soil quality; an ecosystem case study of their use.", Forest Ecology and Management, p. 357, vol. 138, (2001). Published

Kloeppel, B.D., Gower, S.T.; Vogel, J.G.; Reich, P.B., "Leaf-level resource use for evergreen and deciduous conifers along a resource availability gradient.", Functional Ecology, p. 281, vol. 14, (2000). Published

Hutchens, J.J., Jr.; Benfield, E.F., "Effects of Forest Defoliation by the Gypsy Moth on Detritus Processing in Southern Appalachian Streams.", The American Midland Naturalist, p. 397, vol. 143, (2000). Published

Darke, Arlene K.; Walbridge, Mark R., "Al and Fe Biogeochemistry in a floodplain forest: Implications for P retention.", Biogeochemistry, p. 1, vol. 51, (2000). Published

Clark, Jim; Horvath, Lajos; Lewis, Mark, "On the estimation of spread rate for a biological population.", Statistics & Probability Letters, p. 225, vol. 51, (2001). Published

Books or Other One-time Publications

Hansen, R.A., "Diversity in the Decomposing Landscape.", (2000). Book Chapter, Published
Editor(s): Coleman, D.C.; Hendrix, P.F., eds.

Collection: Invertebrates as Webmasters in Ecosystem
Bibliography: New York: CABI Publishing: 203-219

Clinton, Barton D.; Vose, James M., "Plant succession and community restoration following felling and burning in the Southern Appalachian Mountains", (2000). Book Chapter, Published
Editor(s): Moser, W. Keith; Moser, Cynthia F.

Collection: Fire and Forest Ecology: Innovation Silviculture & Vegetation Management
Bibliography: Proceedings Tall Timbers Fire
Ecology Conference; 1998 April 14-16; Tallahassee, FL. No.21: pg. 22-29.

Vose, James M., "Perspectives on using prescribed fire to achieve desired ecosystem conditions", (2000). Book Chapter, Published
Editor(s): Moser, W. Keith; Moser, Cynthia F.
Collection: Innovative Silviculture & Vegetation Management
Bibliography: Proceedings Tall Timbers Fire
Ecology Conference; 1998 April 14-16; Tallahassee, Fl., No. 21: pg. 12-17.

Coleman, David C.; Crossley, D.A. Jr., "Fundamentals of soil ecology", (1996). Book, Published
Bibliography: San Diego, CA: Academic Press. 205p.

Pearson, S.M., M.G. Turner, and D.L. Urban., "Effective exercises in teaching landscape ecology", (1999). Book Chapter, Published
Editor(s): J. M. Klopatek and R. H. Gardner
Collection: Landscape ecological analysis: issues and applications
Bibliography: Pp. 335-368

Lambiase, Seth J., "Interspecific life history variation in the land snail genus Mesodon", (1999). Thesis, Published
Bibliography: Chapel Hill, NC: University of North Carolina at Chapel Hill. 104 p. M.S. thesis

Tilley, David Rogers, "Emergy basis of forest systems", (1999). Thesis, Published
Bibliography: Gainesville, FL: University of Florida. 296 p. Ph. D. dissertation

Wyckoff, Peter Howard, "Growth and mortality of trees in the Southern Appalachian Mountains", (1999). Thesis, Published
Bibliography: Duke University. Ph.D dissertation

Coleman, David C.; Blair, John M.; Elliott, Edward T.; Wall, Diana H., "Soil Invertebrates", (1999). Book Chapter, Published
Editor(s): G. Philip Robertson, David C. Coleman, Caroline S. Bledsoe and Phillip Sollins
Collection: Standard Soil Methods for Long-Term Ecological Researc
Bibliography: Pp. 349-371. Chapter 17.

Phillips, Michael J.; Swift, Lloyd W., Jr.; Blinn, Charles R., "Best Management Practices for Riparian Areas. In: Riparian Management in Forests of the Continental Eastern United States", (2000). Book Chapter, Published
Bibliography: Lewis Publishers, Boca Raton, Florida: 273-285

Neihardt, Charlene, "Water Quality Monitoring At The Watershed Scale Using Subpixel Analysis And Benthic Macroinvertebrates", (1999). Thesis, Published
Bibliography: Clemson, SC: Clemson University. 87 p. M.S. thesis.

Crossley, D.A., Jr.; Coleman, D.C., "Macroarthropods", (1999). Book Chapter, Published
Editor(s): Malcom E. Sumner
Collection: Handbook of Soil Science
Bibliography: CRC Press. Boca Raton, FL. C-65-C-70.

Crossley, D.A., Jr.; Coleman, D.C., "Microarthropods", (1999). Book Chapter, Published
Editor(s): Malcom E. Sumner
Collection: Handbook of Soil Science
Bibliography: CRC Press. Boca Raton, FL. C-59-C65.

Swank, Wayne T.; Tilley, David R., "Watershed Management Contributions to Land Stewardship: Case Studies in the Southeast", (2000). Book Chapter, Published
Collection: Proceedings of the Land Stewardship in the 21st. Century: The Contributions of Watershed Management

Bibliography: March 13-16; Tucson, AZ. P-13: U.S.
Department of Agriculture, Forest Service, Rocky Mountain Research Station: 93-108.

Coleman, D.C.; Hendrix, P.F., "Invertebrates as Webmasters in
Ecosystems.", (2000). Book, Published
Editor(s): Coleman, D.C.; Hendrix, P.F.

Bibliography: New York: CABI Publishing. 336 p.

Courtney, Gregory W., "Revision Of The Net-Winged
Midges Of The Net-Winged
Midges Of The Genus
Blepharicera Macquart
(Diptera: Blephariceridae) Of
Eastern North America.", (2000). Book Chapter, Published
Bibliography: In: Memoirs of The
Entomological Society Of
Washington Number 23. The
Entomological Society of

Web/Internet Site

URL(s):

coweeta.ecology.uga.edu

Description:

This web site is the primary electronic access for both project investigators as well as for scientists, students, and other interested people to gain access to information and products from the Coweeta LTER Program.

Other Specific Products

Contributions

Contributions within Discipline:

Numerous publications and findings have been contributed to aquatic biology, forest ecology, sociology, economics, anthropology, and watershed ecology.

Contributions to Other Disciplines:

Contributions have been made to sociology and economics.

Contributions to Human Resource Development:

Numerous graduate and undergraduate students have been trained on this project (see personnel section). Outreach and schoolyard research projects have also educated students, teachers, administrators, and the general public.

Contributions to Resources for Research and Education:

Numerous graduate and undergraduate students have been trained on this project (see personnel section). Outreach and schoolyard research projects have also educated students, teachers, administrators, and the general public.

Contributions Beyond Science and Engineering:

Numerous graduate and undergraduate students have been trained on this project (see personnel section). Outreach and schoolyard research projects have also educated students, teachers, administrators, and the general public.

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Unobligated funds: less than 20 percent of current funds

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Any Product

Coweeta LTER Program 2001 Annual Report
NSF Grant DEB-96-32854
Submitted to the National Science Foundation 31 July 2001

Introduction

Coweeta LTER research focuses on studies along complex environmental gradients to examine the response to disturbance in a landscape perspective. We are examining the causes and consequences of land cover change in the southern Appalachians and are examining three linked components of the landscape: upland forests, riparian zones, and streams. In addition, the regional and socio-economic components of our research include a large scale (56,000 km^2) research approach to better understand the regional interactions of our ecosystems.

This report contains a brief update of these major research projects along with updates on data management and other LTER related research. In addition, we also include information on outreach, cross-site, and LTER/ILTER Network activities. We conclude with listings of publications and research grants related to our Coweeta LTER project.

Research Activities and Findings

Land-Use Change Regionalization Project

Our regionalization land-use change project, initiated with augmentation funding in 1994, has been a steady source of excitement for our site.

Aquatic Ecology Highlights

The aquatic research group has focused on a series of twenty-four sampling sites representing six replicated primarily forested and pasture sites in two different river drainage systems (Little Tennessee and French Broad). Fish and invertebrate quantity and diversity, along with water quality variables, have been sampled at each site over the past three field seasons and have yielded numerous interesting results. As more detailed data of the land cover history of the

area upstream of sample points has become available from GIS projects, additional analyses of the stream data have been possible. Results show that though significant differences exist in the species assemblages between primarily forested and agricultural drainage types, the history of the landscape may account for much of the difference between sites within each type of drainage. For example, terrestrial recovery from agricultural use may be relatively rapid, however recovery of stream fauna to their pre-disturbance species and population dynamics may take considerably longer (i.e. decades).

In 2000, we have initiated a long-term (30 year) study on the predicted land-use change in stream ecosystems in the southern Appalachians. This study contains a set of stream study sites where half are predicted to undergo land cover change and the other half are predicted to have no significant change in land cover. Sampling of stream indices (e.g. water quality, fish populations, benthic invertebrates, stream morphology, riparian size and condition, etc.) were conducted in 2000 and will be conducted every five years until 2030. This research project is integrating social and economic predictive modeling with aquatic and riparian ecology.

Terrestrial Ecology Highlights

The terrestrial ecology research group has made progress on two main activities. First, Paul Bolstad, Co-PI on the project, has worked closely with all groups in the Regionalization project to distribute the wealth of digitized mapping and land cover products which his lab has produced. Paul is also a member of the three-person carbon cycling team, along with James Vose and Brian Kloeppel, who are quantifying the pools and fluxes of the carbon cycle across the complex southern Appalachian landscape. Three years of intense data collection and one year of summary and analysis have yielded relationships for the effect of slope position, aspect, temperature, and seasonal morphology on foliage, woody, soil, and litter carbon fluxes. These functional relationships, coupled with the more straightforward measurement of carbon pools for each of the above components now allow the development of a first generation carbon cycling model.

In addition to the carbon-cycling work, efforts by Scott Pearson and Monica Turner have focused on the diversity of species, both plant and bird populations, across the landscape in relation to land-use history. Jim Clark's lab has made a significant contribution to understanding the role of fire in land-use change by reconstructing the charcoal and pollen records from cores taken from 12 small bogs and ponds in North Carolina and Virginia. They were analyzed to determine the importance of fire and human disturbance in shaping presettlement and 20th century forests in the southern Appalachians. Prior to European settlement, low charcoal accumulations occurred, indicating low amounts of burning during the past 2000 years. However, charcoal peaks after European settlement suggest the presence of natural fires in forests. Furthermore, high charcoal concentrations occur at the transition between coniferous and deciduous forests of the Holocene and Pleistocene indicating a greater role of fire in these transitional forests.

Socio-Economic Highlights

Our socio-economic group has made significant progress on two fronts. First, an intense mapping and modeling project has digitized select areas from a five state southern Appalachian area. The database contains typical GIS layers such as slope, elevation, aspect, and land cover along with more socio-economic layers such as building density, population distribution, and road systems. These data have been summarized from sets of aerial photos and satellite imagery

from both the 1950's and the 1990's. This forty year time period change has then been used as a baseline, along with other socio-economic factors, to predicting future land use change with predictions of population and building distribution and land cover for the year 2030.

Ted Gragson has also been performing an extensive census and population history of our regionalization study area and has found numerous interesting patterns. Rather than population growth and seasonal migration being strictly recent phenomena (from retiree and vacation home construction), they may be a repetition of a pattern set early in the population history of the Blue Ridge Mountains. A settlement history from 1790 to the present for the 42 counties in northern Georgia, western North Carolina, and southwestern Virginia comprising the cultural Blue Ridge has been developed from archival census records and other information.

Stream Ecology Projects

Research on southern Appalachian streams continues to be a diverse and productive aspect of the Coweeta LTER project involving 7 Co-PIs and at least 15 graduate students. Stream researchers focus on land-water interactions and in-stream processes, and how they are impacted by anthropogenic and other disturbances. Stream research has been integrated into most LTER project areas including gradient, regionalization, and riparian projects. In addition, several stream projects have been inspired by LTER, but are funded from other sources (see listing of Related Research Grants). These include fish diversity and sedimentation in the southern Appalachians (funded by USGS), the Lotic Intersite Nitrogen eXperiment {LINX} (NSF and Fulbright), a litter exclusion experiment (NSF), and a nutrient addition experiment (NSF).

In another series of studies, we examined the role of macrobiota in structuring the benthic communities of two low-order southern Appalachian streams, one draining intact forest (Ball Creek) and one draining pasture (Jones Creek). Fishes and crayfishes were excluded from areas of both streams using an electric exclusion technique; chlorophyll *a*, ash free dry mass (AFDM), and invertebrates were sampled over a 40-day period. In both streams, chlorophyll *a* and AFDM were higher in exclusion than control areas, although these trends were not consistently significant across all sampling dates. In Jones Creek, significantly more large (> 4 mm) aquatic insect larvae were found in exclusion than control areas, most likely due to exclusion treatments providing a refuge from macrobiotic predators. This refuge effect was also evident in Ball Creek, where exclusion treatments contained significantly more filterers. Results indicate that macrobiota influence the structure of southern Appalachian benthic communities by decreasing the amount of organic matter (algal and detrital) available for other consumers and by preferentially preying on certain sizes and taxa of invertebrates. Compared to some low-order tropical streams, however, macrobiotic influences are low. Weaker effects may be attributed to decreased abundance of macrobiota and increased influence of benthic insects in southern Appalachian streams.

Hillslope-Riparian Projects

In the four years following the vegetation cut and hurricane impacts, soil moisture decreased on the vegetation cut hillslope relative to the storm impact hillslope. Groundwater levels did not vary on either hillslope. For all seedlings measured, initial analysis showed little regeneration and high mortality in the control sites. *Acer rubrum* and *Liriodendron tulipifera* seedlings were found prevalent in the treatment removal quadrats while *Liriodendron tulipifera* and *Betula lenta* seedlings dominated the hurricane removal quadrats. Total soil respiration rates

were similar in the first year post-treatment, but then gradually increased in years two and three to 30% greater in the cut plot transects compared to the storm plot transects.

Monthly measurements of net N-mineralization along three transects in cut and storm plots showed moderate differences at 1 m, and as much as four times greater mineralization rates at 5 and 15 m above the stream on the storm slope. These differences were most pronounced in spring and early summer.

In the five years following hurricane and *Rhododendron* removal treatments, soilwater nutrient concentrations on the vegetation cut hillslope generally did not vary significantly, although a small increase in NO_3-N was seen in one plot on the vegetation cut slope. In contrast, nutrient concentrations on the storm impact hillslope showed marked changes. NO_3-N concentrations showed consistent increases of at least two orders in magnitude in all lysimeters on the storm impact hillslope. Marked and persistent changes were also seen in SO_4 (decrease), Ca (increase) and Mg (increase) in the soilwater. In groundwater, SO_4 showed no differential response following the vegetation removal and hurricane events. For other nutrients (NO_3-N, Ca and Mg), however, responses in groundwater were similar, although of lesser magnitude, to soilwater. Nutrient concentrations varied seasonally, with major changes occurring in summer and early autumn in both soilwater and groundwater.

Terrestrial Gradient and Canopy Gap Projects

The study of forested ecosystems over a complex environmental gradient was initiated in 1991 and has continued to generate many interesting results as well as several new studies that are currently underway. The gradient has five intensive plots, established from a relatively dry oak ecosystem to a mesic high elevation northern hardwoods ecosystem, as well as 20 extensive plots providing greater spatial coverage of these ecosystems across the Coweeta basin.

Several new studies established on the gradient plots include a 15-year small log (bolt) study established by James Vose and D.A. Crossley. During the course of the study, including nine commonly transplanted species on all sites, periodic biomass sampling along with gas flux measurements are being conducted. Two-year results indicate surprisingly high decomposition at the high elevation northern hardwoods site, the site expected to exhibit the lowest decomposition rates. This same site exhibits unexpectedly high soil nitrogen mineralization. In a second set of studies, the area of the gradient plots is being enlarged from 20 x 40 m to 80 x 80 m in an effort to map and model single and multiple tree gap dynamics. Seed rain, seed bank dynamics, seedling dynamics, and overstory survival and growth have already being quantified. This last component will allow a complete analysis of all life stages of the vegetation across the complex gradient. The larger plots have also been used to map and quantify coarse woody debris on the gradient plots.

Our artificially induced forest gap project is nearing completion of the first phase of work. This replicated study conducted on high and low elevation forest sites has monitored the microclimate, seedling dynamics, physiology, and N mineralization of both rhododendron and non-rhododendron study sites. Results show that the impact of rhododendron was highly detrimental to seedling establishment and growth. Several investigators have now established forest gap plots resulting from hurricane Opal that impacted Coweeta on 05 October 95. This progression to more and widespread plots will allow us to investigate the gap dynamics across a larger geographic area and elevational gradient of the Coweeta Basin.

Data and GIS Management

Our Information Manager, Ron Rouhani, and our GIS Manager, Ned Gardiner, have continued to move our Information and GIS management and organization forward as described below.

During the past year, the Coweeta web page (home page URL address: http://coweeta.ecology.uga.edu) has had numerous additions including GIS maps and online data, species lists, schoolyard descriptions, and metadata. The Coweeta LTER bibliography containing 1231 citations including abstracts is available online. The user may search the citations by using a specific or general query string.

A fully interactive web page of our plant tissue and soil sample archive is available online. Jim Deal, our Analytical Lab Manager, maintains the cataloging and management of this archive which contains 82 sample sets with over 21,000 samples. Where possible, online descriptions of the sample sets have also been linked to the online laboratory analyses that have been conducted on the archived samples. Forms for submitting new samples and obtaining subsamples from the archived sets are online and are coordinated by Jim Deal and a committee of two other scientists at Coweeta, Brian Kloeppel and Jennifer Knoepp.

We have fundamentally redesigned our GIS database in the past year. We followed three steps in migrating from an ad-hoc file storage system to a more usable, durable one. First, we archived all GIS data under a simple data directory map. Second, we normalized the database, eliminating redundant information where possible. Third, we standardized the projection, spheroid, and ellipsoid to be used for the entire set of geospatial data. This important planning phase was supported by funding from the University of Georgia (UGA) Office of the Vice President for Research.

Coweeta LTER Outreach Activities

Our research site has participated in a number of outreach activities during the past year.

First, Coweeta personnel have continued to dedicate part of their time to lead tours for a variety of scientists, resource managers, and students to present and discuss research conducted at Coweeta. This past year we provided tours for over 1300 people with topics ranging from climate network operation, to watershed ecology, to terrestrial gradient research, to the impacts of hurricane Opal in October 1995 on our steep mountain terrain.

Second, our site has again been fortunate to receive Research Experience for Undergraduate (REU) positions. This past year, student research focused on fish populations, rhododendron and laurel biomass, and nitrogen distribution and the impact of land use history on small mammals and herbaceous plants.

Third, the Coweeta LTER program has pursued all NSF Schoolyard LTER initiatives to build upon our long term commitment to K-12 education. This past year we have had five teachers, 8 research staff, and over 50 students involved in Schoolyard LTER projects.

Cross-Site Research Projects

There are several cross-site research projects involving the Coweeta LTER site. The first project is a cross-site study by Liam Heneghan, Dave Coleman, Xiaoming Zou, Dac Crossley, and Bruce Haines at the University of Georgia. They are studying microarthropod regulations of microbial populations involved in leaf litter decomposition in sites in Puerto Rico, Costa Rica, and Coweeta. Cross-site litter decomposition is being compared along with a quantification of

the abiotic and biotic agents affecting this decomposition. This study has already produced several publications listed at the end of this annual report.

The second project is NSF funded and concentrates on fine and coarse root growth and dynamics across a series of sites, both LTER and non-LTER, that is coordinated by Ronald Hendrick at the University of Georgia for the Coweeta sampling. The Coweeta site is located on a Terrestrial Gradient project study site and has benefited from the eight years of baseline information already available on the microclimate, soil solution chemistry, throughfall and litter inputs, and large viewing rhizotrons. The minirhizotrons for this study were installed at Coweeta in September 1996 and the first observations were recorded in spring 1997.

Third, the LINX (Lotic Intersite Nitrogen eXperiment) project is a cooperative study among 11 institutions comparing the dynamics of nitrogen in streams at 10 sites ranging from the North Slope of Alaska to Puerto Rico. The central hypothesis of this project is: "the considerable variability among streams in uptake, retention, and cycling of nitrogen is controlled by key hydrologic, chemical, and metabolic characteristics that determine water retention, degree of nitrogen deficiency, and energy flow through food webs in stream ecosystems." We are using simulation modeling, field tracer (N^{15}) additions, and an intersite comparative approach to address this hypothesis. This study is in its second year and in the progress of data collection at the final site.

Fourth, Dave Coleman, Coweeta Co-Lead PI, is a co-author and co-editor on the Standard Soil Methods for Long-Term Ecological Research Volume (2000), Oxford University Press. Agreement on a common protocol for soil measurements that can be greatly affected by methodology (e.g., soil microbial biomass) is imperative to assist in cross-site synthesis. The present volume addresses those concerns, and draws upon the expertise of over 40 scientists from virtually all of the LTER sites as well as collaborators from federal agencies.

LTER/ILTER Network Activities

We have participated in several LTER and ILTER network activities outside of the regular coordinating committee meetings attended by our site administrators and the annual information management meetings attended by our computer and management staff.

First, Dave Coleman, Coweeta Co-Lead PI, is chairman of the LTER Publications Committee that is advising on all LTER publications, including the LTER synthesis volumes series, to be published by Oxford University Press.

Second, Brian Kloeppel participated in the September 1998 Poland ILTER trip with Jim Gosz. Brian has been awarded a grant for cross-site research in Poland and will be making research excursions to Poland in 2000 and 2001. Brian also participated in the April 2001 Central and Eastern European Regional ILTER Meeting in Prague, Czech Republic.

Third, Wayne Swank participated in a scientific exchange in 2000 for a cooperative analysis of hydrologic processes on forested watersheds at Coweeta and Turkey.

Publications of the Coweeta LTER Project (2000 - present)

Please link below to the searchable Coweeta LTER Online Bibliography to locate citations and abstracts of publications. As of 27 July 2001, we have 39 publications from 2000 to

2001. These citations are also entered online elsewhere for the electronically submitted annual report to NSF.

http://coweeta.ecology.uga.edu/webdocs/html/ronbibform.html

Coweeta LTER Related Research Grants (Active in 2000-2001)
Excludes 1996-2002 Coweeta LTER grant from NSF (DEB 96-32854) for $6,030,489
(23 grants total for $7,843,603 representing 5 funding agencies)
Compilation as of 27 July 2001 by Brian D. Kloeppel

Bolstad, P.V., P.B. Reich, and J.M. Vose. Acclimation/adaptation of leaf respiration in eastern deciduous forests: a biome-wide study. Funded by National Science Foundation - Ecological Studies / Ecosystems for $375,000 from 1999 to 2001.

Coleman, D.C. and B.D. Kloeppel. Equipment supplement proposal for the Coweeta LTER program (DEB-96-32854). Funded by National Science Foundation for $25,000 from 2000-2001.

Coleman, D.C., B.D. Kloeppel, M.D. Hunter, and C.M. Pringle. Equipment and cross-site supplement proposal to the Coweeta LTER program grant number DEB-96-32854. Funded by National Science Foundation for $35,000 from 1999 to 2000.

Hendrick, R.L., K. Pregitzer, M. Allen, and R. Ruess. Factors regulating below ground carbon allocation in terrestrial ecosystems: a cross-site experiment. Funded by National Science Foundation for $1,050,000 from 1997 to 2000.

Hunter, M.D. Top-down and bottom-up effects on herbivores: nutrient availability and the trophic interactions of insects on oak. Funded by National Science Foundation for $70,000 from 1999 to 2001.

Hunter, M.D., M.D. Lowman, and T.D. Schowalter. Canopy herbivory and soil processes in a temperate and tropical forest. Funded by National Science Foundation for $300,000 from 1999 to 2002.

Kloeppel, B.D. and D.C. Coleman. Communications and technology facilities improvement to the LTER program at Coweeta Hydrologic Laboratory. Funded by National Science Foundation for $290,000 from 1999 to 2004.

Kloeppel, B.D. and D.C. Coleman. Carbon and water dynamics in mature and old growth forests in Poland and the United States. Funded by National Science Foundation - International Programs for $14,667 from 1999 to 2002.

Kloeppel, B.D. and D.C. Coleman. Dormitory renovation and expansion at Coweeta Hydrologic Laboratory. Funded by National Science Foundation - Field Station and Marine Laboratories for $198,000 from 1999 to 2001.

Kloeppel, B.D. and D.C. Coleman. REU Supplement to LTER program at Coweeta Hydrologic Laboratory (DEB-96-32854). Funded by National Science Foundation for $10,000 from 1999 to 2000.

Kloeppel, B.D. and D.C. Coleman. Schoolyard Supplement to LTER program at Coweeta Hydrologic Laboratory (DEB-96-32854). Funded by National Science Foundation for $15,000 from 1999 to 2000.

Kloeppel, B.D. and D.C. Coleman. Education supplement to the Coweeta LTER Program (NSF Grant DEB-96-32854). Funded by National Science Foundation for $30,000 from 2000-2001.

Kloeppel, B.D., D.C. Coleman, and J.M. Vose. Analytical laboratory equipment at Coweeta Hydrologic Laboratory. National Science Foundation - Field Station and Marine Laboratories for $60,063 from 2000 to 2001.

Nilsen, E.T., O.K. Miller, and B.D. Clinton. Probing the mechanisms by which subcanopy evergreen shrubs inhibit tree seedling recruitment. Funded by USDA-NRI-CSRS for $485,000 from September 1999 to August 2003.

Pulliam, H.R. Habitat suitability and the distribution of species. Funded by National Science Foundation for $240,285 from June 2000 to December 2003.

Rosemond, A.D., J.B. Wallace, K. Suberkropp, and P.J. Mulholland. Nutrient effects on a detritus-based ecosystem. Funded by National Science Foundation for $700,000 from January 1999 to December 2002.

Swank, W.T. and J.M. Vose. Estimating effectiveness of groundwater removal in fast-growing cottonwoods planted for phytoremediation of trichloroethylene. Funded by US Department of Defense, Wright-Patterson Air Force Base for $191,000 from 1991-2001.

Valett, H.M., J.R. Webster, P.J. Mulholland, C.N. Dahm, P.V. Unnikrishna, and C.G. Peterson. Nitrate retention in headwater stream: influences of riparian vegetation, metabolism, and subsurface properties. Funded by National Science Foundation for $1,120,000 from April 1999 to March 2002.

Vose, J.M. Distinguishing groundwater vs. surface water uptake in phreatophytes. Funded by US Department of Defense, Wright-Patterson Air Force Base for $75,000 from 2000-2001.

Vose, J.M. and C.D. Geron. Assessing nitrogen cycling mechanisms to evaluate riparian zone restoration effectiveness. Funded by US-EPA Ecosystem Restoration Competitive Grants Program for $486,000 from 2000-2003.

Vose, J.M., C.D. Geron, and W.T. Swank. Water, soil, and air quality impacts of riparian ecosystem restoration. Funded by US-EPA Risk Management for Ecosystem Restoration Competitive Grants Program for $323, 873 from 1997-2000.

Vose, J.M. and W.T. Swank. Determining sensitivity of Class I Wilderness Areas to acidic deposition: case studies of the Joyce Kilmer and Slickrock Wilderness Areas. Funded by National Forest Systems for $90,000 from 1999-2001.

Wallace, J.B., J.L. Meyer, and J.R. Webster. Stream ecosystem response to decoupling terrestrial-aquatic linkages. Funded by National Science Foundation for $800,000 from September 1996 to August 2000.

Webster, J.R., P.J. Mulholland, J.L. Meyer, and B.J. Peterson. Nitrogen uptake, retention and cycling in stream ecosystems: an intersite N^{15} tracer experiment. Funded by National Science Foundation for $1,100,000 from September 1996 to August 1999.