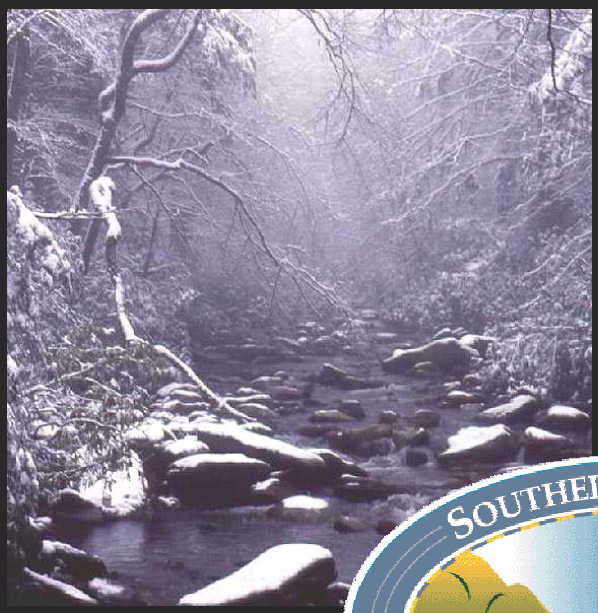
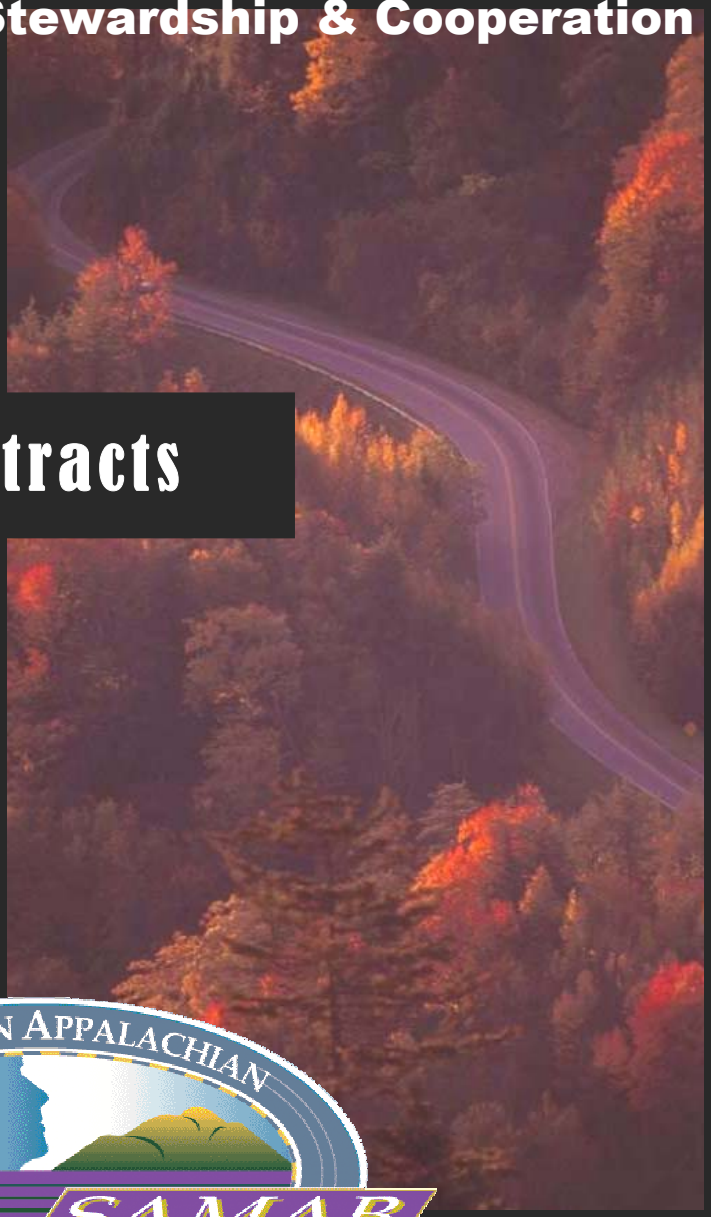
Quality of Life in the Southern Appalachians: Sustainability through Stewardship & Cooperation

15th Annual SAMAB Conference
November 16-18, 2004
Holiday Inn SunSpree
Gatlinburg, Tennessee

Program and Abstracts





SOUTHERN APPALACHIAN MAN AND THE BIOSPHERE
SAMAB

15th Annual SAMAB Conference

Quality of Life in the Southern Appalachians: Sustainability through Stewardship & Cooperation

Conference Agenda

Tuesday, November 16		
8:30 a.m.	Opening and Introductions (Greenbrier) Larry Hartmann, Robb Turner, Briane Adams and Mike Jenkins	
8:45 a.m.	Keynote Addresses: Stewardship of Regional Air Quality (Greenbrier) Dale Ditmanson, Superintendent, Great Smoky Mountains National Park Bill Baxter, Director, TVA Jimmy Palmer, Regional Administrator, EPA (invited) Betsy Child, Commissioner, Tennessee Department of Environment and Conservation	
10:30 a.m.	Break	
11:00 a.m.	Best Practices for Sustainability: A Web-based Information-Sharing Tool for Southern Appalachian Communities (Greenbrier)	
12:00 p.m.	Lunch break	
1:30 p.m.	Options for Municipal Watershed Management (Greenbrier)	Air Quality: Effects, Solutions and Responsibilities (LeConte)
3:30 p.m.		Avian Conservation (LeConte)
5:30 p.m.	Poster Session with light hors d'oeuvres; SAMAB Awards (Gatlinburg/Glades)	
Wednesday, November 17		
8:30 a.m.	Invasive Species: Status, Impacts and Control (Greenbrier)	Protecting and Restoring Natural Ecosystems (LeConte)
12:00 p.m.	Lunch on your own or NEPA / Environmental Coordination Roundtable Luncheon (Laurel A)	
1:30 p.m.	Sudden Oak Death in the Southern Appalachians: The Threat and the Response (Greenbrier)	Achieving Responsible Land and Transportation Development (LeConte)
3:30 p.m.	Appalachian Trail Environmental Monitoring Internet Community (Greenbrier)	Aquatic Resources in a Changing Landscape (LeConte)
4:00 p.m.	Inventory and Monitoring for Adaptive Management of the Roan Mountain Massif (Greenbrier)	
6:30 p.m.	Dinner reception at Calhoun's with multi-media presentation by George Constanz, "Hollows, Peepers, and Highlanders: an Appalachian Mountain Ecology"	
Thursday, November 18		
8:30 a.m.	Natural Resource Inventories in the Southern Appalachians (Greenbrier)	Engaging Stakeholders in Resource Conservation (LeConte)
12:00 p.m.	Lunch on your own	
1:00 p.m.	Field Trip: Compatibility of Wildlife Habitat, Water Quality, & Agricultural Production on a Livestock Farm (meet near conference registration area)	Field Trip: Hemlock Woolly Adelgid Control Methods and Beetle Production Facility (meet near conference registration area)

15th Annual SAMAB Fall Conference

Quality of Life in the Southern Appalachians: Sustainability through Stewardship & Cooperation

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Fifteenth Annual SAMAB Conference Planning Committee

D. Briane Adams, Conference Co-Chairperson, retired U.S. Geological Survey
Mike Jenkins, Conference Co-Chairperson, National Park Service, Great Smoky Mountains
Jenny Adkins, Natural Resources Conservation Service
Tisha Calabrese-Benton, Tennessee Department of Environment and Conservation
Harold Draper, Tennessee Valley Authority
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Bill Hoffard, USDA Forest Service
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Anita Rose, USDA Forest Service
Jim Smoot, US Geological Survey
Steve Wilson, Tennessee Department of Environment and Conservation

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Ernie Bernard, University of Tennessee
Pat Brewer, VISTAS
Dennis Desmond, Land Trust for the Little Tennessee
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Gary Kauffman, USDA Forest Service
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Gerald (Jerry) L. Ryan, District Chief for North Carolina, US Geological Survey; SAMAB Executive Committee Vice-chairperson
Charles Van Sickle, SAMAB Foundation President
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15th Annual SAMAB Conference
Quality of Life in the Southern Appalachians: Sustainability through Stewardship & Cooperation

ABSTRACTS

(organized by session, in order of occurrence)

BEST SUSTAINABILITY PRACTICES IN THE SOUTHERN APPALACHIANS

Tuesday, November 16, 2004
Presenter: John Peine, USGS

Sustainability practices have become a catch phrase for environmental stewardship, sustainable development and growth management among other things. This project focuses on identifying and documenting on a Website these three categories of best practices in the Southern Appalachian Highlands. Human development has become a major concern throughout much of the United States. In the Southern Appalachians, sprawl is of particular concern due to the proximity of metropolitan areas to national, state and local parks, forests and parkways. Knoxville, Tennessee, for instance, has been identified as one of the nation's top ten hotspots of sprawl. Uncontrolled growth is becoming a major problem in the region. The natural beauty of the landscape and cultural heritage associated with the Southern Appalachian Highlands provides poignancy to societal resolve to respond positively to these environmental stewardship values. The good news is that there are numerous examples of 'environmental stewardship', 'sustainable development' and 'growth management' practices in the region. These examples are referred to here as "Best Sustainability Practices (BSPs).. The bad news is that these islands of enlightenment are just that and not widely adapted throughout the region. This project is centrally focused on identifying and documenting these BSPs, and providing a mechanism to disseminate the information on the Internet. Additionally, consultation services concerning BSPs associated with government and non-government organizations are identified. It is all about documentation and raising awareness and following the leaders on the landscape. The Website provides a mechanism to submit BSPs to be added to the selection of documented BSPs.

Project objectives are as follows:

- Database of sustainable practices and consultation services in the southern Appalachians
- Mechanism to facilitate documentation
- Highlight the achievements of leaders in sustainability practices in the region
- Provide a venue for the collaboration of ideas and efforts

Topics included in the TBPs documentation include the following:

- Name of organization
- Location map
- Keyword –best practice themes/subthemes
- Project summary
- Project objectives
- Project objectives
- Rationale
- Implementation
- Funding
- Achievements
- Benefits – environmental, social and economic
- Challenges
- Transferability
- Contact information

So far there are 24 BSPs posted on the Website and there are 13 more under research/review. In addition, there are 19 organizations providing consultation services posted. The URL for the website is: http://www.nbii.gov/datainfo/bestpractices/appalachia/index.html For more information contact Melany Noltenius at mnolteni@utk.edu

Please join us in identifying and posting additional BSPs!!!

OPTIONS FOR MUNICIPAL WATERSHED MANAGEMENT

Tuesday, November 16, 2004
Session Moderator: Dennis Desmond, Land Trust for the Little Tennessee

Forest Management in Municipal Watersheds: Defining the Issues
Dennis Desmand
The Land Trust for the Little Tennessee

Numerous municipalities in western North Carolina own relatively large tracts of forestland that are used for public water supply. Over the past few decades, these lands and their forests have recovered from past agricultural and logging activity to the extent that valuable commercial timber once again exists. During this same period, there has been a steady increase in human population and its impacts, including demand for forest products and services, introduction of non-native invasive species, air pollution, and climate change. Due to these changes, pressures have mounted to protect, manage, or exploit these municipal lands and their resources. Over the past few years, many of these municipalities have responded to these pressures through one or both of two ways: placing conservation easements on the properties, and/or allowing forest management, specifically commercial timber harvesting. Brief case examples presented include the town watersheds of Asheville, Bryson City, Canton, Waynesville, and Woodfin.

The permanent protection of these lands from residential development through conservation easements has received overwhelming public support. Forest management and commercial timber harvesting, however, have been much more controversial. Given that the priority goal of these properties is the supply of high-quality water, this presentation explores the potential for these lands to simultaneously meet other goals, such as forest health, biodiversity, wildlife, recreation, aesthetics, and income generation. It is argued that many of these goals can be compatible, and that forest management plays an important role in fulfilling many of these goals. The real challenge is in defining the goals, and in reaching public understanding, agreement, and acceptance of these goals and of the forest management practices designed to achieve them.

Watershed Management Impacts on Water Quantity and Quality
James M. Vose
USDA Forest Service, Coweeta Hydrologic Laboratory

Researchers at the Coweeta Hydrologic Laboratory have been studying the interactions among forest management, water quantity, and water quality for more than 70 years. Through a combination of large-scale watershed treatments, small-scale experiments, and continuous monitoring a considerable body of scientific knowledge is available to land managers and policy-makers to help make decisions about appropriate management options on watersheds in the southern Appalachians. In general, streamflow increases are proportional to the amount of basal area removed by cutting. Complete removal results in about a 25 cm increase in streamflow in the first post-cut year. The amount of increase declines each year until leaf area recovers to pre-cut levels. Stream nutrients generally do not increase post-cutting, or, the responses are so small that they are not ecologically significant. The greatest potential response post-cutting is erosion and stream sedimentation. Background sediment yield from uncut forests is about 100 to 200 kg ha-1 yr-1. Post-cut sediment yield often increases (e.g., 25 to 50%) for a short period; however, the magnitude and duration of these increases can be greatly reduced through application of best management practices.

Forestry in a Municipal Watershed: A Case History of the Waynesville Watershed

Lee Galloway
Town of Waynesville

During the first quarter of the last century, the leaders of the Town of Waynesville began accumulating the area comprising the Allens Creek Watershed. Over 8,000 acres were under the Town's ownership at one time.

Up until the mid-1980's, the Town's leaders regularly logged the watershed property. From my understanding, officials were primarily concerned about generating as much revenue from the property as possible. Little attention was given to environmentally friendly practices, and there was considerable sediment entering the 50-acre reservoir—water quality was compromised.

Some of the worst damage occurred during logging operations in the late 1970's. At that time, the Town enlarged the water impoundment, building a larger dam and adding a new drainage area. The logging damage was so severe that during the next election campaign for Town Board, candidates ran and won on a "No Logging" platform.

In 1989, the State of North Carolina developed classification levels for watersheds in the state. The Allens Creek Watershed was assigned the most restrictive, W-S I rating. But to maintain that rating, the Town had to purchase the 691 acres of privatel -held land draining into the impoundment after the expansion in the late 1970s.

The Town spent a total of $1,350,000 to secure the 691 acres, using $850,000 in grants from EPA and the State of North Carolina. In exchange for the grant from the Clean Water Management Trust Fund, the Town agreed to approve a "Forever Wild" conservation easement on the 691 acres. In addition, the Town pledged to place a conservation easement on the balance of the watershed; however, a "Forever Wild" easement was not required. For the past two years, the language of that easement has been crafted and the forest management called for has been hotly debated.

At the meeting of October 12, 2004, the Waynesville Town Board, on a 3-2 vote, approved a conservation easement that specifies that forest management be exercised. It was the most contentious and controversial decision in the five years this Board has served together.

Now, the Town will likely work with Western Carolina University in the development of a strategic management plan for forestry management.

Multiple-Use Management Approach Is the Wise Choice for Municipal Watersheds

Steve Henson
Southern Appalachian Multiple-Use Council

Municipal watersheds are scattered across the Appalachian region and several towns and/or water authorities are currently proposing conservation easements and forest management strategies for these important water sources. The majority of these watersheds are large enough to allow for multiple-use management approaches, much like the congressional mandates for National Forests, to address long-term watershed health and productivity.

Controversy surrounds some of these proposals as opposition to using timber harvesting/logging as a tool to achieve watershed objectives invokes images of destruction and pillage. However, the sciences behind watershed management and management histories of municipal watersheds reveal that proper planning and application of contemporary forest management techniques, including timber harvesting/logging, is essential for improving and maintaining watershed function. These activities can also be quite beneficial to other resources on the landscape including forest health, wildlife habitat diversity and expanded recreation opportunities. Timber harvesting receipts from these activities can also provide regular sources of income for money strapped municipalities and water authorities.

My premise is that maintaining the flexibility of a multiple-use management approach to municipal watersheds is a win-win scenario for watersheds and people.

Don't Forget the Important Voice of Local People

Monroe Gilmour
Swannanoa Valley Alliance for Beauty & Prosperity

"We have the forestry expertise so we'll make the decisions. When the public gets involved, it just gets chaotic." Thus answered the registered forester of a municipal watershed in western North Carolina when asked how community folks could get involved in forestry management decisions for that community's primary water-supply watershed. At another time, a registered forester told me, "Monroe, if you want to see a poorly managed forest, go see Joyce Kilmer National Wilderness." Those two comments get at the crux of the misunderstandings, the fundamentally different world-views, and the conflicts that often accompany municipalities' efforts to log their watersheds. This talk will explore those areas of conflict and suggest that involving the community from the beginning is the most effective way to develop a workable solution for a community's watershed management decisions.

Watershed Classification and Regulation in NC, Does It Allow Forest Management?

Forrest Westall, NC DENR

North Carolina has been classifying water supply watersheds for over twelve years. Several municipalities and public utilities in NC have protected and undeveloped watersheds that they use for raw water supply for public water purposes. The issue of active management of these watersheds for timber harvest has become an important consideration.

The applications of a State-mandated program to protect these watersheds through the local government jurisdiction raises concerns about what can be done in these watersheds and still protect water quality for public use and other environmental considerations. This presentation will examine NC's rules and constraints on water supply watersheds and how the agency views "active" management of these undeveloped watersheds.

To address what the state regulations might say about options for forest management (or other kind of management) within a municipal watershed.

AIR QUALITY EFFECTS, SOLUTIONS, AND RESPONSIBILITIES

Tuesday, November 16, 2004
Session Moderator: Pat Brewer, VISTAS

Air Quality Trends in the East Central U.S.
William J. Parkhurst
Tennessee Valley Authority

Contrary to the popularly-held perception that air quality is bad and getting worse, with very few exceptions, air quality is much better today than it was when the first national clean air standards were adopted in 1971. Nevertheless, the issues and environmental solutions we face today are larger, more complex and more challenging than ever. As the science of air quality improves, so do the yardsticks by which we measure our progress. The recent revisions to national particulate matter and ozone clean air standards, in particular, have resulted in more stringent metrics. While many localized problems associated with primary pollutants–such as suspended particles, sulfur dioxide and carbon monoxide–have been largely solved, the tougher secondary regional pollution issues–such as ozone and fine particles, visibility impairment and acidic deposition–still test our collective resolve.

This presentation will provide a brief, factual look at where we've been, where we are, and where we're going with regard to air quality in the east-central US. Specifically, we will consider regional air quality trends for National Ambient Air Quality Standard pollutants from 1980 through 2004.

Air Quality Issues at Great Smoky Mountains National Park
Jim Renfro
National Park Service, Great Smoky Mountains National Park

Monitoring and research conducted over the past 25 years in Great Smoky Mountains National Park has shown that air emissions (and resulting pollutants) generated outside the Park and transported into the park, are significantly impacting park resources (streams, soils, aquatic life, vegetation and visibility), visitor enjoyment and potentially public health. The burning of fossil fuels (e.g. coal, oil, and gas) produces emissions of sulfur, nitrogen, and carbon that can convert into harmful secondary pollutants (e.g. fine particles, sulfates, nitrates, and ozone). Winds blowing toward the southern Appalachian Mountains can carry these pollutants from nearby sources (e.g. the Tennessee Valley and Knoxville) and from sources as far away as the Ohio, and Mississippi River valleys, the industrial cities of the Southeast and Midwest, the Central States and even the Northeast. The height and physical structure of the mountains and nearby valleys, combined with predominant weather patterns, tend to trap and concentrate air pollution entering the mountains and predispose the park's air quality.

This presentation will provide a brief summary of the status and trends of air quality in and around the park and on-going efforts addressing these issues. The talk will include an overview of the responsibilities and requirements of the park's federal Class I designation under the Clean Air Act. Also, discussion will focus on the air pollution problems that degrade scenic views from fine particle pollution and regional haze, acid deposition impacts from excessive nitrogen and sulfur to aquatic and terrestrial systems, ozone pollution impacts to park vegetation, and non-attainment of the 8-hour ozone health standard. Results will show that over the past five years, park air quality (visibility, fine particles, ozone, and acid rain) has improved significantly, mostly from cooler/wetter/cloudier/windier weather. However, there are still considerable challenges that lie ahead as we work toward reducing additional emissions to attain the ozone and fine particle health standards, and restore and preserve the air quality related values this park was charged to protect.

Visibility Improvement – State and Tribal Association of the Southeast
Pat Brewer, VISTAS

The organization called Visibility Improvement - State and Tribal Association of the Southeast (VISTAS) is responsible for the technical analyses and planning activities to support the 10 VISTAS states in developing their State Implementation Plans for regional haze. The 1977 amendments to the Clean Air Act set a national goal to prevent any future and to remedy any existing impairment of visibility due to manmade air pollution in Class I national parks, wilderness, and wildlife areas. The 1999 Regional Haze Rule requires states to develop State Implementation Plans that define how visibility will be improved in Class I areas by 2018. These plans are due to EPA by January 2008. In addition to the 10 states, participants in VISTAS include representatives of the Environmental Protection Agency, National Park Service, US Forest Service, Eastern Band of the Cherokee, local air regulatory agencies, industries, and environmental groups. VISTAS is supporting monitoring, emissions inventory, and atmospheric modeling to define the pollutants contributing to visibility impairment at the 18 Class I areas in the VISTAS states, the sources of these pollutants, and the benefits of emissions controls. These projects are overseen by three workgroups that are open for participation: Data, Technical Analysis, and Planning. In addition to fine particulate monitoring supported by federal, state, and local agencies, VISTAS is funding continuous measurement of fine particle sulfate, nitrate, and carbon at three sites and characterization of sources of organic carbon fine particles at five sites. Working with the states, VISTAS has developed detailed emissions inventories for the year 2002 and is projecting emissions to 2018, considering both existing emissions control requirements and additional control options. Regional meteorological, emissions, and air quality models are being used to simulate the complex chemical and physical processes that control the interactions and transport of pollutants in the atmosphere. VISTAS is modeling the year 2002 and evaluating the changes in air quality that are projected to occur by 2018 in response to specific emissions control strategies. These analyses will be used by the states to define emissions control requirements in state implementation plans due to EPA by January 2008.

Air Quality: Taking Action for Cleaner Air in Tennessee
Barry Stephens
Tennessee Department of Environment and Conservation, Division of Air Pollution Control

Nonattainment is a word that was crafted by EPA to define areas that have poor air quality. In this presentation, the varying degrees of nonattainment will be reviewed and the methodology used by EPA in making such designations. The current pollutants of concern are ozone (O3) and fine particulate matter (PM2.5). Ozone problems are observed almost statewide during the summer months though there has been significant improvement in ozone levels in recent years. PM2.5 nonattainment problems are more likely to occur in the eastern part of the state, particularly in the East Tennessee River Valley. In addition to finding ways to attain the ambient standard for these pollutants, the states must find a way to address regional haze, specifically in and around our Class 1 areas like the Great Smoky Mountain National Park. We must reduce emissions to protect the scenic vistas in the Class 1 areas. Finding the right mix of emission reductions from the mobile sector, the industrial sector and even the area sources is the challenge before us. Balance is the key.

Evaluation of Ozone-induced Foliar Injury across the State of Virginia, 1997 - 2002
Anita Rose, USDA Forest Service

Ozone has been identified as one of the most significant air pollutants affecting vegetation. Research has shown that ambient ozone concentrations can cause foliar injury on a number of plant species throughout the eastern United States. Currently, the USDA Forest Service, Forest Inventory and Analysis Program is monitoring for ozone injury across the United States. Using this data, I focused on the extent of ozone injury over six consecutive years throughout the state of Virginia. The occurrence

of foliar injury to species known to be sensitive to ozone was determined on a total of 90 plots across all years. A total of 8030 plants were examined for foliar injury. On average, 23 plots were visited each year, with an average of 58 plants evaluated per plot. A plot-level foliar injury index (biosite index) was derived from the amount and severity of injury recorded at each plot. Biosite indices varied both spatially and temporally. The years 1998 and 2000 had the highest biosite indices (21.9 ± 7.7 S.E.M. and 20.8 ± 11.4 S.E.M, respectively), while 1999 and 2002 had the lowest (1.8 ± 0.8 S.E.M and 0.2 ± 0.2 S.E.M, respectively). The coastal plain region of the state had the highest biosite index and the southern mountains had the lowest (18.0 ± 5.4 S.E.M and 0.9 ± 0.5 S.E.M, respectively). Both year ($p = 0.015$) and physiographic region ($p = 0.0073$) had a significant effect on biosite indices. Sensitivity to ozone did appear to differ between species ($p = 0.005$), indicating that the distribution, selection, and evaluation of individual species could have an effect on the calculation of biosite indices.

AVIAN CONSERVATION

Tuesday, November 16, 2004
Session Moderator: Kay Franzreb, USDA Forest Service

The Appalachian Mountains Bird Conservation Initiative: A Partnership for Protection and Restoration of Appalachian Bird Habitats and Bird Communities

Keith Watson
U.S. Fish and Wildlife Service

The familiar theme of bird population decline is evident in the Appalachians as elsewhere. Landbirds in the Appalachians are experiencing some of the most dramatic declines observed in North America. This decline is associated with some species whose relative global population has high percentages in the Appalachians. Truly, protection and restoration of Appalachian habitats, or the lack thereof, may have widespread influence on long term survival of many Appalachian landbird species.

Recently, managers in the U.S. Fish and Wildlife Service in conjunction with several key conservation partners decided to establish an Appalachian Mountains wide bird conservation effort to address bird habitat and population conservation. This effort is tiered to the bird conservation strategy outlined by the North American Bird Conservation Initiative (NABCI), the consolidation of existing North American bird conservation initiatives and efforts. The Appalachian Mountains Bird Conservation Initiative intends to achieve bird conservation through biologically driven, landscape oriented partnerships.

To date, organizational efforts have resulted in the establishment of an Appalachian Mountains Bird Conservation Region Coordinator, a Steering Committee composed of partners from federal, state, and non-government agencies. A Technical Committee to develop and implement bird conservation in the region is under development. The Appalachian Mountains Bird Conservation Region Concept Plan is under development and is expected to guide the development of cooperative bird conservation in the Appalachian Mountains.

The Taxonomy, Habitat Requirements, And Geographic Distribution Of The Appalachian Yellow-Bellied Sapsucker.

Scott M. Pearson, Mars Hill College
John Gerwin, Rebecca Browning, NC Museum of Natural Sciences
Curtis Smalling, Audubon North Carolina

The Appalachian Yellow-bellied Sapsucker (AppYBSA) is a subspecies of the Yellow-bellied Sapsucker (Sphyrapicus varius). While the bulk of this species breeds across the northern portions of North America, a smaller set of populations breed in the Southern Blue Ridge Province of the Appalachians in the high mountains of western North Carolina, southwestern Virginia, and eastern Tennessee. This project sought to examine issues pertinent to the conservation status of this species in our region.

The taxonomic status of this bird was examined by conducting genetic analyses of blood samples from individuals sampled across the Appalachian Mountain chain. Genetic similarity, assessed using mitochondrial and microsatellite DNA, did not reveal differences between populations in southern versus northern Appalachians.

Nesting habitat was quantified by comparing the structure and composition of forest stands harboring nests to stands without nests in three locations in western NC. Results indicate a preference for stands with many trees >35 cm dbh and having a species composition consistent with northern hardwood, high-elevation cove, and high elevation red oak forest types. AppYBSA were tolerant of forest edges created by roads.

The geographic distribution of AppYBSA was mapped using the results of over 700 surveys conducted by volunteers and agency personnel. The surveys used a standardized technique that employs call/drum playback. Populations occupied sites ranging in elevation

1100-1600 m, although the majority were between elevations of 1150-1400 m. Although populations were not associated with any particular landform, the most were found in mid- to high-elevation deciduous forest types. See http://biology.mhc.edu/ybsa for more information.

Potential impacts of future land use changes on Golden-winged Warblers in the Cumberland Mountains of Tennessee

Lesley Bulluck and David Buehler
University of Tennessee

The loss of quality early successional habitat throughout the eastern United States has led to the decline of many disturbance-dependent species, including the Golden-winged Warbler. The current distribution of Golden-winged Warblers is disjunct with a large center of abundance in the upper midwestern United States and southern Canada, and smaller "populations" in the central and southern Appalachians. Golden-winged Warblers in the southern Appalachian may become extirpated if habitat loss ensues via forest succession and land-use change. With regard to land-use change, coal-mining activity in the Cumberland Mountains is predicted to increase during the next 10-20 years; a large portion of this mining activity is likely to be the re-mining of already reclaimed mine sites. Reclaimed mine sites currently provide the majority of nesting habitat in portions of the southern Appalachians, and the great number of birds in the Cumberland Mountains may serve as a source for the entire southeastern population. Therefore the spatial and temporal distribution of future mining activity may affect the viability of Golden-winged Warblers in the southern Appalachians. We are developing a population model that assesses the relative population responses to various spatial and temporal land use change scenarios to determine the relative risk of extinction (or extirpation in this case). After such analyses, land-use scenarios can be ranked in terms of their potential impacts on populations. These analyses can be used in an adaptive management framework so that land use can be modified as more information is assimilated.

POSTER SESSION

Tuesday, November 16, 2004
Convener: Gary Peeples, US Fish & Wildlife Service

Salamander Abundance in Forest Fragments in Madison County, NC.
Robin R. Adams and Scott M. Pearson, Mars Hill College

Habitat fragmentation has been shown to affect the abundance and diversity of vertebrate animals using forested habitats. The contemporary drivers of landscape change in the Southern Blue Ridge Province include residential development. The goal of this study was to determine whether the abundance and diversity of terrestrial salamanders are correlated with forest patch size and density of residential development. During July–October 2004, non-lethal pitfall traps were used to sample salamanders at 12 forest stands that vary with respect to patch size and residential development. These data were compared to capture rates estimated from prior studies in this area. Forest stands having the greatest abundance of salamanders were located in close proximity to large forested areas and/or streams. The most abundant species included Plethodon glutinosis, P. jordani, Desmognathus carolinensis, and Eurycea wilderi.

Characteristics of Forest Stands Used for Nesting by Appalachian Yellow-Bellied Sapsuckers
Jared L. Bailey, Scott M. Pearson, Alma Coyle, Mars Hill College
John Gerwin, Rebecca Browning, NC Museum of Natural Sciences,
Curtis Smalling, Audubon North Carolina

The Appalachian Yellow-bellied Sapsucker (AppYBSA, Sphyrapicus varius) breeds in mid- to high-elevation forests in the mountains of Southern Blue Ridge Province. However, little quantitative information is available on the types of forest habitat it uses. This study compared the structure and composition of forest stands that contained AppYBSA nests to stands that did not harbor nests. Specifically, we compared the size and density of trees between nest and non-nest stands. At the stand level, there were no significant differences in tree size and density between nest and non-nest stands. However, AppYBSA preferred microsites with larger trees for the placement of nests compared to a random sample of available microsites in the surrounding forest. Over 75% of nests were found red maple (Acer rubrum), sugar maple (A. saccharum), or black locust (Robinia pseudoacacia), and 75% of nest trees were >35 cm dbh. Observations on territorial behavior, spacing of nests, and bird behavior around the nests are also discussed.

ENERGY: A Hands-On Science Exhibition Sponsored by the DOE and ORNL
John Andrew Bubany,
The North Carolina Arboretum

This display will be a vehicle for The North Carolina Arboretum to make other area natural resource professionals attending the SAMAB conference aware of this innovative exhibit project and the need for support and potential partnership.

TNCA's touring science exhibition proposes to incorporate model educational outreach strategies on energy and environmental conservation. Housing educational hands-on exhibit experiences on energy, conservation and the environment, this immersive experience will incorporate energy science with various natural resource messages, providing visitors of all ages with the information they need to make effective energy efficiency decisions.

The primary component of this program is the development of a user-friendly interactive exhibit designed to allow visitors to gain personalized recommendations for energy-efficient structures, including landscape strategies. The exhibition will educate visitors

on energy science and energy efficiency technologies with both home and business applications. Visitors to the exhibition will be able to craft individual recommendations and will explore the implications of such technology use regarding environmental conservation as it relates to natural systems, biodiversity, water and air quality, and sustainable landscape strategies.

Visitors will understand that past/current energy choices have had an impact on health, the environment, and natural resources. By providing environmental and technological education the visitor will be given the critical tools necessary to increase investments in clean energy. Visitors will understand that their energy choices are directly related to production and consumption of energy and as consumers they control the efficiency of energy use.

Current and Desired Future Conditions of the Forest Systems in the Cumberland Plateau and Mountains

Daniel L. Druckenbrod, Virginia H. Dale, Lisa M. Olsen,
Oak Ridge National Laboratory

The mixed mesophytic forests within the northern Cumberland Plateau and Mountains in Tennessee and Kentucky are among the most diverse in North America; however, these forests have been impacted by and remain threatened from changes in land use across this landscape. This poster reports on an ongoing research effort providing an integrated-landscape conservation approach for this region. This approach first compares current prevailing conditions (CPCs) and desired future conditions (DFCs) at a landscape-scale developed using remote sensing imagery, remnant forests, and descriptions of historical forest types within the Cumberland Plateau and Mountains. Subsequently, research focuses on at-risk forest types identified in the landscape analysis and assesses gaps between DFCs and CPCs utilizing structural, compositional, or functional attributes of specific forest types. Landscape-scale analyses reveal that forest communities in this region are tightly coupled with physiographic variables that relate to soil moisture availability. These communities vary from mixed mesophytic communities in mesic areas to xeric communities of oak and pine. The results from this ecological research are contributing to an integrated-landscape conservation approach by providing science-based guidance for new conservation initiatives in the northern Cumberland Plateau and Mountains.

Toxics Release Inventory for Tennessee: Pollution Prevention Trends and Opportunities

Daniel S. Ferguson and Ken Silver,
East Tennessee State University

Rationale: The Pollution Prevention Act of 1990 set a national objective of preventing pollution at its source, rather than simply managing it. Tennessee is ranked in the top quartile of states for toxic releases. Ready opportunities may exist for pollution prevention (P2) within specific industrial sectors.

Purpose: To identify opportunities for P2 in Tennessee industries using the U.S. Environmental Protection Agency's Toxics Release Inventory (TRI) and the Pollution Prevention Worldwide Information Network (P2WIN) database.

Methods: A literature search on sector- and region-specific uses of the TRI database was performed. From the Tennessee data for 2001, descriptive summaries were compiled for chemicals, sectors and environmental media. Quantitative relationships between P2 practices and releases were analyzed cross-sectionally. The P2WIN database was searched for case studies potentially applicable to specific contaminants.

Results: 1) An overview of releases from Tennessee industrial sectors is presented for 2001. 2) Variation in P2 practices by region of the state is of borderline statistical significance ($0.050 < p < 0.10$). East Tennessee firms appear to lag in their use of audits. 3) The fabricated metal products industry (SIC 34; N= 72), where recovery of metals for in-process reuse is straightforward, has been the focus of successful P2 efforts internationally. SIC 34 ranked high among sectors in Tennessee for surface water releases and offsite disposal. Of the nearly 1.5 million pounds of inorganic substances released

from SIC 34, more than 25% is accounted for by heavy metals (387,144 pounds).

Conclusions: These initial findings indicate regional differences in P2 methods among firms in Tennessee. Further, they suggest both a need and an opportunity for increased source reduction by metal fabricators. Inconsistencies in TRI data must be addressed before causal inferences can be drawn from longitudinal analyses.

Hurricanes Frances and Ivan: Were We Prepared?

Phillip Gibson, French Broad Riverkeeper, RiverLink, Asheville, NC
Kieran Fogarty, Western Michigan University, College of Health and Human Services

Objectives. We evaluated the level of preparedness of federal and local agencies in their monitoring of weather related activities of sixteen counties of western North Carolina during Hurricanes Frances and Ivan in September 2004. The impetus for this evaluation stems from the deaths and regional economic and environmental impacts resulting from flooding, elevated rainfall, release of toxins into the environment, slope movements and landslides.

Methods. Our analysis is based on focus group discussions with representatives from five federal agencies who are the primary collectors and disseminators of data which are the catalyst of local emergency response systems. The agencies involved were the National Weather Service's Division of Meteorology and River Forecasting, the United States Geological Survey, the North Carolina Geological Survey, and the North Carolina Flood Plain Mapping Program. The USGS operates and manages the stream gage network that supplies data to the NWS. The NWS manages the river modeling program that serves as an alert to local emergency services regarding the potential for flooding. The NC Flood Plain Mapping program manages the development of maps which local, state, and federal agencies rely upon for management of flood plain development, creation of local ordinances, stormwater rules, models that determine flood insurance requirements, and inventorying existing development. The NCGS serves as a clearinghouse for data on local soils, geological features, historical landslides, triggers for landslides, and can assist in predicting future landslide activities.

Results. Results derived from these sessions indicate insufficiencies in the monitoring systems and dissemination of the data (rain gage, stream gage, flood plain mapping, and landslide activities) to and among local leadership.

Conclusions. Our findings suggest improved monitoring systems with respect to flood plain mapping and stream gages and rain gages would improve early detection of potential flooding and systemic issues such as landslides and would thus increase the likelihood of protecting human life from natural disasters. Human deaths did occur from these two hurricanes that were separated by ten days. It is not understood if the following would have prevented the loss of human life and property, but the data collected from the focus group indicates several gaps in data collection and dissemination. They are the following:

The mountain region needs updated flood plain mapping. Some maps are over 20 years old. A factor in flood control is understanding the percentage of impervious coverage – i.e. stormwater management. This can be achieved from the aerial imagery taken from the flood plain mapping project. Accurate, real-time, ground-truth rainfall data are important to augment radar Doppler data. Thus, we need to enhance and maintain the existing stream and rain gage network. The NC Geological Survey assesses each landslide in the region and compiles data that reflects the triggers and potential for future landslide activity. An assessment of this information needs to be disseminated to local governments and planning boards to ensure minimization of future landslide injuries and fatalities. In addition to flooding, the flood waters carried contaminants into waterways, home and businesses. Thus, a process is needed to identify and remove incompatible land uses throughout the watershed.

Acknowledgements. Our gratitude is extended to the participants of this focus group and for their continued support in addressing

these issues and improving the lives of western North Carolinians. Thanks to Gerald Ryan, United States Geological Survey; Jeanne Robbins, United States Geological Survey; Rick Wooten, North Carolina Geological Survey; John Dorman, North Carolina Flood Plain Mapping Program; Joe Pelissier, National Weather Service; Jeff Gramschel, National Weather Service.

Biological Control of Hemlock Woolly Adelgid: Timing Is Everything?

Jerome F. Grant, Isaac Deal, Paris Lambdin, The University of Tennessee
Daniel Palmer, New Jersey Department of Agriculture
Rusty Rhea, USDA Forest Service
Glenn Taylor, National Park Service

An exotic invasive insect species, the hemlock woolly adelgid (HWA), now threatens the ecological, recreational, economical, and aesthetic values of eastern hemlocks throughout the southern Appalachians. This small piercing-sucking insect, introduced into the United States from Asia during the 1920s, has devastated hemlocks in the eastern United States and is now well established in the southern Appalachians. Biological and ecological research is necessary to enable scientists and land managers to develop science-based management programs to effectively reduce populations of HWA and improve the health of hemlocks.

One science-based approach is to release large numbers of adults of an introduced beneficial lady beetle, Sasajiscymnus (=Pseudoscymnus) tsguae, onto infested hemlocks. Ideally, these predatory beetles would feed on adelgids, reducing the number of successive generations of HWA until their numbers were too low to negatively impact the growth and survival of hemlocks. This biological control approach would be one component of a multitactical program for long-term and area-wide suppression of HWA. To maximize the effectiveness of these predator releases, biological and ecological research, combining both basic and applied aspects, is necessary to determine the optimal method of release. The development and implementation of an alternate release plan, e.g., egg releases, may enhance predator establishment, while maximizing production capacity of predatory rearing facilities and minimizing additional input. Releases of eggs at field sites would augment rearing programs by saving time, effort, and expenses. Thus, our research goal is to develop, assess, and determine appropriate protocols for releasing eggs of S. tsugae to enhance their establishment against HWA on hemlocks.

Egg releases conducted during 2004 demonstrated that this method is an effective way to release beetles. The eggs hatched, immatures developed through all life stages, and adults were recovered. These results are very promising, but many questions remain. The appropriate timing of egg releases is vital to the success of this protocol. Suitable food must be present at the time of release, as well as several weeks after release. Ecological research will enable egg releases to be correlated with the appropriate life stages of the HWA to allow sufficient food to enable the predatory beetles to reach adulthood.

The Progress of the All Taxa Biodiversity Inventory in the Great Smoky Mountains National Park

Jeanie Hilten, Discover Life in America, Inc.

Discover Life in America (DLIA) is the non-profit organization uniting the efforts of scientists, volunteers, teachers and students to conduct the All Taxa Biodiversity Inventory (ATBI) in Great Smoky Mountains National Park, and beyond. This survey of all life forms in the Park is yielding new knowledge about the often over-looked and little understood members of Appalachian ecosystems—from algae to moths to spiders. As the Smokies face growing threats from air pollution, invasion of exotic insects and diseases, and ever-growing pressures of development along the borders, Park managers need to direct efforts to "hot spots" of concern.

As of August, 2004, 3,314 species that are new records for the National Park have been found and an additional 516 taxa that are new (undescribed) to science. Along with the inventory work, mapping distributions of organisms, communities, soils, and geology, and

studies of ecological relationships are underway. This knowledge will contribute to scientific resource management in the Smokies, the surrounding region, and in other parks and preserves.

Discover Life in America serves as a coordinator of the varied efforts and partnerships involved in the ATBI—providing grants to researchers, organizing and training volunteer "citizen scientists", and developing educational activities. Partners involved include Great Smoky Mountains National Park, Friends of the Smokies, Great Smoky Mountains Association, Parks as Classrooms, and Great Smoky Mountains Institute at Tremont.

The All Taxa Biodiversity Inventory, begun in 1998, will take from 12-15 years to complete in Great Smoky Mountains National Park. On a wider scale, the knowledge gained and methods used in the project will be a model for research in biodiversity and will encourage the discovery, understanding, preservation, and enjoyment of natural resources. To join the adventure, contact Jeanie Hilten, DLIA, at 865-430-4752 and visit the website, www.discoverlifeinamerica.org.

Modeling and Monitoring Fire Behavior on the Landscape of the Southern Appalachians

Hugh Irwin, Southern Appalachian Forest Coalition

Increasing numbers of prescribed fire projects are being conducted in Southern Appalachian public forests. Ecological studies have highlighted the role of fire in specific ecological communities in the Southern Appalachians, and there is strong evidence that some of these communities (e.g. table mountain pine, pitch pine) are fire dependent. Prescribed fire is increasingly used as a tool to restore the dynamics to fire dependent natural systems.

Fire on the landscape of the Southern Appalachians was likely a complex mosaic of burned and unburned areas reflecting physical conditions (slope position, aspect, moisture, as well as long-term and recent weather patterns). Ecological communities can provide conditions that either increase or decrease fire susceptibility, and fire can also shape the composition of ecological communities. As prescribed fires are applied to the landscape the potential exists to both restore as well as harm ecological communities.

Adequate monitoring of the outcomes and effects of prescribed fire is essential to assure that these projects have the desired outcomes and to verify the continued integrity of natural communities.

A GIS model will be described and displayed that predicts fire behavior on landscape prescribed fire projects based on physical conditions and ecological communities (this is an update of a model described at last years SAMAB conference). Monitoring efforts conducted in conjunction with prescribed fire projects will be described, and the potential to leverage project and remote monitoring through GIS modeling will be explored.

Oriental Bittersweet Mapping Occurrences in a Combined Regional Effort

Pamela J. Nabors, NBII-SAIN/TVA
Contributors: Matthew Durnin, Brandon League, Gary Kauffman, Scott Kichman, Keith Langdon, Jack Ranney, Chris Ulrey, Andy Brown, and SAMAB Volunteers

Oriental bittersweet (*Celastrus orbiculata*) is an invasive exotic plant species in southern Appalachia. It is a very aggressive competitor with native vegetation and hybridizes with the native bittersweet. It is a current hot topic in western North Carolina where residents have traditionally used the woody vine with orange berries to make seasonal wreaths. However, it has recently been listed as a noxious weed, thus making the sale or distribution of the plant illegal. Wreath-makers contend that it is already so widespread that the ban should be lifted. Ecologists disagree.

To aid the decision-making process, field survey data from multiple regional organizations were combined to provide a rapid assessment of oriental bittersweet in the western counties of North Carolina. Oriental bittersweet occurrence data that were readily available were included, namely from the SAMAB Southern Appalachian Volunteer Environmental Monitoring program, the Great Smoky Mountains National Park, the Blue Ridge Parkway, the Pisgah National Forest, and the Nantahala National Forest. The data sets from these thoroughly conducted surveys were

complimented by two ecologists who conducted rapid assessment surveys from their vehicles.

Maps were created by the NBII Southern Appalachian Information Node (SAIN) of the National Biological Information Infrastructure (NBII). The mission of NBII is to provide increased access to data and information on our nation's biological resources. Visit http://sain.nbii.gov for more information about NBII-SAIN and to view this map on-line. Also visit http://www.samab.org for more information about oriental bittersweet and other invasive plants in our region.

Web Applications for Empowering Community Monitoring in Southern Appalachia

Pamela J. Nabors, NBII-SAIN/TVA
Team Member Contributors: Brandon League, Wolf Naegeli, Farial Shahnaz, Jeremy Floyd, Robb Turner,Franciel Azpurua-Linares, Shelaine Curd-Hetrick

The mission of the National Biological Information Infrastructure (NBII) is to provide increased access to data and information on our nation's biological resources. The NBII network is being developed through regional and thematic web-based 'nodes.' Our region is fortunate enough to have one of these regional nodes – namely the Southern Appalachian Information Node (SAIN). The NBII Southern Appalachian Information Node (SAIN) facilitates partnerships and creates applications that improve information exchange for research, education, and environmental decision-making in the Southern Appalachian region. (Visit http://www.nbii.gov for more information about NBII. Visit http://sain.nbii.gov for more information about SAIN.)

This presentation introduces web-based information products created by NBII-SAIN for the SAMAB Southern Appalachian Volunteer Environmental Monitoring (SAVEM) program. These web applications include data entry forms, tabular reporting, and static and interactive maps. The presenter will show the audience how to use these new on-line resources for invasive plant and aquatic monitoring and discuss plans for additional capability.

Spatio-Temporal Dynamics of Soil Moisture in Forested Woodlots.

Sara H. Nichols and Scott M. Pearson, Mars Hill College

Soil moisture is one of the most important abiotic factors influencing the demography of populations and ecosystem processes. Spatio-temporal variation in percent moisture in the top 10 cm of soil was monitored in two woodlots during the summer and autumn of 2004. In each woodlot, measurements were taken at 10-m intervals within a 100 x 60 m sampling grid. We hypothesized that moisture levels would be correlated with precipitation, soil type & texture, and slope position. Moreover, soil texture should have the strongest influence. Temporal differences were correlated with precipitation and growing season. Differences in topography between the two woodlots accounted for among-site variation in the mean and variance of percent moisture. Low slope positions had higher variance in moisture in space and time than high slope positions. Spatial variation in soil moisture explains differences in the composition of vascular plant community across these sample grids.

Forest Dynamics: The Effects of Elevation on Tree Diversity and Abundance at Fisher Creek Watershed

Marcie Renfroe, Shakira Black, Ashley Holmes, Rose McDowell, Danterio Moss, Wesley Price, and Jasmine Robinson
Upward Bound Math & Science Regional Center at Western Carolina University

This project focuses on tree diversity at Pinnacle Park, an 1100 acre region within Fisher Creek Watershed, located in Jackson County, N.C. Three sites at different elevations were measured to be 31.8m x 63.6m, which is 0.202 hectares. Only trees with a minimum girth of 0.6meters were recorded. Specific site locations were chosen based on an inventory project run by Mr. Jay Coward, the chairman of the board – Pinnacle Park Foundation, at elevations: 3320 ft, 3400 ft, and 3560 ft. The hypotheses stated that tree diversity and abundance would increase as elevation increases due to the fact that hikers and tourists would not disturb the area as much at higher elevations

than at lower elevations. The results indicate that while tree abundance increases with elevation, basal area decreases. With an increasing number of species in one area, competition exists between trees as resources such as nutrients, water, and sunlight become scarcer. The Yellow Poplar tree (Liriodendron tulipfera) is the most dominant tree found in sites one and three, as well as overall in number throughout the three sampled sites. This particular tree species overcomes competition by rapidly producing many seedlings. White Oak (Quercus alba) is the dominate tree found in site two. Furthermore, the Simpson's Index for Diversity tested the diversity at three sites. Tree diversity increases from site one to site two. However, diversity decreases from site two to three. Other abundant trees recorded at Fisher Creek Watershed include Sugar Maple, Black Birch, and snags.

Off-Highway Vehicle (OHV) Stream Sedimentation Study

Mark S. Riedel, USDA Forest Service, Coweeta Hydrologic Lab

A wealth of research has been conducted to quantify erosion and transport of sediments from forest roads and their impacts on stream sedimentation and water quality; however, little has been done to determine the impacts of off-highway vehicle (OHV) on sedimentation from roads and trails. The use and erosion from the OHV trail networks in National Forests of the southern Appalachian Mountains are largely undocumented. We have been monitoring OHV impacts on stream water quality for a trail system in north Georgia. The transport of suspended and bed load sediments in a stream with a watershed having no OHV trails, a stream with an extensive OHV trail network in its watershed is significant. Both streams experienced massive bed load transport following torrential rains from Hurricane Charles, Frances and Ivan. We will characterize differences in sediment loading and transport within these streams during baseline and storm flow conditions.

Forest Resource Monitoring of Invasive Plant Species in the Southern Appalachian Region

Victor A. Rudis and Sonja N. Oswalt
USDA Forest Service, Southern Research Station

To be effective, management of biotic plant invasions requires a long-term, regional prevention policy as well as efforts focused on eradication at specific locations and broad-scale control of individual populations. We describe efforts to evaluate forest-associated risks associated with nonnative invasive plant species for regional forest resource planning in the Southern Appalachians. The short-term goal of these efforts is to provide a baseline inventory, i.e., to describe what, where, and how much of the invasive plant pest problem exists in forests, while the long-term goal is to monitor forest resource impacts and the rate of change in plant infestations. We present a strategic approach comprised of a survey of 33 regionally important nonnative invasive plant species from a 0.067-ha sample area at systematic intervals equivalent to a 5-km grid in forests, as well as growing-season field observations of all plant species for a portion of forested locations. Specific objectives include estimating the relative importance of a "hit list" of noteworthy invasive species, and a census of all species to gauge their relationship with all nonnative and potentially invasive species. The information forms a building block toward identifying the invasive plant pest problem in the Southern Appalachians, and the development of associated priorities, policies, and long-range management in forested areas.

Modeling Visitor Acceptance of a Shuttle System in Cades Cove

Charles Sims, Becky Stephens, Don Hodges, Mark Fly
University of Tennessee Department of Forestry, Wildlife and Fisheries

The purpose of this paper is to address concerns levied against the implementation of a shuttle system in and around the heavily visited Cades Cove area in the Great Smoky Mountains National Park. Using a random household telephone survey, we obtained opinions on the use of a shuttle system in the Cades Cove area. We also utilized a basic contingent valuation

scenario to value the use of a shuttle system in an overall traffic Management plan. Contingent market behavior was modeled for households and a traditional measure of consumer surplus was estimated. We argue that acceptance of a shuttle system may be higher than previously thought and that some visitors may even place a value on having a shuttle system present.

Our Sense of Place: People, Places and Spirit

Jim Stokoe and Linda Giltz,
Land of Sky Regional Council

Land-of-Sky Regional Council has developed a video presentation that shows and describes many of the elements that make up our region's "sense of place." It describes the importance these assets have to our economy, our quality of life and our future. Many things make up our sense of place and make us feel at home: the Blue Ridge Mountains; rivers, waterfalls and river valleys; farms and rural landscapes; our small, vibrant cities and towns; history and heritage; arts and culture.

The presentation is designed to be an introduction to group discussion about our sense of place and what can be done to preserve those things that make this place different from other places. The project is an initiative that came out of the Land-of-Sky Regional Council's strategic plan, Regional Vision 2010, under the strategic initiative: "Protect and restore our natural and cultural wealth." This video presentation is available for individuals, groups, schools and organizations around the region. It is hoped that through the presentations and resultant discussions that new investment ideas and partnerships will be identified and developed, and that more people will be inspired to invest in and preserve our sense of place "assets."

Sense of place is important to our region – not only as something that makes us feel at home – but also as a key competitive advantage in a state whose economy is increasingly dominated by urban areas. Those urban areas are able to offer infrastructure, financial services, and other amenities more efficiently than the rural areas. But our region offers "sense of place" amenities to attract highly skilled labor, entrepreneurs, and businesses. Although, cheap land and utilities once were the keys to attracting businesses – now quality of life and a strong sense of local identity and character are becoming much more important.

As our region draws more growth and development, maintaining our sense of place becomes both more important and more difficult. Our challenge is to find ways to preserve and maintain our sense of place assets, while accommodating and welcoming development, businesses and people.

Development of this video was aided by funding from the North Carolina Rural Economic Development Center and the Z. Smith Reynolds Foundation and the time, ideas, and stories, art, music and enthusiasm of many people. Copies are available by contacting Linda Giltz at 828-251-6622, lindag@landofsky.org.

Evaluation of Timber Harvest to Improve Hardwood Forest Habitat for Songbirds on Tennessee National Wildlife Refuge

Benjamin S. Thatcher and David A. Bueler
University of Tennessee, Department of Forestry Wildlife and Fisheries

Tennessee National Wildlife Refuge has managed its hardwood forests with experimental selection cutting in an attempt to increase nesting and foraging substrate for mature forest songbirds. We present the results from an ongoing study designed to experimentally test the effects of this management on the avian community. We measured habitat characteristics and collected daily nest survival, Brown-headed Cowbird brood parasitism, and population density data within twelve 20-ha research units, both prior to and following forest management. Kentucky Warbler and Indigo Bunting densities increased significantly (>10x) in harvest vs. reference units 2 years post-treatment. Wood Thrush densities and nest survival rates decreased in the harvest units following treatment. In the short-term, proactive forest management appears to increase avian community diversity but may have mixed effects on breeding mature forest songbirds. Results from this study will be used to make recommendations for adaptive management.

Changes in Concentration of Contaminants in Scott's Creek, Western North Carolina

Anh Truong, Phaedra Binion, Shakori Edwards, Tavoccous Elliott,
Amesha Jones, Paul McClellan,
Upward Bound Math & Science Regional Center at Western Carolina University

Scott's Creek, is a 4th-order gravel-bedded stream in the Little Tennessee watershed in Jackson County, North Carolina. The region is highly dependent on this river for drinking water and tourism related to river recreation. Recently, there has been increasing interest in quality of the water in Scott's Creek. Our objective here is to assess the current quality of the water, and to devise methods for future monitoring and prediction of contaminant concentration in the river. A cross-section of Scott's Creek was surveyed just upstream from it's confluence with the Tuckaseigee River using an auto-level, stadia rod, and survey tape. During a period of 5 days in July 2004, our research group monitored the stage and velocity of the river as well as the concentration of nitrates, reactive phosphorous and fecal coliform in the water. We used colorimetric methods to assess water chemistry, and the membrane filter technique to extract coliform bacteria from our water samples. Our results suggest that the nutrients and the bacteria counts vary in phase with the river discharge. Our analysis of the data leads us to conclude that both discharge and E. coli concentration are related to precipitation. The relationship between river stage and precipitation is complex, requiring a "multiple" regression equation which plots Q as a function of the previous 3 days of rainfall. The relationship between E. coli concentration and precipitation is much simpler, showing that the abundance of bacteria varies directly with daily rainfall. We infer from our data that it is unlikely that E. coli in Scott's Creek has a "point" source.

Highways and Byways: Gateways for Invasive Plants into the Southern Appalachians

Greg Wiggins, Jerome Grant, and Paris Lambdin
The University of Tennessee

Exotic invasive species are often of interest to biologists and conservationists due to their negative impacts on natural systems. However, in the case of exotic invasive plants, unnatural systems, such as interstates and highways, can play an important role in their dispersal and range expansion. As many invasive plant species can readily colonize disturbed habitats, highway medians and shoulders provide perfect habitats for these problem plants. The occurrence of exotic plant species in roadside habitats may not be a primary concern to many vegetation specialists, but the increasing presence of invasive species along roadways provides source populations from which invasive species can colonize natural areas. Several species that are currently found along roadways have the potential to spread to natural areas. In a recent vegetation survey along interstate roadsides, 18 of the 30 species of plants most commonly encountered were exotic species. Of these, 12 are listed as a "significant threat" or higher by the Tennessee Exotic Pest Plant Council. Widely distributed species, such as musk thistle and spotted knapweed, can out-compete native vegetation in large areas. Other less encountered species, such as Canada thistle and purple loosestrife, have the potential to greatly expand their ranges if management of localized infestations of these species is not aggressively pursued. Communication among local, state, and federal agencies is essential to insure education and awareness regarding which exotic species are of management concern. Cooperation among agencies can increase the effectiveness of area-wide management efforts, and therefore slow the spread of exotic species into our precious natural areas.

INVASIVE SPECIES STATUS, IMPACTS, AND CONTROL

Wednesday, November 17, 2004
Session Moderator: Gary Kauffman, USDA Forest Service

Status of hemlock woolly adelgid control efforts in Great Smoky Mountains National Park

Tom Remaley and Glenn Taylor
National Park Service, Great Smoky Mountains

Hemlock woolly adelgid was confirmed in Great Smoky Mountains National Park in April, 2002 and by mid 2004 the park was generally infested. Control methods include foliar sprays of insecticidal soap, systemic insecticides and the use of biocontrol insects.

With assistance from The Friends of the Smokies, the USDA Forest Service, NPS and the Great Smoky Mountains Association, the hemlock woolly adelgid control program greatly expanded in 2004 to include a total of 900 acres treated in 2004, with nearly 33,000 predator beetles released at 14 new sites.

Biological Management of Hemlock Woolly Adelgid in the Southern Appalachians

E. C. Bernard, J. F. Grant, and P. L. Lambdin, and C. J. Jones.
Entomology and Plant Pathology Department, The University of Tennessee

Hemlock woolly adelgid (HWA) populations were detected in Great Smoky Mountains National Park (GSMNP) in 2002. Representatives of concerned organizations met at the Southern Appalachian Man and Biosphere (SAMAB) Conference in early 2003 to focus on strategies to control the spread of HWA. The Friends of the Smokies, GSMNP, United States Department of Agriculture Forest Service, The University of Tennessee (UT), and local communities all become actively engaged in efforts to use an integrated approach to slow the current advances of HWA. A major part of this effort was establishment and funding of a beneficial insects laboratory at UT to mass-rear beetles predacious on HWA. In the first year (2003-2004), 25,000 *Sasajiscymnus tsugae* (St beetle) were produced at the UT facility, and production of more than 100,000 St beetles is planned for 2004-2005. Production of a second beetle, *Laricobius nigrinus*, will begin in January 2005. Research efforts at UT include studies of adelgid biology and behavior, beetle movement away from release sites, and assessment of beetle feeding efficiency.

Interactive Effects Of Nitrogen Availability And Propagule Pressure On Invasion By *Lespedeza Cuneata*

Gregory M. Crutsinger, Matthew C. Fitzpatrick, Martin A. Nuñez, Christopher M. Oswalt, Jill M. Stephens, and Jake F. Weltzin
University of Tennessee

Invasive species are a global threat to biodiversity and the functioning of natural ecosystems. Therefore, it is critical to understand the factors determining the spread of non-native organisms. The objective of this study was to assess the role of biotic and abiotic factors in the establishment of the non-native invasive plant, Lespedeza cuneata, in an old-field ecosystem in eastern Tennessee. In May of 2004, we initiated a three-factor experiment including two levels of propagule pressure (1730 seeds added per m2 or no seeds added), three levels of nitrogen availability (10 g nitrogen /m2/year addition, 1000 g carbon/m2/year as sucrose to reduce availability of soil nitrogen, and an un-amended control), and two levels of herbivory (removal or no-removal). Throughout the growing season, we periodically monitored soil moisture, soil temperature, interception of light by the plant canopy, leaf area index, canopy greenness (NDVI), plant species composition, and rates of L. cuneata seedling emergence. Ambient plots and plots with addition of carbon had greater soil moisture and light availability, whereas plots with addition of nitrogen were driest and darkest. Additions of

seeds increased seedling density at least three-fold, except in plots with supplements of nitrogen. Removal of herbivores had no effect on seedling establishment. Results indicate that nitrogen availability and propagule pressure interact to determine establishment of L. cuneata. Addition of carbon may not be an efficient strategy to control this species. In fact, changes in ecosystem structure and function caused by addition of nitrogen may have important effects on the establishment of L. cuneata.

Impacts of Microstegium vimineum on Natural Regeneration of Woody Species Following Harvest

Christopher M. Oswalt, Wayne K. Clatterbuck, University of Tennessee
Sonja N. Oswalt, USDA Forest Service, Southern Research Station

Some of the greatest threats to the sustainability of the eastern deciduous forest are the impacts of non-native invasive (NNI) plants (Citation). As NNI plant ranges expand from rural/urban interfaces further into the forest, silviculturists and other land managers will be faced with increasingly complex and difficult circumstances. Two NNI plant species that have the potential to severely alter the composition and structure of regenerated stands are *Microstegium vimineum* and *Lonicera japonica*. *M. vimineum* is an Asian annual grass introduced into the United States in the early 1900's. Currently, *M. vimineum's* range extends over the majority of forest land east of the Mississippi River. *Lonicera japonica* was introduced from Asia and is now common throughout most of the southern states. We examined the potential impact of these NNI plant species on natural regeneration following three different harvesting methods (commercial cleracut, high-grade and two-age). Simple linear and multiple regression techniques were used to explore quantitative relationships between the NNI's *M. vimineum* and *L. japonica* and woody regeneration diversity and structure. Shannon's H and Simpson's D diversity indices were used. An increase in NNI cover resulted in a decrease in both Shannon's H and Simpson's D (R2=0.42, r=-0.69, P=0.005 and R2=0.28, r=-0.56, P=0.029). Total stems per acre also decreased with increasing NNI cover (R2=0.77, r=-0.88, P<0.0001), with *M. vimineum* explaining the majority of the variation. These results suggest that as NNI plants increase their range, greater silvicultural and land management challenges will accompany them. The spread of NNI plants may have serious implications and has the potential to alter the composition and structure of disturbed and harvested forests.

National Park Service Southeast Exotic Plant Management Team: Meeting the Natural Resource Challenge

Nancy D. Fraley, National Park Service

Estimates indicate that nonnative plants infest 4,600 new acres of federal land each day. Invasive nonnative plants currently infest an estimated seven million acres of National Park Service (NPS) lands. Managing invasions of this magnitude requires a coordinated strategy based on cooperation among all land managers and on the principles of integrated pest management.

The Southeast Exotic Plant Management Team (SE-EPMT) was established in July 2004 and fully staffed in January 2005. Modeled after the coordinated rapid response approach used in wildland fire fighting, the SE-EPMT is one of 17 teams serving NPS units in the US. The SE-EPMT serves 16 parks in seven southeastern states. Exotic plant management projects are prioritized based on the management objectives of the individual park units. Coordination with the resource management, cultural resources, and maintenance staff is essential in successful implementation of management strategies. The success of the EPMT derives from its ability to adapt to local conditions and needs using weed science expertise and partnerships. An overview and update of EPMT as an effective exotic plant management tool in the southeast will be discussed.

Natural Resource Conservation Service Programs to Eradicate Invasive Plant Species and Establish Native Species

Robin Mayberry, USDA – NRCS

The United States Department of Agriculture-Natural Resources Conservation

Service offers several programs to assist landowners throughout the southeastern states with eradicating invasive species and replacing them with native species. With the technical assistance these programs provide, Tennessee landowners have begun to take a stand against the growing concern of nonnative invasive species inhabiting the southern Appalachian region.

The agency offers landowners assistance with establishing native warms season grasses and provides information about why these grasses are important to landowners. One area of particular interest is eradicating of Tall Fescue and Sericea Lespedeza and replacing them with native warm season grasses. Landowners are also educated with other uses for native warm season grasses, such as hay production. This presentation will showcase the techniques that address invasive species eradication, the establishment of native species, and their effects on wildlife species in the Tennessee.

Building on volunteer invasive plant monitoring results

Jack Ranney, University of Tennessee Energy Environment and Resources Center

Results of volunteer efforts to monitor invasive plants in the southern Appalachians are starting to yield some payoffs. Most importantly, these include the early emergence of a regional picture of how invasive plants are affecting the landscape, especially when combined with GIS technology and the biology of the invasive plants. This is leading to some eye-opening collaborative interests to develop strategies and priorities across stakeholder groups. These efforts will be briefly summarized with focus on Oriental bittersweet in North Carolina and initial efforts to develop an invasive plant situation statement in Tennessee and the southern Appalachians.

PROTECTING AND RESTORING NATURAL ECOSYSTEMS

Wednesday, November 17, 2004
Session Moderator: Anita Rose, USDA Forest Service

Influences of Changing Disturbance Regimes on Forest Structure in Southern Appalachian Landscapes

John Waldron, Texas A&M University, Bent Creek Experimental Forest
Charles Lafon, David Cairns, Maria Tchakerian, Robert Coulson, Kier Klepzig

We used a landscape-scale model of forest succession and disturbance (LANDIS) to evaluate the impact of natural disturbances (fire, wind, insects) on forested landscapes of the southern Appalachian Mountains. Using Great Smoky Mountains National Park as a study area, we calibrated LANDIS to fit the complex topography and vegetation associated with the Southern Appalachians. Our results show the potential changes in woody species composition in the presence/absence of fire and other natural disturbances for this region. We further show both the effectiveness and limitations of applying the LANDIS model to a diverse, mountainous environment.

Modeling and Monitoring Fire Behavior on the Landscape of the Southern Appalachians

Hugh Irwin,
Southern Appalachian Forest Coalition

Increasing numbers of prescribed fire projects are being conducted in Southern Appalachian public forests. Ecological studies have highlighted the role of fire in specific ecological communities in the Southern Appalachians, and there is strong evidence that some of these communities (e.g. table mountain pine, pitch pine) are fire dependent. Prescribed fire is increasingly used as a tool to restore the dynamics to fire dependent natural systems.

Fire on the landscape of the Southern Appalachians was likely a complex mosaic of burned and unburned areas reflecting physical conditions (slope position, aspect, moisture, as well as long-term and recent weather patterns). Ecological communities can provide conditions that either increase or decrease fire susceptibility, and fire can also shape the composition of ecological communities. As prescribed fires are applied to the landscape the potential exists to both restore as well as harm ecological communities.

Adequate monitoring of the outcomes and effects of prescribed fire is essential to assure that these projects have the desired outcomes and to verify the continued integrity of natural communities.

A GIS model will be described and displayed that predicts fire behavior on landscape prescribed fire projects based on physical conditions and ecological communities (this is an update of a model described at last year's SAMAB conference). Monitoring efforts conducted in conjunction with prescribed fire projects will be described, and the potential to leverage project and remote monitoring through GIS modeling will be explored.

Fire Regimes And Successional Dynamics Of Appalachian Yellow Pine (Pinus) Stands In The Jefferson National Forest, Virginia

Georgina DeWeese Wight, Henri Grissino-Mayer, University of Tennessee
Serena Aldrich, Charles Lafon, Texas A&M University
Steve Croy, Elaine Kennedy Sutherland, USDA Forest Service

Fire-adapted stands of yellow pine are prevalent on the xeric ridgetops and southwest facing slopes of the Appalachian Mountains. Such stands historically have canopies dominated by Table Mountain pine (*Pinus pungens Lamb.*) (TMP), Virginia pine (*Pinus virginiana P. Mill.*), and chestnut oak (*Quercus montana L.*). The deterioration of TMP stands (most likely resulting from successful 20th century fire exclusion practices) has prompted concern by

land management agencies because TMP requires fires to open their serotinous cones and release seeds, open the canopy to provide sunlight, and reduce the duff layer on the forest floor to expose mineral soils. The absence of fire has increased litter accumulation and allowed fire-intolerant species to move into and dominate TMP stands. A better understanding of historic fire regimes would allow forest managers to adopt a prescribed burning plan that would help the ecological maintenance of TMP. Two sites were established at Brush Mountain and North Mountain. Cross sections were collected from fire-scarred trees at both sites. Macroplots (100 m x 20 m) were used to inventory stand composition and determine the stand age structure. Increment cores taken from all tree within the plots were used to create separate Brush Mountain and North Mountain tree-ring chronologies to help date the fire scars on the cross sections. Our preliminary results show that fire was a regularly occurring disturbance in TMP stands during the past three centuries. The Brush Mountain tree-ring chronology (1732–2002) has an interseries correlation of 0.59 and an average mean sensitivity of 0.30. The Weibull median fire-return interval is 4 yrs for all fire years and 10 yrs for years in which fires were perhaps more widespread (≥25% scarred). Brush Mountain appears to have had a fire regime in which several high-severity, late season fires occurred in 1853, 1926, and 1934 that initiated cohort establishment. The North Mountain tree-ring chronology (1743–2002) has an interseries correlation of 0.60 and an average mean sensitivity of 0.34. The Weibull median fire-return interval is 3 yrs for all fire years and 8 yrs for years in which fires were perhaps more widespread (≥25% scarred). North Mountain has a patchy fire regime with cohorts establishing after a series of low-severity, dormant season fires. We found evidence of one major cohort that established in the 1920s with other cohorts establishing after less severe fires in or around 1850, 1875, and 1890. Stand structure has also changed at both sites with red maple *(Acer rubrum L.*), black gum (*Nyssa sylvatica Marsh*.), and mountain laurel (*Kalmia latifolia L.*) gaining dominance in the understory, especially in the mid-20th century.

Post-fire Regeneration of Yellow Pine (Pinus Echinata, P. Rigida, P. Virginiana) Communities in Great Smoky Mountains National Park

V. L. McDaniel and R. N. Klein
National Park Service, Great Smoky Mountains National Park

Great Smoky Mountains National Park uses prescribed fire to restore and maintain yellow pine communities. Fire suppression has enabled fire-intolerant species like red maple, blackgum, and white pine to out-compete yellow pines, and as result their community structure and composition is changing. The Park's fire management objectives include reducing both duff depths and the density of pole-size trees (2.5-15.0 cm diameter at breast height) to promote yellow pine seedling recruitment. Between 1997 and 2004, we collected monitoring data in seventeen 0.1 hectare plots located in five separate prescribed burned areas. We observed a significant reduction in both pole-sized tree density and duff depths one year post-burn. These reductions were positively correlated with an increase in yellow pine seedling density. We noticed, however, thresholds for duff depth and pole-tree mortality whereby few pines would germinate if duff was greater than 3 centimeters or if pole-tree mortality was less than 85%. Two burns achieved these thresholds and thus had significant pine regeneration, while the other three burns did not and had very little pine regeneration. Time of year and duff moisture level when burns occur may play an important role in fire severity, pine seedling regeneration, and thus maintaining yellow pine communities.

The Status Of Flowering Dogwood (Cornus Florida L.) In Burned And Unburned Areas In Great Smoky Mountains National Park

Eric J. Holzmueller, Shibu Jose, University of Florida
Michael A. Jenkins, Great Smoky Mountains National Park

Flowering dogwood (*Cornus florida* L.) survival is threatened across most of its range in forests of the eastern US by dogwood anthracnose, a disease caused by the fungus *Discula destructiva*. Where anthracnose is

present, mortality of *Cornus florida* has been severe. Currently, no management techniques exist to reduce impacts of the disease on populations of dogwood. This study examined *Cornus florida* in burned and unburned forests in Great Smoky Mountains National Park (GSMNP) to determine if past burning has favored dogwood survival. Stand composition, structure, and soil conditions of areas that burned in the 1970s and 1980s were compared to unburned areas to determine if *Cornus florida* stem density and health were affected by fire. Preliminary results indicate that heavy *Cornus florida* mortality has occurred in unburned areas in western GSMNP over the past two decades (between 1979 and 2000). However, *Cornus florida* density appeared to be greater in areas that burned once during the 1970s (248 ± 67 stems/ha) than in unburned areas (88 ± 30 stems/ha; P=0.10). In areas that burned twice, once in the 1970s and once in the 1980s, the difference was even more pronounced (708 ± 159 stems/ha; P=0.0001). The increase in *Cornus florida* stem density in burned areas compared to unburned areas is likely a result of stump sprouting and reduced shading. Our results suggest that prescribed burning may be used to mitigate the impacts of dogwood anthracnose in the GSMNP and other areas in the eastern US.

An Exploration of *Tsuga Canadensis* Regeneration in the Great Smoky Mountains

Joshua A. Kincaid
University of Georgia

With impending climate changes and invasion of eastern hemlock (Tsuga candensis) stands in the southern United States by the hemlock woolly adelgid (Adelges tsugae), it is important that we obtain baseline data on these forests in order to monitor future changes in these eastern hemlock systems. Moreover, there has been no research which specifically examines the status of eastern hemlock regeneration in the southern Appalachian Mountains. During the summers of 2003 and 2004, fifty 14x21 m plots were established within mature hemlock-hardwood stands of the Great Smoky Mountains National Park (GSMNP). Detrended correspondence analysis (DCA) was used to arrange species importance values and hemlock seedling and sapling densities in ordination space. Spearman's rho correlation analysis was used to aid in the interpretation of the DCA structures. The DCA of species importance values by site reveals no significant correlations between environmental variables and axis one. However, there is a significant negative correlation between percent cover of rhododendron (-0.60, $p < 0.05$) and the second axis. This may indicate a moisture or nutrient gradient from cove hardwoods to northern hardwoods, but this can not be confirmed until more environmental data are available. A DCA of seedling and sapling densities by site reveals a significant correlation between axis one and the percent cover of rhododendron (+0.35, $p < 0.05$). The percent cover of rhododendron also correlates with axis two (-0.27, $p < 0.10$). The moderate, but significant correlations between rhododendron and axes one and two may indicate that canopy openings favor both rhododendron expansion and hemlock seedling establishment. However, few of these seedlings actually survive so that only sites with very low rhododendron cover have larger hemlock saplings. Variance-to-mean ratios for hemlock seedlings and saplings indicate significant spatial clumping within plots. Other researchers have attributed this clumping to hemlock's affinity for particular substrates such as decaying wood. However, the clumping of hemlock seedlings and saplings in GSMNP may be due canopy gaps, which promote both prolific hemlock regeneration and rhododendron expansion.

Butternut Conservation: Understanding Aspects of Canker Resistance for the Development of Breeding Orchards

S.L. Brosi, S.E. Schlarbaum, L.M. Thompson, S.L. Clark,University of Tennessee;
R.L. Anderson, Consulting Forest Pathologist
F.T. van Manen, USGS, Southern Appalachian Field Branch

Butternut*, Juglans cinerea* (L.), a native tree species important for timber and wildlife, is being devastated by butternut canker disease, caused by the exotic fungus (*Sirococcus clavigignenti-juglandacearum* V.M.G. Nair,

Kostichka, and Kuntz). The fungus produces multiple branch and stem cankers that eventually girdle infected trees. Forest Inventory and Analysis data for the southern United States indicate that 80 percent of the population has been killed. The small population size and lack of sprouting can result in permanent loss of butternut in some areas. Low genetic diversity has been found in certain butternut populations. However, healthy, potentially canker-resistant butternut trees have been found growing near diseased trees indicating that a breeding approach could be a feasible strategy to produce resistant butternut trees for reintroduction. A three-tiered approach to restoration involves finding resistant trees through GIS-modeling, screening progeny for resistance, and insight into the conditions that impact canker development through the use of dendroecology.

A GIS-based approach to locate extant butternut trees was implemented on various land bases in the southeastern United States. Habitat is being modeled using a variety of different spatial scales in order to better understand habitat requirements and to be applicable to multiple land-holding agencies. Predictive habitat models were developed for Mammoth Cave and Great Smoky Mountain National Parks and the St. Francis National Forest. Data to construct models for other areas is now being collected.

Seedlings from open-pollinated families were established under infected butternut trees at various locations for exposure to heavy disease pressure. Resistant genotypes will be selected over time and integrated into resistance breeding programs to produce canker resistant, locally adapted seedlings for use in restoration efforts.

Butternut canker disease appears to vary annually, in terms of occurrence and severity. Dendroecology research is being conducted to determine if stress conditions predispose butternuts to canker disease. Sampling of butternuts and surrounding trees in three widely separated areas has been completed and will be used to determine if butternut canker disease is stress related. Additionally, the research will determine natural conditions under which butternuts successfully regenerate and grow. The results will help refine management practices to improve growth and survival of resistant seedlings.

NEPA Roundtable

Wednesday, November 17, 2004
Discussion leader: Harold Draper, TVA

Roundtable Synopsis:
Harold Draper, Chairperson of the SAMAB Environmental Coordination Committee, will lead a discussion of ongoing NEPA issues at participants' agencies. Topics of special interest will be best practices in public participation and the geographic and temporal scope of cumulative effects analysis.

SUDDEN OAK DEATH IN THE SOUTHERN APPALACHIANS: THE THREAT AND THE RESPONSE

Wednesday, November 17, 2004
Session Chairperson: Bill Hoffard, USDA Forest Service

Sudden Oak Death - An Overview of the Disease
Kelly Ivors,
Department of Plant Pathology, North Carolina State University

Phytophthora ramorum is considered an emerging pathogen that has received worldwide attention as the causal agent of sudden oak death (SOD). The pathogen was first isolated in 1993 in Germany and the Netherlands from rhododendrons in nurseries but was not formally described until 2001. *P. ramorum* has been detected in over 10 European countries, where it is reported to cause twig blight of Rhododendron, Viburnum, Camellia, Kalmia, Pieris, Vaccinium and other important nursery plant species. Symptoms of SOD in the United States were first observed during 1994-95 in the San Francisco bay area in California; subsequently *P. ramorum* has reached epidemic proportions in oak forests along a 650 km stretch of the Pacific coastline from central California to southern Oregon. In California and Oregon, *P. ramorum* causes a deadly canker disease of tan oak (*Lithocarpus densiflora*), coast live oak (*Quercus agrifolia*), California black oak (*Q. kelloggii*) and Shreve's oak (*Q. parvula* var. shrevei), and non-lethal foliar and twig infections of numerous native hardwood and coniferous forest trees, understory shrubs and herbaceous plants. The pathogen has also been identified in nurseries in California, Oregon, Washington and British Columbia that are located outside the natural range of *P. ramorum*. Recently, the pathogen was unknowingly transported to 21 other states after the movement of infested materials via nursery trade. Although the geographic origin of *P. ramorum* remains unknown, the risk of introducing *P. ramorum* outside of its present range is of great concern. A better understanding of its origin, evolution and modes of dispersal is necessary for developing regulatory and disease management strategies.

Sudden Oak Death Nursery Issues in the Eastern U.S.
Alan Windam, University of Tennessee
(no abstract)

***Phytophthora ramorum* Detection Surveys for Forests in the United States**
Steven W. Oak, USDA Forest Service, Southern Region FHP

Diseases caused by Phytophthora ramorum in forest landscapes of North America are presently confined to areas of the Pacific coast in the states of CA and OR. However, the vulnerability of other ecosystems is suggested by the discovery in Europe of disease in hosts which are abundant in oak-dominated forests of eastern North America; successful greenhouse inoculation trials of these and other potential eastern tree and shrub hosts; and brisk domestic and international trade in woody ornamental hosts. A risk map was developed for the US using overlay analysis. The three factors used in the analysis included hosts (red and live oak overstory and evergreen understory); climate (limiting temperature extremes and length of annual mesic/moist period); and potential pathways of introduction (importers of rhododendron nursery stock from the Pacific coast or Europe). The results showed an area of potentially elevated risk in the East centered in the Southern Appalachian Mountains.

Federal and state forest management agencies in 7 eastern states encompassing most of this area joined in pilot tests of early detection survey methods in 2003. Objectives were to field test survey methodology, develop diagnostic capacity, and determine *P. ramorum*

status. The risk map guided sampling intensity. *Rhododendron spp*. and *Kalmia latifolia* were examined for foliar symptoms and *Quercus* spp. bark for bleeding symptoms on 4-100 meter transects per survey location. Diagnosis for the presence of *P. ramorum* was by nested PCR conducted at laboratories located in 6 of 7 cooperating states. Foliar samples consisted of 10 leaf composites, while bark samples came from individual cankers. Quality assurance of diagnostic results was accomplished on replicate samples from half of all transects at a separate laboratory.

Over 1,100 bark and foliage samples representing over 10,000 individual symptomatic leaves and bark cankers were collected from the forested perimeter of 54 woody ornamental nurseries and from 118 general forest areas during the growing season of 2003. *P. ramorum* was not detected in any sample. These survey methods were implemented in a greatly expanded survey in 2004 in response to the discovery that P. ramorum-infected ornamental nursery stock had been shipped throughout the US during the previous year. The target host list was expanded to 8 foliar and 3 bark host genera. Top survey priority was assigned to the perimeters of trace forward woody ornamental nurseries. The cumulative total of locations surveyed in 2003 and 2004 now exceeds 1000, and the number of submitted samples exceeds 4000. *P. ramorum* was detected by these methods during 2004 only in Golden Gate Park, San Francisco County, CA in symptomatic bark of coast live oak (*Quercus agrifolia*). This area is in the heart of the CA quarantine area surrounded by the infested counties of Marin, Contra Costa, Alameda, and San Mateo. These survey results demonstrate that *P. ramorum* is not yet widely established in forest landscapes outside of currently regulated areas on the Pacific coast, even in close proximity to woody ornamental nurseries receiving infected stock in high risk areas. Surveys aimed at early detection of *P. ramorum* diseases will continue.

A Potential Regulatory Response to the Threat of Sudden Oak Death in Tennessee

Anni Self, TN Department of Agriculture

(No abstract)

ACHIEVING RESPONSIBLE LAND AND TRANSPORTATION DEVELOPMENT

Wednesday, November 17, 2004

Session Moderator: Steve Wilson, Tennessee Department of Environment and Conservation

Conservation Based Residential Development: Protecting Natural Resources within a Residential Development

David Tuch, Equinox Environmental Consultation & Design, Inc

Every year North Carolina loses farmland, forestland, and natural & cultural resources to the pressures of development. Conservation subdivision design offers one of the best tools in which to protect significant features in the natural and cultural landscape while providing for residential housing needs. Conservation subdivisions can help protect animals and plants found in our forests, wetlands, riparian corridors, and open spaces by creating a more sustainable pattern of development. A recent project designed and planned by Equinox will be used as a case study to illustrate how a property can be developed in a fashion which protects the key resources of a landscape. Located in Buncombe County, North Carolina, Drovers Road Preserve is the first conservation subdivision design in the county and it is being used as a model for sustainable development. A detailed natural resource inventory was performed to identify the lands to be protected through a conservation easement and lands suitable for homesite development. The design of Drovers Road Preserve includes: innovative stormwater management practices (bioretention pond and a stormwater wetland), appropriate road design and layout to minimize construction impacts, enhancement/restoration of habitat, and the reuse of materials resulting from construction activities (i.e. trees milled and used in the construction of a picnic shelter). The homesites were not included in the conservation easement so detailed and stringent Design Guidelines were also created in order aid homeowners in maintaining the ecological integrity of the landscape within the boundary of each homesite. While conservation subdivision design is not a new concept it is gaining popularity in our region. In fact, some are abusing the ability to place portions of a property under a conservation easement just to gain state and federal tax incentives with little thought given to natural resource protection. Not only will it be illustrated how a property's key ecological features can be protected and how current innovative stormwater management technologies and habitat improvements can be interwoven into a design, an appropriate process will be identified for the creation of such developments to ensure a site's ecologically sensitive areas are truly being protected.

Controlling the Impacts of Development on Water Quality

Paul Schmierbach, Tennessee Department of Environment and Conservation

Development near the Great Smoky Mountains National Park seems to be accelerating. Vacation homes, rental cabins, timeshares and condominiums spring up daily. The State of Tennessee's 305 (b) Report lists area streams as not meeting water quality criteria for bacteria and siltation.

How do we combat these impacts to improve and preserve water quality in the Park and surrounding areas? Environment and Conservation construction stormwater requirements, local MS4 programs and innovative sewage treatment may be part of the answer.

Green Tourism in Southern Appalachia: Eight Suggestions for Enhancing the Region

Al Fritsch

This talk discusses environmental problem areas where improvement could enhance the regional tourism potential: deteriorating air quality and visibility, auto congestion, stream contamination, visual pollution, recreational

mismanagement, nonrenewable energy production, litter problems, and invasive species proliferation. Information is drawn in part from our currently published book – Eco-tourism in Appalachia: Marketing the Mountains, University Press of Kentucky, 2004.

Suggestions being shared with county and area development agencies include: regional powerplants restrictions, public transportation to the Great Smoky Mountains National Park, water cleanup programs (Pride Projects), billboard alternatives, off-road vehicles registration and policing, small-scale solar/wind energy applications, waste pickup, recycling and container deposits, and systematic removal of invasive species through youth conservation projects.

The Use of Geographic Information Systems and Public Involvement for the North Shore Road Environmental Impact Statement Great Smoky Mountains National Park, North Carolina

Jack Van Dop, Federal Highway Administration

The Federal Highway Administration and the National Park Service are currently conducting an EIS to discharge and satisfy any obligations on the part of the United States that presently exist as the result of a Memorandum of Agreement of October 8, 1943, between the United States Department of the Interior; Tennessee Valley Authority; Swain County, North Carolina; and the State of North Carolina.

In the 1940's, construction of Fontana Dam resulted in the flooding of NC Route 288, leaving over 44,000 acres without access. TVA purchased and transferred this land to Great Smoky Mountains National Park (GRSM). The 1943 Agreement specified that as funds were available, the NPS would construct a new road to replace NC Route 288. The new road, to be built along the northern shore of Fontana Lake, was to extend generally from Bryson City to just west of the Fontana Dam area. Construction of the road began in the 1950's with roughly 7.2 miles completed. The project ended in 1972 after completion of the Lake View Road Tunnel due to environmental concerns and funding issues.

In order to provide the full range of study alternatives and thorough analyses that is required by NEPA, the EIS study area consists of 120,000 acres. Geographic information systems (GIS) technology is being utilized during the analysis process to help identify potential corridors and "hot spots" where impacts to the environment are likely to be the greatest. In addition, due to political pressure, the timeframe for completing the EIS is being expedited. With the use of GIS, the government has been able to provide the public with reasonably available information, while taking a two-phased approach to impacts analyses and alternatives development. This has allowed for an expedited review process.

With more than 4,000 individuals, resource agencies, and interested parties on the mailing list, an extensive public involvement campaign is currently underway, spanning multiple states. Major topics of public concern include geology and soils, water resources, natural resources, socioeconomic conditions, cultural resources, traffic conditions, visitor use and experience, and aesthetic resources. The local heritage, socioeconomic and community features are tightly intertwined with the cultural resources present within the study area. The GRSM is recognized as an International Biosphere Reserve and a World Heritage Site by the United Nations, and offers many optimal and diverse habitats for plant and animal species. This project has become a fierce battle between those committed to acknowledging and sharing the stories of the past with those seeking to preserve the natural and ecological resources for the future.

APPALACHIAN TRAIL ENVIRONMENTAL MONITORING INTERNET COMMUNITY

Wednesday, November 17, 2004

Presenter: John Peine, USGS Southern Appalachian Field Station

The USGS National Biological Information Infrastructure program encourages the use of Communities on the NBII Portal to demonstrate the value and utility of that information system. The Appalachian Trail (AT) Environmental Monitoring Community has been created on that portal. The Appalachian Trail is one of the most recognized trails in the world. The trail transverses 14 states, 8 national forests, 5 national park units and several state forests and parks. There are 400 universities within 100 miles of the AT corridor. There are numerous ongoing localized natural resource inventory and monitoring activities along the Appalachian Trail corridor. The AT Community provides a mechanism to coordinate this activity to create a continental scale environmental Inventory and monitoring transect. The first year of the project has revealed considerable interest in the AT Community among those involved in inventory and monitoring activities. Many would like to put their efforts into a continental context. Capabilities of the AT Community include the following:

1. Primary focus is to facilitate navigating and discussing AT corridor environmental I&M information
2. Post announcements
3. Create a calendar as needed
4. Community and project folders to post documents
5. Manage projects via work tasks and deadlines
6. Facilitate community and project discussions and specific topics within discussions
7. Edit projects and documents
8. Plan meetings
9. Access hierarchy via community manager, project manager, community members and invited users
10. Member and user profiles and subscriptions
11. Email members as needed
12. Search capabilities
13. List hotlinks to priority websites
14. Feedback mechanism

A companion effort by the USGS Mapping Division is to create an on-line data viewer Website on which indicators of environmental indicators are posted. So far there are 62 mapping themes posted. Some initial projects being managed via the AT Community are discussed. For more information, contact John Peine at jpeine@utk.edu

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INVENTORY AND MONITORING INFORMATION SYSTEM FOR MANAGEMENT OF THE ROAN MOUNTAIN MASSIF

Wednesday, November 17, 2004

Session Leader: Carolyn Wells, U.S. Fish and Wildlife Service

This program will discuss an initiative to establish a biological information management system for the Roan Mountain Massif. The initiative addresses a long-standing critical need to establish an information system for geo-referenced biological data that supports the ongoing management activities of the Roan Mountain Massif. The Roan Mountain Massif is a hotspot of endemic, rare, threatened and endangered species in the southern Appalachian Highlands, and is a region of convergence of northern and southern species. However, the precise geographic location and spatial extent of numerous species and communities of conservation concern have not been systematically documented, nor have the precise locations, timing and nature of various management activities conducted across the massif. The methodology developed would be applicable throughout the Appalachian Mountain range.

It is widely recognized that restoration and maintenance of the high elevation grassy balds of the Roan massif will require long term vegetation management to control the invasion of woody plants. There are many partners involved in the stewardship of this remarkable landscape. These partners include the sister DOI bureaus USFWS and NPS, the USDA Forest Service, The Southern Appalachian Highlands Conservancy, The Nature Conservancy, The North Carolina Wildlife Resources Commission, The Tennessee Wildlife Resources Agency, and the NC and TN Natural Heritage programs. The greatest challenge for this initiative is to design an information system that is flexible enough to handle the variety of data being collected and utilized by all of the partners. For more information, contact Carolyn Wells at Carolyn_Wells@fws.gov.

AQUATIC RESOURCES IN A CHANGING LANDSCAPE

Wednesday, November 17, 2004

Session Moderator: Steve Wilson, Tennessee Department of Environment and Conservation

Legacy Effects of Human-induced Disturbance in Southern Appalachian Stream Channels

Martin D. Lafrenz
University of Tennessee; Portland State University

Legacy effects are long-term environmental consequences to ecosystem disturbance events. These disturbance events, which can be either natural or human-induced, are relatively discreet but high magnitude occurrences that severely disrupt the more typical ecosystem processes. Following these disturbance events, ecological conditions may return to a pre-disturbance state; however, the time lag to recovery may span decades or even centuries. I surveyed the stream channel geomorphic condition for 51 streams in Great Smoky Mountains National Park in order to examine the legacy effect of human disturbance that occurred there in the early 20th century. The selected streams drain watersheds representing one of the following conditions: pristine, light or patchy logging, heavily logged, or concentrated settlement. Logging in the park largely ceased over 70 years ago. Yet, most streams that drain previously logged areas remain quite different from pristine streams; hence, the legacy effects are indeed long-lasting. The differences among streams are sometimes predictable but are often counterintuitive; for instance, some disturbed stream channels are narrow and incising rather than wide and filling with sediment as is typically reported. These different long-term responses to disturbance are a function of several other landscape factors including the geology, slope, shape, and aspect of the catchment basin. Recognition of the differences in time to recovery and the nature of stream channel recovery to disturbance should influence decisions regarding the protection of native ecosystems in Southern Appalachia that might be more sensitive to disturbance events. Additionally, this knowledge allows for the detection of more resilient, previously disturbed areas, which may be better candidates for recovery efforts.

The Copper Basin Project: Paths to Reclamation

Dave Turner
Tennessee Department of Environment and Conservation, Division of Water Pollution Control

The Copper Basin is located in southeast corner of Tennessee. The Copper Basin mining, smelting and processing operations was major supplier of iron, copper, zinc and sulfuric acid from 1850's to 1987. The mining and smelting operations caused extreme environmental harm to the land surface and stream water quality. On January 11, 2001, TDEC and EPA, OXY USA Inc. and their corporate affiliate Glenn Springs Holdings, Inc. executed a Memorandum of Understanding (MOU) to work together in a coordinated manner with the common goal of the ultimate environmental remediation and restoration of the Copper Basin.

The remediation continues with projects milestones as Isabella Lead Cap, Isabella Granulated Slag Reclamation, Cantrell Flats Waste Water Treatment, Davis Mill Creek – Belltown Creek Diversion and other actions planned in the near future.

Georeferenced Video Mapping of Mussel Habitat in the Big South Fork National River and Recreation Area

Adam Fiscor and Paul Ayers
The University of Tennessee

The rivers and streams in Big South Fork are home to five endangered species of mussels. Big South Fork also has a wide diversity of aquatic habitats from shallow high gradient

streams to deep low gradient rivers in gorges. Some of these water ways are in pristine condition and others are polluted from surface coal mining in the surrounding area. This pilot project involved video mapping three sections of the river for habitat classification. The three sections of river totaled 27 km and ranged from shallow, upland to deep, lowland characteristic.

Habitat information in this project was gathered with an Underwater Video Mapping System (UVMS). The platform used for UVMS was a canoe equipped with a underwater video camera, an above water video camera, Global Positioning Systems (GPS), and a sonar unit. Attributes such as pool riffle run, substrate components, depth, along with other visual habitat physical characteristics were all gathered using the UVMS. Images from the video were interpreted and used to produce habitat classifications. Other sources of GIS data and river data will assist in the development of GIS maps.

Information from this project will be used by the park for inventorying the habitat characteristics and present conditions of the rivers. This is an effective way of permanently recording and mapping visible physical characteristics in stream and river habitats.

Pigeon River Re-introduction Efforts Update: 2004

Joyce A. Coombs and J. Larry Wilson
University of Tennessee
Jonathon Burr, Tennessee Department of Environment and Conservation,

Since its inception in 2001, the Pigeon River Recovery Project has re-introduced twelve fish species totaling 8,145 individuals as well as substantial numbers of snails and mussels. During the past three years, fish have been collected from tributaries to the Pigeon River, reference streams within the French Broad basin, and from the upper reaches of the Pigeon River itself. To assess survival of relocated species, fluorescent visible implant elastomer (VIE) tags were employed to tag darter species, which were easily observed by snorkelers. Snorkeling surveys conducted during the summer and fall of 2003 covered random transects of 21 sites covering a 22.4 km (13.5 mile) reach of the Pigeon. Gilt darters (*Percina evides*) were located at seven of these sites including tagged, untagged, and young-of the-year; the presence of untagged young-of-year and juveniles indicated successful reproduction. In 2004, re-introductions of four targeted species began in the North Carolina reach: saffron shiner (*Notropis rubricroceus*), mirror shiner (*N. spectrunculus*), telescope shiner (*N. telescopus*) and silver shiner (*N. photogenis*). Snorkeling surveys in 2004 located surviving mussels, thousands of common snails, and the first sighting of a blueside darter (*Etheostoma jessiae*). Tagged and untagged gilt daters were also observed at the re-introduction site and further downstream. An attempt to propagate the tangerine darter (*P. aurantiaca*) at Conservation Fisheries, Inc., began this year with the goal of re-introducing it into North Carolina and Tennessee.

Quantifying and Controlling the Movement of Sediments from Southern Appalachian Forest Roads

J. McFero Grace, USDA Forest Service

Forest road networks are elemental components on the Southern Appalachian landscape. Specifically, road systems on the nation's public lands are a key aspect in maintaining the quality of life in the Southern Appalachians because they provide access for resource management and recreation opportunities. The effect of Southern Appalachian forest road systems on soil erosion and water quality is a major concern of forest managers, residents, and the public. Sediments from forest roads are a concern because these sediments have the potential to reach stream systems. The forest floor (filter strips) has been historically recommended and utilized as a filter of forest road sediments. As a result minimum filter strip width criteria have been incorporated into Best Management Practices (BMPs) for forest roads. However, the effectiveness of filter strips in controlling sediment movement and minimizing the risks of sediment delivery to stream systems have seldom been assessed.

A series of studies were undertaken by the Southern Research Station's Forest Operations Research Unit (SRS-4703) to (1) assess

sediment travel distances downslope of forest roads, (2) characterize the factors influencing these distances, and (3) evaluate alternative sediment control practices. A total of 88 forest road turn-outs sites were randomly selected from National Forest roads in the Southern Appalachians in northeastern Georgia. Visible sediment deposition lengths were measured downslope of the road lead-off ditch structure for each selected site. Characterization of factors influencing sediment travel distances involved measuring deposition width, deposition depth, flow obstructions, downslope gradient, and road characteristics. In addition, a study was initiated in the Southern Appalachians on the Chattahoochee National Forest to evaluate the effectiveness of three road sediment control treatments: settling basins, sediment basin with riser control, and hay bale barriers in reducing sediment export onto the forest floor and filtering sediment laden storm runoff.

Based on the lead-off structures considered in this investigation, observed road lead-off ditch management practices on the Chattahoochee National Forest were consistent with BMP recommendations 90 percent of the time. This is an important finding because sediment travel distances based on this consistency is expected to be minimized. The mean distance, based on visual assessment, that sediment deposition extended downslope for all sites was 19 m. In fact, 88 percent of sediment travel distances were less than 30 meters, which is Georgia's minimum recommended SMZ width for trout streams. Findings of this work indicate that additional investigations need to be undertaken to quantify the influence of steep topographic relief, a common characteristic for Southern Appalachian road systems, on the proportion of sediment deposited on the forest floor in relation to sediments actually delivered to streams. The objective of this presentation is to report the findings of the investigations assessing sediment movement from forest road turn-outs.

NATURAL RESOURCE INVENTORIES IN THE SOUTHERN APPALACHIANS

Thursday, November 18, 2004
Session Moderator:
Becky Nichols, National Park Service, Great Smoky Mountains National Park

Soil Resource Inventory of the Great Smoky Mountains National Park

Anthony Khiel
USDA-Natural Resources Conservation Service

A comprehensive soil resource inventory of the Great Smoky Mountains National Park (GSMNP) has been underway since November 1998 and is slated to be completed in September 2007. This project involves not only mapping the soils of the park, but also includes an extensive effort to generate soil chemical and physical data about these soils. Seventy–two sites have been sampled for chemical and physical properties of the related soils. The two major obstacles to this inventory have been the complexity of the underlying geology and the remote nature of the majority of the GSMNP. Assistance from U.S. Geological Survey has solved most of the problems understanding the geology in the park. A soil/landscape relationship modeling approach was adopted by the field staff in order to apply knowledge of the soils in known areas to the more remote areas of the GSMNP. As a result, 20 newly classified soils have been discovered. Many of these new soils do not occur outside the GSMNP.

Discovering the Diversity of Life in Great Smoky Mountains National Park

Becky Nichols and Keith Langdon, National Park Service, Great Smoky Mountains National Park
Jeannie Hilton, Discover Life in America

Great Smoky Mountains National Park comprises more than 210,000 hectares of rugged, heavily forested mountains in the southern Appalachian range. The floral and faunal communities in the Park are some of the richest and most diverse in the temperate world; however, fewer than 10,000 of an estimated 100,000 species in the Park are known. Gaining a better understanding of natural communities, species distributions, and interactions will provide a critical knowledge base for responding to threats that these resources face, and the need for this type of information, in part, has led to the inception of an All Taxa Biodiversity Inventory (ATBI). This effort, which is the first of its kind, involves inventorying every species of life found within the Park, estimating relative abundances, plotting distributions, and documenting species, community, and habitat associations. Products will include web pages, interactive keys, reference specimens, and protocols applicable to other natural areas. The many benefits of this project include the improvement of Park resource management, tremendous educational opportunities, and hopefully a renewed interest in the field of taxonomy, to name a few. To date, we have discovered over 516 species, mostly invertebrates, that are undescribed.

Fruit Production in Mature and Recently Harvested Upland- and Cove Hardwood Forest of the Southern Appalachians.

Cathryn H. Greenberg, U.S. Forest Service, Bent Creek Experimental Forest
Douglas J. Levey, University of Florida

Fleshy fruit is an important dietary component of many vertebrates, yet little is known about fruit availability or management strategies. Since 1999, we have monitored fleshy fruit abundance monthly in replicated (n = 6-9 per treatment), 0.1 ha plots within both mature and recently harvested (“young”) cove- and upland hardwood forest types. Forty-three species produced fruit during 1999-2002. Production (dry mass of pulp) ranged 570 (mature cove hardwood) to 1,629 (young cove hardwood) g/ha in 1999, and 796 (mature upland hardwood) to13,644 (young upland hardwood)

g/ha in 2002. Total fruit production was highest in harvested treatments after the first year post-harvest, and has remained high. Pokeweed (Phytolacca americana) and blackberry (Rubus spp.) produced fruit only in young stands of both forest types. Pokeweed production peaked 2 and 3 years post-harvest, whereas blackberry (Rubus spp.) increased in young stands starting 3 years postharvest. Huckleberry (Gaylussacia ursina) production was highest in both mature and young upland forest, but varied among years. A few species dominated fruit production, but dominant species varied among treatments. Fruit was available from June through December, but peak availability differed among treatments due to differences in species composition and fruiting phenology. Fruit production and composition are influenced by forest type and age, such that fruit availability shifts among months and years, and across the landscape.

Vegetation Inventory and Analysis in National Park Units of the Southern Appalachians

Marguerite Madden, Center for Remote Sensing and Mapping Science (CRMS)
Department of Geography, The University of Georgia

The Center for Remote Sensing and Mapping Science (CRMS) at The University of Georgia is using a combination of Global Positioning system (GPS) surveys, softcopy photogrammetry and geographic information system (GIS) modeling procedures to map vegetation and produce detailed vegetation databases for National Park lands. Working in conjunction with National Park Service resource managers, overstory vegetation data sets are being developed for 17 National Parks, Preserves, Home Sites and Battlefields in the southeastern United States. As the databases are completed, GIS analysis and modeling procedures are used to demonstrate their utility for assisting in management decisions to protect park resources.

In the case of Great Smoky Mountains National Park (GRSM), detailed overstory and understory vegetation maps/databases were created that provide resource managers with baseline information needed for inventory, monitoring and management tasks. Upon completion of the databases, GIS analyses and 3D perspective visualization of the vegetation databases were conducted to assess terrain characteristics associated with forest and shrub communities identified on the aerial photographs. Further calculations of landscape metrics such as patch and polygon statistics, edge and shape measurements provided evidence of individual interpreter differences vs. the effects of human influence on the vegetation patterns in the landscape. These analysis techniques also are being used to assess the distribution of hemlock in GRSM and the possibility of modeling hemlock susceptibility to the exotic hemlock woolly adelgid.

Digital Mapping of Invasive and Endangered Plant Species

Christopher D. Butler, Paul D. Ayers, University of Tennessee

The Obed Wild and Scenic River (OBRI) is a recreational park and ecological refuge located on the Tennessee Cumberland Plateau in Cumberland and Morgan counties. The objectives of the project is to identify 14 invasive, threatened and endangered plant species located in the park, and create a digital map to be used in the relocation of plant species. Thousands of new invasive plant species are introduced in the United States each year, causing detrimental effects to native plant species and millions of dollars in environmental, economic, and health related expenses. The main concern of the invasive species is the ability of them to rapidly reproduce and out-compete native plants for light, air, water, and land. The OBRI has a diverse population of the plant species including three endangered (Cumberland Rosemary, Little Brown Jug, and Barbara's Buttons), one threatened (Virginia Spirea), and ten invasive species (Silk Tree Mimosa, Autumn Olive, Chinese Lespedeza, Crown Vetch, Japanese Honeysuckle, Japanese Stilt Grass, Multiflora Rose, Air Potato, The Stinging Nettle, and Whitestar). The major outbreaks of invasive, endangered, and threatened plants occurred at the river access points, which accounted for 62% of the plants located during the survey. The findings of the

survey demonstrate the massive outbreak of invasive, endangered, and threatened plants along the riverbanks and islands located throughout the OBRI.

The methodology of the project consisted of a plant identifier and a GPS technician surveying 50 meters from the riverbank from Barnett Bridge to Jett Bridge. The plant identifier located the invasive and endangered plant species, recorded visual images of the plants and surrounding landmarks, and performed eradication where possible. The GPS technician recorded UTM coordinates, number of plant species, abundance of plants, estimated plant coverage, and species eradication. The fieldwork data was exported into an ArcGIS database where the data is displayed on a digital map, which includes the pictures and properties of each identified plant site. The file is to be used by the National Park Service to identify invasive and endangered plant species and to create a proposed plan of eradication. Using the ArcGIS digital map on a handheld PDA and GPS receiver, park rangers will be able to plan, locate, and eradicate invasive plant species while working in the field.

Web Applications for Empowering Community Monitoring in Southern Appalachia

Pamela J. Nabors, NBII-SAIN/TVA
Team Member Contributors:
Brandon League, Wolf Naegeli,
Farial Shahnaz, Jeremy Floyd, Robb Turner,
Franciel Azpurua-Linares, Shelaine Curd-Hetrick

The mission of the National Biological Information Infrastructure (NBII) is to provide increased access to data and information on our nation's biological resources. The NBII network is being developed through regional and thematic web-based 'nodes.' Our region is fortunate enough to have one of these regional nodes – namely the Southern Appalachian Information Node (SAIN). The NBII Southern Appalachian Information Node (SAIN) facilitates partnerships and creates applications that improve information exchange for research, education, and environmental decision-making in the Southern Appalachian region. (Visit http://www.nbii.gov for more information about NBII. Visit http://sain.nbii.gov for more information about SAIN.)

This presentation introduces web-based information products created by NBII-SAIN for the SAMAB Southern Appalachian Volunteer Environmental Monitoring (SAVEM) program. These web applications include data entry forms, tabular reporting, and static and interactive maps. The presenter will show the audience how to use these new on-line resources for invasive plant and aquatic monitoring and discuss plans for additional capability.

Applying the National Vegetation Classification to National Parks in the Southern Appalachians.

Rickie White, NatureServe

The National Vegetation Classification is the federal standard for plant community inventories and is now being used throughout the United States on federal public lands to classify and map community types according to their vegetation composition. These community types, in turn, are used by managers to create vegetation maps of land units and have been used successfully to prioritize management, better understand what areas are in need of changes in management, and to look at how threats such as the hemlock woolly adelgid might impact the forest in the future. I intend to present a details look at the National Vegetation Classification and discuss how it has been applied in the Great Smokies, Carl Sandburg Home National Historic Site, and a handful of other small, medium, and large parks in the southern Appalachians.

Basin-wide Evaluation of Potential Endangered Species Impacts for the TVA Reservoir Operations Study

John Baxter, TVA Regional Natural Heritage Project

The Tennessee Valley Authority has been collecting, managing, and using occurrence information concerning Federal- and state-listed species (and other rare or unique resources) for more than 30 years. In recent years, this information has been stored in a Regional

Natural Heritage database that is compatible with similar databases maintained by many state Heritage projects. This over 30,000-entry database is made available to staff as an on-line Geographic Information System (GIS) that was developed by TVA. This database is used routinely to supply occurrence information for site-specific environmental reviews of TVA and other projects.

When TVA decided to review how it operates the entire system of dams and reservoirs (TVA's Reservoir Operations Study), the information available in the Natural Heritage database was used in a new and extremely effective way. The GIS format provided the capability to identify Federal- and state-listed species known to occur within specified distances around parts and/or all of the regulated river system. Other available GIS tools allowed further sorting of the data by occurrence date and taxonomic group. These tools helped to quickly identify how many and which listed species were known from each part of the river system. These results also helped identify specific habitat characteristics that could be used to compare effects of several alternative operating strategies. The GIS analysis of the Natural Heritage data provided TVA with clear, factual data and analysis results that were easily understood by the public and Federal and state resource agencies. Continuing improvements in database storage and analysis capabilities should make this type of analysis available to a wider variety of agencies and projects in the future.

ENGAGING STAKEHOLDERS IN RESOURCE CONSERVATION

Thursday, November 18, 2004
Session Moderator:
Tisha Calabrese-Benton, Tennessee Department of Environment and Conservation

The French Broad River Conservation Corridor
Karen Nolt, Knox County Parks and Recreation

The French Broad River Conservation Corridor is a model, multiuse open space corridor to conserve, protect and enhance the natural beauty, rural heritage, wildlife habitat, and outdoor recreation on and around the French Broad River in Knox County, TN.

As this is a highly scenic rural area, the presentation focuses mainly on the visual attributes of the river corridor including historic and archeological, habitat protection, natural resource management, working farms, water resources, recreation, riparian buffer conditions, scenic vistas and natural areas.

The benefits of open space protection are briefly covered and the five functional categories of open space are identified and mapped as 1) Natural Resource Protection, 2) Natural Resource Management, 3) Public Health and Safety, 4) Recreation, and 5) Character of a Place.

The diverse partners that have collaborated on this project are celebrated, and the recent conservation easement on a 425-acre farm, which was celebrated Sept. 8th as Cruze Dairy Farm Forever, will be highlighted. The future of this project will be outlined, as well as ways that other organizations can support and nurture this regionally significant river corridor.

Visitor Surveys on the Blue Ridge Parkway: Implications for Resource Managers in the Southern Appalachian Region
Leah Greden Mathews, University of North Carolina – Asheville

Over the last five years, two surveys have been conducted with over 1000 visitors to the Blue Ridge Parkway in southwest Virginia and North Carolina as part of the Scenic Experience Project. The surveys asked visitors about their visitation behaviors and expenditures, including changes to those behaviors and expenditures that would occur if scenic quality along the Parkway changed (presented at SAMAB 2003). Additional components of the survey asked respondents to indicate their preferences for park characteristics and other features. This presentation will outline the general findings of the two phases of the study, with special emphasis on the take-home messages that have implications for resource managers responsible for land management and air quality in the Southern Appalachian region.

Youth Banding Birds in Great Smoky Mountains National Park
Charlie Muise
Great Smoky Mountains Institute at Tremont

The problem of declining songbird populations has received attention since the 1960's. While the process of uniquely marking birds with leg bands in order to study populations has been used extensively, bird banding has traditionally been conducted during migration. One shortcoming of migration banding is that it is not possible to correspond declines with breeding locations.

In 2000 Great Smoky Mountains Institute at Tremont joined the Monitoring Avian Productivity and Survivorship (MAPS) bird-banding network. MAPS banding stations around North America are active during the breeding season, so changes in bird populations can be corresponded to different breeding regions.

While professionals with significant banding experience supervise this project at Tremont, students at the college, high school and even middle school level conduct much of the hands-on work. Benefits of student involvement include training of potential future scientists and

increased community knowledge and understanding of the need of the program. Students benefit by receiving hands-on training, learning about the scientific process and the opportunity to "test drive" a potential career choice.

We now have five years of data on breeding bird populations at a low-elevation site on the west side of Great Smoky Mountains National Park. Although this station handles a smaller than average number of birds per season, we have caught perhaps more Louisiana Waterthrushes than any other station. We also collect enco- and ectoparasites from them for the All Taxa Biodiversity Inventory.

The RTCAR Initiative: Building the Bridges between Cultural and Environmental Preservation

David Cozzo, Western Carolina University

The Revitalization of Traditional Cherokee Artisan Resources Initiative is a grant funding initiative that was established as a means to teach, protect, and promote Cherokee traditional art, resources, and land care for future generations. One goal of the RTCAR Initiative is to generate collaborative engagement between regional stakeholders and the Eastern Band of the Cherokee Indians to preserve or re-establish culturally significant resources, many of which have become scarce due to increasingly restricted access or habitat alteration. Resources of initial concern include the basket materials river cane (Arundinaria gigantea) and white oak (Quercus alba), dye plants such as bloodroot (Sanguinaria canadensis) and yellowroot (Xanthorhiza simplicissima), quality clay for potters, and wood or stone for carvers. The project will eventually expand to include culturally significant edible and medicinal plant resources. The RTCAR Initiative is seeking partners for habitat restoration projects and research on sustainable harvesting techniques that would guarantee Cherokee artisans access to resources and insure the future of Cherokee traditional arts.

People, Places, and Cultural Diversity in the Natural Environment

Rebecca Vial, Great Smoky Mountains National Park

The Great Smoky Mountains is one of the most diverse biological areas in the United States. In the 21st century, no place on earth today is unknown or unaffected by man. Just as I believe that Columbus was not the first white man in North America, so also do I believe that everywhere on this planet has to deal with human contact and influence. How we handle this contact and how we make this story a part of the natural setting without ignoring the cultural setting is the theme of this paper.

When the restoration of grasslands, reintroduction of species, and the introduction and removal of exotics is discussed, we must include the people who had an impact on the area.

Volunteer Stream Monitoring - a cooperative effort between non-profits, NC DENR and the citizens of NC

Gracia O'Neill, Clean Water for North Carolina
Jason Robinson, Kanugalihi Biological Consulting

The SMIE (Stream Monitoring Information Exchange) formed about a year and a half ago, and has worked to increase public involvement in, and knowledge of, their local waterways, as well as to increase collaboration between local citizens, local and regional organizations and NC DENR (North Carolina Department of Environment and Natural Resources). SMIE has developed and begun testing a volunteer biological (benthic macroinvertebrates) monitoring protocol that will provide more precision in evaluating water quality than biological citizen monitoring methods that are already in use (such as Izaak Walton League), while being accessible to non-technical volunteers who have participated in a one-day training.

In developing the protocol, SMIE has incorporated feedback from NC DENR, and NC DENR's Biological Assessment Unit believes they can use our volunteer-collected data as a "red flag" for field technicians. In addition, SMIE is also working to centralize volunteer-

gathered data, and to make that data easily accessible to multiple user groups (NC DENR, educators, homeowners, land-use planners, recreationists, etc.) via the web.

Our near-term goal is to help pull together small groups of people in various locations throughout 3 counties in NC to engage in monitoring activities on a regular basis (at least 3 times per year). Through engaging in regular monitoring of rivers and streams, citizens will participate in identification of local water quality trends and problems. Participation in this project will raise the water quality awareness and expectations of participants, and improve identification of problems, causes, and specific strategies to improve the quality of WNC waters. Our hope is that these citizen monitoring groups will be a focal point for community interaction, promote a sense of stewardship of local waterways, and empower citizens to protect the quality of our mountain rivers and streams.

FIELD TRIPS

Thursday, November 18, 2004

Compatability of Wildlife Habitat, Water Quality, and Agricultural Production on a Livestock Farm

Tony Sexton and Jenny Adkins
Natural Resources Conservation Service, Tennessee

A farm tour and open discussion will be held on the compatibility and economic gains of wildlife and water quality on a livestock farm. The beef cattle farm is located in picturesque Wear Valley, Sevier County, TN. The tour will demonstrate and provide information on agricultural practices and financial assistance that are typically promoted on livestock farms across the Southeast. These practices protect and improve water quality, wildlife habitat, and agricultural production.
See examples and learn the conservation value of

- Stream crossing (development),
- Cattle exclusion ,
- Riparian buffer,
- High tensile electric fence,
- Spring development/Alternative livestock watering facilities, and
- Rotational grazing

HWA Control Methods Used in the Great Smoky Mountains National Park

Tom Ramaley, National Park Service, Great Smoky Mountains National Park
Ernie Bernard, University of Tennessee

Discuss hemlock woolly adelgid control efforts in the Great Smoky Mountains National Park, and see the equipment used in control efforts. Also, visit the University of Tennessee's biocontrol lab where *Pseudoscymnus tsguae* beetles are raised for biocontrol efforts in the park.

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