Forest Botanical Products

Program of Work

Maintaining Sustainability and Responding to Socio-Economic Needs in the Southern Appalachians

PROGRAM OF WORK

Forest Botanical[1] Products: Maintaining Sustainability and Responding to Socio-economic Needs in the Southern Appalachians

[1] **any naturally occurring mushroom, fungi, flowers, seeds, roots, bark, leaves, and other vegetation (or a portion thereof) that grows on National Forest System lands. The term does not include trees except as provided in regulations by the Secretary of Agriculture**.

TABLE OF CONTENTS

[1] Funded projects for 2000-2001

INTRODUCTION

During the past 20 years there has been a significant change in the forest botanical products market. Previous collections of forest botanicals, with the exception of ginseng, were primarily for personal use. The level of harvest was limited by local population density and access to suitable harvest sites. Today the trend is toward collection for rapidly expanding commercial markets away from the areas of harvest. At least 175 species of plants native to North America are currently sold in the non-prescription medicinal market in the United States; and more than 140 medicinal herbs native to North America have been documented in herbal products and phytomedicines in foreign countries (Robbins 1999). Approximately half of the 175 species occur within the Southern Appalachians. Increased access to once remote portions of public land in this area and the demand for such a large variety of products has led to levels of collection that may not be sustainable. Recent monitoring of forest botanical products in the wild have substantiated previous anecdotal evidence that populations of several species are sparse and declining.

The recent act of the One Hundred Sixth Congress details a Pilot Program of Charges and Fees for Harvest of Forest Botanical Products and makes it essential that National Forests understand more about the value and sustainability of species sold as a forest botanical product. This act requires that Forests "collect not less than the fair market value for forest botanical products harvested" on the lands they manage and that Forests "shall establish appraisal methods and bidding procedures to ensure that the amounts collected for forest botanical products are not less than the fair market value". It further states that Forests "shall conduct appropriate analyses to determine whether and how the harvest of forest botanical products on National Forest System lands can be conducted on a sustainable basis" and clearly instructs Forests to "not permit...the harvest of forest botanical products at levels in excess of sustainable harvest levels".

For more information: Contact Gary Kauffman, botanist for the National Forests in North Carolina, at garykauffman@earthlink.net or call 828-526-3765.

PROGRAM EMPHASIS AND DESIGN

This program will improve our understanding of those ecological and socio-economic processes that influence the production and harvest of forest botanical products. It will provide land managers in the Southern Appalachians. with inventories, identify trends in demand for products, quantify harvest effects, and identify possible methods to enhance production. It will also define the process and information needed to gain this knowledge in other sub-regions. With this knowledge, land managers will be able to enhance opportunities for sustaining both human and environmental systems where forest botanical products are harvested. Overall, this program will complement ongoing goals to manage temperate landscapes for diversity, resilience, and sustained productivity.

This program will promote projects that collect and synthesize information on the **sustainability** of forest botanical product harvests. We will use 5 major focus areas to address sustainability:

- product demand,
- product supply and productivity,
- management,
- socioeconomic needs, and
- education.

We will collaborate with research units, universities, other federal and state resource management agencies, and local conservation groups to address these five general areas. Projects within these focus areas will:

- address current demand and future trends for products at the local, regional, and national level using permit numbers and distributor sales to determine price and quantity of products,

- evaluate product supply and productivity through habitat models to determine species distribution, experimental harvests to determine recovery rates for the more abundant species (Fraser fir, log moss, galax), and landscape-level monitoring of wildland populations to determine harvest effects due to collection pressure for the least abundant species (ginseng, ramps),

- evaluate management policies by reviewing Land and Resource Management Plans in the Southern Appalachians and recommend consistent standards and guidelines, complete conservation assessments for species used as a forest botanical products, evaluate the feasibility of restoring degraded Southern Appalachian coves to productive medicinal plant communities, evaluate the feasibility of cultivating important medicinal plants on private land, and complete a monitoring plot design for adaptive management of forest botanical products,

- describe the demographics of collectors and distributors, and complete an economic diversity and dependency analysis for the Southern Appalachians,

- produce a variety of educational tools to promote the wise-use of forest botanical products including powerpoint presentations and brochures, and field management guides for the most important species.

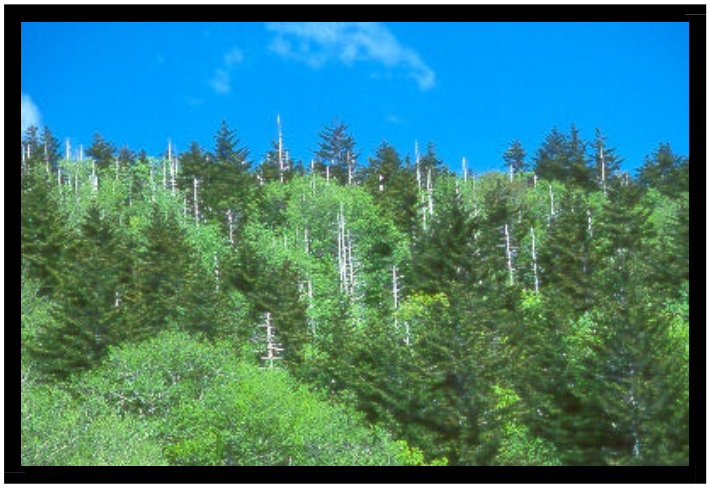
Primary emphasis will be given to those species considered most vulnerable to over-harvest and those with the highest demand as measured by permit volume. On the National Forests in North Carolina, at least 50 plant species are sold as forest botanical products using a free-use or paid permit system. The more common species are listed within their product category in Table 1. Species that will be addressed in this program are noted with an asterisk (*). They include black cohosh, ginseng, bloodroot, bethroot, ramps, galax, log mosses, Fraser fir, mountain laurel, rhododendron, and azalea.

This document describes projects that we feel are necessary to adequately address the issue of forest botanical product sustainability in the Southern Appalachians. Included with the project descriptions are the names of the principal contributors. For projects that are currently unfunded in 2000-2001, we have identified potential contributors that are experts in their field and that we feel could add the most to these efforts.

Table 1: Forest Botanical Products sold in the Southern Appalachians. Species that will be addressed in this program are noted with an asterisk (*).

Product	Common Name	Scientific Name	Pro-
Medicinals	Black Cohosh	*Actaea racemosa*	*
	Maidenhair Fern	*Adiantum peltatum*	
	Star Grass	*Aletris farinosa*	
	Mountain Angelica	*Angelica triquinata*	
	WildSarsparilla & Spikenard	*Aralia nudicaulis & Aralia racemosa*	
	Wild Ginger	*Asarum canadensis*	
	Butterfly Weed	*Asclepias tuberosa*	
	Wild Indigo	*Baptisia tinctoria*	
	Blue Cohosh	*Caulophyllum thalictroides*	
	Star Grub	*Chamelirium luteum*	
	Pipsissewa	*Chimaphila umbellata*	
	Stone Root	*Collinsonia canadensis*	
	Hawthorn	*Crategus spp.*	
	Wild Yam	*Dioscorea quaternata*	
	Striped Gentian	*Gentiana villosa*	
	Witch Hazel	*Hamamelis virginiana*	
	Hepatica	*Hepatica acutiloba*	
	Wood Nettle	*Laportea canadensis*	
	Indian Tobacco	*Lobelia inflata*	
	Partridge Berry	*Mitchella repens*	
	Bee Balm & Bergamot	*Monarda didyma & Monarda fistulosa*	
	Ginseng	*Panax quinquefolius*	*
	Mayapple & Bowman's Root	*Podophyllum peltatum & Porteranthus trifoliatus*	
	Red Raspberry	*Rubus idaeus*	
	Elderberry	*Sambucus canadensis*	
	Bloodroot	*Sanguinaria canadensis*	*
	Sassafras	*Sassafras albidium*	
	Maddog Skullcap	*Scutellaria integrifolia*	
	Goldenrod	*Solidago spp*	
	Bethroot	*Trillium erectum*	*
	Slippery Elm	*Ulmus rubra*	
	Yellowroot	*Xanthoriza simplicissima*	
Edible plants	Ramps	*Allium tricoccum, Allium burdickii*	*
Floral plants	Smokevine	*Aristolochia macrophylla*	
	Bittersweet	*Celastrus scandens*	
	Galax	*Galax urceolata*	*
	Log mosses	*Hypnum curvifolium, H. imponens, Thuidium*	*
	Laurel Leaves	*Kalmia latifolia*	
	Ground-Pine, Running Cedar	*Lycopdium obscurum, Diphasiastrum digitatum*	
	Christmas Ferns	*Polystichum acrostichoides*	
	Grapevine	*Vitis spp.*	
Ornamentals	Fraser Fir	*Abies fraseri*	*
	Mountain Laurel & Azalea	*Kalmia latifolia & Rhododendron*	*
	Doghobble	*Leucothoe fontansiana*	
	Rhododendron	*Rhododendron maximum, R. minus*	
	Hemlock	*Tsuga canadensis*	

Diverse Forest Products



Fraser Fir: 150-200 Permits/Year
Regional sensitive species that provides unique habitat for other rare plants and animals

Log Moss: 15-20 Tons/Year
A plant community that provides habitat structure for small animals and other associated species

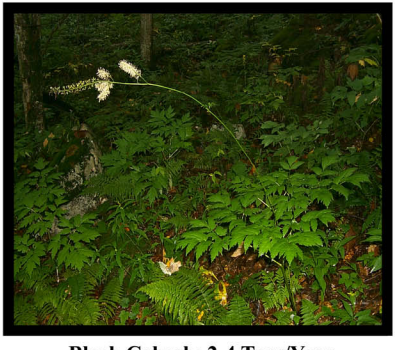
Ramps: 1000+ Free Use Collections
Spring ramp festivals are a part of local culture, but annual harvest may exceed rate of recovery

Mt Laurel: 15,000 Plants/Year
These collections result in loss of topsoil which may impact site productivity

Medicinal Plant Collections

Bloodroot: 1-2 Tons/Year
Annual harvest may exceed rate of recovery

Ginseng: 400-600 Permits/Year
Studies indicate viability concerns with continued harvest of this uncommon species



Black Cohosh: 2-4 Tons/Year
Medicinal herbwith greatest increase in recent collections

Bethroot: 10-20 Permits/Year
Demand projected to increase

Approximate
TIMELINES

---------- *YEAR 1* ----------						---------- *YEAR 2* ----------					
Jan.	**Mar.**	**May**	**July**	**Sept.**	**Nov.**	**Jan.**	**Mar.**	**May**	**July**	**Sept.**	**Nov.**
2000	**2000**	**2000**	**2000**	**2000**	**2000**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**

Product Demand

(1A) NFsNC permits-►

(1B) S. Appalachian permit trends----►

(1C)Regional trends in demand----------►

Product Supply

(2A) Product distribution, habitat modeling------►

(2B)Experimental harvest: fraser fir, moss, galax----------►

(2C) Ramp population harvest pressure----------►

(2D) Ginseng population harvest pressure----------►

(2E)Ecology of species----------►

Management

(3A) Cove restoration----------►

(3B) Conservation strategies--►

(3C) Land mgmt. plans----------►

(3D) Monitoring design and remeasurements----------►

(3E) Effects of burning -------►

(3F) Cultivation of medicinals----------►

(3G) MOU between agencies ----------►

(3H) Indirect effects of Moss collection ----------►

Socioeconomic

(4A)Demographics of collectors ----------►

(4B) Economic diversity/dependency analysis--►

Education

(5A) Powerpoint presentation, information sharing-----►

(5B) Management guides ----------►

(1A) Price and Quantity of Permits Issued for Forest Botanical Products on the Nantahala and Pisgah National Forests: 1988 to 2000 (<u>funded</u>)

Gary L. Kauffman[1], Steven A. Simon[2]

ABSTRACT

Knowledge of the demand for forest botanical products is critical, and along with supply, a necessary factor for evaluating levels of sustainable harvest. The price and quantity of permits issued for product collection is one measure of demand. However, permits may represent the minimum amount of harvest because permits are often illegally exceeded and other poaching is known to occur. Still, they represent what is currently known about local demand and can be used to evaluate trends through time.

We will determine the current trends for forest botanical product demand on the Nantahala and Pisgah National Forests by evaluating all permits issued between 1988 and the year 2000 on seven Districts (note: see 1B for all Southern Appalachian Forests). Data for the period 1988 to 1992 has been compiled and analyzed and a database created that includes 45 products or product groups, price, and quantity. We have nearly completed the compilation of data for the period 1993 to 2000

A complete list of all the permitted forest botanical products will be compiled as well as the number of individual collectors per product. We will analyze price fluctuations in individual permits and total yearly costs and benefits to the Forest. Separate analyses of native and non-native species will be conducted. The analysis will detail any significant change in product collection locations (by district and Landtype Association).

<u>Timeline</u>

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

data collection---►analysis----►
complete reports-----►

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 28801

(1B) Long-term Trends in Price and Quantity of Permits Issued for Forest Botanical Products in the Southern Appalachians (unfunded)

Gary L. Kauffman[1], Mark Pistrang[2]

ABSTRACT

The Nantahala and Pisgah National Forests in North Carolina are representative of the variety of forests found throughout the Southern Appalachians and therefore the variety of plant species found in this subregion. It may also follow that demand for forest botanical products in North Carolina is representative of demand throughout the subregion given the similarity in species, disturbance history, and culture. Still, a more accurate assessment of this demand would include information from all National Forests found in the subregion.

We will determine the current trends for forest botanical product demand in the Southern Appalachians by evaluating all permits issued on the Chattahooche, Sumter, Cherokee, and the Talladega District of the National Forests in Alabama between 1988 and the year 2000. We will create a database compatible with the Nantahala and Pisgah Forests database.

A complete list of all the permitted forest botanical products will be compiled as well as the number of individual collectors per product. We will analyze price fluctuations in individual permits and total yearly costs and benefits to the Forest. Separate analyses of native and non-native species will be conducted. The analysis will detail any significant change in product collection locations (by district and Landtype Association).

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

data collection---►analysis----►

complete reports-----►

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Botany Program, Cherokee National Forest, Cleveland, TN 37320

(1C) Regional Trends in Demand for Forest Botanical Products at the Wholesale, Retail, and Secondary Manufacturing Levels (unfunded)

Jim Chamberlain[1] and Gary Kauffman[2]

ABSTRACT

The market for medicinal herbs is international and demand is expanding worldwide at a rapid rate. It is estimated that over 40% of prescription drugs in the U.S. contain at least one ingredient derived from nature (Foster & Duke 1990). While many of these ingredients now have synthetic derivatives, in European and Far Eastern markets the emphasis is on the whole natural product. Demand is expected to rise given the purported health benefits of many of these native species, and in America, to increase dramatically as consumers age and become more concerned with their health.

Many of the products used in herbal medicines that are sold abroad come from North America. At least 175 species of plants native to North America are currently sold in the non-prescription medicinal market in the United States; and more than 140 medicinal herbs native to North America have been documented in herbal products and phytomedicines in foreign countries (Robbins 1999). Increasing demand for medicinal herbs grown in the wild could significantly impact species populations and natural plant communities in the Southern Appalachians. Approximately half of the 175 species sold occur within the mountains of North Carolina. Recent collections within the National Forests in North Carolina have concentrated on bloodroot (*Sanguinaria canadensis*) and black cohosh (*Cimicifuga racemosa*). In addition to these two species, wild yam (*Dioscorea villosa*), bethroot (*Trillium erectum*), devil's bit (*Chamelirium luteum*), and stargrass (*Aletris farinosa*) are all projected to have increased collection pressures in the future (Edward Fletcher, Wilcox Herbs cultivation manager, pers. comm.).

Relating the increase in product demand to harvest amounts can be difficult because wildcrafters, (commercial collectors), are very secretive about quantities being collected and their collection sites. One method of estimating demand on public land is by analyzing the number of permits for each product. It is likely, however, that the amount of collected materials purchased on National Forests, where production rates are highest, may not reflect the actual amount of product that reaches the market. For example, in 1998, there were 5,190 pounds of dried ginseng sold to dealers in the 17 counties within western North Carolina. This represents approximately 15,500 pounds wet weight or 15,500 permits (each USFS ginseng permit allows collection of 1 pound wet weight). USFS ownership averages 22% within these counties and therefore 3,426 of the permits would have proportionately come from USFS lands. In 1998, however, only 515 USFS ginseng permits were purchased.

In order to more reliably estimate forest botanical product extraction on the National Forest's in North Carolina we will analyze regional trends in demand from wholesale distributors, retail distributors, and secondary manufacturers and compare this with known sources and distribution of each product. For example, between 300,000 and 500,000 dried pounds of black cohosh was traded last year within the United States, all of which came from wildcrafting sources since there are no significant cultivation sources for this species in the medicinal market (Boetsch, 2000). By comparing the total amount of product that reaches the market to the amount of land capable of supporting these species we hope to determine the source of product collection and the likely trends in the future.

Timeline

Jan. 2000	Mar. 2000	May 2000	July 2000	Sept. 2000	Nov. 2000	Jan. 2001	Mar. 2001	May 2001	July 2001	Sept. 2001	Nov. 2001

complete report----------►

[1] Integrated Life Cycle of Wood: Tree Quality, Processing, and Recycling (4702), Virginia Polytechnic Institute and State University, Blacksburg, VA.
[2] Botany Program, Nantahala National Forest, Highlands, NC 28741

(2A) Forest Botanical Product Distribution, Abundance and Habitat Modeling in the Southern Appalachians (<u>funded</u>)

Steven A. Simon[1], Gary L. Kauffman[2], and
W. Henry McNab[3]

ABSTRACT

Understanding the distribution of forest botanical products is the first step in developing management strategies for sustainable harvests. Although abundance may vary according to collection pressure, most plant species sold as a special forest product are associated with specific habitats. Determining site suitability and assessing landscape pattern will strengthen our understanding of the relationship between species presence and absence, and physical and biological site variables.

We will use species composition and abundance data from an extensive network of permanent field monitoring sites for the habitat modeling. The Southern Appalachian dataset is the culmination of over 20 years of field work by various ecologists and includes detailed information from over 2000 locations. Multiple logistic regression will be used to develop a model of the probability of occurrence of different forest botanical products as a function of continuous and discrete physical variables, e.g. elevation, aspect, slope, site exposure (landform index), slope position, solar radiation, average annual precipitation, and geology. These variables will be used to indirectly assess species ecological amplitude in the Southern Appalachians where plant species are distributed along gradients controlled by temperature, moisture, and fertility. We will model the following species or species groups: ginseng and other medicinal species/mixed mesophytic coves, ramps, galax, and log mosses. A raster-based Geographic Information System will be used to apply the distribution models to Western North Carolina.

Two approaches to habitat model validation will be used: a 10-fold validation by repeatedly developing the model based on 90 percent of the data and testing it with the remaining 10 percent, and stratified random field sampling of model-predicted low, medium, and high probability of occurrence sites away from the original data collection areas. Habitat models will be refined using data collected during field validation and will be linked to ecological units (landtype associations, landtypes, and landtype phases).

<u>Timeline</u>

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

develop terrain models--►
develop species habitat models --► ***field validation ---------► refine models ---------►***
complete species distribution maps --►

[1]Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 28801
[2]Botany Program, Nantahala National Forest, Highlands, NC 28741
[3]Ecology and Management of Southern Appalachian Hardwood Forests, Bent Creek Experimental Forest, Asheville, NC 28806

(2B) Experimental Harvest of Fraser-Fir, Log Moss, and Galax: Determining Growth and Yield (funded)

ABSTRACT

Fraser Fir David L. White and Joan L. Walker[1]

During the 1970's and 1980's, a thriving Fraser fir *(Abies fraseri)* Christmas tree market was established in the North Carolina Mountains. Much of the original propagation material, seedlings and cones, came from a large, relatively healthy Fraser fir population on Roan Mountain in North Carolina. There is now some concern that the historic levels of seedling and cone collection may not be sustainable.

Fraser fir is a southern Appalachian narrow endemic confined to the North Carolina, Tennessee, and Virginia mountains (Weakley 1998). It is only found in high elevation forests above 5,000 feet elevation. Fraser fir is considered a Regional Forester's (R8) sensitive species because of the continued decline of mature trees. Mature trees of this species are threatened by an exotic insect, the balsam wooly adelgid, and typically die within 2-7 years following infestation (Nicholas et al. 1992). The species is able to survive because mature trees are able to regenerate sites before individuals die. Seedling harvest has been justified for this reason and because seedling harvest is allowed only in size classes that would otherwise be lost to high natural mortality in undisturbed populations.

We will determine if the rate of collection in small seedling size classes is greater than the natural death rate and if there is any effect on larger size classes with this harvest. A pilot study on detecting change within Fraser fir seedlings on Roan Mountain is being initiated in 2000. Permanent transects with randomly selected plots will be installed within adjacent collected and uncollected management areas on the south face of Roan Mountain. Counts of seedling size classes and an assessment of stand structure will be collected within each plot.

Log Moss Gary L. Kauffman[2], Dave Danley[3], Steven A. Simon[4]

Log moss has been harvested within the mountains of North Carolina for the past 25-35 years (Tim Southard, Wayah Ranger District TMA, pers. comm.). Little information is available regarding the growth rates of log mosses except from a small harvest study of log moss initiated in 1991 on the Nantahala NF. In that study, log moss was monitored at the 2 ½ and 6 year interval following an initial experimental harvest of moss from logs in 5 different locations. Moss recovery was slow on all logs and estimated to be between 20-30 years for areas stripped clean of moss. But it took half that time when islands of unharvested zones were left on the log during the initial harvest (Kauffman & Lea 1997). With this slow rate of growth, it is uncertain if the logs can continue to serve as moss nurseries as they continue to decay (Smith, pers. comm.).

Log or sheet moss, used in the floral industry in the Southern Appalachians, includes three species; *Hypnum curvifolium*, *H. imponens*, and *Thuidium delicatium*. These species are common within the southern Appalachians and the eastern United States. Sufficient quantities of moss that provide an economic harvest occur primarily in concave basins or east and north-facing protected slopes (Anderson & Crum 1981, Dr. D.K. Smith & Dr. Paul Davison, pers. comm.).

We will determine the recovery rate of log mosses on different size classes of logs. The project will establish a series of permanent plots with either complete (typical collector methodology) or partial log moss harvest. Harvest and control plots will be randomly placed across a uniform small watershed. Plots will be stratified based on a range of log size and decay classes. The number of plots will be based on the variability of log moss coverage within each log size class. Within each plot (log), the moss coverage will be measured for length, width and depth. A photopoint will be established at each plot. A remeasurement will be completed the second year and then every 2-3 years until complete recolonization occurs in the harvested plots (or 10 years, whichever comes first).

(2B) Experimental Harvest of Fraser-Fir, Log Moss, and Galax: Determining Growth and Yield (continued)

Galax Gary L. Kauffman[2], Dave Danley[3], Steven A. Simon[4], W. Henry McNab[5]

"Galax-pulling", the stripping of leaves for the floral industry, is an important folk industry in the Southern Appalachian mountains. Since 1988, more permits have been sold for Galax (*Galax urceolata*) than for all other forest botanical products on the Nantahala and Pisgah National Forests. Furthermore, there has been a dramatic increase in the number of Galax permits during the past 5 years and an influx of new "Galax pullers" that may not be using traditional methods of low-impact harvest. As a consequence, traditional Galax collecting areas have been stripped of larger marketable leaves and demand for new collection sites is rising. Currently there are concerns that patches of Galax in traditional collection areas are being stripped of larger harvest-sized leaves faster than they are being replaced and that continued harvest may not be sustainable across the landscape.

Galax is one of the most common herbaceous plants found on the Pisgah and Nantahala National Forests. It is also common throughout its range from West Virginia to the southern most edge of the southern Appalachians (Weakley 1998, Kartesz 1999). It occurs most frequently in pine-oak/heath forest, scarlet oak-chestnut oak forest and acidic cove forest (Schafale & Weakley 1990).

We will establish long-term monitoring plots and impose experimental harvest levels to determine productivity and rates of recovery. Permanent plots will be installed in various Galax patch densities and sizes to test if patch size affects recovery rates. Belt transects will be established across the selected Galax populations with harvested or unharvested treatment types randomly selected along each transect. Within each plot, total stem counts of leaves greater than and less than 3 inches diameter will be tallied. A reevaluation of the number of plots will be determined the second year following the examination of the year-to-year variability in the undisturbed portion of the study. We will also address the question of harvest method impacts, i.e. what effect does rhizome removal have versus removing stems only. We will interview known Galax harvesters and visit active harvested sites to determine the standard methodology of harvest and apply this method and one that includes rhizome removal in a randomized plot design.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
				Fraser fir plots estab.----►						
		Log moss & galax plots established ---►								

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001
		Fraser fir monitoring year one ------►								
		Log moss monitoring year one------►								
Galax monitoring year one ------►										

[1] Endangered, Threatened, and Sensitive Wildlife and Plant Species in Southern Forests (RWU-4201), Clemson University, Clemson, SC 29634
[2] Botany Program, Nantahala National Forest, Highlands, NC 28741
[3] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[4] Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801
[5] Ecology and Management of Southern Appalachian Hardwood Forests, Bent Creek Experimental Forest, Asheville, NC 28806

(2C) Variability in Wildland Populations due to Harvest Pressure: Ramps (*Allium tricoccum*), an Edible Forest Botanical Product (<u>funded</u>)

David L. White and Joan L. Walker [1]

ABSTRACT

Managers need information about inventories and harvest effects in order to develop effective harvest policies for forest botanical products. Information is not currently available that could be used to determine the impact of harvest levels on populations in the wild or their recovery rate following intensive harvest. It is also unknown if current collection policies will provide sustainable harvests of even the most common forest botanical products.

Ramps (*Allium tricoccum*), are a popular edible herb found in the Southern Appalachians. They are collected for personal consumption, for large festivals, for farmers markets, and gourmet restaurants. Ramps are widely distributed throughout eastern North America and range from southern Canada and North Dakota to the edge of the southern Appalachians (Kartesz 1999). They occur within rich cove and northern hardwood forests in mid and high elevation mesic sites throughout western North Carolina (Weakley 1998). An experimental harvest study of ramps within the Great Smoky Mountain National Park (GSMNP), the southern end of the species range, suggests slow recovery following harvest (Rock 1996). In Quebec, in the northern part of the range, declines have been demonstrated from over-harvesting (Nault and Gagnon, 1988). As a result, commercial sales of the plant have been prohibited there (Nantel et al. 1996) and collection in the GSMNP is now prohibited.

A monitoring design to detect changes in ramp populations within 3 disturbance / accessibility classes was initiated in 1998 and 1999 on the Nantahala NF by Dr. Joan Walker and David White (Clemson University, Southern Research Station). In 1999, both ramp cover and density were determined in 15 randomly selected ramp populations assigned with 3 accessibility classes. Initial results describe the abundance and distribution of ramps in the Upper Nantahala River Watershed, and suggest the probable links among historical harvest, patch size and accessibility.

Using data from the monitoring study, we will detect change due to the existing harvest use to help determine if this rate of change is sustainable. We will discriminate between change in ramp populations due to over-harvesting and those resulting from various environmental factors such as site quality or biological factors such as population density and structure. This will be accomplished by comparing ramp populations that are remote and relatively undisturbed (no evidence of harvest) to ramp populations that are accessible and have a known harvest usage and high probability of having continued harvest pressure. We will also evaluate the minimum ramp patch density needed to provide both economical and sustainable harvest levels.

<u>Timeline</u>

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
◄---plots established			***data analysis ------►***			***complete reports-----►***				
Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001
		test monitoring design ------►								

[1] Endangered, Threatened, and Sensitive Wildlife and Plant Species in Southern Forests (RCWU-4201), Clemson University, Clemson, SC 29534

(2D) Variability in Wildland Populations due to harvest pressure: Ginseng (*Panax quinquefolius*), a Medicinal Forest Botanical Product (funded)

Gary L. Kauffman[1], Robert D. Sutter[2], Steven A. Simon[3], Wayne Owen[4]

ABSTRACT

There is considerable concern about maintaining the sustainability of ginseng harvests on public lands in the United States. In 1999, The US Fish & Wildlife Service banned any exportation of ginseng plants less than 5 years of age (Javier 1999) and on the Hoosier National Forest all collections of this species have been banned due to declining population sizes. Within western North Carolina, a recent reassessment of ginseng populations identified viability concerns at one-half of long-term monitoring sites (Sutter 2000). These monitoring sites were established in 1979 and sampled annually for 2-4 years and then again in 1999. Although one small population increased in size and another remained the same, most had decreased greater than 90% in size, and showed a decline in older 3 and 4 prong individuals and lower fruit production.

Gingeng (*Panax quinquefolius*) is a long-lived perennial, living up to 50 years in age (Charron 1989, Sutter pers. comm.). It is present throughout most of the southern Appalachians and extends to the southern limit of its range in the Piedmont of the Gulf States. Ginseng is typically associated with rich cove forests, particularly those sites with higher nutrient and base content (Rock 1999, Gagnon 1999). It has been collected for almost 200 years from the mountains of western North Carolina and, except for the extreme southern portion of its range, is commonly collected throughout National Forests in the southern Appalachians. Most of the trade in this species has been in the Asian medicinal plant market.

We will continue to collaborate with the Southeast regional Nature Conservancy office to develop a monitoring protocol to detect change and determine viability of ginseng populations (Morris et al. 1999). Viability will be addressed by examining the relationship between ginseng presence and abundance, physical and biological site variables, and accessibility. Three accessibility classes will be examined: populations within 0.5 km of an open road, 0.5 to 2 km of an open road, and those found in the most inaccessible portions of the Forest. Permanent plots will be randomly distributed across the Nantahala and Pisgah Forests within known populations and those sites identified through habitat modeling (project 2A). We will also continue to assess change in the long-term monitoring plots established in 1979. Within all plots, population demographics and plant vigor will be determined by counting individual plants within prong classes, measuring height for all 2, 3 and 4 prong plants, and counting mature fruit. We anticipate a minimum of 10 years of annual monitoring to accurately assess population stability and the influence of accessibility on population size and vigor.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
		established long-term monitoring plots----------►								

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001
		1st of 10 year annual monitoring ----------►								

[1]Botany Program, Nantahala National Forest, Highlands, NC 28741
[2]Ecology of the Southern Forests, The Nature Conservancy, Chapel Hill, NC
[3]Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801
[4] Fisheries, Widlife, and Range, USFS Southern Region, Atlanta, GA 30367

(2E) Ecology and Life History of Important Species Collected as Forest Botanical Products (unfunded)

Gary L. Kauffman[1], Dave Danley[2],
Steven A. Simon[3]

ABSTRACT

Very little is known about the ecology and life history of many herb, shrub, and moss species in the Southern Appalachians that are collected as forest botanical products. This information is critical for understanding how these species grow, reproduce, and respond to collection pressure. This is also important information used in conservation assessments.

We will complete a literature review for species collected as forest botanical products with special emphasis on those that are most vulnerable to over-harvest. For example, plants such as ginseng (*Panax quinquefolius*) which are dependent entirely on sexual reproduction and other medicinal plants having a narrow distribution could be most at risk of extirpation if over-collection occurs. This review will include an examination of species life history, range-wide distribution and abundance, population variability, and evaluation of all available pertinent ecological management or conservation studies.

We will also identify the network of scientists, land managers and private individuals who are working on management of any of these species and may have valuable unpublished studies or insights on sustainability. This review will provide an up-to-date list of active participants in the management and conservation of these species.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
							literature review --------►			
Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001
complete reports ------►										

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[3] Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801

(3A) Restoration of Southern Appalachian Coves to Support Sustainable Forest Botanical Product Harvests (unfunded)

Gary L. Kauffman[1], Steven A. Simon[2], W. Henry McNab[3], and Joan L. Walker[4]

ABSTRACT

Southern Appalachian coves have been heavily impacted by past land use practices. Prior logging and farming were concentrated on these highly productive sites and many have now been invaded by very competitive, exotic species. A wide variety of cove herbaceous species were sold and bartered in small commercial medicinal markets (Sheppard 1935, Harding 1936). Most of the former land use was concentrated in accessible low elevation sites and as a result, currently have a depauperate herbaceous flora.

Ginseng has been harvested for the past 200 years. Historical records detail a greater distribution and abundance of this species in western North Carolina (Sheppard 1935). In addition, a diverse and abundant group of herbaceous plants have been collected for more than 2 centuries. These collected species include bloodroot (*Sanguinaria canadensis*), goldenseal (*Hydrastis canadensis*), yellow lady's slipper (*Cypripedium parviflorum var. pubescens*), wild ginger (*Asarum canadensis*), Senega snakeroot (*Polygala senega*), and liverwort (*Hepatica americana*). It is unknown how these past collections have affected current herbaceous abundance in Southern Appalachian coves.

This project will identify potential cove sites to restore missing herbaceous components. As a start we will identify suitable habitat for ginseng. We will develop a habitat model based on the suitability of sites for ginseng-associated species. These ginseng-associated species were recently compiled from an assessment of the Southern Appalachian database. Nine common species were found to be associated with ginseng in at least 25% of the plots where they occurred. By modeling on this suite of species, we will be able to locate potential ginseng habitat as well as high quality cove habitat (mixed mesophytic forest). Field validation of the sites will be completed with the modeling validation (see project 2A).

Issues of genetic diversity and local germplasm will have to be considered with any widespread attempt to restore native species to coves. The appropriateness of species for reintroduction will be determined with the predictive model, however, the source of material will also have to be considered. For instance, some local ginseng collectors are known to have sown Wisconsin-grown seed at harvest sites and it is unknown how this could potentially affect viability of local populations. A current study on the genetic diversity of ginseng in the southern Appalachians will provide information to determine sites to collect native seed to propagate (Jennifer Cruise, University of Georgia doctorate student, pers. comm.). A source of material reintroductions will potentially come from groups and agencies the NFsNC will be working with to cultivate currently collected medicinal species (see project C6).

Restoration sites will provide research opportunities to investigate the dynamics of species interactions and harvest sustainability. Major cooperators may therefore include personnel from NC Sate University, Clemson University, University of Georgia, the NC Cooperative Extension Service, and Yellow Creek Botanical Institute.

Timeline

Jan. 2000	Mar. 2000	May 2000	July 2000	Sept. 2000	Nov. 2000	Jan. 2001	Mar. 2001	May 2001	July 2001	Sept. 2001	Nov. 2001

develop species habitat models --►

field validation ---------► refine models ---------►

collection of propagules ----------► plant propagules in increase beds---►

[1]Botany Program, Nantahala National Forest, Highlands, NC 28741
[2]Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 28801
[3]Ecology and Mgmt. of S .Appalachian Hardwood Forests, Bent Creek Experimental Forest, Asheville, NC 28806
[4] Endangered, Threatened, and Sensitive Wildlife and Plant Species in Southern Forests (RCWU-4201), Clemson University, Clemson, SC 29534

(3B) Conservation Assessments and Strategies for Managing Species Collected as Forest Botanical Products (unfunded)

Gary L. Kauffman[1], Dave Danley[2], Steven A. Simon[3], Larry Hayden[4]

ABSTRACT

A conservation assessment is a necessary first step in developing a plan of action to conserve species collected as forest botanical products and recommend management options that would allow sustainability of harvests. The assessment would include gathering, analysis and documentation of what is known and not known of the status, condition and ecology of these species while the strategy would identify conservation objectives for inclusion in a forest plan amendment or revision.

We will use biological information gathered in project 2E (Ecology and Life History of Important Species Collected as Forest Botanical Products) and further assess the range-wide status and condition of species collected as forest botanical products. We will complete a written plan of action that establishes conservation objectives and identifies management actions that will be done to accomplish them. Using information from project 3C, standards and guidelines will be written and coordinated with Southern Appalachian Plan revisions.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

complete conservation strategies----------►

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[3] Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801
[4]Ecosystems and Planning, National Forests in North Carolina, Asheville, NC 28801

(3C) A Review of Southern Appalachian Forests Land and Resource Management Plan Standards and Guidelines for Managing Forest Botanical Products (unfunded)

Larry Hayden[1], Ranotta McNair[2], Steve Hendricks[3]

ABSTRACT

Inconsistency in standards for managing forest botanical products on adjacent National Forests may lead to increased pressure on the Forest where restrictions, prices, or the permitting process is perceived to be less cumbersome or restrictive. Consistent standards can provide a logical framework for actions designed to sustain natural and managed ecosystems. This is especially true in landscapes having similar land-use history, resource types and ecological processes. Currently, inconsistencies exist in the Southern Appalachians where Forests having similar habitats and product abundance have different collection policies. Furthermore, there are no Forests in the Southern Appalachians that identify sustainable harvest levels for forest botanical products and few Forests that provide standards based on land allocation.

We will use a working group of forest planners, botanists, and law enforcement officers to: (1) review Land and Resource Management Plans in the Southern Appalachians[4] and identify inconsistencies in standards and guidelines related to forest botanical products, (2) develop standards and guidelines for managing forest botanical products and providing sustainable harvests, and (3) complete a feasibility analysis of using consistent standards across the subregion.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
								conduct workshop--►		

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001
complete std. & guides --►			***complete feasibility analysis--►***							

[1]Ecosystems and Planning, National Forests in North Carolina, Asheville, NC 28801
[2]Forest Exec., National Forests in North Carolina, Asheville, NC 28801
[3]Soil, Water, Air, Landuse Planning, Cherokee National Forest, Cleveland, TN 37320
[4]Nantahala, Pisgah, Chattahoochee, Sumter, Cherokee, and National Forests in Alabama (Talladega District)

(3D) Permanent Monitoring Plot Design for Adaptive Management of Forest Botanical Products on the Nantahala and Pisgah National Forest (<u>funded</u>)

Gary L. Kauffman[1], Steven A. Simon[2], David D. Danley[3], Bernard R. Parresol[4], W. Henry McNab[5], Joan L. Walker[6], Katherine Elliot[7]

ABSTRACT

Monitoring change within existing Forest Service management areas is important in developing an adequate internal review process. The review process allows the Forest Service to identify necessary change when current management is not achieving the desired goals. The series of plots established for monitoring ramps, Fraser fir, galax, ginseng, and log moss can serve as important long term monitoring stations for evaluating change for forest botanical products. These monitoring stations will be dispersed over a variety of Landtype Associations and Landtype Phases and incorporate a diversity of community types.

Permanent monitoring plots will be archived and updated in the Forest Service corporate database, NRIS. The permanent locations will be identified with a global positioning system having an accuracy of 15 meters. They will be stored as point data in a GIS layer. A random sample of these and other permanent plots from the larger southern Appalachian database will serve as effective monitoring stations to assess forest botanical product population change. Statistical tests of power and sample size will be utilized to develop a statistically sound monitoring design.

<u>Timeline</u>

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
		installation of plots--►								
Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001
	1st annual remeasurement--►									

[1]Botany Program, Nantahala National Forest, Highlands, NC 28741
[2]Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 28801
[3] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[4]Biometrics Unit, Southern Research Station Headquarters, Asheville, NC 28802
[5]Ecology and Management of Southern Appalachian Hardwood Forests, Bent Creek Experimental Forest, Asheville, NC 28806
[6]Endangered, Threatened, and Sensitive Wildlife and Plant Species in Southern Forests, Clemson University, Clemson, SC 29634
7 Ecological Unit, Southern Research Station at Cowetta, Otto, NC

(3E) The Effect of Prescribed burning on Growth and Density of Mountain Laurel (*Kalmia latifolia*) and Galax (*Galax urceolata*) (unfunded)

Gary L. Kauffman[1], Dave Danley[2], Steven A. Simon[3], and Robin Kastler[4]

ABSTRACT

It is widely accepted that both Galax and Mountain Laurel sprout readily following top kill due to burning. The degree of sprouting, however, has not been quantified sufficiently to determine density and volume of sprouts. Furthermore, long-term studies are not available that identify rates of recovery. This information is needed to determine how management practices can be used to enhance production of these forest botanical products.

We will establish monitoring plots in sites supporting Galax and Mountain Laurel within planned prescribed burn units on the Nantahala and Pisgah National Forests. The number and size of plants will be tallied pre- and post burn. Photo points will be established to further document community change.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

slash laurel--►

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

conduct prescribed burns ---►

begin first year monitoring ----------►

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[3] Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801
4 Fire, Forest, Heritage Resources, National Forests in NC, Asheville, NC 28801

(3F) Cultivation of Important Medicinal Plants Found in the Southern Appalachians (unfunded)

Gary L. Kauffman[1], Steven A. Simon[2], Dr. Jeanine Davis[3], Joe-Ann McCoy[3]

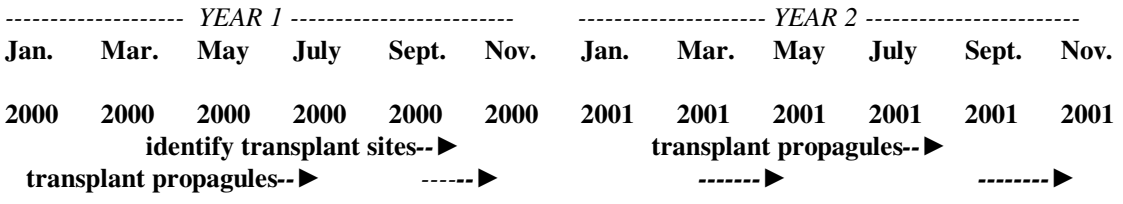
ABSTRACT

Medicinal herb species are the most diverse assemblage of products currently being collected from the Southern Appalachians. They represent a market that has been in a constant state of flux in the 1990's. It is difficult to predict the changing market and to adequately assess sustainability for the wide diversity of species.

The medicinal herb industry in the U.S. is worth over $3 billion and had been growing at a rate of 24-26% through the-mid 90's (Nutrition Business Journal 1998, Ed Fletcher & Jeanine Davis, pers. comm.). However, within the past year this phenomenal growth rate has slowed, somewhat dramatically for some species (Jeanine Davis, pers. comm.). For instance, black cohosh dropped this last year from a peak of $12-17 per pound to the current level of approximately $3 per pound dry weight (Robin Suggs, Yellow Creek Botanical Institute, pers. comm.). At present the herb market is very soft because of the lack of repeat buyers. Speculation is that product inconsistency of the wild collected market is responsible for widely variable medicinal benefits to the consumer (Davis, pers. comm.). A consistent final medicinal product is highly desirable. Still, parent materials from natural populations have the potential to provide a less variable product.

An increase in cultivation of desirable cultivars would help to alleviate collection pressures on public land. Before mass cultivation becomes a reality, growers and researchers will need propagule material both to experiment with cultivation techniques and to make initial plantings. A factor in limiting continuing research into cultivation of many of these medicinal herbs is the ready availability of plant material (Davis & Carol Schumann, USDA-ARS, Appalachian Farming Systems Research Center, pers. comm.). With this project, the National Forests in NC will provide a source of material to help to alleviate the propagation material gap. Potential harvest areas with an abundance of desirable species will be identified during the validation of the predictive model (see project 2A).

Work was initiated in 1999, through a grant from the US Fish and Wildlife Foundation, with the Yellow Creek Botanical Institute (YCBI) to establish local germplasm beds of various forest botanical products. YCBI is a non-profit organization, located in the mountains of North Carolina, dedicated to the promotion, research and development of sustainable native crops. Discussions are ongoing with other potential cooperators such as the Mountain Horticultural Experiment Station, a research branch of the North Carolina Cooperative Extension Service. Dr. Jeanine Davis has been experimenting with alternative crops at the station for the past 10 years and is recognized as a leader within medicinal plant propagation research. In addition, we will collaborate with the Appalachian Farming Systems Research Center, a field office of the USDA-ARS located in West Virginia. They are currently experimenting with cultivation of numerous medicinal herbs. We will work closely with these three groups and provide necessary propagule materials. Our goal is to eventually meet some of the demand for numerous native medicinal plants with woods-grown multicultures within the private sector, thus alleviating the overcollection from federal lands.



[1]Botany Program, Nantahala National Forest, Highlands, NC 28741
[2]Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 28801
[3]Department of Horticultural Science, North Carolina State University, Mountain Horticultural Crops Research and Extension Center, Fletcher, NC

(3G) A Memorandum of Understanding Between the U.S. Forest Service, U.S. Park Service, and N.C. Forest Service to Coordinate Enforcement of Federal and States Laws concerning Forest Botanical Product Harvest (unfunded)

Gary L. Kauffman[1], Steven A. Simon[2], David D. Danley[3],

ABSTRACT

The Nantahala and Pisgah National Forests share a common boundary with 2 National Parks, The Great Smoky Mountains National Park (GSMNP) and the Blue Ridge Parkway. Many law enforcement issues regarding forest botanical products, such as poaching, do not just affect one agency, nor are they confined to public lands. There is a need to have regular communication among the different agencies about any emerging issues, changes in collection policies or recent poaching control innovations.

Discussions among National Park Service, US Fish & Wildlife Service (USFWS), and USFS land managers, rangers and law enforcement officials have been initiated to develop coordination and cooperation between the agencies that have common borders. A strategy is being developed to curtail current poaching. This includes development of a common accessible database on poachers caught on federal and state lands. This project will help to facilitate discussions between law enforcement officials and biologists from the respective agencies who deal with forest botanical product issues. A memorandum of understanding is anticipated from these discussions detailing a strategy to ensure information exchange and cooperation in implementing management goals.

The North Carolina Department of Agriculture and the GSMNP rangers have developed marking techniques to identify plants as off limits to collectors. This has been particularly helpful to discourage and successfully convict ginseng poachers in the GSMNP. Recently, these techniques have been refined to use on Galax and various medicinal plant populations located in the Blue Ridge Parkway (Jim Corbin, pers. comm.). These marking techniques will be explored within management areas designated as off-limits to any collection of forest botanical products. This technique may identify a harvest rotation strategy for selected forest botanical products. Regular communication among law enforcement officials on these designated marked areas, as outlined in a memorandum of understanding, will help to curtail poaching.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

Memorandum of Understanding --►

[1]Botany Program, Nantahala National Forest, Highlands, NC 28741
[2]Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 28801
[3] Botany Program, Pisgah National Forest, Burnsville, NC 28714

(3H) The Indirect Effects of Harvesting Log-Moss on other Plants Associated with Downed-logs (funded)

Gary L. Kauffman[1], Dave Danley[2],
Steven A. Simon[3], Paul Davison[4]

ABSTRACT

Between 1988 and 1992, permits were sold for the collection of 25 tons of log moss per year on the Nantahala and Pisgah National Forests. The most abundant mosses found on decaying logs include *Hypnum curviflium*, *Hypnum imonens*, and *Thuidium delicatulum.* These are common mosses with wide-spread distribution. However, it is unknown what other associated mosses or liverworts may also occur within the moss mat community. Moss harvest typically includes stripping away the entire sheet of mosses covering a log and could have secondary effects to these associated species, some of which may have range-wide viability concerns. In addition, little is known about the essential role that log mosses play in the forest decay and nutrient exchange process.

A study in northwestern Oregon identified all species associated with the commercial harvest of epiphytic moss mats and found 43 species occasionally associated with 6 collected species (Peck 1997). It is likely that rare bryophyte species could be associated with the traditional log moss harvested species. Three sensitive bryophyte species occupy decaying logs in the Southern Appalachians. They are *Buxbaumia minakatae*, *Riccardia jugata*, and *Cheilolejeunea evansii* (Crum and Anderson 1981, Hicks 1992). Little is known about the range and habitat specificity of these three species in North Carolina. Vascular plants may also be associated with this community given the moisture retentive properties of the moss mat (Holcombe 1976).

We will characterize the community of plants (non-vascular and vascular) associated with downed logs that would typically be collected in "log moss" permits. Sites will be sampled for all associated species. These sites will be representative of appropriate areas that log moss harvesters would select. Multiple transects placed at 50 meter intervals will be located within each of these sites. Randomly selected points will be located on each transect, where four quadrats will be established. Within each quadrant, the nearest log with a harvestable quantity of log moss will be sampled. Only logs with at least a 10-inch wide log moss strip will be sampled since this minimum width is a primary factor that determines whether a mat is harvested or not (Ronald Gibson, moss harvester, pers. comm.). A 1-meter length strip will be harvested from each log. All the species will be separated and identified and their relative abundance visually estimated.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

locate sites during model validation--►

catalog species within moss communities---►

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

catalog species within moss communities---►

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[3] Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801
[4] University of North Alabama, School of Arts and Sciences, Florence AL, 35632

(4A) Forest Botanical Product Collectors and Distributors in the Southern Appalachians (unfunded)

Jim Chamberlain[1]

ABSTRACT

There is a lack of knowledge of the human element of forest botanical products. Both Native Americans and white settlers traditionally have utilized a diversity of products from the forests and many species are closely intertwined with the cultural history of the region. In addition to important personal uses, a number of the region's forest botanicals have become significant commodities and new markets are developing. Markets for many of these products are poorly understood. It is unknown how many western North Carolinians are involved. This portion of the study will focus on who is involved, their perceptions, values, and behaviors.

We will identify people who collect, distribute, and market products. Partial information on collectors is available from the permits issued on the Forest. Additional information will be acquired from interviews with collectors and dealers. We will detail any recent changes in the labor structure and practices of this industry. For instance, the galax (*Galax urceolata*) industry labor force has apparently been dominated by long-time white residents since the early Twentieth Century. However, in recent years many permittees have been Latinos, who are relative newcomers to the area. We will examine the causes and implications of such a shift in the labor force. We will also interview and survey galax collectors and dealers about the collection policy on National Forest lands to determine what their concerns and needs are.

Cultural views and attitudes shape the way people treat natural resources. Among Southern Appalachian people historically there has been a tendency to view land and the vegetation that covered it not so much as private property or a commodity to be bought or sold as a common inheritance held by individuals on behalf of the family and the community (Southern Appalachian Center 1979). Free access to land was the local norm. This access included the right to freely hunt game or gather products on that land. It is important to determine if these values are still strongly felt within the region, if they are restricted to more isolated rural areas, or if they are no longer widely believed. These values help to determine the context of contemporary management of forest botanical products. By understanding the number of collectors and distributors, their values, and their distribution within the region, we hope to assess collection trends for the future.

[1] USDA Forest Service, Southern Research Station, Integrated Life Cycle of Wood: Tree Quality, Processing, and Recycling (4702), Virginia Polytechnic Institute and State University, Blacksburg, VA.

(4B) Economic Diversity and Dependency Analysis of Forest Botanical Products in the Southern Appalachians (<u>unfunded</u>)

Larry Hayden[1] and Jim Chamberlain[2]

ABSTRACT

Economic Diversity

Economic diversity refers to the number and relative importance of forest botanical product industries within a local economy. In general, the more industries which exist, the greater the capability of the economy to "weather" the economic storms of recession and unemployment. The better the balance among economic sectors, the more viable the local economy. In order to determine the impact of the forest botanical products industries, we will determine the number of industrial sectors existing within the economy, the concentration of economic activity within these sectors, and the role forest botanicals play in diversifying the economy.

Economic Dependency

Economic dependency refers to those industrial sectors on which the region is dependent for exports. In addition to the determination of the number of forest products sectors in the region, a determination will be made of those which export forest products to the "rest of the world". Forest botanical products can provide an economic stimulus to a local economy. It is important to identify what the impact of forest botanical products are having within the local and regional economies. We will determine if individual products are primarily collected and shipped out of the region or if there is an added value with processing of the forest botanical products. Any added value to the raw collected product can multiply the benefits to the local and regional economy. These distinctions are important to ascertain and quantify socioeconomic effects with a change in the collection policy of any botanical product.

<u>Timeline</u>

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

complete analysis and reports-----►

[1] Ecosystems and Planning, National Forests in North Carolina, Asheville, NC 28801
[2] Integrated life Cycle of Wood: Tree Quality, Processing, and Recycling (4702), Virginia Polytechnic Institute and Sate University, Blacksburg, VA.

(5A) A Powerpoint Presentation (and brochures) Describing USFS Policy, Species Ecology, and Distribution of Forest Botanical Products in the Southern Appalachians (unfunded)

Gary L. Kauffman[1], Steven A. Simon[2], David D. Danley[3], Larry Hayden[4]

ABSTRACT

There is a need to inform the public about management of forest botanical products. It is important to inform the public where different management areas are located and different collection policies with neighboring state and federal agencies. An informed public will be better able to understand the complex issues in implementing any change in the current standards and guides. It is also important to inform Forest Service personnel of new management guidelines. Finally it is important for this project to educate the consumer about the need for purchasing cultivated medicinal plants as opposed to wild harvested plants in order to alleviate some of the collecting pressures.

A public forum will be initiated in cooperation with other agencies to inform the general public about pertinent findings, new management proposals and any management concerns. Target audiences would be local collectors, distributors, environmental groups and other concerned publics. Presentations will be made during annual native plant conferences, annual meetings of the Southern Appalachian Biosphere & Man, and a lecture series recently initiated by the Yellow Creek Botanical Institute. A web site associated with the conservation of forest botanicals will be developed. Individual forest botanical products will be highlighted through the length of this study on the web site.

People who issue permits within the National Forests need to have readily available information packets on each forest product. These folks are the first contact people with the collectors on the Forest, and they must provide a consistent message to the permittees. The packet of information will detail the current range of the species within North Carolina with a habitat description, a species description with an accompanying photo or line drawing, and the permitting process for that particular species with any mitigation requirements that need to be incorporated within the permit. This project will inform law enforcement personnel on the correct identification of all forest products. A pamphlet outlining the life history, distributional range and existing management guidelines across federal and state lands will be developed for all law enforcement personnel.

Timeline

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000

Presentation to annual SAMAB Conference --►

Web site development ---------►

Yellow Creek Botanical Institute lecture ---------►

Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

Presentation to Native Plant Conference --►

Presentation to annual SAMAB Conference --►

Public Forum

[1]Botany Program, Nantahala National Forest, Highlands, NC 28741
[2]Threatened, Endangered, and Sensitive Species Program, National Forests in NC, Asheville NC, 2880
[3] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[4]Ecosystems and Planning, National Forests in North Carolina, Asheville, NC 28801

(5B) Management Guidelines for the Sustainable Harvest of Important Forest Botanical Products (<u>unfunded</u>)

Gary L. Kauffman[1], Dave Danley[2],
Steven A. Simon[3], Chris J. Ulrey[4]

ABSTRACT

Currently there are no sources of information on the management of forest botanical products. The only available information is general, such as found in horticulture books dealing with cultivation of plants, or plant groups (rhizomatous plants, woody plants), or guidelines for seasonality of harvests in Forest Land and Resource Management Plans. Clearly there is a need to synthesize available information and incorporate new information developed in this program on sustainability of product harvests.

We will develop guidebooks for use by forest managers, private landowners, and collectors that outline basic facts about individual species sold as botanical products, identify methods of harvest, and recommendations for sustainable use. We will include the ecology and life history of each species, species distribution, recommended harvest levels and intervals, and suggestions for collection, planting, and cultivation of important species.

<u>Timeline</u>

Jan. 2000	Feb. 2000	Mar. 2000	Apr. 2000	May 2000	June 2000	July 2000	Aug. 2000	Sept. 2000	Oct. 2000	Nov. 2000
Jan. 2001	Feb. 2001	Mar. 2001	Apr. 2001	May 2001	June 2001	July 2001	Aug. 2001	Sept. 2001	Oct. 2001	Nov. 2001

complete guidebooks ----------►

[1] Botany Program, Nantahala National Forest, Highlands, NC 28741
[2] Botany Program, Pisgah National Forest, Burnsville, NC 28714
[3] Threatened, Endangered, and Sensitive Program, National Forests in NC, Asheville, NC 28801
[4]Wildlife and Botany Program, Blueridge Parkway, Oteen, NC

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