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Nontimber products and forest capacity- *Mark H. Hansen, Jim Chamberlain, Keith W. Moser*
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Introduction

Many terms (e.g., non-traditional, secondary, minor, non-wood, and special or specialty) are used to describe non-timber forest products . National legislation uses "Forest Botanical Products" (H.R. 2466 1999), where as the USDA Forest Service (2001) defines them as "special forest products". The widely used term "non-timber forest products" (NTFS's) is used in this report. Whatever we call them, these are forest plant-based products collected by humans outside of timber products harvesting. Many non-timber resources that do not involve the collection of plant materials such as wildlife, water, recreation, grazing, and other ecosystem services are not included in the definition of NTFP's (MUSYA 1960; NFMA 1974) and are discussed in other chapters of this report.

NTFP's are a significant yet under-appreciated and difficult–to-quantify benefit. Havesting them is an important activity that provides income, recreation, sustenance, and cultural benefits to many. Because gathering these products is not perceived as an organized, systematic activity on a national scale, these critical resouses have received little coverage in past assessments. For many a single product is an important part of their cultural heritage. Yet, NTFP's are not solely individualistic and episodic gathering activities. Some products have international exposure and are subject to organized commercial activity. Consider the more than one million gallons of maple syrup and millions of holiday wreaths that are sold each year. Selected NTFP's comprise a major segment of the multi-billion dollar medicinal and dietary supplement industry.

NTFP's involve more species than timber products and include trees, woody and herbaceous plants, fungi, and other biological material harvested from within and on the edges of forests. Plant parts harvested include the roots, tubers, leaves, bark, twigs and branches, fruit, sap, and resin, as well as the wood (Chamberlain et al. 1998). These products are commonly classified into five product categories:

- culinary,
- crafts,
- floral and decorative,
- medicinal and dietary supplements, and
- landscape products.

Table 1 presents a large (but not "all encompassing") list of species and their product categories, consolidated from various sources. In this table are several hundred plants, the largest number of which are harvested for medicinal purposes. The list is extensive for the forests of the coterminous states, however only includes a few of the many NTFP species in Alaska, Hawaii, Puerto Rico, and other US territories. There are a number of other major products that come from natural landscapes and are commonly associated with NTFP's but were not included in this list because they are associated with nonforest ecosystems (e.g., wild rice), are not strictly a plant

product (e.g., honey), or are primarily a by-product of timber by- product (e.g., landscaping chips and bark).

Recent trends in some major NTFP's

No single NTFP harvesting data source exists for the nation or over time. **Figure 6.9** shows trends in three products (maple syrup, wild blueberries, and American ginseng) plus all products on National Forest System administered lands over the time period 1998 to 2006. These data come from four different sources. USDA, National Agricultural Statistical Service produces annual estimates of the production of maple syrup in the US; US International Trade Commission tracks the export wild blueberries; USDI, Fish and Wildlife Service produces an estimate of the total harvesting of American ginseng; and USDA, Forest Service maintains records of the sale of NTFP harvesting permit sales for the 193 million acres they administer.

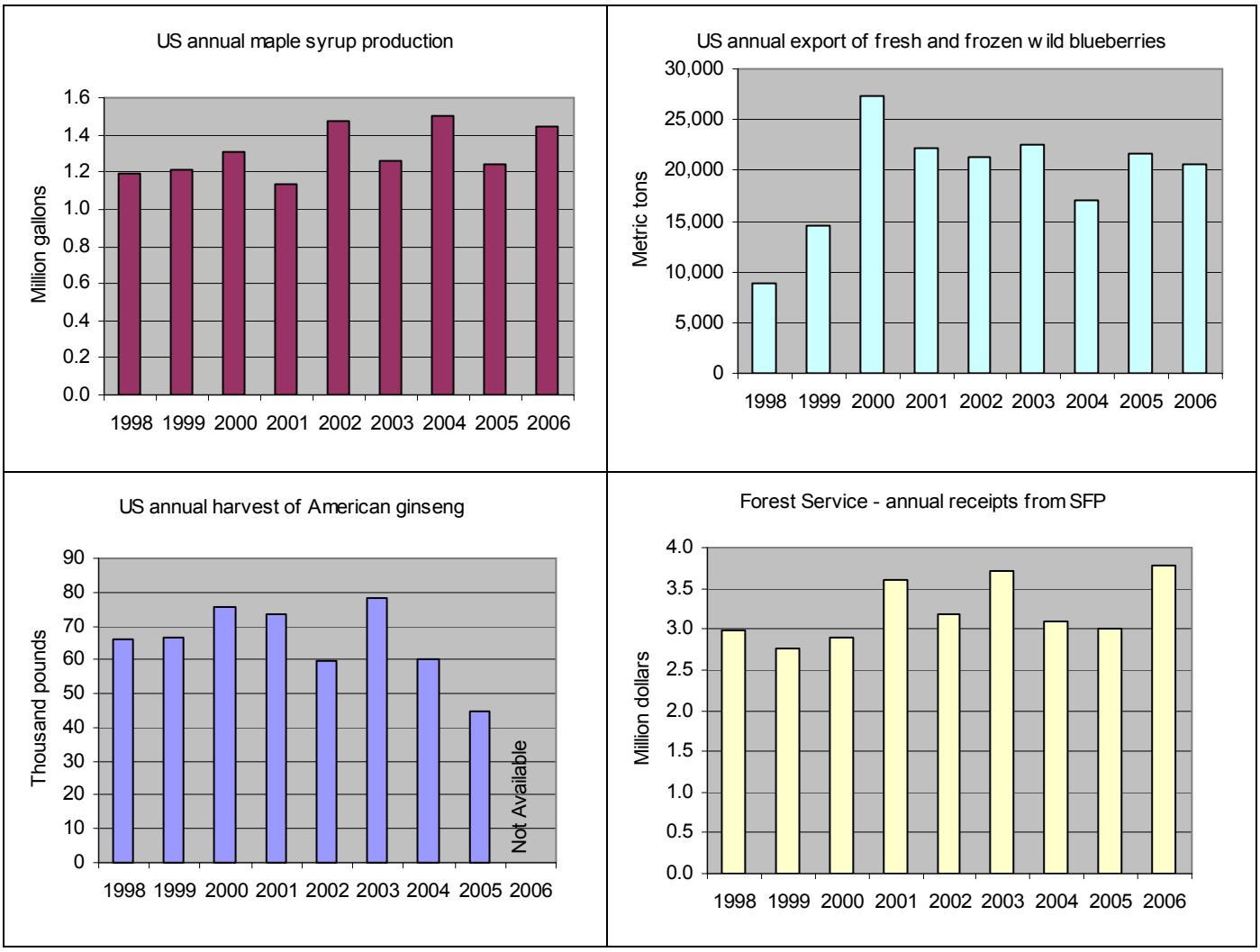

Figure 6.9 - National trends in selected non-timber forest products, 1998 to 2006

Production of maple syrup fluctuated between 1.1 and 1.5 million gallons over the past nine years due to variations in the weather that effect yields. The ideal maple-syrup tree is a 10 to 12 inch diameter sugar maple (*Acer saccharum*) or black maple (*A. nigrum*) with a well-developed crown (Willits, C. O., 1965). **Figure 6.10** shows the distribution of land suitable for maple syrup production, stands where there is at least 25 sq. ft. of basal area in sugar and/or black maple trees at least 10 inches in diameter, with these two species making up at least 25 percent of the total basal area. A total of 8.3 million acres of timberland land meeting these criteria are currently found within the 26 states where these two species occur, accounting for 3.7 percent of the total timberland area. Over 80 percent of this suitable area (7.6 million acres) is privately owned and could be managed for syrup production; however, only a very small portion of the available maple resource is currently being tapped for syrup. A well-managed sugar bush yields 10-20 gallons of syrup per acre annually. From a national perspective, the maple resource is not currently a limiting factor in syrup production. Limiting factors are primarily economic and relate

to the labor and energy needed to extract and refine the product. Forest health issues that affect maples, such as defoliation, frost damage, dieback, and maple decline are impacting the syrup production and are of great concern to syrup producers.

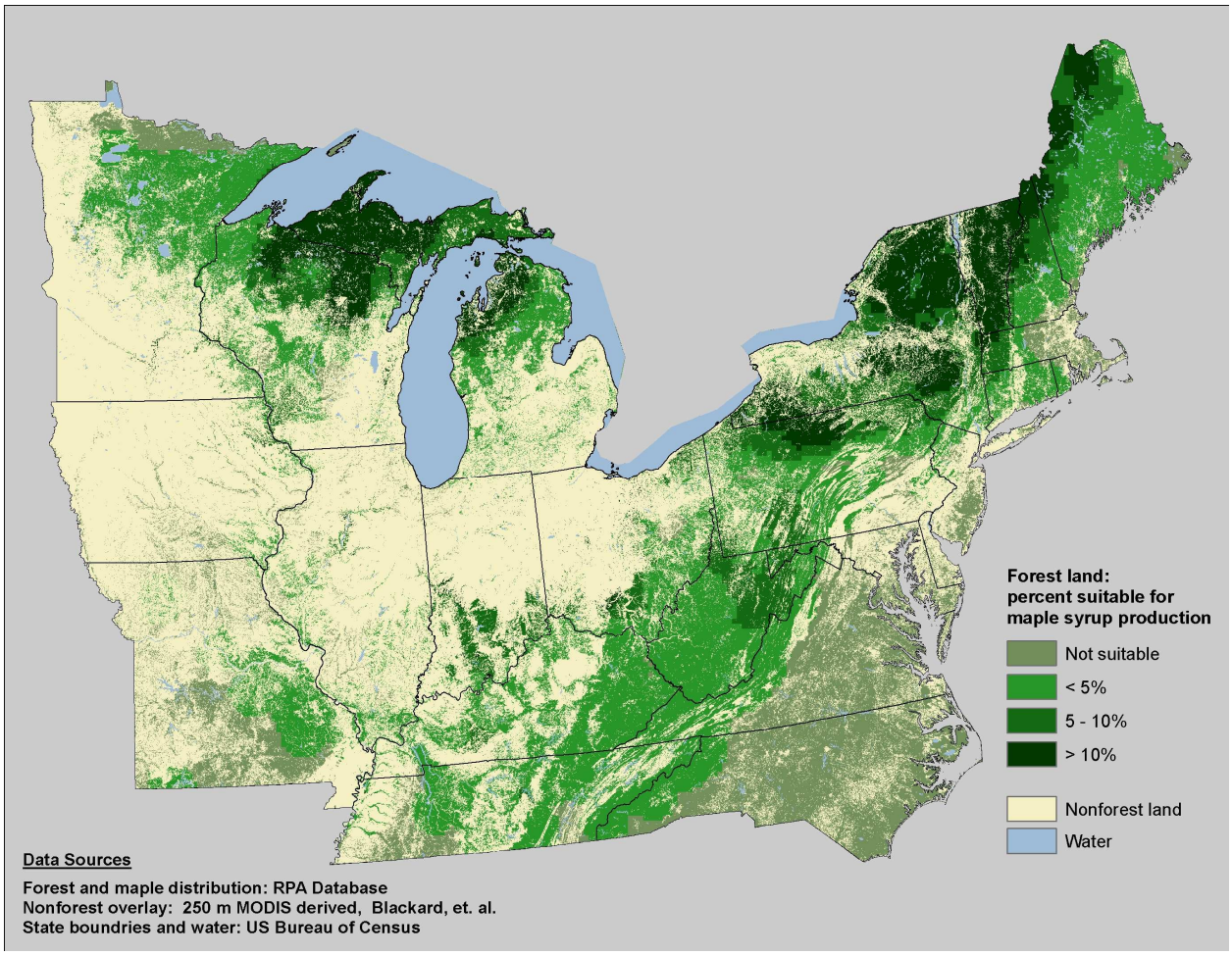

Figure 6.10 - Forest land suitable for maple syrup production

Wild blueberries (*Vaccinium angustifolium*) are harvested and marketed commercially primarily in northern New England and New York. A fraction of the total harvest is exported however data on domestic consumption are not readily available. Other data sources do not distinguish between wild blueberries and cultivated blueberries (*V. corymbosum* cultivars) or cover only specific regions or time periods. The export data demonstrates the continuing importance of this NTFP. For the years 1993 to 1997 (not shown in figure 6.9) exports range from 7,633 (1993) to 10,466 (1994) metric tons, indicating there were large increases in the export of this product in 1999 and 2000 and that this demand has continued.

American ginseng (*Panax quinquefolius*) is a long-lived perennial found in the understory of cool, well-drained hardwood forests of the eastern US and southeastern Canada. For most of the 1800's and into the early 1900's the US exported several

hundred thousand pounds of wild ginseng root per year. International ginseng trade is included in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Approximately 90 percent of the harvest is exported to Asia where demand is high and expected to increase. To ensure that the ginseng resource is not over-harvested to a point that is detrimental to the survival of the species, the export of wild and wild-simulated ginseng is limited to roots from plants that were at least 5 years of age or older at the time of harvest. Cultivated ginseng is considered inferior to the wild variety, thus not relieving the pressure on the wild resource. "Wild-simulated" ginseng – where seeds are planted in forest conditions and allowed to mature under natural conditions – is being practiced by thousands of landowners and is expanding to fill the demand for this product. Despite rising prices, exports of ginseng have declined in the past few years (**Figure 6.9**) due to resouce depletion caused by years of exstensive harvesting. Other factors impacting ginseng include logging, grazing, deer browsing, habitat loss, and depletion of genetic diversity within the species. In drastic contrast to maple syrup, the harvesting of this NTFP is having a devastating impacting on the resource.

The Forest Service regulates the harvesting of NTFP's on the lands it administers. Between 1998 and 2006, revenues from the sale of collection permits rose from 3.0 to 3.8 million dollars per year. Christmas trees account for approximately a third of the permit dollars collected and boughs and limbs (primarily harvested to produce wreaths and garlands) another third. In 2006, permits to harvest more than 264,000 Christmas trees were sold on NFS land at a cost of $2-$10 per tree. These amounts do not reflect the true market value of the product collected. Collections from NTFP were about 1.5 percent of the total FS collections from timber ($253 million in 2006).

Boughs and Pine Straw

The harvesting of pine straw for use in landscaping in the South and fir boughs in New England, Lake States and Pacific Northwest for use in Christmas wreaths and garlands are two large industries that provide income to forest land owners, seasonal employment to many people, and products used by many consumers (**Figure 6.11**).

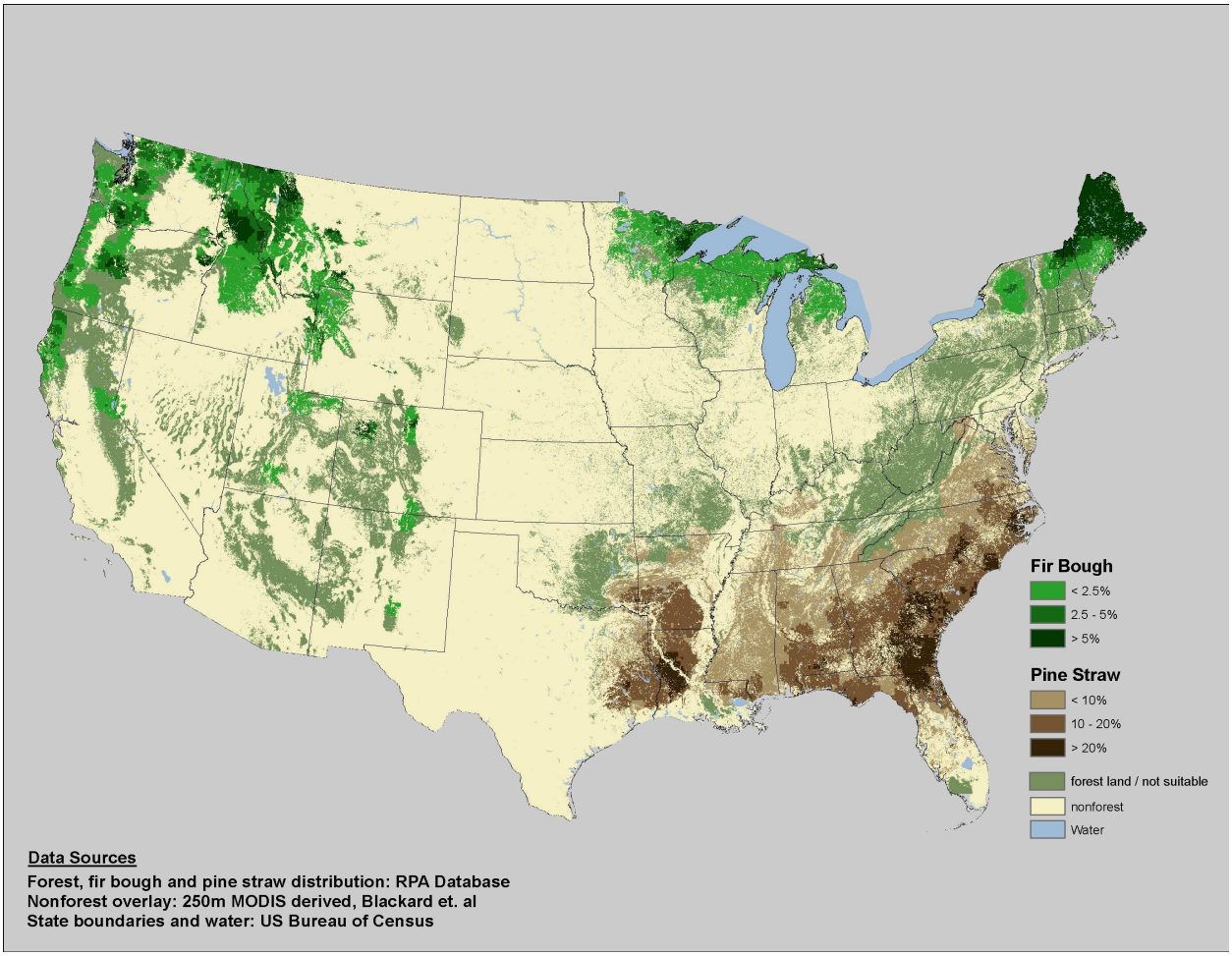

Figure 6.11 - Distribution of timberland suitable for harvesting of fir boughs[1] and pine straw[2] .

[1] stands with at least 250 small diameter fir(Abies spp. and Pseudotsuga menziesii) trees (1-5") per acre, less than 50 sq ft per acre in trees 5"+, and small diameter trees of other species are less than 50 percent of the small diameter tree

[2] stands where the basal area of loblolly (Pinus taeda), longleaf (P. palustris) and slash pine (P. elliottii) trees 5" diameter and larger is at least 50 square feet per acrea and other species make up less than 25 percent of the total basal area

Pine straw is harvested mostly on private lands, providing extra income to landowners prior to the harvest of commercial timber. In Georgia, pine straw harvesting has increased the last few years, with an estimated 610,000 acres harvested in 2005 (Boatright and McKissick 2006). The total estimated value of pine straw harvested in Georgia has increased from $38.5 million in 2005 to more than $62 million in 2006, representing 9.4 percent of the Georgia's total forest products industry (Boatwright and McKissick 2007). Over the period, 2001-2005, the average annual pine straw harvest was valued at $26.5 million per year (Boatright and McKissick 2006, 2005, 2004, 2003; Doherty et al. 2002).

The harvest of boughs occurs on both public and private forest lands. Many public land management agencies issue permits for the clipping of boughs from the lower branches of live trees. The floral industry relies heavily on fir boughs and greens from other species gathered from the forests. A study of the floral greens and decoratives industry in the Pacific Northwest revealed they contributed more than $128.5 million to the economy

(Schlosser and others 1991). Bough collection for holiday wreaths, primarily balsam fir (*Abies balsamea*), is a major economic activity in the Lake States and New England, with over $23 million dollars of wreaths and garlands produced in 2003 from 4,300 tons of boughs in Minnesota alone (Jacobson and others 2005).

Edible Forest Products

Culinary products include mushrooms, fungi, fruits, ,berries, ferns, greens, roots and tubers. In the southern Appalachian hardwood region, food festivals are organized around the emergence of wild onions (*Allium tricoccum*), known regionally as ramps. Maple syrup festivals, such as those in the Mt. Rogers (Virginia) and St. Albans (Vermont) , are common in many areas. Fiddleheads (the young, tightly coiled fronds of the fern *Matteuccia struthiopteris*), dandelion (*Taraxacum* spp.) greens, and poke salad (*Phytolacca decandra*) are eaten in the spring, as well. Nuts and berries — including black walnuts (*Juglans nigra*), muscadine grapes (*Vitis rotundifolia*), wild blueberries, raspberries and blackberries (*Rubus* spp.), big huckleberry (*Vaccinium membranaceum*) and persimmons (*Diospyros virginiana*) — are gathered, consumed, and sold throughout the U.S. Pawpaw (*Asimina triloba*), is growing in popularity as an edible fruit (Thomas and Schumann 1993) and is harvested well beyond its native range of Kentucky and Ohio. Pinyon pine *(Pinus monophylla)*, produces an edible "nut" that has been harvested commercially for generationsin the Southwest. In Nevada and Utah, the USDA Forest Service (Nevada only) and the USDI Bureau of Land Management (both states), sold 230 tons of pine nuts in 2004 and 111 tons in 2006. In 2006, the retail value of pine nuts sold from public lands in Utah and Nevada exceeded $2 million.

Craft products

NTFP's are an important source of raw marterials for crafts. Wood-based crafts produced from trees or parts of trees, excluding products made from cut timber, include sassafras (*Sassafras albidum*) stems for walking sticks, willow (*Salix* spp.) branches for furniture, and white oak (*Quercus* spp.) splits for baskets. Products made from vines, such as smokevine (*Aristolochia macrophylla*) and grapevine (*Vitis* spp.), are also included in this category. The number of species used in production of crafts is only limited to the crafters imagination and market acceptance.

Many craft products are important to Native American culture. The Anishinaabe (also referred to as the Ojibwe and Chippewa) and others use bark from paper birch (*Betula papyrifera*) for baskets, canoes, shelter, and other products, with different bark characteristics required for each use. For most products large trees (8"-15" diameter) with straight, blemish- and branch-free boles are needed. Black ash (*Fraxinus nigra*) splits are used to construct baskets. The species' ring-porous characteristic makes it easy to split into pieces that can be woven. Similar bole requirements are needed for a tree to make a good ash basket tree, with the additional requirement that trees should have a minimum

growth ring width of about 3 mm. Brich bark artisans are concerned that the resource is declining. This concern is supported by data from FIA inventories which show a 24% decrease paper birch trees of this size on timberland in the Lake States (MI, MN, and WI) between the early 1990's and the latest inventories. Some have expressed similar concerns about the black ash resource, however these same inventories show a 24% increase in black ash trees of the appropriate size. The exotic pest emerald ash borer (*Agrilus planipennis*) will likely have a devastating effect on the black ash resource of this region in the near future.

Medicinal and dietary supplements

Forest harvested plants used for their therapeutic value are marketed either as medicines or as herbal remedies. According to Farnsworth and Morris (1976), 25 percent of all prescriptions dispensed in the United States contain active ingredients extracted from higher order plants. The number of plant species harvested from southern forests with medicinal value exceeds 125 (Krochmal *et al.* 1969, World Wildlife Fund 1999). Of these, approximately 50 are commonly harvested and purchased by herb dealers. The central hardwood region is the principal source of many medicinal plants, including black cohosh (*Actaea racemosa*), American ginseng, and bloodroot (*Sanguinaria canadensis*). More than 80 percent of the forest-harvested ginseng comes from Virginia, Kentucky, Tennessee and North Carolina. Moore (1995) identifies and documents more than 85 medicinal forest plants of the Pacific West. Some of the more popular of these are Devil's club (*Ophlopanax horridum*), Hypericum (*Hypericum perforatum*), Oregon grape (*Berberis aquifolia*), Uva ursi (*Arctostaphylos uva-ursi*), Valerian (*Valeriana dioica*) and Yerba Santa (*Eriodictyon californicum*).

The findings of medical research helps to increase market demand for medicinals (Eisenberg *et al.*, 1993, Le Bars *et al.*, 1997, Stix 1998). The estimated value of the global markets for herbal medicines in 1996 was approximately $14 billion (Genetic Engineering News 1997), of which Europe and Asia represented more than eighty-percent of the global trade. In 1998, the total retail market for medicinal herbs in North America was estimated at $3.97 billion, more than double the estimate just two years before (Brevoort 1998, Genetic Engineering News 1997).
St. John's wort (Hypericum formosum and H. perforatum) and black cohosh, are two medicinals that have experienced increased popularity in recent years (Brevoort 1998).

Landscape, floral and decorative products

Many of the trees, shrubs, and other plants used in the landscape and floral industries originated in forest ecosystems and now supplied by non-forest commercial sources such as nurseries, green houses, and farms, however, forests continue to be the source of

materials for these industries. Galax (*Galax urceolata*), an evergreen groundcover, has been harvested from the forests of western North Carolina and southern Virginia since before the 20th century. Sprigs and long-lengths of grapevine and smokevine also may be used as compliments or back drops in floral arrangements. Several species of moss and lichen are harvested from Appalachian forests for the European floral industry. Sheet moss, angel hair moss, and antler moss are purchased from harvesters in the Great Lakes region (Thomas and Schumann 1993). Forest plants harvested in the Pacific Northwest for the floral industry include beargrass (*Xerophyllum tenax*), sword fern (*Polystichum munitum*), Evergreen huckleberry (*Vaccinium ovatum*), Salal (*Gaulteria shallon*), and Scotch broom (*Cytisus scoparius*).

Using native plants or plant products for landscaping is growing in popularity. Landscaping enterprises that use native plants may propagate the plants from wild-harvested germplasm or transplant live plants from the wild. A recent phenomenon is rescuing plants that are slated to be destroyed by development projects such as road construction. Moorman and others (2002) identify more than 200 species of trees, shrubs, herbs and vines used in landscaping that are native to southern United States. Rhododendron and azaleas are commonly transplanted from eastern forests for the landscaping industry. More than 15 species of forest plants from the Pacific Northwest have been documented as used in landscaping (Vance and others 2001).

Special Forest Products management in the Pacific Northwest

NTFP activity in the USFS Region 6 represents approximately 50 percent of the special forest products (SFP) program nationally. The management of the Forest Service's SFP program consists of recreational or personal use, commercial, tribal, and wildlife consumption. The recreational program aids individuals who collect edibles such as huckleberries and mushrooms for personal us and transplants of native plants for home landscaping. This program does not represent a high dollar value, however it is very important to the people the more than the 100,000 forest visitors who obtain permits each year.

The commercial SFP program serves primarily the floral and holiday wreath industries. The lush coastal forests west of the Cascades has many high-demand plants used by the floral industry world-wide. Several species of ferns, salal, Oregon grape, and other plants, provide full and part-time employment to many. During the holiday season noble fir, cedar and Douglas fir boughs and many cones are also harvested. Beargrass and matsutake mushrooms are species used primarily by commercial ventures and are in very high demand. During the last few years the Forest Service has received an estimated $1.5 million annually in receipts.

Ever since Pacific yew bark was found to conatin a chemical used in cancer treatments, interest has increased in other potential new pharmacudical products that might be discovered. The past few years the Forest Service has given out over 30 bio-prospecting permits to researchers searching for the next cure from plants from our National Forests.

Another important customer are several Native Amerian tribes that use NTFPs for traditional and culture purposes.

Galax harvesting in the southern Appalachia

Used historically by the Eastern Band of the Cherokee Indians to alleviate kidney ailments and nervous problems (Hamel and Chiltoskey 1975), the primary use of galax today is as a complement in floral arrangements. .Although galax grows from Georgia and Alabama, north into Maryland and West Virginia and west into Kentucky (NatureServe 2002), the major source of the leaves for the global industry is the mountains of western North Carolina. Within the state, the supply center is a nine county region in the northwestern corner. Most collection occurs along the escarpment of the Blue Ridge. The average annual harvest, as indicated by the major dealers in the region, ranges from 209.7 million to 323.9 million leaves. Harvesters receive between $0.01 and $0.02 per leaf, which suggests that the value of the annual harvest could range from $2.09 million to $6.48 million. In a region that is economically challenged this has significant impact on the local economy. Significant changes in the demographics of those harvesting galax have taken place in the past 15 year and these changes are impacting the management of the resource and the local economy (Emery et al, 2006).

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