Red Spruce Ecosystem Restoration on the Canaan Valley National Wildlife Refuge

West Virginia University and Davis & Elkins College students plant over 6,000 red spruce and balsam fir trees

By Dave Saville

As part of the Highlands Conservancy's program to restore the red spruce ecosystem in the Highlands, an outing was planned to plant seedlings on the Canaan Valley National Wildlife Refufe. West Virginia University and Davis and Elkins College Students collaborated on this project to plant seedlings of red spruce and balsam fir that were grown from seeds we collected in Canaan Valley. Now in its 4th year, this program has already returned tens of thousands of red spruce trees to their original native locales. Through the cooperation of many agencies, organizations and individuals, the importance of this unique ecosystem is being recognized, and more is being done to protect and restore it.

Quickly written recollections:

Friday afternoon, April 7th, I drove to Canaan with a truckload of trees, tools and food. I visited the Wildlife Refuge, where last-minute details were worked out, then on to Whitegrass Cafe where I picked up more food, mainly Saturday evening's dinner. On to the Lanesville Cabin where soon carloads of WVU students, many armed with guitars, banjos, mandolins etc. began to arrive. Corey Bonasso even brought his stand-up bass! As you might imagine, a bunch of students, a cabin, music, bonfire, Dolly Sods Wilderness at hand..... the students had a great time! Dancing outside, staying up late etc. etc.

Spectacular weather awaited the tree planters on Sunday as the crew went to Cabin Knob, the highest point of the refuge, to expand and connect 2 disconnected areas of red spruce. PHOTO COURTESY OF DAVE SAVILLE

Saturday morning, I got up early to get down to the Seneca Rocks Visitor Center to pick up a bunch of tree planting bars we borrowed from the Forest Service, and then on to the Wildlife Refuge where I set up a lunch-making, buffet. I had made a big batch of hummus, and fried up 6 lbs of tofu the night before for vegetarians to make sandwiches with, along with the usual meat and cheese fare. Believe it or not, the partiers, I mean students, from the night before all showed up on time (9am) (thanks Jim) and more were arriving from every direction. Soon Russ McClain showed up with a van-load of D&E College students and by the time we were ready to leave for the planting site we had almost 50 people (maybe more)! Dan Friend, the official WVU photographer, was there too, to document the weekend's events on film.

OH, I forgot to mention the weather. It was still raining, and had been all night long. No worries. On to the site we went. We had over 30 planting bars and dozens of buckets and bags to haul trees in. Although it was still raining, as it would all day long, we set out in groups of 2 to get the trees in the ground. The site was about a mile-long area along the eastern banks of the Blackwater River. A few stands of fir and spruce were there, and we were expanding and connecting them with seedlings. By 3pm we had put 1600 balsam fir trees and 3200 red spruce trees in the ground! Everyone was wet and tired, so we headed back to the cabin where hot showers and naps for many revived the group.

A repeat of Friday night was about to happen, minus the rain. A feast, prepared by Whitegrass Cafe, ensued and everyone had their fill of vegetarian chili, baked potatoes, salad and cornbread. Oh yeah, and of course brownies. A clear sky (finally) meant cold temps (teens). A group of 5 U of Maryland students showed up. They'd had a bad experience wilderness camping in the rain the night before, and were wet and tired, so we took them in. Eric, from Sweden, got a card game going on the kitchen table.

Sunday morning I was again up early, this time to get the buckwheat cakes and sausage cooking. As the cakes were coming off the griddles, the students were there with plates ready to put them on. Out with the lunch fixins, and off to the planting site for Sunday's effort. A change in plans had us up on Cabin Knob planting trees on this highest point of the Wildlife Refuge. There, two stands of spruce, both known sites for endangered species (squirrels) were expanded and connected with the spruce and fir seedlings. The group was somewhat smaller, but 23 of us planted about 1200 seedlings up there on a beautiful blue-sky day with spectacular vistas of Canaan Valley accompanying us. We finished up the day's work by 2 PM and people began to head home, but a few D&E students decided to enjoy a bit more of the sunshine and hiked on for the afternoon. A few WVU students also decided they weren't ready to leave and headed back to the cabin in Lanesville for another night after an afternoon hike in Dolly Sods Wilderness.

Many thanks to: Russ McClain for helping to organize and supervise all this, and for bringing a whole gang of great folks from D&E College to work with the WVU students; Jim Kotcon, faculty advisor of the WVU Student Sierra Coalition who spent the whole weekend with us and was a great help in pulling it all together; Ken Sturm, Biologist at the Canaan Valley National Wildlife Refuge, and Stan Skutek, Refuge Manager, for joining us, and making it all happen on their end; Laurie Little at Whitegrass Cafe for helping so much with the food; Corey Bonasso for rallying and organizing so many WVU students to participate; Thomas Minney and Amy Cimarolli from The Nature Conservancy for their (and their family's) help and dedication to restoring the red

Cory Chase, WVU Student and Canaan Valley native is right at home planting spruce in the Valley.

spruce ecosystem; Melissa Thomas VanGundy, Forest Ecologist at the Monongahela National Forest; Chip and the Chase boys - Cory, Adam and Morgan - for their help and never-ending nurturing and soul sustenance; the WVU Plant & Soil Science Club; Society of American Foresters; Student Sierra Coalition; Wildlife, Fisheries and Parks and Rec students; the D&E College students (and Pete), and everyone who persevered and reveled in the weather and elements to make this weekend a memorable, rewarding and productive experience.

Dozens of WVU photographer Dan Friend's pictures can be seen at http://www.ia.wvu.edu/photo/photo/2006/42006/24075/

Armed with planting bar and red spruce seedlings, Bobby Mitchell is also prepared for the wet weather endured by the nearly 50 volunteers from West Virginia University and Davis & Elkins College.

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West Virginia Highlands Conservancy
Working to Keep West Virginia Wild and Wonderful!

Red Spruce Ecosystem Restoration in the West Virginia Highlands

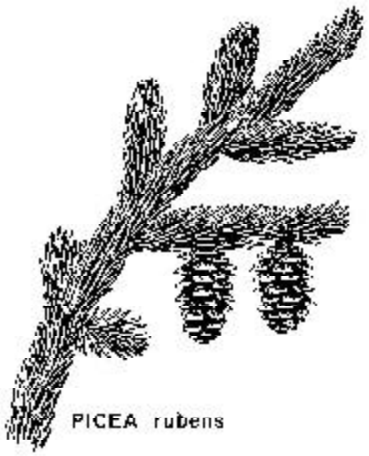
By Dave Saville

Introduction

The West Virginia Highlands Conservancy recently received a grant from the Columbia Gas Transmission, Nisource Environmental Challenge Fund to undertake an important effort to help restore the red spruce ecosystem in West Virginia and promote the use of native species in forest restoration and reclamation projects. Red spruce cones will be collected locally, seeds extracted and seedlings grown to be used by land managing agencies, watershed associations and private land owners for streambank stabilization and stream shading, reforestation, reclamation and restoration projects throughout the West Virginia Highlands.

Red Spruce Ecosystem

Red spruce is a component of the relict montane forest community in West Virginia. Spruce forests of West Virginia are listed as an "endangered ecosystem" by the National Biological Service. They have experienced 85-98% decline from their original range. This plant community has been severely degraded and in some cases entirely removed from the landscape following years of exploitive logging and mining operations and fires. Originally thought to cover as much as 500,000 acres, with some estimates as high as 1 million acres, red spruce and spruce/hardwood forests now cover less than 50,000 acres in West Virginia.



The spruce forest of the West Virginia highlands provide unique habitat for a variety of wildlife species typical of more northern areas such as fisher, snowshoe hare, saw whet owl and northern goshawk. Additionally, the threatened Cheat Mountain salamander and endangered West Virginia northern flying squirrel are found in close association with spruce forests. The lack of suitable red spruce forest and the degraded and isolated condition of existing spruce forest are thought to be the primary reasons for listing the Cheat Mountain salamander and the West Virginia northern flying squirrel under the Endangered Species Act.

There is some data to suggest that red spruce may be making a come back, although very slowly. Research at the US Forest Service Northeastern Research Station at the Fernow Experimental Forest suggests that the growth rates of red spruce, which experienced a downturn in the 80s, are back up and doing fine. Acid rain research has shown mortality effects on red spruce in the southern Appalachians and Adirondacks, but not here in West Virginia. The biggest threats to spruce forests in West Virginia today are development, and a lack of protection from logging on the Monongahela National Forest.

Re-forestation using red spruce

In general, there are two different perspectives regarding plant materials for revegetation; the "agricultural" perspective and the "ecological" perspective. The agricultural approach uses whatever works, is practical, and grows on a site. The ecological approach tends to be more complicated and less understood; it looks at the total function of a plant community (soils, plant interactions, etc.) and what nature would do if left on its own.

Congress has mandated that the Forest Service take a more ecological approach on National Forest lands with the use of native plants in revegetation. Under the Invasive Species Executive Order of 1999, it became the Agency's duty to prevent the introduction of invasive species and restore native species and habitat conditions in ecosystems that have been invaded. Maintaining the rich native flora and associated communities of our National Forest is a critical element of Forest Service Management. The use of native plants for revegetation and restoration is integral to the overall goal of conserving the biodiversity, health, productivity, and sustainable use of forest ecosystems.

Virtually every resource discipline on the Forest has some degree of involvement with revegetation or restoration efforts: wildfire rehabilitation, post logging reseeding, road construction, campground reconstruction, wildlife and fisheries habitat projects, restoration of mineral drilling pads, special uses sites and corridors, soil and water restoration areas, and even restoring conditions in overused Wilderness camping sites. Red spruce is an excellent selection for many of these applications. It grows well on poor soils and disturbed sites and it has also shown some promise with direct seeding.

Indeed, such restoration has been taking place on the Mon for several years. The Shavers Fork Coalition and the Mountaineer Chapter of Trout Unlimited have been using "wildlings," (seedlings gathered from the wild) in streambank restoration work on the upper Shavers Fork River. The Highlands Conservancy planted over one thousand wildlings along the Shavers Fork during its Spring Review in 2000. Many of the wildlings have been gathered from spruce forests at Snowshoe Mountain Resort. The Forest Service underplanted 107 acres of red pine plantations last year with native red spruce wildlings. Some have also been used by the Nature Conservancy at their preserves and by other private land owners. The US Fish & Wildlife Service is restoring Spruce forests on the Canaan Valley National Wildlife Refuge using wildlings.

Second home development and recreational developments in areas such as Canaan Valley and elsewhere often have massive ground disturbing activities that require reclamation and revegetation. Homes and condos and resorts need to be landscaped. Strip mines and mountaintop removal mining disturb vast acreage of land that needs to be reclaimed and revegetated. Logging operations throughout the state are being revegetated by direct seeding and tree planting. Currently Colorado blue spruce, Norway spruce, Scotch pine and other exotic tree species are being used in many of these applications.

The practice of using exotic species is having a serious detrimental effect on the local ecology. Native plants are displaced, often replaced by invasive species that further spread and have impacts far beyond the project site. Animal species dependant on the displaced natives are soon impacted. The Highlands Conservancy, along with the West Virginia Native Plants Society, is strongly advocating the use of native species in restoration and reclamation applications.

Local eco-type

Beyond just using native species, the other important factor in restoration/revegetation, according to Forest Service geneticists and others, is to use *local* native plants or *ecotypes* as opposed to non-local natives. An ecotype is a particular population of plants within a species which, due to genetic differences, has a different physical form (leaf size, height, etc.), resistance to diseases/pests, hardiness, or flowering time that is adapted to certain environmental conditions of a particular area. Genetically non-local ecotypes or cultivars brought in from great distances away from the restoration site may contaminate the genetic material of the local plant communities. Introduced non-local genetic plant materials may contribute to weakening the fitness of local native plant populations and their ability to survive. To preserve biodiversity, which involves species diversity, community diversity, and genetic diversity, we need to be working towards maintaining local native plant gene pools. To the extent practicable, seeds and

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Red Spruce *(Continued from p. 6)*

plants used in revegetation projects should originate from a population of native plant species from genetically local sources.

There were attempts by the U. S. Forest Service to collect seed, grow and plant red spruce in the 1920's and 30's. In 1928 the Forest Service established a new tree nursery in Parsons, WV. By 1931, they could produce 2 million trees per year. During this period, it was the largest tree nursery in the eastern United States, and employed as many as 116 people. The major seedling crop in those early days was native red spruce.

During the summer of 1931, 800 bushels of red spruce cones were gathered on the Monongahela National Forest. The cone picking crew was recruited from the Thornwood and Hunting Grounds area, and the project began at the Gatewood Switch Cabin (Shot Cherry?). At the beginning of each day the crew hiked from the cabin to the mountaintop near Spruce Knob, an elevation of 4,860 feet, to pick the red spruce cones. John King was among the group, he describes the process as follows:

> "The red spruce trees were climbed, and 12-quart galvanized buckets were filled with red spruce cones and lowered to the ground by an attached line. The cones were emptied into large gunny sacks and backpacked down the mountain to camp. A picker would average four or five bushels a day. The sticky spruce gum clung to hands, face, and clothes and each man carried a pint whiskey bottle of coal oil to help remove the viscous mess."

The seed gathering process was repeated annually for several years to ensure a continuous supply of seed for planting at the Parsons nursery. The Nursery grew red spruce from this seed, until 1982.

Historian and retired WVU Forestry professor Ken Carvell explains that during these early reforestation efforts, most of the red spruce seedlings were planted on former red spruce sites which had burned over repeatedly. Soils were thin or non-existent, and the sites were presently covered with hay-scented fern and bracken fern. In some cases a bucket of soil was imported to the site to plant each tree in. These plantings were generally failures with only 5 to 8% survival. Besides the lack of adequate soils, lost from the fires, much mortality resulted when the ferns dried out in the fall and fell on top of the young seedlings. The snows would then drag the seedlings to the ground, smothering them. Since Norway spruce has a much stiffer stem, it could better withstand the competition and matting and soon became the tree of choice for reforestation.

What we're doing

Red spruce restoration efforts thus far have had to use wildlings because currently the only red spruce available is of a Nova Scotia seed source. Being a maritime province very low in elevation and much further north than the spruce forests of West Virginia, it would not be desirable, and could be detrimental, to import Nova Scotia source trees into West Virginia. There are problems associated with using wildlings including damaged root systems, labor intensive harvesting, and poor transplant success. To encourage and facilitate these restoration efforts, the West Virginia Highlands Conservancy has initiated a project to collect local seeds and grow local eco-type red spruce seedlings to transplanting age. We began this effort in the fall of 2003 when 6 bushels of cones were collected from Canaan Valley and Snowshoe Mountain. With the help of Quarterpine Farms' Jim Rockis, the seed was extracted from the cones.


Cones of Red Spruce

Seed extraction is a complicated business. First the cones must be cured for about 6 months. During this time, the cones dry out and the scales open up. This triggers the seeds to be released. They are then placed in a large tumbler which dislodges many of the seeds from the cones. The cones are then soaked in water for several days. This closes the cones and "re-cocks" the triggering mechanism that releases the seed. They are then moved into a large kiln that slowly dries the cones, and as they open back up, the remaining seeds are released. The cones are then tumbled a second time. The extracted seeds are then dewinged, and superfluous inert matter removed, by a large thrashing-like machine that uses screens, brushes and a blower to purify the seed. A "gravity table" is then used which creates a fluidized bed to sort good seeds from bad seeds based on their mass. Seed is then evaluated using an x-ray to determine seed purity and soundness, and then germination tests are done.

The small amount of cones collected last fall has yielded enough seed to get our program under way. We are still awaiting the results from the germination tests, but initial evaluation shows an excellent 114,540 seeds/lb. with 89.8% purity and 98% sound seed. Seed has been sent to the NRCS Plant Materials Center for storage and to two commercial nurseries to be grown.

Providing this seed is a critical component to the larger restoration effort. Once grown, these trees will be made available to land management agencies (U.S. Fish and Wildlife Service, U.S. Forest Service, WV DNR & DEP) as well as private non-profit groups (The Nature Conservancy, Highlands Conservancy, Shaver's Fork Coalition, Upper Elk Watershed Association and others), and the public to increase red spruce habitat throughout the Allegheny Highlands.

With the help of a Columbia Gas Transmission Nisource Environmental Challenge Fund Grant, the Highlands Conservancy will organize and undertake a volunteer red spruce cone collecting effort in September and early October 2004. Cones will be collected from the Canaan Valley National Wildlife Refuge, Monongahela National Forest, Canaan Valley and Blackwater Falls State Parks, and at Snowshoe Mountain Resort. Once grown, these local source seedlings will be planted where existing spruce is not regenerating quickly or in hardwood forested areas where spruce was historically present and could help enlarge an adjacent spruce stand or connect isolated patches of spruce. Additionally, some underplanting of Eastern Hemlock groves in riparian areas is being considered to offset the impacts of hemlock decline from the woolly adelgid, an exotic insect pest killing hemlock trees.

By making red spruce seed and seedlings available to agencies, industry and the public, more of this important local native conifer will be used in reclamation, restoration, revegetation and landscaping applications. We all need to raise our awareness and understanding of the importance of red spruce and its eco-system in West Virginia and the importance of maintaining and restoring native species in the landscape.

HIGHLANDS CONSERVANCY SPONSORS SPRUCE SYMPOSIUM

By Don Gasper

As part of its Fall Review in October, 2004, the West Virginia Highlands Conservancy presented a SPRUCE SYMPOSIUM.

This consisted of three excellent presentations; hopefully some of it can be captured to be of even more use. Dr. Bill Grafton, a Wildlife Biologist, a Botanist, and as much of an Ecologist as we have in the state started it off. He talked on the distribution of spruce historically and today and associated plant species. He noted today's spruce spread over only one-tenth of its original area. Prior to its near complete logging 100 years ago, there is evidence of an old bark beetle attack and fires through Greenbrier and across through Hardy county. Our rhododendron was associated with the original spruce forest and important elsewhere as well. He briefly recounted the reports of our few historians (Fairfax surveyors, Porte Crayon, etc.) and went on to tell us of the spruce today.

It is found on wet and dry sites. It grows better on more fertile sites, but it is found on very infertile sites where little else would grow. Gaudineer and Cheat Mt. are dry sites, as is the Highland Scenic Drive. The rocks and ferns on Mt. Porte Crayon

are dry also. Spruce Mt., Snowshoe, and Roaring Plains are dry. Cranberry spruce however grows mostly in wet sites, and Dolly Sods are mixed.

Spruce is also found at Cheat Bridge, and upper Shavers Fork and in Kumbrabow State forest. It is replaced by some other conifers and deciduous beech and maple at lower elevations. It is associated with larch in Crainsbill Swamp and balsam fir on Blister Run and in Canaan Valley; but most often with rhododendron and ferns and on wet sites with alders. It is often associated with beech, birch, cherry and maple. The Falls of Hills Creek Trail (that many of us had just hiked) has all of these. He concluded nicely with a list of flowering plants that some of us recognized, and he mentioned ferns and some fescue can both "poison" the surrounding soil to prevent the growth of other competing species.

The talk by Tony Jenkins, a Soil Scientist from the U.S. Natural Resource Conservation Service, focused on infertile geology and their soils and the available nutrients. It was on-going research, and he cautioned then some are saying "no impoverishment", either by Acid Rain leaching nutrients over 50 years and/or by the initial geological supply of nutrients.

However, it is becoming clear that in nutrient poor, acid soils fertility is very limited. He noted that declining sugar maple was simply limed (calcium carbonate) and it recovered. He has found in some common wide-spread soils (Gauley, Mandy, Snowdog) overlying infertile geologies did have extremely low levels of nutrients. One site had only 513 total nutrients with 192 of that "plant available". This was the lowest on record - ever, anywhere. He noted spruce produced its own organic acid, and we were shown typical soil profiles. Depth, he noted, could vary from only 2 inches to 14 inches, and soil fauna were not as diverse or abundant as in other soils like the better red Mauch Chunk soils.

Jenkins' talk was preceded by a joint report of the N.O.A.A., U.S.F.W.S. and Canaan Valley Institute research station in Canaan Valley.

"The mid-Atlantic Highland region is known to be adversely affected by the atmospheric deposition of pollutants. Major issues affecting ecosystems in this area are atmospheric contributions to watershed acidification, nitrogen overload, and continuous elevated ozone levels in the non-winter months. Evidence is mounting that Canaan Valley, WV is significantly impacted by these phenomena. Increased acidification to watersheds can lead to toxic environments for fish and other aquatic species, and reduce the immune systems of trees and plants. Increased nitrogen begins to alter the balance between plant and animal life...."

The Spruce Symposium also had a talk by Biologist Ken Sturm on how the U.S. Fish and Wildlife Service was planning to manage their spruce on the Canaan Valley Wildlife Refuge. It was shown to be scattered, and would benefit from plantings that would connect these "islands". Planting stock was discussed.

Do not be concerned that there was some conflicting information reported at this symposium, as some is on-going research. Don Gasper reported on a 2001 U.S.F.S. and Penn State flight over W.Va. spruce, and they were reported to be "healthy" - yet he is concerned about spruce soils and nutrients, and nutrient leaching by acid deposition and acid stream life that drains many of the spruce ecosystems. Further he noted the nitrogen in the nitric acid portion of Acid Rain acts as a fertilizer and this could be very bad for growth when the other required nutrients are in such short supply.

Finally, Dr. M.B. Adams at the U.S.F.S. Research Station at Parsons prepared a brief report. Some of it, unaltered but briefed, follows, and it notes some of

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Spruce Symposium

(Continued from p. 8)

the requirements for the "threatened" northern flying squirrel will influence red spruce management. Everything in it is from peer-reviewed literature - nothing more.

"Since the 1960s, there has been considerable mortality of red spruce in the Adirondacks and northern Appalachian Mountains, and growth declines in the central and southern Appalachians, prompting concern about the sustainability of montane spruce-fir forests in the United States...."

"Dramatic and widespread mortality of red spruce was only observed in the northern Appalachians and Adirondacks of the Northeast. The mortality observed in the Northern Appalachians and the Adirondack mountains is due to winter injury of foliage. Two or more years of winter injury can lead to a decline in productivity and nutrition from which the tree will not recover...."

"Acidic deposition is believed to be a contributing factor to the decline of red spruce related to winter injury events. The acidic deposition leaches nutrients, in particular Calcium, from the foliage, rendering the needles more susceptible to freezing damage. It has been well documented that acidic deposition can make the trees less cold-hardy, and thus when severe winter temperatures are experienced the foliage is damaged. Winter temperatures in the southern and central Appalachians seldom, if ever, reach these critical temperatures, thus there are few, if any, reports of winter injury to red spruce in the southern and central Appalachians...."

"Growth declines were observed in red spruce in the southern Appalachians and in the central Appalachians during the 1960s-1980s, based on tree ring analyses, but significant amounts of mortality of red spruce were <u>not</u> observed in the South. Growth declines observed in the central and Southern Appalachians have reversed in more recent years...."

"Acidic deposition also affects the high elevation red spruce by leaching calcium from the soil and increasing concentrations of available aluminum, although the magnitude of this response is not well-defined. We can demonstrate the process, but not the extent. Low calcium and magnesium concentrations in the soil and elevated aluminum concentrations may result in a reduction in root biomass and thereby limit uptake of water and nutrients contributing to decline. Note that Magnesium deficiency has been documented for red spruce in the Smokies only on a few sites. Evidence of low soil Calcium effects exists in the northern Appalachians and Adirondacks, but not for the southern and central Appalachians...."

"Red spruce is relatively insensitive to elevated ozone concentrations, and ozone is not considered a serious threat to red spruce health."

The symposium certainly presented a lot of information. Perhaps it can be the beginning of ongoing efforts and dissemination of information.

HELP WANTED!

By Don Gasper

We are so fortunate to share magnificent recreational and cultural opportunities in our mountains as residents or as visitors - the apple butter, the fishing and hunting, friendliness, hiking, camping, the beautiful vistas, streams and forests, skiing, berry picking, birding, etc. In participating and appreciating what are often family activities, we invariably reflect upon how dear they are and the environmental problems that threaten or limit them.

For instance, regional air pollution threatens our remotest mountains. It affects vegetation and trout streams and our lungs. Mountain top removal coal mining has caused catastrophic flooding and hardship to many of our neighbors that even if the mining if it were stopped now the hardship will continue for generations. Uncontrolled logging similarly has undermined the delicate ability of stream channels to carry water.

We know these things; but being merely informed and concerned are not enough. We must be a part of the solutions to preserve our unique environment and way of life.

Join environmental and cultural groups. Just your membership will help them with their mission. Talk with friends and neighbors. Initiate contacts with city and county officials about your watershed concerns. Write to state and national elected officials; they generally want to know what their constituents are concerned about. Write to newspapers. Become active in your environmental or civic group. As busy as we are we should make some time to exercise our freedom of speech.

It is the individual American citizen that is blessed with this opportunity to individually or in a group to work to improve our way of life. This is how every reform protecting the land and people has ever been accomplished. It is the individual, just like you, that has made a difference, who has made the time and effort to do what he (or she) best can. This has been responsible for tax easements for a city park, to the National Clean Air Act, the Clean Water Act, and the Surface Mine Act. This is the only way we will ever improve our communities and region.

Particularly, here, we write to those of you with a particular knowledge of, and concern for the Monongahela National Forest, to join us in reviewing a new plan for this nearly one million acres. If you think you can contribute, we hope you will at the same time feel a bit of a duty to do so. Please contact us even if you can only give a little time. Phone the West Virginia Highlands Conservancy. The numbers for officers and administrative officers are listed on p. 2.

CANAAN FIR AND RED SPRUCE RESTORATION

By Dave Saville

The West Virginia Highlands Conservancy has been working for several years for the conservation and restoration of two important members of our forest community, balsam fir and red spruce. Balsam fir is threatened by over browsing from the un-naturally large deer population and an exotic insect pest, the balsam woolly adelgid. Red spruce, while as a species is doing just fine, has been reduced from covering over one half million acres of the West Virginia highlands to about 50,000 acres today.

Balsam fir in West Virginia is unique. It has existed for centuries isolated from the southern fraser fir and the northern balsam fir. It is a unique intermediate between its northern and southern cousins. Native "Canaan" balsam is close to be extirpated from our state. Adelgids are killing mature trees, and there is insufficient natural regeneration occurring because deer are browsing the young tender seedlings.

To combat the problem, we have attempted to protect the genetic material of the various stands of fir by seed banking the seed in long-term storage facilities of the Natural Resource Conservation Service. We have constructed numerous deer exclosures that are serving as refuges and research units for the fir. We have also instituted an aggressive program to grow Canaan Valley balsam fir seedlings for restoration projects on both public and private lands.

Red spruce is a different story. Once covering thousands of acres, it creates a unique ecosystem that is now listed as "endangered" by the National Biological Service. Historically spruce lands have been replaced by hardwoods, and now development pressure is further reducing its coverage. Land mangers in the highlands are just beginning to place more attention on the restoration of this ecosystem.

The Highlands Conservancy has been working to raise awareness to the restoration needs of the red spruce ecosystem. We are encouraging the use of red spruce in reclamation and restoration projects instead of using exotic Norway spruce and Scotch pine. Because red spruce is not a commercially grown species, we have had to initiate our own seed collection effort, and contract with various nurseries to get the trees grown. In 2005, we will have about 11,000 West Virginia source red spruce trees planted in various restoration projects around the highlands including on the Canaan Valley National Wildlife Refuge and Monongahela National Forest.

To develop a big picture, landscape scale, restoration plan, we are bringing together ecologists and GIS technicians. This plan will look at where spruce historically existed, where it is now, and where we can best focus our efforts to connect and expand the many remnant spruce ecosystem "islands" that are widely scattered across the mountains.

Why are we selling seedlings?

Because Canaan fir and Red spruce are not commercially grown trees, seedlings are not available in the private sector. Because of this, we have focused considerable effort in collecting cones, processing seed, and getting it into the hands of growers. We have made available thousands of Canaan fir seedlings over the years, and for the first time this year we will have red spruce seedlings available. While most of these seedlings will be used in the various projects we have underway, we are making a few available to our members. This April we will have "plugs" of both species available. These are container grown 6-12 inches.

Proceeds from the sale of these seedlings will be used to further our efforts on behalf of these two important West Virginia natives. Quantities are very limited at this time. $10 for 10 plugs, or $20 for 25. Send your order to WVHC PO Box 306 Charleston, WV 25321. If you have any questions or would like more information contact Dave Saville at daves@labyrinth.net or 304-284-9548.

The *Highlands Voice* is published monthly by the West Virginia Highlands Conservancy, P. O. Box 306, Charleston, WV 25321. Articles, letters to the editor, graphics, photos, poetry, or other information for publication should be sent to the editor via the internet or by the U.S. Mail by the last Friday of each month. You may submit material for publication either to the address listed above or to the address listed for Highlands Voice Editor on the previous page. Submissions by internet or on a floppy disk are preferred.

The *Highlands Voice* is always printed on recycled paper. Our printer use 100% post consumer recycled paper when available.

The West Virginia Highlands Conservancy web page is www.wvhighlands.org.

The West Virginia Highlands Conservancy is a non-profit corporation which has been recognized as a tax exempt organization by the Internal Revenue Service. Its bylaws describe its purpose:

The purposes of the Conservancy shall be to promote, encourage, and work for the conservation—including both preservation and wise use—and appreciation of the natural resources of West Virginia and the Nation, and especially of the Highlands Region of West Virginia, for the cultural, social, educational, physical, health, spiritual, and economic benefit of present and future generations of West Virginians and Americans.

FORESTS ON THE EDGE

By Don Gasper

A national United States Forest Service. and E.P.A. study issued in February 2003, using satellite images for land cover types found less than 1% of U.S. forests (public and private) were further than 1,350 yards from a road or powerline clearing, etc. that would break up a continuous forest and form an "edge". About half this "fragmentation" they found is caused by small (about 18 acre) holes in the interior forest. Today, "Forest clearing has left relatively little interior forest..." they concluded.

The concern about edges is that their effects are not only on the road or in the edge, but that they reach far into the forest. There is edge species predation and competition with interior species. There are microclimate changes, habitat quality, wildlife migration barriers as well as invasive species (plant and animal). Interior bird nesting is reduced by everything from raccoons to catbirds and bluejays.

"Only recently have biologists begun to examine the effects of roads, which constitute a much smaller population of the landscape but have the potential to create both edge effects and strong barriers to animal dispersal. Our preliminary data show significant reductions in salamander densities and changes in habitat characteristics near forest roads..."

Researchers already know that salamanders are less abundant near forest roads; and that with generally more biomass than birds, they play a vital part in the forest food web. Roads cause edge effects on salamander populations by reducing soil moisture and availability of rocks, moss and trees on the forest floor, and create barriers for terrestrial salamanders thus reducing gene flow among populations. Research will shed light on the degree to which these edge effects have changed salamander behavior and genetic character.

In a recent book with 1000 references Donald Davis gives us much of the following information. In the closed canopy of the great forest that extended across the mountains of the eastern United States in pre-colonial times there were few clearings and edges. Though trapped out later in the 1700's there were beaver and their edges. Also there were woods buffalo (woodland bison) by that time that came into the mountains having discovered deserted Indian settlements and clearings, and they made fields that are some of our high "balds" today. There were always bogs and their edges. The native peoples maintained clearings for cane (bamboo) forage along streams and for their orchards. These were restricted to areas near their settlements. Beyond was the great Appalachian Forest.

This old forest was the "commons" used by many tribes for hunting and commerce. It varied but the trees were generally large, and 200-300 years old, and the tree canopy overhead was closed. There were, here and there, fairly large areas of younger trees resulting from wind and fire. The dynamic throughout, though, was simply tree-fall. Wind surely had a hand in finally toppling a big old tree creating a "gap" in the otherwise closed canopy. In its fall it might bring down another or parts of several trees. The gap was always small, but enough sunlight reached the forest floor for the sun-loving oaks (and chestnut) to regenerate - for they remained an important component of most of this forest.

The gap was typically small, about an acre, but occurred regularly throughout the closed canopy of this vast climax forest. New gaps, as best we know, amounted to only one tenth of one percent of this forest each year. The gap functioned only for 10 years before shade became too great. This meant that one percent of the canopy was composed of functioning gaps at any one time over a vast amount of time and space.

In the southern part of this forest the Cherokee had settled half of their 70,000 square miles. They had clearings, orchards, fields for cattle, and gardens. Their cattle and hogs grazed freely far into the forest. They picked up all the wood on the forest floor for firewood. Beyond though was hunting ground. They sold 25,000 deer skins per year for many years around 1750. Davis reports, 160,000 deer skins were shipped from Charleston, S.C. alone in 1748, and earlier from 1700 to 1715 over a million deer skins in all from the same port.

C.G. Whitney in a 1994 book describes this pre-colonial forest as "big trees covered with epiphytes, and mosses grew on the forest floor. They were generally 200 years old with some even over 300 years old. Fallen woody debris on the forest floor is estimated at 6 to 12 tons/acre for the central hardwoods and 16 to 21 tons/acre in the cooler hemlock/northern hardwood stands". "The English colonists found the dense forest a stark contrast to the sparsely wooded landscapes of their homeland. Stand volumes ranged from 3,000 to 25,000 board feet/acre with a maximum development in multiple canopied white pine/hemlock forests of 100,000 board feet/acre." (W.Va. spruce stands in 1910 covered 300,000 acres with 50,000 board feet/acre.) "Tree heights ranged from 70 to 130 feet tall." Some "tree diameters ranged from 3 to 15 feet". "Forest blanketed 454 million acres with every state 95% forested"; today, 400 years later it is 99.9% cut over.

The U.S.F.S. and U.S. E.P.A. study found a much more fragmented forest today. The opportunity for a large continuous forest today is very limited and a very rare one.

SUMMER CAMP

There is a Junior Conservation Camp run by the W.V. Division of Natural Resources this summer during the week of June 21 - 25. There may be 200 youngsters from 11 through 14 attending. It is well staffed with outdoor experts, all fun, caring people, mostly from D.N.R.

If you have a youngster that is interested in outdoor things, most certainly it will be time well spent. If two young pals go together, it may be even better. The cost is $117 each. Youngsters can arrange to go by contacting the Division of Natural Resources, Building 3, Capitol Complex, Charleston, WV 25035, and by phoning them at 1-304-558-3370.

The Forest Primeval: What It Was and Where It Went

WHERE THERE ARE MOUNTAINS By Donald E. Davis (University of Georgia Press 2000 214 pages)

Reviewed by Donald Gasper

Don Davis writes of the Original Southern Appalachian Forest from 1540 and the time of Desoto's explorations to its first logging in 1900. He details many changes in these just 400 years in this forest and its inhabitants. At only 214 pages of text the book should be read, for it is full of information, and he lists over 1000 references - and this review by Don Gasper is daunting.

"Where There Are Mountains" you have the large, little penetrated, and even less altered, vast, incredibly old forest of the unglaciated southern Appalachians. It is and was a mixed mesophetic hardwood forest; in Desoto's time it was in climax state.

In 1540 there were big chestnuts that comprised often one fifth of the upland forest, in some large areas they were one third.

Oaks and rhododendron made a thick understory in west North Carolina, north of Asheville along the French Broad River, where they found lofty mountains and rough going. There were groves of American chestnut, red oak, chestnut oak, hemlock. Above 5,000 feet were mature stands of towering fir and red spruce. Sugar maples, many 4' thick, were plentiful in mountain coves. Where the occasional openings occurred, there were wild strawberries and pea vines. There were sphagnum and cranberry bogs.

In eastern Tennessee, oak and hickory were common with sycamore in the flood plains. In dryer areas the forest yielded to huckle berries, mountain wild azalea and mountain laurel replaced rhododendron. In the Cumberland Plateau in the 1500's they would find large chestnut, beech poplar, hickory, oak, black gum and sugar maple. Many were 4' - 6' in diameter. In places walnut and cherry dominated. There were 130 tree species and 200 flowers recorded.

The Spaniards introduced smallpox and flu into Florida in the 1520's. It spread to the interior like wildfire. In 1550 Desoto found deserted villages throughout South Carolina. The southern Appalachian natives suffered a depopulation of perhaps 95%. In 20 years large cities were gone.

As the native population died off woodland buffalo (bison) came into the abandoned clearings as early as 1600 from swelling herds in the west. Bison grazed down open fields and meadows and left trails; but few were present in the 1700's, as noted by Bartram in the 1800's, and by 1775 they were gone. Pollen evidence indicates the abandoned clearings were taken over by ragweed and pines.

The Spanish introduced cattle, hogs, horses, mules, donkeys, burros, sheep, goats and chickens - peaches, oranges, figs, watermelons, musk melons, pears, wheat, barley, yams and sweet potatoes and cowpeas.

Through the 1600s the recovering Cherokee and such maintained some of their clearings near their settlements. Clearings

were not large or frequent. They raised river cane (a bamboo) along creeks and rivers for forage for cattle and hogs. They had persimmon, plums, grapes, maize, squash, beans and crabapples, pawpaw, red mulberry, wild cherry, nuts from oaks, hazels, beech. They kept wild turkeys. Oak, beech and chestnut dominated the landscape. Fire was used to make clearings for blackberries, strawberries, and huckleberries.

Near their expanding settlements Indians burned two times per year. River cane, an important forage and used for baskets and on their houses, grew if streamside shade could be eliminated and they used fire to maintain it. Peach trees obtained from the Spaniards by 1600 were carefully tended by the Cherokee. With clearing and care they were an important improved food through the 1600's and the 1700's.

By 1750 the Cherokee had apples and they kept bee hives for pollination. Through the 1600's, Spanish trade provided cloth, and metal knives, hoes, and axes in exchange for furs. Beaver could have been over harvested increasing floods and droughts.

The English displaced the Spanish along the east coast in the early 1700's, but the trade for fur was only increased. The English introduced the apple, onion, turnips and cabbage. From 1700 to 1715 one million deer hides were shipped to England. From 1739 to 1761 over one million deer hides were shipped from Charleston alone. From 1750 to 1800 Cherokee in southeast Tennessee burned cultivated fields and produced maize, sweet potatoes, and beans. In the ridge and valley region there was even more agriculture.

Fire, however, may not have been widespread. Desoto does not mention it. Settlements were composed of only 1000 to 10,000 people and distant. Fires then were local, and less likely in the mountains. Large unintentional fires were unlikely. In all, Davis notes, "great disturbance of the eastern forest by natives is not proven as some present land managers claim."

The Cherokee through the 1700's consisted of 2000 to 4000 families (30,000) people in 70,000 square miles. They settled about half of this; the rest was forest hunting ground. Cherokee and early settlers trapped and success fell by 1760. In 1740 only 600 beaver pelts were shipped from Charleston. (By 1800 beaver were scarcely found in the east.) In 1769 a South Carolina law limited the kill of doe deer and fauns. Trade records show two years earlier professional hunters killed 700 Buffalo in 2 months.

Beaver, gone by 1800, had helped prevent wide spread flooding. Cattle and hogs were grazed from 1750 to 1800 without confinement. River cane was gone by 1800, and in the forest hogs competed with deer, squirrels and turkey for nuts and many plants. They compacted the forest floor as much as they disturbed it. They prevented tree regeneration, and contributed to flooding.

About 1800 the Cherokee nation themselves were across 70,000 sq. miles (today, 6 states) and had about 20,000 cattle, 7600 horses and up to 40,000 hogs. Half this area could be called settled but they were surrounded by vast forests and they herded cattle into the forest - even mountain tops. Near the clearings the large trees stood wide apart; and grass, wild pea-vine growing 6' tall, and flowers covered the forest floor. These reportedly occupied the place of bushes and young forest growth in a number of places for a long time. All downed wood was gathered for firewood.

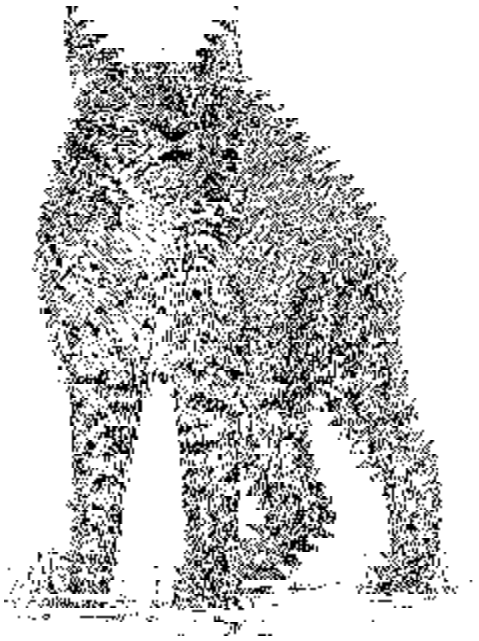
(Continued on p. 15)

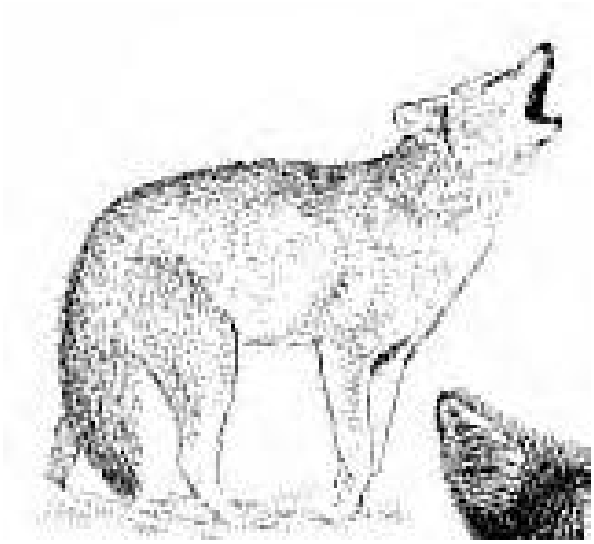
Where There Are Mountins
(Continued from p. 14)

By this time white settlers brought in grass seed: timothy, orchard, bermuda and red and white clover. Cane breaks and adjoining woodlands were turned into pasture. The crow appeared with the whites after 1800. There were a few wolves and mountain lions. Sheep rearing began.

Modern history tells us much more - next is the Civil War. Yellow pines, sweet gum and sassafras grew up in untended fields where corn and wheat had grown. The Cherokee were moved off their lands. Destructive farming for food, tobacco, etc. for several generations of poor white farmers resulted in soil erosion and exhaustion. Logging began, and in 1880 two-thirds of West Virginia was still covered with this dynamic old growth forest. At this time it was composed of large (some 8' in diameter) yellow poplar, chestnut, hemlock, red oak, basswood, beech, maple and spruce. This clearcut logging and fires caused a destruction of the forest floor and great flood adjustments followed. It must be added that the remaining chestnut, as much as 30% of this original forest in the mountains, was killed in the 1920's by the chestnut blight.

Less than one tenth of one per cent of this magnificent old forest remains due to the actions around 1900 of another blight on the landscape of the eastern mountains - called man.





Volunteers Needed— Wind Energy Committee.

The Wind Energy Committee of the West Virginia Highlands Conservancy needs your help. The Highlands Conservancy is committed to protecting "special places," such as our pristine Allegheny ridges, but does not oppose all projects everywhere.

We need help in carrying out this commitment. This requires research, writing, coordination with community groups, and contact with regulators and developers. If you have interest in this issue and have (or are willing to learn) any of these skills, contact: Peter Shoenfeld, (304)866-3484, peter@mountain.net

T SHIRTS

White, heavy cotton T-Shirts with the I [heart] Mountains slogan on the front. The lettering is blue and the heart is red. Sizes S, M, L, XL, XXL, and XXXL. $8 total by mail. Send sizes wanted and check made out to West Virginia Highlands Conservancy to:

Julian Martin
WVHC
Box 306
Charleston, WV 25321-0306

HATS FOR SALE

West Virginia Highlands Conservancy caps for sale. The cap is khaki and the pre-curved visor is forest green. The front of the cap has West Virginia Highlands Conservancy in gold above the I [Heart] Mountains. The heart is red; we and mountains are black. It is soft twill, unstructured, low profile, sewn eyelets, cloth strap with tri-glide buckle closure. $8 by mail. Make check payable to West Virginia Highlands Conservancy and send to

Julian Martin
P.O. Box 306
Charleston, WV 25321-0306.

SHIRTS NOW AVAILABLE IN LONG SLEEVE MODEL

We now have I [heart] Mountains long sleeve shirts in sizes M,L, XL. The shirt is heavy cotton and white with blue lettering. The heart is red. $15 total by mail. Send sizes wanted and check made out to West Virginia Highlands Conservancy to:
Julian Martin,
WVHC, Box 306,
Charleston, WV 25321-0306

36th Annual Spring Review focuses on the Monongahela National Forest

By Dave Saville

The West Virginia Highlands Conservancy met on the upper Williams River May 10-12 for it's 36th annual Spring Review. In a rain soaked spring, we were fortunate to have a weekend of beautiful weather in such a wonder-full setting. The WV DNR's Handley Wildlife cabin served as a headquarters for the event. Folks began to arrive on Friday evening, some from as far away as Tennessee, South Carolina and Illinois. The drive down to Pocahontas County was spectacular as crystal clear blue skies provided unparalleled vistas along the Highland Scenic Highway and elsewhere.

Some folks set up tents, others opted to stay in the cabin, while still others stayed in the Motel in Edray. Bicycling, canoeing, bird watching and socializing were some of the Friday evening activities. Following a Don Gasper lead Saturday morning bird walk, Dave Saville served up some of his now famous Preston County style Buckwheat cakes served with real maple syrup of course. Mollie Moorhead put out a spread of lunch vitals and everyone got to pack their own lunch to take with them on the various outings scheduled for the day.

Several different trips were planned. The one that got most people's attention was a tour of the Forest Service's proposed timber sale on the upper Williams River. This project area includes 16,454 acres of the Monongahela National Forest. Within this area, the Forest Service is proposing the following timber harvests: thinning - 1573 acres, over story removal - 83 acres, two-age - 439 acres, clear cut - 260 acres, timber stand improvement - 1871 acres, crop tree release - 298 acres, beech disease - 302 acres, **total 4743 acres of Logging!!!** In addition they propose 8.3 miles of road re-construction, opening of over 5 miles of currently gated forest roads to public motorized transportation, possibly much more. Marlinton District Ranger Rondi Fischer lead us on this most informative tour. Along with Rondi, other Forest Service folks who joined us were Tom Cain, Fisheries Biologist, Glen Juergans, Silviculturist, and Doug Adamo, Forest Planner. We were also very fortunate to have along Mark and Kristi Donham who are very knowledgeable folks working with Heartwood.

We learned a great deal about mosses while on this trip as Susan Studlar, moss researcher from WVU, came along. It was great to learn more about these often overlooked plants and the unique ecosystems the mosses create. We all got a good laugh when Glen suggested that they are re-foresting mountaintop removal sites. I thought he was going to fall off the mountainside. Tom Cain discussed some of the stream improvements they have planned for the upper Williams River and some of it's tributaries. These include some stream bank stabilization and adding woody debris to headwater streams. We looked at some of the skid trails in the timber sale areas and noted how poorly they had been reclaimed following the previous Forest Service logging. They had not been "outsloped" as the BMPs require, so were carrying water and causing erosion and sediment transport. We were assured that they do a better job now.

Hugh Rogers took another group of folks on a hike into the Cranberry Wilderness Area. They hiked the Big Beechy Trail. This trail travels through carpets of mosses and liverworts in some of the finest Red Spruce forest in the State. They were also treated to finding some rare twayblades in bloom.

Some others of the group took a car tour along the Highlands Scenic Highway. They visited the many vistas, the Cranberry Mountain Discovery Center, Cranberry Glades and the Falls of Hills Creek.

Saturday evening dinner had Mollie mastering the barbecue grill cooking up Wonder dogs and Petite Beef™ hamburgers. An array of pot luck salads and deserts were feasted upon. The Silent Auction started with a couple dozen excellent donated items. It netted us $280. Included were some wonderful hand carved spoons donated by artist Ed Fletcher, a dry bag from Mike Breiding, a hand woven basket, fossils, gems, books and other great stuff. Thanks to everyone who donated and bid the prices up on these items.

The Saturday evening program featured Doug Adamo and Mark Donham discussing the Monongahela National Forest Plan Revision currently underway. The importance of this process was impressed upon us and how imperative it is that we organize and motivate our members and friends to get involved. The revision of the Monongahela National Forest Management Plan is the fist time in 17 years, since 1985, that we have the opportunity to change the direction of the management of the National Forest. What comes out of this revision is how the National Forest will be managed for the next 15 years at least. Please look for more information on this process and how you can help the Highlands Conservancy have a positive affect on the future of over 1 million acres of the best of the West Virginia Highlands.

Hugh Rogers was a pancake making machine as he prepared some of his wonderful blue corn pancakes on Sunday morning. Ruth set out a spread of some great granola with enough sides to call it a feast. The Board of Directors meeting followed, while others lead by Ruth, took a trip to the Cranberry Wilderness, Glades and beyond. Super weekend! Thanks to everyone for coming, participating and helping out. —-*Spring Review 2002 Committee—Carter Zerbe, Cindy Rank, Don Gasper, Dave Saville*

THE REVIEW NEVER SLEEPS

Even before the Spring Review was completely over, President Frank appointed Bob Marshall, Peter Shoenfeld, Don Gasper and unofficial chairman Dave Saville as the committee to plan the Fall Review. If you have any advice, ideas, encouragement, whatever please contact one of them.

COMING ATTRACTIONS:

June 15 Meeting to receive public comment on the Mon Forest Plan Revision, Seneca Rocks 9am-12noon and 1-4pm

June 17 Meeting to receive public comment on the Mon Forest Plan Revision, Elkins, Davis & Elkins College 4-7pm

June 18 Meeting to receive public comment on the Mon Forest Plan Revision, Richwood Public Library 4-7pm

June 20 Meeting to receive public comment on the Mon Forest Plan Revision, Marlinton McClintock Public Library 4-7pm

June 20-22 "Coal Summit - The True Cost of Coal"; Charleston Civic Center

June 24 Meeting to receive public comment on the Mon Forest Plan Revision, Blackwater Falls State Park 4-7pm

June 25 Meeting to receive public comment on the Mon Forest Plan Revision, White Sulphur Springs City Hall 4-7pm

July 13 West Virginia Highlands Conservancy Summer Board Meeting

July 27 Garden Party at Walnut Farm, 1978 Smithtown Road, Morgantown

August 2 Sustainability Fair, Lapaix Herb Farm, Alum Bridge (near Weston in Lewis County)

October 11 - 13 West Virginia Highlands Conseranсy Fall Review

October 13 West Virginia Highlands Conservancy Fall Board Meeting

(*More About the Legislature)*

antideg?) to get rid of the Environmental Quality Board's role in setting water quality standards. It would have replaced EQB with a new Water Quality Board headed by the Secretary of DEP and composed of various department heads appointed by the governor, such as Agriculture, Forestry, and Highways (just imagine Gus Douglas and Randy Dye deciding what our state's water quality standards should be).

Now the environmental community has been no great fan of the EQB over the years, but this new proposal was simply ludicrously unacceptable. Thankfully, House Judiciary Committee Chairman John Amores (D-Kanawha) agreed. Even though the bill was adopted in the House Government Organization Committee, it was never taken up in Judiciary.

Water Quantity Protection

Two separate water protection actions were passed by the Senate and await the House next week. One action is a resolution, the other a statute.

SCR 27 is a resolution that establishes a yearlong, detailed study of water quantity policy in interims, supported by an independent technical/citizen task force that will meet monthly.

SB 650 — the Water Quantity Law — would be the first statute to directly protect West Virginia's water quantity in our state's 139-year history.

Well, that's my report for now. The WVEC lobby team wants to thank the WVHC board for its continuing financial support and assistance during the session.

SOUTHERN APPALACHIAN MOUNTAINS INITIATIVE: FINAL REPORT 2002 ON AIR QUALITY, IMPACTS AND CLEAN-UP

By Don Gasper

The Southern Appalachian Mountains Initiative (SAMI) was a voluntary public-private regional partnership working to improve air quality. Eight Southeastern States lead SAMI. They are Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. Other participants include the U.S. Environmental Protection Agency, U.S. Forest Service, National Park Service, industries, environmental organizations and interested citizens.

State Air Chiefs attended meetings four times per year for the 8 years of the study, for a number of years as many as 4 Governors were present yearly. For the last 5 years the W.Va. Highlands Conservancy has interacted on the Technical Oversight Committee and the Effects Sub-committee. The severe conditions found in Dolly Sods and Otter Creek, and federal law to protect them, set the necessary strong clean-up studied by SAMI in the southeast. This was due to great and prolonged acid deposition and a lack of buffering (low geological acid neutralizing capacity).

The SAMI Mission was to identify and recommend reasonable measures to remedy existing - and to prevent future -adverse effects from human-induced air pollution on the air quality related values of the Southern Appalachians, primarily, those of Class 1 parks and wilderness areas, weighing the environmental and socioeconomic implications of any recommendations.

In 1990 and 1992 the Department of the Interior published preliminary notices of adverse impacts for Shenandoah and Great Smoky Mountains National Parks respectively. These effects included:

Reduced visibility, particularly in summer months

Decline in spruce fir forest ecosystem

Foliar injury to several wildflower, shrub, and tree species

Increase acidity of streams and reduced stream habitat suitable for supporting trout.

SAMI was created in 1992 in response to these Federal Land Managers' concerns about permitting new emissions sources near Class 1 parks and wilderness areas in the Southern Appalachian Mountains. SAMI was established to examine the present and future effects of air pollution on these parks and wilderness areas. It was also to recommend ways to deal with any adverse effects that were found.

SAMI confirmed poor air quality and its adverse impacts. It suggested each state reduce its own sulfur and nitrogen emissions to levels below those planned in the Clean Air Act, and that the Federal Government assist the Ohio Valley States in planning regional reductions.

THE VALUE OF WILDERNESS

By Don Gasper

From the first our American spirit came from this new continent's immense wilderness. Our national character was forged in response to wilderness's challenge. We became courageous, rugged, and self-reliant, ingenious and curious and rugged individualists. These values shape our early history. Even among today's citizens there are those who test themselves by penetrating, for a time, today's limited wild areas. These relic wilderness areas are of enormous and growing value.

These are our links to the original forest and our past. The U.S.Forest Service calls them "ecological anchors in today's fragile landscapes", "aquatic strongholds for trout", and ecological "reference areas for research". "A tap-root into the landscape of our beginnings, they fuel our imagination and ignite our spirit".

The designated Wilderness Areas (144 in the East - they are small) and our parks are the only places our country permanently protects from logging and most other extractive uses. Wildlife habitat is protected and allowed to develop and ecosystems are allowed to function naturally. Wilderness protects watersheds, recharges aquifers, filters pollutants dropped in from the air. We must clean up our air, because "if we are to preserve wilderness, the air over our heads and water in our rivers must be as wild as the land beneath our feet." Wilderness areas are to be places where "the earth and its community of life are untrammeled by man" and places "retaining its primeval character and influence."

That we will need more Wilderness is clear. The Monongahela National Forest affords us this timely opportunity. Our Public Lands Committee is actively involved in these advocacy for the forest. If you want to join in this work, contact chair Bob Marshall at the address listed on page 2.

MORE ON THE CREATION (Continued from p. 12)

chicken barbecue picnic supper and then jammed into a huge tent borrowed from an evangelistic church for a true "come to Jesus"-type wilderness rally the likes of which I have never seen since. As a hard rain pelted down on the canvas overhead, distinguished guests including US Senator Robert Byrd, US Secretary of the Interior Stewart Udall and Monongahela National Forest Supervisor Eaphe Oliver took their seats on the makeshift stage, together with a set of conservationist speakers representing the diverse constituency of the wild Highlands.

I found myself in the role of the "anchor man" of that team of speakers addressing their concerns regarding threats to the Highlands. In the "call and response" speaking style of the late US Senator Hubert Humphrey I did my best to rouse the audience roughly as follows: "Do we want a Royal Gorge Dam? (Nooooo!) Do we want an Appalachian Regional Commission Corridor H highway? (Nooooo!) Do we want a Highland Scenic Highway? (Nooooo!)" and so forth. We were rocking and rolling, and fervently hoping that our policy-making guests from Washington and Elkins got the message. Following that emotional evening, the organizers concluded they had gotten their new group off to a good start.

After I left the Wilderness Society in 1969 to pursue university graduate studies, other TWS staff members including Ernie Dickerman and Doug Scott assisted the West Virginia wilderness classification campaign that contributed to the passage of the Eastern Wilderness Areas Act and other legislation giving West Virginia its initial set of National Wilderness Preservation System units. The lawsuit brought about that time by the West Virginia Division of the Izaak Walton League of America to halt clearcutting on the Monongahela National Forest was so successful that it led to the introduction (initially by West Virginia's US Senator Jennings Randolph) and passage of the National Forest Management Act of 1976 that mandates protection of biological diversity on national forests and set the stage of a new national forest-by-national forest planning process that identifies potential wilderness tracts.

Capping off this story for me personally was my appointment by President Jimmy Carter in 1977 to be the US Department of Agriculture assistant secretary in charge of the US Forest Service. With this leverage I was able to direct that a thorough review be made of all 191 million acres of the National Forest System to create an inventory of roadless areas suitable for consideration as wilderness by the US Congress (RARE II) and to oversee the drafting of regulations interpreting the National Forest Management Act to be sure its ecosystem management thrust and its wildlife habitat-protecting provisions were well fleshed out in the "regs".

It was a pleasure to be involved in these events and to push at every opportunity for maximum protection of the natural environment. Thousands of people ranging from supportive and helpful Forest Service staff though tough back country sportsmen and rock climbers to "arm chair conservationists" who wrote supportive letters to their congressmen have contributed to the success of the West Virginia Highlands Conservancy and its wilderness-protection objectives. More work along these lines remains to be done, but much has been accomplished.

Mr. Cutler was Assistant Executive Director, The Wilderness Society, 1965-69; Assistant Secretary for Conservation, Research and Education, US Department of Agriculture, 1977-80; and is currently a Member, Roanoke City Council, Roanoke, VA, where he has served since 2002. Contact information: 2865 S. Jefferson Street, Roanoke, VA 24014; mrcutler@aol.com; (540) 345-7653.

Swept Trees Amongst Rocks

These mountaintop spruce trees are often hit with fierce winds. Their shape has been severely altered as a result. Photo © Jonathan Jessup

Rare Sub-Species of Balsam Fir Threatened

The West Virginia Highlands Conservancy Launches Rescue Effort

Introduction

The West Virginia Highlands Conservancy (WVHC) as part of its commitment to the preservation and conservation of West Virginia's natural heritage is undertaking a crucial, and indeed urgent, step in preserving a unique sub-species of balsam fir found only in West Virginia. West Virginia's balsam is in serious decline. Most stands found scattered around the highlands have exhibited 80 percent or higher mortality in the last five years. Without human intervention, we may soon witness the functional extinction of this unique gene pool from the forests of West Virginia.

Abies balsamea, balsam fir, is generally considered to be a northern species. A relict of the ice age, this fir once covered the mountains over a much broader area, well into the southern Appalachians. During the last Ice Age, climates in the southeastern United States resembled those of Canada today. As the glaciers receded north the climate gradually warmed, and this northern species migrated northward along with them. High elevations in the southern and central Appalachians allowed pockets of the fir to persist. While once a single species, it is believed that these isolated pockets furthest south developed their own unique characteristics gradually over tens of thousands of years,. These have been described as a separate species. Botanists have named this southernmost species, *Abies fraseri*, or fraser fir (also called southern balsam). Fraser fir is native to some of the mountainous areas of western North Carolina, Tennessee, Virginia and Western Virginia.

The isolated pockets of fir that persisted at high elevations in West Virginia, in Canaan Valley, and as far south as Blister Run on the Upper Shavers Fork River, are still considered to be the northern balsam fir. However, because of their isolation, these trees also developed unique characteristics sufficient to be given the sub-species name, *phanerolepis*.

The Problem

The few remaining pockets of balsam fir found in West Virginia primarily consist of mature trees only. They re-seeded, or were left, following the logging boom of the earlier part of the century. Not being a long-lived tree, stand regeneration depends on a vigorous re-population of seedlings from its abundant, periodic seed crops. In West Virginia, we have not seen this happening. Because of the location of these firs in places where there are dense populations of white tailed deer – places like Canaan Valley – seedlings have not been allowed to reach maturity due to over-browsing. Balsam and red spruce often grow side-by-side, but deer seem to prefer the balsam.

If one were to have visited the many stands of balsam around the state over the years, one would find out

that young trees are a rarity. Unfortunately, if a tree hasn't gained sufficient height to prevent a deer from browsing its leader, it never will have. The bulk of the balsam growing now in West Virginia grew up before the population explosion in the deer herd. If you look down in the grass you might find some balsam seedlings. Take a closer look. They probably have stems bigger around than your thumb, but are only a few inches high. They may be 10 years old but have never outgrown the grass sufficiently because of annual deer browsing. Rarely, a young balsam might grow up in the center of a clump of Alders, out of deer's reach.

Aside from these browsed trees, nearly the entire balsam fir population in West Virginia is in the 30 to 70 year old range. Many have reached maturity and are dying. Compounding the problem, there are some exotic and native insect pests that attack these older, less vigorous trees, hastening their demise. The alarming problem here, is the total lack of any young trees growing up to take their place. Overall there is a serious, rapid decline in the natural stands of balsam. It is possible that within three to five years balsam may be essentially extirpated from the state.

In the earlier part of the twentieth century white tail deer were not common in the mountain counties of West Virginia. Consider these figures: During a 16 year period from 1917 to 1932 only 19 deer were killed in Tucker County (where most of West Virginia's balsam is located). That's just over one deer per year. Even as late as 1961 only 207 deer were killed in Tucker County. Compare this with the hunting records of the numbers killed in Tucker County for 1995: 1,691 bucks, 1,218 antlerless, 337 muzzleloader, 884 archery. And the numbers are rising. According to the National Shooting Sports Foundation, at the turn of the century there were estimated to be only 500,000 white tail deer in the entire nation. Today it has risen to over 18 million.

The Intervention

Recently, an important step in protecting this species was taken by the Dalen Family of Franklin, WV. The Dalens own a very unique property known as Blister Swamp. Blister Swamp gets its name from the "blister pine," a local name for the balsam fir that grows there. The natural stands of balsam in Blister Swamp, as elsewhere, are in trouble. Found there are thirteen rare plant species, two of which are uncommon in the world-at-large. Blister Swamp is also an important bird breeding site. Unfortunately, the Swamp has also been significantly altered by deforestation, livestock grazing, and the influx of aggressive non-native species over the past 100 years. Because of the foresight and appreciation of the uniqueness of their land, the Dalen Family has initiated a conservation and restoration project at their Blister Swamp property.

As John Dalen stated, "The primary objective of the project is preserving and restoring the unique plant life and balsam fir and making a sanctuary for the fir."

Through a cooperative agreement with The Mountain Institute's Appalachian Program, The Nature Conservancy, the US Fish and Wildlife Service, and others, 40 acres of the wetland have been fenced off to exclude livestock and deer. During the summer of 1998, John and Andrea Dalen; Alton Byers,

director of the Appalachian Programs of The Mountain Institute; Rodney Bartgis, conservation director for the West Virginia Chapter of The Nature Conservancy and myself, gathered some balsam fir seed from some of the few remaining healthy trees producing cones that year. The seed is being grown by a professional, commercial grower in Minnesota. There are currently 800 seedlings nearing transplant size to be transplanted to their native location in the newly fenced off portion of the wetland.

The WVHC is taking an important "next step" in preserving the species. Balsam fir produces a seed crop only once every 5 years or so. This year we see an abundant cone crop for the first time since 1996. Because of the rapid rate of decline of the natural stands of balsam, this may well be the last chance to collect seed from the remaining seed trees. It is feared that there may be few seed trees left alive by the time there is another crop.

The WVHC has organized a concerted effort to assist in the rescue of unique gene pool of *abies balsamea*, var. *phanerolepis*. In cooperation with The Mountain Institute's Appalachian programs, The US Forest Service, and the Natural Resource Conservation Service (NRCS) Plant Materials Center, we will undertake an effort to collect significant quantities of balsam seed this summer from all of the major stands of balsam found in the state. The NRCS Plant Materials Center in Alderson, WV has agreed to act as a repository for the seed. While some seed will be stored in environmentally controlled storage units, some will also be germinated and grown at the facility to be replanted in the areas where the seed was collected.

Phase One of the re-introduction process will take place on the upper Shavers Fork River. As part of the WVHC's involvement with the "Healing the Headwaters" agreement [page 1, June "Voice"], seedlings will be grown from seeds collected from the southernmost natural stand of this unique balsam at Cheat Bridge. These seedlings will be used in watershed restoration efforts on the upper Shavers Fork River. The promise in this effort lies in the fact that there is a considerably less dense population of white-tailed deer in this region than in other areas where the balsam grows. Partners in the "Healing the Headwaters" agreement, including the Mountaineer Chapter of Trout Unlimited, Shavers Fork Coalition, The Mountain Institute, the WVHC and others have already undertaken significant steps in restoring this watershed from the degradation of past mining and logging activities. Future restoration efforts will use the balsam seedlings in streambank stabilization, stream shading and other re-vegetation components of the effort.

The Procedure

To accomplish our ambitious seed collection goals, we are organizing a volunteer effort the weekends of July 29&30, and August 19&20. We will travel around the highlands to collect cones from as many stands of fir as possible. We are still negotiating with the various land managing agencies to get permission to collect seed. There are necessarily many hoops to jump through. So far, we have permission to collect seed from the Shavers Fork stand at Cheat Bridge – Ken Rago, Ranger on the Greenbrier District of the Monongahela National Forest, has been very cooperative and supportive of our efforts. We also have tentative agreement with Canaan Valley State Park, where there are several

remaining stands of balsam. We are still looking into the possibility of collecting seed from the Freeland Run stand on the Canaan Valley National Wildlife Refuge and a beautifully healthy stand on Dolly Sods. All the seeds collected from the various locations will be kept separate, and will one day be grown and replanted at the same or nearby sites. Of course the scope of this project is very long term – growing and replanting plans will be developed as time passes and additional research is conducted.

Fir cones are unique in that they stand upright on top of the branch, differing from other coniferous genera. The cones are found only in the highest branches of the tree. When they ripen in the summer, the seeds and scales dislodge from the central axis of the cone and shower to the ground. The whole, intact cone never falls off the tree. Years after the seed crop, cone axes can still be seen on the branch. Gathering seed from trees requires the use of extension ladders to climb the tree and pick each cone individually. Some of the trees will be readily accessable, others will require hiking various distances. The success of our effort will depend on how much help we get. If we can put together several teams, we will be able to get to more stands of trees. The window of opportunity is very small between when the seeds ripen and when they dislodge and fall to the ground.

How You Can Help

We need volunteers the weekends of July 29&30 and August 19&20 – folks who would be willing to climb, carry ladders and equipment and haul cones out of the woods. We also need funds to help defray costs involved. If you would like to help, or would like more information, please e-mail Dave Saville at <daves@labs.net> or call (304) 284-9548. If you would like to make a contribution to this effort, you can send a check to WVHC, PO Box 306, Charleston, WV 25321, and earmark it for the balsam fir rescue effort.

Didn’t someone famous once say, "the most important part of intelligent tinkering is to save all the pieces?" In our ever-increasing manipulation of our natural ecosystems, it is important to protect the species that makes West Virginia’s forests among the most diverse on earth. Although West Virginia’s balsam is not an important tree to the timber industry, it does have considerable value to the horticultural and Christmas tree trades. Besides that, anyone who has seen the steeple-like spires or smelled the heavenly scent of balsam would agree that this species is worth keeping as a part of our natural heritage. In the mean time, research goes on as to the exact reasons for the balsam’s decline and how to reverse the trend. At least we will have saved the pieces.

Canaan Cone Collecting - Part I

Or, Watch Them Thunderbolts When on Them Ladders!

(Part II of the Adventures of the dedicated Coneheads will appear in the October Highlands Voice)

By Dave Saville

We had a great, somewhat wet, bountiful, fun, enlightening weekend (July 29 & 30) in Canaan. Overall, a huge success! We had about 20 volunteer balsam fir cone gatherers on Saturday and about 12 on Sunday. We spread out with as many as eight ladders -- 4-40 foot, 1-32 foot, and 3-20 foot ladders up on the trees with climbers on each one. We collected data on each tree, tagged them, and kept cones from each stand separate. We have collected several bushels of cones from over 100 trees in 4 stands on the Canaan Valley State Park, 3 stands on the Canaan Valley National Wildlife Refuge and 2 sites on private property in the Valley. Some collectors were so engaged as to stay over until Monday to pick up a couple stands we were not able to get to during the weekend.

This morning I will spread the cones out on racks to cure. In a few weeks, when they are good and dry, we will tumble them, to break them apart, then use a "windmill" to separate the seeds from the rest of the cone parts. The Natural Resource Conservation Service's Plant Materials Center in Alderson will then begin stratification of some seeds to germinate, and put the rest into storage.

All the seeds will remain the property of the land managing agency, or property owner, of where the seeds were collected. In the near future we will begin a cooperative restoration planning process with everyone involved.

The tenacious volunteers need to be thanked, not only for the success of their efforts, but also for braving frequent afternoon thunderstorms. Nobody moved so fast as the climbers scurrying down the aluminum ladders (dubbed "lightning rods") when the thunder began to roll in. There was more than enough work for the rest of us, who don't care for heights, to keep track of the data, the cones, tags and getting the ladders up into and out of the trees. We even succeeded in getting Jeff Young from West Virginia Public Radio up into a couple trees. (He aired his story on his experience on the radio a few days later).

On Saturday, Siriannis Restaurant in Davis provided some great pizzas for lunch, including a couple of Wally's vegetarian specials. Um, Um good!! On Sunday, Laurie and Chip Chase, of the Whitegrass Ski Touring Center and Cafe fame, (well known folks to Highlands Conservancy members and Canaan Valley locals as well), hosted us for lunch at their beautiful new home. We also had mascots "Scout," the black lab, and "Belle"(Ding Ding), the Champion, and working, Bloodhound to help with the entertainment, if not the work.

From forty feet up, atop a spiring balsam tree, the view is incredible. Once over the unease caused by a shaky, swaying ladder, you could enjoy the view of the surrounding treetops and landscape. Although almost breathtaking, the splendor of the vista was somewhat dampened by the site of so many gray, dead skeletons of once lush, dense, blue-green balsam fir treetops. The extent of the devastation brought by the exotic balsam woolly adelgid is very saddening indeed. Many stands we had considered for collection were so far gone as to not have any trees left healthy enough to produce any seed. The plague seems to spread through a stand like a wave, where one portion of a stand is completely decimated, and another still healthy, and just beginning to become infested.

Our collective thoughts during the weekend seemed to lead to what seems like another logical human intervention – protecting some of the remaining naturally existing fir trees. The adelgid is very easily controlled by several means. Perhaps the safest, and most environmentally friendly, is by spraying the trees with dormant horticultural oil spray during the winter months. This is an insect control method long used by organic gardeners (which includes use apple orchards). The adelgid does not fly – they live their entire lives on the host tree. In the winter, only the immature nymphs of the adelgid are present. Our next step in sub-species conservation may be to identify accessible, isolated, compact stands throughout the state, and implement a treatment program.

We will be back at our cone collecting duties on Saturday, August 19. We will meet at the Greenbrier Ranger District Headquarters in Bartow at 8:30 AM, and proceed to Blister Run of Shavers Fork to spend the day with our ladders and burlap sacks. On Sunday August 20, The Mountain Institute's Appalachian Program will lead a team of Cone Collectors to Blister Swamp to collect cones from the few trees left there. I will be on a badly needed vacation much of the time between now and then, but do hope to check my e-mail occasionally. Anyone interested in helping on August 19, should drop me a line at daves@labs.net or (304) 284-9548. I'll be home on the 15th and will get back to you then.

[note: this article was written prior to the August dates mentioned above.]

Canaan Cone Collecting - Part II

Or, Cones, Cones, and More Cones

By Dave Saville

We met at Shot Cherry Cabin on Friday evening, August 18th. Mike Breiding was first to arrive, by now a seasoned cone collector. This weekend Betsy came along with him. I met Bob Churby at Cheat Lake, and we arrived at the Cabin just at dusk. Rain fell during the whole trip, sometimes heavy. Frank and Barb Slider and friend Ann Dillaman pulled up right behind us.

After a good breakfast, we headed down the mountain to Bartow and met Peter Shoenfeld, Bill Hitt, Bill Grauer and Matt Mongin. We drove up Cheat Mountain to the work site. This day we would be picking balsam fir cones from trees in the southernmost natural stand of balsam on the continent located at Cheat Bridge on the Upper Shavers Fork of Cheat River. When we arrived we were met by West Virginia Native Plants Society members Chris Gatens and Kevin Campbell. We got right to work getting the ladders off the truck and into the woods. Arming ourselves with gloves, sacks, clipboards with data sheets, and tags, what we found was lots of water. Although sunny at the time, it had rained for 2 days prior to our arrival. Compounding the problem, beavers had moved in and built new dams making Blister Run difficult to ford. There was good reason to call this place Blister Run Swamp today. We didn’t waste any time in getting the ladders up into the closest trees. Although several trees had cones in them, they were not as numerous as what we had found in Canaan Valley. This meant we would need to get up into many trees in order to collect a significant amount of seed. Bob Churby and I went on a reconnaissance mission to locate accessible trees with cones. We use 40 foot extension ladders, but because of the height of these trees, and the fact that the cones are located in the very top of the tree, most had cones that were out of reach. Several of the workers took a break and set up a great lunch buffet in the shade of a CCC red pine plantation.

By 3:30 PM, we had depleted our energy so we began to pack up the equipment and get the trucks loaded up. Having climbed over 50 trees, we were successful in collecting over 3 bushels of cones. After stopping by the Cheat Mountain club for a quick visit with Jason and Carl, we arrived back at Shot Cherry Cabin about 5 PM, and had enough time to clean up before heading "out to dinner." The Mountain Institute’s Spruce Mountain Campus is just 2 miles down the road, and Alton, Marcie and Ryan had invited us to join them during their Family Weekend for dinner. We arrived at the campus to find parents constructing bat boxes with their kids. Wonderful smells were coming from the kitchen where Natalie and Brent were busy preparing the meal. We cone pickers mingled with the families and helped put the finishing touches on the bat boxes. After dinner everyone gathered in the main classroom where I presented a talk about our balsam fir conservation project. We headed back to Shot Cherry Cabin and it wasn't long before "lights out."

On Sunday, a few of us met at the Pigs Ear, and joined Alton Byers from the Mountain Institute and Rod Bartgis of The Nature Conservancy and collected cones from a few trees at Blister Swamp on the Dalen Farm. We had a great afternoon as Rodney led a tour of the swamp and it's many unique features. Some of us stayed at the house and enjoyed talking with Sugar and John. Our cone collecting endeavors are now complete.

Our goal was to collect cones from as many stands of balsam fir from around the state as possible, thus protecting any genetic diversity that exists within the sub-species. We were successful in getting seed from 11 separate stands within it's 50 mile range. We collected cones from every major stand of fir except the one on Big Stonecoal Run of Red Creek. We did enjoy a warm, welcome and appreciative relationship with the US Fish and Wildlife Service for gathering cones on the Canaan Valley National Wildlife Refuge. Canaan Valley State Park folks were very cooperative in giving us access to the fir trees there. In addition, On August 18 we were allowed access to trees by Ryan Bidwell and several other private property owners. Mission accomplished! Greenbrier District Ranger, Ken Rago issued a limited permit to collect seed at Blister Run.

The Natural Resource Conservation Service is now undertaking the seed extraction, stratification, and germination procedure for some seed, and will seed bank the rest.

Balsam Fir: Does it have a Future in West Virginia?

By Dave Saville

Balsam fir is a northern species of tree that reaches its southern continental limit here in West Virginia. Isolated pockets of this fir have remained at high elevations as remnants of the last ice age. The future of these trees is threatened by the lack of stand regeneration due to the over browsing by the seriously overpopulated herds of white tailed deer in West Virginia, and an exotic insect pest that is killing mature trees. The West Virginia Highlands Conservancy has been working for several years to find ways to prevent the extirpation of balsam fir from the state.

The balsam wooly adelgid is a sucking insect from central Europe. It was accidentally imported into this country at the turn of the century. It has decimated the natural stands of Fraser fir found in the southern Appalachians and is now wrecking havoc on the few remaining stands of balsam fir found in West Virginia. Their presence in a stand of fir is devastating. Their infestation kills mature trees 20-30 years of age and older. Younger, more vigorous trees seem to fend off their deadly attack.

In the southern Appalachians, the mature trees in the stands of Fraser fir have all been eliminated. Because there is not a serious overpopulation of deer in the high elevations where the Fraser fir grows, a vigorous understory of younger trees has come up in their place. Fir trees reach sexual maturity at 10-12 years of age, when they begin to produce abundant, periodic cone crops. These cone crops only occur about once every 5 years. Therefore, a tree might be expected to produce only 2-3 crops of cones in its lifetime, before succumbing to the effects of the adelgid.

The few stands of balsam fir found in West Virginia are in serious decline. Some have had virtually all the mature trees eliminated. The future of these stands is threatened because, unlike the Fraser in the southern Appalachians, there is no stand regeneration. Despite abundant seed crops, there are no young trees replacing the older trees killed by the adelgid. With deer populations in West Virginia being as much as 100 times greater than their historical numbers, any balsam fir seedlings don’t stand a chance of surviving against the ravenous appetites of these herbivores. In the face of a wildlife management agency unwilling to manage the deer herd in a responsible way, without some intervention, we will watch this species completely disappear from our state in a few short years. Of course, it isn’t only the balsam fir that is adversely affected by deer overpopulation. Dozens of species of plants are threatened and even the overall forest ecology is being seriously altered from their over-browsing.

Last summer Highlands Conservancy volunteers made a serious effort to preserve this unique species by collecting and seed banking seeds from several stands of balsam fir found scattered around the West Virginia Highlands. Since then, we have redirected our attention to other ways of protecting this unique Mountain State native. In June of this year, a gathering was held at the Canaan Valley National Wildlife Refuge to discuss the plight of these trees. Biologist Ken Sturm, and other US Fish and Wildlife Service staff, assembled over 30 individuals with diverse backgrounds to discuss the issue. Entomologists, ecologists, biologists, botanists, foresters, and other experts came from several West Virginia agencies, as well as researchers from West Virginia University, Ohio, North Carolina and

Pennsylvania. Short term and long term conservation strategies were discussed. With the help of so much expertise, there is real hope that there is indeed a future for balsam fir in West Virginia.

Long-term strategies focused on finding solutions to the adelgid problem. Natural resistance, predators, and treatments are being researched by several institutions. In addition, concerned citizens must put increased pressure on the West Virginia Department of Natural Resources to reduce the deer populations. This agency has historically been reluctant to do this because they do not feel a responsibility to the citizens of West Virginia, but only to deer hunters that purchase hunting licenses, thus supplying them with a pay check. This unwillingness to manage the deer population responsibly has led us to a short-term strategy of erecting deer exclosure fences around stands of balsam fir to allow for natural regeneration.

Since there was an abundant cone crop in the summer of 2000, there is now a significant amount of seed germinating in the soil of these stands. In another 3-4 years, when we might expect another seed crop, there may not be any mature trees left to produce cones. There is therefore a sense of urgency to protect the seedlings germinating in these stands now. We hope to assemble some resources and volunteers to erect several deer exclosure fences in stands in several locations.

How you can help!

On Saturday October 20th, we will erect the first deer exclosure on the Canaan Valley National Wildlife Refuge. We are looking for volunteers. We will meet at the parking lot on Freeland Road at 9AM. Wear boots, bring gloves, post hole digging tools, hammers, etc. Come prepared for extreme weather, but hope for the best. We'll be working all day, and in the event we don't finish the job on Saturday, we will return on Sunday. We'll supply snacks and lunch for all our volunteers. Come on out to visit the Nation's 500th National Wildlife refuge, and the cumulation of over 25 years of Highlands Conservancy's efforts to protect this most unique and ecologically valuable of all landscapes in West Virginia. For more information contact Dave Saville at daves@labs.net or 304-284-9548.

Keeping Beasts from the Balsam

By Dave Saville

On Saturday October 20th, about 20 volunteers from the Highlands Conservancy and the Friends of the 500th (Wildlife Refuge) gathered on the Freeland Run tract of the Canaan Valley National Wildlife Refuge to erect a deer exclosure fence. This exclosure will demonstrate the effects of over-browsing and protect the dwindling stand of balsam fir. Blue skies and warm weather greeted us as we met at 9 AM. Wildlife biologist Ken Sturm had all the materials ready for us as we began drilling fence post holes with a power auger. We used 12 foot long 6x6 posts and 8 foot woven wire to build the structure. The Highlands Conservancy provided the volunteers with beverages and pizza from Sirianni's Restaurant in Davis. From digging holes, setting posts, building corner braces and hanging the wire, there was plenty of work to keep everyone busy.

We hope that by keeping the deer from browsing on the young fir trees a new generation of trees will grow up to replace the mature trees which have been negatively impacted by the Balsam Woolly Adelgid. This exotic insect infests mature trees and eventually kills them. Because of the overpopulation of white-tailed deer, there has been inadequate regeneration for stand replacement. Thanks to everyone who came out to help. We hope to build some more of these exclosures in the future.