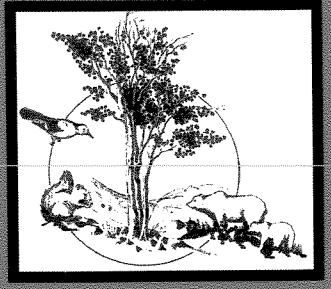
Spring | Summer 2003

Nutcracker Notes

Whitebark Pine Ecosystem Foundation



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WPEF
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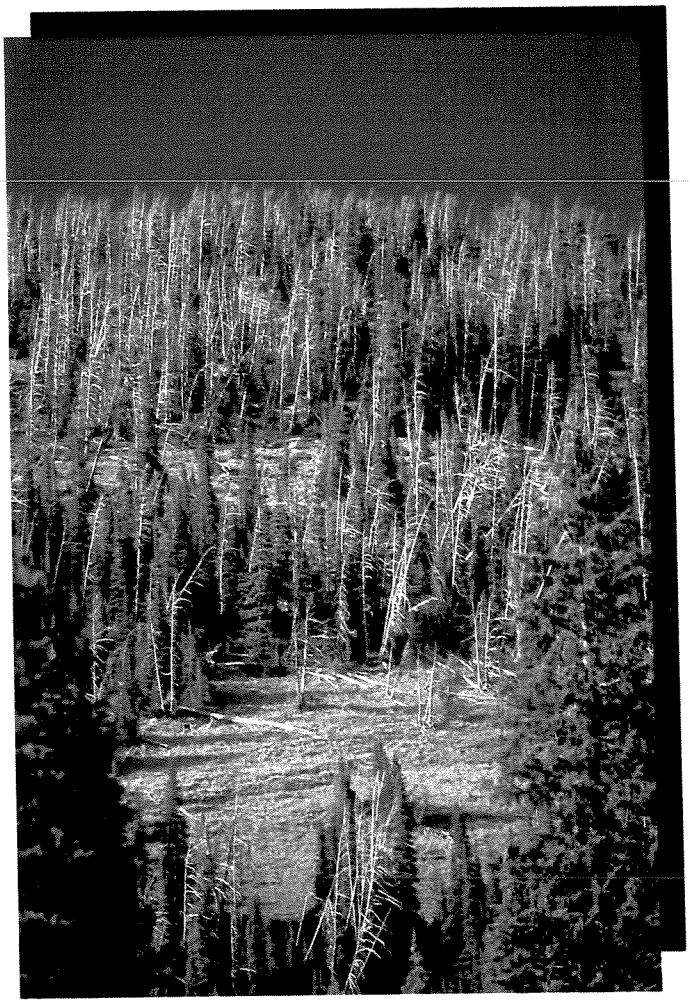
Whitebark Pine in Canada: Photo Essay

Collecting whitebark pine cones in the British Columbia Coast Range, near D'Arcy. Photo by Andy Bower.



Dead whitebark pine in Waterton Lakes National Park, Alberta. Photo by Lorne Fitch.

Whitebark pine regeneration atop Lime Mountain, B. C. Photo by Andy Bower.

WPEF's Mission:

Counteract the decline of whitebark pine, a keystone species of high-mountain ecosystems in western North America.

Director's Message

Diana Tomback
Director of the Whitebark
Pine Ecosystem Foundation

Coincidentally, I am writing this message on Earth Day, 2003, which gives rise to some reflection on the role and mission of the Whitebark Pine Ecosystem Foundation within a more global context: preserving North American biodiversity and vital ecosystem functions. The over-arching purpose of the WPEF is "to counteract the decline of whitebark pine ecosystems." Whitebark pine is threatened both by fire suppression practices leading to successional replacement from shade-tolerant conifers, and the spread and intensification of white pine blister rust. These two challenges have led to a serious decline in whitebark pine ecosystems throughout the northwestern United States and southwestern Canada. In Canada, blister rust now occurs everywhere within the range of whitebark pine, raising urgent questions about the future of the species in its northern range.

Translated into practical terms, "counteracting the decline" means keeping whitebark pine communities on the landscape through hands-on management, and enlisting public and government support for this effort. Where fire exclusion has resulted in loss of whitebark pine through successional replacement, management actions include prescribed burns and silvicultural treatments, which eliminate competition from shade-tolerant conifers and provide regeneration opportunities for whitebark pine. However, blister rust presents an even greater challenge to forest management, because rust-infected trees lose their ability to produce seeds, essentially precluding natural regeneration. The only effective strategy we have against blister rust is to identify rust-resistant trees, and plant their seedlings or seeds. The reality of our management need is harsh—no quick fix here: Restoring both successionally advanced whitebark pine communities and combating blister rust will require decades of work. Blister rust cannot be eliminated from our North American forests. The best we can do is "naturalize" the rust over time, with the spread of rust-resistant genes. Management for blister rust and advancing succession needs to be built into the planning process for all national forests, parks, and wilderness areas.

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WPEF Facilitates Grant to Assess Whitebark Pine in Canada and U.S.

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This summer will see a major assessment of the health of whitebark pine in the northern Rockies, from the Waterton-Glacier International Peace Park to Willmore Wilderness Park north of Jasper, Alberta, on both sides of the Continental Divide. The project is receiving funding from the Wilburforce Foundation through a Y2Y Science Grant to the Whitebark Pine Ecosystem Foundation, the Species at Risk Program of Parks Canada, the Parks Canada Western Canada Service Centre, and in-kind support from Glacier, Waterton Lakes, Kootenay, Yoho, Banff and Jasper national parks. Other collaborators are Alberta Sustainable Resource Development, the Alberta Natural Heritage Information Centre and Selkirk College.

A baseline sample on the distribution, health status and population age structure of whitebark pine populations is necessary to assess the extent of the blister rust problem, to project possible outcomes, and to monitor the success of any future restoration activities carried out in the study area. This population information is also critical to a status assessment under the Canadian Species at Risk Act (SARA).

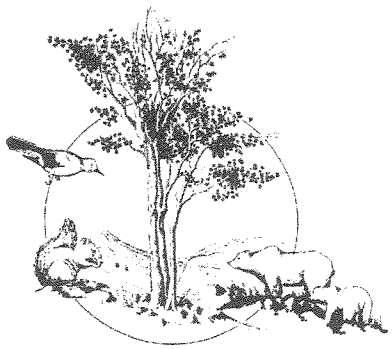
Study objectives are to determine the number of mature individuals capable of reproducing, the population age structure and population trend, and to identify areas where connectivity between populations has been lost and restoration is required. The specific objectives are to:

- Re-survey at least 50% of the 182 whitebark pine assessment plots established in 1995-1996 in the Peace Park to determine the rate of spread in blister rust infection, canopy kill (which leads to loss of seed production) and mortality.
- Assess the extent of blister rust infection, top kill and mortality in whitebark pine through the rest of the study area by surveying a geographically stratified sample of stands representing different elevations, aspects, successional status and forest types.
- Identify potentially rust-resistant individual trees among highly infected stands.
- Identify potential areas for whitebark pine restoration activities at the landscape scale. These areas either have high mortality or high infection rates, and/or have experienced advanced succession and loss of whitebark pine through competitive exclusion.

Whitebark pine stands will be identified through mapping of known occurrences and potential habitat. These maps, and local knowledge, will be used to stratify the study area, identifying plots to be surveyed across the range of habitat diversity and geographical extent in the study area. Plots that are accessible directly by motor vehicle, mountain bike or foot will be preferred. Opportunities to utilise helicopter flights for access to remote areas will be investigated with various agencies.

A protocol for assessing mortality and infection rates of whitebark pine, under development by a multi-disciplinary committee of the Whitebark Pine Ecosystem Foundation (WPEF), will be the main part of the methodology used during surveys. This protocol is compatible with methods used in previous surveys in the study area. Disease incidence, top kill and mortality rates, and causes, will be calculated for all survey plots. Comparisons will be made across geographical regimes (e.g., north to south, east to west). Age/size distribution will be calculated.

Whitebark pine restoration requires knowledge of the distribution and size of populations in addition to understanding the effects of blister rust. In areas of 85% or greater infection rate, the remaining cone-bearing trees may be genetically resistant to blister rust. This survey will identify populations that are important as source populations for natural recolonization, seed collecting for gene conservation, and for outplanting of resistant stock. These remnant cone-bearing populations are also a high priority for restoration through prescribed fire and/or mechanical treatments.



Parks Canada Whitebark and Limber Pine Workshop

Diana F. Tomback, WPEF Director

Those of you who have checked our web site recently have probably noticed that we have posted the proceedings of a Parks Canada workshop. This posting was requested by Sal Rasheed of Parks Canada, which is the Canadian equivalent of the National Park Service in the United States. The workshop was held February 18 and 19, 2003, with about 30 participants representing Parks Canada, the Canadian Forest Service, Natural Resources Canada, Pacific Forestry Centre, BC Ministry of Forests, Alberta Sustainable Resources Development, Alberta Community Development, Alberta Parks and Protected Areas, University of British Columbia, Selkirk College, several consulting companies, and 4 people from the U.S. The workshop turned out to be a remarkable experience—particularly with respect to the high level of interest in and concern expressed for the future of whitebark and limber pine in their northern ranges.

The objectives of the workshop included opportunities to provide updates on research on whitebark and limber pine, for Canadian researchers and managers to connect with U.S. researchers to identify common monitoring and restoration goals, to identify key knowledge gaps and prioritize research, and to foster trans-boundary cooperation and guidance. The first presentation, by Peter Achuff, National Botanist in Parks Canada, caught everyone's attention immediately. Dr. Achuff told us how the recent passage of Canada's first endangered species legislation, the Species at Risk Act (SARA), could provide a major opportunity for the conservation of whitebark pine and limber pine. He walked the audience through the SARA process. Apparently, whitebark pine and limber are seriously being considered by Parks Canada for SARA protection.

There were 11 other presentations, and I will mention some of these. Bob Keane spoke about prescribed fire and silvicultural techniques for whitebark pine restoration, and I gave an overview of the status of whitebark pine in the United States, gaps in knowledge, and political challenges to restoration. Stefan Zeglen summarized his recent blister rust survey of whitebark pine in British Columbia, and two students from Sally Aitken's lab at the University of British Columbia, Andy Bower and Jodie Krakowski, presented their genetic studies of whitebark pine. Brian Geils from the U.S. and Richard Hunt discussed aspects of the pathology of blister rust and rust resistance. Anna Schoettle from the U.S. presented her studies of limber and bristlecone pine, including common garden genetic work to determine seed transfer guidelines. Brendan Wilson discussed the prescribed burning and monitoring program recently initiated by National Parks in the Canadian Rockies. Other talks presented information on the status and management of whitebark and limber pine.

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Whitebark Pine as Part of Education in Fire Ecology

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Most school children can tell a conifer from a broad-leaved tree. Of course, they won't be perfect. They are likely to call the conifer an "evergreen" (which will be confusing when they meet their first larch) or a "pine" (which will be confusing when they are asked to find a spruce). But ask them to distinguish between whitebark pine and any other conifer, and they are really in trouble. The Whitebark Pine Ecosystem Foundation hopes to convince the general public that whitebark pine is a special tree that is in trouble—requiring our attention, research, and investment for its continuation in the ecosystem. How can we do that, if they think every needle-leaved tree is a pine, and all pines are pretty much alike?

Education has to be part of the answer. One educational program that features whitebark pine ecosystems and their special properties is the *FireWorks* program (Smith and McMurray 2000), developed at Missoula's Fire Sciences Laboratory and now implemented throughout Montana, northern Idaho, and in many other locations in the western states. *FireWorks* uses hands-on activities to help children and adults learn about the role of fire in forests dominated by ponderosa, lodgepole, and whitebark pine. By thinking about these 3 forest types in every activity, students learn that tree species differ in their habitat needs and adaptations to fire, and that fire plays a unique, crucial role in each ecosystem.

FireWorks consists of a curriculum and a trunk full of laboratory materials, specimens, books, posters, and other resources. The curriculum, containing 36 activities for students in grades 1-10, is available from the Rocky Mountain Research Station (download from http://www.fs.fed.us/rm/pubs/rmrs_gtr65.html or request a copy of Gen. Tech. Rep. RMRS-GTR-65 from rschneider@fs.fed.us). Trunks are available for loan from more than 30 locations in the western states and Alaska; locations are listed at http://www.firelab.org/fep/research/fireworks/trunks.htm.

What Does *FireWorks* Teach About Whitebark Pine?

Fire tells a complex, unique story in whitebark pine forests, and that story differs dramatically from fire's story in ponderosa and lodgepole pine. Those differences provide a rich context for learning about fire. As students study fire behavior, for example, they

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Proceedings of the Parks Canada Workshop on Whitebark and Limber Pine February 18-19, 2003, Calgary, Alberta

Editor's Note: The proceedings contents are listed below. The proceedings can be accessed and downloaded from WPEF's web site (www.whitebarkfound.org).

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Whitebark Pine Electronic Mailing List Now Available

You are invited to join a new USDA Forest Service electronic mailing list: (whitebark@srs.fs.usda.gov). This group will encompass whitebark pine, and other high elevation white pines, across its range. It will deal with issues pertaining to current status, restoration, blister rust resistance, genetic variation, cone crops, potential joint studies, news of recent publications, etc. If you are interested, contact Richard Sniezko (rsniezko@fs.fed.us) for further information. Other lists are also available for those interested in blister rust resistance in white pines and forest tree pest resistance. An online subscription form is available (www.srs.fs.usda.gov/list/usdafs.htm).

Whitebark Seedlings for Horticultural Use

Ecologist Ron Mastrogiuseppe reports that a small number of grafted whitebark pine seedlings that appear robust and suitable for landscaping in full sunlight situations are available through Ray and Peg Prog at Forest Farm Nursery, Williams, OR. The Nursery's hours are 8 am to 4 pm. Phone 541-846-7269.

WPEF Annual Meeting and Field Trip

Please note that the Whitebark Pine Ecosystem Foundation's third Annual Meeting and Field Trip will be held at West Yellowstone, MT, on Thursday September 11, 2003, one day after the WPEF Blister Rust Workshop. When the agenda is completed and announcement and registration form will be mailed to WPEF members and posted on our web site (www.whitebarkfound.org). Please mark your calendar and plan to join us.

Monitoring Whitebark Pine and Limber Pine Using a Computerized Database and Maps

Blakey Lockman, Forest Pathologist,
USDA Forest Service, Northern Region

Whitebark pine and limber pine are well distributed throughout the western United States and the impacts of white pine blister rust and other damaging agents are also found westwide. It is unknown how extensive and intensive the damage from white pine blister rust and other agents are to these two pines throughout the west. Whitebark pine and limber pine stands provide significant wildlife habitat and watershed values, but relatively little research has been conducted within them; thus the dynamics and impacts of detrimental changes are less understood. It is important to determine the overall condition of these forest types and the impact white pine blister rust and other agents are having so restoration efforts can be developed and focused properly. Although work is being proposed to survey these forest types, there is no present effort to consolidate the information on a range wide basis. There is a need for compiling what is currently known about these species into a database that can be used westwide and accessed by all interested individuals.

A project has recently been funded by National Forest Health Monitoring to create such a database. The products from this project will also include maps of the current distribution and condition of the two species as well as the incidence of white pine blister rust within their ranges. The principal investigators are the USDA Forest Service, Region One Forest Health Protection (Blakey Lockman and Gregg DeNitto); Rocky Mountain Research Station, Missoula Fire Lab (Bob Keane); University of Colorado, Denver (Diana Tomback, Dept. of Biology); and the Whitebark Pine Ecosystem Foundation. Funding for the project is through September 2003.

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We ended with an agreement in principle for cooperation between Canadians and Americans to develop a North American conservation network for whitebark and limber pine. This requires the selection of conservation areas throughout the ranges of whitebark and limber pine. Permanent sample plots for research and monitoring would be established by different researchers within these areas, or make use of existing plots. Restoration activities would be focused within these areas, with the goal of maintaining minimum population sizes. The Canadians would develop their network first, and report on their progress at the annual WPEF meeting in West Yellowstone in September, 2003. The WPEF was asked to be the conduit of information regarding the conservation effort for whitebark and limber pine.

Landscape Patterns of Blister Rust, Whitebark Pine, and *Ribes* species in the Greater Yellowstone Area

Maria Newcomb, University of Montana,
School of Forestry

Whitebark pine communities in the Greater Yellowstone region are an important component of one of the world's most famous ecological reserves. The most notable threat to these high elevation communities may be from the introduced disease, white pine blister rust. A master's thesis project addressing the disease system in this region was recently completed by Maria Newcomb, graduate student under the direction of Dr. Diana Six at the University of Montana, Missoula, with contribution from Dr. Brian Geils, Rocky Mountain Research Station. The project investigated associations between landscape features and rust severity among whitebark pine stands across the Greater Yellowstone region, including back-country sites not previously surveyed for the disease. Although blister rust is only spread to pines from infected *Ribes* (currant and gooseberry shrubs), no previous studies have related the spatial, landscape distribution of *Ribes* species to the variation in rust severity in whitebark pine stands. This study not only took a full landscape perspective, but also recognized the distinctive roles of each *Ribes* species for development of a rust infestation.

The severity of blister rust among whitebark pine stands in the Greater Yellowstone region varies from high, where nearly all pines are diseased, to low, where most have escaped infection. The study objective was to relate this variation in disease severity among stands to landscape features that broadly reflect the ecology, distribution, and pathology of each species of *Ribes*. Each *Ribes* species has a unique general susceptibility to infection, as well as its own spatial proximity to the pine hosts. For example, *Ribes montigenum* is the only species that has a close spatial association with whitebark pine at high elevations, but this species may only be involved in local disease intensification rather than disease spread from stand to stand. Of the nine species and subspecies of *Ribes* occurring in the Yellowstone region, *Ribes lacustre* and *R. hudsonianum* have been shown to be important hosts in other white pine forests. Their role as hosts in whitebark pine forests, however, is unknown since they are most commonly found at lower elevations. *Ribes lacustre* and *R. hudsonianum* are found in highest abundances in forest and riparian habitats, generally below 8600 feet elevation, which is near the lower limit of abundant whitebark pine. Thus, the proximity between whitebark pine stands and forest-riparian *Ribes* habitat was approximated by the nearest distance to a stream at 8600-foot contour.

In order to relate variation in rust severity to landscape features, it was necessary to address the fact that whitebark pine trees vary considerably in growth form and size both among and within stands. Host trees from site to site present very different targets to the pathogen. Consequently, a comparison of rust severity among stands with different size distributions requires adjustment for canker capacity (maximum number of cankers expected for trees of a particular size) with a relative severity index. Use of this index allowed for a meaningful analysis of the relationship between disease severity and variables such as the nearest distance to a stream at 8600 ft., expected habitat for *Ribes lacustre* and *R. hudsonianum*. Distance from whitebark pine sites to this landscape feature was found to be a significant explanatory factor in disease severity. Therefore, when blister rust in whitebark pine forests is considered at a spatial scale that considers proximities between the high-elevation pine hosts and *Ribes* hosts across the landscape, it may be possible to project expected rust severity and to map regions of similar rust hazard.

Blister Rust Workshop Aids Whitebark Pine Restoration

The Whitebark Pine Ecosystem Foundation is conducting a Blister Rust Workshop on September 8-10, 2003, at West Yellowstone, MT. Director Diana Tomback explains that this training session helps fill the most urgent need for prioritizing sites for whitebark pine restoration: Providing standardized information about the extent, intensity, and dynamics of blister rust infections.

The workshop begins the evening of September 8th at the Holiday Inn, and has indoor and field sessions the next two days that teach blister rust symptom identification and monitoring techniques. The workshop will initiate efficient and relatively non-technical surveys that are comparable from place to place and year to year. This session is recommended for land managers, scientists, field technicians, and professionals interested in whitebark pine restoration and the effects of blister rust.

Registration is $150 per person. For information and registration contact Debbra Graham, Continuing Education, University of Montana at (406) 243-4623 or debbra.graham@mso.umt.edu.

What's Hot in Whitebark Pine Publications?

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Several new publications about whitebark pine may be of interest. First there are two related papers authored by University of Idaho, USDA Forest Service Research and USDA Forest Service National Forest System specialists that comprehensively discuss the "restoration of white pine ecosystems" by breeding and planting rust-resistant whitebark pine trees. One is a Journal of Forestry article and the other is a University of Idaho publication (Fins and others 2001, 2002). These papers provide a rich history in the introduction of blister rust in the United States and detail efforts to enhance genetic resistance in all white pines.

Two more papers have documented the extent of rust damage in two regions in North America. At Crater Lake National Park, Murray and Rasumussen (2003) performed a survey of 1200 trees over 24 transects and found blister rust is easily the most important mortality agent outweighing all other mortality sources combined. Zeglen (2002) assessed the health of whitebark pine trees in British Columbia using data collected from over 24,000 trees and found 19% of the pines dead, 31% had active rust infections, and most areas showed increasing infection rates. In a related paper, Cottone and Ettle (2001) used color aerial photography to estimate number of whitebark pine trees in Mount Rainier National Park, USA and estimated that there are only 22,000 trees left in the park. A whitebark pine conservation plan was written by Wilson and Stuart-Smith (2002) that outlines methods that can be used to maintain this declining species (contact wilsonb@netidea.com for information).

There are also two less recent papers describing whitebark pine communities and stand dynamics of northern California. Peter Figura (Figura 1997) did a Master's study describing the stand age and structure of various whitebark pine stands. Riegel and others (1990) identified whitebark pine as one of the four series common in the same mountain range as Figura's (1997) work.

The last two papers summarize recent research results. First, Richardson and others (2002) examined population genetic structure and biogeographical patterns of whitebark pine and found that the species has been intimately tied to climatic change and glaciation with range movements that were facilitated by the Clark's nutcracker. Next, Perkins and Roberts (2003) developed logistic regression models for the probability of attach and mortality of whitebark pine trees in central Idaho. Equations presented in this publication can be easily implemented into stand models.

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investigate the effects of forest structure on fire spread. They construct physical models of forests with different arrangements of trees: uniform, dense tree cover—representing the structure of mature lodgepole pine forests; open, sparse cover—representing the structure of historic ponderosa pine stands; and medium-dense cover with trees in clusters—representing the structure of historic whitebark pine stands. They try to underburn trees with different crown heights (represented by small stick models with paper canopies) and relate this to historic forest structure. Students examine plant specimens to compare the bark thickness and cones of the three pines. Their examination of fire-scars on tree cross sections from the 3 species shows how these traits help the species persist and thrive in the presence of a specific fire regime. Students use feltboard cut-outs of plants, animals, weather events, and fire to tell the successional story of each forest type. Older students make costumes and present a drama to illustrate the same principles.

Culminating activities in *FireWorks* challenge students to solve problems using their new knowledge. They assemble a layered jigsaw puzzle that cannot be solved without understanding typical fire behavior, fire history, adaptations, and successional patterns in all 3 forest types. They use role playing to set goals and plan management for example landscapes.

How Does *FireWorks* Fit into Schools and Communities?

More than 150 teachers and agency staff from 14 states have participated in *FireWorks* master classes, and hundreds of others have attended shorter workshops. The program reached more than 2,500 students during the 2001-2002 school year. Teachers often comment that they like the program because the activities are interdisciplinary, covering science, math, language, social studies, art, speech, and other subjects. They also find that the program's structured, hands-on activities hold student interest. A study by University of Montana psychologists (Thomas and others 2000) showed that students using *FireWorks* were more engaged in learning and more positive about their teacher and classroom than students of the same teacher in other classes.

But *FireWorks* is not just for kids. It has been used in college classrooms (Smith and others 2001) and with public audiences. Informative workshops about fire management on the Clearwater National Forest used 4 *FireWorks* activities. Researcher Tami Parkinson (2001) found that these workshops increased adults' understanding and led to fruitful discussion of fire management problems. Participants' attitudes toward agency land management were more positive at the end of the workshop—and a month later—than at the beginning of the workshop.

Learn More About *FireWorks*

A free, 3-day "master class" in *FireWorks* will be held Tuesday through Thursday, July 8-10, in Missoula, Montana. Participants will "learn by doing" the activities in the curriculum and will discuss teacher outreach with a panel of environmental education experts. For more information or to sign up, please contact Nancy McMurray (406-329-4803, nmcmurray@fs.fed.us)

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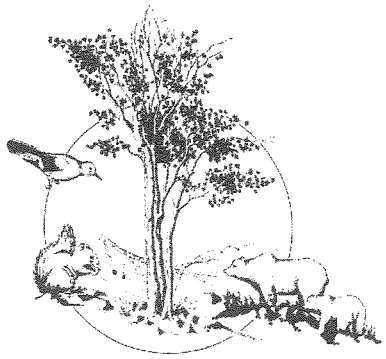

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research, and disease resistance testing. Mapping will be completed soon. A community classification is expected by 2005. This year we are initiating a monitoring project in the Park by installing permanent plots. We are particularly interested in the rates of death once pines are infected. Our fire history project will also include Mount Rainier and North Cascades National Parks along with adjacent US Forest Service lands. Objectives are to: 1) gain an understanding of fire regimes associated with Cascadian whitebark pine, and 2) describe historic and current stand conditions, 3) estimate potential ecological effects of fire exclusion policies. Biologist, Scott Weyenberg has been hired at Crater Lake to execute this 2-year study. A separate long-term program entails identifying disease-resistant trees in the Park. We are collecting cones and having them tested.

While these biological investigations take place, the Park is increasing its protective measures for the pines. Our new five-year fire management plan (2003-2007) acknowledges the tree's sensitive status and dictates they will not be felled except when posing a direct threat to firefighter safety. Fire lines are to avoid the immediate vicinity of pines. The plight of whitebark pine is discussed at all-staff meetings and a routine topic for seasonal interpreter orientation.

Because Crater Lake NP has only two terrestrial ecologists, we have relied on the welcome cooperation and support of organizations such as the Oregon Natural Heritage Program, Joint Fire Sciences Program, and US Forest Service. Because of Rim Drive, whitebark pine stands are easily accessible. This provides a unique opportunity for year-round research. Our outreach also includes public media. Most recently, the plight of the Park's whitebark pine was the topic of Oregon Public Broadcasting's "Oregon Field Guide" television series.

While progress is being made, overall pine numbers continue to decline in the Park. A mountain pine beetle epidemic detected last year is killing some of the largest individuals. Rim Village, a central tourist destination, is losing its few remaining pines. Rather than throw our hands up in despair, we have become more resolute in conserving whitebark pine as an important element of Crater Lake National Park.

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The WPEF has some important upcoming events and new projects. First of all, we now have educational partnerships with three ski areas in Montana, two in Oregon, and two more in Wyoming; all these ski areas include whitebark pine communities, some healthy and some in serious decline. Secondly, our workshop "Monitoring whitebark pine for blister rust," is scheduled for Sept. 8-10, 2003, in West Yellowstone at the Holiday Inn SunSpree Resort and Conference Center. The annual meeting of the Whitebark Pine Ecosystem Foundation will be held in conjunction with this event on Sept. 11. The purpose of this workshop is to present a set of methods that is complete, time-efficient, and relatively non-technical for surveying white pine blister rust in whitebark pine; blister rust symptoms will also be explained and illustrated with pictures and live material. Workshop participants will have a day devoted to field instruction to learn and practice these survey techniques, with a high teacher to student ratio. Attendance is limited, so please e-mail Debbra Graham (debbra.graham@mso.umt.edu) for registration information.

We also have two important accomplishments this year relating to whitebark pine restoration. In partnership with the WPEF, Cyndi Smith of Waterton Lakes National Park in Canada submitted a proposal for a Yellowstone to Yukon (Y2Y) Science Grant, a program that is funded by the Wilburforce Foundation (see accompanying article). The proposal presents a plan to re-measure many of the whitebark pine blister rust plots in Glacier and Waterton Lakes National Parks originally established in the mid 1990's by Kate Kendall, and to establish new plots for monitoring blister rust in whitebark pine elsewhere in the Canadian Rocky Mountains. The methods developed by the WPEF for the workshop will be the standard for this effort. Also, the WPEF and two board members, Bob Keane and I, are cooperators on a funded proposal from Region One Forest Health Protection (USDA Forest Service) to set up a range-wide database system for maintaining and mapping blister rust infection levels in both whitebark and limber pine. This database will enable us to prioritize areas for restoration attention, and keep track of changes in blister rust infection levels.

Please help spread the word about the WPEF, our role and mission, and important activities. Talk to your office or agency about an institutional membership. Help us expand our membership base. See you in West Yellowstone in September!

Assessing Whitebark Pine at Crater Lake National Park

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Nearly a half million people mingle under whitebark pine trees that cling to steep cliff tops of Crater Lake's margin. Known as the "Rim," this subalpine habitat combines with several scattered mountain peaks in supporting roughly 14,000 acres where the pine occurs in varying abundance in the 183,000-acre Park. Whitebark pine are closely tied to the aesthetic appeal of the lake, accenting spectacular photographs on postcards, calendars, books, and even the official AAA Oregon map cover. With a perimeter of 24 miles, the whitebark pine found here constitute the most extensive lakeside population anywhere.

The pines stretch from 6900 feet to the maximum Park elevation of 9,000 feet. Because we are on the Crest of the Cascades, forest communities can differ between the mild and wet western half and the cooler and drier eastern part. A rigorous classification of communities has not been performed, however, general assemblages can be described. Upper west-facing slopes on bouldery terrain tend to support whitebark pine – mountain hemlock (*Tsuga mertensiana*) / Davidson's penstemon (*Penstemon davidsonii var. davidsonii*). On gentler slopes with well-developed soils the understories are characterized by woodrush (*Luzula* spp.). South and east-facing terrain can support significant cover of pinemat manzanita (*Arctostaphylos nevadensis*). Where the recent (7,700 years BP) volcanic eruption left behind immense pockets of ash, whitebark pine typically forms tree islands punctuated by squirreltail (*Elymus elymoides*), California needlegrass (*Achnatherum occidentale ssp. californicum*), and Bloomer's rabbitbrush (*Ericameria bloomeri*). Pure stands are uncommon, restricted to the most harsh sites in the Park including ash barrens, the lip of the Rim, and above 8000 feet.

Until the past several years, the status of the Park's whitebark pine has not been formally examined. Blister rust was not confirmed on the Park's population until 2000, when it was determined to be killing significant numbers (Murray and Rasmussen 2003). Based on conservative estimates, infection ranged from zero on the east side to 20% on the west. Plenty of snags along the west Rim indicate that the disease is not a newcomer and is known to be in the area as early as the 1930's (USDA 1949).

In order to understand and respond to the pine's dilemma Park staff have a lot of catching up to do. To date, the only completed project is the rust survey. Concurrent actions include mapping, community classification, monitoring, fire

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Idaho's Giant Whitebark

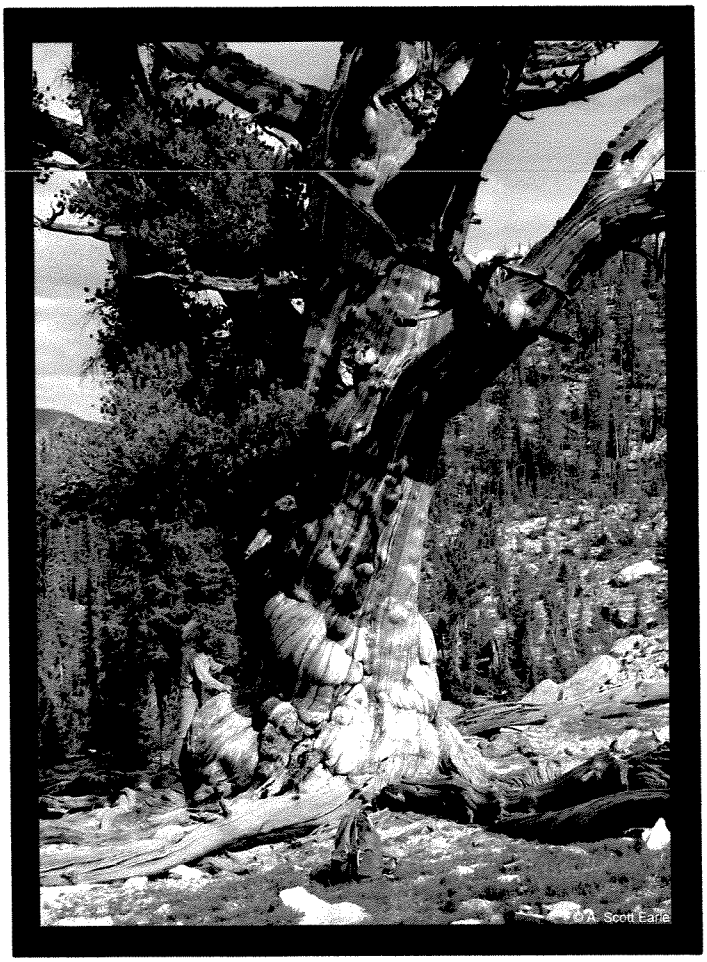
Steve Arno, Editor

The photo of an enormous whitebark pine (see page 13) was e-mailed to Diana Tomback with little accompanying information except that the tree grows in central Idaho's Sawtooth Range. A little sleuthing revealed that the image was taken by Scott Earle, who also published an article and pictures of this giant tree in Sun Valley Magazine a couple of years ago. WPEF board member and Sawtooth area resident Dana Perkins reports that she is well-acquainted with this tree, which grows near Imogene Lake. This monarch is 8 feet 9 inches in diameter (dbh) and 69 feet tall, and is listed as the largest whitebark pine on the National Register of Big Trees maintained by American Forests (www.americanforests.org).

Dana observes that it is a classic strip-bark tree, like many of the ancient bristlecone pines, where after centuries of battling an inhospitable climate and bark beetle attacks, the tree's living tissue is restricted to a strip nourishing branches on one side of the trunk. However, unlike the 4000-year-old bristlecones, this gargantuan whitebark has relatively wide growth rings, under the living strip of cambium. After all, it stands near a small creek and probably has well-watered rootlets.

Dana reports that Dave Lee, former wilderness ranger and now deceased, discovered the mammoth tree in the 1970s. Rumor has it he knew of an even bigger one. Dana, too, knows of another behemoth whitebark in the Sawtooth, perhaps the same one Dave spoke of, that she needs to revisit and measure. She also intends to revisit the Imogene Lake giant and compare its remaining foliage to what appears in 1992 photos, to assess whether it is dying back or holding its own. Such an on-site visit involves a heart-pounding 8-mile trek, each way, after negotiating the 4 x 4 track up to the Hell Roaring Creek trailhead. According to Scott Earle's account, climb the trail to and around Imogene Lake and then another half mile or so up near the divide just below Imogene Summit. The immense tree stands close to the trail. Anyone willing to make this journey might well pack binoculars and scan some of the surrounding basins for still other ancient whitebark titans.

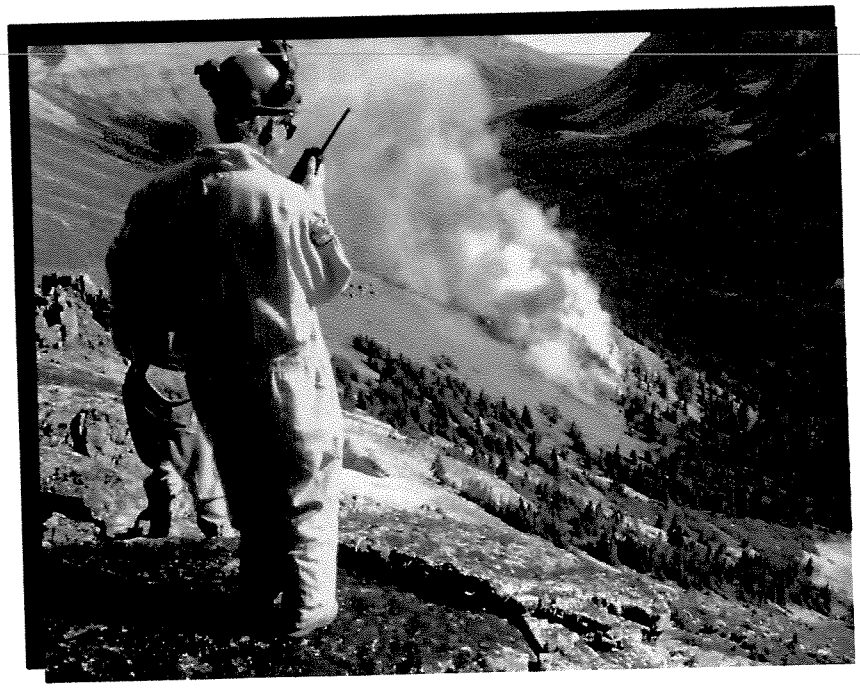
See accompanying photos on next page.



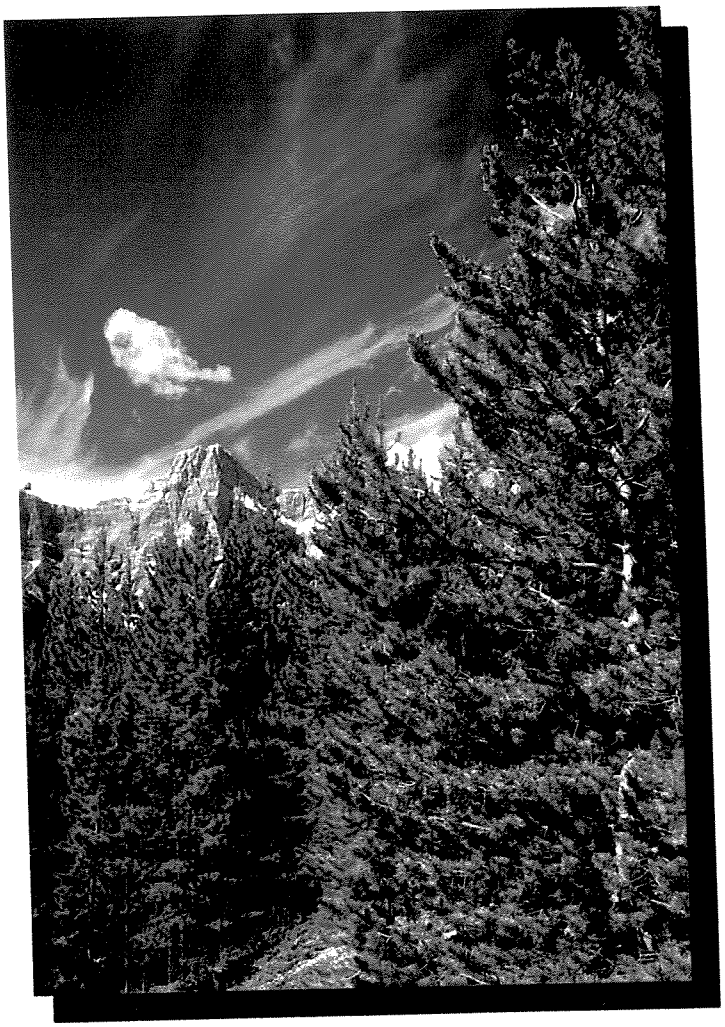
Central Idaho's giant whitebark pine. Photo by A. Scott Earle.

Whitebark pine along the Crater Lake Rim. Photo by Michael Murray.

Whitebark Pine in Canada: Photo Essay



Monitoring the Helen Prescribed Fire, Banff National Park. Photo by Brendan Wilson.



Whitebark pine in a 90-year-old burn, Banff National Park. Photo by Brendan Wilson.