

Montana Family Forest News

Tree Crowns, what
do they tell us?



About the cover—Peter Kolb, MSU Extension Forestry Specialist

If you are reading this newsletter, it is almost certain that you love trees and forests. Surveys have given us a long list of why people feel the way they do about this subject, ranging from the spiritual to the utilitarian. I liken the love of forests to the love of books and libraries. Books can give us endless information about just about anything, let us escape from reality into some enjoyable fantasy world, teach us to be better in our relations to others, learn about history, and ultimately learn about ourselves. Libraries in turn can give us a quiet place to reflect and learn. If you forgive the analogy, forests do pretty much the same, though first you need to learn a new language in order to “read the forest” and the ecosystem it creates. If there is an alphabet, it might be the climate, soils, geology, and tree, plant and animal species. Combinations of these make up the words, and over time they make up different chapters and plots within the novel that is your forest. Tree crowns are a reflection of the genetics and life history of each tree (or character) on that site, and combinations of crowns tell us a little about interactions and story of that site. The cover shows us some really big strong healthy ponderosa pines, surrounded by others that have some other characteristics (thin crown, wide crown, lighter needles, etc). We know that ponderosa pines need full sunlight to germinate and grow—so aging the trees tells us when that location had a major disturbance that created sunny bare mineral soil. Maybe a lightning strike caused fire? Or maybe some fire set by the Salish or Kootenai people? But why do the trees look different with this shared history? Does the thin crown tree have a disease that will infect the other trees? Maybe it just is in a different phase of its life? Poor nutrition, genetics, a cold? And then there is the larch—looking a little ragged compared to the ponderosa pines—but why? Is this the way larch is supposed to look? And what about the tree “kids” in the foreground? Will they turn out like their parents, or do they need something new that their parents did not have when they were younger? As forest managers we have a population of individuals we are responsible for, and that most of us want to see get bigger, stronger and healthier, and that provide us with the pleasure of seeing them grow and give us not only the experience, but also the wood products that provide us with the means to do more for the forest. Tree crowns can tell us a lot, and hopefully this issue will give you some more information that helps figure out the characters, plot and the chapter of the book that we are a part of. And if you find you end up with more questions than answers, game on, that is always part of learning more and being a forest steward. I hope you enjoy this issue of the Montana Family Forest News!

A handwritten signature in blue ink that reads "Peter F. Kolb". The signature is written in a cursive, flowing style.

From the Editor's Desk

This newsletter is possible through funding from the Renewable Resources Extension Act (RREA). It highlights numerous articles focused on information and resources that forest landowners can use to better their knowledge and potentially implement on their own land. The overall concept is to provide articles that capture one's attention based on current issues and updates on various organizations on a state and national level. Our goal is to provide articles that will give important information and encourage landowners to develop new ideas towards their land. **The newsletter is also available at <http://forestry.msuextension.org/publications.html>.**

Warm regards,

Christina Oppegard

Editor

Peter Kolb

MSU Extension Forestry Specialist

Designer:

Christina Oppegard

MSU Extension Program Manager

Advisor:

Cindy Peterson

MSU Extension Associate Forestry Specialist

Financial Contributors:

Montana Tree Farm

Montana Stewardship Foundation

Montana Forest Owners Association

Montana State University Extension Forestry

The U.S. Department of Agriculture (USDA), Montana State University and Montana State University Extension prohibit discrimination in all of their programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital and family status. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Cody Stone, Director of Extension, Montana State University, Bozeman, MT 59717.

Table of Contents

Front Cover

By: Peter Kolb (PhD) MSU Extension Forestry Specialist

Tree Farm News

- 1 **Letter from the Montana Tree Farm Chair**
By: Holly McKenzie, Montana Tree Farm Chair
- 2 **Montana Tree Farm in hiring**
Submitted by: Holly McKenzie, Montana Tree Farm Chair
- 3 **The Great Gray Owl and Critical Nesting Habitat in Snags**
By: Jim Watson, Montana Tree Farm Member
Mary Naegeli Memorial Scholarship
Submitted by: Cindy Peterson, MSU Extension Forestry
- 4 **Fire Ready Spring Clean-Up!**
By: Pat McKelvey, Montana Tree Farm System Board member
Tree Farm Inspector Trainings!
Submitted by: Holly McKenzie, Montana Tree Farm Chair
- 5 **Tree Farm Logger of the Year 2021**
Submitted by: Holly McKenzie, Montana Tree Farm Chair
Outstanding Tree Farmers of the Year
Submitted by: Holly McKenzie, Montana Tree Farm Chair
- 6 **The 75 Year Story of Art Weaver and his Montana Tree Farm**
Submitted by: Linda Smith, past administrator for Montana Tree Farm System
- 7 **Tree Farm Annual Meeting**
Submitted by: Holly McKenzie, Montana Tree Farm Chair
- 8 **Women in the Woods Workshop**
Submitted by: Ashley Juran, Montana DNRC

MFOA

- 9 **Letter from the President**
By: Allen Chrisman, MFOA President

Forest Stewardship Foundation News

- 10 **Forest Stewardship Foundation**
By: Ed Levert, Foundation Chair
Save the Date, 12th Annual Landowner Conference
Submitted by: Ed Levert, Foundation Chair

Featured Article

- 11 **What can tree crowns tell us?**
By: Peter Kolb (PhD) MSU Extension Forestry Specialist

Special Feature

- 25 **Pondering Our Human Role**
By: Lisa Schmidt

Extension News

- 27 **MSU Extension Forestry Online Publications**
Submitted by: Christina Oppegard, MSU Extension Forestry
- 28 **Germany Forest, Culture, and Study Tour**
Submitted by: Peter Kolb (PhD) MSU Extension Forestry Specialist
- 29 **About FireSafe Montana**
Submitted by: Pat McKelvey, FireSafe Montana
Montana Natural Resource Youth Camp
Submitted by: Christina Oppegard, MSU Extension Forestry
Support our Newsletter
Submitted by: Christina Oppegard, MSU Extension Forestry

Advertisements

- 30 **Weyerhaeuser**
Pyramid Mountain Lumber
Watershed Consulting LLC
- 31 **F.H. Stoltze Land and Lumber Co.**
- 32 **RDO Equipment Co.**
- 33 **MSU Extension Forestry Calendar of Workshops and Events**
Marks-Miller Post & Pole, Inc.

Back Page

- 34 **Key to lichens**
By: Peter Kolb (PhD) MSU Extension Forestry Specialist
- 35 **Liking those lichens**
By: Peter Kolb (PhD) MSU Extension Forestry Specialist



Letter from the Montana Tree Farm Chair

By: Holly McKenzie, Montana Tree Farm Chair



This was a busy year for Montana Tree Farm! This program is strongly supported by our forest products industry community and the State DNRC as well. Our success is dependent upon our steering committee members, so I want to shout out a thank you to the newest members who joined us this year. Newest member to the team is Mark Schiltz from Montana Land Reliance. Mark represents conservation interests for forest landowners, and we are excited to have someone on board who can help with inquiries about conservation easements. We also gained Zach Bashoor from Pyramid Mountain Lumber, Tye Sundt from Weyerhaeuser in Kalispell, Jeff Whitlock from F.H. Stoltze Land & Lumber in Columbia Falls, Pat McKelvey (MFOA member and Tree Farmer in Helena), Tim Benedict (retired Forest Service and Tree Farm Inspector) who resides in White Sulphur Spring, and Angelo Ververas of IFG in St. Regis. All of these new and previous Steering Committee members have been instrumental in helping us through the past year of Inspections, Peer Networking, Annual Meeting in Helena, and SFI audits. Thank you everyone for your help!

Montana Certification Assessment: With incredible effort by our committee members, Inspectors, and of course our dedicated Tree Farmers, the Montana Certification Assessment Review by PricewaterhouseCoopers was conducted virtually on 15 randomly selected Tree Farms. The purpose of this third-party assessment process is to verify that Montana's Tree Farm program continues to meet the Standards of Sustainability for Forest Certification. The assessment team randomly selected 15 tree farms from broad geographic areas and reviewed management plans and interviewed the landowners during a one-week timeframe: The Tree Farms ranged in size from 10 to 4,000 acres and the auditors were impressed with how diverse our approach is to thinning and managing these forest tracts. They liked how many of our members expressed their appreciation of the MSU Forest Stewardship Workshop which was their first exposure to how they might take care of their forestland. Montana was commended for our efforts to make sure every Tree Farmer gets a 5-year visit from a resource professional.

We were also humbled by auditor findings and realized we have some deficiencies and corrective actions needed during our assessment process. The primary errors in our performance measures involved written management plans that did not address FORI (forests of recognized importance), special sites on the landscape, desired age and future condition, and desired wildlife species. This was a great reminder for us to review these Inspection Form items with our Montana Inspectors, as well as reminding Tree Farmers to periodically read and update their management plans to address items that might not have been considered at the time your plan was written. The MSU Extension Forestry website has the latest template of the Forest Stewardship and Tree Farm plan which addresses the critical elements that need to be in every plan. All Tree Farmers and Inspectors need to pull out their plan, review in the context of the 021 Standard and update as necessary. There are some handy update templates available to guide you through this or reach out to your Inspector for guidance. This must be done regularly, at a minimum every 5 years or as needed to meet changes in your objectives, tree farm conditions or when there are updates to the Standards Of Sustainability.

Membership Fees: For the first time in Montana history, Tree Farm sent out invoices and asked all Tree Farm-ers for a \$25 annual membership fee to help us cover expenses in 2022. We have discussed doing this for many years due to the cost of newsletters, awards, part time administrative help, and other special programs like Peer Networking. Many of you responded favorably and donated additional funds to help us with our scholarship and awards as well. This is a friendly reminder to send those uses in as soon as possible so we won't have to mail out as many reminders. Thanks for helping us make ends meet.

Results of Peer Network Pilot Program (with AFF and DNRC partners)

Summary and Reflection:

- 37 Montana Tree Farmers stepped up to join this network and mentor their peers
- 4 orientation events were held to discuss the goals and purpose of this network in the 3 target counties (Lincoln, Flat-head and Sanders)
- 3 field tours (one in each county) took place, involving approximately 145 participants

- 5 virtual events are planned for 2021–2022
- 21 individual landowner visits (representing 1,259 acres) resulted in 15 summary reports advising next steps
- From the summary reports:
 - 80% of landowners are interested in becoming Tree Farmer members,
 - 80% plan to take the MSU Forest Stewardship Workshop,
 - 60% are interested in a visit from their DNRC service forester,
 - 73% are interested in cost-share assistance, and
 - 73% would like to participate in a networking event or forestry field day.
- The remaining \$9,461.77 from the original grant can be spent in 2022

We are most excited that so many people (plus spouses/partners/children) raised their hand to be a part of this network. We believe this demonstrates the value people see in Tree Farm and their commitment to good forest management! Beyond the encouraging numbers listed above, a few highlights stick out to me:

In Kila, new Montana landowners were getting started on the right foot by seeking out forestry information before they built their homes; they also got to know one another as new neighbors and made plans to continue helping each other in their work as forest stewards. In Trego, 17 landowners subsequently responded to outreach and a Tree Farm field tour and are now in the pipeline for NRCS cost-share funding to accomplish thinning projects. In Thompson Falls, Tree Farmers gathered to meet one another, see a working ranch and productive forest, and learn about wildfire resiliency, a timely lesson as the Thorne Creek Fire approached.

In addition, this community of Tree Farmers and other forest landowners have helped one another via email, through phone calls, during orientation events, and as participants in our first winter webinar. MTFs should be proud of its dedicated members and can hopefully capitalize on this enthusiasm and momentum.

Insights:

- Tree Farmers are hungry for more interaction and connection with one another. Beyond certification and inspections, they are interested in belonging to a community where they can learn, share, and socialize.
- Having local, state, and federal agency employees at events is a good way for landowners to ask questions, put faces to titles, and feel more comfortable reaching out to government agencies.
- Many new forest landowners coming to MT from other states have been eager to prove they are responsible stewards of their new properties. This is good news for our forests and may be a group to tap for growing Tree Farm membership.

The above Peer Network program was primarily created through efforts by our Steering Committee member, Jane Mandala who is also a fellow Tree Farmer. Jane helped us extensively administrating the Tree Farm program and the Peer Network during 2021. Jane has taken a full time job with National Forest Foundation and we are now searching for a new part time administrator (see ad in this newsletter) and another Peer Networking Coordinator. Thank you, Jane, for all you did for Tree Farm this past year! Everyone agreed that the peer network was beneficial and would be good to continue throughout Montana in the future.



Looking for a part-time job? Montana Tree Farm is hiring

Montana Tree Farm Program is seeking a part time administrative assistant for approximately 8 hours/week. The job requires some travel and meeting attendance. May work remotely. This job pays \$20/hour, not to exceed \$10,000 annually.

More details found at treefarmssystem.org/montana or montanatreefarmssystem@gmail.com

The Great Gray Owl and Critical Nesting Habitat in Snags

By: Jim Watson, Montana Tree Farm Member - Spring Brook Ranch, Kalispell, Montana



Jim Watson's resident Great Grey Owl.

Our Great Gray Owl study is entering its sixth year. Similar to other species projects, we are conducting long-term monitoring of nest sites, banding chicks, collecting data, and surveying new areas. In conjunction to our base study, we are also interested in learning more about their nesting needs.

A special focus of our Great Gray project is to record the measurements of nest snags. Similar to cavity nesting owls, Great Gray Owls depend on specific site characteristics to nest. While obligate cavity nesters need the holes of woodpeckers, natural tree holes, or nest boxes, Great Grays rely on large, broken-topped trees, called snags, or the abandoned nests of other large birds. When the owl nests on the top of a broken snag, the bowl must be large enough to accommodate its massive size. In recording the measurements of these snags, we are building a predictable

model to identify, and potentially manage for, these unique, dead trees. Snags are a critical component of forest ecosystems and provide homes for a myriad of species. Again and again, we find them removed from otherwise ideal Great Gray habitat. As a result, public education is a key focus of this project.

As with all studies, sample sizes must be large enough for meaningful results, so we will continue to collect data for this special project. Do you know of a Great Gray nest? Please let us know. We are following up with as many leads as we can in order to grow our sample size.

Additionally, if you haven't checked out the Great Gray Owl Cam, you are in for a real treat. Although the nest is currently empty, you can enjoy highlights from last season and get ready, hopefully, for the pairs' return! The Great Gray nest cam is made possible through our partnership with explore.org. or <https://www.owlresearchinstitute.org/great-gray-owl-conservation>.



Large bird tree estimated height is over 30" DBH.



Mary Naegeli Memorial Scholarship

\$1,000 in 2022

MT Tree Farm offers a \$1,000 scholarship annually to a resident of Montana enrolled (for the first time) or attending any accredited institution of higher education, on a full time basis, have a cumulative grade point average of 2.5 or above, and must demonstrate an interest in forestry/natural resource issues.

Applicants must have a Tree Farmer or a Tree Farm Inspector as a reference. Perhaps you know someone who qualifies for this scholarship. If so, please let them know about this great opportunity.

Contact Cindy Peterson at 406-243-4706 or cindy.peterson@umontana.edu to be connected with one. For more information and how to apply go to: <https://www.treefarmssystem.org/montana-awards-and-scholarship> application are due May 1, 2022.

Award will be announced by August 1, 2022 and will be sent directly to the schools financial aid office to be applied to the Fall 2022 school year.

Fire Ready Spring Clean-Up!

By: Pat McKelvey, Montana Tree Farm System Board member

Now is the time to get the yard and immediate area around your home ready for the summer and wildfire season.

More and more people in Montana are making their homes in woodland settings - in or near forests, rural areas or remote sites. There, homeowners enjoy the beauty of the environment but face the very real danger of wildfire. Wildfires often begin unnoticed. They spread quickly, igniting brush, trees and homes. Reduce your risk by preparing now.

Start with a simple plan of action from the top down. Begin by inspecting your chimneys, and clean at least once a year. Remove any branches within 15 feet of a stovepipe or chimney opening. Follow by cleaning of the roof and gutters if present. They may have collected needles, leaves, twigs, and other debris over the winter. Work your way down the siding, just looking for cracks that may need attention, collected debris on window sills, or other areas of collection that in the event of a wildfire would catch and hold hot embers. Any areas where a snow drift has formed, so can an “ember drift” form.

Work in that immediate 5 feet around the structure.... raking leaves, dead limbs and twigs, clearing any flammable vegetation. Look up....and if you see dead branches or limbs extending over the roof, cut them off. If there are branches close to power lines, call the power company to have them cleared.

Check your landscaping. Avoid planting high resin, fire-prone plant materials, such as juniper and tall grasses; burning embers and ground fires can easily ignite them. Succulent plants and ground covers are good choices, as are flowerbeds and vegetable gardens. The MSU cooperative extension service has a list of plant materials that will give you the green you are looking for, but are also fire resistant. Take a look at their list, you'll be glad you did.

Remember to move that firewood stack at least 100 feet, and uphill, from the structure. And if you have a wooden board fence, check its condition as well. Make sure that if it approaches the body of the structure, there is a way to provide for an opening so you can break that connectivity to the structure in the event of a wildfire.

As the season progresses you will get into that regular grass mowing routine, and maintain an irrigated green space around your home. The spring, is also a good time locate and store those handy tools that could be used in the event of a fire. Keep on hand those tools you use in your landscape maintenance work, as well as hoses and sprinklers.

While you're at it, spring is a perfect time to review, or design an action plan for what you'll do in the event of a wildfire in the area. Revise, if necessary, but refresh your whole family on what that plan is. It will save you lots of time, when you might not have much time to react to a possible wildfire near you.



Tree Farm Inspector Trainings!

If you were a tree farm inspector before the 021 form changes, or if you would like to become a tree farm inspector, there will be 2 in person trainings held this year. You may also contact the chair for a link to on-line training.

Two Opportunities

Thursday, April 21, 2022

6:00 pm - 9:00 pm

Dinner Provided

Before the Landowner and Joint SAF conference on April 22

Helena, Montana—Location TBA

Wednesday, May 4, 2022

9:00 am - 2:00 pm

Polson, MT—Location TBA

Montana Tree Farm System, Inc., montanatreefarmssystem@gmail.com, www.treefarmssystem.org/montana



Tree Farm Logger of the Year 2021

Steve Marks, Marks Lumber

Clancy, MT

In the early 1980's when Steve and Laura Marks decided to focus their efforts on the now over 75 year old family sawmilling business, I doubt either of them could have imagined being where they are today. Steve's commitment to sustainability of both forest and community extends to the family ranch, sawmill, logging and land management activities. Steve Marks uses innovative manufacturing and product development that allows stewardship forestry be economically viable in a market without a lot of opportunities. Recognizing the need for diversity and never shying from trying something new, their products range from firewood by the pound, a wide range of custom wood products, biomass utilization and custom logging and land management services. Steve is a stalwart supporter of local collaborative, Montana Wood Products Association, and Montana Logging Association. He is involved in his local fire departments, churches, and other community organizations. At the end of the day, he does this stuff because he cares about Montana's forests and knows that our legacy is the forest and communities we leave behind. His family started ranching in Clancy before the turn of the last century and have every intention of continuing for future generations. Steve has invested greatly in getting the word of sustainable forestry out to the public both through the work he performs and print, broadcast and social media. Check them out on their website and help us congratulate them on Tree Farm Logger of the Year 2021.



Outstanding Tree Farmers of the Year

Dianne and Steve Wilson

Clancy, MT

With a clear objective of leaving the lands better than they found it, Steve and Dianne have made great progress on their 160-acre Tree Farm up the North Fork of Travis Creek outside of Clancy, MT. After retiring from a professorship at Duke University, they have had quite a range of experiences with trying to get the much-needed thinning and restoration work completed. Utilizing grants where necessary, they recently completed a 35-acre thinning and fuel hazard reduction treatment bringing the total treated acres to just over half of the forested area. Utilizing much of the wood harvested in Steve's Wood Mizer sawmill, they were able to restore some of the historical homestead buildings and barns, including constructing a replica of the original homestead cabin. With a wood fired boiler providing heat for their home, most of the wood from their management activities is used on site. Active in the local community, hosting tours and show me trips for NRCS grant programs and fuel hazard reduction efforts, Steve and Dianne are willing to share their knowledge and experiences. With the next generation of Wilsons recently moving to the Tree Farm, the phrase Family Forest is reflected in all their stewardship activities. Please join us in congratulating Steve and Diane as the 2021 Montana Tree Farm of the Year.

The 75 Year Story of Art Weaver and his Montana Tree Farm

Submitted By: Linda Smith, past administrator for Montana Tree Farm System



Art Weaver's father purchased the land in 1938, and at that time you couldn't even park a car on the property; it was so full of thick underbrush and 4' stumps left behind by the previous owner. Originally, they purchased 80 acres and in 1945 an additional 160 acres were purchased. As the years passed, some of the property was sold for family members to build homes on the mountainside and now the Tree Farm has a total of 140 acres. As you enter the property on Elk Park Road, you can't miss the beautiful majestic stand of Blue Spruce trees. Leading up the driveway you come into view of a majestic pond and a lovely home amongst the trees.

WOOD

The Weavers became Certified Tree Farmers in 1945, one of the first in the state of Montana. They were honored as 75 year Tree Farmers in 2019 at the Annual Meeting in Columbia Falls. Pictured above is Art and Barb Weaver with Tree Farm inspector, Ron Buentemeier, receiving their new 75 Year Tree Farm Sign. It is proudly on display in their front yard. Art and Barb purchased the property in 1963 from his parents and used their home in Evergreen as a down payment, while his parents moving into their Evergreen home. The following year, the Evergreen home narrowly escaped damages from the floodwaters that overflowed the Flathead River. Unable to get to his parents, Art climbed up the mountainside with a set of binoculars. From there he could see the family home on Maple Drive and to this day he still remembers spotting the irises planted around the outside of the home. At that moment he knew their home had escaped heavy damage and his parents were safe!

Art's father began thinning and reforesting the property with a forester named Royer. They began sawing the trees down and hauling them out with a team of horses. For many years they harvested Christmas trees and cut posts and poles. Eventually they had a logger come in and do selective thinning on 100 acres. Salvaged blowdown and poor soil at the base of the mountain made it hard to grow the trees at first. After they thinned the fir and lodgepole, they had a fair amount of straight growing trees! It has taken time and patience though!

Art states:

"One huge advantage of being a Tree Farmer is that he can call his own shots – Art hates taking orders from others – with the Tree Farm he can listen to their ideas and then do what he prefers!"

WILDLIFE

Wildlife are very plentiful as a result of managing the land. It was important to Art is that all seven grandchildren were able to hunt successfully on the Tree Farm. Herds of elk frequent the open field, many deer come thru, as do an occasional grizzly bear, black bear, bald eagle, mountain lion, falcons, wild turkeys. They have installed a game camera and can monitor the various wildlife on the property.

WATER

A beautiful man-made pond can be seen when you drive into the driveway complete with a rowboat, just waiting for the grandchildren to use. Nearby is a 6" water spigot that has been used many times to refill water tankers in case of fire. The water spigot was put to good use one evening when Barb looked out the window to see flames headed in their direction! The flames were 10' high! Art immediately got the water truck started up. As he came closer, he realized he

would have to lay down on the seat of the truck and drive thru the flames in order to save his land. He ended up with burns on his arms from the heat. He refilled the water truck a couple of times to put out that fire. A combine had been cutting a nearby barley field and parked the combine way too close to some trash and it started the field on fire! Luckily, Art had been a volunteer fireman with Bad Rock Fire Department and he knew how to fight that fire! He also believes in watering and keeping a green space around the home.

ROCKS

The land has rocks! In 1975 they started the gravel business and developed a large gravel pit. Art bought a little loader and truck to get started. Eventually a large rock crusher was purchased. At one time they had eight trucks running out of the gravel pit, with Barb dispatching radios, phones, doing the bookwork. It was a busy place! Soon Art got tired of the governmental control with random inspections by Mine, Safety, Health Agency (MSHA). With Steve's help, he listed with a broker the huge \$400,000. crusher, 10 days later it was SOLD and he shut everything down! Much to the surprise of the inspector from (MSHA)! Art was so tired of the bureaucratic red tape and the law books! Thank God the Tree Farm doesn't require that!

Art has a car collection. He started with two Internationals. He found enjoyment in an Austin Healy race car and spent many hours racing with his car and had lots of FUN! Art still has 9 antique vehicles in his shop – he built lots of them from junk up– the photos of the cars are just beautiful!

At age 89, Art was the second generation to own Weaver's Tree Farm located in the Bad Rock area of Columbia Falls. Art graduated Flathead High School in 1950 and earned a purple heart during the Korean War. He passed away just over a year ago leaving his wife and kids to manage one of the oldest Family Forests in Montana.



montana TREE FARM system

You're Invited!

Montana Tree Farm's Steering Committee cordially invites you to join the statewide Annual Tree Farm Meeting. The event kicks off with coffee and pastries followed by two Tree Farm field tours. Transportation will be provided. The tours will be followed by lunch, a silent auction, and a short business meeting.

Tree Farm Annual Fall Meeting

Saturday, September 24, 2022

8:00 am to 2:30 pm

Come Tour Lovely Gold Creek off Hwy 200 between Missoula and Greenough!



Women in the Woods Workshop

Date

May 14th, 2022

Location

Lone Pine State Park
Kalispell, MT

Spend your Saturday connecting with women landowners, learning about forests and the skills needed to care for them, while enjoying hands on learning led by women for women.

During this workshop you will learn:

- How to operate your **chainsaw safely**
- How to improve **wildlife habitat** on your land
- How to reduce your **wildfire risk**

From beginner to expert, women forest landowners with all levels of experience are welcome. You are encouraged to bring a friend!



Workshop cost is \$30.

Class will meet virtually from 6:30 pm-8:00 pm on Thursday, May 12th to cover chainsaw safety in preparation for the workshop.

Workshop will be held *rain or shine* from 9:00 am - 5:00 pm, May 14th.

A list of gear to bring will be provided to participants before the workshop.

Lunch will be provided during the workshop.

To learn more, please contact Ashley Juran at ashley.juran@mt.gov or 406.542.4280

Workshop made possible by grant funding from the USDA Forest Service in partnership with the Montana DNRC and funding from the Montana Tree Farm Program.





Letter from the President

By: Allen Chrisman, President



A brief introduction of the 2022 Officers of Montana Forest Owners Association: At our January meeting, the Board of Directors re-elected Allen Chrisman as President, Dave Atkins as Vice President, and Cameron Wohlschlegel as Secretary. Christina Opegard was elected to the Treasurer position. We thank Robin Kolb for her service in 2021 as our Treasurer, and we appreciate Christina for being willing to take on this responsibility.

MFOA was actively engaged this past year in a significant issue regarding the valuation of your forest land for tax purposes. MFOA, along with other organizations, successfully supported legislation that provided for a revenue neutral tax rate to temporarily neutralize a new appraisal system that the Department of Revenue adopted that resulted in valuations far beyond what forest owners could expect in revenues. In addition, companion legislation directed the Department of Revenue to reconvene the Forest Land Taxation Advisory Committee to develop a new appraisal that will hopefully resolve these issues.

Recently MFOA submitted a Grant proposal to the Montana Forest Collaboration Network for funding to support a survey of private forest owners in Montana. The intent of the Survey is to identify their knowledge of the danger from wildfires, their understand of fuels treatments to reduce the intensity and severity of wildfires, whether they are interested fuels treatments, and if so, what barriers they are encountering that prevents them from implementing fuels treatments. The Survey is intended to help implement the Montana Forest Action Plan by identifying those barriers and sharing that information with the responsible Agencies. Montana State University Extension Forestry is a partner in this proposal, and both Montana Tree Farm and FireSafe Montana are supporters.

While it was a busy year for MFOA, there were several areas where we failed to meet our commitment to our Membership. I didn't produce any NIPFTY Notes this year; our website doesn't have a webmaster and I struggle with maintaining it; and we haven't gotten our Membership Dues Renewal letters out to our members. Despite these setbacks, the Board of Directors is energetic and engaged, and very concerned about looking out for the interests of private forest owners across the State. So, thank you for your patience and understanding.

If you want to make a difference and speak up for your rights as a forest landowner in Montana, please consider joining us – only \$25 per year. Thanks for your support.

Enroll online here: <https://www.montanaforestowners.org/>



Forest Stewardship Foundation

By: *Ed Levert, Forest Stewardship Foundation Chair*



On April 22nd the Foundation is co-sponsoring the 12th annual Forest Landowner Conference/Society of American Foresters(SAF) State meeting in Helena. After having a virtual conference in 2021 this will be a great time to actually see old friends and enjoy the camaraderie of the conference. There will be a virtual opportunity for those who can't make the trip. This year's theme is "Exploring Human and Ecosystem Response to Wildfire". We have an outstanding array of speakers beginning with our keynote presentation by Dr. Mark Finney, "Historical Scope and Scale of Wildland Fire in Montana". The event is being held at the Delta Hotels Helena Colonial.

The following day on April 23rd the Foundation is sponsoring a free insect and disease workshop from 8:30 AM -12 PM featuring Amy Gannon and Jill Hautamiami from the Montana DNRC. You can register for both the landowner conference and the insect and disease workshop by going to the Foundation's website, <https://www.foreststewardshipfoundation.org>.

You can help our non-profit organization continue to offer educational opportunities by joining the Foundation on our website or sending \$25 to the Forest Stewardship Foundation; PO Box 1056; Libby, MT 59923.



Save the Dates!



12th Annual Landowner Conference

Co-sponsored by the Montana Society of American Foresters

April 22, 2022

Helena, MT
Helena Colonial Inn

Forest Insect and Disease Workshop

April 23, 2022 8:30am to 12:00pm

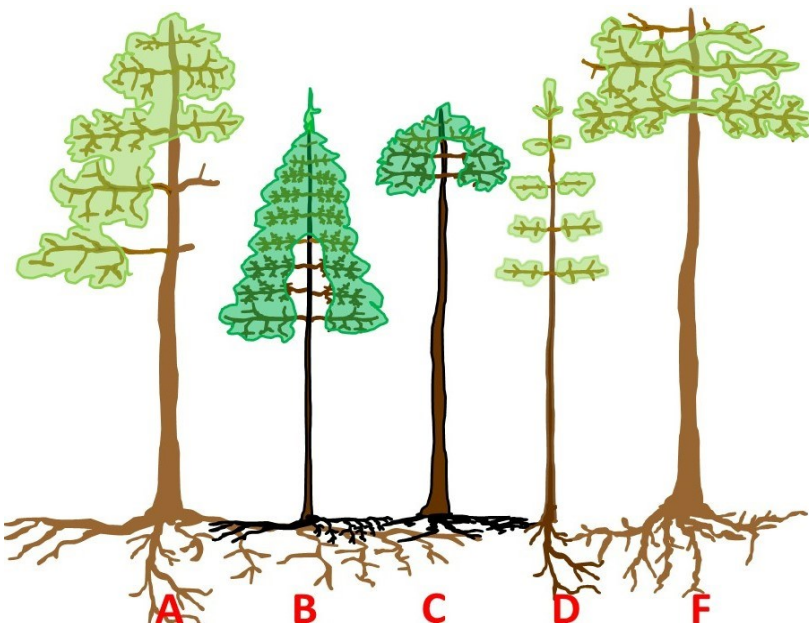
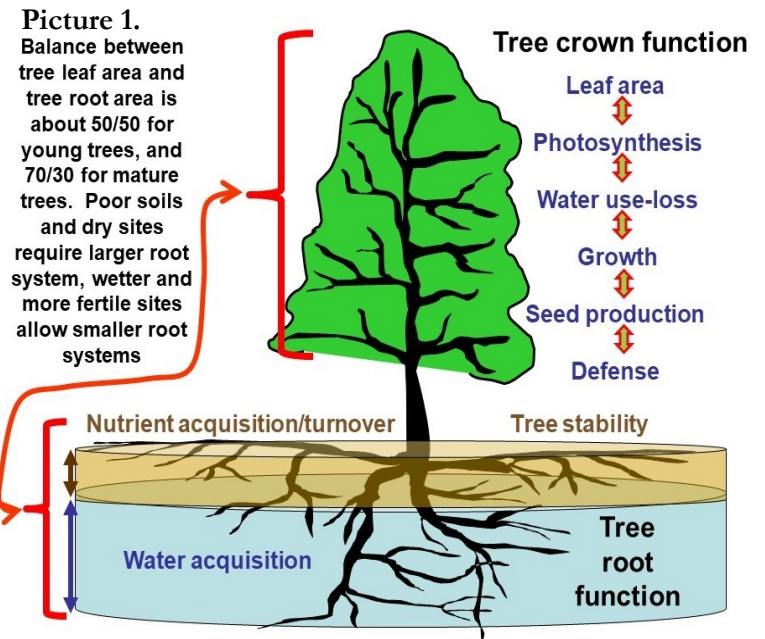
Helena, MT
Helena Colonial Inn

For more information go to: <https://www.foreststewardshipfoundation.org/events>

What can tree crowns tell us?

By: Peter Kolb (PhD) MSU Extension Forestry Specialist

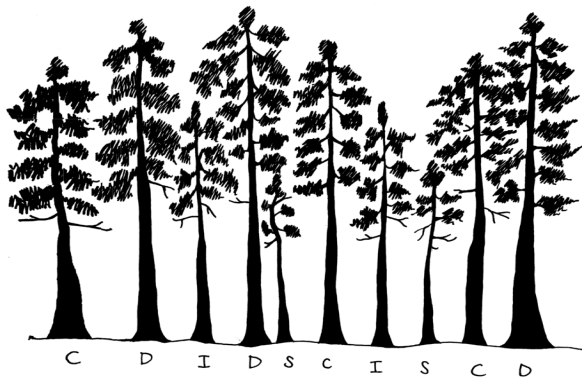
Trees are quite remarkable in their ability to grow as stationary organisms across a wide variety of sites, and sometimes persist there for hundreds, and in rare instances, thousands of years (Picture 1). Some tree species, primarily the “seral” or “pioneer” species such as ponderosa pine, lodgepole pine, limber pine, western Larch and even Douglas-fir are adaptable to growing on different and changing site conditions. Other tree species are much more sensitive to specific site conditions, and once they reach a mature size, do not adjust well to local changes (light, water, temperature) in their environment. Species with this sensitivity fall primarily into the “climax” or “shade tolerant” category such as grand and subalpine fir, Engelmann spruce, western red cedar, and sometimes Douglas-fir (a complicated species).



Picture 2. Tree crown shapes are determined by species light adaptations, and are also a reflection of the trees’ root system. Pioneer species do not have shade tolerant needles, and lose needles and branches that get shaded (A). They also tend to have expansive tap roots. Shade tolerant species can maintain needles and a larger functional crown in partial shade, and develop a shallower rooting structure (B). Shade tolerant species also have minimum light requirements and can stagnate from the combination of low light and soil water competition (C); a condition from which they rarely can recover. In a limited light environment pioneer species can expend more energy growing tall to reach more light, though with structural consequences (D) such as tall spindly crowns and diminished roots. As all tree species age, drought stress or root dieback from root disease will show as crown top dieback (F). Pioneer tree species can live for centuries with this condition whereas shade tolerant species cannot.

Trees go through different adaptability phases as they grow. Seed germination and early seedling survival is sensitive and dependent on specific soil moisture and temperature requirements. However, once established for a year or two, most seedlings are pretty tough at surviving changes in their local environment. It usually takes almost a decade of growth before competition with neighbors, too much sun, or too much shade starts to weaken and kill tree species that are poorly adapted to a particular site, or individuals growing in a bad spot. The sapling and pole size phase in a trees life is also when they can stagnate in dense clusters and suffer from intense competition with their neighbors. This is a critical phase for many tree species as competition for sunlight determines not only their tree shoot or “crown” development, but also determines how much energy a young tree has for stem and root growth (Picture 2). In general, a young tree’s crown size is directly proportional to its root area, as one needs the other to grow.

A species genetic programming (sun or shade tolerance, tap or shallow fibrous root system) is also critical and will give that species



Picture 3. openoregon.pressbooks.pub 5.4 Field Technique Tips for Determining Crown Class and Live Crown Ratio. D - dominant tree crown, C - codominant, I- intermediate, S- suppressed.



Picture 4. Selection for leaving dominant and codominant Ponderosa pine (A), suppressed lodgepole and Douglas-fir (B), and dominant Douglas-fir (C) with variable results.

an advantage or disadvantage for any particular set of site conditions. The density and competition from the same and other species within a group of trees will further modify how any individual tree will grow, and its potential to grow bigger and healthier. Even at a young age, a tree's individual tree crown size and shape is a good indicator of its future potential to: 1) grow larger, and 2) live longer. Thus the combination of a tree's crown shape, size, and density, as well as taking into account that species growth characteristics, is a good measure for selecting which trees have the greatest growth potential and lifespan for any particular location.

Tree crown indices were first developed over a century ago to help foresters evaluate tree growth potential (Picture 3). There has been some difference in opinion over time regarding what crown characteristics and position are the best to leave when harvesting. The initial thought was that a tree with a dominant crown has superior growth and genetics for a site and should be left to continue to gain a greater size and as a seed source for the site. This methodology is currently used in Europe and called "Z" tree selection where younger dominant crown trees are given more space, which has been measured to promote both increased wood quality and volume growth for any given site by 10-20%.

The other thought, often applied to more mature stands of trees, has been that dominant trees are in that position because chance has given them more light, and thus they are taller and bigger. Dominant crowns also coincides with larger stems, and they are the more valuable trees for harvest. By removing dominant trees, intermediate and suppressed trees can "release" and with more light, and less root competition for water, show increased growth rates. Stem volume calculations show that improving radial stem growth in a 14-20" diameter tree from 20 years per radial inch of growth to 10 years can increase stem volume and value by 20% within 5-15 years. This kind of "release" cut has also been widely practiced with good results.

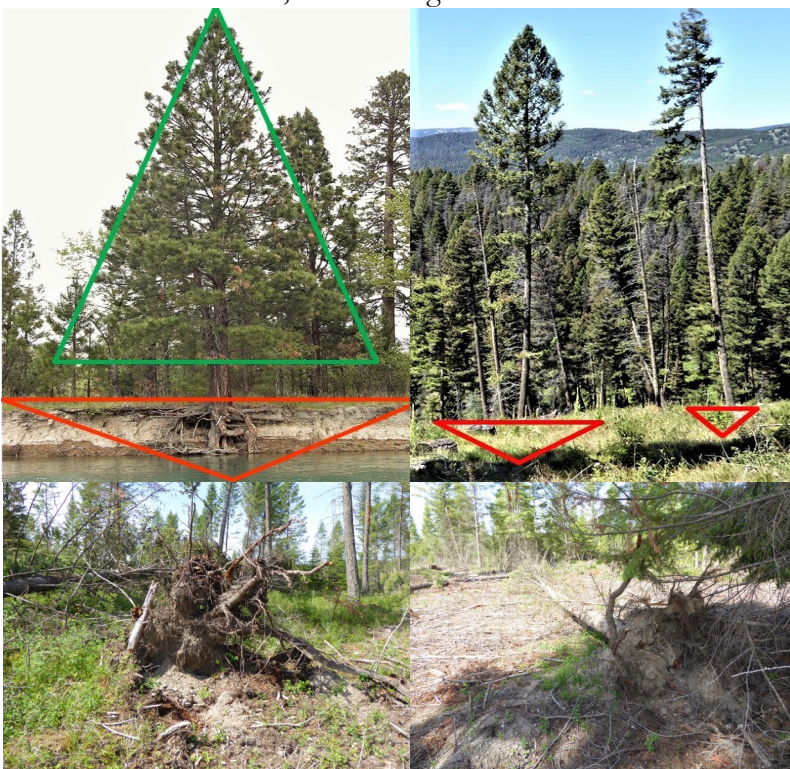
Experience with both of the above concepts across Montana and Idaho has yielded mixed results (Picture 4). For some species and sites, leaving a mix of dominant, codominant and intermediate trees and providing them with more space has yielded excellent results (4A). More light and soil water allowed trees more resources to grow larger and remain more resistant to insects, diseases, and even fire. Alternatively, extreme removal of the more

dominant trees and leaving suppressed trees to a sudden full-sunlight and wind environment can result in sunburned and stressed trees (4B). This has also been referred to as “high grading” because there is some evidence that suppressed trees might also be genetically disadvantaged for that site and produce poorly adapted offspring. At the other end of the spectrum, leaving mostly dominant and codominant trees in a wider spacing can also yield poor results (4C) where these trees suddenly decline and start to die. Clearly there is more to consider than simple crown position and dominance when developing a stand treatment.

As trees mature on any particular site, they are increasingly influenced by the specific conditions their crowns and root systems encounter. Although tree species are genetically “programmed” to grow with certain characteristics, they are also opportunistic and will try to take advantage of available resources. This is why the standard genetic formula is: Phenotype (what you see) = Genetics + Environment + (Genetics x Environment). A tree's crown development is a product of this formula where “environment” plays a strong role during the growth and lifespan of the tree. The interaction of root development and crown development cannot be overemphasized, although root growth and crown growth can react in almost opposite ways. Most crowns will grow larger when provided with ample light, whereas most root systems can be less expansive when developing in highly fertile soils (such as riparian areas). Root growth reacts to resource variability within the soil. Typically roots will grow into locations where concentrations of water and nutrients are most available, much like branches will grow into gaps in a canopy where sunlight is available. Excavations around rotten old stumps that collect and sequester water in their decayed wood shows them surrounded by “sheaths” of fine roots. Similar root concentrations are often found in septic drain fields, sometimes clogging drain tiles and rendering them in need of renovation. Likewise, trees will grow fewer roots into areas that are excessively dry, obstructive (clay soils), or

nutrient poor when better soils are nearby. Though in general, the better the soil resources, the better the tree height growth and crown development, and proportionally the more symmetrical and extensive the root system — within the genetic capability of the tree species (Picture 5).

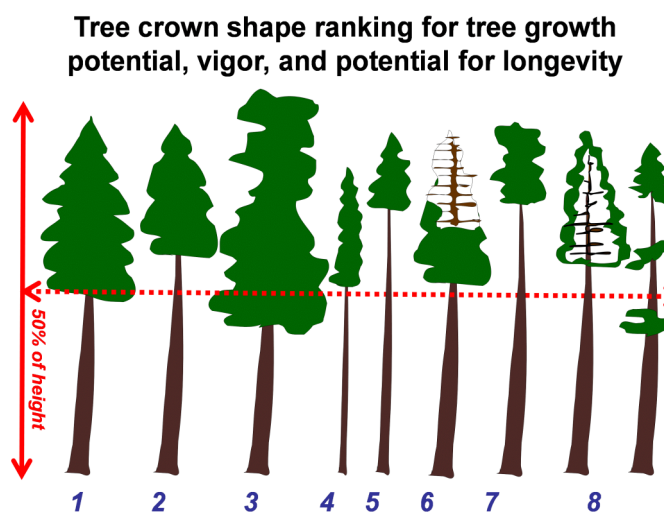
Younger trees are very capable of rapidly locating and growing their roots and shoots into new resource locations. As trees get older with larger crowns to support, they require significantly more soil resources and are highly reliant on their existing root system. They also take much longer to develop new roots into new soil resources if existing roots are disrupted or conditions change. Sudden changes above ground, such as more sunlight and wind in a thinned forest canopy, can create a greater need for water than the existing root system is capable of supplying. Shallow and poor soils that are suddenly exposed to more sunlight and soil heating can exacerbate this issue, which may explain dominant trees fading after surrounding trees are removed (Picture 4C). Older and larger trees, especially those with shallower root systems can be more



Picture 5. A ponderosa pine (top left) has an aggressive tap-root system comprised of fewer but thicker main roots that can grow twice as wide as the tree crown width (bottom left). Douglas-fir (top right) has a more fibrous root system that is less expansive and can often grow one sided (bottom right) to exploit soil “hotspots” where nutrients and water are more available. Crown size is a good indicator of root size, and wind-firmness. Tall trees with small crowns can be very susceptible to wind-throw when too many of their neighboring trees are removed. One sided crowns often indicate one-sided root systems as well.

sensitive to sudden changes in their local environment than younger trees of the same species. Among species, pioneer species with their deeper root systems tolerate change better than climax (shade tolerant) tree species that have shallower root systems. Root systems are, however, quite difficult to evaluate. Tree crowns are much easier to see and evaluate, and their shape and size often is very reflective of the root system that supports them. This makes tree crowns a valuable indicator of overall tree health and potential.

Tree crowns and needles, and what they tell us about an individual tree can vary tremendously among species, and sometimes even within a species. Tree species of the northern Rockies can only utilize about 1/2 of full sunlight at the summer solstice (June 21) when the maximum energy from the sun reaches the northern hemisphere. Different species have adapted by producing waxy coatings on their needles, different needle shapes, and needle positions to evade or reflect excess sunlight. Sun tolerant species tend to have thinner, longer and more angular needles to reflect excess sunlight, and take advantage of convective cooling from the surrounding air. Shade tolerant species have wider, darker and sometimes shorter needles that absorb more sunlight since the average shade from another tree only leaves them with 10% of full sunlight. However, both sun and shade tolerant species can modify or grow new needles over time to compensate for more shade or sunlight. Every tree will have both sun and shade adapted needles depending on their position on the tree. Of these, the sun needles produce 70-90% of the energy needed by the tree. Shade tolerant species have greater ability to compensate over time for full sunlight than sun tolerant species can compensate for full shade. However, a significant change in light requires a new cohort of needles to grow for this adaptation to occur, which will take 3-5 years for a full transition. In the meantime maladapted needles will sunburn, turn yellow and/or produce fewer sugars essential for tree growth. How we evaluate tree crowns, will therefore, depend on the tree species we are examining, as well as their position in the canopy and individual crown characteristics.



Trees with large crowns that are taller than other trees not only received full sunlight and thus have greater energy production potential, they shade other trees. This dominant canopy position gives them the greatest growth potential and with this, the assumption that they are healthier than other trees. However, there

Trees with large crowns that are taller than other trees not only received full sunlight and thus have greater energy production potential, they shade other trees. This dominant canopy position gives them the greatest growth potential and with this, the assumption that they are healthier than other trees. However, there



Picture 6. The importance of crown shape has long been recognized by foresters and several crown classification methodologies were developed to assist with tree selection. As a general guideline, trees that have between 1/2 and 1/3 of their total height occupied with a living needle cohort are considered to have enough leaf area to allow for full photosynthetic capacity and thus have abundant energy for growth and defense (1 & 2 rating). However, such trees are quite often not found in a densely grown stand of trees. Thus crown shape was added as an indicator for a tree's ability to develop a full crown. A pointy crown indicates that the tree can grow taller and develop an optimal crown shape even if it does not presently have one (4 & 5). A flat or rounded top tree crown indicates that the tree's effective maximum height has been attained, and thus it cannot grow a larger crown area by growing taller (3 & 7). If the tree is flat topped, but retains an adequate crown (>30% of tree height - #3) it has what it needs and is considered a healthy crown. Alternatively, if the crown is flat topped and only a small percentage of the tree height (#7) then it is constrained in energy production and does

not have the ability to grow out of this situation. Another common visible crown issues is limited needle retention (#8) that is an indicator of either a pest/pathogen infection or severe site drought conditions. Dead tops (#6) can have many causal factors and its cause and tree consequence is very tree species dependent.

are additional crown evaluation features that need examination (Picture 6). The overall shape of the crown, percentage of crown area compared to the total height, needle density and distribution, branch angle, stem diameter and taper, and symptoms of insect and disease damage all need to be considered for evaluating tree potential growth and longevity.

Tree crown size is the easiest starting point. A tree that carries lateral branches with healthy needles for 1/2 to 1/3 of the total tree height indicates that there is ample photosynthetic area for good energy production to support all of the trees physiological needs (Picture 6, tree crowns #1 & 2). Too large a crown area can result in greater water requirements, that across the arid Northern Rockies could result in too much crown water loss and increased stress from summer drought. Less crown area might result in inadequate photosynthesis and constraints on energy availability for growth and defense. A tapered pointed top to the crown indicates the tree is growing taller, and thus still capable of adding more crown area. A flat topped or rounded crown (Picture 6, #3) indicates the tree has reached close to its maximum height potential. This is significant for two reasons. First, as trees age, they slow in their growth rate potential. For most tree species this occurs close to 120 years of age and is referred to as “culmination of mean annual increment” - or the age when the maximum growth rate of a tree is no longer achievable. Second, and perhaps more importantly, a flat top indicates the maximum height to which a tree can efficiently transport water to its needles to compensate for water loss. When reaching this height, the terminal leader is chronically drought stressed, dies back, and lateral branch growth is more prevalent. The drier the site (low humidity and soil water availability), the shorter the vertical distance a tree can effectively transport water against gravity to maintain crown water demands, and the shorter the mature height that a tree can grow to.

For a tree with a healthy crown, a flat topped crown is not catastrophic since it has enough needle area to produce a net positive sugar flow to support itself. There are many ponderosa pines and western larch trees that have survived for 300+ years past the time they developed a flat topped crown and still survive at ages of 500+ years . Alternatively, for Douglas-fir this is a stage where it is increasingly susceptible to Douglas-fir beetles and spruce budworm, for Engelmann spruce the risk of spruce bark beetle increases, and lodgepole pine is more prone to being attacked by mountain pine beetle. Insect and disease attack, however, also depends on many other factors, including tree density, competition for water and drought stress, crown energy production potential, prevalence of a single species (food source for an outbreak to develop) across the landscape, individual tree genetics, and soil nutrition. Most shade tolerant species, with the exception of western red cedar, are shorter lived than sun tolerant species (with the potential exception of lodgepole pine). This is due to a shallower root system that makes shade tolerant species more sensitive to episodic drought periods, and possibly less developed defense mechanisms against insects, diseases, and wildfires.

Flat or rounded top trees that have been excessively crowded and shaded by surrounding trees (#7 in picture 6), have small round topped crowns. For these trees, a diminished crown area also indicates a smaller root system and less water absorption capacity. Giving these trees more space typically only has a minimal impact since they are incapable at this stage of growing back a larger crown. They have reached their maximum height and can only grow wider crowns, which is limited by branch strength and wind firmness. Inability to grow larger crowns also limits the trees ability to expand its root system. Trees of this crown character are mostly confined to their present proportions, and usually are at high risk from drought stress and stem failure from the drying effects and torque of increased winds, increased temperatures from more sunlight, and potentially insect and disease attack. The failing crowns of trees in picture 4C might be best explained by the effect of these influences.

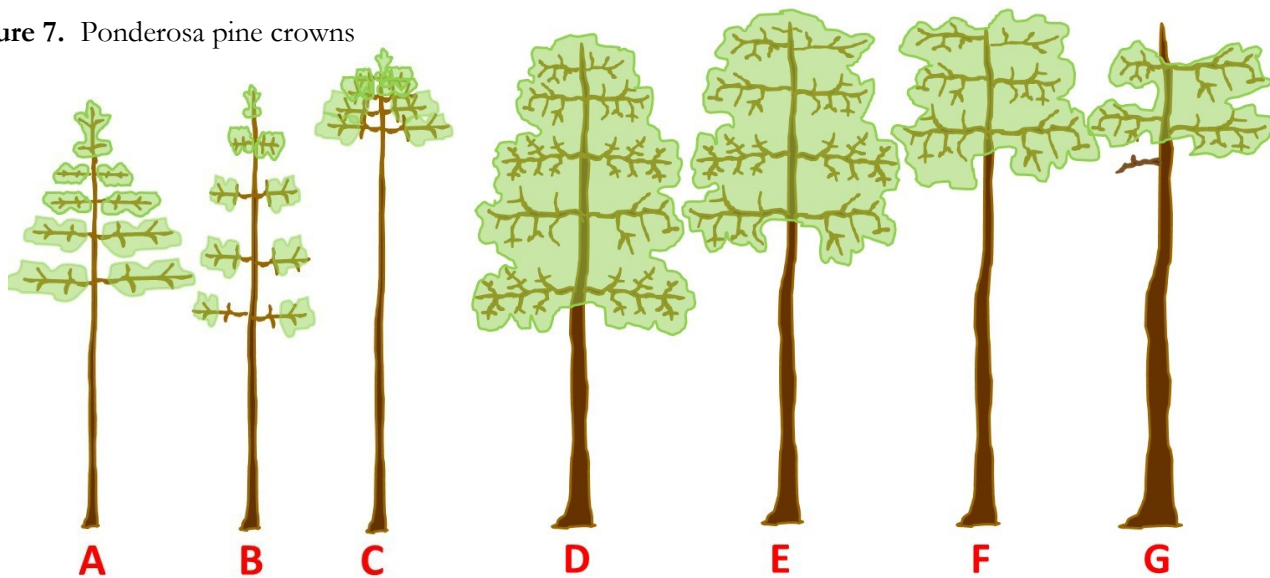
Intermediate and suppressed crowns can be difficult to evaluate and much depends on the tree species (Picture 6, #'s 4 & 5). Younger trees that are growing in a small opening with episodic sunlight will often show phototrophic growth and develop a very long and thin leader with sparse and shorter lateral branches and a spindly stem. These trees have the potential to develop well proportioned crowns and roots, but respond best to gradual increases in sunlight brought about with periodic and moderate removal of the

surrounding and competing trees. Too much space, created too quickly, leaves them highly susceptible to wind or heavy snow bending, from which they cannot recover. Typically shade tolerant species tolerate and develop quality crowns more quickly than sun tolerant species because they retain more foliage (#4, picture 6) that can develop with more space. The danger for them is sun-scalded foliage if given too much space too quickly. Sun tolerant (shade intolerant) species will drop their lower branches and maintain a smaller pointy top (#5, picture 6). The overall diminished crown size leaves them highly susceptible to wind and snow damage after release, though they do not sun scald as easily and their deeper rooting habit is not as impacted by warmer and drier shallow soils. Both shade and sun tolerant trees within this crown category develop best with a gradual release from surrounding crown competition.

The final categories of crowns include those with dead tops, forked tops, and thinning tops. These symptoms are typically caused by either past damage from animals, insects and diseases, or double terminal buds. The future of trees within this category is highly species dependent. Ponderosa pine and western larch tolerate and often recover from top damage. For Douglas-fir, grand fir and subalpine fir a dead top is an indicator that the tree will have a significantly shortened lifespan and already has or will develop stem decay issues from invasive fungi. Overall, crown categories #6 and #8 from picture 6 indicates severe problems, and a higher probability that the tree will not survive past the next 10 years.



Picture 7. Ponderosa pine crowns



Ponderosa pine is one of the most versatile and long-lived tree species found across the northern Rockies.

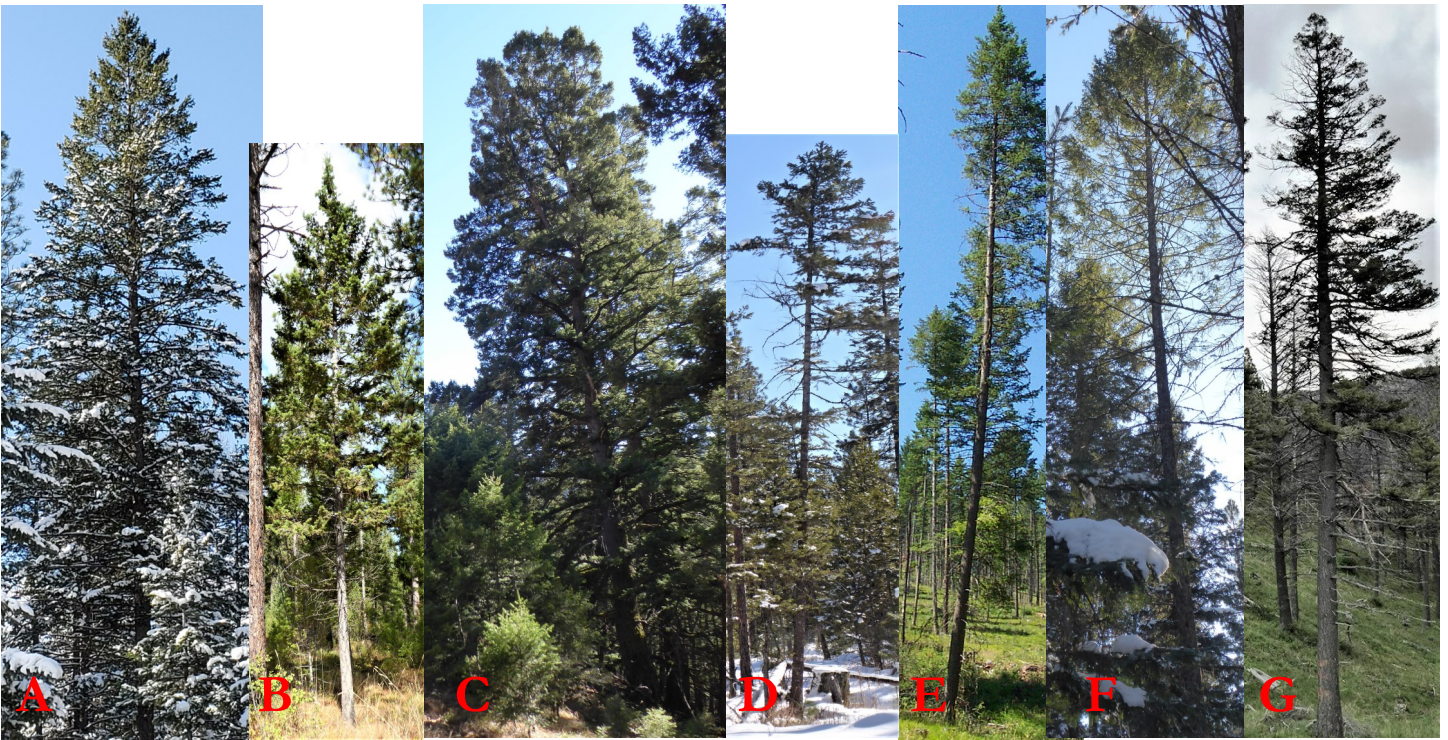
It can develop an extensive tap root system allowing it to find water in deep soils and rock fissures and survive on very dry sites. Surprisingly its roots can also tolerate significant flooding and its taproot ends can be found submerged in stream bottoms. In areas with a high water table, ponderosa pine has the versatility to develop a relatively shallow root system. It is also quite cold tolerant and can be occasionally found on higher elevation sites. Its heavy cones and seeds do not allow it migrate very quickly, unless facilitated by a bird or other animals transporting and caching its seeds, which might explain absence in certain areas of Montana (such as the Bozeman area) although it grows quite well there. Its crowns are adapted to reflect excess sunlight and disperse heat, which makes it shade intolerant. When it has enough space it will develop a symmetrical crown (A) and exhibit rapid growth. When too crowded as a juvenile it can exhibit rapid height growth to track light in the upper canopy. This occurs at the expense of stem diameter (B) growth making this crown type very susceptible to bending or breaking from heavy wet snow, especially when thinning around it gives it too much space all at once. Over time excess crowding will cause the tree to lose its lower branches leaving it with a small crown (C) that is also prone to breakage and windthrow if given too much space quickly. Both B and C crowns respond best to moderate thinning of surrounding trees that over time allow the crown, stem and root system to expand and provide more balance and stability to the tree. As ponderosa pine matures it will reach its maximum height (D) based on its ability to transport water up the stem from the soil in a manner that can keep up with evaporative water demand to the crown. If too long a delay occurs, the crown leader(s) will die-back from drought stress (E & F) creating a rounder and eventually flat topped crown. The lower the summer humidity and thus the greater the evaporative demand, the shorter the mature height of ponderosa pine. It can take about 150 years for ponderosa pine to reach its terminal height and start developing a more rounded crown, but as long as the tree maintains somewhere close to a 30% crown-height ratio it can survive past 500+ years.

Although younger (10-30 year) and mid-mature (30-90 year) ponderosa pine are fairly tolerant of climatic fluctuations on most sites, more mature ponderosa pine can be more sensitive to changes in their surroundings—and can be affected by rapid changes in local climate and soil water balance. Rapidly growing pines that are suddenly drought stressed seem to be a favorite food for western and mountain pine beetle as they are full of nutritious sugar but lack the water pressure to push defensive pitch to attack sites. Thus younger mature trees that appear to have a perfect full crown and good growth rates (distance between whorls of branches) that have quickly grown into a crowded forest condition, or that are subjected to sudden drought might be the first trees attacked and killed. Pine engraver is an indicator of drought stressed trees by killing the tops of water stressed mature trees (G), and stagnated pole sized trees midsummer. Ponderosa pine has pitch canals in its wood that can be very quick to create a “pitch” seal and block off damaged areas. This immune response might also make the tree more resistant to future beetle attacks. Many very old mature trees show they have survived past top-kill from either lightning (Pine is an attractive tree to lightning) or from pine engraver. Although ponderosa pine is good at avoiding drought with deep roots, competition with Douglas-fir, that can dry down its water suction significantly more than pine, can be detrimental. Douglas-fir can obtain water from drier soils than ponderosa pine, and this may also allow it to parasitize water from the pine root systems. Water parasitism among species has been well documented, though not yet studied between these two species. Douglas-fir regeneration often crowds around mature pine trees, that coupled with its greater water suction would indicate this interaction at play.

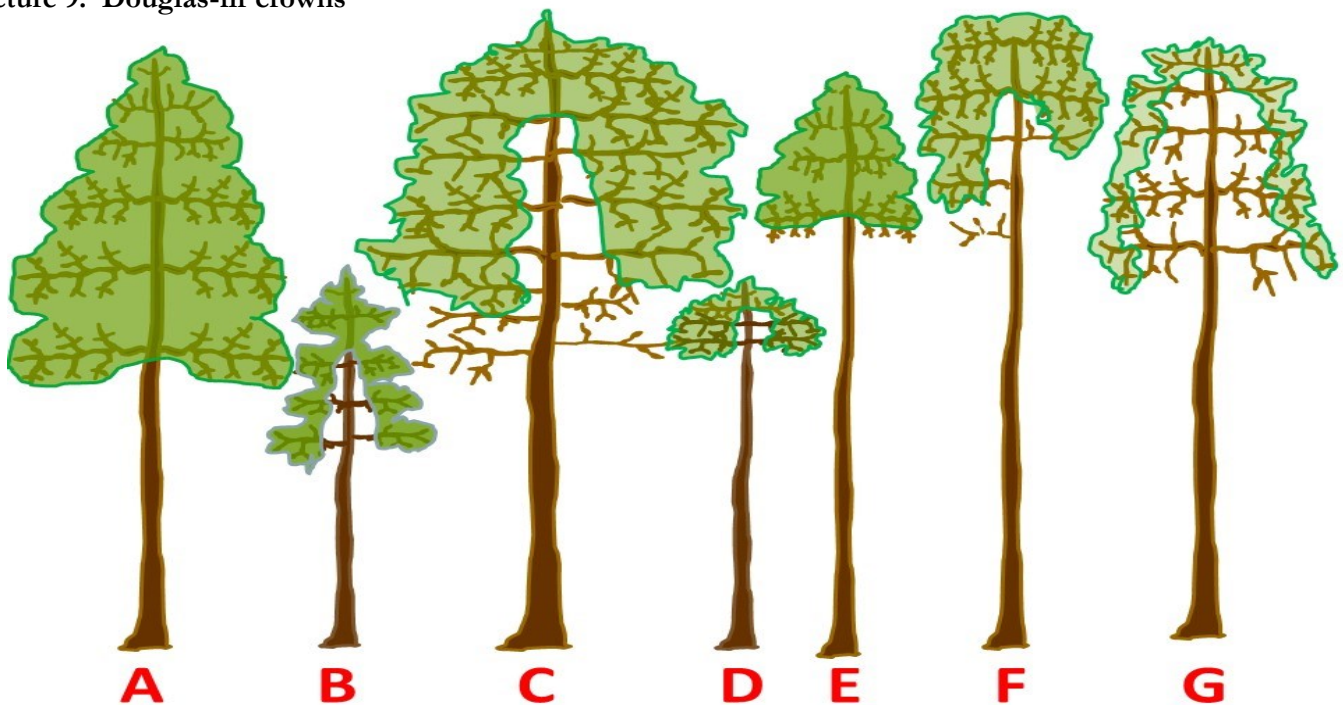


Picture 8. Ponderosa pine and western larch can sustain top dieback from a variety of agents and to different levels of damage, but fully recover from them with some change to their stem form (A, B, C). A “U” shaped fork (D) or what is referred to as a “dogleg” (E) in the stem is the result of damage to the main leader when the tree was younger, and many ancient trees of these two species exhibit such past injuries. A “U” shaped fork is different than a “V” shaped fork (F) that results from a double terminal bud. Forks that result from injuries develop when lateral branches develop dual dominance, and the wood fiber grows across the fork, forming a very strong and stable fork. A “V” shaped fork develops with a parallel wood grain that has no lateral connection and strength and is thus very prone to splitting the tree trunk when one fork has more wind or weight exerted on it. A fork near the middle of the tree is a much greater risk to the tree than a fork that has developed near the top of the crown. More vertical branch angles (G) causes greater wood defect in the tree stem for wood production, is genetic in origin, and might be linked to greater susceptibility to gall rust and other needle and stem pathogens, but this has not been carefully studied or substantiated. Spotty or irregular branch dieback (H) is consistent with disruption of water flow to the crown from root diseases and stem pests and pathogens. The pictured example is being caused by persistent turpentine beetle infestation on the lower stem. A sudden yellowing crown (I) indicates a serious disruption of water flow to the crown for which there might be a variety of causes, leading to tree death. A red or orange crown (J) indicates total water-flow blockage for which there is no possible reversal (the tree is dead).





Picture 9. Douglas-fir crowns



Douglas-fir is a highly adaptable species, and is the most commonly found tree species across the Northern Rockies. Its adaptability as a young tree can make it complicated to assess and manage once mature. With moderate to full sunlight it grows well and develops an extensive crown both as an overstory tree (A) and understory tree in partial shade (B). This gives it the ability to grow as both a pioneer and climax tree in moderately dry to wet environments. As it matures (around 120 years) it develops a rounded top (C) and self shading reduces its lower canopy needle area. The partial shade tolerance of Douglas-fir makes it its own worst enemy, allowing it to develop into dense overcrowded stands whose canopies intercept rain and snow that evaporates back into the air rather than hydrating the soil. This along with a dense needle area (that has significant water needs), allows Douglas-fir to develop into stands that have outgrown the capacity of the site to support them with adequate water. When Douglas-fir regenerates as a mostly even-aged seedling cohort

following a disturbance such as fire, mountain pine beetle outbreak, or thinning, it quickly develops into an overcrowded stand where light and soil water competition creates trees with narrow and shallow crowns (E), and proportionally small and shallow root systems. As trees reach their mature size, most crowns become more rounded (F) or broader with moderately pointed tops. In such crowded stands, mature trees shade each other into developing very shallow and short crowns, often covering less than 10% of their height. Thinning stands of trees in this condition is very difficult as they cannot adapt well to more sun or increases in soil temperature. If thinning is applied on sunny south and west aspects it must be very gradual (perhaps less than 30% of the trees can be removed) to maintain soil shade. North and east aspects are more forgiving. Group selections or “patch” cuts might be better management solutions for mature stands with poor crowns.

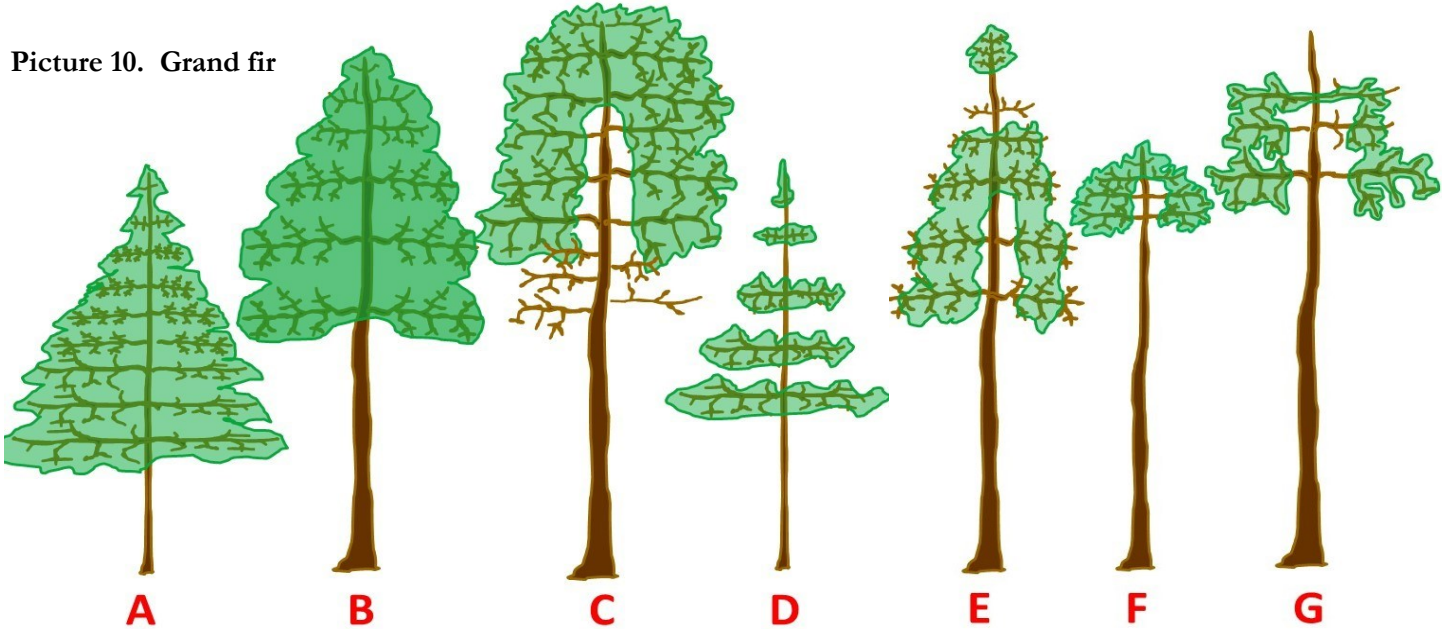
Douglas-fir may regenerate in spotty patches under a dense closed canopy forest, but it is not a fully shade adapted species, and deep shade, along with root competition from neighboring trees will result in stunted smaller trees with wide shallow crowns (D). When establishing under western larch or ponderosa pine dominated overstories, enough light penetrates these deciduous and more open crowned trees to allow Douglas-fir to develop a more aggressive and rapid growing crown such as seen in (B). Whereas understory Douglas-fir with a “B” crown can take good advantage of more space from thinning and grow into a well proportioned mature tree, a “D” crown tree may never release, or take decades to develop a more robust crown and root system that can support better growth. Smaller trees with “D” crowns have occasionally been measured to be over 100+ years old. The older they are with this type of crown, the less likely they are to respond to more space and develop into bigger trees.

Open grown Douglas-fir with “A” or “C” crown shapes may survive for close to 400 years. Older Douglas-fir may exist but are quite rare. Douglas-fir can be expected to develop a “C” crown at around 100 years, and 200 years average age is not uncommon for “old growth” stands with “F” crowns. This species can develop a deeper root system as it is somewhat tap rooted, though when it develops in dense even-aged stands a shallower root distribution is often observed. This may be exacerbated by shallow soils that are common on mountain slopes. Crowded Douglas-fir stands can develop root grafts between individual trees, responsible for creating the “living stump” phenomenon. After tree removal occurs, some stumps and their root systems remain alive decades after being cut. Grafted root systems among mature trees provides neighbor trees access to water acquisition from cut tree root systems, and sugar from the intact surrounding trees diffuses across the root graft into the cut tree root systems keeping them alive.

Grafted root systems may offer trees an advantage for water and nutrient acquisition, but also come with significant disadvantages. Specific fungal root diseases such as *Armillaria*, *Schweinitzii*, and laminated root rot will infect root system of susceptible trees, and follow root grafts into other trees creating what are termed “root rot pockets”. Infected trees will develop a “G” crown noticeable as poor needle retention and “thin crowns”. Such crowns indicate the tree will likely die within the next 5-15 years. Root disease is particularly common where Douglas-fir are mature, and have persisted for multiple generations (C and F crowns), or on wetter forest types such as where grand fir and western red cedar are the climax species. This offers additional challenges for stand improvement practices because thinning mature trees to relieve drought stress also creates food sources that may stimulate root diseases. Thinning Douglas-fir stands to alleviate water competition is best recommended when trees are young or have A, B and sometimes E crowns.



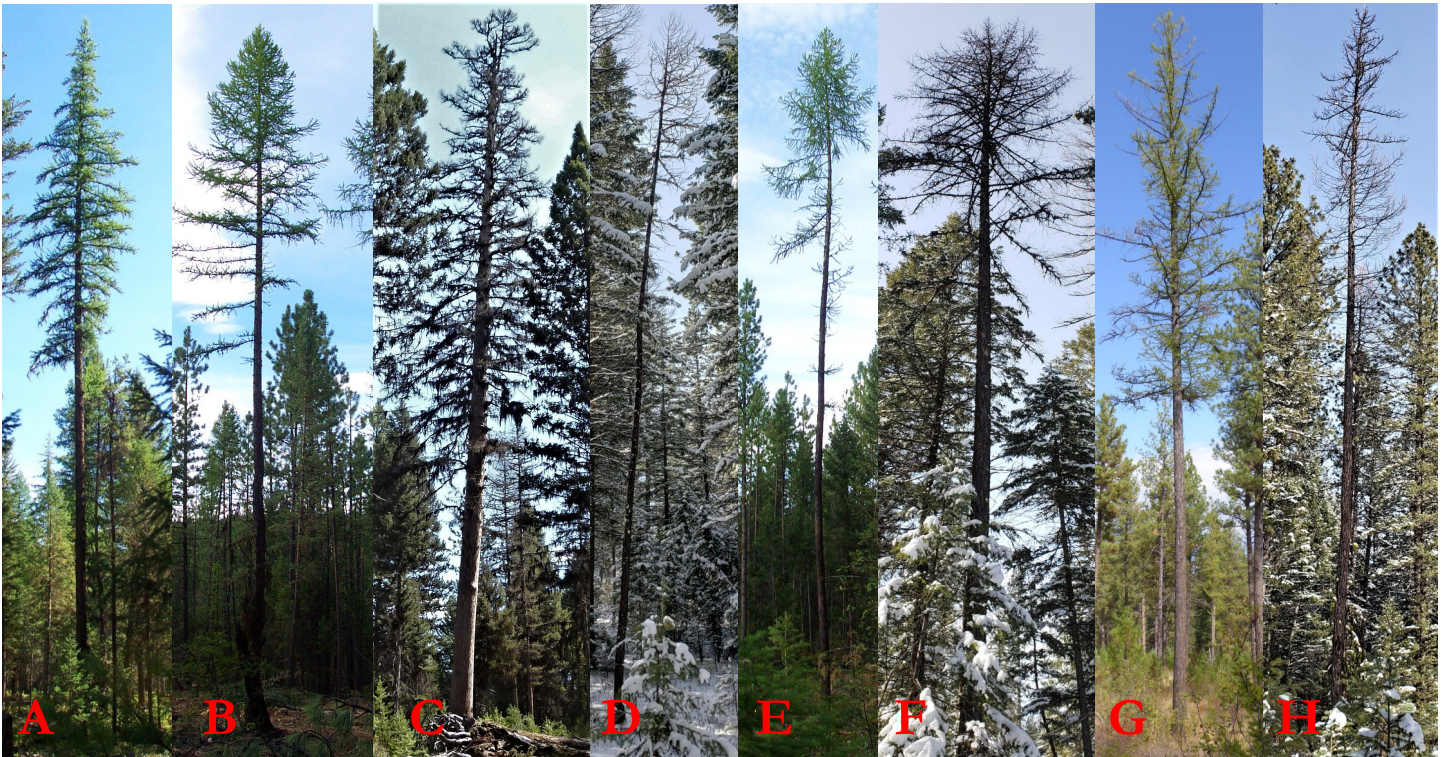
Picture 10. Grand fir



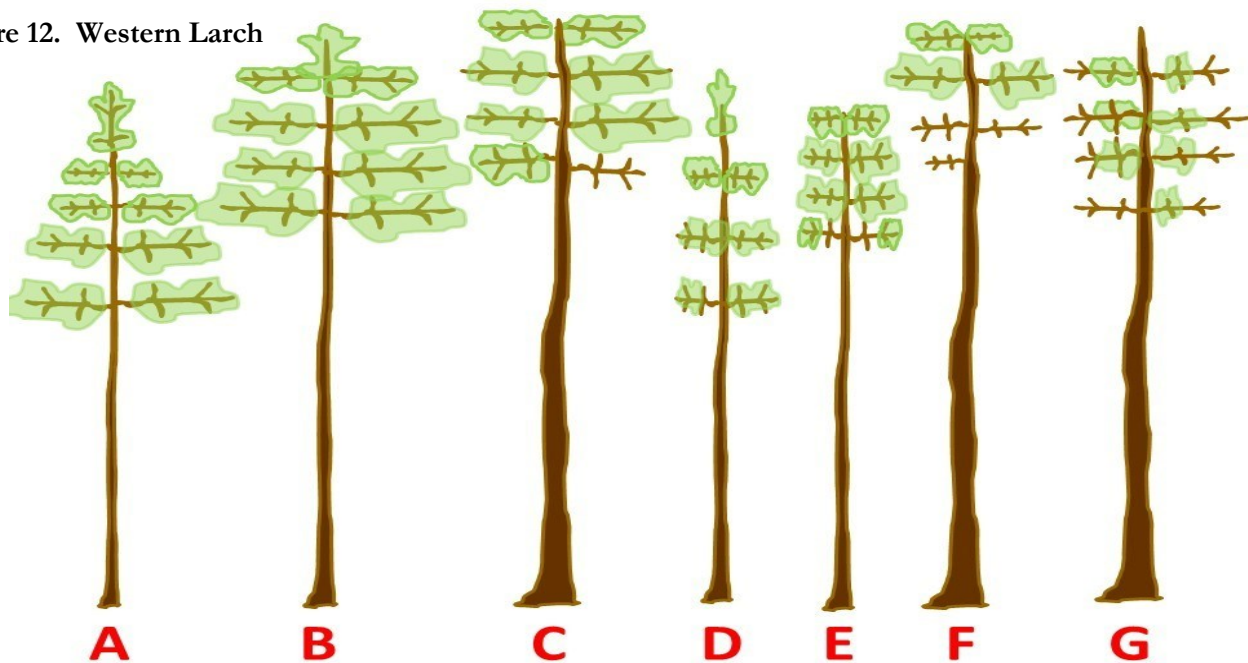
Grand fir is quite shade tolerant and capable of very rapid growth. It is good at maintaining a full crown (A, B) even as a very mature tree (C). Partial shade will stimulate rapid leader growth (D). Too much shade will also stagnate its growth (F) from which it has difficulty recovering. It's downfall is great sensitivity to water stress and poor defenses against a host of pests and pathogens. Water stress can result in leader dieback (E, G). Spruce budworm and Tussock moth will also defoliate tree tops, that can grow back into what is called a "fiddle top" (E). Seasonal drought makes it extremely susceptible to fir engraver bark beetle that will also cause top dieback or sudden tree death. Its retention of good crown shape and volume can be misleading as Indian Paint fungus (Picture 11) commonly invades and decays the center core of the tree. Any presence of a conk on the stem indicates it is completely decayed inside making it unstable and worthless as a wood source. It is rare to find healthy intact grand fir that are older than 200 years.



Picture 11. Indian paint fungus conk.

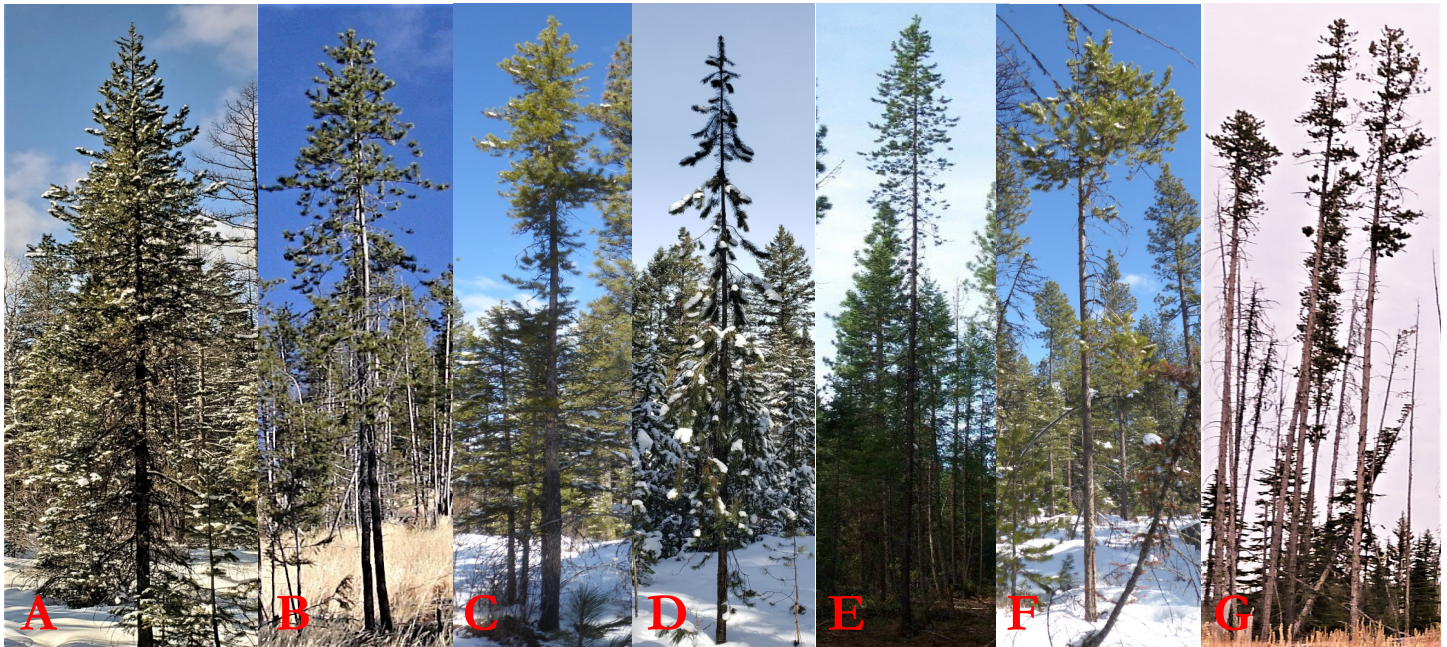


Picture 12. Western Larch

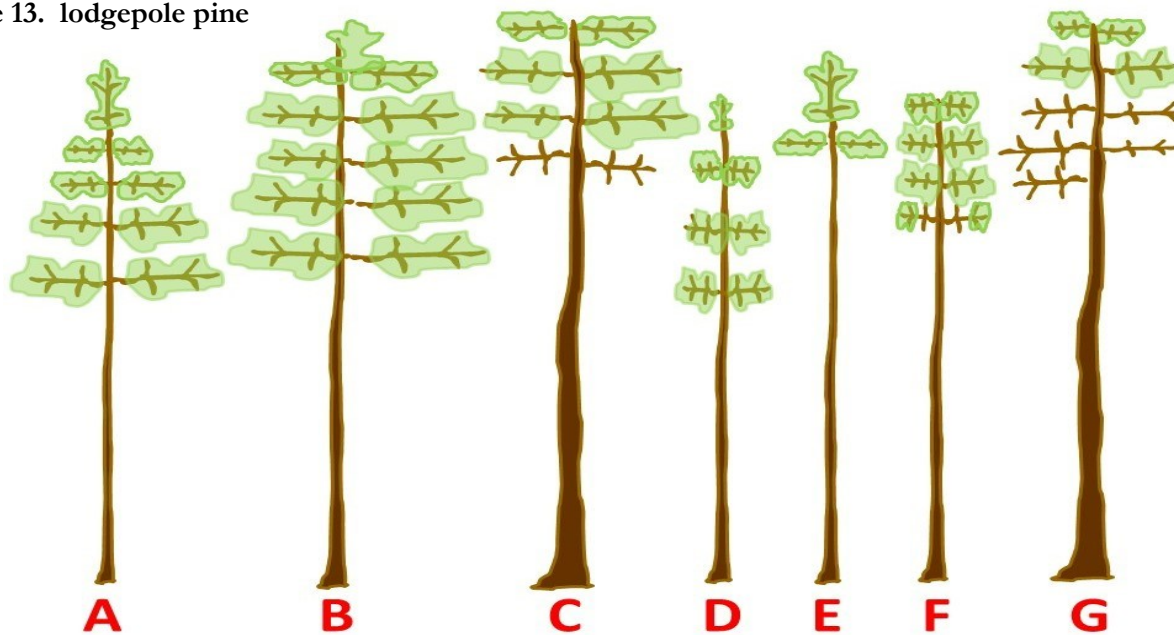


Western larch is the ultimate survivor where it grows. It is quite shade intolerant and is well adapted to colonize burned and heavily disturbed sites. With enough space it grows quickly with well formed crowns (A and B). As a juvenile it grows with rapid height growth, but easily stagnates from light competition with surrounding trees. If caught early (D) it responds well to thinning, but if in a dense condition too long (E) it may take a decade or more before it starts to grow well again. It is highly susceptible to late spring snowfalls of heavy wet snow that stick to new needles that may permanently bend over the stem. Once it matures it forms a flatter or wider crown (F). Any shade will cause it to drop its lower limbs, which reduces crown volume. Larch is one of a few trees that can produce “Lammas” growth—or adventitious branches later in the summer, and thus is good at recovering from injury. It may be one of the longest lived species in the northern Rockies living up to 1000 years. Older trees are often infected with brown heart rot and carpenter

ants making it an ideal habitat tree, especially for Pileated woodpeckers (C). Swollen branch connections to the main stem, visible fungal conks and occasional branch dieback (G & H) usually indicate that the heart wood is decayed, though infested trees can survive for many centuries with this condition. Larch starts to occur across wetter Douglas-fir sites, and is sensitive to drought stress that can also show itself as branch and especially terminal leader dieback. The most fire resistant tree in the northern Rockies, it can survive significant fire damage to its stem and crown. The former record giant larch in Montana survived for decades with just one lateral branch keeping it alive. Many of the ancient larch (C) approaching 1000 years of age had experienced dead tops from which they have recovered.



Picture 13. lodgepole pine



Lodgepole pine is an often maligned species because of its common occurrence as dense monocultures on landscapes that experienced infrequent and severe wildfires, and its susceptibility to mountain pine beetle outbreaks when it reaches 80+ years of age. It is a shade intolerant species that is relatively fast growing on poor as well as good soils, and with enough space, it develops a fairly symmetrical crown (A & B). If open grown it will retain all of its branches to ground level, though with moderate shade from competing trees it

will let its lower shaded branches die. Shaded branches smaller than 1 inch diameter will typically self-prune, whereas larger branches will persist for decades. At close to 90 years lodgepole pine will develop a flat topped crown (C) and growth will start to slow. If it can maintain a healthy crown and is not attacked by mountain pine beetle it may attain an age of 300 +years, though this is not common and usually occurs when it is an isolated tree growing within a forest of other species. Since lodgepole pine regeneration is adapted to take advantage of severe disturbances, it often develops in very dense pure stands, that can start to stagnate at 5 years of age with 5-20 stems per square yard. This kind of extreme crowding creates tall thin crowned saplings and poles (D), that over time will self-thin to some level, but result in stands of small crowned trees (E) that over time can stagnate as stunted mature trees with small flat topped crowns (F). These crowded stands of trees are frequently drought stressed during the summer and when stems reach a diameter (8-10 inches) that can support mountain pine beetle larvae, they are attacked and become breeding grounds for bark beetle outbreaks. On better soils, dense stands of lodgepole pine can reach 80 ft in height and stem diameters approaching 20 inches (4.5 ft from the soil surface). Lodgepole pine develops a very limited vascular system for transporting water (also called xylem or sapwood) that reduces water transport to taller crowns and can result in trees slow decline (G). Once a lodgepole pine crown has reached a mature height with a flat top and less than 20-30% crown (% of the total height) it will have minimal response to more space, water and nutrients. Thinning and spacing dense lodgepole pine stands at the sapling, pole sized, and mature tree stages will allow it to develop an optimal crown, good growth and greater longevity. The state record lodgepole pine is 3 feet in diameter and approximately 120 feet tall. Lodgepole pine is adapted to grow at mid to higher elevations where a shorter growing season and deep snowpack limits summer drought. It will also occur in riparian areas, though is often plagued with stem and branch fungal diseases such as western gall rust and stem canker diseases. When lodgepole pine occurs as individual trees in mixed species stands it often persists into an older age than when it occurs in a monoculture. With its serotinous cones, it is the only species whose seeds can survive a severe crown fire, and can be an important component for ensuring some natural tree regeneration following a wildfire.

Pondering Our Human Role

By: *Lisa Schmidt*

I have been absorbing two books lately. Both of them talk about how humans solve – or don't solve- problems.

The Wizard and the Prophet, written in 2018 by Charles Mann, compares Norman Borlaug's wizard philosophy that humans can solve all of the problems of the world with technology to William Vogt's prophet philosophy that if we don't impose limits on food, water, energy and climate change, and live within those limits, we all will perish.

Borlaug focused on developing wheat varieties that would feed more people. Vogt developed the idea that the limited natural resources of earth can only support so many living beings, whether those beings are birds, bacteria or babies.

Vogt was the first to name these limits carrying capacity. Carrying capacity is easy for ranchers to understand – our pastures only feed so many cattle and sheep. Frankly, I scratch my head when wildlife managers in Yellowstone National Park deny what an overpopulation of bison is doing to the land.

Meanwhile, wizardly technology has fed millions of people across the globe with new varieties of wheat and rice, among other foods.

Vogt assumed humans are one cog of biology, like rats or bacteria. Borlaug assumed humans are separate from other species, with the capacity to analyze and invent. Charles Mann does not advocate for either the Wizard approach or the Prophet approach.

In fact, he acknowledges that both sides point to the immense problems inherent in the others' solutions. All of those problems boil down to the cost of implementation and the risk that they won't work. Think about small-scale nuclear energy instead of coal, one single wheat species grown across the globe instead of many species with diverse disease resistance and growth characteristics or mandated population limits as examples of solutions with high potential risk of failure.

I'm a bit of both wizard and prophet: Improve carrying capacity with innovative tools, but recognize carrying capacity is limited. In Viktor Frankl's 1946 book, *Man's Search for Meaning*, Frankl assumes humans are separate from other species, yet will behave as rats or bacteria unless they find meaning to their lives. Frankl was a psychologist before he spent years in a concentration camp during World War II so he experienced human nature at its depths. Frankl noted that uncertainty and loss of hope for the future were almost as effective at killing concentration camp inmates as typhus.

Only the gas chamber and starvation were more effective. Borlaug and Vogt implied that they agreed with Frankl by devoting their lives to solving two of humankind's greatest uncertainties – chronic hunger and the risk of hunger for all of us in the future. While Borlaug and Vogt worked on physical solutions, Frankl focused on how our attitude is what keeps us going. Frankl said the secret is to switch our focus from what we expect from life to what life expects from us. He said each of us can tolerate any situation, even a concentration camp, if we have a reason to live. Frankl's examples included helping our children or publishing a book. Borlaug and Vogt lived for developing solutions to human hunger and convincing people to live within the limits of our natural resources.

Yet, neither wizards nor prophets address the biggest hurdles to overcome – varied cultural norms, human nature and values. Frankl attempted to articulate fundamental human nature and values that we all share. He hoped we could use our common characteristics to rise above the scary uncertainty of our collective future.

The power of wizards, prophets and psychologists is that they approach conundrums from different perspectives. All we have to do is combine the various perspectives to solve our problems. How hard can it be?

Lisa Schmidt raises grass-fed beef and lamb at the Graham Ranch near Conrad. Lisa can be reached at L.Schmidt@a-land-of-grass-ranch.com. For more of Lisa's endeavors including her observations and blog associated with ranch life, check out www.a-land-of-grass-ranch.com.



MSU Extension Forestry

Online Publications

Forestry Factsheets

<http://forestry.msuextension.org/publications.html>

- Shaping and Pruning Your Ornamental Trees
- Hand pruning Container and Bare-root Tree Seedlings
- Wildfire Severity Photo-guide for Assessing Damage and Aiding Recovery of Trees and Forests across the Northern Rockies
- Do Burn Piles Need Rehabilitation?
- Burning Slash Piles; What's the Best Way to go About it?
- The Difference between planning and doing Forest Management
- Forestland Grazing: Understory Forage Management
- Managing your Timber Resource: Which Trees to cut, which Trees to leave?
- Using Alternative Slash Management Systems in Western Montana
- After the Storm: Caring for Your Trees
- Developing a Wildfire Hazard Reduction Plan for Your Property
- Alternative Forest Management
- Managing Bark Beetles
- Forest Soil - How does it function?
- What is a Tree - Biology and Growth
- Pruning Trees
- Trees and Shelterbelts
- Photo Guide for Assessing Wildfire Severity
- A 13 year case study of the impacts of the Fridley Fire across land ownerships and management responses in the Northern Rockies

Other Publications

- 2018 MSU Extension Southern Bitterroot Wildfire Recovery Tour- Sula State Forest
- Climatic Influences on Forests across Montana – Strategies for Conservation and Functional Retention
- Management Practices For Forest Health And Catastrophic Wildfire Resistance
- Growing Trees on Montana's Prairie
- Call before you cut - A Resource Guide to Forest Management
- Biodiversity Guide for Montana Forest and Woodlot Owners
- Timber Sale Planning and Forest Products Marketing
- Guide to Forest Aesthetics in Montana
- Identifying Montana's Forest Invasive Weeds
- Watersheds in Montana
- E3A: Exploring Energy Efficiency & Alternatives



MSU Extension Forestry

Online Videos

Instructional Videos

<http://forestry.msuextension.org/videoresources.html>

Forest Stewardship Program

- The Big Picture (public land survey system, topographic maps and photos)
- Northern Rockies Forest Ecology and management (5-part series)

Extension Forestry Video Resources

- Rocky Mountain Forest Processes
- YouTube Channel New Channel!

Prescribed Pile Burning

- Prescribed Pile Burning for Landowners Webinar (November 19, 2020)

Forest Management Videos

- Northern Rockies Forest Ecology and Management (5-part series)
- Timber Harvesting for Private Landowners (produced by F.H. Stoltze Land and Lumber with other sponsors)

Chainsaw Safety Awareness Videos

- Chainsaw Safety Awareness (2-part series)
- How to Fell or Cut Down a Tree Using a Chainsaw

Restoration and Utilization

- [Bioenergy in Northwest Montana](#), Bioenergy Day 2017
- [Restoration Renaissance: A new Paradigm in John Day, OR](#). When the town's remaining lumber mill threatened to close, environmentalists and local leaders stepped in to save it.
- [From the Ground up: A Story of Stewardship in Lake County, OR](#). A remote rural community becomes a national leader in collaboration; redefining the idea of stewardship.
- [Living with Fire: Black is the new Green in Trinity County, CA](#). Local leaders and forest managers are discovering how living with fire keeps communities safe and creates new local businesses.
- [Forest biomass diversion in the Sierra Nevada: Energy, economics and emissions](#); highlighting the benefits and challenges associated with managing forest biomass and transforming it into a source for renewable energy.

Germany Forest, Culture and History Study Tour

Yes, we are going to try again!

May 13-27, 2023



2017 study group on the Schafberg in Austria looking into Bavaria



The "Waitburg" where Luther translated the Bible from Greek into German—setting in motion the Reformation, essentially establishing the notion of "individual rights". Located near the town of Eisenach, where first forestry texts were published.



Ebrfurt—perfectly preserved ancient city and cultural center of Thuringia

Spend 2 weeks in scenic Bavaria and Thuringia experiencing forestry, history and culture. Tour starts in the ancient Bishop seat and University town of Freising, just 15 minutes by bus from the Munich International Airport. A few days will be spent examining the arboretum of the

King of Bavaria's estate in Munich as well as the University Forest and educational forest nature walk. From there we will travel south to Munich's municipal watershed forest, and the logging museum in Ruhpolding with a quick trip into Salzburg. Then it is north to the amazing old city of Regensburg, and the historic Danube river and associated forests. On this trip we will travel further north into the vast forests of Thuringia with some stops at a Napoleon era fortress, medieval castle, and the ancient Castle Waitburg and the fantastic and historic city of Erfurt which escaped bombing during WWII and allows for exploration of 800 year old buildings, alleyways and Cathedrals. Many additional stops at local venues. We will travel with a charter bus and stay at comfortable local hotels. Most breakfasts and some dinners included.

Cost: approximately \$3500 per person and your own airfare (will depend on currency exchange and economic situation).

Maximum number of participants is 20 due to logistics, first come first serve and will require a \$200 nonrefundable deposit by September 12, 2022.

Contact Peter Kolb (406-243-4705) or Christina Oppgard (406-243-2773) for questions or to reserve a spot.



About FireSafe Montana

FireSafe Montana is a private, non-profit organization established in 2006 as a (501 (c) 3). It is our goal to assist if asked, in the formation of local FireSafe councils across the State of Montana. We are actively looking toward a statewide coalition of diverse interests that work together to make Montanans, their homes, their neighborhoods, and their communities fire safe.

We work through public information programs, educational materials, website, special recognition events, and individual requests, to raise public awareness of the local wildland fire hazard. We encourage active involvement in federal, state, and local fire mitigation efforts to reduce the potential loss of life and property from wildfire in Montana.

Montana's private landowners, regardless of tract size, are encouraged to manage their land for reduction of the wildland fuel hazard. We encourage the use of ignition resistant building materials. When people take personal responsibility for applying and maintaining Firewise practices on their property, they greatly increase the chances of their homes, and their community, of surviving a wildfire. Visit our website at www.firesafemt.org.

Montana Natural Resources Youth Camp

July 10-15, 2022

Lubrecht Experimental Forest, Greenough

Camp Fee: \$300.00 (6-days)

We invite all youth ages 14-18 to spend one week in the rustic setting of Lubrecht Experimental Forest east of Missoula and learn about Montana's natural resources. The accommodations are comfortable, the food is great, and the instruction and friendships are the best.

Campers learn about forests, streams, soils, geology, range land, wildlife, and recreation, and spend a half-day rafting the Alberton Gorge of the Clark Fork River. In between the field sessions, taught largely by professionals that volunteer from a variety of natural resources based agencies and industries, specialty evening programs, guest speakers, hands-on learning-through-discovery, and campfires provide for a lasting summer camp experience.

Scholarships and applications are available at forestry.msuextension.org/mnryc.html or Contract Christina Oppegard, Camp Director at 406-243-2773 or christina.oppegard@mso.umt.edu.

If you would like to support our newsletter

Donation can be made either online or by mail

Online donations: <https://payment.msuextension.org/product/BEF42DF0-155D-02F0-AF368526F4C5A896>

Mailed donations: make checks out to "MSSEF" and mail to

MSU Extension Forestry • W.A. Franke College of Forestry and Conservation
32 Campus Drive • Missoula, MT 59812-0606



“We at Weyerhaeuser promote the American Tree Farm System as an effective tool for expanding and certifying sustainable forest management with family forest landowners and our log procurement programs have a preference for Tree Farm-certified raw material sourced from these landowners.”

GROWING A TRULY GREAT COMPANY



www.eyerhaeuser.com



Supporting Sustaining Forestry

Trust our professional to care for your forest.
For Hands-on Experience, call:

PML Seeley Lake

Scott Kuehn, Resource Forester
Office: 406-677-2201 Ext. 34
Mobile: 406-546-9304
montanaforester@yahoo.com

PML Bitterroot

Doug Wasileski, Resource Forester
Office: 406-777-0464
Mobile: 406-239-2476

PML Missoula

Zachary Bashoor, Resource Forester
Office: 406-677-2201
Mobile: 406-369-5162
Zachary.bashoor@pyramidlumber.com



WATERSHED
CONSULTING LLC

Serving Western Montana for 20 Years!

- Complete Land Stewardship Services
- Forest Assessments and Management Plans
- Light-on-the-Land Forest Work
- Fire Hazard Reduction Services
- Arbonist and Orchard Services
- Riparian Restoration
- Revegetation and Custom Growing
- Aerial Surveys and Mapping Services
- Floating Islands and Clean Water Solutions

To Learn More, Visit our Website:

www.watershedconsulting.com

(406) 541-2565



F.H. Stoltze

Land & Lumber Co.

Purchasing Logs and Stumpage

We are currently purchasing Lodgepole pine, Englemann spruce, alpine fir, grand fir, douglas fir, and western larch logs. We offer competitive prices for logs, standing timber, and timber land.



Let our professional foresters help you meet your land management goals and objectives.

Visit us at: fhstoltze.com or give us a call at: 406-892-7005



Helping you do more: RDO does that.



RDO Equipment Co. provides late model John Deere Construction and Forestry equipment solutions and STIHL products to meet your worksite needs. Coupled with exceptional support, quality service, and reliable parts—we help you do more.

Call or visit us for more information.



RDO Equipment Co.
8571 Running W. Road
Missoula, MT 59808
406-549-4171

STIHL®



JOHN DEERE

RDO®
EQUIPMENT CO.

RDOequipment.com

2022 Calendar of Workshops and Events

Workshop/Events	Date	Location	Information
Forest Stewardship for Loggers	April 13-15	Kalispell	https://www.logging.org/contact
Forest Stewardship	May 5-6 & 13	Frenchtown	Location full
Forest Stewardship	June 2-3 & 10	Bozeman	Location Full
Forest Stewardship	July 14-15 & 22	Kalispell	Location Full
Forest Stewardship	August 4-5 & 12	Eureka	Location Full
Forest Stewardship	September 8-9 & 16	Kalispell	Location Full
Forestry Mini-College	March 12, 2022	Missoula	University of Montana
MT Natural Resource Youth Camp	July 10-15	Lubrecht	Deadline: July 1st
Germany Forest, Culture and	May 13-27, 2023	Bavaria and	Reserve a spot by September
Project Learning Tree	See online calendar for event schedule		

Other Workshops and Events

12th Annual Landowner Conference	April 22nd	Helena	https://www.foreststewardshipfoundation.org/events
Forest Insect and Disease Workshop	April 23rd	Helena	

2023 Forest Stewardship Workshop Interest Survey

Interested in a Forest Stewardship workshop? Help us plan for 2023 and into the future.

Complete a quick survey of locations you might like to attend a workshop to help us determine 2023 and future workshop locations. Those on the survey will have an opportunity for early registration in 2023.

https://montana.qualtrics.com/jfe/form/SV_08IKO3cOAsocl8O

Registration information: <http://forestry.msuextension.org/calendar.html#mfsp>

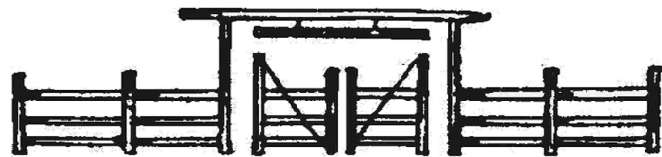
We would like your Feedback

If you like/dislike certain things about this newsletter or have ideas for future topics.

Please send us your thoughts!

MSU Extension Forestry • W.A. Franke
College of Forestry and Conservation
32 Campus Drive • Missoula, MT
59812-0606

Email: extensionforestry@montana.edu



MARKS-MILLER POST & POLE, INC.

- Farm Posts and Rails
- Deck Railing
- Gates
- Custom Beds
- Colored Mulch
- Pressure Treated Wood Products
- Tree and Orchard Stakes

PO Box 125
Clancy, MT 59634

406-933-5981
www.marks-miller.com

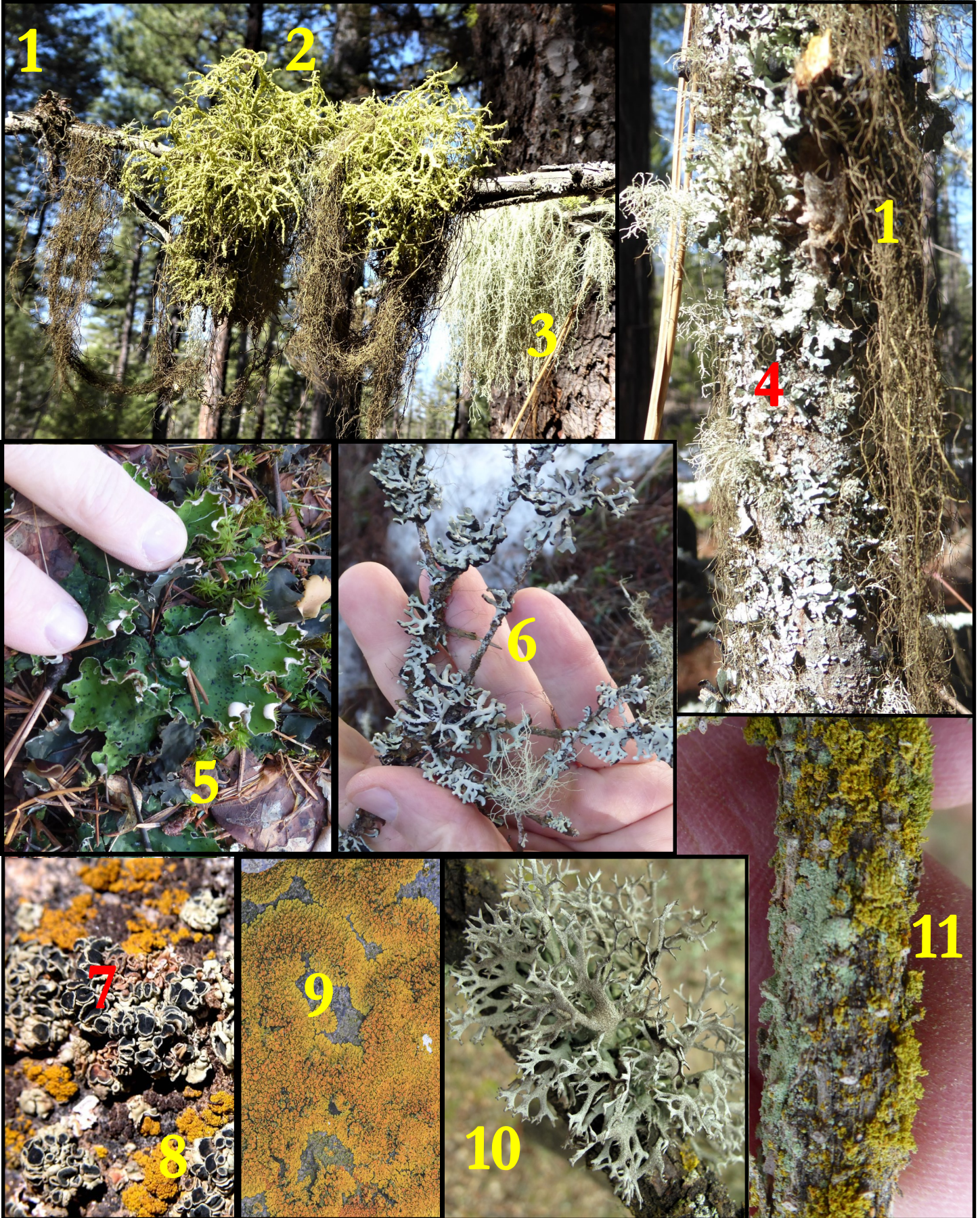
Key to lichens

There are reported to be more than 1000 different kinds of lichens in the Rocky Mountains alone. From a coarse identification perspective there are three main types: Foliose—that are leaf like and have two sides, Fruticose—that are hair like or shrub like, and Crustose—that form crusts on rocks, trees and even cars. Lichens are a unique symbiotic organism that consists of Algae that photosynthesize and produce sugars, fungi that supply minerals and water, and cyanobacteria that fix nitrogen and can also photosynthesize. Many contain usnic acid that has strong antibiotic properties and has been used in folk medicine to treat tuberculosis and other infections. Usnic acid is what gives lichens their bitter taste, and in high enough concentrations can disagree with some people. Some lichens produce vulpinic acid that is toxic to humans.

1. *Bryoria fremontii* - Edible horsehair, or Tree hair—is brown in color, fine textured and can grow to be 3 feet long. Although it can be eaten raw it is very bitter. For consumption it was soaked in water for several days and then steamed. It has been reported that this lichen gathered from 3 trees could supply a family with food all winter. Early European explorers consumed it but most reported it to be indigestible. It is also a great fire starter and is a favorite winter food for deer and elk.
2. *Letharia vulpina* - Wolf lichen - The wolf lichen has a bright yellow-green colour and grows in Europe and western North America. It contains a yellow chemical called vulpinic acid, which is poisonous to mammals. In the past, wolf lichen mixed with ground glass and meat was used as a poison for wolves. It's unknown if the lichen or the glass was most responsible for their death.
3. *Usnea longissimi* - Old man's beard. This rarer lichen hangs from a central stalk and can get up to several feet in length. Its habitat is shrinking and instead of establishing itself via spores, parts of it break off and reestablish elsewhere. Like many lichens, it is very sensitive to air pollution and a strong indicator of clean air.
4. *Paemelia sulcate* -Waxpaper, or Powdered shield. This is one of the most common lichens found in forests and hummingbirds use it extensively to make their nests. Native and European people used it to make yellow-brown dyes for clothing.
5. *Peltigera aphthosa*, Freckle pelt lichen. This is a common ground dwelling lichen belonging to a group including a paler version of “dog pelt” lichen that might have the more species in the Rocky mountains than anywhere else in the world. The dark spots on the lobes are pockets of cyanobacteria that "fix" nitrogen.
6. *Hypogymnia physodes*—Grey monks hood, or hooded bone. Pale upper lobes with black lower surfaces help identify this common lichen. It is one of the most pollution resistant lichens and is often found in city parks.
7. *Lecanora garovaglii*, Gray crust, with other crusts, on a rock. Photo by Chris Wagner, U.S. Forest Service.
8. *Pleopsidium chlorophanum*, Yellow crust, with other crusts, on a rock. Photo by Chris Wagner, U.S.F.S.
9. *Xanthoria*—Sunburst lichen. Even though this lichen appears crust-like, the leafy lobes identify it as a foliose lichen. This lichen is an indicator of high nutrient status and it may indicate where animals have been urinating in city parks. It is unknown if it is native in Montana or considered an invasive.
10. *Pseudevernia furfuracea*, - Tree moss. Commonly grows on the bark of firs and pines and is rather sensitive to air pollution. The species has numerous human uses, including use in perfume, embalming and in medicine. It is reported to have biochemicals that are very effective at absorbing heavy metals and is being studied as a bioremediation solution for polluted sites.
11. *Candelariella*. Found across the globe, although most commonly described in North America, Asia, and Australia. Species can be found on rock, soil, tree bark, mosses, and other lichens. While some species may grow only on rock, and others only on trees, the more generalist species can be found in a variety of locations. This was on a dead spruce branch in a shaded riparian area.

Liking those lichens-you see them every day in the forest, but how well do you know them?

By: Peter Kolb (PhD) MSU Extension Forestry Specialist





MSU Extension Forestry
W.A. Franke College of Forestry and Conservation
32 Campus Drive
Missoula, MT 59812-0606

NON-PROFIT ORG
U.S. POSTAGE
PAID
MISSOULA, MT
59812
PERMIT NO. 100