Spring 2021

The Boreal Forest *Newsletter*

This printing was paid for by the Renewable Resources Extension Act (RREA).

From the Editor:

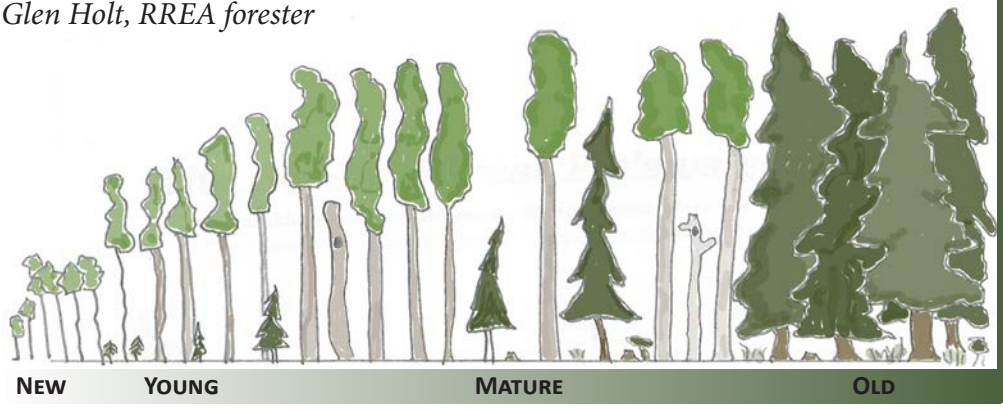
Spring is here and the snow is melting fast! Tinder dry dead grass becomes more exposed as dry warm weather continues. It is exceedingly important we all be extremely careful with open burning, with anything that causes sparks like tool grinding or welding etc., near dead dry grass. A grass fire caused by a single spark can easily escape efforts to control it.

Early cool, moist mornings often give way to a warm, dry midday and a hot, dry, windy afternoon this time of year. A grass fire can burn up all you value before the fire department can respond. Be careful and Firewise. Follow the State of Alaska's rules and regulations about open burning. It is important to you, your family and your friends and neighbors.

Most spring wildfires are human-caused due to escaped open burning. Don't leave a fire unattended! Burn with a Division of Forestry burn permit, which is required on all state, municipal and private land where a local burn permit program does not exist! Follow the guidelines on that permit. Go to the following link for a permit and guidelines: www.forestry.alaska.gov/burn.

Our Featured Tree Species are the two pine species found in Alaska. Many people plant the fast-growing lodgepole pine to replace some of their beetle-killed spruce. This edition also begins a discussion of Alaskan forests as wildlife habitat, the importance of it and their seasonal changes.

Glen Holt, RREA forester



What's Inside

Published by the University of Alaska Fairbanks Cooperative Extension Service in cooperation with the United States Department of Agriculture. The University of Alaska is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: www.alaska.edu/nondiscrimination

Pruning for Defensible Space

Glen Holt, RREA forester

Winter is the best time for thinning and pruning to create defensible space from wildfire around your home, buildings and community.

State Forestry has information on line about pruning and defensible space. Its publication, "Firewise Pruning," may be found on the web at http://bit.ly/Firewiseprune.

Check out the "Firewise Alaska" booklet at http://bit.ly/Firewisebooklet. This link will show how to create defensible space and will guide you to protecting homes, structures, access points, power lines and other infrastructure valuable to your life and the communities in which we live.

Pruning removes branches and "ladder fuels" from trees left after thinning. Pruning is an ongoing project to be reevaluated every few years and reduces flammable material like spruce branches that, even live, can easily carry a fire up the tree in to its crown, spreading embers to other locations. These "ladder fuels" allow the fire to "climb" up into the unpruned tree and spread fire.

Pruned branches and thinned out trees (those removed by cutting) can be piled and burned away

This stand of spruce around an Alaska school was thinned and pruned.

from other trees and buildings when snow is on the ground and there is no chance of fire spreading to other parts of the landscape.

Leaving any amount of pruned or thinned materials on-site adds to the fuel load at that site and will make it much harder to suppress and control the fire. It is important that those materials be removed. It is always best to thin out and prune up when snow or rainy winter weather gives the landowner time to remove cut materials.

Spruce cut during the dormant winter months and removed won't attract spruce beetles, which have become a significant risk in many parts of Alaska.

Contact your local government, city, borough or state offices to find an appropriate site to deposit and dispose of pruned branches and thinned-out tree stems not useful for anything else. If burning is not feasible or practical, remember to find a place for this material because it will become more flammable as it dries out later in the spring and summer.

A brush disposal site for people to dispose of brush, thinned and pruned material helps reduce on-site fire danger.

The Effectiveness of Defensible Space and What is "Firewise"?

Two summers ago, Alaska experienced a significant wildfire season. The Mat-Su Valley got hit particularly hard with multiple fires right in the wildland/urban interface. No one was killed but dozens of homes and structures were burned in these life- and landscape- changing events.

This shows the aftermath of the 2019 McKinley wildfire near Willow, Alaska. Creating defensible space might have helped saved this structure.

Alaska EPSCoR created a video that describes the McKinley Wildfire that occurred in summer 2019 just north of Willow, Alaska. This video does an excellent job of showcasing how important it is to provide prior wildfire defensible space using the Division of Forestry's Firewise Program. See it at www.youtube.com/watch?v=no8dvnjbdHY.

Now is a perfect time to cut out, thin back, prune up and dispose of flammable materials as you create or maintain your own wildfire defensible space before another local wildfire season. It's not too hot out, it's not buggy and you can use a sled to tow around your brush and firewood cut to create defensible space before you have another fire emergency imposed by hot, dry conditions and lots of smoke in the air.

The Spruce Beetle Outbreak

Glen Holt, RREA forester

Many of our forests and forested areas within Southcentral Alaska, including parts of the Mat-Su Valley, the Kenai Peninsula and the Anchorage Bowl, have been experiencing an intensive and extensive spruce beetle (*Dendroctonus rufipennis*) outbreak.

This latest outbreak has been going on since 2017. The last major infestation in this region occurred in the 1980s. Forest entomologists with the Alaska Division of Forestry and the USDA Forest Service have so far determined more than 1.1 million acres of spruce and mixed spruce forest have been killed in this latest event. While spruce beetles are commonly found in this part of Alaska, this particular outbreak is being studied to determine if conditions more conducive to spruce beetles are becoming more common in Alaska forests and what if anything can be done to prevent or manage similar occurrences.

Jason Moan, a forest entomologist for the Division of Forestry, is actively monitoring the situation using yearly aerial surveys as the best method to keep track of spruce forests and the spread of spruce beetle as attacked forests turn brown and succumb to the beetle.

Most things "spruce beetle" are covered extensively through the website, www.alaskasprucebeetle.org/.

The University of Alaska Fairbanks Cooperative Extension Service has produced several useful and informative videos that will help concerned Alaskans understand and manage the situation in their yards and forested tracts.

"Spruce Beetles: What they are and what you can do about them"
www.youtube.com/watch?v=xM-HUuA8Ko0

"Processing a Beetle-Killed Spruce Tree"
www.youtube.com/watch?v=BqFuwAjhc4k

"Evaluating a Beetle-killed Spruce Tree"
www.youtube.com/watch?v=t0EtgDiTKpw

Significant spruce tree and spruce forest mortality are being encountered within our mature spruce stands throughout much of Southcentral Alaska. Foresters and forest ecologists believe that white spruce will remain in the forest ecosystem but the

Spruce beetles can girdle and kill spruce, causing their needles to turn brown and fall off.

situation is being monitored and studied to determine the effects on spruce habitat. They are also considering the viability of spruce and timber harvests and the effect of wildlife habitats in the future. For more information, resources, publications and links refer to the following:

Resources & Publications

FS-R10-FHP. 2017. "Forest Health Conditions in Alaska." *U.S. Forest Service, Alaska Region. Publication R10-PR-43. 64 P. Available here: www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd572286.pdf.*

Holsten, E.H., R.W. Thier, A.S. Munson and K.E. Gibson.1999. "The Spruce Beetle." *Forest Insect and Disease Leaflet 127. Washington, D.C.: U.S. Department of Agriculture, Forest Service. Available here: www.barkbeetles.org/spruce/sbfidl127.htm*

Werner, Richard A., Edward Holsten, Steven Matsuoka and Roger Burnside. 2006. "Spruce beetles and forest ecosystems in southcentral Alaska: A review of 30 years of research." *Forest Ecology and Management 227: 195-206. Available here: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.419.9960&rep=rep1&type=pdf.*

Forestry Tools: Increment Bore

Glen Holt, RREA forester

Foresters, forest ecologists, scientists and forest land managers often use a tool called the "increment bore" to measure the relative growth rate and/or age of a tree. The bore is screwed into a tree's trunk at 4½ feet above the ground, which is called "at breast height." This is the same location that the DBH or diameter-at-breast-height measurement is taken.

The hollow bore is screwed into the tree, using the slightly larger screw threads at the front inch of the tool. The bore is screwed at least halfway into the tree so that as closely as possible it reaches the tree's center. Year one is the very center of the tree and 10 or more years are added to the age of the tree from the rings counted within a stabber that is placed within the hollow increment bore.

The increment bore is put together by unscrewing the stabber from the handle, removing the stabber and the bore from the handle and then inserting the bore into the handle. The bore is then screwed into the tree the proper distance and the stabber is inserted into the bore. The bore is backed off one full turn, which loosens the core taken within the stabber and then the stabber is easily withdrawn from the bore, keeping the tree core on the stabber so it doesn't fall out. Tree rings are counted carefully using the naked eye or a hand lens. The length of growth of the first 10 years can be measured using a 20ths-of an-inch scale.

A tree that has 12 20ths counted from the outside edge of the core would indicate that the tree grew double in the last 10 years or 24 20ths (1.2 inches) in diameter. Those measurements are compared to other trees of that species measured in that area or a similar stand and an estimate of the tree's relative growth rate is made and compared by foresters or scientists to indicate site productivity, tree maturity and whether the tree or stand of trees is continuing to gain in productivity.

An increment bore is a tool used to measure the growth rate increment within a set number of years and/or the age of the tree by counting growth rings.

Former Extension Forester Tony Gasbarro inserts an increment bore into a white spruce tree to determine its age and relative growth rate.

The Forest as Habitat

Glen Holt, RREA forester

Alaska forests play a significant role as wildlife habitat. All wildlife needs food, water and shelter. The three basics may vary as required seasonally and at the appropriate life stage of the specific wildlife species.

The requirement for "food" often differs seasonally. Moose, for example, require food in the form of green succulent vegetation during the summer. They may at times be found belly deep in a lake or pond feeding on green vitamin-rich aquatic vegetation.

The same moose will be found in a willow patch during the winter browsing on that season's new growth of willow, birch or aspen shoots. The forest that provides lots of that kind of regrowth will keep moose close all winter. A forest without that stage of forest growth or young stage of regeneration will have fewer moose.

"Shelter," also referred to as "living space" or "cover," can also be seasonal. It can function as protection from predators, nesting cover or protection from deep snow. A cow moose may hide itself in a secluded stand of black spruce to give birth to its calves. After the calves are more mobile, they will move on to better forage for the cow. That cow may choose seclusion and privacy as shelter rather than as food-rich range, which it also needs in abundance at the appropriate time to survive.

Mature white spruce are suffering from an outbreak of spruce beetle (*Dendroctinus rupifrenis*) and are dying in the Mat-Su, on the Kenai Peninsula and in the Anchorage bowl, areas of Southcentral Alaska. Mature spruce provide significant seasonal food and cover habitat for spruce grouse and the red squirrel.

During the snow-covered months of winter, spruce grouse feed almost entirely on the needles of white spruce. At this time of year, snow covers all other food choices, such as berries and bugs they easily find at other times of the year.

In winter, the red squirrel feeds significantly on seeds found in spruce cones of mature spruce trees. Squirrels gather and store the cones and spruce seeds found within them in caches they access during winter months when other sources of food are unavailable. It isn't apparent what the impacts to the populations of spruce grouse and red squirrels will be

Moose may be found feeding on succulent plants in a summer pond.

Moose in winter transition to browse when all ponds are frozen.

Spruce grouse feed largely on the needles of spruce trees during the snow-covered months of winter.

Red squirrels and spruce grouse utilize white spruce for food and cover.

in areas where most of the mature white spruce have been killed by spruce beetle.

All wildlife requires seasonal food, escape cover from predators, shelter from bad weather, water and nesting space to thrive and prosper. A lack of any one of these basic requirements be a limiting factor to the population potential of that species of wildlife in an area. Foresters and biologists work together designing timber sales to harvest wood products we all use every day and to enhance habitat for wildlife.

Older growth forests of birch and spruce in South-central and Interior Alaska provide habitat for species that require larger trees, including dead trees for cavity-nesting wildlife such as woodpeckers, owls and flying squirrels.

Wildfire often disturbs large tracts of forest by killing many or most of the trees in large areas. Trees like aspen, poplar and birch come back profusely from stump sprouts or seed that blows in from adjacent unburned stands of timber. Birch seed can blow in over the snow from quite a distance.

Wildfire remains the dominant forest regenerative force in creating new and varied stages of wildlife habitat throughout the landscape of interior Alaska.

—continued on next page

This forest of aspen grew back well after cutting and it provides improved habitat for nesting ruffed grouse, snowshoe hare and browsing moose.

The Forest as Habitat, continued from page 7

Trees that grow up (naturally regenerate) after a wildfire are often similar in age and in tracts large enough to escape much of the damage inflicted by browsing moose. The acreage of forests regenerating from timber sales is not nearly as large as the acreage of forests regenerating from wildfires and most often are unable to withstand significant browsing due to their smaller size.

The means, methods and demand for harvesting boreal forest timber are limited at this time. Most cutting units are seldom large enough or not cut quickly enough to regenerate hardwoods like birch, willow, aspen, poplar or cottonwood, and then still be able to escape mortality caused by browsing.

Wildfire regenerates the forest and provides habitat for wildlife that need browse and vigorously regrowing hardwood trees like birch, aspen and willow.

An old growth birch/spruce forest provides habitat for cavity-nesting wildlife.

Featured Tree Species: The Pines of Alaska

Two pines are native to Alaska and they are separated by location and variety. *Pinus contorta* var. *contorta* is the "shore pine." *Pinus contorta* var. *latifolia* is the "lodgepole pine" and the more inland variety.

Shore pine

Alaska's shore pine is more prevalent than the lodgepole pine and may be found predominately in muskeg landforms from southern coastal Southeast Alaska throughout the Tongass National Forest north to near the town of Yakutat. It is described as a small to large resinous, evergreen tree that is 20-75 feet (6-23 meters) tall and 8-32 inches (20-81 centimeters) in trunk diameter, with a crown that is either rounded, spreading or narrow.

The shore pine's leaves (needles) are arranged two in a bundle with a sheath at its base and 1-2 inches (2.5-6 centimeters) long. Needles are relatively long, stiff, often twisted, and colored a yellow-green to dark green with whitish lines (stomata). Its twigs are stout and orange when young, becoming gray brown and rough with age. Winter buds are short-pointed, with many narrow red-brown scales.

The bark is gray to dark brown and scaly, and the bark is thin, becoming thicker as the tree increases diameter. The wood is resinous or pitchy, coarse-textured, straight-grained (scrubby trees with spiral grain), moderately lightweight and moderately soft. The heartwood is light yellow to yellowish-brown, and the sapwood is narrow and whitish.

Cones are almost stalkless, egg-shaped, one-sided, 1¼ to 2 inches (3-5 centimeters) long, and colored light yellowish-brown. They have many prickly cone scales; maturing in two years, they are persistent (stay on the tree), and may open or remain closed but can stay attached to the tree for many years. Seeds are brown, and about ½ inch (15 millimeters) long.

The shore and lodgepole pines are not important for commercial lumber because of their small size and limited occurrence. The wood has been used for poles

—continued on next page

Taller shore pine have a rounded crown and grow along the edge of muskeg areas with other rainforest tree species like hemlock.

The bark of shore pine is fairly smooth and thin.

The cones of shore pine open more easily than its relative, the lodgepole pine.

The Pines of Alaska, continued from page 9

Shore pine needles are two to a bundle with a sheath at the base.

and fuelwood. The sweet orange-flavored sap has been reported to provide local Native people a delicacy, served fresh or dried.

The shore pine is the only common pine throughout Southeast Alaska and is often found as a low spreading or scrubby tree 20-40 feet (6-12 meters) high and 8-12 inches (20-30 centimeters) in trunk diameter. However, it sometimes may become taller. The cones of a shore pine point backward on the twig. The cones spread seeds when they open naturally at maturity in October-November.

The dwarf coastal form is common in open muskegs of peat moss and on benches near lakes. It is classed as shade intolerant, and grows in open stands as a scrub pine, straight when young but gnarled with age and can have large branches extending almost to the ground.

On very poor sites, it may be found as a flat, low growing shrub. Shore pine grows its best form and is larger in the better-drained borders between muskegs and hemlock or hemlock-red cedar stands. Occasionally the trees are pioneers of rapid growth after infrequent fires or logging or on outwash sand and gravelly areas.

Lodgepole Pine

(*Pinus contorta* var. *latifolia* Engelm.) Other names include Rocky Mountain lodgepole pine.

The Rocky Mountain or inland variety of lodgepole pine reaches the state only near the vicinity of Skagway and Haines. This mostly taller form of the species has a narrower crown and may grow 50-75 feet (15-23 meters) high and 8-12

inches (20-30 centimeters) in trunk diameter. Lodgepole pine cones are hard, heavy, point outward and mostly remain closed for many years. They tend to open best after a forest fire and release seeds after the fire. However, in Alaska some cones open at maturity.

This variety of pine can be added to the list of Alaska trees, making two varieties of lodgepole/shore pine species. The inland variety differs from shore pine in being generally taller with a narrow crown, with thinner, scaly bark, slightly longer needles, and with slightly larger, heavier, closed cones, which point outward on the twig rather than backward.

Lodgepole pine grow well in Alaska and are quite cold hardy.

It forms stands in a mixed forest with Sitka spruce, western paper birch and subalpine fir (also from the Rocky Mountains) and in the inner fiords down to sea level in the North Tongass National Forest. It is also found northward in the Yukon Territory along the Yukon River and its tributaries near Dawson to within 50 miles (80 kilometers) of the Alaska border and then east and south through western Alberta and British Columbia and farther south in the Rocky Mountains down to Colorado and Utah.

Near Fairbanks and other areas throughout Alaska, the inland variety has been introduced as a fast growing and hardy shade tree.

The wood of the Rocky Mountain variety of lodgepole pine has been found to be suitable for making paper pulp and fiberboard. Other uses so far include lumber, railroad ties, mine timbers, poles, posts and fuelwood. The lumber has gone mostly for rough construction, occasionally for boxes, siding and flooring.

This species, including three geographic varieties, has a broad range from Southeast Alaska, central Yukon, and southwestern Mackenzie, south in mountains and along the coast to Colorado, Utah, and California.

Adapted from Guide to Alaska Trees, Agriculture Handbook No. 472 *by Leslie Viereck* and *Elbert Little Jr. USDA Forest Service. 1974.*

Biomass Project Update for Southeast Alaska, and Other Places

By Karen Petersen

Even in this time of COVID, all things biomass (locally obtained waste wood energy) keep moving along. There have been several projects completed in Southeast Alaska in the past year. In March 2020, we had the dedication of the Hydaburg Biomass Project. The Hydaburg School installed two GARN-style cordwood boilers.

Over the course of the summer, the community of Kake finished the design and engineering of a citywide district heat system. The plan for this was delivered by Wisewood Engineering in June. The city is now looking for the funding to build this project.

And speaking of construction, the City of Craig received a Denali Commission grant and will likely have the next biomass installation in Southeast. This biomass boiler will be installed at its high school. They plan to install a Twin Heat brand, containerized, "boiler-in-a-box." This chip boiler will be the first of this style installed in Alaska.

The Wood Energy conference is slated to be held in Whitehorse, Yukon Territory in late fall of this year. At this time the focus will be on a series of virtual tours of installed biomass systems. Southeast Conference has had two virtual tours, one in Hydaburg, Alaska and the other in Teslin, Yukon Territory.

Hydaburg School Superintendent Bart Mwarey, left, and Tony Christensen, the Hydaburg mayor, pose with school's cordwood boiler.

Upcoming tours are scheduled for the Alaska Brewing Company in Juneau, Alaska. The brewery dries its old brewing grains and uses that biomass to heat and cook its next batch of beer. Their slogan is "Beer Powered Beer"! And after this tour, we will be going to Dawson, Yukon Territory!

Visit www.alaskawoodenergy.com for dates and links. You can also find out information on the Yukon-Alaska Wood Energy Conference and links to view short videos that were produced by the Alaska Center for Energy and Power, on installed biomass systems in Alaska.

Karen Petersen is the biomass coordinator for Southeast Conference.

Forestry Research: Measuring Water Content in Firewood Trees

The University of Alaska Fairbanks (UAF) is doing research to determine the best time to harvest trees and to shorten firewood drying time. Fairbanks has a winter air quality problem due to burning insufficiently seasoned firewood. This research will help wood cutters determine the best time to harvest trees like birch to facilitate drying and seasoning and reduce air quality problems that affect the health of many Fairbanks winter residents.

UAF researcher, Jessie Young-Robertson is noting dramatic seasonal variations in the water content of deciduous trees like birch and aspen. Young-Robertson, a forest ecologist with the UAF Agricultural and Forestry Experiment Station, said that many scientists believed trees lost most of their moisture content after losing their leaves, when trees go seasonally dormant during winter. Jessie's research using sensors in birch trees showed that they dumped 70 percent of their water content into the soil in a 24-hour period in late October when temperatures stayed below freezing. "The surprise was how much and how fast," she said.

These findings could be significant because the fall season is a popular time to harvest firewood. Depending on when the trees are harvested, moisture content of the wood varies considerably. Further research may hold a key to reducing wintertime air pollution in Fairbanks caused by burning green firewood.

UAF forest ecologist Jessie Young-Robertson measures tree moisture in a study plot. UAF photo by J.R. Ancheta

Young-Robertson has studied water uptake in plants in several species of trees from March to September and found that deciduous trees that have low water content during winter and early spring, become saturated when the snow melts, and then again lose 20 percent of their water content during leaf out. Her research is trying to pinpoint when moisture content is the lowest and which environmental factors influence this. Harvesting firewood at the right time, might shorten the amount of time needed to season it and reduce harmful emissions linked to burning wet wood.

This important research started in the woods northeast of Fairbanks on research plots in the Caribou-Poker Creek Research Watershed, off the Steese Highway and near Smith Lake. Young-Robertson will continue to monitor plots that include birch, aspen and spruce, collecting data on air temperature, soil temperature, water content and tree girth. One reason for placing the plot near UAF is that she hopes to stream the data to a website so people can track ongoing conditions and watch for the best time to harvest.

Young-Robertson hopes to increase the number of plots and add a plot on Fort Wainwright so she can monitor trees in various conditions and hopes to conduct drying experiments with birch and spruce, the two most popular choices for firewood. The firewood would be harvested at different levels of moisture content. She will try to determine the difference in drying times needed to reduce the water content to 20 percent or lower, the standard required by the state and the Fairbanks North Star Borough. For more information on this research by the UAF go to www.uaf.edu/afes.

Adapted from an article in the UAF publication: Fall 2019 Agroborealis Research Highlights, *found at* www.uaf.edu/afes.

Institute of Agriculture, Natural Resources and Extension
1751 Tanana Loop
P.O. Box 756180
Fairbanks, Alaska 99775-6180

Phone: 907-474-5211
877-520-5211 (toll free in Alaska)
Fax: 907-474-2631
Email: UAF-RREA@alaska.edu