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after the fire

Lightning started one dandy of a fire on Casper Mountain in August. Firefighters named it the Jackson Canyon Fire, and it was big for our small mountain – more than 12,000 acres burned. Heroic, around-the-clock efforts by firefighters contained the fire and minimized damage to human habitations and, most importantly, no one lost their life.

We stood in awe of the fury this fire brought to the landscape. Some people may view the fire as a natural disaster while others may view it as an important part of the ecological process of our western mountains. Whatever your position, the fire is out, the firefighters gone, and now is the time to assess the damage, make sense of it, and witness the rebirth of our mountain landscape.

It is for these reasons this insert was developed. Collaborations with local and regional experts have provided valuable information to assist in the management of the land after the

fire. A special thank you to the Wyoming Department of Environmental Quality, the Casper-Natrona County Health Department, and the University of Wyoming Cooperative Extension Service (UW CES) for providing funds for this insert.

As residents of Natrona County and property owners on Casper Mountain, we have a stake in the rebirth process. It is our mountain, and our actions going forward will dictate if this process is successful. Scientists predict mountain pine beetle activity will increase because many existing trees are still under stress. The result will be more dead trees and more fuel for the next big fire.

As land managers, we need to be vigilant in efforts to detect and control the spread of infected trees. Erosion and ash runoff will be issues that may affect water quality in water wells, streams, ponds, and the North Platte River. The impacts can be minimized by implementing simple erosion-control methods.

The land will heal itself. Already, trees and shrubs have reseeded and resprouted. Regrowth is occurring on the hillsides and the burned prairie.

Provided there is a wet spring next year, the prairie and mountain will be incredibly beautiful, but landowners are cautioned not to graze these areas but wait until the prairie plants have fully matured for a season. Although grazing is a natural aspect to this ecosystem, these plants are weak – grazing too early may allow noxious weeds to enter the system and displace the native vegetation we cherish.

Our state had its fair share of wildland fires in 2006. Our hope is this information will be of use to others across Wyoming affected by fire.

We invite you to join us in helping Casper Mountain heal – after the fire.

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Determine whether to salvage fire-damaged trees

The wildfire is out and the firefighters have gone home or to another fire. You survey your property for the first time since the fire rolled through. The sight of burned trees is unsettling compared to the green, picturesque landscape before the fire. Wildfire is part of the life cycle of a forest ecosystem, and the landscape will soon be green and thriving with new vegetation. Most of the burned pine trees are dropping seeds onto the nutrient-rich, ash-riddled ground, and aspen killed by the fire will be sending up thousands of new sprouts from their unburned root systems.

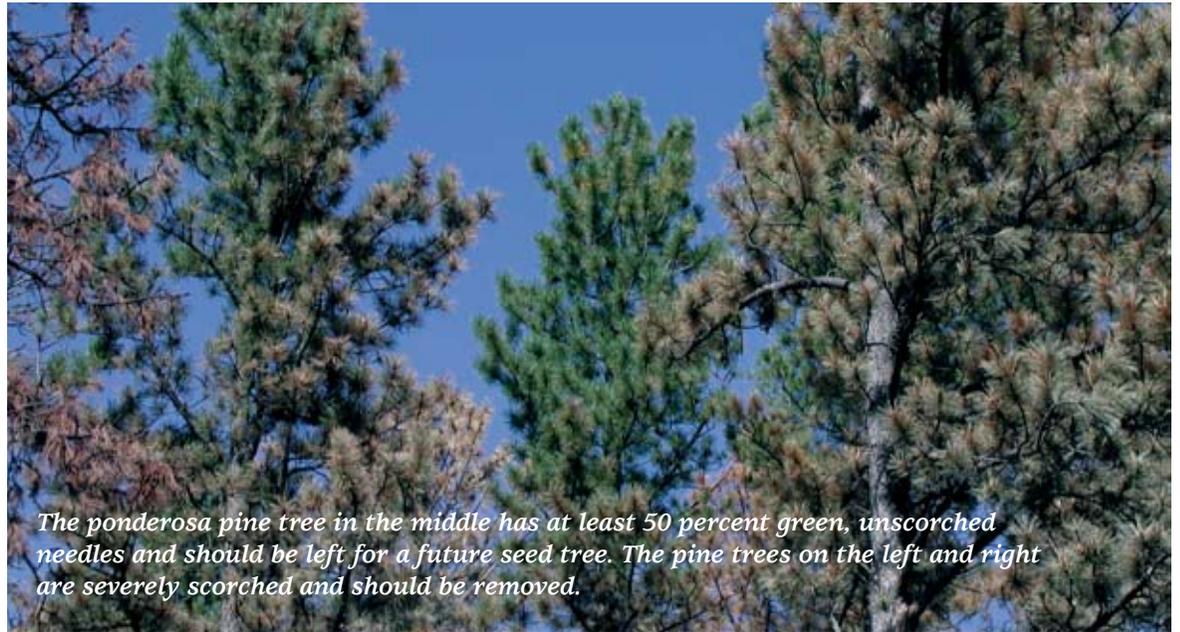
The burned trees that dot the landscape will remain for many years. Leave them there for wildlife? Cut them for firewood? Are they worth anything? Will more damage be done by removing the trees? All should be considered when developing a management plan for a property.

If left, dead trees will eventually fall to the ground and block roads and trails, causing difficult walking conditions through the forest. These fallen trees can be fuel for future wildfires, thus increasing the severity of a fire.

If done correctly, removing badly burned trees will not adversely affect a property. There could be a financial return if one works with a commercial contractor. If the fire burned through property in August or later in the year, then wood borers



These newly dropped limber pine seeds on the ash-laden ground from the Jackson Canyon Fire on Casper Mountain will assure that some regeneration of limber pine will occur.



The ponderosa pine tree in the middle has at least 50 percent green, unscorched needles and should be left for a future seed tree. The pine trees on the left and right are severely scorched and should be removed.

(wood boring larvae that excavate holes into the dead wood) have probably not yet infested the burned trees. This means pine trees more than 8 inches in diameter could qualify as sawtimber-size trees, which are worth more than firewood. These trees should be harvested and removed as soon as possible before wood borers infest them in late spring.

The firewood could be removed up to five years later without significant wood loss due to rot. Most commercial and home-use firewood cutters favor cutting firewood two to three years after a fire so most of the burned bark has had time to erode off the tree leaving wood that's less dirty to handle.

When implementing a salvage sale, consider leaving five to 20 burned trees of various diameters per acre for wildlife snags or dead, standing trees. These could be trees with poor form, many branches, or be severely burned into the inner wood of the tree.

Many areas may have partially burned trees. A good rule of thumb is if at least 50 percent of the pine tree has good, deep-green needles remaining, there is a good chance the tree will survive. Most

other trees with less than 50 percent green needles should be removed during salvage operations.

The resulting branches and tops created during salvage operations should be scattered around the area to reduce soil erosion while the trees are skidded or dragged by the use of heavy equipment to designated landing (loading) areas. The action of the equipment working and the trees being skidded will create a mixing affect with the newly dropped pine seeds, mineral, soil, and nutrient-rich ash. This will greatly increase the number of pine seedlings in these areas.

Implementing a salvage sale can seem complicated but generally can be done fairly quickly and easily. Working with a resource professional and a reputable contractor would make this process fairly easy. Contact a local Wyoming State Forestry Division office or University of Wyoming Cooperative Extension Service office for more information on forest management assistance. Wyoming State Forestry Division offices can be found online at <http://slf-web.state.wy.us/forestry/offices.aspx>. UW CES offices are at www.uwyo.edu/UWces/Counties.asp.

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Scorched habitat forces animal behavior changes

Wildfires have significant short- and long-term effects on the availability and quality of wildlife habitats.

Immediately after a fire, reduced cover and lack of food will force most wildlife out of an area. Within a few weeks – depending upon the time of the fire, soil moisture, and precipitation – there may be many species of herbaceous plants and



sprouting shrubs that resume growth and provide forage for grazing wildlife. For the Jackson Canyon Fire area, limited resprouting will occur this autumn.

Larger animals, primarily deer, on Casper Mountain will move into populated areas seeking food and habitat. Landowners this autumn and winter could see increased damage to landscape plants, notably trees and shrubs, and should take precautions to prevent browsing and rubbing. A simple and effective way to prevent damage is to put three to four steel posts in the ground around the trees or shrubs in question at equal spacing about 4 feet away from the tree. Wrap with landscape fabric or poly plastic snow fence to form an enclosure. Take the enclosure down in April or May.

Mountain lions, bobcats, and coyotes often follow deer and could also be a concern. Although rare, mountain lions have been known to stalk humans, but the real concern is pet predation. Coyotes, too, can prey upon pets. The Wyoming Game and Fish Department has direct authority regulating mountain lions and other wildlife. If mountain lions are seen in human populated areas, call the Wyoming Game and Fish Department Casper Regional Office at (307) 473-3400.

While not abundant initially, vegetation regrowth can attract deer and elk. Eventually, these plant species will often become more abundant than before the fire, thus improving the habitat quality for all grazing wildlife species. Use of burned habitat by these animals should increase compared to before a fire.

Wildfires generally remove fuels like grasses, forbs, shrubs, and small limbs on trees. The remaining tree trunks provide only a little cover but may be sufficient for elk, deer, and large predators such as mountain lions, bears, and coyotes.

Some wildlife find improved habitat after wildfire; however, wildlife needing mature forest and shrub lands will leave. Birds and small mammals with stricter habitat requirements may not return because of the loss of nesting sites



and food resources. Cavity-nesting birds (flickers, kestrels, and chickadees), those that prefer open areas (western bluebirds, mountain bluebirds, and robins) and those that eat insects that infest dead timber (such as woodpeckers) may increase following fires. Those preferring more densely vegetated areas (such as goshawks and hermit thrushes) may decrease.

Unburned habitat areas provide a refuge for species requiring more mature plant communities. These areas can increase the diversity of habitat and wildlife.

The sage grouse is a common bird in sagebrush habitats on Casper and Muddy mountains. Burned sagebrush areas with new forbs and shrubs will improve sage grouse habitat for several years.

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After the fire — rehabilitating the fire line

A common question from landowners affected by the Casper Mountain fire goes something like this: “What do I do to restore the land the bulldozer tore up when the fire-break was made?”

The good news for many landowners is they do not need to do anything. Many of the fire lines constructed along the base of Casper Mountain (Coates Road, Wolf Creek Road, and others) were cut shallow enough that roots and root crowns of native grasses and forbs (broad-leaved plants) were left intact. They will recover without assistance.

Deeper cuts had to be made in some areas to create more secure fire lines, which removed all plant life. Landowners will need to restore the land in these areas.

Landowners need to think about reseeding disturbed areas this fall. Research supports seeding in late September into October so



Bulldozer working on the fire line, Jackson Canyon Fire, August.

grass and forb seed will be in the soil ready to germinate and grow in the spring.

Use a broadcast method of seeding rather than drilling because of the rough terrain. Rocks at the base of Casper Mountain make using a drill seeder difficult. Broadcast seeding generally requires as much as 50 percent more seed to equal the results of drill seeding. Hand-operated broadcast seeders are an ideal way to apply seed on the ground at appropriate seeding rates.

What to seed? Finances and the look desired will dictate whether native or an introduced (non-native) species is chosen. Native

species tend to blend into the environment whereas introduced species may look out of place – yet both will stop erosion and help prevent weeds from entering disturbed sites.

Native seeds generally cost more because of short supplies and the difficulty of harvesting seed. Another important consideration is buying certified noxious weed-free seed to prevent establishment of undesirable plant species.

Whether using native or introduced species, use 10 to 20 pounds (lbs) of pure live seed (PLS) per acre. Use the percentage of PLS listed on the seed packet label to calculate the amount of PLS. For example, for a 15-pound bag with a PLS percentage of 90, then .9 times 15 equals 13.5 lbs of PLS in the bag.

Below is a native species seed mix that could be used along the base of the mountain:

Common name	Cultivar	LBS PLS/Acre
Slender wheatgrass	Revenue or Pryor	4.0
Thickspike wheatgrass	Critana or Bannock	4.0
Western wheatgrass	Rosana	4.0
Muttongrass	Common	2.0
Hairy vetch	Common	2.0
Total pounds pure live seed per acre		16.0

Below is a native species seed mix for use at higher elevations on top of Casper Mountain:

Common name	Cultivar	LBS PLS/Acre
Mountain brome grass	Bromar	8.0
Idaho fescue	Winchester	2.0
Green needlegrass	Lodorm	4.0
Slender wheatgrass	Pryor	3.0
Total pounds per acre		17.0

Introduced plant species that could be used in prairie areas along the base of Casper Mountain include pubescent wheatgrass, Russian wildrye, crested wheatgrass, and various dry land varieties of alfalfa such as Ladak, Nomad, and Spreader III. These should be seeded at 10 to 15 pounds PLS per acre depending upon the respective plant species.

Introduced plant species that could be used on the top of Casper Mountain include smooth brome grass and orchard grass. These should be seeded at 12 to 15 pounds PLS per acre.



Fire line safety zone cleared of vegetation on Red Creek 3 Fire on Casper Mountain in August 2003.



Same safety zone in August 2006 after being broadcast seeded using a native seed mix.

Landowners should be aware some introduced species such as smooth brome grass are very competitive with native species and may become invasive in natural areas such as riparian areas, wetlands, or meadows.

Rake the soil after seeding to ensure good soil-to-seed contact. This won't be feasible in some areas given the amount of rocks in the soil. Seeds will collect and germinate, and plants will establish in the cracks and crevices left by heavy machinery.

Many landowners may become concerned and frustrated if the seed does not grow after the first growing season; however, patience is required since three years may be needed to see results and for seedlings to become established. Seeded areas should not be grazed until after the first and possibly second growing season to allow establishment of new seedlings.

Disturbed ground provides a good seedbed for noxious weeds. Landowners are strongly encouraged to look for potential noxious weed infestations. If uncertain about whether a plant is a noxious weed, take a sample to a local county weed and pest control district office or a local University of Wyoming Cooperative Extension Service (UW CES) office for identification. If a noxious weed, various weed control strategies can be used that won't harm the planting.

For weed identification, see www.uwyo.edu/CES/WYOWEED/wyoweed.htm. For lists of noxious weeds, see <http://plants.usda.gov/java/noxiousDriver> and click on Wyoming under State Noxious Weed Reports.

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Seed available to reseed critical burned areas

The Natrona County Community Emergency Response Team (CERT) has a limited amount of emergency funding to help landowners reseed burned areas determined critical to reduce the impact on the water quality of streams flowing off Casper Mountain.

The program is offered with financial assistance from the U.S. Environmental Protection Agency and the Wyoming Department of Environmental Quality Nonpoint Source Pollution Control Program.

The critical areas include burned areas adjacent to drainage bottoms and fire lines with direct connections to stream courses. This program will provide free a native grass and sterile cover crop seed mixture to reseed critical areas.

Also available for loan will be hand tools and hand-seeding equipment. Those interested should contact Stewart Anderson, CERT team leader, at (307) 235-9205 for more information.

Where to get seed?

Landowners may want to reseed some areas of their property in the burned area of the Jackson Canyon Fire or where heavy machinery cut a fire line across their property.

Using a seed mix appropriate for soils in your area that also meets rehabilitation needs is important. A local feed store may have the seed and should be a first stop; however, if not, there are several Rocky Mountain seed companies that specialize in native and non-native grass and forb species.

Here is a list of those seed companies. Listing these seed companies does not imply preference; simply, they often have the seeds that fit Casper-area conditions.

Sharp Bros. Seed Co.
Greeley, Colorado (800) 421-4234
www.sharpseed.com/

Granite Seed
Lehi, Utah (801) 768-4422
<http://www.graniteseed.com/Index.aspx>

Wind River Seed, Inc.
Manderson, Wyoming (307) 568-3361
www.windriverseed.com

Pawnee Buttes Seed, Inc.
Greeley, Colorado (800) 782-5947
www.pawneebuttesseed.com

Arkansas Valley Seed Solutions
Denver, Colorado (877) 957-3337
www.avseeds.com

Canned food precautions can keep you safe after fire

Are you concerned about the canned foods in a home or storage area affected by a fire? Are they safe? Can I use them?

Clean-up after a disaster is never easy. Confusion regarding safety makes the process even harder.

Discard any food in cans or jars that have been near a fire. The heat can activate food spoilage bacteria. Extreme heat can split or rupture the can or jar, rendering the food unsafe. If the jars or cans have been exposed to fire-fighting chemicals but no heat, they can be decontaminated the same as cookware (see below). Wash and sanitize them, discard the old label, and put on a new label with the name of the product and expiration date (if applicable).

Discard food in permeable packaging, like cardboard, plastic wrap, screw-topped jars, and bottles that have been stored outside a refrigerator. They have been exposed to fire retardant and/or toxic fumes released from burning materials. Foods stored in refrigerators and freezers may also be contaminated by fumes. The seals are not airtight.

What about cookware? Wash pots and pans exposed to fire-fighting chemicals thoroughly in

soapy, hot water, and rinse in clean, hot water. Submerge cookware for 15 minutes in a sanitizing solution of 1 teaspoon of chlorine bleach per quart of water.

If food has been near a fire, discard it. If it develops an off-odor or flavor, throw it out. This is a sign of spoilage.

For additional information on food safety, contact a county extension service office, consumer health specialist, environmental health office, or the U.S. Department of Agriculture Meat and Poultry Hotline at (800) 535-4555. If in doubt as to whether food is safe, throw it out!

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Mountain pine beetle outlook

Ponderosa and lodgepole pine on Casper Mountain and many other locations in the state have been plagued for years by the mountain pine beetle, *Dendroctonus ponderosae*, (MPB).

The last several years of drought have significantly increased the number of trees killed by the beetle. The Jackson Canyon Fire burned nearly 12,000 acres on the mountain.

The MPB is a member of a group of beetles collectively called bark beetles and is no bigger than the head of a kitchen match. Besides ponderosa and lodgepole pine, the beetle will also attack whitebark pine, limber pine, bristlecone pine, and pinyon pine in Wyoming.

Beetles kill trees two ways. As eggs hatch, the larva feed under the bark. The damage caused by this feeding essentially stops the flow of food and water in the tree. Secondly, the beetles carry spores of the blue stain fungus. This fungus clogs the water-conducting vessels in the tree – a one-two punch.

The presence of boring dust in bark crevices and around the base of a tree or the presence of pitch tubes on the trunk are clues beetles have attacked. Trees try to defeat the attack by producing enough pitch to force the beetle out of the tree. These gobs of resinous sap and chewed-up bark are called pitch tubes. They can be seen in the tree trunk from near the ground to 30 feet up on big trees.



Blue stain fungus in ponderosa pine.

There are two types of pitch tubes. The first, called a dry hit, is small and brownish because only a small amount of pitch is mixed with the boring dust and generally indicates the beetle successfully entered the tree. The second is larger and creamy-white in color. Although this kind of pitch tube is more alarming, it indicates the tree is healthy and may be able to “pitch out” the beetle due to the availability of large amounts of pitch.

The needles of an infested tree fade from green to yellow to reddish brown, usually in the



Fading needles following a successful mountain pine beetle attack.

spring following the attack of the previous summer.

MPB larvae overwinter under the bark. These larvae mature into adult beetles and infect new trees on Casper Mountain from approximately mid-July to the end of August. Each infested tree may produce enough beetles to attack as many as three to five other trees.

Damage by man can also make a tree more susceptible to beetle infestation. Examples include cutting or disturbing roots, covering roots, wrapping the tree with fencing, or nailing signs or other items to a trunk.

Will the fire affect MPB populations on Casper Mountain?

Drought reduces a tree's ability to produce sap to pitch beetles out. Fire, such as the Jackson Canyon Fire, will stress trees, and partially damaged green trees may have a greater susceptibility to the beetle. Fewer trees remain after a fire so remaining trees may be at greater risk because there are fewer hosts for beetles to attack.

There are natural controls for MPB. Prolonged sub-zero temperatures in winter, wood peckers and other insect-eating birds, parasites, predatory beetles, and flies can reduce MPB populations.

These natural controls cannot be counted upon to keep beetle populations in check.

Direct controls, such as chemical treatments, felling, burning, or salvage logging, can destroy

beetles in the infested trees before they emerge and infest new trees. These efforts can be very successful if landowners cooperate within a large area.

Indirect controls are the long-term solution. Trees in an overcrowded stand compete for nutrients, water, and sunlight and will be more susceptible to attack. Thinning overcrowded stands will increase the vigor and health of trees – a key to reducing MPB problems. Thinning will not only improve the overall condition of a forest but can also improve the aesthetic value through larger, fuller trees.

Beetles are not destroyed by cutting an infested tree. If any stage of the life cycle is present in the felled tree, beetles can mature and infest new trees.

Harvesting firewood from trees killed by the pests could bring them to your area. Specialists with the University of Wyoming Cooperative Extension Service (UW CES) advise harvesting firewood only from trees dead long enough that all needles have fallen and emergence holes are present in the bark. When trees have decayed to that stage, the insect species living under the remaining bark or in the wood are not threats to surrounding, living trees.

Trees are often felled following a fire to act as a mechanical barrier to reduce soil and ash movement during rains. Trees felled for this purpose should be checked for beetle activity and treated if found.

The upside of the Jackson Canyon Fire is that some beetles were destroyed by the fire.

If an MPB problem is suspected, contact a Wyoming State Forestry Division office or UW CES office for further control recommendations. Wyoming State Forestry Division offices can be found online at <http://slf-web.state.wy.us/forestry/offices.aspx>. UW CES offices are at www.uwyo.edu/UWces/Counties.asp

On the Web: www.fs.fed.us/rm/landscapes/Solutions/Pinebeetle

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Burned and stressed trees pose danger, attractive home for mountain pine beetle

The wildfire has burned through all or a portion of your property. You assess the damage, take in what has happened, and consider what to do first.

Safety was the most important factor for firefighters while battling the fire and should remain number one for you and anyone helping with any project.

A wildfire consumes dead material first. Dead trees and stumps will generally burn until they are either consumed or extinguished by firefighters. These burned-out stumps leave deep holes on the ground surface, which could cause sprained or broken ankles and injured knees. The roots will also burn out leaving holes just 2 to 3 inches below the surface of the ground. The ground could give way under foot and also cause foot and knee injuries.

Partially burned, standing trees called snags are usually throughout affected areas. These trees have partially burned-out bases, which are very susceptible to wind throw and could fall at any moment. Many trees have bases that have burned through, have fallen, and are leaning into another tree. These trees are dangerous and could fall at any time, especially during windy days.

Burned trees, which have been consumed except their tops and are hanging from branches of adjacent trees (referred to as widow makers by foresters, loggers, and firefighters) are another hazard. These snags are the most dangerous and should be avoided as much as possible, especially during harvesting.

These widow makers can fall at any time and are silent killers. Care should be taken while cutting down trees with these snags.

Removing snag trees can be dangerous even for professional arborists and loggers. Contracting to cut down these snags may be the best and safest course for many landowners.

There are usually partially burned and scorched trees that survive a wildfire. Scorched aspen trees will usually die within a year but will regenerate by root suckers from their un-



The snag at right has been partially burned through but is still standing. The snag on the left has been burned through and is leaning into an adjacent tree. This snag is at high risk for blowing over in moderate wind.

burned root systems. Conifer species such as subalpine fir, Englemann spruce, Douglas fir, lodgepole pine, ponderosa pine, and limber pine can survive a wildfire if the base of the tree did not burn too hot and at least 50 percent of the tree crown (needles) is unscathed with a good, green color.

These scorched trees are very stressed, which may attract forest pests such as the mountain pine beetle. Pests are always present in forest ecosystems at endemic levels. Checking these scorched trees for signs of bark beetle attack is very important since many forest areas in Wyoming are seeing epidemic levels of forest pest infestations. Even though many beetles were killed by the wildfire, many also survived and will continue to emerge from their brood trees to attack these weakened trees up to late August each year.

These trees can be identified by sap or pitch tubes on the bark or sawdust in the crevasses of the bark or at the base of the tree. These trees should be removed or treated by accepted direct-control techniques before early July of the following year. If implementing a salvage sale, these infested trees can be identified and removed as part of the sale.

Some landowners may have only scorched

trees left adjacent to their structures. They may want to consider applying a preventative spray such as carbaryl (trade name Sevin™) or permethrins (trade names Astro™, Dragnet®, and others) to any pine tree they want to save from bark beetle attack. Many of these preventative sprays can be purchased at a local home and garden store or a county weed and pest control district.

A high-pressure sprayer is needed to reach the upper portions of the trees; treating many trees may be expensive. I would suggest treating only selected trees to minimize expense. Most tree service companies can apply preventative sprays. The main stem of the trees must be fully covered, including all crevices in the bark up to where the tree reaches 5 inches in diameter. These trees should be sprayed no later than late June, just before the adult beetles emerge to attack new trees.

Landowners can contact a local University of Wyoming Cooperative Extension Service office or nearest Wyoming State Forestry Division office for more information on identifying hazard trees, bark beetle infested trees, preventative spray options, and how to contact local contractors.

Wyoming State Forestry Division offices can be found online at <http://slf-web.state.wy.us/forestry/offices.aspx>. UW CES offices are at www.uwyo.edu/UWces/Counties.asp.

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These pitch tubes on this scorched ponderosa pine tree are from mountain pine beetle attacks and appeared two days after it was burned in the Jackson Canyon Fire on Casper Mountain.



Water quality and erosion following wildfires

Rain is probably the last thing landowners think about as they assess the fire damage to previously forested areas, but it is one of the greatest threats to the future health of the land.

In particular, runoff and erosion caused by rainfall and melting snow can greatly affect the future health of vegetation, streams, and wildlife.

In a healthy forest, the forest canopy and the litter layer protect the soil. The forest canopy intercepts raindrops and reduces their impact on the soil. Rain that makes it through the canopy is intercepted by the litter layer covering the forest floor. Together, the canopy and litter layer keep the rain from detaching soil particles. They also serve to slow the movement of water from the area and increase infiltration into the soil.

Fire can destroy this soil protection, and soil particles can wash down denuded slopes entering stream channels reducing water quality and altering or degrading aquatic habitat. The most

critical period is the first two years following a fire; however, the sooner steps are taken to reduce the potential for erosion, the better.

Potential Impacts on Water Quality

Wildfire may produce immediate and significant water quality impacts on fish and other aquatic life, drinking water supplies, and wastewater treatment plants. Many of these problems are caused by increased runoff.

Loss of cover material on the soil surface is the primary cause of increased runoff. This leads to decreases in water infiltration and increases in both runoff amount and rate.

Increases in runoff may also be caused by a water-repellant (hydrophobic) soil layer that can form following severe, slow-moving fires. These soil layers do not always develop and can vary in thickness and duration. To test if the soil is hydrophobic, place a drop of water directly on the soil surface (avoid burned vegetation.) If the water forms a bead and holds its shape, it is hydrophobic. This drop test should be repeated several times.

Impacts from runoff are highest in the areas immediately adjacent to the fire; however, effects can often be seen within a radius of 100 miles.

Of primary concern is the risk that streams, reservoirs, and water

treatment facilities will be filled or damaged by the increased sediment from runoff.

Runoff entering streams and lakes may carry extra sediment, ash, charcoal, and woody debris. These can kill fish and other aquatic life by decreasing oxygen levels in the water.

Fires can also release chemicals normally found in soil and vegetation, which can be washed into streams or lakes. These can include phosphorous and nitrogen. Phosphorous, which can cause a decrease of oxygen in water, usually moves with the sediment leaving the burned area and can be deposited in streams and waterways. Though phosphorous is an important nutrient, excess levels in waterways can over stimulate growth of aquatic vegetation and can lead to eutrophication (depletion of oxygen in water). After wildfires, nitrogen is primarily moved in the form of nitrate into waterways, and the levels of nitrate can often exceed federal drinking water standards.

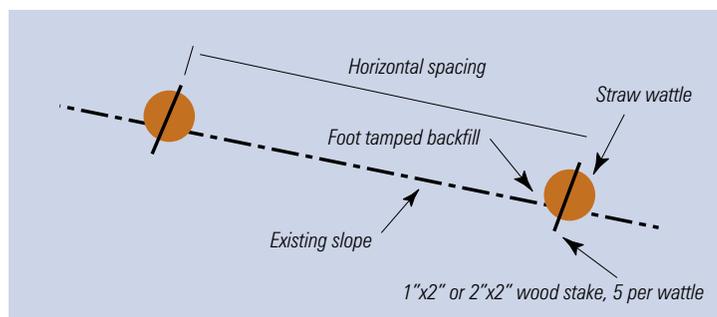
Runoff and Soil Erosion Control

A number of measures can lower the soil erosion hazard and protect the land's productivity and water quality the first few years after a fire.

A combination of measures is recommended when appropriate or feasible.

1) Reseeding

Many plants can recover after even a severe fire; it is recommended to leave existing vegetation if it



Straw wattle

does not threaten personal safety or property. For areas without plant cover, the soil can be covered with a mulch, and/or planted or seeded vegetation, usually a grass that sprouts quickly and has a dense, fibrous root system to bind the soil. Seed can be purchased throughout Wyoming. Some of the recommended varieties (this is not an inclusive list) include western wheatgrass, mountain brome grass, and other varieties listed on Page 3. Roughen the soil surface before seeding and break apart the water-repellant soil layer, if one exists. Broadcast the seed at the appropriate rate for the variety, usually about 10 to 15 pounds per acre. Rake in the seed to about ½ inches, roll or tamp area if possible, and cover with certified weed-free hay straw. Control weeds as necessary.

For large areas where covering the soil is not economically feasible or will not quickly occur, try to control water running over the soil and carrying sediment. Erect barriers to slow and disperse the runoff water, reducing its erosive power and allowing water to soak in or settle out sediment before reaching a streambed.

2) Contour Logs

Contour log terraces can provide a barrier to runoff from heavy rain. Properly placed, they can force the water to meander back and forth across the slope between the logs, slowing the water and allowing it more time to soak in. Trees (with limbs removed) or logs 6 to 8 inches in diameter are placed on the contour perpendicular to the direction of water flow or slope. Logs should be placed in an alternating pattern so water cannot flow directly down the slope. Embed logs into the soil their entire length, and backfill with soil to prevent water from running underneath. Stabilize the logs by driving in stakes on the downhill side of the logs.

3) Straw Wattles

Straw wattles can be used in a similar fashion. Straw wattles are flexible enough to follow the contour of the slope. Wattles are tubes of plastic netting packed with straw or similar packing material. The wattle tubes can be purchased from an erosion control material supplier (www.straw-wattles.com). As with contour logs, the wattles should be fully embedded in the soil and secured with stakes.

4) Silt Fences

In areas where runoff is more dispersed, such as broad, flat areas, silt fences can trap and remove sediment from runoff water. Silt fences are constructed out of woven wire fence with a fabric filter cloth. As the water with the soil passes through the cloth, the soil is filtered out. All of the necessary materials can be purchased at hardware stores, lumber yards, and nurseries. The fence can be staked with fence posts (spaced at a maximum of 10 feet apart) driven 16 inches into the ground. As with the contour logs and straw wattles, the fence should be installed perpendicular to the direction of flow. The fence should reach at least 8 inches into the ground and have a minimum filter height aboveground of 18 inches.

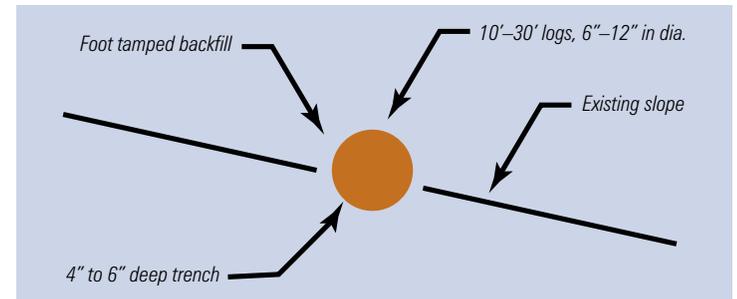
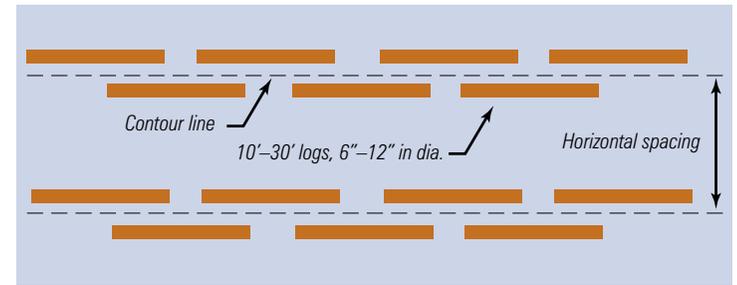
5) Straw Bales

Straw bales are often used in small drainages where runoff can concentrate and move sediments. The bales act as small dams, collecting sediment and slowing down the runoff water. Bales should be carefully placed in rows with overlapping joints, similar to laying a brick wall. They should be butted up tight against one another and embedded at least 6 inches into the soil. A minimum of two rows of bales is suggested for small drainages. Weed-free straw is recommended to help prevent the spread of noxious weeds.

Additional Information

Firewise: The national Firewise Communities program is a multi-agency effort designed to reach beyond the fire service by involving homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire – before a fire starts. Information at www.firewise.org/

More specific information on how to install these soil erosion control practices and others can be found by accessing the links found in the NRCS



Contour log terracing

Fire Recovery Tips under “Information Brochures and Flyers”.

<http://plant-materials.nrcs.usda.gov/news/features/wildfire.html>

And the following U.S. Department of Agriculture Natural Resources Conservation Service FACT Sheet topics at www.wy.nrcs.usda.gov/technical/ewpfactsheets/firebmp.html:

- Straw Mulching (after seeding)
- Contour Straw Wattles
- Contour Log Terraces
- Straw Bale
- Check Dams
- Silt Fences

Colorado State University Cooperative Extension has various publications relating to protecting property from wildfire and recovery from wildfire:

www.ext.colostate.edu/pubs/natres/pubnatr.html#for

Ginger Paige is an assistant professor in the Department of Renewable Resources in the University of Wyoming's College of Agriculture. She can be reached at (307) 766-2200 or gpaige@uwyo.edu.

Drinking water and septic systems — *What you need to know after the fire*

Homeowners returning to their sites affected by fire may have questions about their drinking water and septic systems.

Individuals with private wells need to be concerned about how safe the water is to drink. Have the water tested at a certified environmental testing laboratory to ensure the water is safe. Environmental and ecological service listings can be found in the yellow pages in a telephone book. Each lab will have directions how to submit a sample, what they charge, and other information. You will want the laboratory to test for total coliforms.

Laboratories will provide a bottle for collection and normally will have results in a few days. Instructions with the sample container must be followed very carefully for accurate results.

The laboratory should test for bacterial contamination – total coliform bacteria. If there are specific concerns about chemicals in the water, talk with laboratory personnel about additional tests they could recommend.

The water should only be used for showering and flushing toilets while waiting for test results. Use bottled water for drinking, brushing teeth, or cooking. If bottled water is not available, disinfect small quantities of water by boiling it for two to five minutes. If impractical, mix 1 gallon of clear water with 6 to 8 drops of 5 percent regular household bleach (do not use scented or perfumed bleach). Regular household bleach is 5 percent to 5.25 percent. Do not use ultra bleach, which has a higher concentration. Let the mixture stand 30 minutes before drinking. If the water is cloudy and contains particulates, allow the particles to settle, drain the clear solution from the top into another clean container, and add double the amount of drops listed above.

If the water sample comes back positive for bacteria, the well needs to be disinfected. To disinfect a well, mix 2 quarts of 5.25 percent bleach (regular household bleach) with 10 gallons of wa-

ter. Use only regular, unscented bleach. Pour the solution into the well, start the pump, and open all the faucets in the home. When a chlorine odor is noticeable at the faucets, close them and stop the pump. Allow the well to stand for 24 hours without pumping.

After 24 hours, open taps and flush all lines until the chlorine odor is no longer detected. The laboratory testing the water will provide more information on how to disinfect a well if results are positive for bacterial contamination.

Thoroughly flush water lines if the water tastes or smells smoky after a fire. If there was a loss of pressure, some backflow of water and other contamination could have occurred. Be sure to have the water tested, and thoroughly flush the entire system.

Perform a visual inspection of the well. The following should be checked to ensure there is no damage:

1. Electrical components that supply power to the pump
2. Additional disinfecting equipment, if applicable (UV lamps, reverse osmosis filter)
3. Pressure tanks, storage tanks, and vents
4. Wellhouse, aboveground cap and casing
5. Any pipes aboveground that bring water into the home

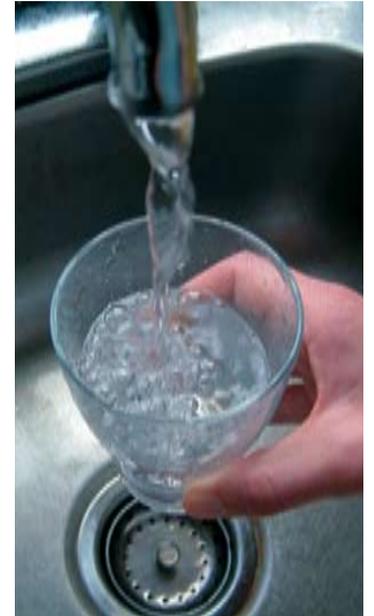
If damage is found, contact a professional knowledgeable with well maintenance. Listings should be available in the yellow pages of the telephone book. If the well top was not capped or otherwise protected, call a laboratory to determine if there are additional tests to consider.

Septic System

Homeowners will want to determine whether the septic system was damaged. The fire should not have affected the underground system; however, there is the possibility of damage if heavy equipment was parked on top.

Look for damage from the clean-out outside the house to the end of the drainfield. Often, fire-

fighters dig fire-breaks or dozer lines to protect a structure from a fire. A dozer line through the drainfield will be noticeable, and damage to the drainfield could have occurred. Once the system is used again, there may be surfacing sewage or toilets and plumbing fixtures that may not drain properly. These are good indications something is wrong.



Contact the local agency that permitted the septic system to help determine where the problem is. Most systems are installed in a flat area. In mountainous areas, systems are sometimes installed on slopes. Since vegetation in the area is likely gone, there is a concern the topsoil could start eroding away from the septic system.

Articles on erosion and how to deal with it are included on previous pages. Be advised to only use shallow-rooted plants, such as grass, to revegetate around septic systems. Plants that grow long roots, such as trees, should not be planted on top of septic systems. Their roots can grow into the system and cause damage as these plants seek water and nutrients.

Contact a local health department for information about any of the above topics.

April Gindulis is an environmental health specialist with the Casper-Natrona County Health Department. She can be reached at (307) 235-9340 or aprilg@cnchd.org

Eliminate freezer or refrigerator odors

Did your refrigerator or freezer quit? Was electricity interrupted? How do I clean it? How do I get rid of the odor in my freezer?

A clean refrigerator and freezer are important to keeping food safe.

Disconnect the unit from the electrical outlet, and remove all food. Clean the freezer or refrigerator thoroughly with soap and water, including the tray beneath, condenser coils, front grill, and the inside of the unit. Use a mild soap, such as dish soap – no solvent cleaning agents, abrasives, or cleansers that might impart taste to food or ice cubes or cause damage to the appliance interior. Follow the manufacturer's instructions. Then try some combination of these suggestions from the U. S. Department of Agriculture Food Safety and Inspection Service:

- Wipe out the inside of the appliance with a solution of equal parts vinegar and water. The vinegar is an acid, which destroys mildew.
- Wash the inside of the unit with a solution of baking soda and water. Scrub the gaskets, shelves, sides, and door. Allow the refrigerator to air out for several days in a secured place where children won't be endangered.

- Sprinkle fresh coffee grounds or baking soda loosely in the bottom of the freezer or in an open container inside the appliance and leave for 24 to 48 hours.
- Place a cotton swab soaked with vanilla inside the clean freezer or refrigerator. Close the door for 24 hours then check the unit for odors. The unit will smell like vanilla if its clean.
- Stuff the refrigerator or freezer with rolled newspapers. Close the door and leave the newspapers for several days. Remove the paper and clean the unit with a vinegar-water solution.

Smell better? If not, one or more of these techniques may need to be repeated. Refrigerator odors can be very difficult to remove.

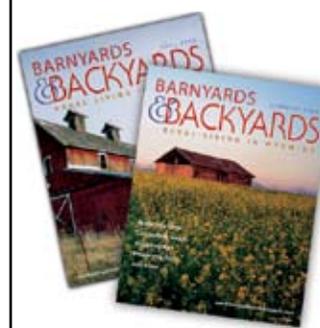
Once the refrigerator or freezer is clean and running, add new, safe foods to them.

Keep the refrigerator smelling fresh by making a habit of cleaning spills and throwing out old and spoiled food. A small, open box of baking soda kept on the shelf will absorb odors.

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A spring (March 2007) post-fire recovery workshop is being planned for landowners or managers affected by the Jackson Canyon Fire. To view a full agenda, when available, for this event or others of interest please visit the "Events" page at www.barnyardsandbackyards.com or contact a local Cooperative Extension Service office.



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Revegetating with Firewise Landscape Plants

The Jackson Canyon Fire showed what a wildland fire could do.

Nearly all vegetation species burned, especially the resin- and pitch-laden conifers (evergreens). Others, such as the more moisture-rich aspen and green chokecherry, held their ground.

Although there are no “fire-proof” plant species, there are plants, called Firewise landscape plants, to consider as the process of revegetating affected landscapes begins. These Firewise plants have one or more of these characteristics: they hold more moisture in their leaves, have limited resins/pitch to catch fire, grow without accumulating large amounts of combustible dead branches, are often short and grow close to the ground, and can resprout following a fire.

These Firewise plants are native and/or adapted, meaning they will

grow either on the mountain or on prairie-dominated slopes. An abbreviated list of Firewise plants for consideration is below.

Consider these guidelines when determining where to place these plants:

- Plants nearest a home should be more widely spaced and smaller than those farther away.
- Create pathways with gravel and decorative rock stepping stones within the landscaped area. This will help modify fire behavior and slow its spread across a property.
- Mulch to conserve moisture and reduce weed growth. Mulch can be organic (wood chips) or inorganic (gravel and rock). Avoid pine bark or thick layers of pine needles that can easily catch fire.

A comment about conifers: these plants are an essential part of the



This picture shows effective use of small FireWise plants near the home and use of a rock pathway for slowing down a potential wildland fire.

Casper Mountain ecosystem and, though flammable, do not need to be entirely removed or not used within the landscape.

Proper thinning and pruning of existing trees and shrubs can effectively reduce wildfire hazards.

Select conifers better able to survive fire, such as the ponderosa pine that develops a thick bark and self-prunes lower branches as it ages.

For more information about protecting a home from wildland fire, visit www.firewisewyoming.com/

On the Web: www.Rockymountainwildlandfire.info

Tom Heald is a University of Wyoming Cooperative Extension Service (UW CES) educator serving Converse, Niobrara, and Natrona counties. He can be reached at (307) 235-9400 or theald@natronacounty-wy.gov. Donna Cuin is a UW CES horticulture program associate serving Natrona County and can be reached at 235-9400 or dcuin@natronacounty-wy.gov. This article was adapted from the Colorado State University Extension Service Fact Sheet no. 6.305, “Firewise Plant Materials” www.ext.colostate.edu/PUBS/natres/06305.html

Firewise Plants					Firewise Plants				
Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height
Flowers and Ground Covers					Large Shrubs and Trees				
<i>Alchemilla</i> spp.	Lady's mantle	M - H	PS/Sh	1'	<i>Mahonia aquifolium</i>	Oregon grape holly	M - H	S/Sh	4 - 6'
<i>Antennaria parvifolia</i> ^{ab}	Small-leaf pussytoes	M	S/PS	< .5'	<i>Mahonia repens</i> ^{ab}	Creeping grape holly	L - H	S/Sh	1 - 2'
<i>Antennaria rosea</i> ^a	Rosy pussytoes	M	S/PS	< .5'	<i>Physocarpus monogynus</i> ^a	Mountain ninebark	M	S/Sh	2 - 4'
<i>Aquilegia</i> spp.	Columbine	M - H	S/PS	1 - 2'	<i>Potentilla fruticosa</i> ^a	Shrubby cinquefoil	M	S/PS	2 - 3'
<i>Artemisia frigida</i>	Fringed sage	L - M	S	1 - 1.5'	<i>Prunus besseyi</i> ^a	Western sand cherry	L - M	S	1 - 3'
<i>Centranthus ruber</i>	Jupiter's-beard	L - H	S/Sh	2 - 2.5'	<i>Purshia tridentata</i> ^a	Antelope bitterbrush	L - M	S	1 - 2'
<i>Cerastium tomentosum</i> ^b	Snow-in-summer	L - M	S/PS	1'	<i>Ribes aureum</i> ^a	Golden currant	M	S/PS	2 - 3'
<i>Delphinium</i> spp. ^c	Delphinium	M - H	S/PS	.5 - 3' +	<i>Rosa woodsii</i> ^a	Wood's or native wild rose	M	S/PS	2 - 3'
<i>Dianthus</i> spp.	Pinks	L - H	S	< .5' - 2'	<i>Shepherdia canadensis</i> ^d	Russet buffaloberry	M - H	S	5 - 6'
<i>Echinacea purpurea</i>	Purple coneflower	M	S	2 - 3'	Large Shrubs and Trees				
<i>Gaillardia aristata</i>	Blanket-flower	L - M	S	1 - 1.5'	<i>Acer glabrum</i> ^a	Rocky Mountain maple	M - H	S/Sh	6 - 10'
<i>Geum triflorum</i>	Prairie smoke	M - H	S/PS	1.5'	<i>Acer grandidentatum</i> ^a	Wasatch maple (bigtooth maple)	M	S/PS	10 - 20'
<i>Iris germanica</i>	Bearded iris	L - M	S	1 - 3'	<i>Amelanchier alnifolia</i> ^{ac}	Saskatoon alder-leaf serviceberry	M	S/PS	6 - 8'
<i>Linum lewisii</i> ^{ac}	Wild blue flax	L - H	S/PS	1 - 2'	<i>Crataegus</i> spp. ^a	Hawthorn (several native)	M	S	6 - 8'
<i>Penstemon caespitosus</i> ^{ab}	Mat penstemon	L - M	S	< .5'	<i>Malus</i> sp.	Crabapple	M	S	10 - 15'
<i>Pulsatilla patens</i> ^a	Pasqueflower	M	S/PS	1'	<i>Populus tremuloides</i> ^a	Quaking aspen	M	S	8 - 25'
<i>Ratibida columnifera</i>	Prairie coneflower	L - M	S	2'	<i>Prunus americana</i>	American plum	M	S/PS	4 - 6'
<i>Sedum</i> spp. ^b	Stonecrop	M	S/PS	1 - 1.5'	<i>Prunus virginiana melanocarpa</i> ^{ac}	Western chokecherry	M - H	S/PS	6 - 8'
<i>Thymus</i> spp. ^b	Thyme	L - M	S	< .5'	<i>Rubus deliciosus</i> ^a	Boulder raspberry, thimbleberry	M	S/Sh	4 - 6'
<i>Veronica pectinata</i>	Speedwell	L - M	S	< .5'	<i>Syringa vulgaris</i>	Common lilac	M	S	4 - 8'
<i>Vinca minor</i> ^b	Periwinkle, myrtle	H	Sh	< 1'					
Shrubs									
<i>Arctostaphylos uva-ursi</i> ^{ab}	Kinnikinnick, bearberry	M	S/Sh	1'					
<i>Ceanothus fendleri</i> ^a	Buckbrush, mountain lilac	M	S	2'					
<i>Cercocarpus intricatus</i> ^a	Little-leaf mountain mahogany	VL - L	S	4 - 6'					
<i>Cercocarpus montanus</i> ^{ac}	True mountain mahogany	L - M	S	4 - 6'					
<i>Cornus stolonifera</i> ^a	Red osier dogwood	H	S/Sh	4 - 6'					
<i>Fallugia paradoxa</i> ^a	Apache plume	VL - L	S	2 - 4'					
<i>Holodiscus dumosus</i> ^a	Ocean spray, cliff/rock spirea	L - M	S/PS	4'					

Approximate water needs: L = Low, M = Medium, H = High

Sun/Shade Preference: S = Sun, Sh = Shade, PS = Part Sun

^a Native species

^b Ground cover plant

^c This species, or some species in this genus, may be poisonous to livestock, pets, and/or people under some conditions. Before planting, check with University of Wyoming Cooperative Extension, Wyoming State Forest Service, or other knowledgeable personnel.

^d Several species of *Symphoricarpos* are native.