

Identifying Woody Species Browsed by Moose in Northeastern Minnesota



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Summary

Identifying tree and shrub species that herbivores consume in northeastern Minnesota can be challenging due to the number of woody species in the region. However, it is an important skill for many researchers studying the boreal forest. Researchers can use a dichotomous key or tree identification book to learn species identification. However, these often are state-wide resources and therefore include species that are not common in the northeastern part of the state. This report describes how to identify the common woody species available in northeastern Minnesota in both summer and winter seasons. This report has information specific to moose browsing, but the information about the woody plants is relevant for anyone trying to identify woody species in the arrowhead region.



Balsam fir (*Abies balsamea*) branch after moose browsing on in winter.

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Introduction

Moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), and snowshoe hare (*Lepus americanus*) are herbivores that live in northeastern Minnesota. When their ranges overlap these three species compete with one another for food resources. Biologists have many reasons for identifying the various plant species these browsers could consume such as gaining insights into a species' diet, habitat quality, or competition for resources between species. This report will outline how to identify the species common in the moose diet in winter and summer. However, many of these species are also consumed by white-tailed deer and snowshoe hare in northeastern Minnesota.

Moose have a generalist diet (no one genus makes up >60% of diet) in northeastern Minnesota (Peek et al. 1976, Ward 2014). In many of the places moose live, most of the diet is composed of about six or seven different plant species. In summer in Minnesota moose mainly eat the deciduous species mountain maple (*Acer spicatum*), willows (*Salix* spp.), paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), and mountain ash (*Sorbus decora*). They will also consume red maple (*Acer rubrum*), juneberry (*Amelanchier* spp.), pin cherry (*Prunus pennsylvanicus*), and chokecherry (*Prunus virginianus*). In winter in Minnesota moose continue to consume deciduous species, but the diet is mostly composed of beaked hazel (*Corylus cornuta*), paper birch, willows, quaking aspen, red-osier dogwood (*Cornus stolonifera*), and juneberry. Moose will also consume red maple, mountain maple, mountain ash, and pin cherry.

In the winter, when leaves are not available, some conifer species are also consumed by moose. Balsam fir (*Abies balsamea*) is the conifer that is most often browsed in North America. Consumption of balsam fir is higher on Isle Royale than it is in Minnesota, in part because of historically higher moose densities in a national park (Jordan 2014).

Some of the pictures in this document were taken on Isle Royale National Park in the early 1990s. These pictures can indicate intensive browsing that is present in parts of Minnesota moose range (Fig. 1). Other pictures were taken in northeastern Minnesota from 2012 to 2014.

Figure 1. An example of over-browsing on a red-osier dogwood shrub. This is also referred to as hedging. Hedging will occur when moose browse on the same plant year after year.



Species Identification

The rest of this technical report is a list of browse species consumed by moose in northeastern Minnesota. There are also some species included that are not eaten. Descriptions of these species is included for completeness. Deciduous species are species that lose their leaves every year, while coniferous species have needles that are not dropped at the end of summer (with the exception of tamarack (*Larix laricina*)). Dichotomous keys to these species in summer and winter are in Appendix 1 and Appendix 2.

Deciduous Species

Mountain Maple (*Acer spicatum*)

In northeastern Minnesota moose consume two maple species: mountain maple and red maple. The main identifying feature of mountain maple is the bark. Starting at the bottom of the stem the bark is a light gray color which transitions to an area of splotchy gray and red (Fig. 2A) and then becomes a red stem at the top (Fig. 2B and C). This splotchy appearance is very characteristic of mountain maple and is an excellent identifier in both seasons, but it is particularly helpful in winter when leaves are absent. Twigs in winter are a dull, grayish red and the buds are small, thin, and close to the stem (Fig. 2D and E). In summer the twigs are usually bright green (Fig. 2F and G), although you may also see red twigs and petioles (Fig. 2C). Mountain maple is a shrub, not a tree, so it can become tall, but it will often lean to the side and does not have a large stem diameter. In contrast, red maple grows into a large tree. Mountain maple leaves also have a typical maple-leaf shape with three main lobes (Fig. 2H). Branches and buds in maple are always opposite (Fig. 2D and E).

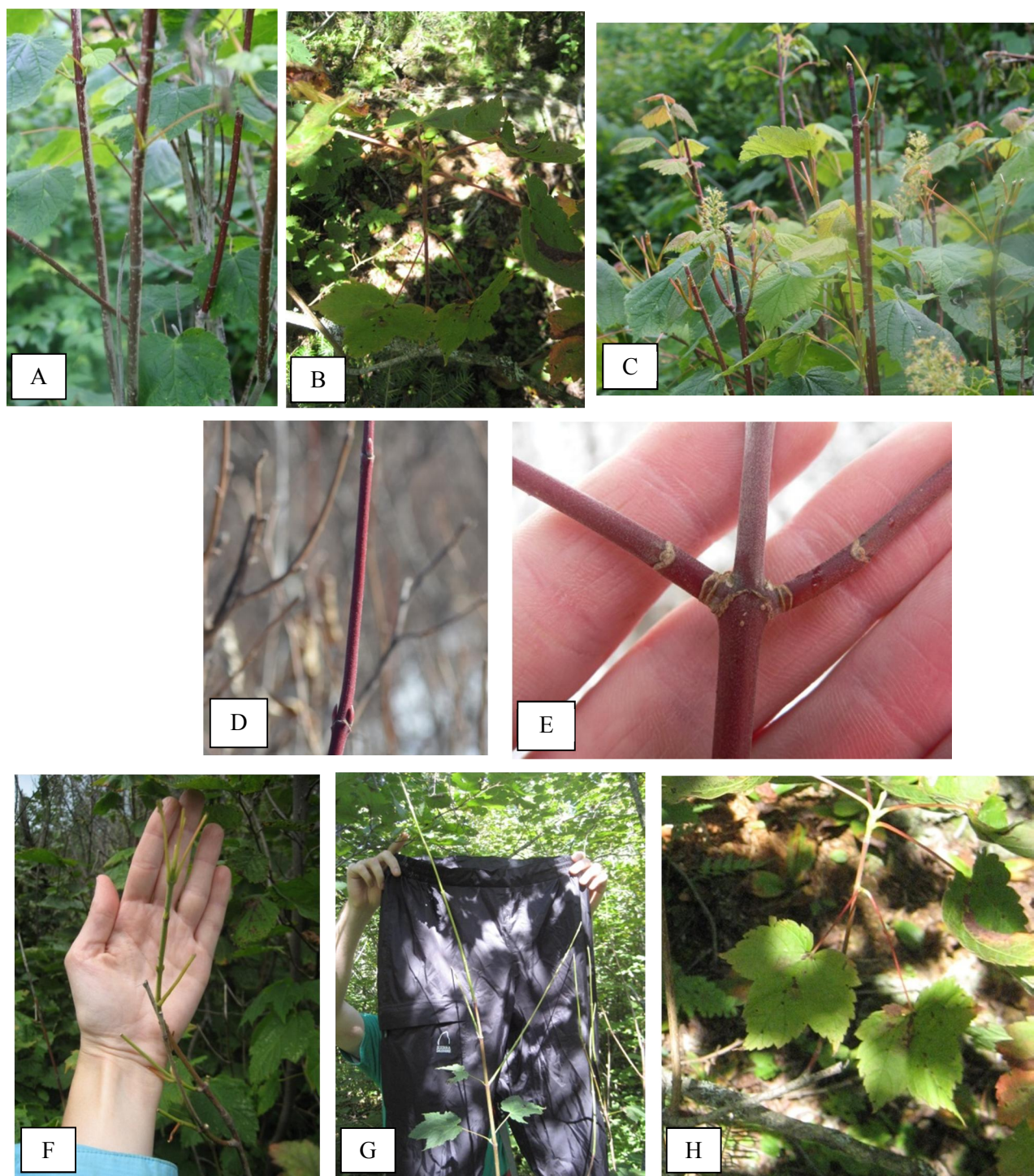


Figure 2. Examples of (A) splotchy transition from light gray to red on mountain maple bark; (B) red twig color and green (or red) petioles of unbrowsed mountain maple twigs; (C) red twig color and green (or red) petioles of browsed mountain maple twigs; (D) buds and (E) twigs in winter; (F) short, bright green, browsed, mountain maple twigs; (G) long, bright green, browsed twigs; and (H) maple-shaped leaves.

Red Maple (*Acer rubrum*)

Red maple can be identified in summer by the typical maple-shaped leaves (Fig. 2H) attached to a red twig on a plain, medium gray stem. The leaves are opposite. The change from red twig to gray stem starts abruptly at the junction between the twig and stem (Fig. 3A and B). This is in contrast to mountain maple twigs and stems which have a splotchy transition from red to light gray (Fig. 2A). Additionally, red maples grow into large trees whereas mountain maples are only tall, spindly shrubs. However, if the red maple is very young this distinction may not be clear. In winter you can use the twig color and bud shape for identification. Red maple twigs are a deep, but vibrant, red color with big, rounded buds (Fig. 3C). On the buds you can often see three white lines crossing over. Mountain maple twigs are a duller, grayish red with much smaller buds (Fig. 2D).

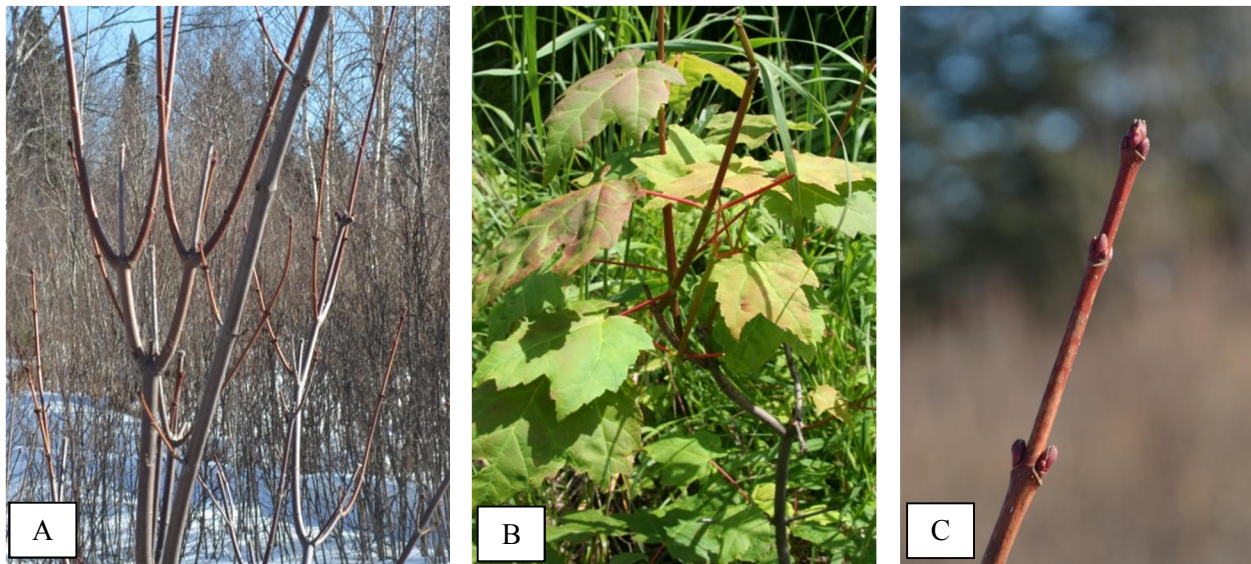


Figure 3. Red maples show the abrupt change from medium gray stem to red twig in (A) winter and (B) summer. (C) Red maple buds in winter.

Red-Osier Dogwood (*Cornus stolonifera*)

Red-osier dogwood is another deciduous species in northeastern Minnesota with red twigs and opposite leaves. However, the leaves are oval shaped, come to a point at the end, and have few, parallel veins instead of branching veins (Fig. 4A). The leaves may look like they are in a whorl, or circle, on the stem (Fig. 4B). The stem can be either red or orange in winter (Fig. 4C) and red or green in summer (Fig. 4D). However, the stem is red/orange all the way to the dirt, it never becomes gray, unlike mountain maple and red maple (Fig. 4E). The consistent color of the stem into the ground is a good identifier in summer and winter because no other species have this coloring. In winter, the buds of red-osier dogwood are thin and close to the twig although they can be long (Fig. 4F). Red-osier dogwood is a shrub. Red-osier dogwood is often observed with spittle bugs on the twigs in summer next to leaves (Figs. 4A and B), although this is not a fool-proof identifier.

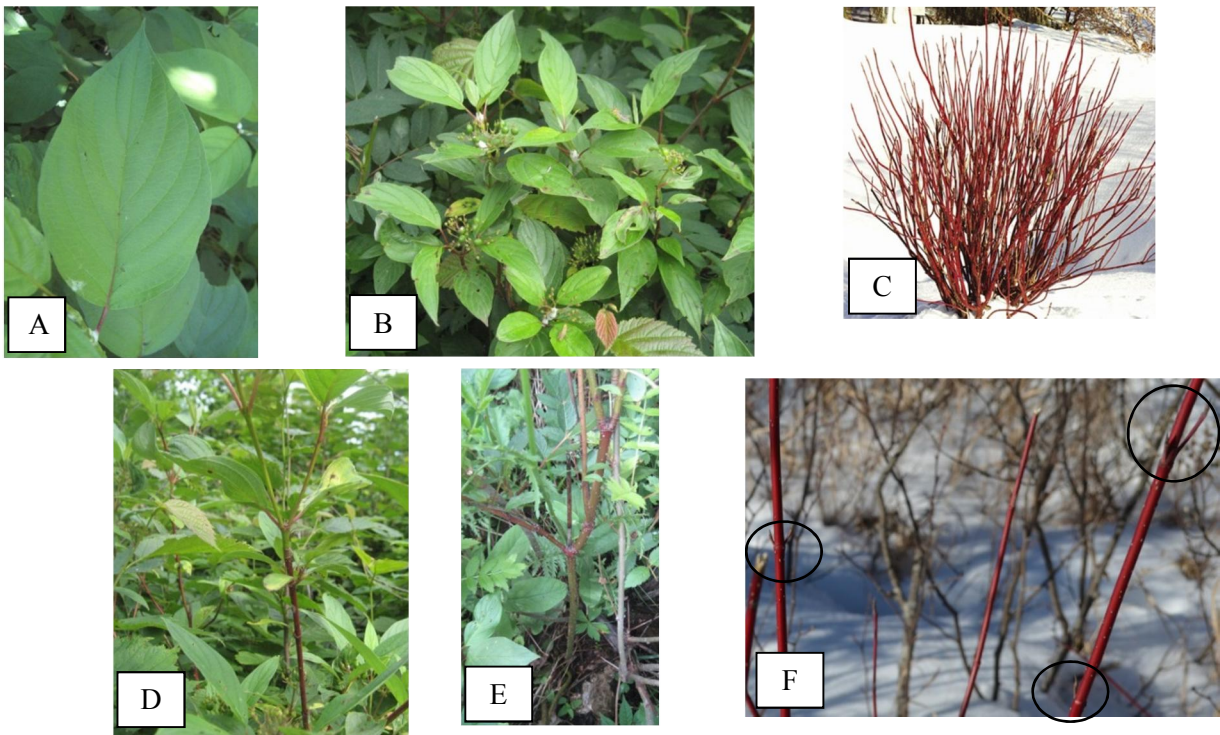


Figure 4. Red-osier dogwood leaves display (A) few, parallel veins and oval shape. While not a true whorl, the (B) whorl-like pattern is an appearance unique to red-osier dogwood. Red-osier dogwood stems (C) in winter; (D) red and green; and with (E) stems remaining colored down to the ground without becoming gray at any point. (F) Red-osier dogwood buds in winter are thin and short, but can be longer (in circles).

Beaked Hazel (*Corylus cornuta*)

Beaked hazel is commonly called “hazel” and is very abundant in northeastern Minnesota. Hazel is a shrub and often grows in dense patches that do not surpass three meters (Fig. 5A). The bark is all brown with a dark brown braided pattern (Fig. 5B and C). As this pattern is almost always present, it is the most identifiable feature in both summer and winter.

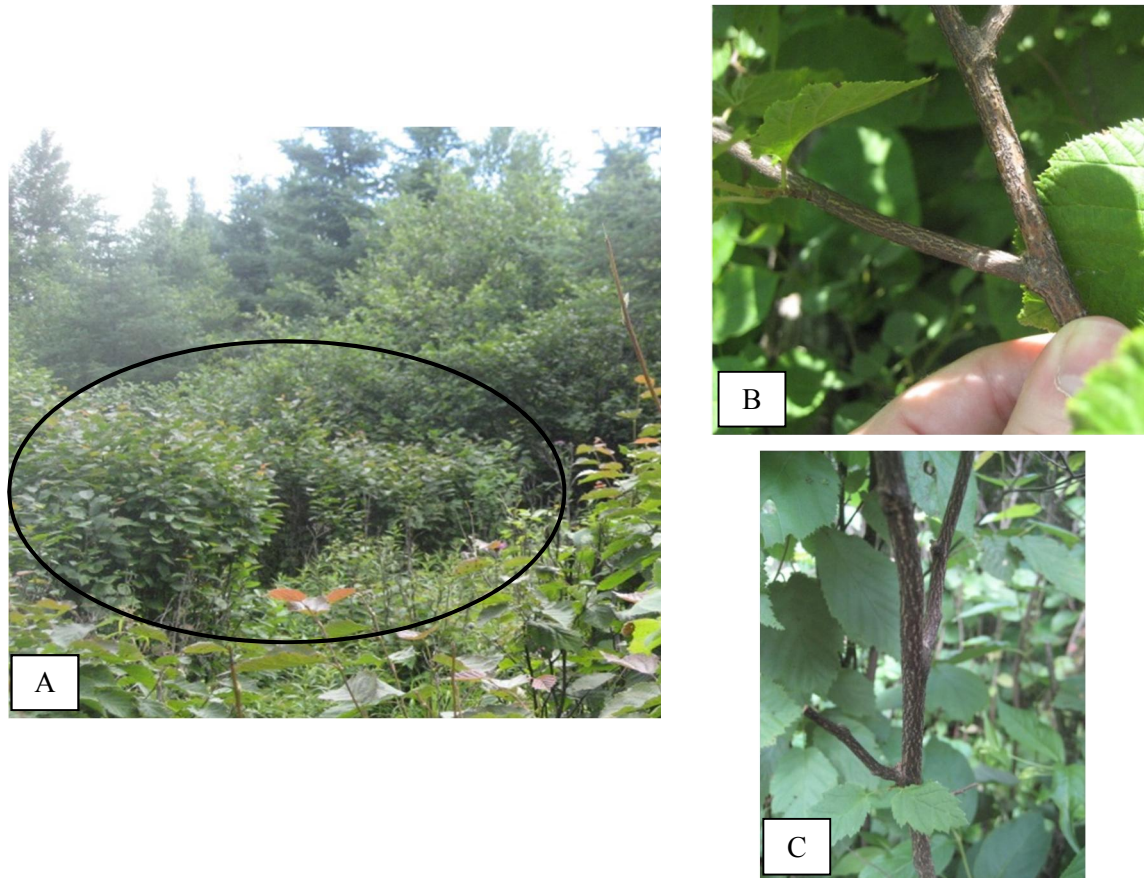


Figure 5. (A) A dense patch of beaked hazel plants in summer, and (B and C) the braided pattern on the bark.

The leaves of hazel have many veins and have a wider oval shape (Fig. 6A). It can be mistaken for alder when only using the leaves, so using the bark and growth pattern (hazel is typically shorter than alder) as additional information will assist in identification. Additionally, although the current annual growth in summer is usually green, it can be red and the leaves could have a redish color as well (Fig. 6B). If a hazelnut is present (Fig. 6C), it is definitely beaked hazel, but these are not present for long periods of time in summer. In winter the buds are rounded and light brown (Fig. 6D). A single twig can be anywhere from one inch to over 15 inches.

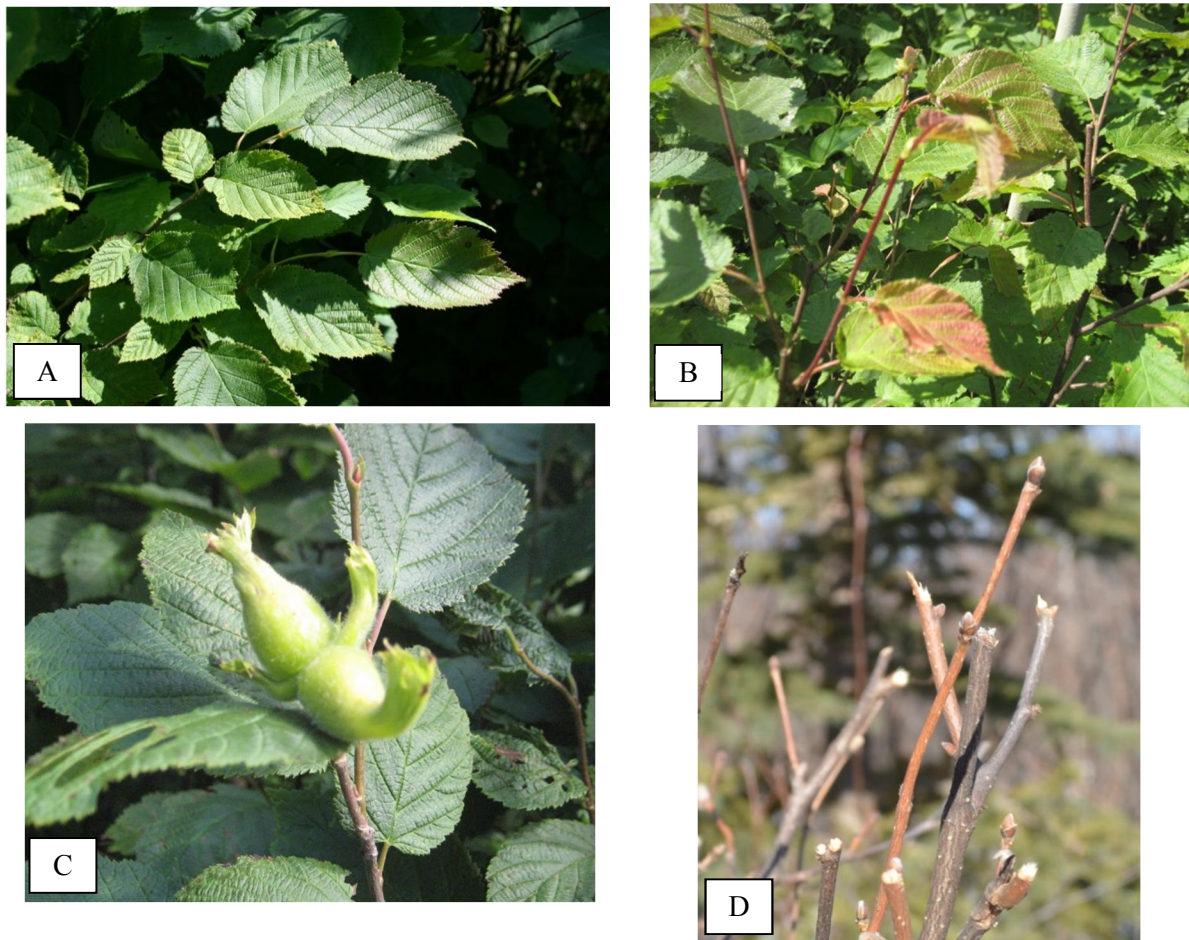


Figure 6. (A) The leaves of beaked hazel are oval shaped and have many veins and show (B) a red tint in summer. Examples of (C) a hazelnut (not often seen because it is eaten by squirrels and other animals), and (D) buds of beaked hazel in winter.

Paper Birch (*Betula papyrifera*)

Paper birch is a tree also known as white birch. The main identifying feature of older paper birch stems is the peeling bark of the tree (Fig. 7A). Although the bark is usually white, very young saplings may have brown peeling bark, or brown non-peeling bark (Fig. 7B). The leaves are alternate and have an approximate triangle shape with serrated edges (Fig. 7C). The twigs, particularly the tips of them, will have small white lenticels giving the twigs a sandpapery or fuzzy feeling (Fig. 7D and E). These features are also very helpful in identification of paper birch.

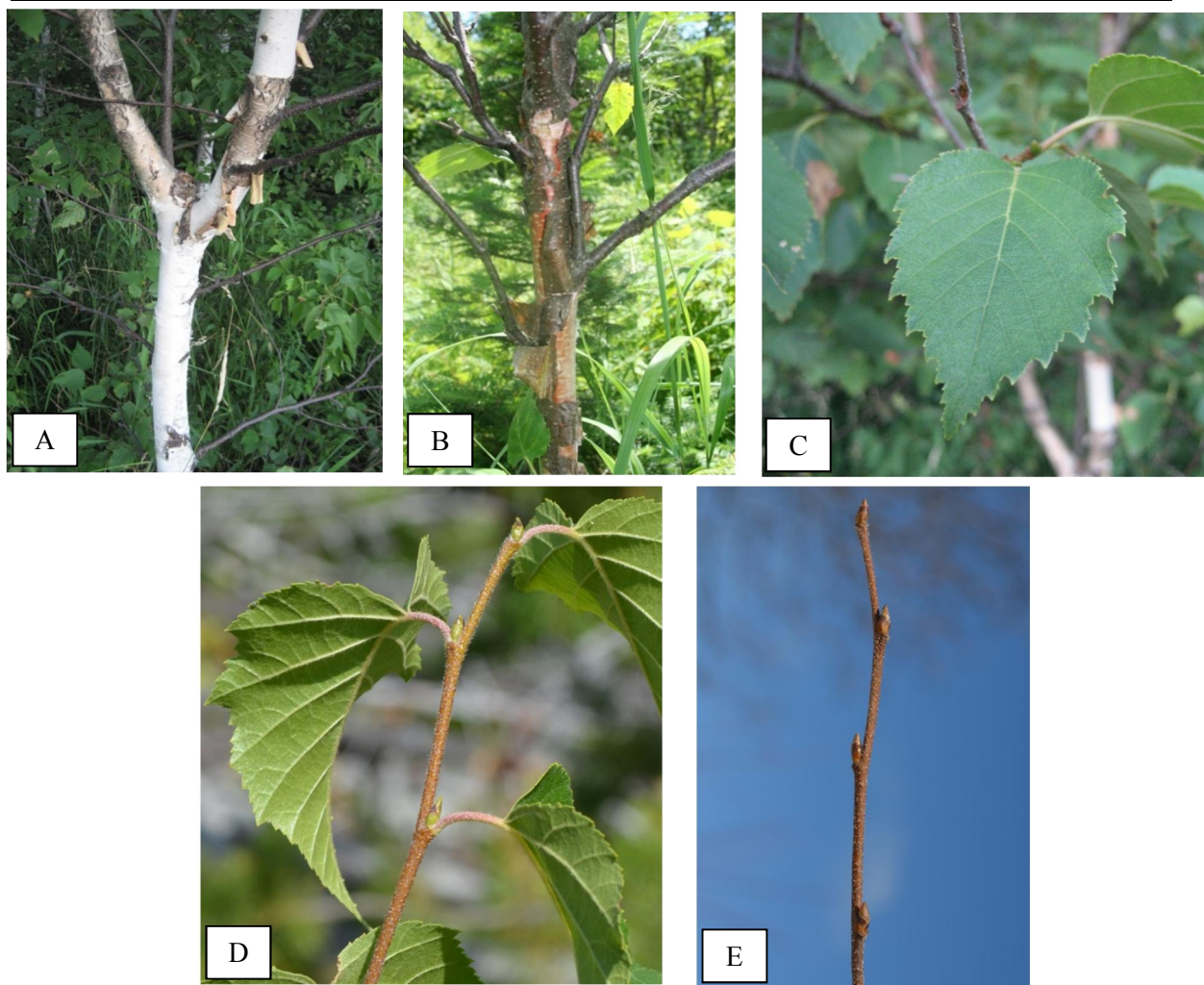


Figure 7. Peeling bark of a paper birch: (A) white bark and (B) brown bark of a younger tree. (C) A paper birch leaf; (D) a twig in summer and (E) a twig in winter, with white lenticels visible.

Quaking Aspen (*Populus tremuloides*)

Quaking aspen is a tree also known as trembling aspen or popple. Quaking aspen can be easily identified in summer by the “quaking” leaves when the wind blows. The quaking is due to the flat petiole of the leaf which can be felt when held between the pointer finger and thumb (Fig. 8A). Because quaking aspen leaves can vary in size from about one to five inches (2 to 12 cm) across, feeling the petiole of the leaf is a useful identifying feature. The leaves are alternate, but often grow in clumps at the end of twigs (Fig. 8B), making this difficult to distinguish. Quaking aspen saplings have light gray bark without any lines, spots, or other identifying features (Fig. 8C). In winter aspen is best identified by the plain, light gray bark, and twigs with an orange/brown color (Fig. 8D). In the winter quaking aspen is the most likely species to have curled, black, frozen tips at the end of the twigs if they have been previously browsed. Quaking aspen is typically found covering large areas due to clonal reproduction from root suckers, but solitary aspen also occur.



Figure 8. (A) Arrow indicates the flat petiole on a quaking aspen leaf; (B) aspen leaves growing in clumps at the end of a twig; (C) aspen stem with light gray bark; and (D) aspen twigs in winter.

Mountain Ash (*Sorbus decora*)

Mountain ash is one of two deciduous tree species in northeastern Minnesota with compound leaves (Fig. 9A). The presence of compound leaves is the most distinct identifying feature of mountain ash in the summer. The other species with compound leaves is black ash (*Fraxinus niger*). However, the species are easy to tell apart because mountain ash leaflets are toothed (Fig. 9B) while black ash leaflets are smooth (Fig. 9C). Mountain ash does have white flowers and red berries (Fig. 9D) but these are only present for short periods in the summer and are therefore, less reliable identifying features. In winter, the best identifying feature of mountain ash are the buds which are black and bigger than all other buds (Fig. 9E). In contrast, the buds of black ash are brown and more symmetrically triangular than those of mountain ash and may have two points instead of one. The bark of mountain ash is a grayish brown, but occasionally will have tiny spots of purple/maroon, especially in summer.

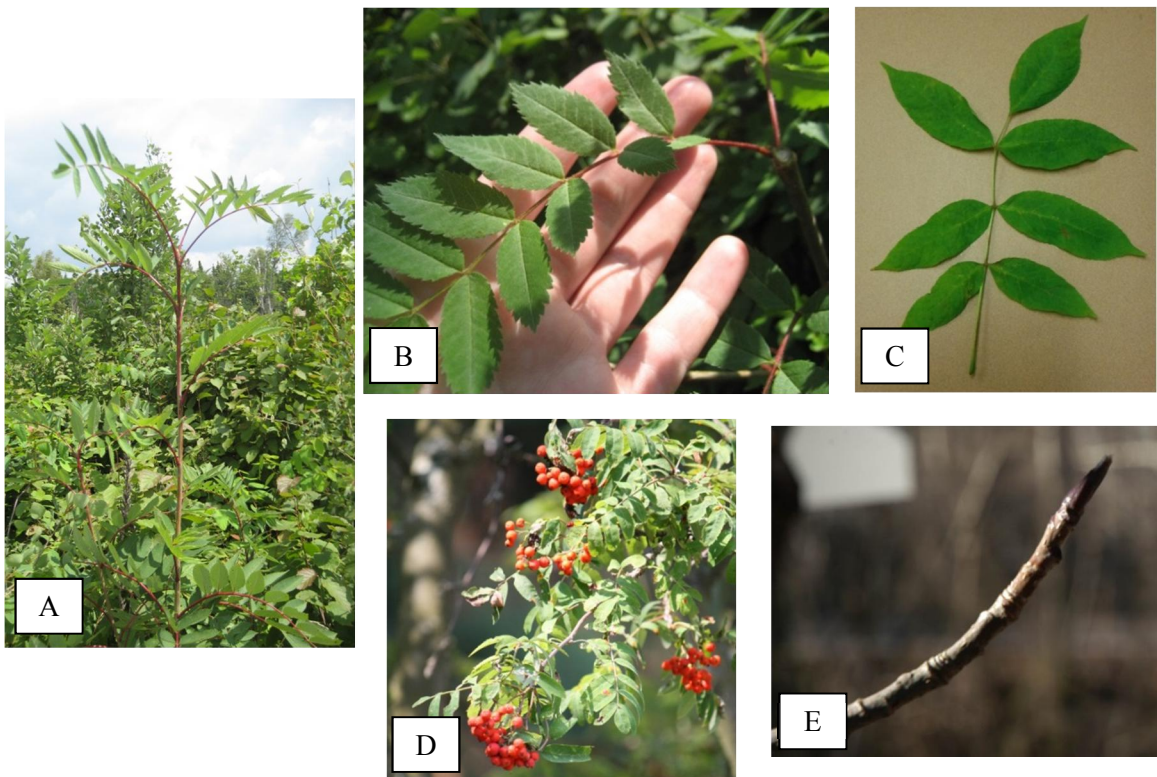


Figure 9. (A) A young mountain ash tree with one twig at the top. Mountain ash leaves have (B) many toothed leaflets, contrasting (C) black ash leaves with smooth leaflets. (D) Red berries and white flowers, and (E) black buds in winter.

Pin Cherry (*Prunus pennsylvanicus*)

Pin cherry is the only tree in northeastern Minnesota with multiple buds on the terminal end of a twig in winter that are red (Fig. 10A). Chokecherry can also have multiple buds, but they are tan or gray. Because all other species have a single terminal bud this is the best identifying feature in winter. Pin cherry buds are also very small and dark red/purple. The twigs are also a red/purple color and often have a whitish “flaking” look (Fig. 10A). Pin cherry stems have dark reddish bark with prominent white lenticels (Fig. 10B). Leaves are long and narrow with tiny serrated edges (Fig. 10C). They can have a waxy appearance. All cherry trees are susceptible to a black fungus that is commonly called “black knot fungus” due to its appearance (Fig. 10D). This fungus can help identify the plant as a cherry and bark color, bud formation, scent, and bud size can narrow identification to the species level.

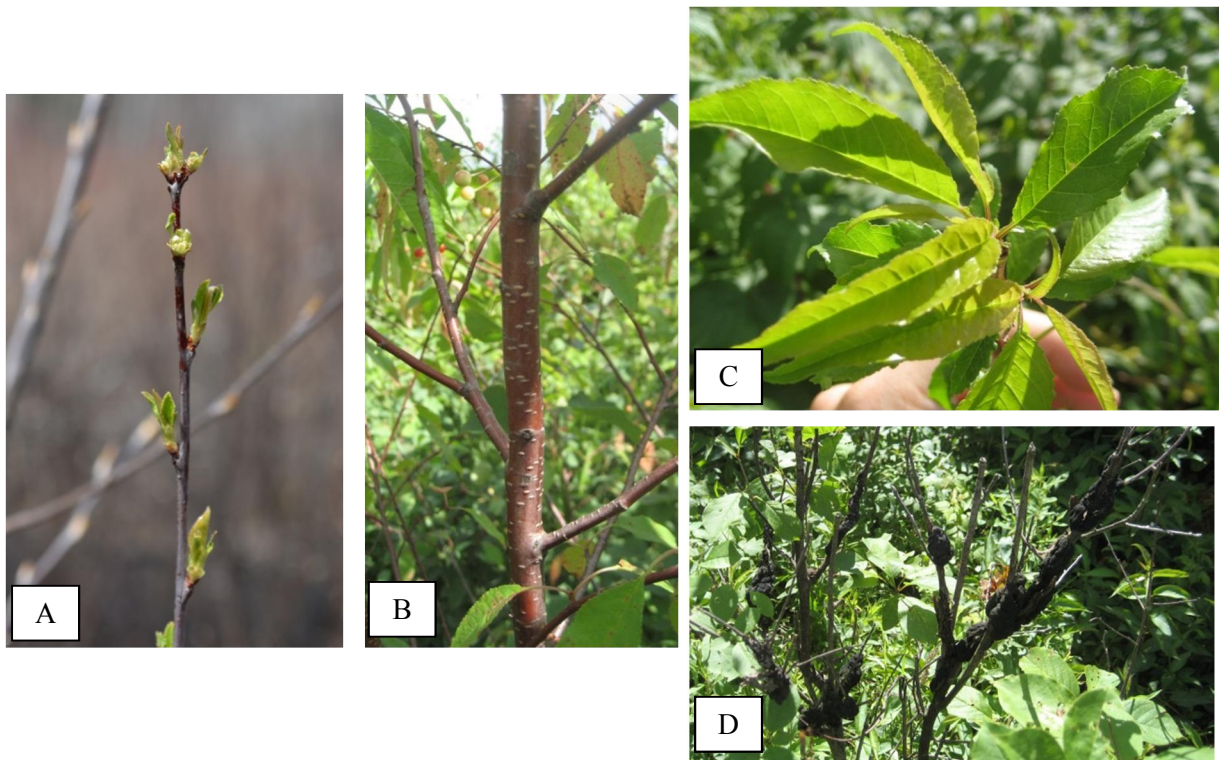


Figure 10. (A) The terminal end of a pin cherry twig with multiple buds in leaf-out. The “flaking” appearance of pin cherry twigs can also be seen. (B) Pin cherry stem with dark red bark and white lenticels. (C) Pin cherry leaves with small, serrated edges. (D) Tree with black knot fungus.

Chokecherry (*Prunus virginianus*)

Chokecherry is a tree that can easily be misidentified as pin cherry, juneberry, or willow. One of the best identifying features is the scent of chokecherry. This scent is difficult to describe since some people consider it pleasant and others consider it bitter and unpleasant. However, if a scent is present it can rule out all other species except balsam poplar which has a completely different appearance. Another good identifying feature of chokecherry is the diamond pattern on the bark. The bark is gray, but the diamond shapes are a tan color (Fig. 11A). This pattern is more prominent in winter than summer, but simply having the pattern can help determine that it is not another species. If the chokecherry tree is very young the pattern may look like circles instead of diamonds (Fig. 11B). The leaves have small serrations around the edge and are generally wider and more rounded than pin cherry leaves (Fig. 11C). In winter it is the only gray twig with tan buds. The buds of chokecherry (Fig. 11D) are much larger than pin cherry buds.



Figure 11. Chokecherry stems display a (A) diamond pattern; on very young chokecherry stems, the pattern may appear (B) more like circles than diamonds. (C) Leaves of chokecherry have small serrations. (D) Buds of chokecherry in winter.

Balsam Poplar (*Populus balsamifera*)

Balsam poplar is a tree also known as balm of gilead. The best identifying feature of balsam poplar is the distinct sweet scent that is present year round. In winter the scent can be brought out by squishing a bud and in summer the twig can be scraped. Additionally, in winter balsam poplar has very large orange buds that are usually sticky (Fig. 12A and B). In summer the twigs may also be sticky. The leaves are approximately triangular shaped, but not obviously serrated (Fig. 12C). This species is more commonly consumed by moose in northwestern Minnesota than it is in northeastern Minnesota.

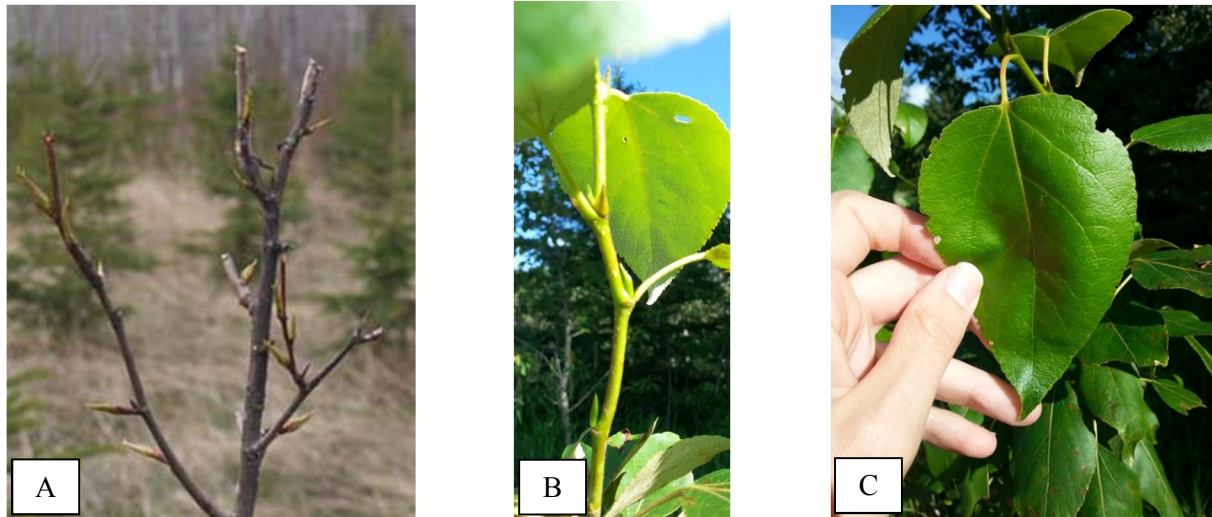


Figure 12. (A) The orange, sticky buds of balsam poplar in winter become (B) green, sticky buds in summer. (C) The leaves of balsam poplar.

Willow (*Salix* spp.)

There are many species of willow in Minnesota, and we identify these species to genus. In summer willows usually have long, thin alternate leaves all along the twig (Fig. 13A). Twigs can be one inch to over 12 inches long depending on the species. The twigs could be red (Fig. 13B), orange, yellow, or green (Fig. 13A) in summer, and red, orange, or yellow in winter (Fig. 13C). The buds in winter are small, with a single scale, and “hug” the twig. Willows tend to grow in the sunlight, so it is rare to find one growing in a place with little sun. Willows can be shrubs or trees, but within moose range in northeastern Minnesota the shrub growth pattern is most often observed.

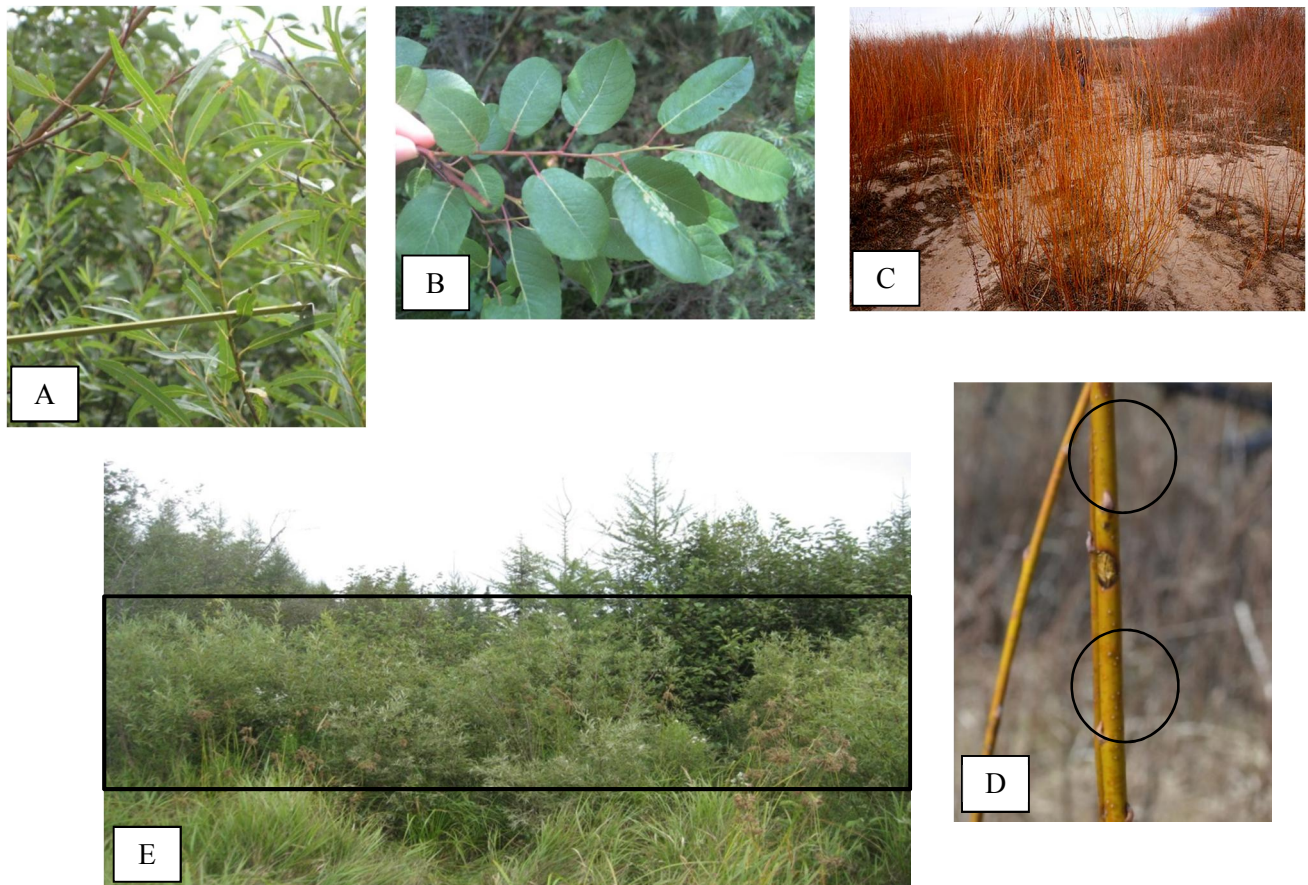


Figure 13. (A) A twig of a willow with long, thin leaves. (B) Red twigs of willow in summer, compared to (C) twigs in winter. (D) Willow buds in winter have a single bud scale. (E) Willows growing as shrubs in open sunlight are in the mid ground of the photo and in the black rectangle.

Juneberry (*Amelanchier* spp.)

Juneberry is also known as serviceberry. There are many species of juneberry in Minnesota and it is difficult to identify them to the species level in the field. We identify juneberry to the genus level. In summer juneberry has rounded leaves that tend to be flat with few obvious veins (Fig. 14A). The bark is also a plain gray with no consistent pattern present. Sometimes there is a splotchy white and gray pattern (Fig. 14B), but often there is no pattern. In winter the twigs are often a purple/red color (Fig. 14C). The buds in winter often have white lines or white hairs where the bud scales overlap (Fig. 14C). If these are present it is a clear identifier of juneberry. For this reason, it can be easier to identify these plants in winter than in summer. Due to the difficulty in recognizing the various juneberry species it is sometimes best identified by process of elimination.

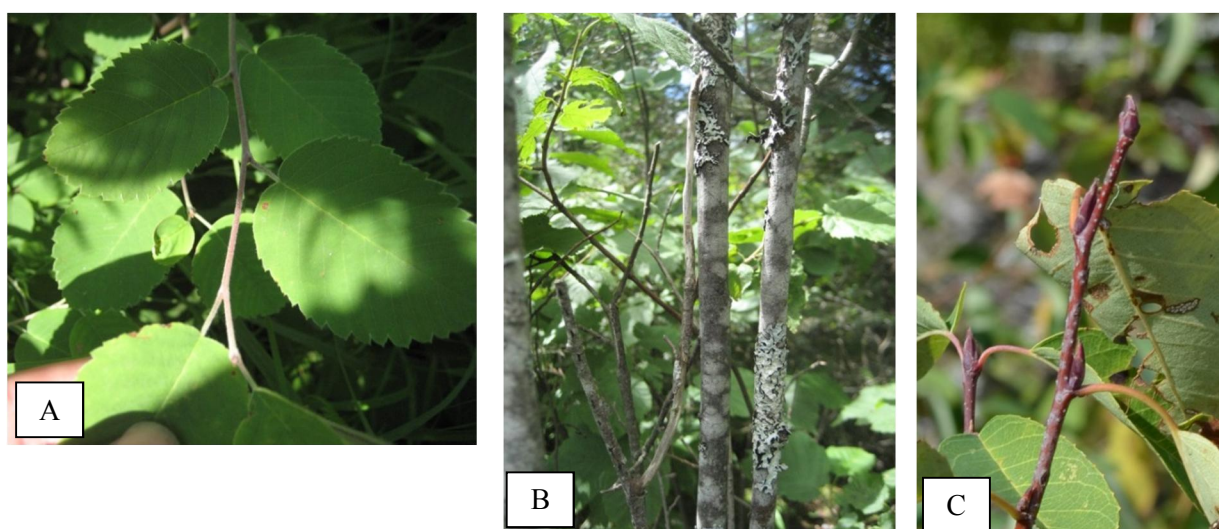


Figure 14. (A) Leaves of one juneberry species. (B) The stem of juneberry with a splotchy pattern. (C) The twigs and buds of juneberry in winter look like these (without leaves).

Alder (*Alnus rugosa*)

Moose do not eat alder in northeastern Minnesota. However, it is abundant in swampy areas, and has leaves that appear similar to beaked hazel, so it is a good species to recognize so as to not consider it available browse for moose. Alder grows as a tall shrub and very often the stems grow in clumps with stems leaning sideways, making alder stands difficult to walk through. The bark is dark gray/brown with white lenticels (Fig. 15A). The leaves have many veins (Fig. 15B) and can be mistaken for hazel if only using the leaves. Alder also has distinct “fruits” which look like mini pine cones (Fig. 15C). If you see these dry fruits it is an identifying feature of alder. These fruits can be present at any time of the year, but it is possible for a plant to not have any. Finally, in winter the buds of alder are a reddish purple and they tend to stick out from the twig, in contrast to the “hugging” appearance of many of the other species (Fig. 15D).

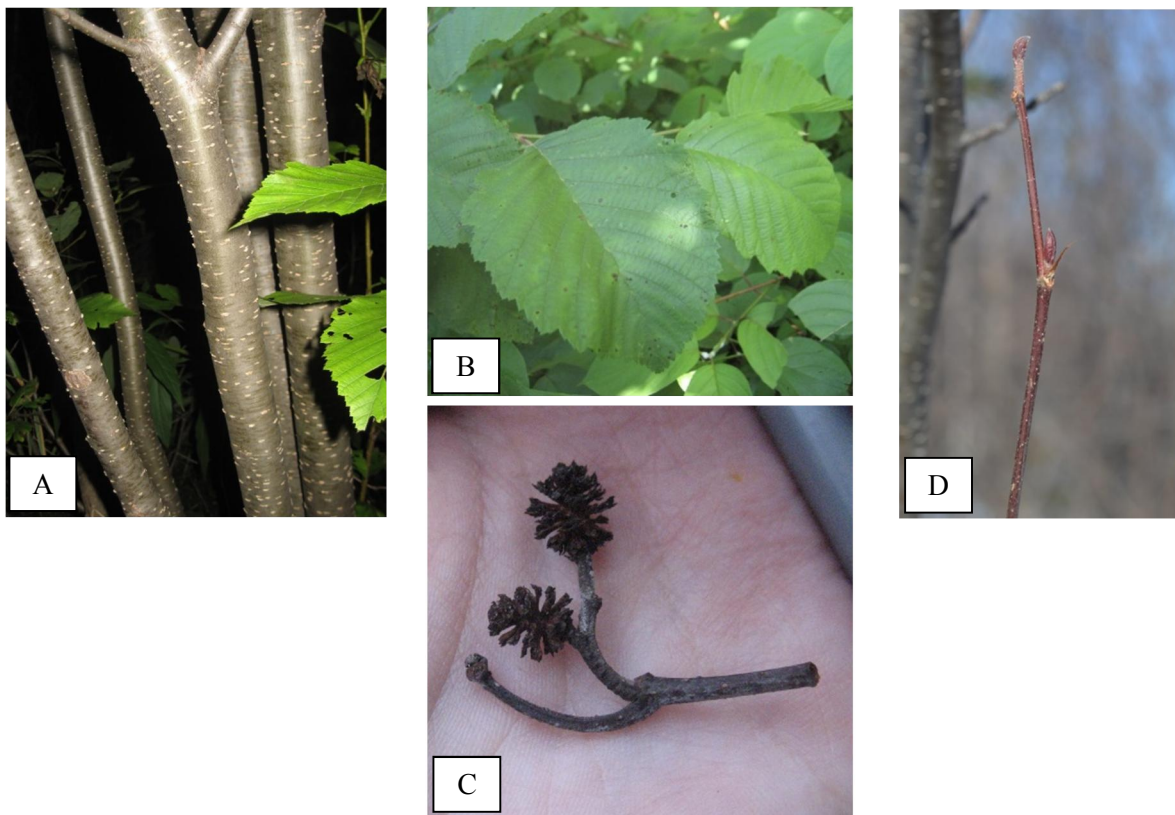


Figure 15. Alder (A) gray bark with white lenticels and (B) leaves. (C) Dry fruits are a distinguishing feature of alder. Example of alder (D) buds and twigs in winter.

Coniferous species

Balsam Fir (*Abies balsamea*)

Balsam fir is the only conifer tree species that moose consistently browse in northeastern Minnesota. It is only consumed in winter. Balsam fir has flat needles and the needles are not clumped on the twig (unlike pines which have needles attached in clumps) (Fig. 16A and B). The phrase “fir is flat, spruce is square” is helpful to remember when identifying conifers. Balsam fir, in part because of its abundance, is the conifer most commonly eaten by moose in Minnesota. It is only eaten in winter.

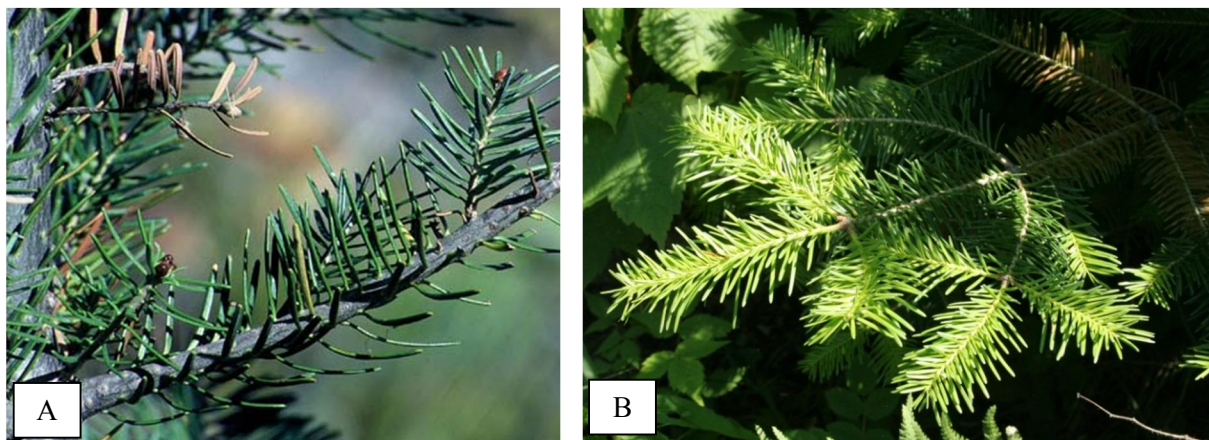


Figure 16. (A) Balsam fir twigs and (B) needles. Flat needles are apparent in (A).

White Pine (*Pinus strobus*)

White pine is a tree with clumps of five needles (Fig. 17A). One way to remember this is that “white” has five letters in it and it has clumps of five needles. The cones of white pine are slender and longer than cones of red pine (Fig. 17). White pine is only eaten in winter by moose.

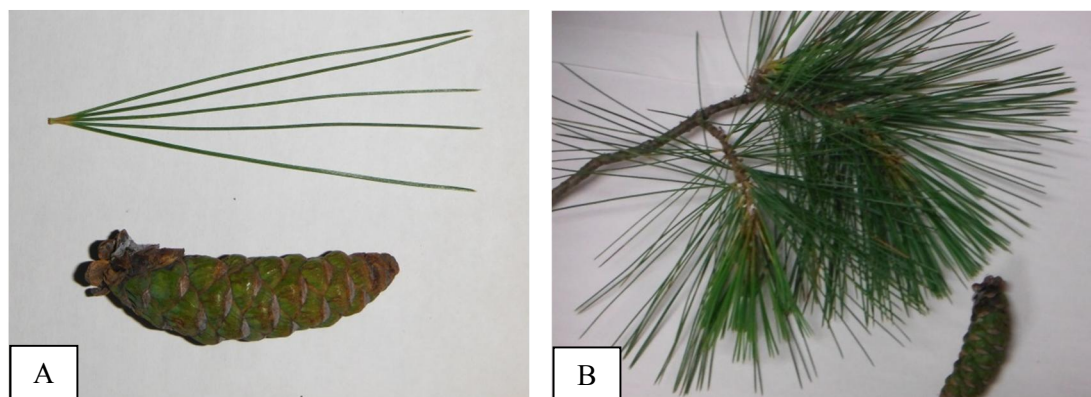


Figure 17. (A) The needles of white pine are in clumps of five. Example of white pine (B) branch.

Jack Pine (*Pinus banksiana*)

Jack pine is a coniferous tree with clumps of two needles that are between 2 and 4 cm long. Additionally, jack pine cones are sealed shut and can be opened by fire, so they are a good identifying feature (Fig. 18). Jack pine is only eaten in winter by moose.

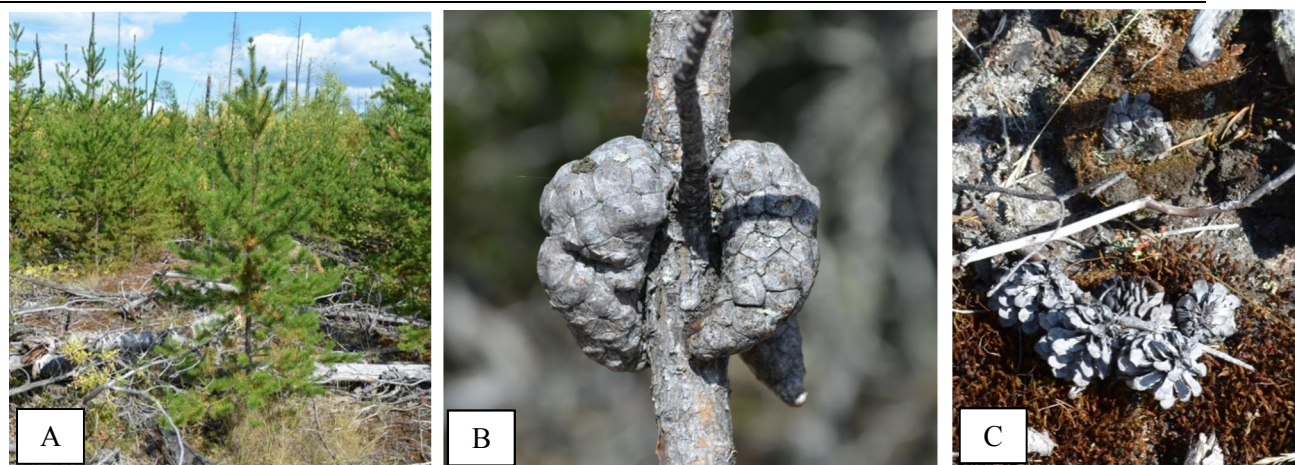


Figure 18. (A) A jack pine sapling in a burned area. (B) The cones of jack pine are usually sealed completely shut, and after a fire the (C) cones will be opened.

Red Pine (*Pinus resinosa*)

Red pine is a tree that is sometimes called Norway pine. The needles of red pine occur in clumps of two (like jack pine), but the needles are approximately 12-18 cm long (Fig. 19). Red pine is only eaten in winter by moose.

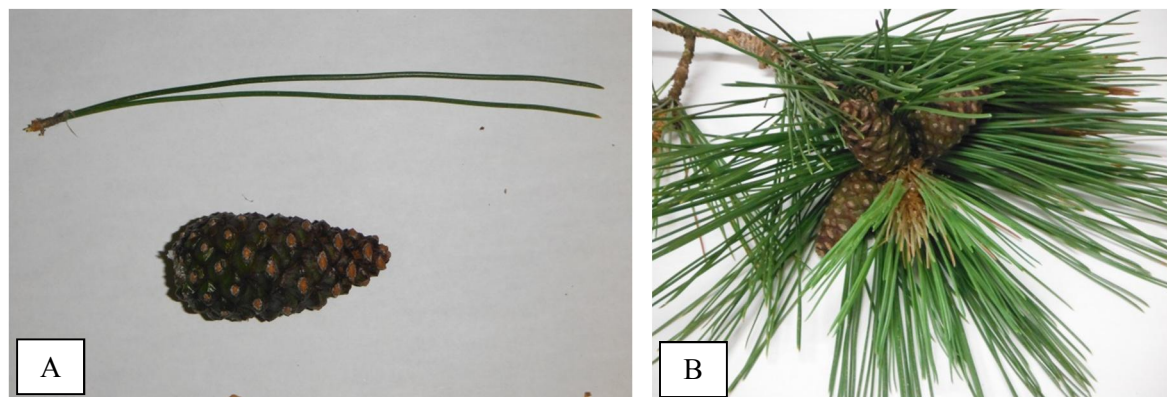


Figure 19. (A) The needles of red pine are in clumps of two and are longer than those of jack pine. (B) A branch of red pine with cones.

Northern White Cedar (*Thuja occidentalis*)

Northern white cedar is a conifer often found in wetter lowland areas, although it can also be found in upland forest. The leaves have a distinct branching pattern which makes them the best identifying feature of cedar (Fig. 20A). No other species has leaves that look like this. Moose eat northern white cedar only eaten rarely, and only in winter.



Figure 20. (A) A single “needle-leaf” of cedar and (B) many needle-leaves of cedar. (C) The bark pattern of the white cedar.

White Spruce (*Picea glauca*)

White spruce is a tree with square needles (Fig. 21A), in contrast to fir needles which are flat. This difference can be felt when a needle is rolled between two fingers. White spruce needles tend to be longer than black spruce and the cones of white spruce are long and thin (Fig. 21B) when compared to black spruce. White spruce is not eaten by moose.



Figure 21. (A) The needles of white spruce, and (B) a partially opened and (C) a young, green white spruce cone.

Black Spruce (*Picea mariana*)

Black spruce is a tree with square needles (Fig. 22), in contrast to fir needles which are flat. This difference can be felt when a needle is rolled between two fingers. Black spruce needles tend to be shorter than needles of white spruce. Black spruce generally grows in wetter areas than white spruce, which is usually growing in upland areas. Black spruce is not eaten by moose.



Figure 22. Black spruce (A) needles, (B) branch, and (C) cones.

Tamarack (*Larix laricina*)

Tamarack is also known as American larch. Tamaracks look like conifers because they have needles, but they lose their needles in autumn. In winter the most identifiable feature are the light brown twigs covered in dark bumps (where the needles grow each summer). In the summer tamaracks have bunches of short, soft needles extending from each bump on the twig (Fig. 23). Tamarack is rarely eaten by moose.



Figure 23. Tamarack needles in summer.

Acknowledgements

I would like to thank Dr. Ron Moen for initially teaching me the species identification for these species and encouraging me to commit them to memory. I would also like to thank Ron Moen and Michael Joyce for some of the photos used in this report. Finally, I thank Amanda McGraw for her contributions to the winter identification information.

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- Ward R. L. 2014. Browse Availability, Bite Size, and Effects of Stand Age on Species Composition and Browse Density for Moose in Northeastern Minnesota. M.S. Thesis, University of Minnesota, Minneapolis, MN.

Appendix 1. Key to Identification of Summer Browse Species

- 1a. Compound leaves present (2).
- 1b. Simple leaves present (3).
- 2a. Gray stem with red/pink petioles and serrated leaflets**Mountain ash**
- 2b. Gray/brown stem with non-serrated leaflets.....**Black ash**
- 3a. There is a distinctive smell when you crush the buds and break and twig (4).
- 3b. There is no smell when you break the twig (5).
- 4a. Buds are very large and orange, they are sticky and have a sweet smell. The bark is gray/
brown and the leaves can have a waxy look.....**Balsam poplar**
- 4b. Twigs are gray with a diamond pattern or small circular lenticels. There is a distinctive smell
when twig is broken. Leaves are fatter ovals with tiny serrations on edges.....**Chokecherry**
- 5a. Red, orange, green, or yellow twigs present (6).
- 5b. Gray, tan, or brown twigs (10).
- 6a. Opposite leaves (7).
- 6b. Alternate leaves (9).
- 7a. The leaves are oval shaped, have few veins that are parallel, and they looks whorled
(although they are opposite). The stem is red, orange, green, or some combo of those, all the
way down to the dirt. Berries or white flowers may be present.....**Red-osier dogwood**
- 7b. The leaves are maple shaped (8)
- 8a. The red twigs become light gray after a splotchy transition and it is a shrub.....**Mountain maple**
- 8b. The red twigs transition to a darker gray stem abruptly at the joint between the stem and
the twig. It can grow into a tree.....**Red maple**
- 9a. Twigs are dark red. Leaves are long and narrow with small serrations, and can have a waxy
look. Bark is dark red with horizontal lenticels. Often has black knot fungus present.....**Pin cherry**
- 9b. Twigs could be red, orange, yellow, or green. Leaves are long and narrow. Twigs can range
from 1” to over 12” and will have leaves along the entire twig.....**Willow spp.**
- 10a. Twigs are brown (11).
- 10b. Twigs and stem are gray or a gray/brown (12).
- 11a. Twigs (and sometimes leaves) are fuzzy or sandpapery due to white lenticels, leaves are
triangle shaped, bark on stem is white or brown and may be peeling.....**Paper birch**
- 11b. Bark has a braided pattern of dark brown on light brown and/or hazelnut present.....**Beaked hazel**
- 12a. Leaves have flat petioles, they shake in the wind. Leaves can have dramatically different
leaf size. Bark is plain gray. Twigs can be orange/brown.....**Quaking aspen**
- 12b. Leaves are rounded, but may have serrations. Can be a variety of twig colors and leaf
shape/size. Bark is sometimes splotchy, but almost always gray.....**Juneberry spp.**

Appendix 2. Key to Identification of Winter Browse Species

- 1a. There is a distinctive smell when you crush the buds and break and twig (2)
- 1b. There is no distinctive smell when buds are crushed or twigs broken (3)
- 2a. Smell is sweet, twigs and buds are orange and sticky, buds are large.....**Balsam poplar**
- 2b. Smell is strong, some say bitter, twigs are gray with a diamond pattern (or circular lenticels if young), and buds are tan. There may be multiple buds on terminal end and black knot fungus may be present.....**Chokecherry**
- 3a. Buds are opposite (4)
- 3b. Buds are alternate (5)
- 4a. Buds are rounded and plump, stem is a deep red and transitions to a medium gray/brown at joints in the branches. It is possible to grow into a large tree..... **Red maple**
- 4b. Buds are thin, stem is a grayish red and has a splotchy transition to a light gray stem. It is a shrub..... **Mountain maple**
- 4c. Buds are very thin, and can be long (almost like a new twig is already growing). Stem is a vibrant red all the way to the dirt. It is a shrub.....**Red-osier dogwood**
- 5a. Buds are large and black, twigs usually larger in diameter as well.**Mountain ash**
- 5b. Buds are brown and are paired, like two small triangles..... **Black ash**
- 5c. Buds are normal, or small in size, and any color (6)
- 6a. Twigs are fuzzy or rough like sandpaper, bark may be peeling.**Paper birch**
- 6b. Twigs do not feel fuzzy or rough (7)
- 7a. Twigs have a braided pattern on twigs and/or stem, buds are small, round, and light brown.....**Beaked hazel**
- 7b. Twigs are a red/purple color (8)
- 7c. Twigs have a gray, yellow, or red color (9)
- 8a. Buds are small, red/purple in color, and occur in bunches of 2-5 on the terminal end of branches. The stem is also be a dark red/purple color with white lenticels and the tree could also have black knot fungus.....**Pin cherry**
- 8b. Buds are red/purple with faint white lines running across the bud. It has an elegant look. It is a shrub and may have a gray stem.....**Juneberry spp.**
- 9a. Twigs are gray, buds may be orange, often the ends of twigs are black.....**Quaking aspen**
- 9b. Buds are a single scale, there are no lines or designs on the buds. Stem could be yellow, red, or brown.....**Willow spp.**