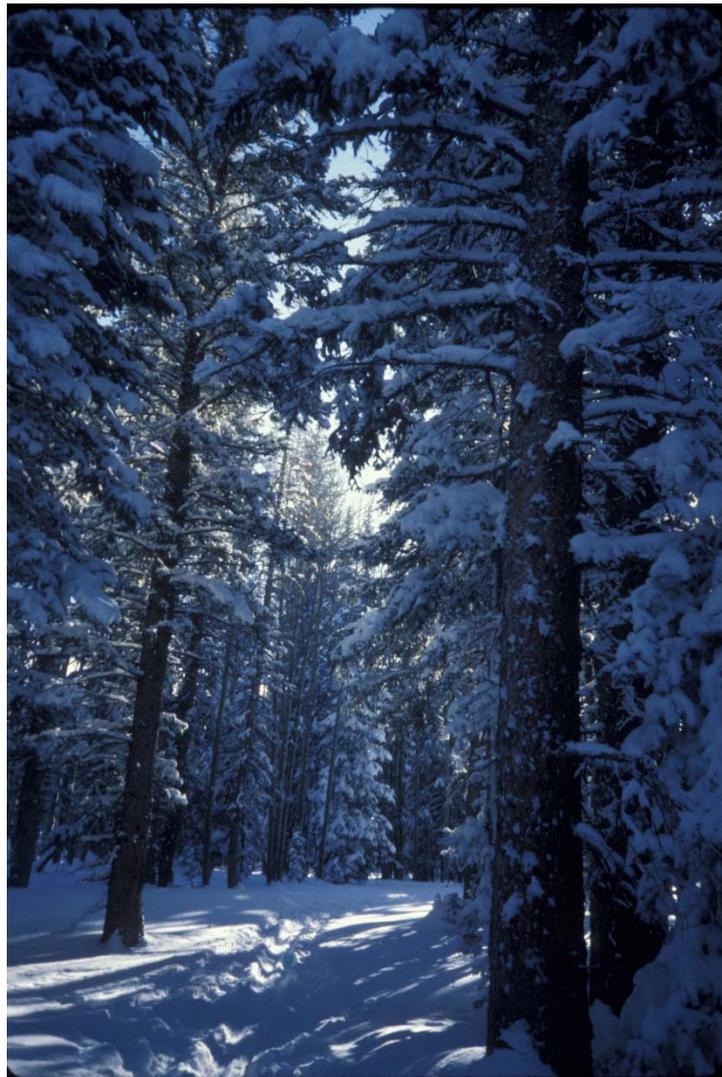


2016 Snowshoe Nature Hike on Grand Mesa

Including landmarks along the road and
comments on plants and wildlife



BY DR. BRUCE BAUERLE
AND DR. DUANE HRNCIR

Copywrite 2005 (updated 2016) Bauerle

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This work can be down-loaded and printed in color for free, for personal use, by Googling “coloradomesa.edu/biology” and selecting Department Faculty, Bruce Bauerle, and scrolling to 2016 Snow Nature Hike on Grand Mesa... or eventually by Googling “2016 Snowshoe Nature Hike on Grand Mesa”.

Dr. Bruce Bauerle



Dr. Duane Hrcir



Introduction

What follows is a travel adventure which will take you from Grand Junction, Colorado, to the Mesa Lakes Resort area by automobile, and then around Sunset Lake on snowshoes or cross- country skis. During our hike around the lake, you will learn to recognize an assortment of animal tracks, animal signs, birds, trees, and other features, while enjoying our beautiful Colorado scenery. Also we have added interesting geological and historical features that can be seen along the hi-way, to entertain you while “on the road”. The total round-trip distance will only be 86 miles, and we guarantee that you will see and learn wonderful things on this trip!

Our adventure begins by setting your odometer at zero, as you move onto Interstate 70 from Horizon Drive, in Grand Junction. We suggest that someone in the car “read aloud” from this guide to the rest of your passengers, as you drive up the mountain.

The Grand Mesa

Grand Mesa is one of the world's largest flat-topped mountains. Located just outside of Grand Junction, it rises to about 11,000 feet in elevation.

There are hundreds of lakes on Grand Mesa, and the following Ute Indian mythology about how the lakes were formed, is extremely interesting.



Ute Indian Mythology - How the lakes on Grand Mesa were formed

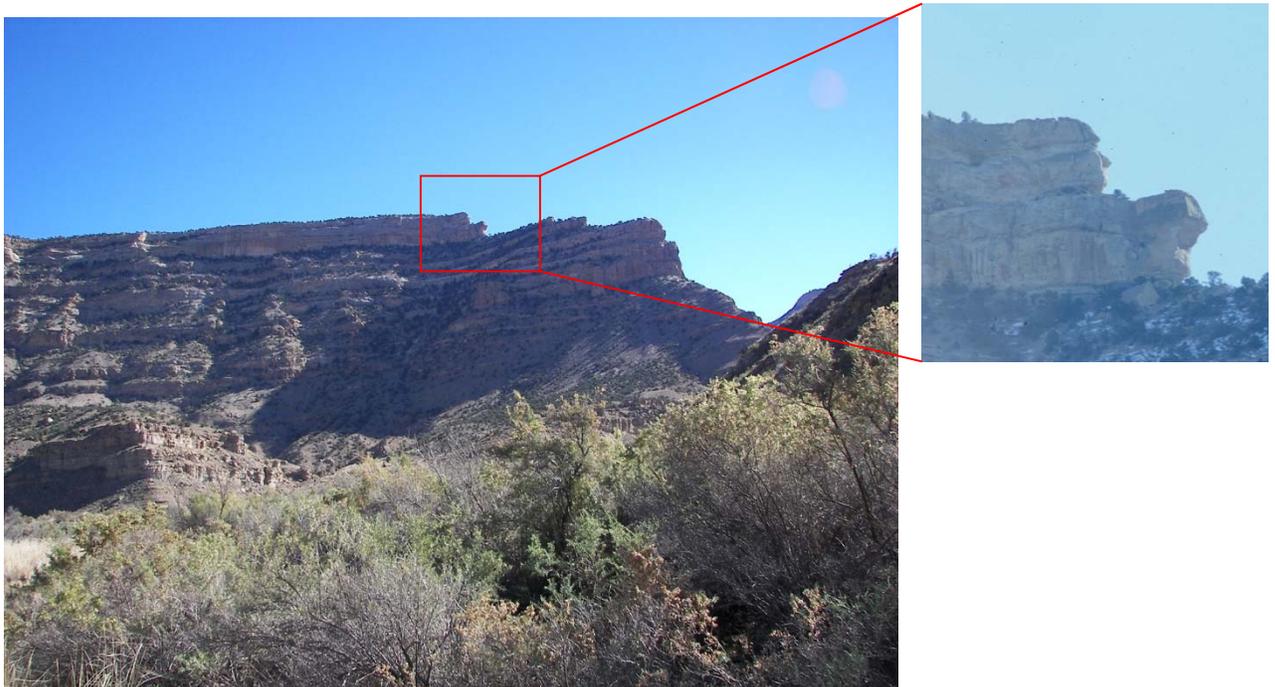
The entire region was a hunting ground of the Utes, who called the mesa Thigunawat, or home of departed spirits. The mystic beauty of this curiously detached upland seemed to them a perfect setting for the wandering souls of departed warriors. The mesa, so the Ute believed, was the home of three pairs of great eagles, known as Bahaa-Nieche, or thunder birds, which nested along the north rim of the plateau; the white rock slides on the slope at that point were supposedly formed of bones and debris from their nests. These birds not only carried off deer and antelope, but captured Indian children.

One day a great Bahaa-Nieche seized the son of Sehiwaq, a chieftain, and carried him off to its aery. The father, bent on revenge, wrapped himself in the bark of the Basthina, or red cedar tree, and thus disguised, started up the side of the mesa. To the Ute the cedar was sacred for its never-dying green, its aromatic fragrance when burned as incense at religious ceremonies, and its durability and fine texture, which made it particularly suitable for lance shafts and tepee poles. The Ute believed that the cedar had originally been a pole, at the top of which their ancestors had fastened the scalps of their enemies, and that the heart of the tree had been stained red by the blood that trickled through its fibers.

It took Sehiwaq all day to scale the mesa. Whenever a thunder bird soared over him, he stood still and pretended to be a tree. Finally, he reached the nests, pulled out the young birds, and sent them tumbling down the slope. A large serpent, Batiqtuba, lived near the foot of the slide, and as the eaglets rolled near him, he captured and devoured them. When the Bahaa-Neiche returned to their nests and saw what had happened, they suspected the serpent, carried him many miles into the air, and tore him to pieces. As the pieces fell to earth, they made deep pits in the ground. So great was the rage of the thunder birds that fire streamed from their eyes and thunder shook the mountain; torrents of rain fell and filled the pits, forming the many lakes on the mesa.

Kids love this story! As you pull into the parking lot at Mesa Lakes Resort, look at the top of the Mesa to the South. This may have been the mythological cliff that the eaglets were thrown down, to be devoured by Batigtuba. The serpent was probably hanging out near what is now South Mesa Lake. Remember to remind everyone as you snowshoe around Sunset Lake, that the lake may have been formed by a **big chunk of “dead snake” falling from high in the sky.**

1. After passing the exit for Palisade, the former Roadside Coal Mine complex on the right, and the site of the former Cameo Power Plant on your left, at mile marker 46 (14.6 miles on your odometer), look up to the very top of the ridge line on your right. You will see a face-like silhouette of a human head. This is the “Cameo” human head profile that the power plant was supposedly named after.

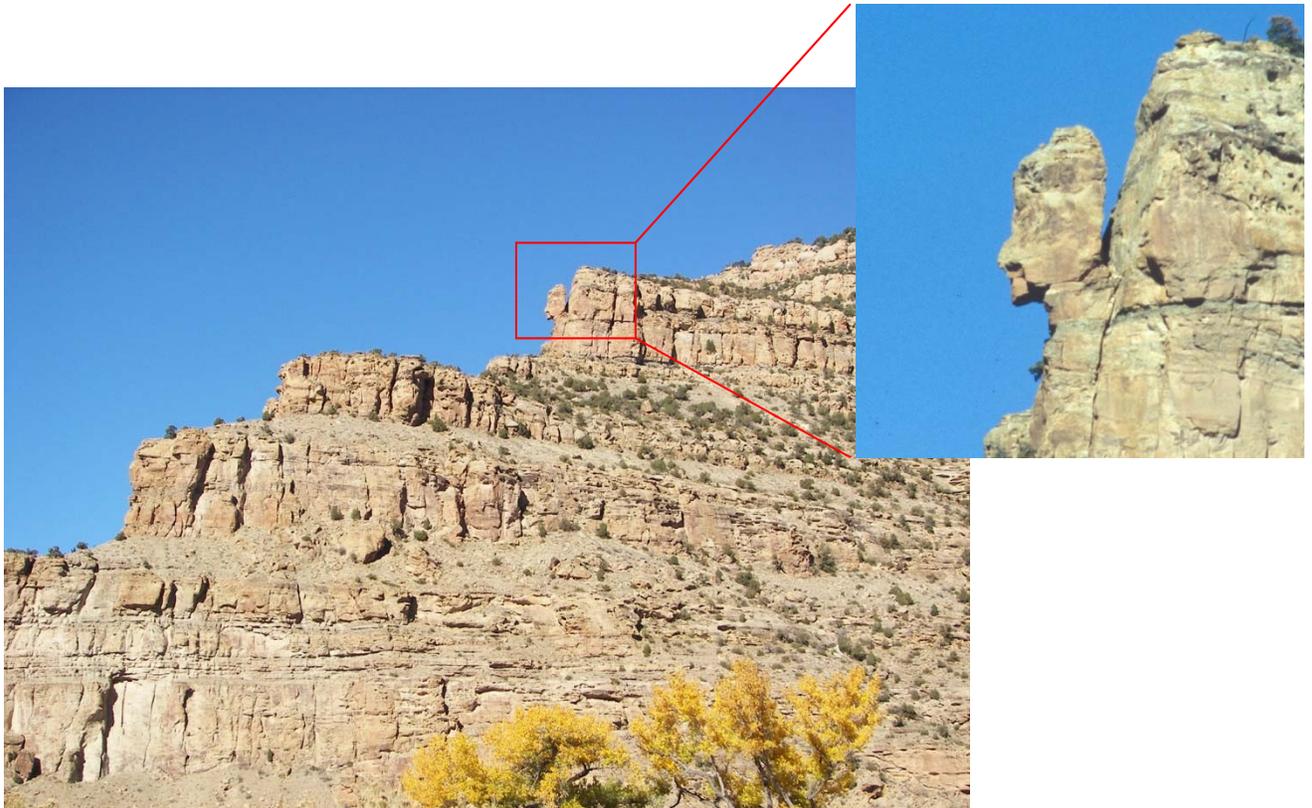




Keep your eyes open for Bald Eagles in the trees along the river on your left, as you drive down the interstate.



2. Next, watch for mile marker 48 (odometer 16.8) near the sign designating the Scenic Byway. Look up and to the left, on the fourth terrace across the Colorado River, and you will see the really cool looking "Witches Head" rock.



3. In just moments, by looking “directly ahead” and to the right as you start onto the I-70 Exit 49.... to Highway 65.... you will see a tall column of rock (odometer 17.5). This is “Bear Rock”. The bear is standing on its hind legs. Do you know the old song “The bear went over the mountain, the bear went over the mountain, the bear went over the mountain, to see what he could see. He saw... the other side of the mountain, the other side of the mountain, the other side of the mountain.... was all that he could see!”? As you round the corner going up the canyon toward the town of Mesa, where traffic merges from the left, “look back” to see Bear Rock from a different angle.



Bear Rock, looking back as you round the corner, leaving I-70

4. "Suicide Wall" will be your next geological treat. The story goes that during the local sheep vs. cattlemen range wars, about 300 head of sheep were driven **over this cliff** by cowboys, who also shot the shepherd on the grazing area above. This smooth, overhanging wall is at odometer 20.1 miles into our trip.



Suicide Cliff, site of a sheep herd massacre, during the range wars

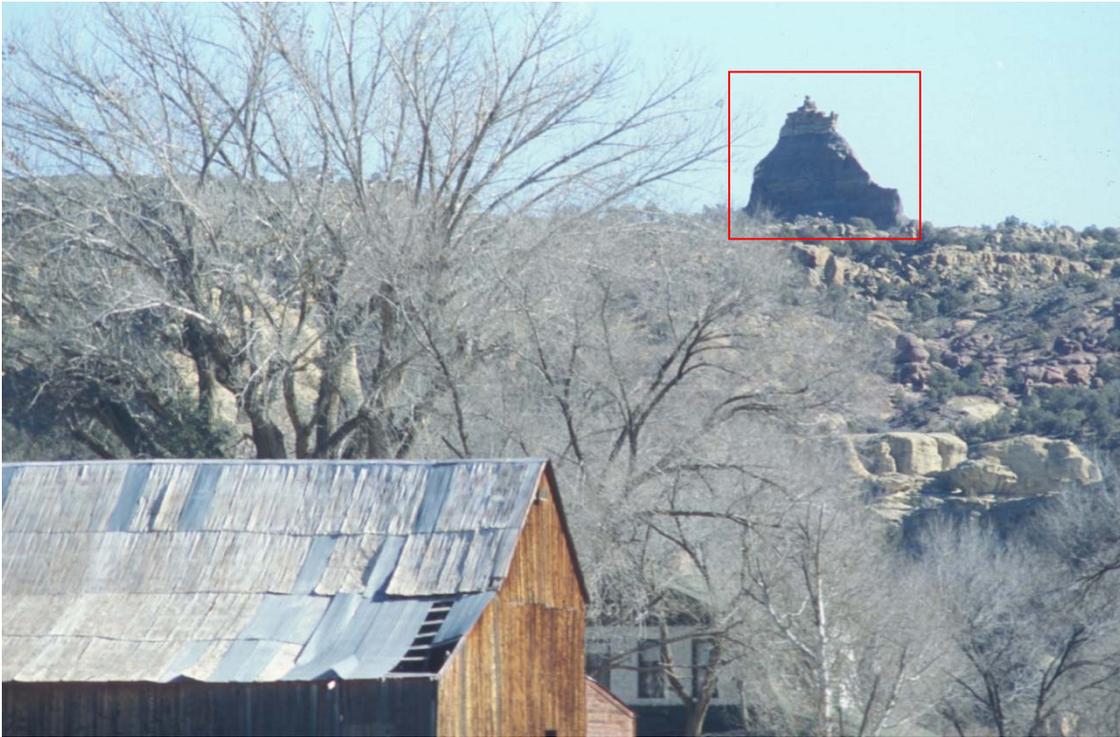
5. About 200 yards past mile marker 55 (odometer 24.4), you should look “down” and to your right, into a pile of weeds surrounded by four metal posts (the private road curves around it), next to Plateau Creek. The concrete structure within the posts is the old Civilian Conservation Corps “Bread Oven”. It was used for baking bread for the hardy men who originally built the highway. A large fire was started inside the oven to heat the stone, the coals were shoveled out when it was hot enough, and the bread (and meat) was placed inside to bake. This is private land, so you will need permission to go down and look at it closely.



Civilian Conservation Corps “Bread Oven”

6. Our next landmark is the huge barn just ahead of you, at odometer 27.0 (before the De Beque Cutoff). The old stagecoach route to Grand Junction from Rifle did not try to follow the Colorado River, which had too many floods and rockslides. Instead it went up the DeBeque Cutoff to this ranch and stagecoach stop. People spent the night here, before going down the original road following Plateau Creek (that you are now on), for an all-day, bumpy, dusty ride to Palisade, Colorado... and eventually to Grand Junction. Wealthy folks stayed in the house, while other men-folk slept on the “hay” in the barn.

7. Look over the top of the barn to see “Teapot Rock” in the distance!

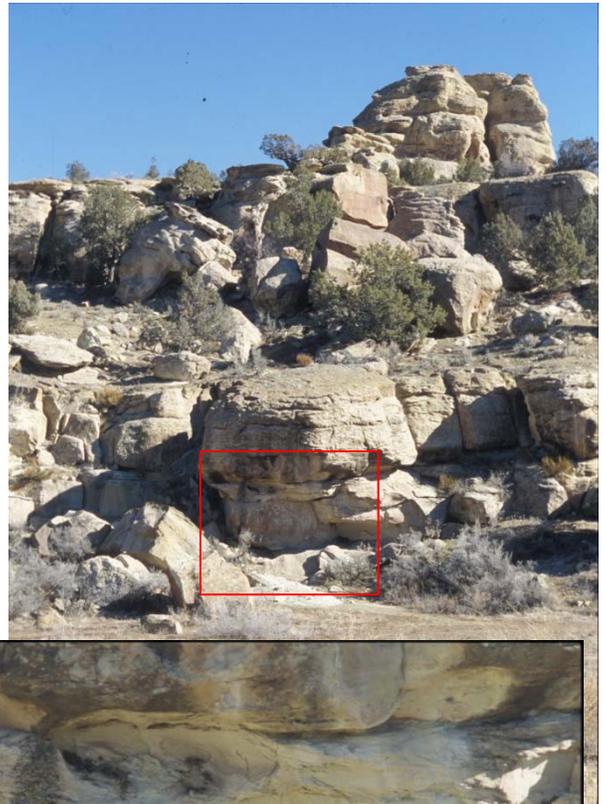


“Stagecoach Stop” barn with “Tea Pot Rock” in the Background

8. Next, you are in for a real treat. Prepare to pull off the road to the left, about 100 yards past the DeBeque Cutoff (at odometer 27.8). Look to your left, at ground level, for a large overhanging boulder with a flat surface below it. These are real “petroglyphs” made by Ute Indians hundreds of years ago. Never touch or put chalk on these, since either will eventually destroy them. They are protected by law, and are wonderful to look at. This was obviously a crossroads for Native Americans.

During the Meeker Massacre, Mrs. Meeker, her daughter Josephine, Mrs. Price and two children were taken by the Utes, and carried from Meeker right through here, to be held hostage on Grand Mesa. The women were eventually released after the army negotiated with the rest of the tribe (who incidentally were camped by the Colorado River near Bear Rock, next to Plateau Creek).

That whole episode (including the killing of Nathan Meeker and nine other men, the following Battle of Milk Creek (also called the Thornburgh Massacre) where soldiers going to Meeker were ambushed by Indians, and where army survivors were rescued by a troop of black “Buffalo Soldiers” coming from Wyoming... is a terrific bit of local history. Fifty soldiers and Utes were killed. Meeker was an “old poop” (our opinion). He and the other locals were only killed when his complaints caused Major Thornburgh to violate the promise made to the Utes to not bring the army onto their reservation. Instead Thornburgh crossed into the reservation with 191 infantry-cavalry. The following battle led to many killed on both sides, Thornburgh was shot in the head and scalped, and Meeker was found stripped, clubbed in the head, shot in the head, with a chain around his neck. A metal stake was pounded into his throat and out the back of his head, so he could tell no more lies. We wish we had time to tell the whole story here, since it **does include the Grand Mesa, in 1879**. Read “*THE UTES MUST GO*” by Peter Decker to know more.



Closer View of Petroglyphs at Mesa / Collbran turnoff

9. After passing through the town of Mesa, you should begin to look for wild turkeys, deer, and elk. At about odometer 31.3 (thru 31.8) when the first clumps of dense Pinion and Juniper begin to appear, you should watch on both sides of the road, under the trees, for turkeys. The fields way off to the right (west) are winter range for large elk herds, which can usually be seen with binoculars, and deer are everywhere around here.



10. We pass into fairly consistent Gambel's Oak forest at about odometer 33.8. Oakbrush needs "more" moisture than Pinion-Junipers, but less than Aspen. A unique pull-over spot we use for our ecology classes at Colorado Mesa University is at odometer 35.9 (right side of the road, just past the house). This is an "ecotone" where Narrowleaf Cottonwood trees (Populus angustifolia) end, and Aspen (Populus tremuloides) begin. Both species mix here next to the road, and there are an assortment of Dogwood, Choke-Cherry, Hawthorn, and Service Berry shrubs here. Along the Colorado River, you probably saw Bald Eagles sitting in a third kind of Populus tree, the Plains Cottonwood (Populus sargentii). Our Gambel's Oak belt circling the Mesa is dense and holds so many leaves during the winter that hunting in it is very difficult. It



shelters and protects much of the plentiful small and large game western Colorado. Bears especially love the nutritious acorns that the oaks produce.

11. As you proceed up the road toward Powderhorn Ski Area, be watching the tops of the Oak Brush (Quercus gambelii) trees for porcupines. They often move down to spend the winter in burrows at this elevation. But on warm days they will come out to sun themselves, looking much like nests in the tops of the scrub oak. If you see one, and the snow is not too deep, you can walk right under it and get a good look from only a few feet away!



Porcupine in Gambel's Oak

12. At the Powderhorn Ski Area turnoff (odometer37.2), you begin to encounter large stands of mixed Aspen, Spruce, and Fir, leaving the oak brush behind. **This is the end of our travel narrative.**

The Mesa Lakes Resort Area

Pull into the Mesa Lakes Resort parking lot. These are swell folks. They can rent you snowshoes, cross country skis, feed you hot chili or huge cinnamon rolls, and give you advice about cross country trails in the area. This is also the take-off place for the West Bench cross country ski trail.

The West Bench Trail is about six miles long, across rather flat terrain, and ends up at the top of lift #1 at Powderhorn Ski Area. It is a beautiful ski or snowshoe trail, which is out of the wind and very well marked with both blazes and forest service blue tabs. A number of trees along it have obvious bear claw marks on them, and the views are terrific. People also cut off part way down this trail, and telemark ski or snowboard down the “Old Powderhorn” ski area.



The view from Mesa Lakes Resort toward the ridge where Ute Mythology claims the thunderbirds nested. The giant snake *Batiqtuba* lived below this ridge.

Old Powderhorn is an abandoned ski area that formerly had a rope tow up the hill. You passed it on the way to Mesa Lakes Resort. It is now a favorite “inner tubing” (snow sledding) area. Tubing here is fun, but can be dangerous when people run over each other, or hit the trees.

Strap on your snowshoes at Mesa Lakes Resort, to begin your hike clockwise around Sunset Lake. Take our word for it, **if you can walk, you can snowshoe!** Much of our route will be on the roads which serve private cabins in the area. We will only be snowshoeing around Sunset Lake (see map), so it is about impossible to get lost. The total distance is fairly short. This hike only takes about one hour, unless the snow is really deep and the trail has not been packed. Even beginners should have no trouble.





A CMU winter ecology class, on the West Bench cross-country ski trail. Snowshoers should try not to trample X-C ski tracks, if possible.



Take your school class on a snowshoe trip.

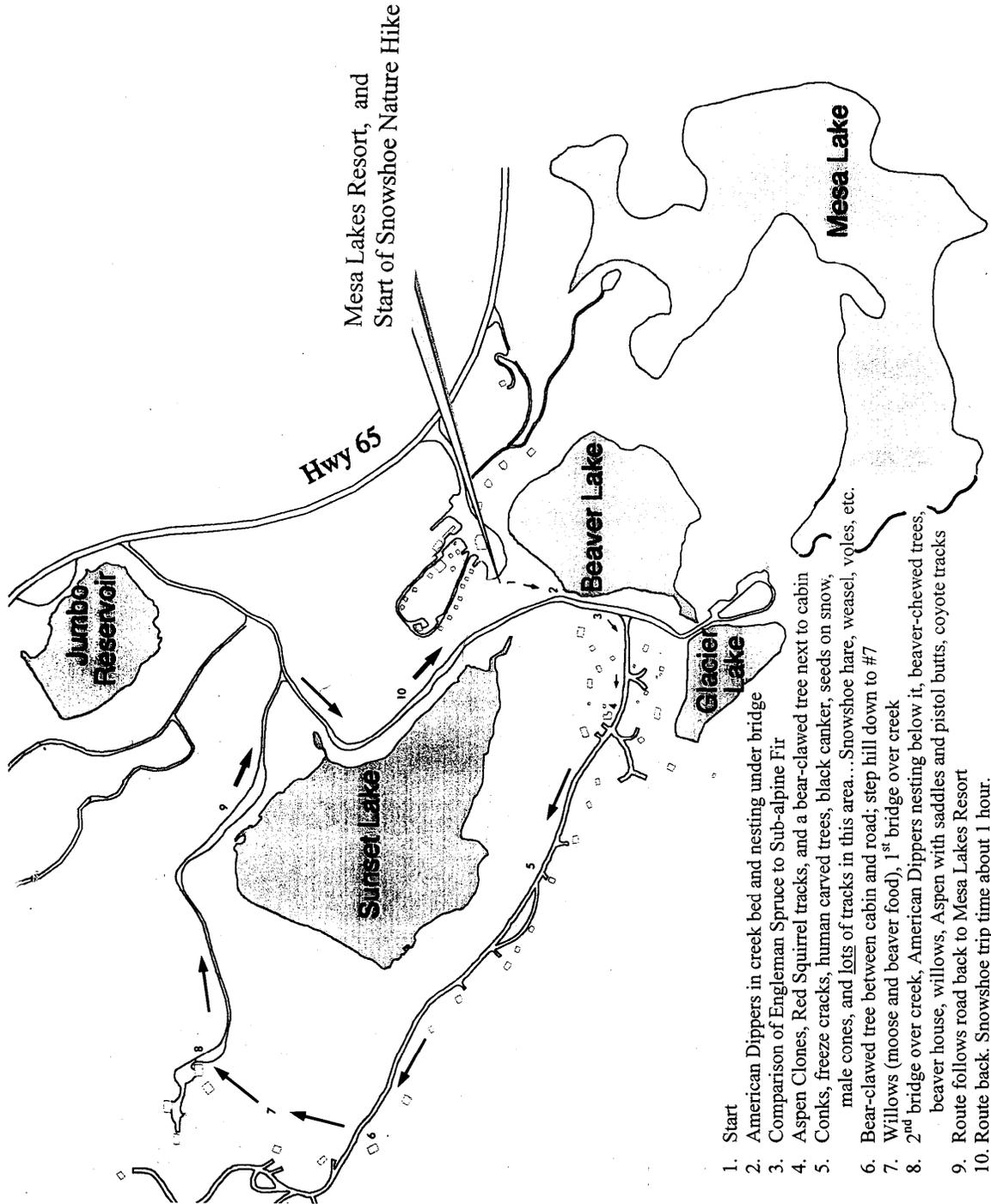


Kids can manage snowshoes!



MAP OF YOUR ROUTE AROUND SUNSET LAKE

(Follow the Numbers)



1. Start
2. American Dippers in creek bed and nesting under bridge
3. Comparison of Engelman Spruce to Sub-alpine Fir
4. Aspen Clones, Red Squirrel tracks, and a bear-clawed tree next to cabin
5. Conks, freeze cracks, human carved trees, black canker, seeds on snow, male cones, and lots of tracks in this area...Snowshoe hare, weasel, voles, etc.
6. Bear-clawed tree between cabin and road; step hill down to #7
7. Willows (moose and beaver food), 1st bridge over creek
8. 2nd bridge over creek, American Dippers nesting below it, beaver-chewed trees, beaver house, willows, Aspen with saddles and pistol butts, coyote tracks
9. Route follows road back to Mesa Lakes Resort
10. Route back. Snowshoe trip time about 1 hour.

Map Location #1 – Check Out the Birds!

The Mesa Lakes lodge area is a great place to birdwatch. You will usually find four or five species of Corvids here, which include some of the most intelligent birds in the world. Gray Jays, Steller's Jays, Clark's Nutcrackers, Common Ravens, and American Crows all hang out near the feeders. Steller's Jays are bright blue with a black crest, and are known for their ability to imitate the scream of a hawk to scare away competition. Clark's Nutcrackers, with white wing bars and tail, black wings, and long beaks, look very different from Gray Jays (which are almost uniformly gray and have short beaks). Both are called "camp robbers" by hunters, because of their propensity to steal things.



The Clark's Nutcrackers will conceal as many as 98,000 seeds in 30,000 places. They will eventually recover and eat more than half of these, as long as ten months later. Not only do they have a terrific spatial memory, but they can penetrate as much as three feet of snow and 1/2 inch of ice to reach these stored seeds! Nutcrackers tend to hide their seeds in open areas, so that those seeds they do not find tend to fill in open spots with new trees. One of the few birds to have a sub-lingual pouch in the mouth, Nutcrackers can carry as many as 50 pinion nuts at one time. Try feeding them some shelled peanuts, and watch this throat pouch fill up like a chipmunk's cheeks!



Clarks Nutcracker



Grey Jay



Stellers Jay



Common Raven



Black-capped Chickadee



Mountain Chickadee (eyestripe)



American Dipper (dives under water)

Ravens “croak” and Crows “caw”. Both are here and look similar from a distance. But ravens are larger, have a heavy bill, a wedge-shaped tail, and are more common. Ravens are especially playful, and have been reported to flop over on a branch, hanging upside down by one leg, while croaking (laughing?), They may do precision-flying, inches apart, performing rolls and loops, and have even been observed “sliding down

snow slopes on their backs” sledding upside down, head first?? That is really cool !! I have seen them fly upside down for short distances along the lift cable at Powderhorn Ski Area.

You can also see both Mountain and Black-capped Chickadees here. Mountain Chickadees are the ones with the white eye-stripe. Chickadees have over twenty different calls, each having a different purpose, ie. flocking, feeding, predator alert. The more dee-dee-dees in the call, the more threatened they are. They have almost as many discrete communication sounds as humans have letters in our alphabet.

There are also Downy, Hairy, and Yellow-bellied Sapsucker Woodpeckers here. The Sapsuckers leave parallel rows of holes in Spruce trees, which then weep sap in the summer. The birds eat the sap, and it also traps insects (sticky). The insects are then picked out by the Sapsucker as it “runs it’s trap-line” of drilled trees all summer. Look for white tail bars on Dark-eyed Juncos and a hint of red on the House Finch’s heads. There are lots of other winter birds to be seen in this area, but these are some of the most common and interesting.



A Yellow-bellied Sapsucker’s trap line of parallel holes

Think “SAFETY” before leaving the resort area

The trails are usually packed and well traveled, so it is nearly impossible to get lost on this nature hike. Even so, it is prudent to check the weather, and go well prepared in case of accidents. Take time to make sure your snowshoes are strapped on

tightly, that you have on warm footgear, and that you are warmly dressed in layers. Leave a note in your car explaining your intended route and estimated time of return, which can be seen by looking through the vehicle window. Let someone in town know when to call for help, if you do not return as planned. Some of this area is a “dead zone” for cell phones, and it is possible to get turned around in a blizzard, even on this simple, short route.

Prepare for the Storm – Your Check List

This is just a quick list of items you should take with you on any back- country trip out in the snow. Some items are for the whole group, and some are personal and should be carried by each participant.

- | | | |
|------------------|----------------|---------------------------------|
| ✓ Warm Boots | ✓ Backpack | ✓ High Calorie Foods |
| ✓ Snow Pants | ✓ Water Bottle | ✓ First Aid Kit |
| ✓ Layered Shirts | ✓ Wind Shell | ✓ Map (at least the first time) |
| ✓ Hat (covers ea | ✓ Sunglasses | ✓ Matches |
| ✓ Gloves | ✓ Sunscreen | ✓ Lighter |

I also recommend that one in the group carry a folding saw to build a big fire, and a survival blanket or bag in case someone gets hurt. **Go prepared for the worst possible weather changes!** Take your cell phone.

Begin Your Hike

Map Location #2

Cross the bridge in front of Beaver Lake, going north from the parking lot. Watch for trout under the bridge, and for the unique American Dipper that often nests beneath it (see photo above).

Dippers (often called Ouzels locally) are the only aquatic American songbird. These tiny grey birds dive headlong into freezing rapids, to walk and “fly” through water as deep as 20 feet. They feed on aquatic bottom-dwelling insects. Briefly.... Dippers sing all year, have twice the feathers of other perching birds, have nose flaps to keep out water, dip (squat) up and down (depth perception??) as often as 40-60 times per minute, are territorial, are unafraid of man, live 7-8 years, lay 4 eggs, and dump a white excrement sac (from their nestlings) off a favorite rock about once an hour in the summer.

Map Location #3

After crossing the bridge and dam at Beaver Lake, you should stop and look at the first evergreen trees you see along the road to your right. It amazes us that so few locals can identify the two major conifer species found on Grand Mesa.

Engleman Spruce grow larger than firs, older ones have rough orange bark, and they have small cones hanging downward from their tops. Needles have edges (square cross sections) if rolled in fingers. The shed seeds (often seen scattered on the top of the snow) are small, and have small wing areas.

Subalpine Firs have smooth grey bark, and have cones that stand ‘upright’. These cones fall apart in late fall, shedding bracts and seeds into the snowpack and leaving tiny, upright “candle-stick” cores on the topmost branches. Look closely at the top of the tree, and you will see them. Needles are flat and soft (not prickly if pulled through the hand).



Rough, orange-barked spruce on the left ... smooth, grey fir on the right



Spruce cones hanging down from top



Fir cones shed, leaving "candlesticks"



Close-up of fir cones after scales and seeds have fallen off the core



(1) An large unopened spruce cone, (2) a Douglas Fir cone (has mouse-tail bracts sticking out) (there is a small “relic” population of Doug Fir along the West Bench trail at the extreme upper edge of their elevation range), and (3) two Sub-alpine Fir cones (before they fall apart leaving upright “candlesticks” the winter)



LEFT – A Spruce cone, a large bract from a shed fir cone, a male cone (produces pollen), and two winged seeds (larger seed is from a Sub-alpine Fir and the smaller seed is from an Engelman Spruce). RIGHT – Three larger fir seeds and two small spruce seeds. All are commonly seen scattered on top of the snow, and some seeds will germinate when it melts in the spring



An insect -caused “gall”



A “Witches Broom” caused by mistletoe

Quaking Aspen are commonly recognized, but most really know little about them. They are very interesting trees. If you take the time to quickly read over the outline of Aspen characteristics we have inserted in the **appendix**, you will be able to amaze your friends with interesting facts about Aspen every time you go to the mountains. Take time to read the appendix.



Rough, dark Aspen bark can indicate average snow depth.



The oxidized powder on the bark of Aspen is a fungicide

for your athlete's foot, jock itch, and also works well as a sunscreen substitute if you forgot yours. It makes you look kind of GHOSTLY, though.

Map Location #4

In front of this first cabin (see map) you can see the "bear-clawed" tree shown below. There are aspen and spruce all around, and usually lots of Red Squirrel tracks here. In deeper snow, squirrels slide "into" and drag hind



legs "out of" each landing, leaving characteristic "H" shapes in the snow. They store pinecones under the snow, and often peel them for the seeds while sitting in the same

spot. This leaves a “kitchen midden” of trash on the top of the snow. By always eating at the same spot, they develop “perfect familiarity” with their feeding area. They memorize each feature while eating, and are thus able to recognize any tiny changes (white weasel predators) sneaking up on them.



Tree with bear claw marks at the bottom



Red Squirrel H-shaped tracks





Red Squirrel tracks in deep vs packed



Red Squirrel's "kitchen-midden"

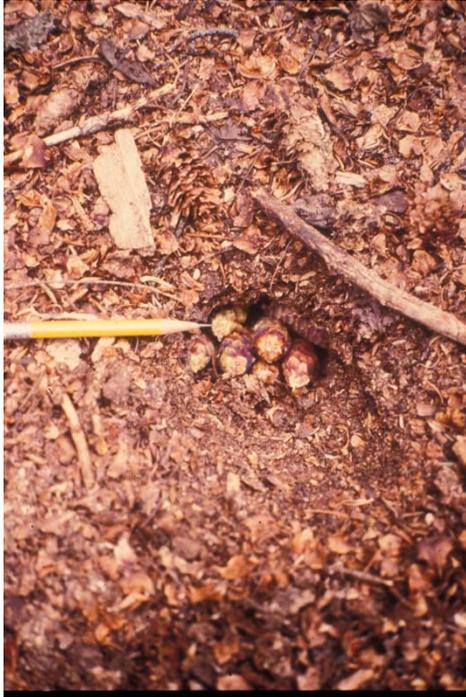


Squirrel (short hops) and fox / coyote tracks



Squirrel H's from foot drag

Red Squirrels show “altruism” by calling out when they see a possible predator in the area, thus drawing the predator’s attention to themselves. This warns all the other critters in the area, but could result in death to the squirrel.



A squirrels pinecone stash



More squirrel tracks



Tracks indicate that a Red Squirrel became dinner for a Great Horned Owl. The old filled-in tracks (crossing – above), are from a Red Fox that passed through the area earlier. Looking for “signs” like these in the snow make every trip worthwhile.



Signs in the snow... of owls eating squirrels (above) and weasels (below)





Great Horned Owls can hear voles, shrews, and weasels under the snow



A pine cone stash



Squirrel track close-up

Also watch for Snowshoe Hare tracks in this area. If the snow is hard-packed, you can sometimes see the enlarged rear footprints that hold this large, heavy rabbit up on top of deep snow. Snowshoe Hares are common prey for Great Horned Owls (since these rabbits are mostly out at night) and Coyotes. Most people misinterpret their tracks. They make a big jump from their rear feet (which are side by side), fly quite a ways, and land on one front foot and then the other (pole-vaulting in line). They then throw their back legs a short distance in front of their front legs (don't try this at home) for the next leap.



Two sets of Snowshoe Hare tracks crossing a set of Coyote tracks



On hard-packed snow (on the right) you can make out the spread hind feet, which give the Snowshoe Hare its name. They turn grey in summer (photo below).

Hares eat exposed grasses and shrubs during the winter, and also chew Aspen bark at the base of young trees. They hang out in sheltered “forms” in dense cover during the day. Forms are recognized by the round droppings left there.



Weasel tracks are here, too. We have Pine Martens, Short-tailed Weasels (Ermine), and Long-tailed Weasels here. The Short and Long-tailed (most common) leave very distinctive tracks. They tend to take a short hop, followed by a longer hop, then short again, and so forth. All four feet land almost next to each other, essentially

looking like a small hole in the snow, and they don't leave skid marks unless the snow is deep. These are savage little critters, killing voles, shrews, pikas (sunning on talus slopes), and occasionally even snowshoe hares on top of the snow. They can also dive down to ground level under the snow to attack mountain pocket gophers (active all winter under the snow) and hibernating deer mice. They kill by biting into the skull at the base of the neck. These weasels turn white in the winter, with black on the nose, ear tips, and tip of the tail.



Short hop – long hop- characteristic of a Weasel's tracks.



A weasel in “summer colors”. They turn white in winter.



A weasel (above right) hops along packing the snow down. Then the powdery snow blows away, and the packed “weasel bumps” appear on the top of the snow. These are unique things to watch for, when snowshoeing and skiing.

Coyote and fox tracks can be told from domestic dogs, because their tracks usually fall in a straight line with the hind feet stepping into the front track. Dogs tend to

walk more straddle-legged (feet more to each side, not in a line). The maximum outside width between tracks is called the “straddle distance” and the pattern of foot placement is the “gait” (ie. walking, loping, running). Dog usually leap, forming h’s, in deeper snow. Coyotes and foxes will seldom be found hunting in deeper snow unless there is a crust under the surface to hold them up.

There are few “deer mice” out in the dead of winter. They hibernate. But you will always see tracks of voles and shrews. Both will make short hops, often leaving tail drag marks. Our smaller species of shrews will just plow a furrow in soft snow, diving down ground-heat-releasing “chimney” openings found around the sides of small trees, for escaping. Deer mice tracks look similar, if they are out. Voles walk more than they hop.



Coyote following shrew or vole tracks.



Shrew or vole tracks showing tail drag marks.

Larger shrews and voles have a straddle width of $\frac{3}{4}$ to $1\frac{1}{4}$ inches, and deer mice (if out and about early or late in the winter season), have a straddle width of $1\frac{1}{2}$ to 2 inches.



Voles (above) have short tails and noses. They are active all winter below the snow, grazing grasses in the “subnivian” zone. Large shrew tracks look much like both mice and voles, but the smaller shrew species just leave a groove in soft snow. Tracks indicate that shrews often dive down chimneys to get to their hunting areas, and voles (which come onto the snow surface occasionally) use chimneys to escape predators. Subnivian describes the about 1” of free space at ground level, where large hoar frost crystals formed from natural ground heat can hold up the snow pack. Have you ever felt the snow “settle with a whump” when the subnivean collapses under your skis? Voles and shrews are major food sources for fox, owls and coyotes.



A shrew scurried over the snow, here, and escaped down a chimney



Shrew, mouse, and vole tracks can look very similar. Most are probably shrews. Mountain pocket gophers are also active all winter under the snow. They mine roots for food, and dump their mine “tailings” into snow caves dug on the surface of the ground. This leaves solid tubes of dirt on the surface after the snow melts in the spring. Pocket gophers churn the soil and increase it’s fertility, along with providing food for predators.



Mountain Pocket Gopher tailings



Dog tracks – dogs usually are bounding

The distance between tracks is used to separate the coyotes (14-15 inches apart) from fox (10-11 inches). These animals have an assortment of “gaits”, including walking, loping, running and bounding. You might enjoy purchasing an animal “tracks” book for your cross country skiing and snowshoeing excursions.

Porcupine tracks are common, and bow inward, as if their legs are still wrapped around trees. They also leave an obvious “belly drag” groove in the snow.

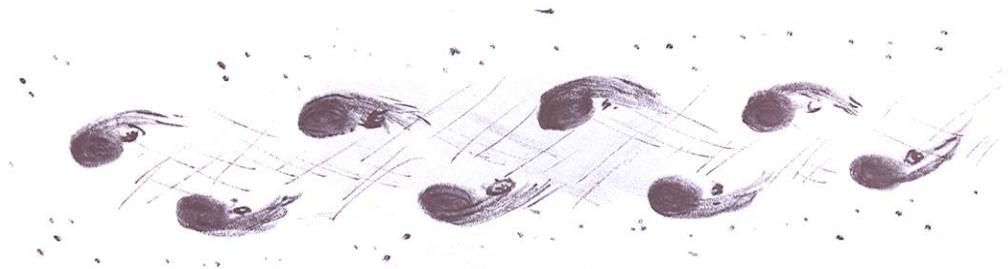


Domestic Dog



Porcupine tracks tow inward

Beaver will be out on the snow in the winter if their pond has not frozen shut. They will leave a tail drag and belly drag, going to and from water. It is fun to look at the width of the tooth grooves on a stump, to verify that the whole family has helped chew down the tree. We asked a group of teachers if there really were five foot tall “monster” beavers on Grand Mesa, since many stumps are cut off that high above the ground on the Grand Mesa. But, of course, these trees were cut in the winter, when beaver were standing on top of five feet of snow.



Porcupine tracks turn in, and there are brush-like body drag marks



View from Map Location #8

Note that you had to cross on the trail that goes over the dam on Sunset Lake now. The old bridges over the creeks have been removed.

You can tell if a beaver-house (center) has residents inside. Active houses will have the snow melted off the top, by their rising body heat. A normal house will hold a pair of adults and their three or four young of the year.

Beaver stab sticks with bark (cambium) into the mud bottom before a pond freezes for the winter. Then all winter they will swim out under the ice, gather a few sticks, and clean off the cambium layer (food) at their leisure in the den. They throw the skinned sticks out when finished, and you can see these on the pond. They often do not use all the food they stored in the mud for the winter, effectively “planting” the willow and aspen cuttings they don’t eat. Like gardening, this helps assure them a future food supply.



A pretty "tall" beaver chewed off these trees! Actually it was standing on snow.



Beaver tail drag marks, leading to aspen forage. Elk and deer will eat aspen bark, scraping upward with their lower front teeth. They have no upper incisors. Moose, released on Grand Mesa in 2005, can lean into and push over a four inch diameter aspen tree to eat the leaves. They are the "elephants" of our forest, and could

possibly be encountered on your snowshoe trip. They do well in really deep snow, post-holing with their long legs and surviving on spruce trees and willows for forage. Moose love pond weeds (Elodea) and even oak in the summer. We like to think that moose may be so mellow most of the time, because they are usually on drugs (willows contain lots of aspirin). A healthy moose has few natural enemies and does not scare easily. It possible, but unlikely, that you will see moose tracks. Deer and elk go down in winter to where the snow is usually less than knee height, so you won't see signs of them except where they grazed or rubbed antlers (elk) on aspen trees.



Native Americans cleaned their teeth with broken off and frayed willow twigs (above). An infusion of bark may cure your headache. Beaver eat willow bark.

Aspen provide excellent forage for lots of critters. A ten inch tree provides 220 pounds of cambium and leaves. Beaver, for example, eat 2-4 lbs. per day. The leaves are very nutritious, and contain about 17% protein and 17% fat. Elk and cattle are heavy users of young aspen, as well as over 55 species of other mammals. Aspen provide cover and feed for over 60 species of birds, and their decaying leaves add essential nutrients for soil building. Clones can interconnect over 100 acres underground and they can sucker and re-generate rapidly after fires. The 24 inch diameter individual stems (trees) average 80-90 years old, but the clone (DNA) may persist for thousands of years (some say millions of years)! Most people do not know that aspen do photosynthesis

through their bark. About 1-2% of a tree's energy comes this way, even in winter. They are self-pruning, contain aspirin in the bark, and unlike other trees, they produce new leaves all growing season. Rough lower bark often indicates depth of the average snowpack.



Young bear-claw marks, at #6 on map



A bear tree on the West Bench Trail



Pine Martins are larger weasels (fur is called sable) that especially prey on squirrels and snowshoe hares. Their tracks look just like ermines (short hop – long hop) but are much longer. They do not turn white in winter.



Bear claws, elk antler rubs, snow depth, and the fungal attack of Black Canker





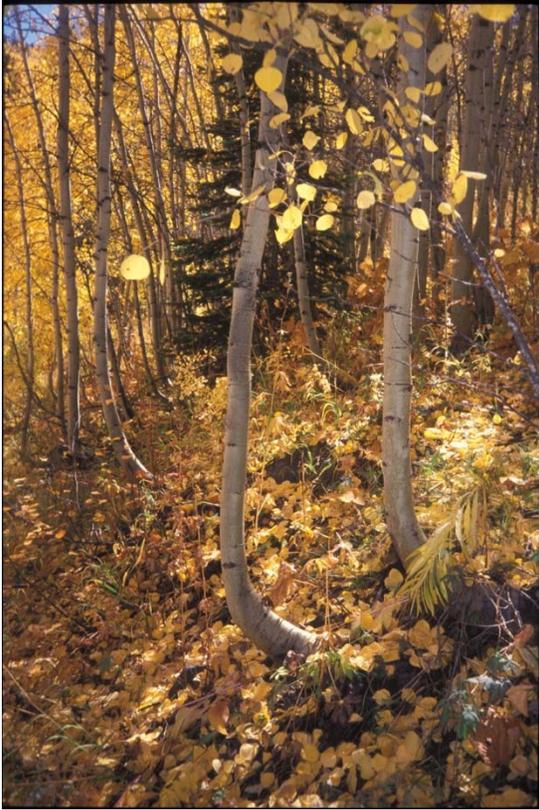
Conk fungi indicate rotten inner wood (above). "Saddles" form when a newly fallen tree bends a young aspen sprout over. The young tree grows around the branch that has fallen on it, and then upward toward the sun. Eventually the fallen tree branch rots away, leaving a bent saddle shape behind.



Chimney



Pistol butt



“Pistol butts” mean the ground is slumping

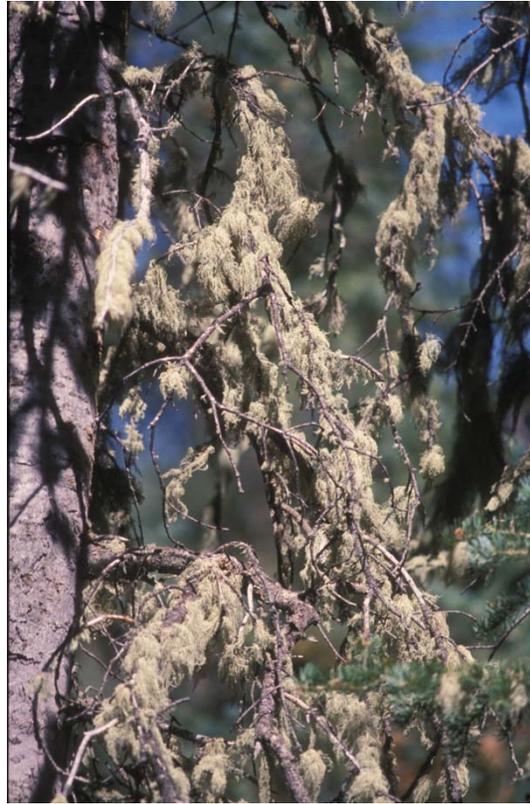
Snow load can pull a tree down



Vole and larger species of shrew tracks are very similar. Both can leave tail drag marks and have a variety of gaits. Only careful measurements and experience can tell them apart. Most are probably shrews, or if early or late in the winter season, mice.



Carving aspen introduces fungal infections



Fructose lichens can fix nitrogen



Rose hips prevent scurvy with Vitamin C



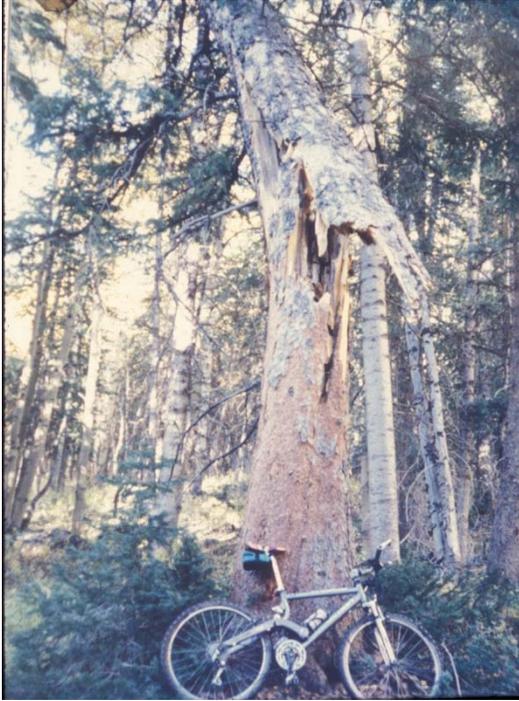
Snow Pillows



“Galls” are caused by insect attacks (above). “Freeze cracks” don’t go all the way to the top of a tree, like a lightning strike would. Both aspen and conifer trees dehydrate during winter to survive cell ice-crystal damage. When the wind rocks them, they get freeze crack spiral splits part way up the middle of their trunks.



Sometimes aspen seem to be “looking at you” with their self-pruning scars that look like eyes. Self-pruning of lower branches serves to safely remove branches which might overload with heavy snow in winter and split the trunk.



Harmonic wind-throw breaks trees in thirds (upper left).

Large hoar frost crystals can form at the surface or at the ground / snow interface, and cause weak layers within the snow pack between storms. These large crystals, also formed from freezing and thawing of old exposed surface snow (and humidity on above ground stems) contribute to avalanches.



Kick snow over yellow snow, please, to make the trails look nicer. Cover dog droppings, too. This photo is of coyote scat. It is composed of fur and bones, not dog food (which crumbles when stepped on).

If you are caught out overnight...



Pick a spot with lots of leaning firewood and use red needles/twigs to start a fire.

Test Your Knowledge – What is happening in the next photo??



There is really no end to the information that we could add to this nature hike, but this is a good start. We have more photos in a free slide show that we do at Colorado Mesa University, and we plan to keep adding to the ones we have used here. Needless to say, we could not end this show without indicating how much fun we have doing these hikes with our students. Depending upon availability, we will take your group out too, at no charge. Several other organizations, including Mesa Lakes Resort staff and the Colorado Division of Wildlife will take you on a guided hike of this type, also. Just ask!



Picnics, snowball fights, and general rowdiness become part of the fun!





Studying snow-pack water chemistry, with Colorado Mesa University students

We plan to update and add to this publication at regular intervals, and are open to any suggestions or additions that you might have. You may download a copy of this for your own use, for free. All of the writing and photography has been done without charge. This is our gift to the community, and we hope you like it ... and use it when friends visit you from out of town. We really and truly just want you to enjoy being out in nature, in the winter, on Grand Mesa.

Go CMU !

APPENDIX 1

ASPEN ECOLOGY (Populus tremuloides)

Summarized by Dr. Bauerle, Biology

Ref. Aspen: Ecology and Management in Western U.S., by De Byle and Winokur, eds. General Technical Report RM-119, U.S.D.A. Govt. Printing Office

Uses:

1. Forage and cover for wild and domestic livestock
Food value: Aspen leaves are 17% protein and 17% fat (rest is sugars, carbohydrates, fiber, etc.). A ten inch diameter tree produces 220 lbs. of cambium and leaves (beaver eat 2 to 4 lbs. per day). Aspen have fifteen times the forage value of a coniferous forest. Elk and cattle are heavy users. Moose can push over 4 inch trees to get at the leaves, and browse to eight feet high. Rabbits, rodents (inc. deer mice, chipmunks, squirrels, beaver and porcupine), grouse, and 55 other species of wild mammals use aspen for food and cover. Over 60 species of birds use the cover and feed in the local area. Lots of cone-flower in understory indicates heavy grazing.
2. Wood fiber
Wood quality is poor. It shrinks and swells, and is poor for use building houses. Tree trunks actually shrink in diameter during droughts Used in fiber board. Logging vehicles can easily damage shallow roots.
3. Firebreaks for more flammable conifers
Aspen soils are wetter, leaves have little canopy to burn, and aspen forests hold 12% more snow than conifer forests...so fires tend to stop when they reach aspen groves. Most fires in aspen are caused by humans, as compared to conifers where 57% are caused by lightening. Aspen are easily damaged by fire, though, and the result is often "heart rot". Rapid re-generation after fire or logging.
4. Aesthetically pleasing.
Leaf stems (petioles) are flat and often have a ¼ twist, so breezes cause flickers of light and "trembling" sound. Beautiful leaves in the fall.
5. High quality water seeps.
Aspen need about 16 inches of water per year. Any springs and watersheds through aspen areas are filtered by grasses and forbs in the understory, resulting in high quality water runoff.

General Characteristics:

1. Clones
Clones can interconnect 100 acres or more underground. When succession by conifers invades a clone, it does not necessarily die out. It is just relegated to the understory, and continues to survive as forbs or shrubs until a fire, avalanche, disease or whatever wipes out the conifer population. Then the clone re-appears as a full sized aspen grove. Most 18 inch trees are about 60 feet tall. The 24inch diameter trees average about 80-90 years old, and the very oldest individual stems get to be 226 years old. The clone (genotype) itself, however, may persist for thousands of years (some speculate even be a million years old).

The oldest tree (original stem or ramet) is usually located near the center of the clone. As the oldest ramets age and die, a fairly circle "open glade" can form at the center of an expanding clone. Later, young suckering ramets may move back, into the glade, instead of just spreading outward from the center.

There can be 60 different clones in one stand, on a hillside. They will vary in disease resistance, regeneration ability, pigment color, leaf fall, leaf shape, genetics, bark, and budding time.

2. Stand Structure:

Usually stands are fairly even-aged. Lateral roots spread out and sucker up into new stems quickly. Most roots are only about 4 inches deep, and are easily damaged by vehicles and compaction (trampling by humans in campgrounds). There are "sinker" roots that grow down occasionally, as well as "sucker" roots that spread upward. When the adult tree is cut, topped, or burned, the lack of the hormone auxin stimulates rapid suckering. Trees usually grow one or two feet per year, but can grow over four feet per year. There is usually a single canopy layer, which is light saturated at 3,500 foot candles. Aspen will continually produce new leaves all during the growing season! Before clearing large areas for pulpwood, the suckering ability of clones should be tested (it varies). In the spring, before the top of the tree makes auxin, warm ground temperatures stimulate sucker growth, resulting in forage for animals.

Aspen are intolerant of shade, so spruce and fir will take over eventually, in many cases. Mixed stands with lodgepole pine are not uncommon, though after fires. Aspen self-prune with the weight of snow, so live branches make up only 10% to 15% of the total biomass. Sexes are separate (although 5% have both). They flower in ten years, and have peak seed production after 50 years (in 3 -5 year cycles). Conifers can invade and dominate (this can take anywhere from 50 to 1,000 years), but in seral stages aspen usually dominate the canopy for 50-150 years. Aspen reduce winds by about 80%.

3. Specific Attributes:

- a. Photosynthesis through bark. Chlorophyll in bark can supply 1% to 2% of a tree's energy, allowing for some competition with evergreens.
- b. Photosynthesis anytime above 27 degrees F.
- c. Self thinning and self pruning.
- d. Will break dormancy in the spring after accumulating 300 hours of temperature above 43 degrees F (300 chill units).
- e. Aspen bark is fungitoxic, and could work on some human infections. White bark keeps it from heating up too much on a sunny day in the dead of winter.
- f. Aspen bark oxidizes into a white powder, which can be used as emergency sunscreen.

Diseases and Deformities:

1. Some Common Diseases

- a. Sunscald – black southern side bark
- b. Generalized Infection – yellow to orange bark, weeping wounds, often caused by Cytospora fungus.
- c. Leaf blackspot – fungus that causes pre-mature leaf drop during wet fall weather.
- d. Black canker – fungal infection that looks like stem exploded!
- e. Heart Rot – center rotted out, often indicated by bracket-type fungi on the outside called Conks 82% of the time.
- f. Fungi – over 250 species of fungus affect aspen. They can girdle and kill a tree.

2. Some Deformities

- a. Pistol butt – curve at base caused by soil movement - “creep”.
- b. Saddles – caused by another tree falling across a very young aspen. It later rots away, leaving a u-shaped curve in the trunk (a saddle).
- c. Snow Bend – tops are bent over by weight of winter snow (also indicates avalanche).
- d. Blow Down – breaks trunk off about 1/3 of the way up a tree (harmonics of a vibrating string). This is mostly found in conifers, in areas where wind gusts become pulsed. Aspen usually just blow over (Wind Throw) tipping up a root disc, since they are so shallow rooted. Storm Sway can break root hairs and slow growth.
- e. Animal Scars – bears, especially, leave permanent records of having climbed an aspen. These interesting scratches are quite common if one knows what to look for.
- f. Elk Rubs – scars where elk remove velvet before the rut. Deer shake their heads in shrubs to remove velvet, but both deer and elk will also pull down long vertical strips of cambium from aspen.
- g. Rough Basal Bark – indicates snow depth, sheep browse, and can result from mice, voles, rabbits, etc. chewing on bark at, or below, the snow.
- h. Weird Leaf Stuff – over 33 species of invertebrates attack aspen, including borers, tent caterpillars, leaf miners, leafhoppers, aphids, leaf rollers, and gall formers.
- i. Stupid Human Acts – idiots who carve initials in aspen. This often introduces fungal infections, and definitely imposes upon other people who would like to enjoy nature in it’s natural state.