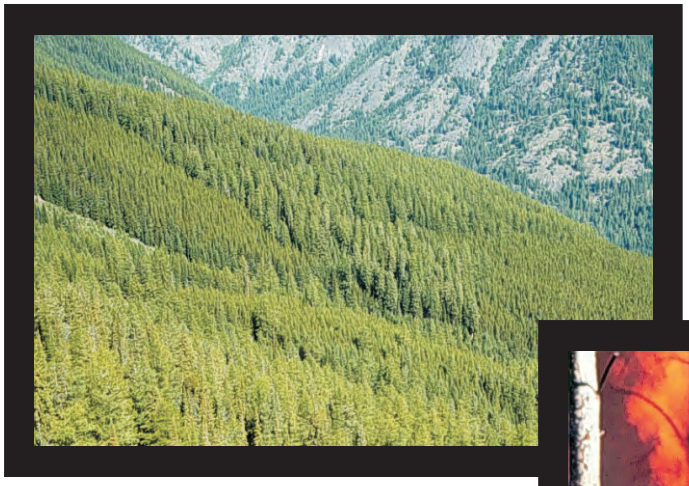
Roaring Tree-top Fires:

Feltboard Kit for Lodgepole Pine/Subalpine Fir Forest

by Nancy E. McMurray and Jane Kapler Smith



FireWorks

Lodgepole pine/subalpine fir forest
Flannelboard display

Fire patterns...what's natural?
Introduction for the teacher

[This page is at the beginning of all feltboard binders.]

Have you seen pictures of forest fires on the news or in magazines? What did these fires look like? Fires that make the news are usually spectacular. They are huge, roaring, scary-looking fires... tall flames blazing up through the trees... fires gobbling up everything in their path... mushroom-shaped columns of smoke looming high above the mountain tops... animals running for their lives. Some forest fires are like this, but not all of them. Fires burning in open pine forests can be just the opposite. These are creepy, crawly fires. They move through the forest like a spider through the grass, creeping slowly along the surface of the ground, quietly burning up flowers and bushes. Occasionally the flames may run up the side of a tree, blackening the bark, but only rarely do they push into the tree tops.

In the forests of the northern Rocky Mountains and in the prairies of the Missouri River drainage, fire is bound to come visiting sooner or later. Over thousands of years, these ecosystems burned again and again. The pattern of fire, however, was different for each ecosystem. Two important things shaped the natural fire pattern: the waiting time between fires, and how the fire behaved. Grasslands and forests growing in hot, dry places near valley bottoms had only a short wait between fires. Cool, wet forests high in the mountains waited a long time between fires. Each kind of ecosystem developed its own way of living with its special pattern of fire. Plants and animals living in these habitats likewise came to depend on these fire patterns for their well-being.

FireWorks has several feltboard stories that describe fire in different ecosystems.

- *Creepy, Crawly Fires* tells the story of past fires in ponderosa pine/Douglas-fir forests.
- *Roaring Treetop Fires* shows the history of fire in lodgepole pine/subalpine fir forests.
- *Rollercoaster Fires* describes how fire was a part of some of the highest forests in the northern Rocky Mountains and Intermountain area, whitebark pine/subalpine fir forests.
- *Dancing Fires in Missouri River Country* describes the diverse habitats and fire relationships of the Missouri River drainage, from the spine of the Rockies to the tallgrass prairies of the central states.

Roaring, treetop fires

Fire pattern in lodgepole pine/subalpine fir forests of the Northern Rockies and Intermountain regions

by Jane Kapler Smith and Nancy McMurray

This feltboard story describes the fire ecology of lodgepole pine forests of the Northern Rockies and Intermountain regions. The focus area extends from the northern Rocky Mountains to the Northern Cascades and includes the "intermountain" region between these two mountain ranges. The story can be told in a single session or divided into chapters. Breaking it up may keep students more fully engaged and offer them time to absorb the complexity and/or investigate the ecology before moving on.

Narrative format: ***Items in blue ink and bold italics*** identify the first mention of each species incorporated in the story. Most of these species are described in greater detail in the *FireWorks Notebook.* Items in ***black ink and bold italics*** identify the first mention of a feltboard piece that needs to be added to the story. Directions to add or remove items from the feltboard are in ***red in the right-hand column***.

Felt pieces: Pieces of the feltboard are located after the narrative. They are assembled in order of their appearance in the story. Most pieces are grouped—all the trees at the beginning, then understory plants, animals, etc. These "piece pages" have 2 parts. Part one is a colored scan of a "piece page" identifying each piece and providing a count of duplicate pieces. Part 2 is the actual felt pieces arranged on a blue felt background. These companion pages should match up. Keep the scanned pages in the notebook while telling the story and they will provide a template for putting the pile of felt pieces back in the right order after the story is told. In book fashion, the left-hand side is the guide for the actual pieces on the right-hand side. All pages are also numbered.

SETUP: Put up the blue lodgepole pine felt background. All materials on the background (sun, hillside, creek) are glued in place. If necessary, use pins to attach additional pieces as you tell and illustrate the story.

HINTS:

- The narrative refers repeatedly to "buried treasures" to describe surface and underground plant parts that can generate new growth or new plants. Buried treasures are shown on the feltboard with pink strips or circles. Students will get the most out of the story if they understand this concept. Buried treasures include rhizomes, corms, caudices, bulbs, tubers, seed (if buried or otherwise protected on the ground), roots (if they can generate new plants), and root crowns. After fires are shown on the feltboard, you may be instructed to remove green vegetation and even to replace it with gray or black, but *always leave the pink buried treasures in place.*
- After you remove things from the background, keep track of them; you'll need almost all of those pieces later in the story.
- If felt pieces won't stay in place on background, attach them with a pin. (These can be found in the *FireWorks* Hardware Box.)

CHAPTER 1. Community members

INTRODUCTION Lodgepole pine forests usually grow higher in the mountains than ponderosa pine forests. Cool days and frosty nights are common even in mid summer. These forests look very different from the hot, open ponderosa pine forests near the valley bottoms. Lodgepole pine forests are cool and shady. Forest fires can be quite spectacular here. They often roar through the treetops like a freight train. Let's take a closer look!	
TREE SPECIES IN THIS FOREST At first glance, a ***lodgepole pine*** forest seems boring. All the trees look pretty much alike. And actually, they are! Most of the trees are the same kind of tree: lodgepole pine. Most of them are about the same size, too. Identical tree trunks seem to go on forever in all directions. Since the lodgepoles grow so close together, our forest feels crowded. How many tree trunks can you touch if you stand in the same spot? More than one, I bet! The trunks are small enough to wrap your arms all the way around. And there aren't many branches near the ground to poke you. When you're standing in this forest, it's easy to forget these trees have live branches. Look up, way up!! The tree crowns form a thick green ceiling high above the ground. Talk about crowded! Up in the air, the trees are all connected to one another. The branches of one tree are woven into the branches of its neighbors. What else is alike about these trees? They are all about the same age, around 80 years old. That's getting old for lodgepole pines. In fact, several have already died and fallen to the ground.	***Put up 15 lodgepole pine trees, spaced close together across the mountain side. Have crowns just touching earch other. There is an extra tree that's in 2 pieces; the trunk is marked with a silver line at the base. Put it together now, and you'll take it apart later.*** ***Put up 2 fallen tree trunks in the foreground.***

Here and there you'll find a few shorter ***subalpine fir*** and ***Engelmann spruce*** trees. They have been growing in the shade of the lodgepole pines. They are nearly the same age as the lodgepoles but grow much more slowly. Their branches reach all the way to the ground. They make small patches of green in this sea of dark brown tree trunks. Near the creek, lots of ***rotting logs*** litter the ground. Pines live near the creek, and so do some really big fir and spruces.	***Put up 2 short subalpine firs, 1 medium subalpine fir, and 2 short Engelmann spruces, spread among the lodgepoles.*** ***Near creek put up 1 big subalpine fir, 1 big spruce, and 1 short rotten log.***
PLANT SPECIES GROWING ON THE FOREST FLOOR Not many plants grow well in this forest. Little sunlight reaches the ground through the thick lodgepole crowns. ***Beargrass*** plants form little tufts on the forest floor. ***Blue huckleberry*** bushes grow here but don't produce many berries because it's too shady. A few ***lupine***, ***glacier lily***, and ***fireweed*** plants grow here too. We call them "wildflowers," but they don't produce many flowers in this shady forest.	***Put up 8 beargrass plants and their pink Buried Treasures circles.*** ***Put up 3 huckleberry bushes so their berries don't show.*** ***Put up 1 each of lupine, glacier lily, and fireweed; mark its Buried Treasure with a pink circle.***

Each plant needs a pink circle to mark where its secret buried treasure lies.	
ANIMAL SPECIES THAT CALL THIS FOREST HOME Old lodgepole pine forests like this one are home to very few animals. There just isn't that much to eat here. Animals sometimes travel through on their way to more inviting areas. Moving around in these forests is often difficult because of all the dead trees lying on the ground. As you can imagine, it's also hard to move quietly in such a messy forest. For some animals this is a good deal. ***Elk*** use dense lodgepole pine forests as hiding spots during hunting season. They can hear the hunters coming from a long way off! Some animals are attracted to the moist creek bottom in the lodgepole forest. ***Martens*** hide in the branches of the big trees and make their dens in the large, decaying logs. ***Red-backed voles*** eat mushrooms that grow here and use the fallen trees as vole highways!!	***Put up elk hiding behind a tree.*** ***Put up marten on rotten log and red-backed vole next to log.***
INSECT HABITAT Although few large animals seem interested in this forest, insects are a different story. ***Mountain pine beetles*** love to hang out in old lodgepole pine forests. These trees are a perfect age and size for raising mountain pine beetles. When adult beetles try to tunnel through the bark of young pines to eat their cambium, the pines make lots of pitch. The beetles drown in the pitch before they can do much damage. Older trees like these, growing in a crowded forest, are no longer strong enough to make lots of pitch. Female beetles bore through	***Put up mountain pine beetle on the lodgepole pine with the silver mark at the trunk base.***

their bark and lay thousands of eggs. Once the eggs hatch, these trees have plenty of cambium--yummy food for larvae. For a mountain pine beetle, there's no better place on earth! But thousands of hungry beetle larvae can quickly kill a lodgepole pine. Its green needles turn a rusty red color and soon fall off.

Eventually the standing dead tree, called a "snag," falls to the ground, adding to the tangled mess of logs already on the forest floor. Maybe the red-backed vole will use it as a "covered bridge" to other parts of the forest.

Take green crown off the lodgepole with the silver mark; leave the trunk standing.

Lay trunk on the forest floor.

Move beetle to another tree.

CHAPTER 2. Fire in the Forest

FIRE WEATHER

As summer days grow hot and dry, even this shady forest begins to dry out. On hot afternoons, huge ***thunderclouds*** build up over the mountains.

A storm rolls over our forest, bringing lots of lightning but little rain. A ***bolt of lightning*** strikes one of the taller lodgepole pines.

Put up thunderhead, partially hiding the sun.

Put up lightning bolt stretching from thunderhead to a lodgepole pine.

Put up small flame fronts along the ground. Remove lightning.

A SMALL FIRE IN OUR FOREST

The lightning starts a surface fire. Not too impressive, is it? The flames barely flicker. The animals move off to a safe distance. The forest floor is still moist in this shady forest. For several days the fire creeps around, spreading slowly here and there beneath the trees and leaving fire scars on them. Eventually it just goes out.

Put up small flames at base of lightning struck tree.

A BIG FIRE IN OUR FOREST

Once in awhile a fire in a lodgepole pine forest can get really big, really fast. Such spectacular fires usually happen when a summer is especially hot and dry. Fuels are drier than usual and strong, hot winds sometimes blow for days, even weeks.

A strong wind can make all the difference in how a fire behaves, changing a small surface fire into a roaring treetop fire in a very short time. Think about flying a kite. Wind can lift a kite from the ground up into the air. If the wind blows constantly, the kite will stay up. A strong wind does the same thing to a surface fire, lifting it from the ground up into the treetops.

Pushed by a steady wind, it roars through the needles and branches. Flames are everywhere-- on the ground and in the air. This fire burns everything in its path. It can even burn through creek bottoms and moist areas. It keeps going until a change in wind, weather, or terrain stops it.

Put up wind in left-hand side of sky with face pointing toward tree crowns.

Put up tall flames reaching from the small surface fire up into treetops)

Put up crown fire stretching across all the lodgepole pine crowns.

RIGHT AFTER THE CROWN FIRE

A roaring treetop fire definitely changes the appearance of a lodgepole pine forest! The trees are killed, except in a few sheltered places. This forest of snags looks bleak, but don't forget that many of these dead lodgepole pines still hold cones with living seed. The seed rains down on the ground for weeks after the fire.

It looks like everything is dead on the forest floor, too. Blackened stubble is all that remains of the beargrass plants. Only ash remains from the glacier lily, fireweed, and lupine plants. The only thing left of the huckleberry bushes is a stick skeleton.

The forest of burned snags is great habitat for black-backed woodpeckers. They feed on the larvae of beetles that live under the bark of recently killed trees.

Take down flames and trees, even the little ones, that are not in the creek bed. Take down cloud, lightning, and wind.

Put up 10 burned lodgepole pine snags with crown branches remaining; put up 5 snags without crown branches.

Take down beargrass plants and replace with black stubble. Remember…pink circles mark the location of Buried Treasures. They stay put after the fire.

Take down glacier lily, fireweed and lupine that have burned and replace with gray ash rectangles.

Take down huckleberry bushes and replace with blackened skeleton.

Put up black-backed woodpecker on burned snag.

THE NEXT GROWING SEASON

By the following spring, many plants begin appearing on the forest floor. Where did they come from? That secret underground treasure, the plant's growing points! If the fire didn't roast their underground parts, most of these plants come bounce right back after a fire. They like the bright sunlight in this forest of snags, and they like the moisture and nutrients that are available now that the trees have died.

Within a couple of years, the ground is covered with beautiful wildflowers. These plants have multiplied since the fire-- spreading out from their underground growing points. Many new plants are starting from seed, too. Grazing animals love this meadow of wildflowers and bushes. They eat the young plants. In winter, they feed on the branches of the shrubs.

Replace 1 gray rectangle with a flowering fireweed, 1 with a flowering lupine, and 1 with a flowering glacier lily.

Replace each huckleberry skeleton with a huckleberry bush with berries hidden. Replace blackened stubble with beargrass plants.

Put up 3 more fireweed plants, 3 more glacier lilies, and 2 more lupine

Put elk among wildflowers.

CHANGE OVER TIME

As the years go by, the wildflowers become less obvious and the huckleberry bushes grow larger. Twenty to thirty years after the fire, all you see is a huckleberry brush field. These bushes are loaded with berries.

A grizzly bear would love to find this spot!

Don't forget those thousands of lodgepole pine seedlings growing among the other plants! They started growing from seed the year after the fire. So did a few subalpine fir and spruce seedlings. Now they're pushing up between the huckleberry bushes. No wonder all the lodgepoles in the first forest looked the same. They all started together after a fire! This new forest is beginning the same way, repeating the story of fire and lodgepole pine.

THE END

Take down all wildflowers except 1 plant of fireweed, lupine, and glacier lily. Turn huckleberry bushes over so berries show.

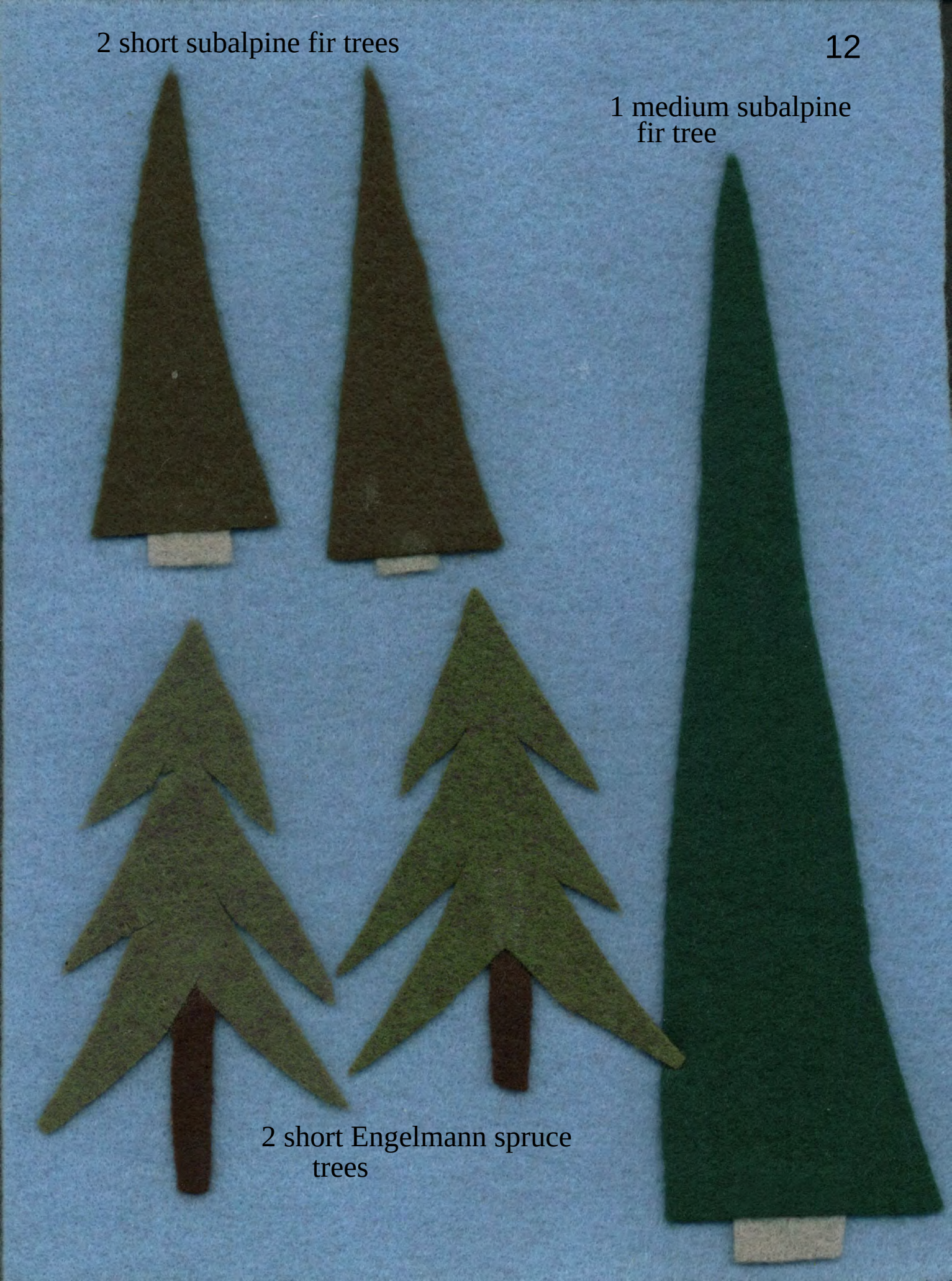
Put up grizzly bear.

Put up 6 lodgepole pine saplings between huckleberry bushes. Put up 1 subalpine fir and 1 Engelmann spruce sapling.

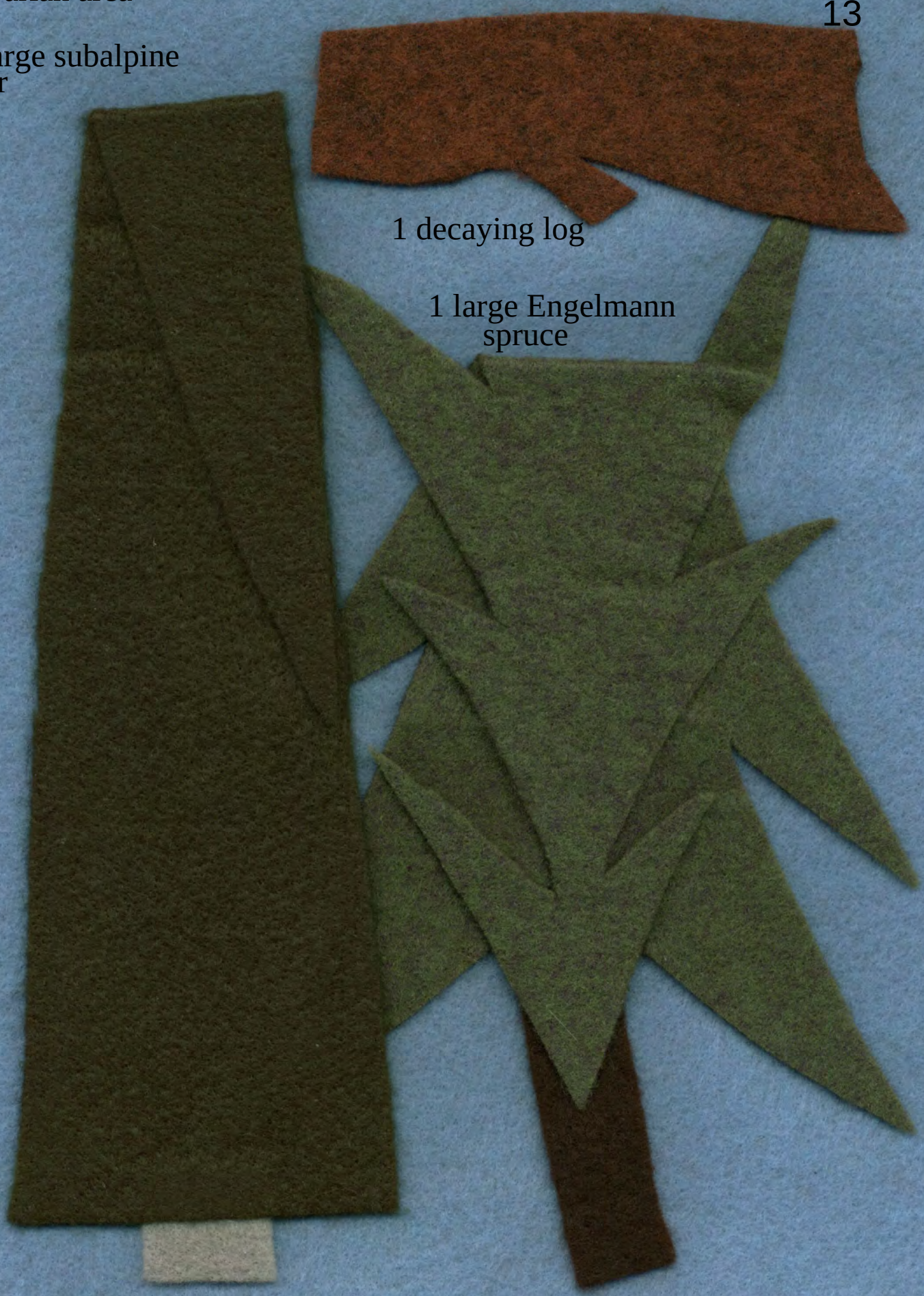
15 lodgepole pines (place in 2 document protectors)

2 brown lodgepole snags
(each 14 inches long)

1 lodgepole pine tree in 2 pieces
(crown + trunk with
silver mark at base)


2 short subalpine fir trees
1 medium subalpine fir tree
2 short Engelmann spruce trees

Riparian area



8 beargrass plants with their pink
Buried Treasures circles

5 blue huckleberry bushes
with their pink
Buried Treasures circles

4 fireweed plants with their pink Buried Treasures circles
3 lupine plants with their pink Buried Treasures circles
4 glacier lily plants with their pink Buried Treasures circles

1 mountain pine beetle

1 elk

1 American marten

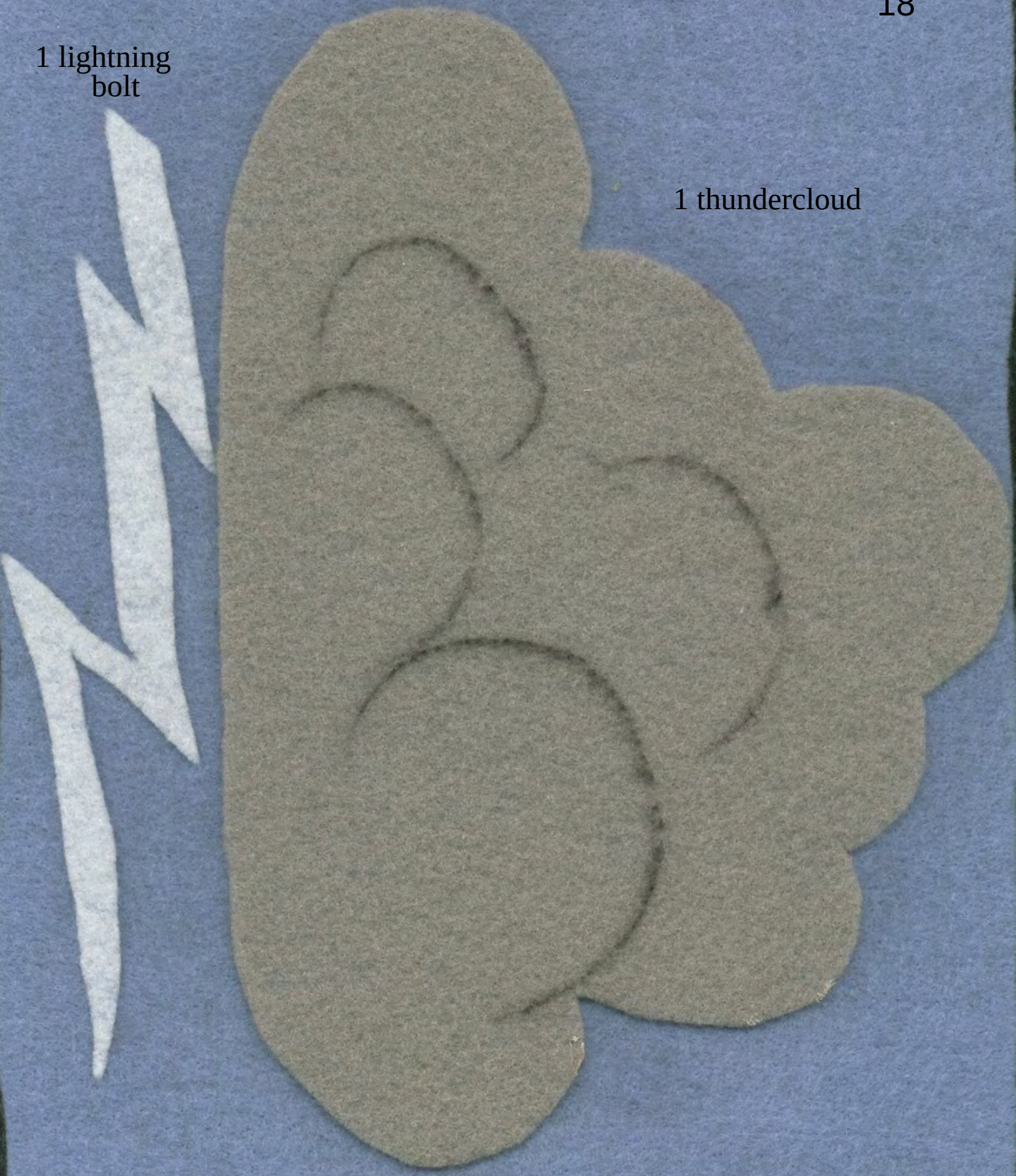
1 grizzly bear

1 black-backed woodpecker

1 northern red-backed vole

1 lightning bolt

1 thundercloud



1ladder fuels fire
1 small surface fire

1 wind

1 very large crown fire

10 burned lodgepole pine snags

5 burned lodgepole pine snags without branches

3 blue huckleberry skeletons
8 burned stubble clumps
of beargrass plants
3 ash pockets
from burned wildflowers
(lupine, fireweed, glacier lily)

6 lodgepole pine saplings