

Creepy Crawly Fires:

Feltboard Kit for Ponderosa Pine/Douglas-fir Forest

by Nancy E. McMurray and Jane Kapler Smith



FireWorks



Ponderosa pine/Douglas-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.

Creepy, Crawly Fires

Fire pattern in Ponderosa pine/Douglas-fir forests of the Northern Rockies and Intermountain regions

by Jane Kapler Smith and Nancy McMurray

This feltboard story describes the fire ecology of ponderosa 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 ponderosa 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

A ponderosa pine forest is a wonderful example of a forest with a creepy, crawly fire pattern. This forest is the first one you come to when you travel from the river valleys up into the mountains. Ponderosa pine forests are very common on dry, south-facing slopes. What do these forests look like?

TREE SPECIES IN THIS FOREST

An open, sunny ponderosa pine forest is a great place for a hike in early summer. Let's take a look! The large, beautiful trees towering over our heads are mostly *ponderosa pines*. Such huge trees need plenty of moisture, so they grow lots of roots into the spaces between trees. In fact, their roots spread out nearly as far as their branches. Their trunks are gigantic—good for playing hide-and-



the mountainside is cooler.

seek. Their lowest branches start high above the ground, so they're not great for tree climbing. But their branches spread out from the trunk like a big umbrella high above our heads—terrific for making cool shade on the hot hillside. Umbrella branches also let lots of bright light reach in around the treetops.

Besides ponderosa pines, the forest also has many large *Douglas-firs*.

Some *western larch* trees grow here too, but mainly in moist places. Lots of larches grow over the ridge on a north-facing slope, where

Put up 3 ponderosa pine trees spread out over the hillside.

Put up 1 Douglas-fir tree on the hillside.

Put up 1 western larch tree near the creek.

PLANT SPECIES GROWING ON THE FOREST FLOOR

Let's sit down and rest at the foot of a huge grandfather pine. Beneath the tree it is shady but bright. It's been easy walking through this forest. Plants covering the ground are short, many of them growing in bunches. *Bunchgrasses* and a soft grass called "*pinegrass*" seem scattered everywhere.



Yellow blossoms of *arrowleaf balsamroot* bob up and down in the breeze. They look like short sunflowers.

A few tall *serviceberry* bushes stick up above the other plants.

These grasses, flowers, and bushes all share an underground secret, a buried treasure that lets them grow back after winter, grazing, or fire. Pink circles mark these buried treasures.

The ground between bunches of plants is covered with old pine needles. Each fall, the oldest needles on a pine tree turn brown and fall off, sprinkling the ground with a new layer of dried needles.

Put up 3 bunchgrass plants with their pink Buried Treasures circles.

Put up 3 pinegrass plants with their pink Buried Treasures circles.

Put up 4 arrowleaf balsamroot plants with their pink Buried Treasures circles.

Put up 3 serviceberry bushes with their pink Buried Treasures circles.

ANIMAL SPECIES THAT CALL THIS FOREST HOME

Forests like this one are perfect habitat for many animals. In the early spring, *white-tailed deer* eat the large arrowleaf balsamroot leaves.

Put up the white-tailed deer next to an arrowleaf balsamroot.

If we are really quiet, maybe we'll see a *pileated woodpecker* pulling pieces of wood from a tree trunk. Many of the large, old trees have rotten centers, so it's easy for the woodpeckers to excavate the large nest hole needed for raising a family of woodpeckers.



Some of the old trees have died and fallen to the ground. Big black *carpenter ants* make their colonies in *the rotting stumps and logs*. And carpenter ants are the pileated woodpecker's favorite food!

Flammulated owls also nest in the big old trees. They can't excavate their own nest hole, but they'll use a pileated's nest cavity once it is empty!

Large downed logs in the wetter parts of the forest are home to *red-backed voles*.

If there are red-backed voles around, their predator the *American marten* is not far behind.

Put up a pileated woodpecker on the side of a ponderosa pine tree.

Put up brown stump and place the black carpenter ant on top of stump.

Put up flammulated owl in a pine tree.

Put up log horizontally near the creek. Put red-backed vole near the log.

Put up American marten near log.

CHAPTER 2. Fire in the Forest

SIGNS OF PREVIOUS FIRES

One pine tree has a *black triangular scar* at its base. Something created that wound on the side of the tree. Can you guess what? A fire!

Put up triangular fire scar at the base of a ponderosa pine.

FIRE WEATHER

As summer temperatures grow hot and days grow long, our pine forest dries out. Day after day, the sun beats down on the mountain side. By midsummer, the hot dry air has baked most of the moisture out of the plants. Now, even in the shade of the pines, the air is like an oven. It's impossible to sneak anywhere. The balsamroot leaves and grasses crackle as you walk through them. Old pine needles make a crunching sound with each step.



Late afternoon is the hottest time of day in this forest. Also by late afternoon, big **thunder clouds** have gathered, blocking out the sun. It wouldn't take much to start a fire, would it? Everything is so dry, just a tiny spark would be enough. How about an incredibly big, hot spark from the sky? Lightning—nature's matchstick! With a flash of light and an ear-splitting crash, a **lightning bolt** strikes one of the tall trees, shattering its top into a million pieces.

As the pieces explode out into the forest, many are on fire. Wherever the hot glowing pieces land, **small flames** come to life. A forest fire begins.

Crinkle some paper in short bursts to sound like footsteps on crunchy grass. Put up thunder cloud, partially blocking out the sun.

Ask class to clap together to make the crash of thunder.

Put up lightning bolt touching one of the pine trees.

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

FIRE AND ANIMALS

Fire starts to creep and crawl through the forest. The carpet of dried pine needles helps the fire spread along the ground. And on the ground it stays, because the flames are too short to reach into the tree crowns!

The animals run, fly, or burrow into the ground to escape the fire. Most are safe in the creek bed, even though fires sometimes creep into this area too.

Move all birds and mammals to creek bed and larch tree; take down burrowing animals--ant and red-backed vole.

FIRE AND PLANTS

The plants, however, can't move to safety. Flames blacken the bark at the bases of the big trees, but their thick bark protects their insides. If there are young trees, most of them are killed. The tops of the other plants are scorched, so they look dead, but their buried treasures remain.



Tops of balsamroot plants are burned to *ash*.

Pinegrass has vanished too.

Black stubble is all that remains of the bunchgrasses.

Nothing but *stick skeletons* are left where serviceberry bushes used to be.

Most of the pine needles on the ground are burned. The flames go out when they run out of things to burn on the forest floor. The plants growing in ponderosa pine forests can survive creepy, crawly fires. In fact, they're used to having fires every 5 or 10 years.

Remember...pink circles mark the location of Buried Treasures. They stay put after the fire.

Remove flames.

Take down flowering arrowleaf balsamroot plants and replace each with a circle of gray ash.

Take down pinegrass plants and replace each with a rectangle of gray ash.

Take down live serviceberry bushes. Replace each with a blackened skeleton.

FIRE ADAPTATIONS IN PLANTS

Even though the forest looks dead after a fire, most plants are still very much alive because they have underground growing points that survived the fire. The soil protects the plants' growing points from the fire's heat. In a forest that burns so often, that's a *big* treasure!

The big pines and firs are not killed by the fire either. Lots of space separates their green needles from the heat of a creepy, crawly fire and thick bark protects their trunks. The fire doesn't burn along the creek because the fuels there are too moist for creepy, crawly flames to spread through.

Remember...pink circles mark the location of Buried Treasures. They stay put after the fire.

SHORT TIME BETWEEN FIRES

Signs of a fire don't last long in a ponderosa pine forest. Once the flames have died down, most of the animals move right back in.



When spring comes again, the arrowleaf balsamroot, grasses, and serviceberry bushes all send up new green shoots. The forest almost looks as if a fire had never happened. The only clues are the **black char marks** on the bark at the tree bases. Add one more fire to this forest's history record!

Replace all the animals in their original habitat.

Take down burned plants and ash pockets, leaving the pink Buried Treasures circles—they mark the spot where plants are still alive underground. Place living plants above the pink circles.

Put black fire scars at the base of trees, but not on larch tree because fire didn't burn into the creek bottom.

CHAPTER 3. Change over Time

LONG TIME BETWEEN FIRES

Let's let our ponderosa pine forest grow for 50 years without a fire. It looks different now. Creepy, crawly fires haven't killed the Douglas-fir seedlings growing in the shade of the big trees. The young trees grow so close together that it's hard to see very far.

Without fire, the *young Douglas-firs* grow taller. The tops of some reach up into the bottom branches of the grandfather pines.



The arrowleaf balsamroots don't get much light, so they don't produce many flowers. There's less grass for the white-tailed deer to eat.

The serviceberry bushes don't produce as many flowers or berries as they did when the forest was more open. The young trees are using up water and nutrients that the big trees need to grow and stay healthy. Without creepy crawly fires, life is getting too crowded for the old giants.

Put up 3 young, tall Douglas-firs—have their tops touch the crowns of ponderosa pines.

Put up more young Douglas-firs—4 small trees (seedlings) and 3 medium-sized trees (saplings).

Take down 2 arrowleaf balsamroots, 2 pinegrass plants, and 2 bunchgrass plants.

Turn serviceberry bushes over so their berries don't show.

FIRE BEHAVIOR AFTER A LONG WAIT

What happens when a fire starts in our forest now? It doesn't stay a creepy, crawly fire for long! Instead, it quickly burns into the lower branches of the young Douglas-firs.



Using the young trees like a ladder, the **flames climb** up into the tops of the ancient pines and kill them in the blink of an eye. These trees have survived dozens of creepy crawly fires, but they can't survive even one treetop fire. A treetop fire may kill the trees near the creek, too, changing the look of the whole forest.

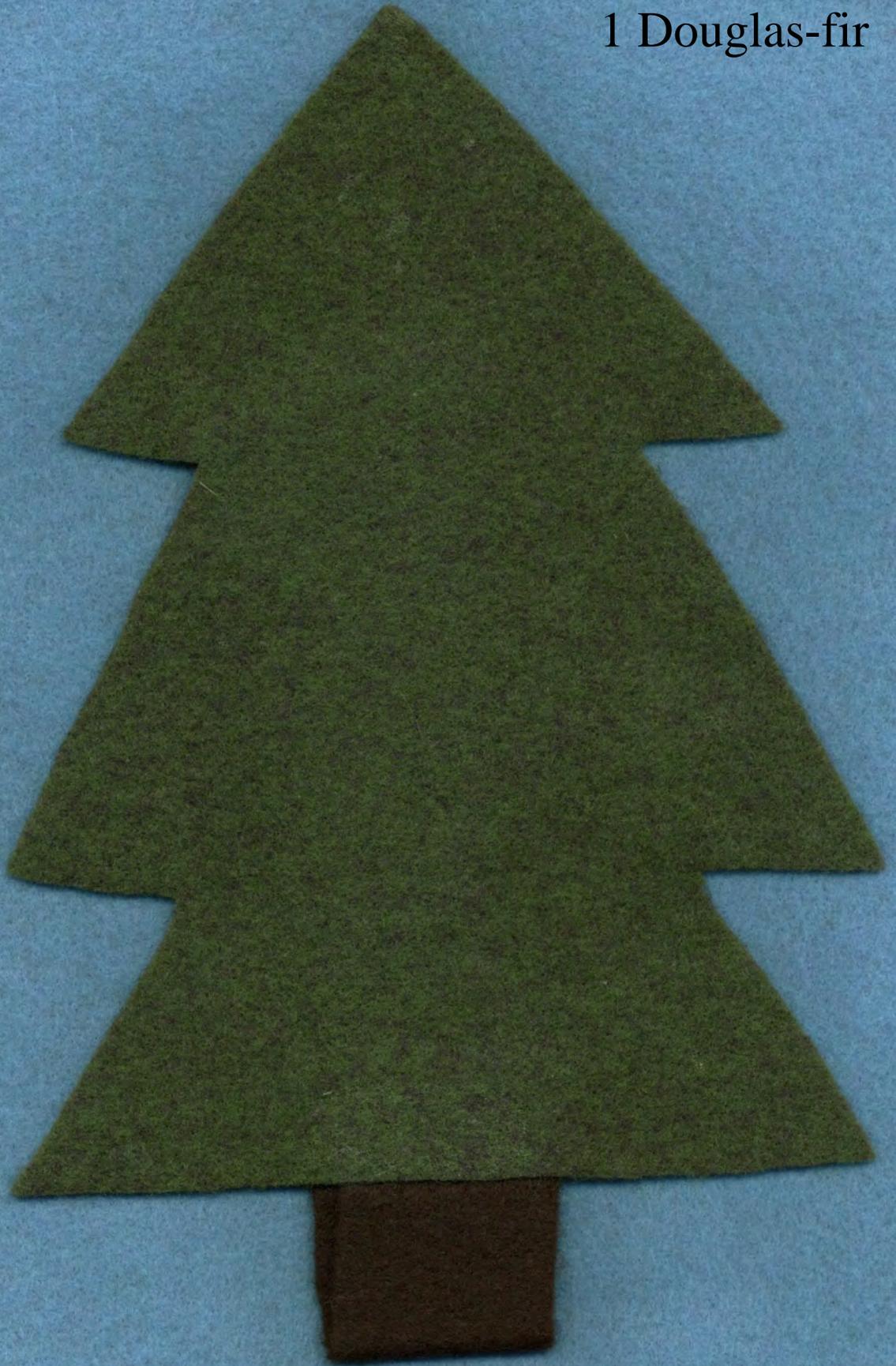
Amazing as it sounds, ponderosa pine forests need creepy crawly fires to stay healthy. Fires that creep through the forest kill most of the young trees. Without these ladder fuels, fires stay on the ground and out of the crowns of the old giants. The high branches and umbrella-like crowns of these trees can keep on shading the hot hillside, just as they have done for hundreds of years. Perhaps we'll come back for another hike next year!

***Put up long line of flames
reaching from small
Douglas-fir trees into the big
trees.***



1 Douglas-fir

11



12

1 western larch



13



1 ponderosa pine fire scar

1 rotten stump



1 rotting log



14

1 white-tailed deer



1 American marten



1 pileated woodpecker



1 flammulated owl



1 ant



1 red-backed vole



4 arrowleaf balsamroots
with pink Buried Treasures
circles

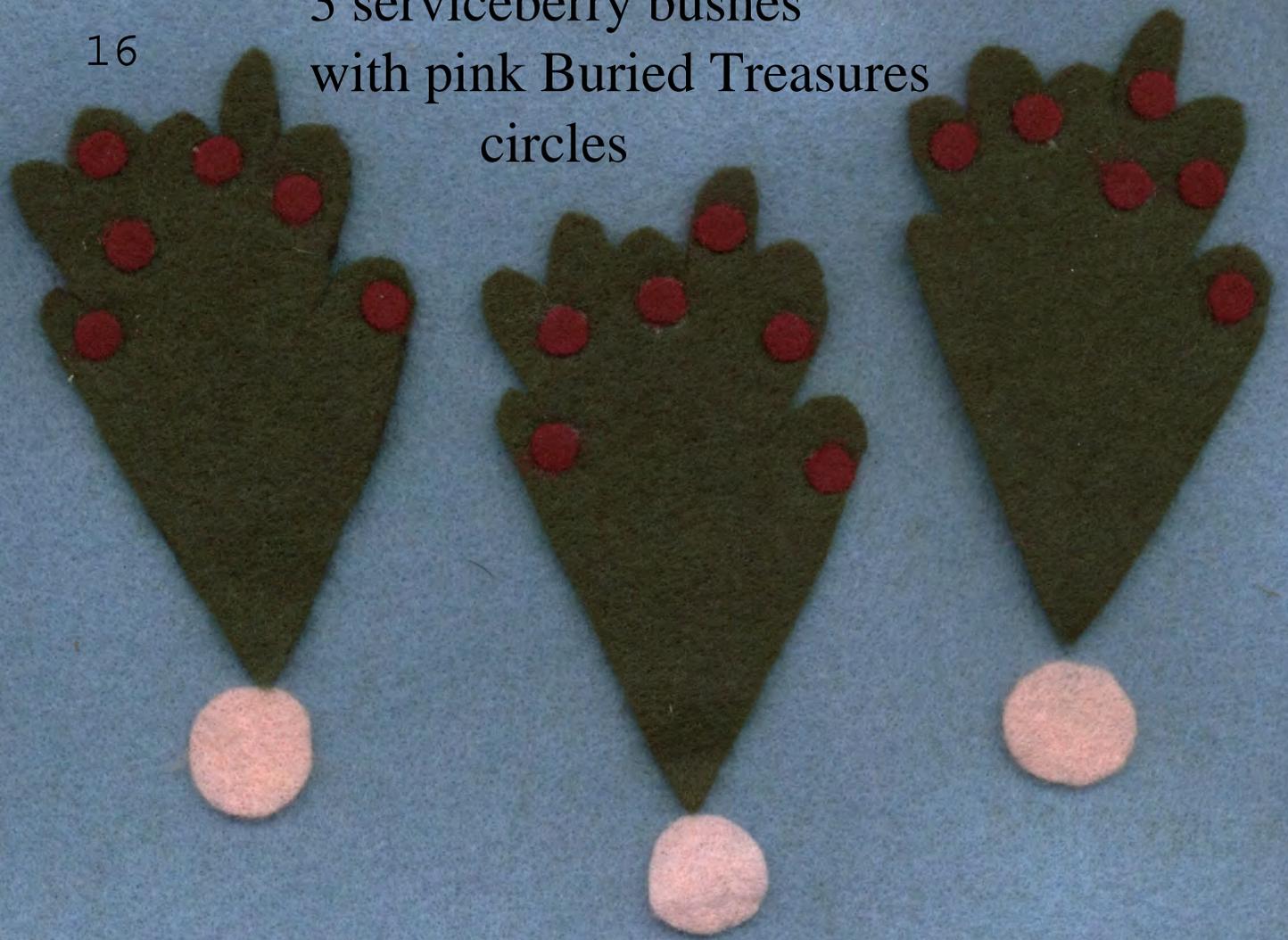


3 bunchgrass plants with
pink Buried Treasures
circles

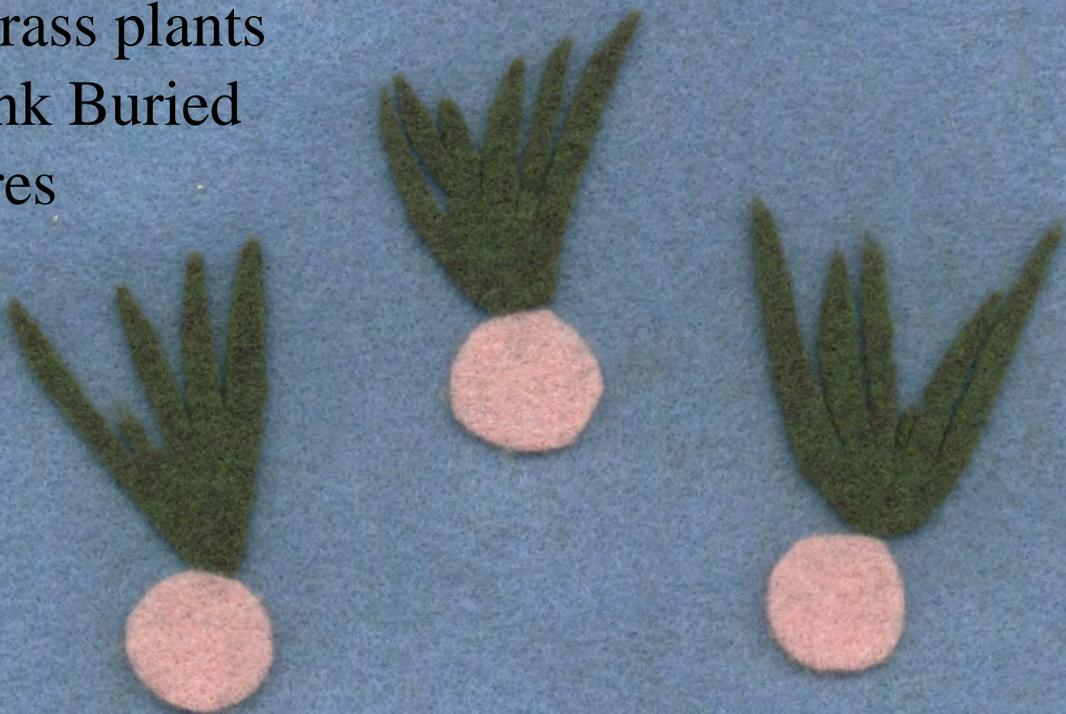


16

3 serviceberry bushes
with pink Buried Treasures
circles



3 pinegrass plants
with pink Buried
Treasures
circles

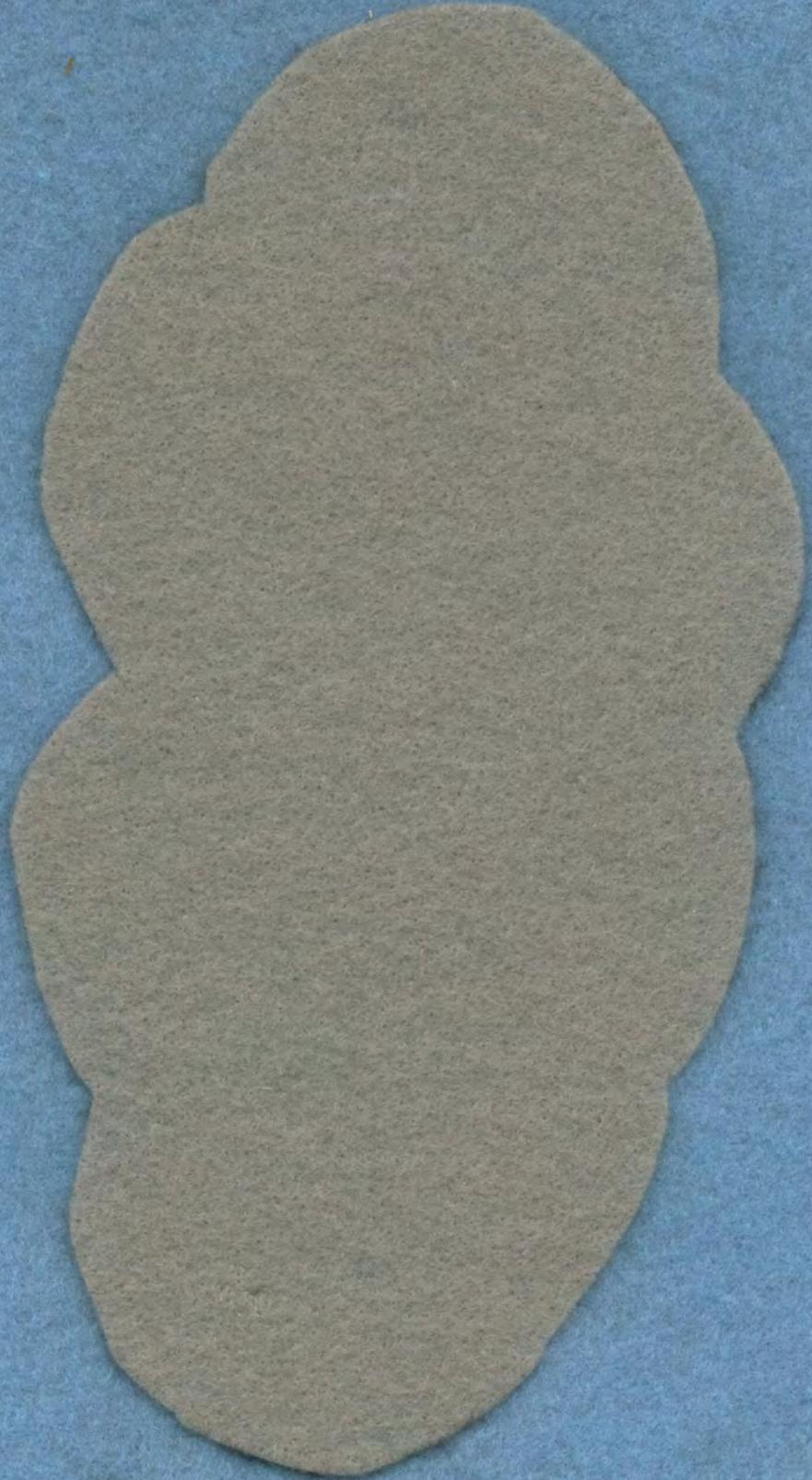


17

1 lightning bolt

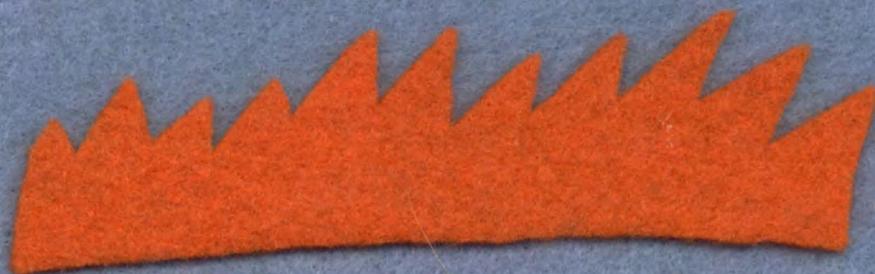
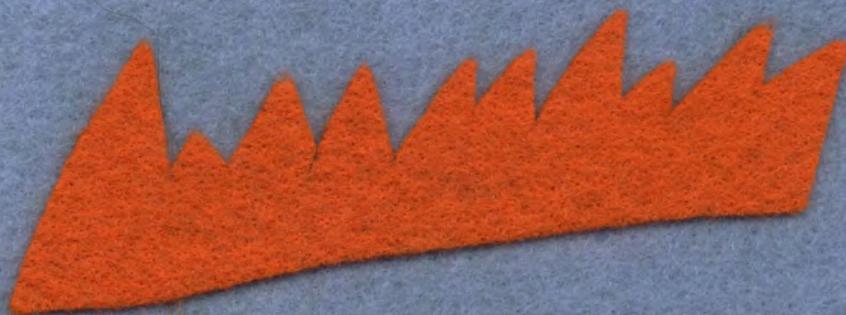


1 thunder cloud



18

2 surface fires



3 bark char for big
trees



4 balsamroot ash layers



3 pinegrass ash layers



3 bunchgrass stubble clumps



3 serviceberry skeletons

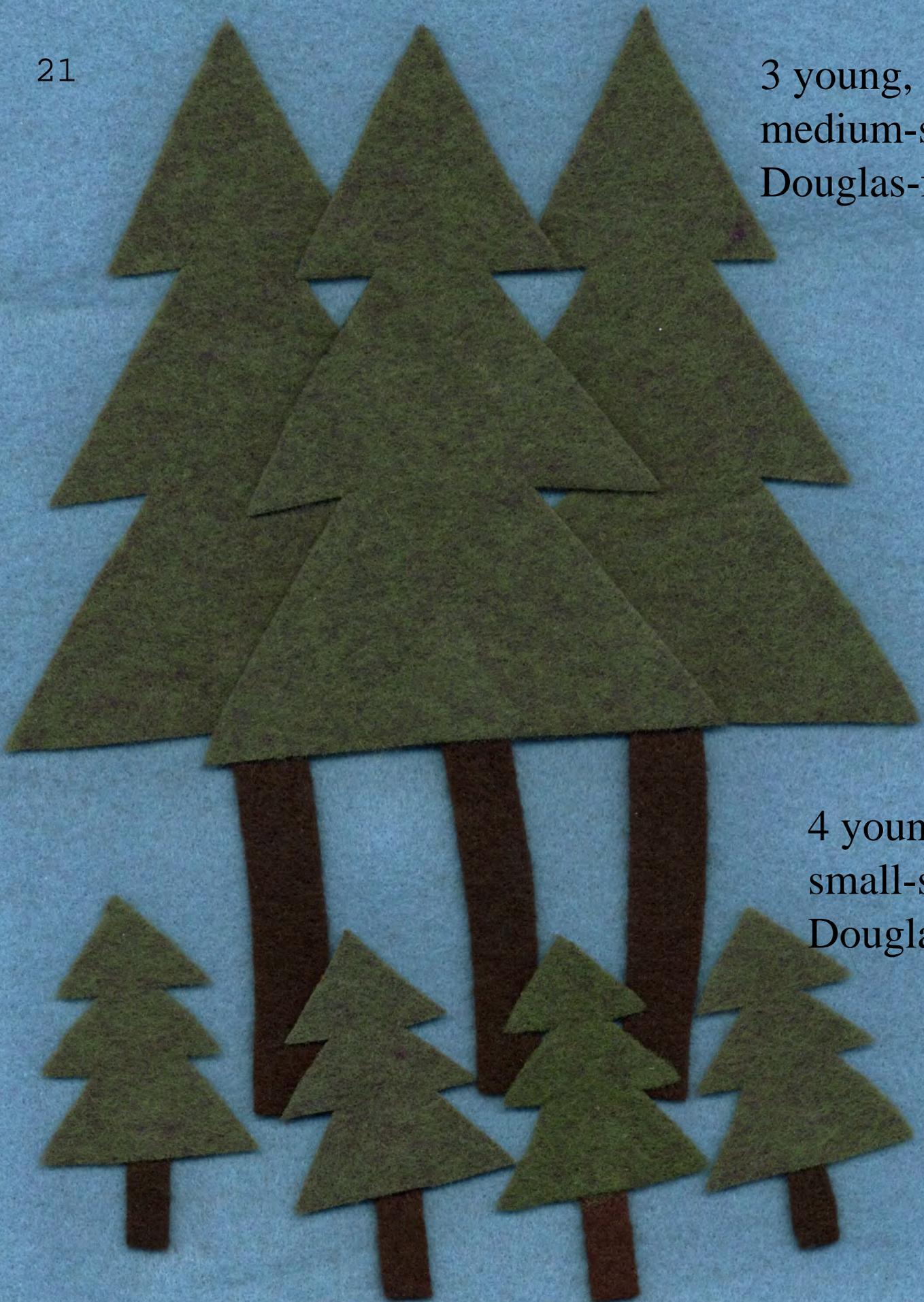


3 young, tall
Douglas-firs



21

3 young,
medium-sized
Douglas-firs



4 young,
small-sized
Douglas-firs

1 ladder fuels
flames



1 surface fire

