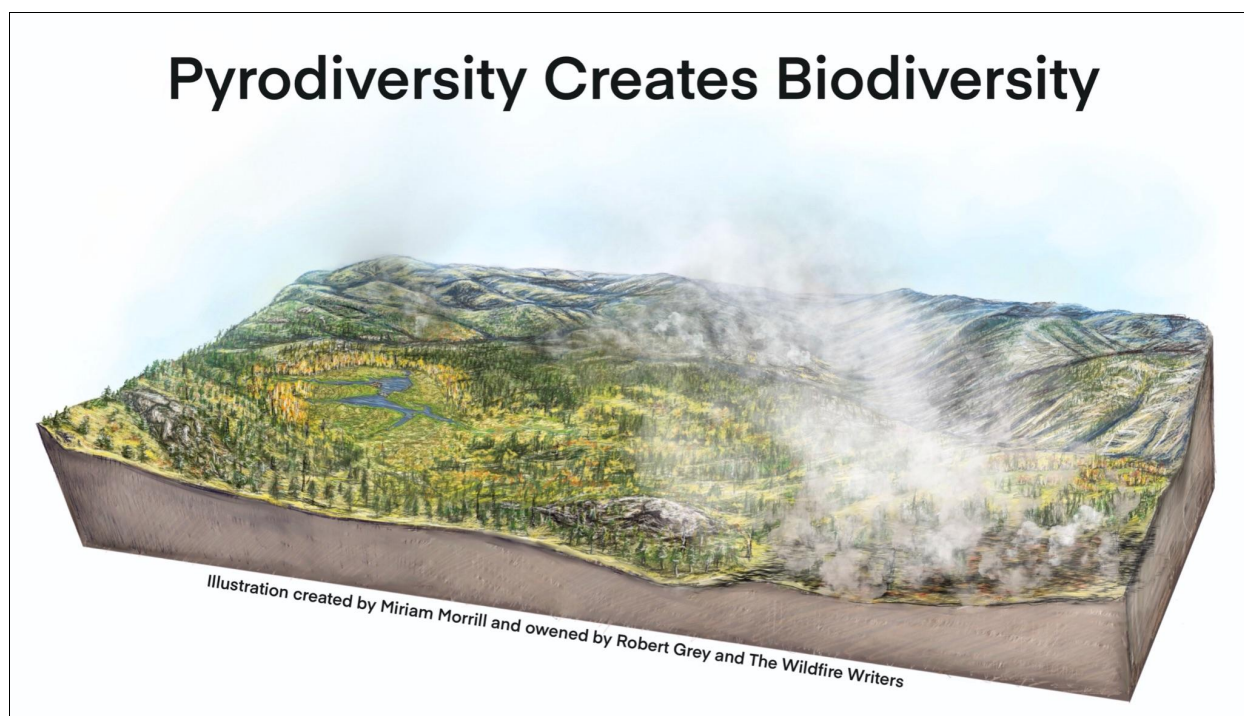


1- LANDSCAPE PATCHES, PATTERNS & FIRE



INTRODUCTION

This lesson will focus on observing a landscape in the real-world or over an AlertWildfire Camera or Google Earth. Participants will learn how to describe and journal landforms and landscape patches and patterns. Understanding and observing patterns and patches across a landscape are relevant in recognizing scales of influence on the land. There are global, regional and local weather patterns that interact with terrain and vegetation communities and create various scales of patterns. We are primarily focusing on personal observations of patches and patterns at a landscape scale. A grounding exercise is used as a trauma-informed approach to seeing a landscape that may have been burned. The subject of fire will be discussed at the landscape scale and add context to fire's role in creating patches and patterns. Several illustrations and tiny fire history maps will be used to observe differences in fire size and shape. A landscape sketch will be added to a story zine that accompanies most of the lessons in this guide.

OVERVIEW AND ESTIMATED TIME (70 minutes)

- Field safety discussion and lesson introduction (5 minutes)
- Grounding exercise (5 minutes)
- Exercise: Landscape patterns & patches comparison table exercise (20 minutes)
- Exercise: Landscape sketch on story zine (30 minutes)
- Exercise: Discussion and writing about landscape and fire patterns (10 minutes)

MATERIALS

- Journal or notebook
- Printed formatted story zine (11x17 page recommended or 8.5 x 11, if larger paper not available)
- Printed fire history map and illustrations
- Graphite pencils, erasers, crayons or colored pencils

LOCATION

Nature journaling practices are best done outside, in nature, but portions or all of each lesson plan can be done indoors. The first lesson is focused on seeing things at the landscape scale and should be done where you can see close vegetation as well as out to distant landforms and sky (20 to 40 mile view). The other option is to use the [AlertWildfire live web cameras](#) or Google Earth looking out over the local landscape. It does not have to be looking exactly at where the students are currently but a scene that captures the general local landforms, and demonstrates the shape of the land where they live.

Comparison Table Exercise
LANDSCAPE PATTERNS + PATCHES

Foreground	Midground	Background
Large Playomation patches of bright yellow-green (grass)	Some moderate hills, but more of a valley area with a lake.	No individual plant details seen. faint land patches can be seen.
Terrain not as steep as background	Larger amorphous (fuzzy) patches of trees/forest that appear more concentrated in darker green areas.	Sharp mountain shapes (fractals) are light faded blue colors and some patches of very light blue or white. Think its a rocky mountain but could be snow.
Only a few large live trees	Some narrow patches and strips where roads & housing appear within forest.	Horizon & skyline meet with the edge of mountain range line as a thicker/darker line.
Smaller patches of small trees that appear more grouped in slope/drainage areas.	Not a wide range of color mostly dark green and some light olive-green color living grass areas.	
More details of individual trees and some grass detail seen.		
Brighter yellow-green colors & more details visible		



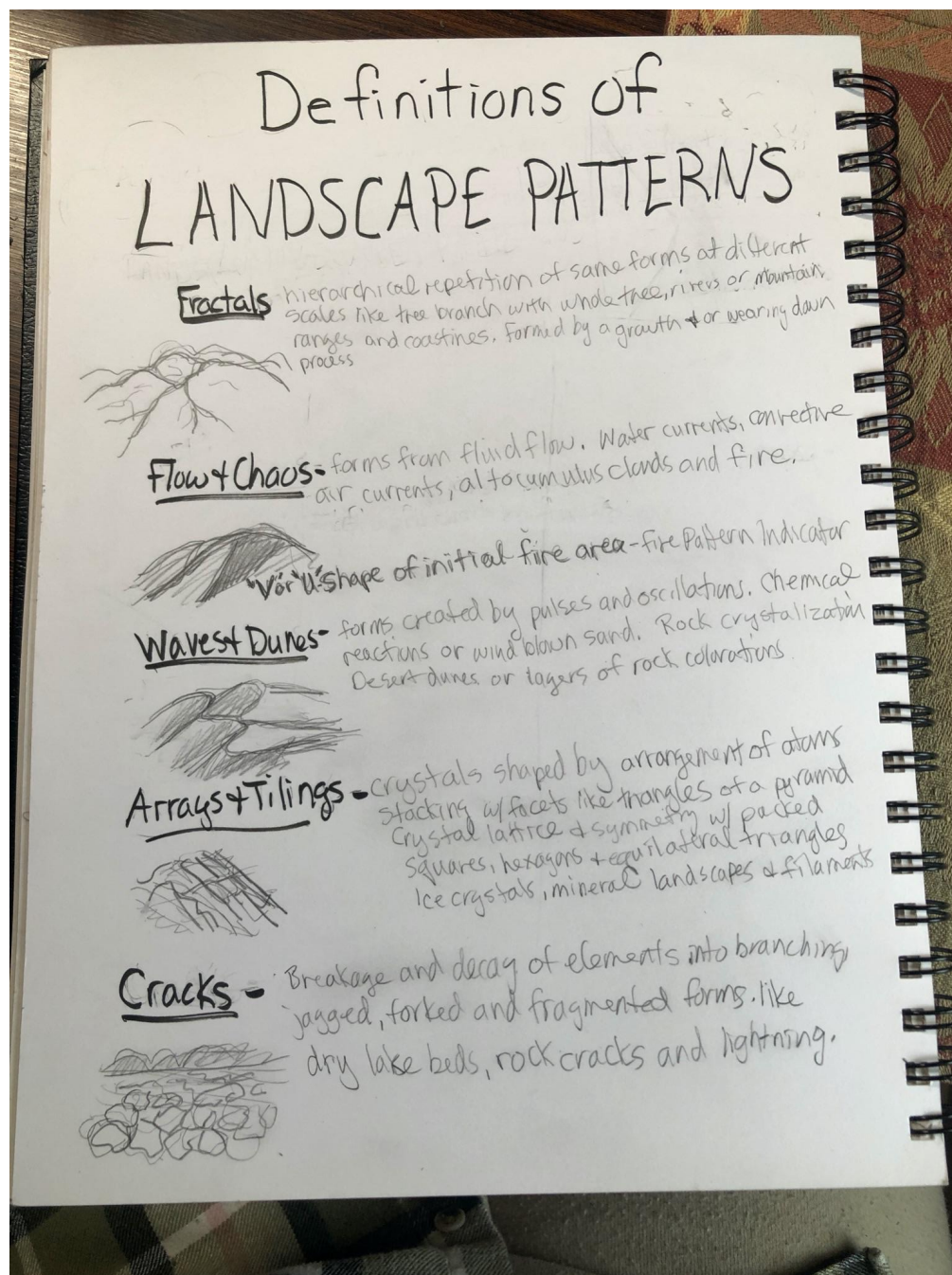
Example comparison table and landscape sketch for the story zine cover page.

BACKGROUND & NATURAL PHENOMENA INVESTIGATED

Fire is a natural phenomena and more than just a momentary event or chemical exothermic reaction. There are relationships between topography, vegetation and weather that influence how fire functions in the environment and over time. To gain a better sense of fire at the landscape scale, this lesson looks at the natural phenomena and how to observe patches and patterns in nature.

Patches can differ in size, gradient and arrangement and are created by processes external to an area (fire), processes between areas (plant competition) and processes

internal to an area (succession). Natural patterns are the recurring forms that result under different processes and can be modeled mathematically. Patterns that influence our fire environment include global, regional, and local weather patterns, weather-terrain interaction patterns, and terrain and vegetation interactions patterns. The ability to observe landscape patterns and build questions around cause and effect is important to building a sense of place.



A nice reference is the book with visuals is Patterns in Nature by Philip Ball. There are also human influences on patterns including urban development and landscape management such as cultural fire use, forestry and agriculture. See sketchnotes on key

landscape patterns by Miriam Morrill below. Fire patches and patterns are tied to various factors including differences in terrain, vegetation, weather and fire management actions. A landscape is the collection of patches and patterns with different histories.

Fires move across the landscape in varying patches and patterns and these can be seen within each individual fire and between different fires over place and time. It is a common misconception that the fire acres reported during a wildfire represent the acres burned. The fire acres represent the entire area (burned and unburned) within the fire perimeter and control line. The acres burned are more clearly observed in fire severity maps that show how much, where, and how severe landscape elements (vegetation and soil) burned. It is rare for every acre within a prescribed or wildfire fire area to burn.

SAFETY TALK & EXERCISE INTRODUCTION (5 minutes)

- Give safety talk appropriate to location and conditions. See guide introduction section with Safety Discussion overview.
- In this lesson, we are learning how to look out at broad landscapes and how to observe, journal and sketch landscape forms, patches and patterns. We will use an outdoor viewpoint or the AlertWildfire Camera or Google Earth to make our observations.
- We will learn about fire shapes, patches and patterns on the landscape using several illustrations and tiny fire history maps.

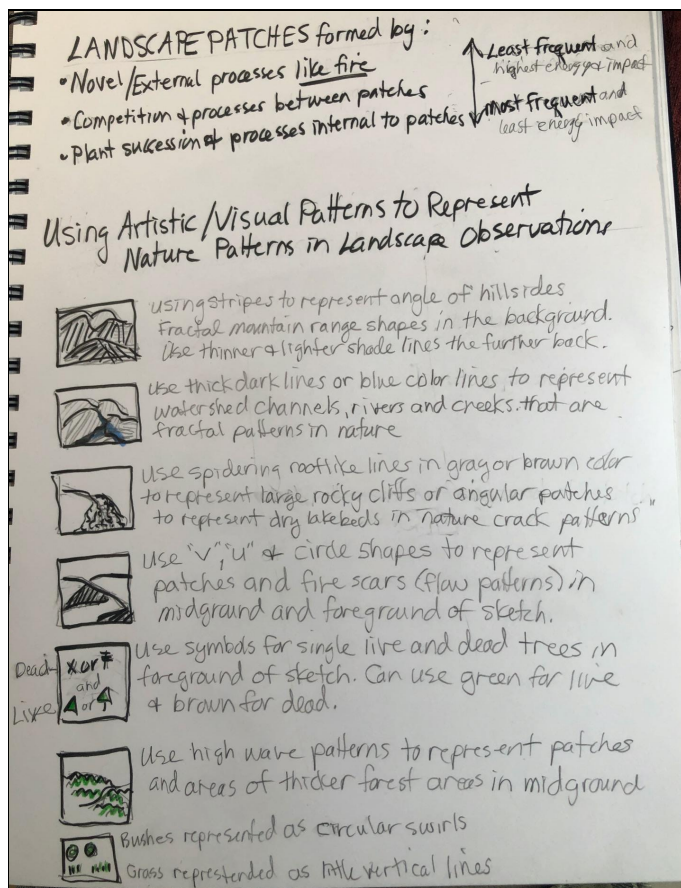
GROUNDING WARM-UP EXERCISE (5 minutes)

- Tell students to stand up straight. We will start the Redi journey with a grounding practice. A practice is something you do as a regular routine, like stretching before you run. This activity clears your mind of distractions and awakens your senses to everything around you. Feel your feet connect with the ground. Do you feel connected with stable footing? Spread your feet out a little further apart and sense your growing connection to the ground. Imagine yourself as a tree with your feet and toes holding you deep in the ground. Feel the strength in your body like the woody trunk of a tree. Stretch your arms out wide like tree branches to gather the light of the sun. Pause for a few minutes and feel yourself connected to the land.
- Tell students that once you are grounded, get your journal and materials ready to write and sketch information, ideas, and questions about this lesson, along with your observations and feelings. You can stand or sit for the next exercise but should show students how to hold the journal in a way they can write while holding the journal still.

- Don't forget to add your name and the date on your journal page.

LANDSCAPE PATTERNS & PATCHES COMPARISON TABLE EXERCISE (20 minutes)

- **Exercise Introduction:** We are exploring a different way of seeing a landscape: we are looking at patches and patterns, which relate to fire on the landscape. We start by looking out at the landscape and putting observations into a comparison table. This will help us think about and describe things we are seeing at different scales.
- Before the teacher creates a demo comparison table, ask, "Who knows what we mean by a landscape?" Ask if students know what landscape patches and patterns are.



- **Landscape** as a general term can be defined as all the things we see within an area of land. A landscape can be farmland, wilderness, urban and any other land area. Within a landscape there are landforms such as mountains, valleys and rivers. We can describe the landscape scene by the physical lines, shapes, size and how the eye moves over the scene and we describe and journal on paper.

Discussion: Additionally, landscapes can be comprised of several diverse ecosystems or habitats, for example, in a mountainous area, the landscape might have alpine ridgelines, scree slopes, moist/cold forest, dry mixed forest, woodlands, riparian areas, shrub steppe or chaparral, and grassland. Within these ecosystems, there can be areas where the vegetation, rock, soils, and other topographical or landscape features are predominant.

- **Patches** or mosaics are relatively small homogenous areas within the landscape that differ from the surrounding areas. In the mountain landscape, a patch could be a riparian area tucked into a canyon, or a forested area surrounded by chaparral. Patches in the landscape change over time – sometimes quickly, sometimes slowly – through what is called patch dynamics - meaning the ways that diverse vegetation, soils, topography, or other landscape components occur as a result of different influences and factors such as elevation, availability of water. Patches can be created and changed by (1) ecological disturbances such as fires, floods, disease, rockslides and avalanches, etc., (2) by influences from neighboring patches, like trees and shrubs competing for space or moisture, or (3) from things happening within a patch, like some plants growing faster than others.
- **Patterns** are recurring/repeating forms that result from growth and movements of elements. These natural movements include weather, terrain and vegetation interactions at the global, regional and local scale. Some fascinating nature patterns include fractals and symmetries, but that is more advanced than this lesson. For this exercise, let's look at repeating elements such as dark and light shapes, straight and crooked lines/tree lines, steep and flat hillsides, etc.).
- **Establish Group View and Scene Framing:** Have everyone look out in the same general direction (best view for this lesson includes the sky touching the land and looking out at multiple landforms to a distance of 30-40 miles). If a field trip to a good view point is challenging, use the AlertWildfire cameras as described at the beginning of this lesson.
 - Show students how to use hands and fingers to frame a scene (portrait format/frame for this lesson) that includes a mix of land features from close up to far away. The view should include a portion of the sky so a title can be added later.
 - If you or they have trouble identifying patterns, try squinting and blurring your eyes so that the details don't distract from larger patterns on the land. You can also hold out a finger to focus your vision and use the blurred outer edges of your eyes to identify patterns.
- **Teacher Demo & Students Follow** (in a sketchbook carried around so everyone can see as you work): To help organize and describe the landscape, our comparison table will have three columns labeled Foreground, Midground and Background. In each of the columns we will use words, numbers and pictures to describe the patches and patterns seen on the landscape.

- **Start with the background** and move forward to keep from focusing on too many details. Describe and discuss any patterns you see within and between distance ranges. You can be creative in the words you use.
- Student goal is to make landscape scale observations of patches and patterns. Students can describe differences and similarities of patches and patterns at different distances. These descriptions will be captured in words, numbers and pictures in the comparison table.
- Look as far into the distance where the sky meets the land. We call the area in the far distance a **background** when describing a scene. The landscape features in the background should have faded unclear light-purple and light-blue colored features like mountains and or valleys. In this exercise, we are looking for patterns in the shape of the area. In this exercise we are looking for patterns and shapes in the landscape. We want to look at the slope and shape of the different landscape features (steep, rounded or flat, open areas or carved deep canyons, etc.).
 - Can you see differences in how steep, rounded, flat, smooth, or jagged the features are in the background? Are there differences between how those elements (hills, valleys, etc.) look? Are some hills or portions of the hill steep and others more rounded?
 - Describe background patches and patterns about the lean of the land with words, numbers and pictures in the background column of your comparison table.
- **Midground** is the area closer than the background, but further than the foreground. You are looking for patches and patterns between vegetation communities and or forest openings.
 - Can you see patches or patterns in the midground? This is where you can see some forest or grassland shapes/areas but can't see individual plants. Are there differences between how crowded or open the forest, shrub or grassy areas look? Do you see different colors or textures between those areas?
 - Describe in words, numbers, and/or pictures the patches and patterns you see between vegetation groups and areas (forest area, grassland area, etc.) in the midground and note in your comparison table.
- **Foreground** is what you can see and experience up close and nearby, like individual plants or trees. You are looking for patches and patterns between plants.
 - Can you see differences in how spread out or close together plants are in the foreground? Are there differences in the size of plants in

certain areas? Are there differences in colors of the patches of plants? Differences in sizes of plants in one area from sizes of some in another area?

- Describe in words, numbers and or pictures the patches and patterns you see in the types of plants, size, shape, color of plants and how those are located and grouped on the land in the foreground.
- As students work, keep track of time, circulate and troubleshoot, and engage in discussions. Students may discuss and model drawings from each other, as long as they are doing their own work.
- A few minutes before ending the exercise, Say: “Take about two minutes to wrap up and add any final details to your comparison table.”

LANDSCAPE SKETCH EXERCISE (STORY ZINE) (30 minutes)



● Exercise Introduction:

Explain that in this exercise, we are creating a simple landscape sketch using symbols and designs on one of the spaces of a story zine (Space #1 on zine formatted 11x 17 or on 8.5 x 11 paper), using observations we made doing the comparison table and looking back out at the view we framed.

- This sketch will be the cover of our story zine that is part of the Redi Master program and should capture basic landscape elements and an impression of the landscape patches and patterns observed. This exercise is not about creating a pretty picture and doesn't have to look

exactly like the landscape you see. We are sketching key information important in understanding the shape of the land. We will spend around ten minutes to complete this exercise together.

- You can create your own symbols and designs for your landscape sketch or use the example.

- **Teacher Demo and Students Follow-** use the story zine paper- page/space #1, a graphite pencil and colored pencils and walk around to show students your work as you go. You can use your fingers and hands to frame the scene to fit the zine page (portrait format). Consider framing the view that offers an equal portion of sky, background, midground and foreground (see example).

Overall Sketch Area

- Start with creating some light graphite pencil lines for the separation between background, midground and foreground areas. Keep an area of sky at the top portion of the sketch, so there's space to add a story title later.
- Use light graphite pencil lines to create the big terrain shapes in the background, midground and foreground and to lightly outline patch areas (where there are openings or concentrations of elements).

Sky and Background Area of the Sketch

- Leave the sky area blank without shading or elements
- Hold your graphite pencil out in front of you so that the pencil is leaning on one area of the background. Look at the angle of the pencil and lay that pencil angle over that same area in the zine sketch to determine how much slope or angle to create. Move your pencil and create a series of lines along that landform area to indicate the lean of the land on that spot. Do the same for other landforms and or portions of the background until the background area of the sketch is filled with a mix of line patterns.
- Go to next steps and when the graphite pencil details are finished come back and color in the sky and background with the light faded colors of blue and or purple to help indicate distance.

Midground Area of Sketch

- Use a variation of line pattern to indicate the shape and form of vegetation groupings. For example, use a v-shaped wavy line pattern to create a forest tree line or slightly bumping line for shrub areas and dotted or tiny vertical lines for grassy areas.
- Start by creating those vegetation elements around the patch areas and then fill in elsewhere in the midground, as needed, to create simplistic and impressionistic vegetation patches and patterns in the midground.
- Go to the next step and when the graphite details have been added come back and color in the midground areas. Use different colors to indicate patch areas and accentuate color/shading around the patch areas. Keep

colors somewhat muted with greens, browns and maybe a little yellow mixed into the greens and browns, if needed. This helps provide a sense of distance from the foreground.

Foreground Area of the Sketch

- Use graphite pencil to sketch simplified and or symbolic vegetation types into and around the patch areas. Don't spend time on details of individual plants to make them realistic, but on details that help show the different types of plants and different areas of plants.
 - Capture differences in vegetation type (tree, shrub and grass), general size and shapes of plants and colors and or shading differences.
 - Use any and all color ranges you see and make them more vibrant in color than in the background and midground. If the vegetation appears similar in color to the midground, such as a green forest in the midground and a mix of forest and grass in the foreground, add a light layer of yellow color first and then overlay greens, browns, etc.
 - Add a few highlights and shadows where needed to show some differences of key vegetation elements in the foreground. For instance, if there's a patch of live trees and a patch of dead trees, add some shadows below a few of the live trees to accentuate.
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- When it comes time to color in the sketch, explain methods to shade lightly or with faded colors in the background (light touch, fewer lines, adding some white or erasing some of the lines to create a faded effect) and darker and or brighter colors in the foreground.
 - Ask students if they have any questions about what they'll be doing, set boundaries, and set them to work.
 - As students work, take time to keep track of time, circulate and troubleshoot and engage in discussions. It should be okay to discuss and copy each other as long as they are doing their own work.
 - A few minutes before calling the students back, Say: "Take about two minutes to wrap up and add any final details to your journal entry."

FIRE PATTERNS EXERCISE (10 minutes)

- **Exercise Introduction:** Explain that in this exercise we are going to discuss and answer some questions on how fire relates to patches and patterns on the landscape using some illustrations and maps for reference.
 - Explain how scientists have studied deep layers of soil samples in California and found clear indications of repeated fires over the past 3,000 years. Native American ancestors used fire as a tool across much of California, which also created many patches and patterns on the landscape. Now, tribes, state and federal agencies and groups like the Butte County Fire Safe Council work to prevent unwanted human-caused wildfires and use prescribed fire and mechanical treatments to create healthy landscape patches and patterns.
- Use the Fire Ignition Area illustration as reference and describe how fires start burning in a small circular area (Fire Ignition Area Illustration) and then spread out in different directions and at different speeds based on the amount and type of vegetation, how steep or flat the land is and various weather conditions (how hot, dry and windy). This is called fire behavior and fire specialists use the fire behavior triangle (fuels/vegetation, topography/steepness and weather) to predict and assess fire behavior.



Screen captures in a collage of some Butte County wildfires between 1905 and 2020 from WIFIRE (firemap.sdsc.edu). This shows the different shapes and locations that wildfires can take. Each block is a five year period.

- Use the Fire Area Illustration and describe how fire interacts with landforms and landscape elements based on differences in the fire behavior triangle. Fire can move over the land at various speeds and in varying sizes and shapes to create different patches and patterns.
 - These fire shapes can look like a winding snake, a long triangular kite or a giant amorphous ameba. Can you see different sizes and shapes in different areas on the map? You might notice different fire burned areas having similar shapes based on where they are located in the terrain.
 - Patterns and patches can be seen within each individual fire and between different fires over space and time. It is rare for all of a fire area, within a prescribed or wildfire to burn. There are always patches of different burn severity (how hot the fire burns the landscape elements).
 - Explain how fire patterns and patches can be different on individual plants such as different portions of trees having been burned.
 - There are different phases of landscape and vegetation recovery after a fire where you can see different patterns within different patches of a fire. At a closer look you can see the different types of plant regrowth and different plant and animal species move in and out of the burned area over time. There may be obvious signs of fire in an area but sometimes it's hard to tell.
 - There are other things that create landscape patterns including elevation, floods, mudslides, and human development.

- **Teacher Facilitated Student Exercise:** Think about how to help students frame questions and discuss patterns they observed in the fire history maps. If they appear stressed by the topic, do another grounding exercise. Explain how we will take what we've learned about fire patterns and what we've seen in our landscape observations and answer a few questions.
 - If they are struggling to write questions, consider asking them to sketch a large question-mark to express that they don't know what their questions are. Putting question-marks all around a journal page to express what you don't know or where you want to know more is a part of the nature journaling process.

Pattern Questions:

- What are some patterns (repeated forms/shapes) you noticed in the shapes and sizes of fire in the fire history maps?

- What are some patterns you noticed from your observations listed in the comparison table that make you think about fire behavior? For example, do you see similar or repeated shapes and sizes of fires along roads, rivers or mountain tops?

Cause and Effect Questions:

- Look back at your comparison table and the fire history maps and consider any similarities in patches and what may have caused those patterns? Does it appear that different types of causes have happened over different periods of time?

Structure and Function Questions:

- How were the structures in some patches (the forms, shapes, arrangement of elements in and around the patches) different from other patches and how do you think those patches function within the larger landscape? For instance, do you think rain water moves through the patches differently? Do you think animals use the patches differently from other areas?