

Ring Around the Biomass

(a Coalition for the Upper South Platte (*CUSP*) activity)

Grades: 3-12

Objectives:

Students will:

1. Describe and evaluate the positive and negative effects catastrophic and prescribed or low intensity fires have on plant communities in a Montane ecosystem
2. Estimate the percent of bare dirt and its effects on erosion and sediment movement
3. Compare a non-managed forest with a burned forest

State Standards Met: List the standards met in alphabetical order by subject. Subjects separated by semi-colons.

Time Required: Full day in the field, 45 to 60 minutes per site, plus transportation to site. Two or three 45-minute classroom sessions.

Materials Location and List:

Outdoor forested burned areas, hula hoops (one per four to five students), notepad, pencils, compass and optional: plant identification guides for fieldwork, slope meter, digital cameras

Background:

In the western USA wildland fires have become catastrophic. Each year they destroy millions of acres of public and private land. The fires burn homes, take lives and alter wildlife habitat. Because of past, one size fits all no burn policies, ponderosa pine forests, located within the Lower Montane ecosystem, have become deathly ill, infested with beetles, malnourished, and prone to high intensity, stand replacing fires. Historically, the fire regime (a fire regime is a description of how often fires occur and at what intensity) thinned the forest of new growth, creating openings and rejuvenating the understory with nutrients. Today, the ponderosa pine forest is overcrowded and ripe for crown fires.

The Hayman Fire was the largest wildfire in the history of Colorado, burning 138,144 acres. The fire season of 2002 burned one million acres across Colorado. The Upper South Platte Watershed, which supplies 80% of Colorado's Front Range with clean drinking water, had three major fires that year: the Snaking, Schoonover and Hayman. Fuel moisture was at a record low in 2002, and Colorado was at the height of a record-breaking drought.

The human-caused Hayman Fire started at 4:55pm on June 8, 2002. Pushed by wind speeds of 18 miles per hour, with gusts up to 33 mph, the fire had jumped a paved roadway by 6:30pm. By 8:00am on June 9th, the fire was estimated to be 1,000 acres. Humidity was around 5 to 8 percent, and wind gusts were measured at 51 mph. Winds fanned the flames of history. Before the day was over, the two fronts of the fire ran through the treetops for 16 and 19 miles respectively. This monster with two heads consumed 60,000 acres that second day. Cheesman Reservoir split the fire, giving the fire perimeter a forked appearance. One head met the still smoldering Schoonover fire and the Polhemus prescribed burn of October 2001 on its east flank, stopping the fire in its

tracks. On the other front, the fire raged on. The fire had a convection column a mile in front of it, pre-heating the fuel before ignition sparks even reached the vegetation. Spot fires ignited by flying embers were reported up to a mile in front of the fire. On June 19th around midnight, relief came in the form of spotty rain. On June 20th, the fire was officially declared contained. By June 21st rain was reported at all the fire weather stations and continued until June 28th when the fire was officially declared controlled. The fire was monitored with satellite imaging, with hot spots addressed and not declared out until winter snows.

Temperatures within the heart of this fire reached record highs, sterilizing the soils and making them hydrophobic. In other areas, the fire scorched the trees and left the ground moderately burned. Fire-adapted plants such as mountain mahogany, kannikinnik, and aspen quickly started to grow in the moderately burned areas. It is fairly common to see trees around the perimeter of the fire that died from heat stress, but were never ignited.

Lesson Plan:

Begin this activity with a discussion of fire behavior and burn severity. Discuss the four types of fire: ground, surface, crown and spot fires. Inform students this activity is focusing on Front Range Montane ecosystems consisting primarily of ponderosa trees. The historical fire regime for this system is a low intensity (the heat) fire that burns at intervals of 5 to 15 years. The vegetation has adapted to fire (with thick bark, heat resistant roots, thick seed coatings, etc). Fire in this state is nutritionally rich and life giving. Crown fires can burn at different intensities. Some crown fires burn the growing points, killing the tree, but open up the forest floor for other plant species. Other crown fires burn at such a high intensity they consume all vegetation and leave the soils hydrophobic.

1. 5 to 7 minutes
At a burned site, randomly throw hula hoops in an area of mosaic burn. Be sure to include some land in different burn severity sites, with varying slope and aspect. Have preset teams of three to five students assigned to each hoop. Instruct the students to leave their hoops in place until they have shared with the group.
2. 15 to 20 minutes - this can be faster if students have 'run through' the exercise at school.
 - a. Students will record the percent of bare dirt (needle cast is counted as bare dirt, sticks and twigs are not)
 - b. Students will record how many different types of plants are in their hoop, plant diversity, and how many of each species (e.g. four grass plants with two being similar, forbs, etc). Older students should identify, draw for later identification or photograph the individual plants.
 - c. Students will record the aspect using a compass, and estimate the degree of slope.
 - d. Students will record the severity of the fire: Unburned; Prescribed = surface fire; Low=lots of needle cast on the ground and tree mortality; Moderate= plant burned but root crowns intact after fire tree mortality; Severe = small woody branches burned off of trees, complete tree mortality.
 - e. Students will record how close their hoop is to larger vegetation (aspen, current shrubs, etc) and note erosion around the site (rilling, gulley, etc).
3. Have all the students gather at one hoop. Have a show and tell session at each hoop site.
 - a. Have the students record the differences between the hoop sites.
4. Repeat the process at several forest sites.
5. Compare the different forest sites.

Suggested Pre-Visit Activities:

- Project Wild, classroom activity “Fire Ecologies” and/or “Smokey Bear Said What”

Suggested Post-Visit Activities:

- Identify the plants and chart the diversity
- Investigate post-fire rehab treatments

Discussion Questions or Assessment:

1. Does aspect affect plant diversity, fire behavior, or both?
2. Are some plants more adapted to fire?
3. What role do weeds play in fire?
4. It is widely accepted that the high severity of fire in Montane forests is a direct result of human interference. What responsibility do we have to rehabilitate the forests? Where do we draw the line?
5. Explore how fire affects lodge pole stands, aspen, and other species.

For tour opportunities and in class room visits

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