Prairie Fire Ecology

Model Prairie Fire Experiment

Evanston Ecology Center

Overview

This experiment lets students test the fire triangle (fuel, heat, oxygen) firsthand using model "prairies" built from matchsticks. Instructors first demonstrate how water and wind change fire behavior, then student groups compete to build two prairie models: one that burns as fast as possible and another that burns as slow as possible.

Materials

- Wood boards with an 8×8 grid of holes (64 holes each)
- Matches (lots — 32 per model, plus extras)
- Lighter
- Spray bottle, filled with water
- Small handheld fan (to act as wind)
- Square aluminum trays (boards sit inside these)
- Bucket of water (in case fire spreads beyond the model)
- Stopwatch (to time how long fires burn out!)

Setup

- Pre-drill wood boards with an 8×8 grid of holes before students arrive.
- Group matches into sets of 32 ahead of time so each team can grab a set quickly.
- Set each board inside an aluminum tray to contain any spread.
- Fill the spray bottle with water and keep the fan and bucket of water within reach.
- Review the fire triangle (fuel, heat, oxygen) with students before lighting anything — see the Field Slides document.

Part 1 — Instructor Demonstrations

Before students build their own models, run these three demonstrations so they can see each factor in action.

Demonstration A: Dense Prairie — No Water, No Wind

- Arrange 32 matchsticks in an evenly spaced array, one space between each match.
- Light the first match and let the fire spread on its own as a baseline.

Demonstration B: Dense Prairie — With Water

- Arrange 32 matchsticks the same way as Demonstration A.
- Spray the match heads with water before lighting.
- Discuss: less fuel is available to the fire until it dries out.

Demonstration C: Dense Prairie — With Wind

- Arrange 32 matchsticks the same way as Demonstration A.
- After lighting the first match, use the small fan to add wind to the fire.
- Discuss: more oxygen reaches the fire, so it should burn faster.

Part 2 — Student Build Challenge

Split the class into small groups. Each group receives 32 matches and is assigned one of the two goals below. Students arrange their matches, then the instructor lights each model.

Goal: Burn Fast

- Build a model that burns through all 32 matches as quickly as possible.
- Wind and water are both available as resources.
- Prompt: how should the three parts of the fire triangle be arranged to speed things up?

Goal: Burn Slow

- Build a model that burns through all 32 matches as slowly as possible - but still burns.
- Wind and water are both available as resources.
- Prompt: how should the three parts of the fire triangle be arranged to slow things down?

> **Safety Reminder**
>
> Keep the bucket of water within arm's reach at all times. Instructors light every model — students never handle the lighter. Boards stay inside their aluminum trays throughout the activity.

Wrap-Up

End by connecting the models back to the real prairie: ask students which conditions (wet vs. dry, calm vs. windy) would make a real prairie fire more or less dangerous — and how land managers use that same logic when planning a prescribed burn.