Post-Burn Monitoring

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- What was planned?
- What actually happened?
- Why did it happen?
- **What can we do next time?**

Evaluating the burn: Ecological

First Order Fire Effects: the **direct** or **immediate** consequences of fire, such as biomass consumption, crown scorch, bole damage, and smoke production.

Examples of **first order fire effects** in burn objectives:

- Topkill at least 70% midstory oaks
- Consume fine fuels and litter across 90% of the unit
- Less than 50% crown scorch on pines

Evaluating the burn: Ecological

Second Order Fire Effects: The **secondary or indirect** effects of fire, such as tree regeneration, plant succession, and changes in site productivity.

Examples of **second order fire effects** in burn objectives:

- Reduce hazardous fuel loads for wildfire risk reduction.
- Promote diverse understory species for wildlife habitat.

Effects visible some time after a burn, in some cases, not until the next growing season….how can you tell?

Post-Burn Monitoring:

- Complex and intensive

or

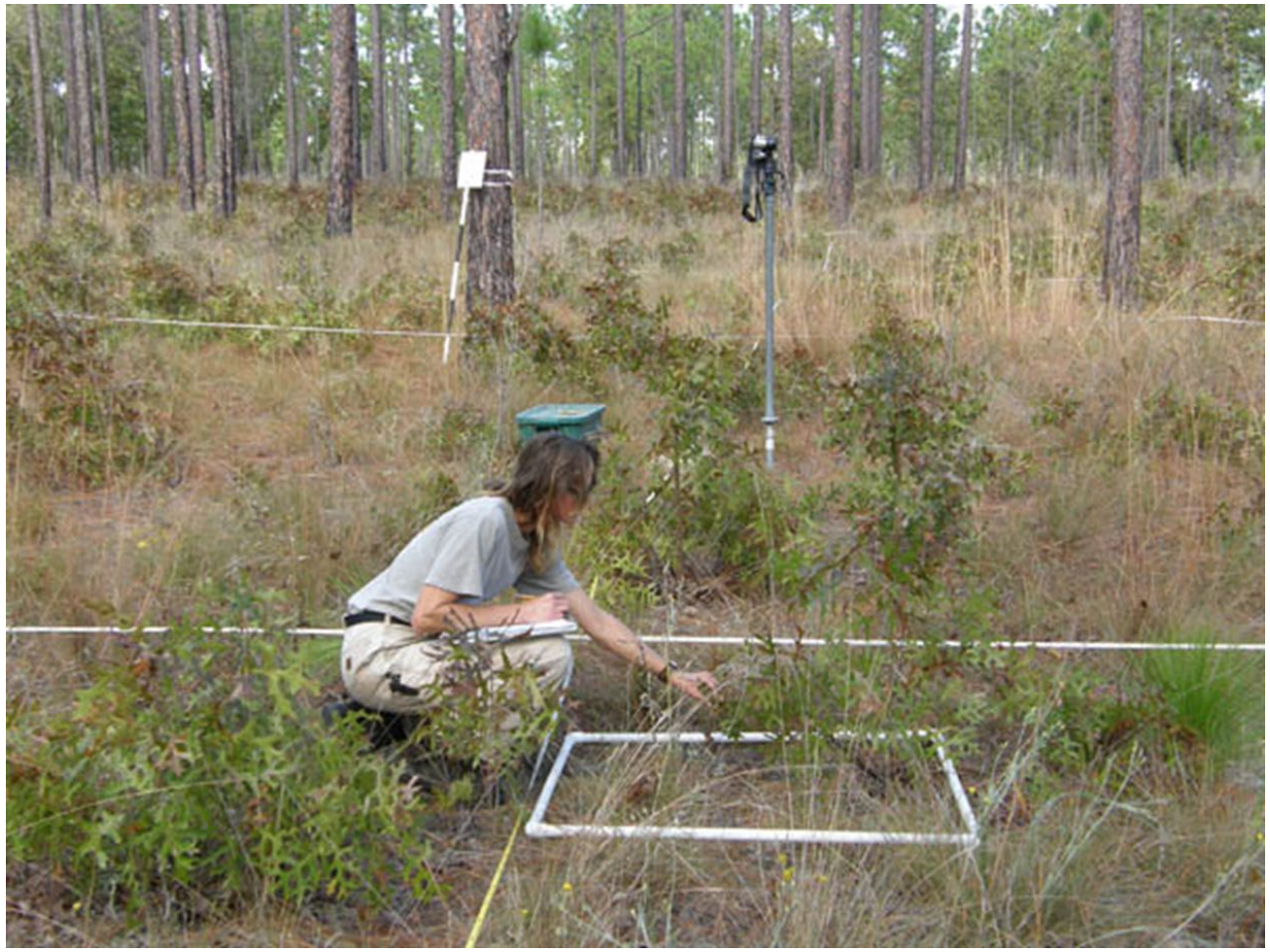
- Simple and accessible

Start out with asking

"What do you want to find out?"

Monitoring methods

- Vegetation plots
- Fuels
- Litter and duff
- Photo plots



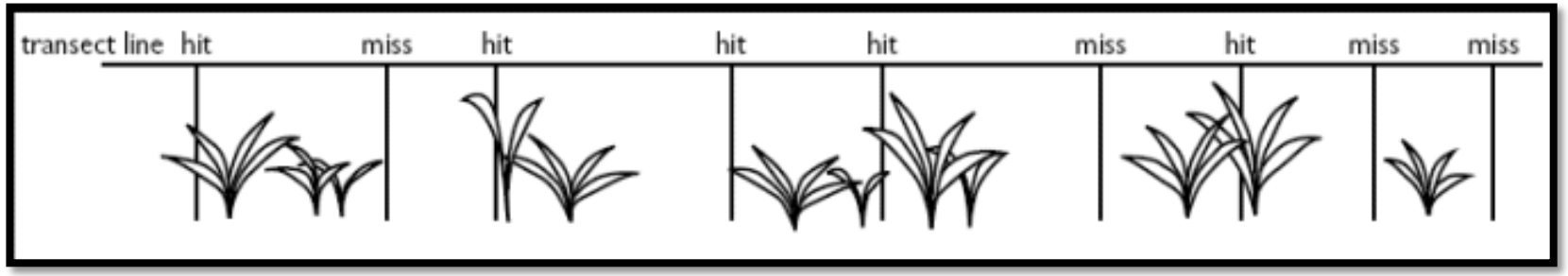
Ordway Swisher Biological Station

Intensive monitoring design:

- Sample everything inside 1m square plot
- Or sample as a % cover
- Count individuals by species, or by group name (legumes, ferns, forbs, if species unknown)
- Followed by statistical analysis, and long term collection to show trends
- Randomly distributed across unit
- Repeatable for annual sampling

Moderate monitoring design: Fuels monitoring

- Point intercept sampling is done at 0.5m increments along a 50m line --Results in 100 points, expressed as %
- Multiple species possible at each point
- Dead fuels and bare ground is recorded



Fuels monitoring: Fuel Loading

Brown's Transects:

An inventory of dead woody fuels and duff.

Dead and down woody fuels have been grouped into classes that reflect the rate at which they can respond to changes in atmospheric conditions.

The classes are:

1 hour timelag fuels - less than .25 inches in diameter

10 hour timelag fuels - between .25 and 1 inch

100 hour timelag fuels - between 1 and 3 inches

1000 hour timelag fuels - between 3 and 8 inches

Photo: Forest Engineering Research Institute of Canada

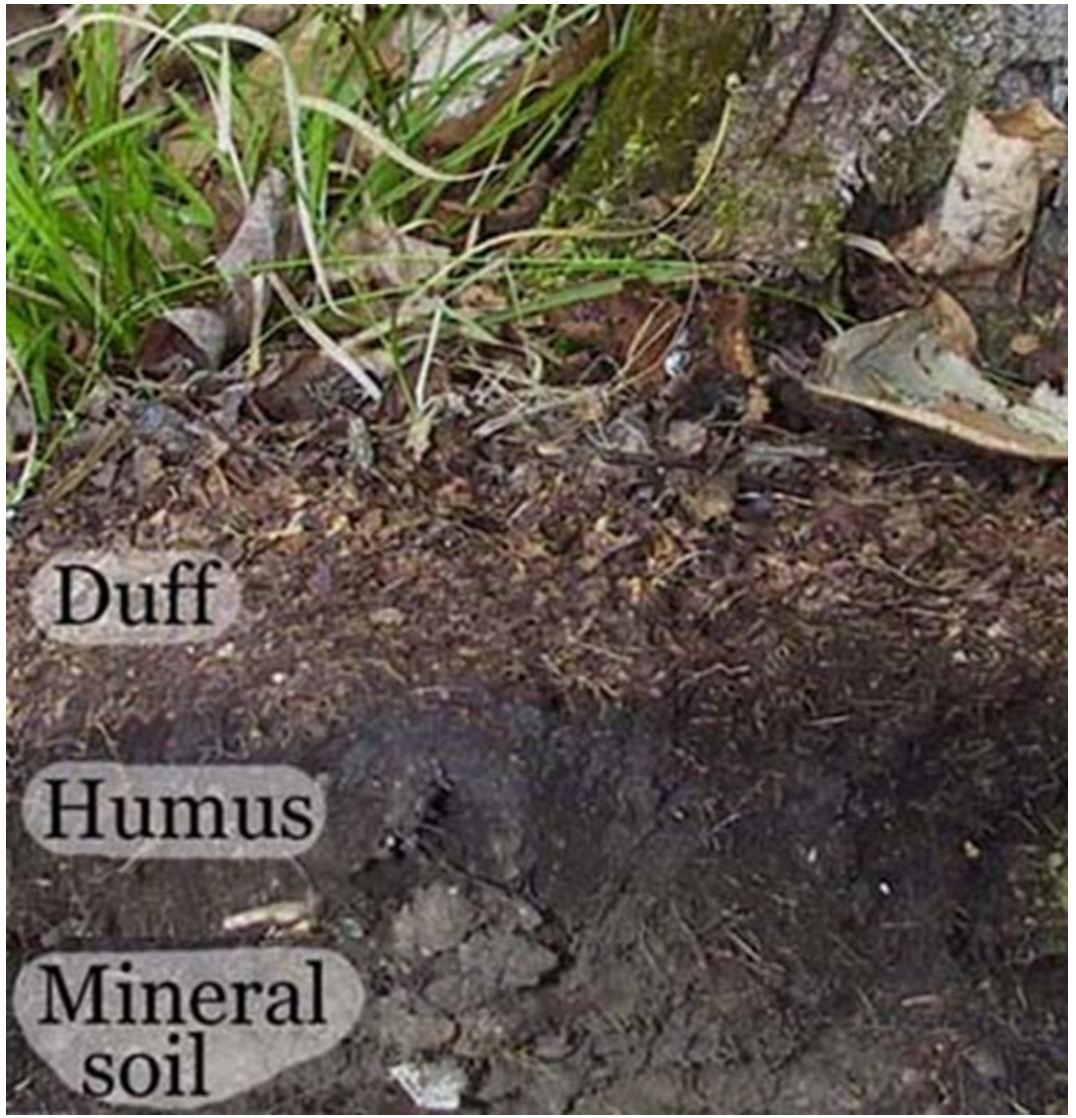
Simple monitoring design:

- Coarse measure of stand structure
- Visual representation of changes over time
- Capture results after a full growing season post-burn for representative vegetation response
- Take at regular intervals, repeatable points of view
- Continue monitoring, even during non-burn years

- Photos taken looking N, E, S, W
- Take from same location every time

Litter and duff monitoring

- **Litter**: composed of loose debris of branches, twigs, bark, leaves and needles; little altered in structure by decomposition.
- **Duff**: layer of decomposing organic materials; subject to drought/moisture cycles; combustible.
- **Humus**: vegetation unrecognizable; mixing of soil and organic matter is underway.
- **Mineral Soil:** has little to no combustion potential.



Litter and duff monitoring: Measuring depth

- Dig through litter layer until duff is reached, without compressing layers
- Measure depth of litter layer
- Excavate duff until mineral soil is reached; measure depth of duff layer
- Track gradual reductions over time from low intensity duff reduction burns

Humboldt State University

Factors contributing to Plant Mortality

Top-kill:
Above-ground plant is destroyed by the fire, but the roots of the plant survive and are able to produce new stems and leaves.

Often does not result in true mortality, but can contribute to regaining control over hardwoods, waxy species, etc.

USDA Forest Service

Factors contributing to Plant Mortality

Crown Scorch

Browning of needles or leaves caused by heat from fire.

Mortality can occur later, depending on how complete the scorch is, and the **time of year**, coniferous vs deciduous trees, adaptability to stress, **post-fire environmental conditions**, etc.

Estimating Crown Scorch

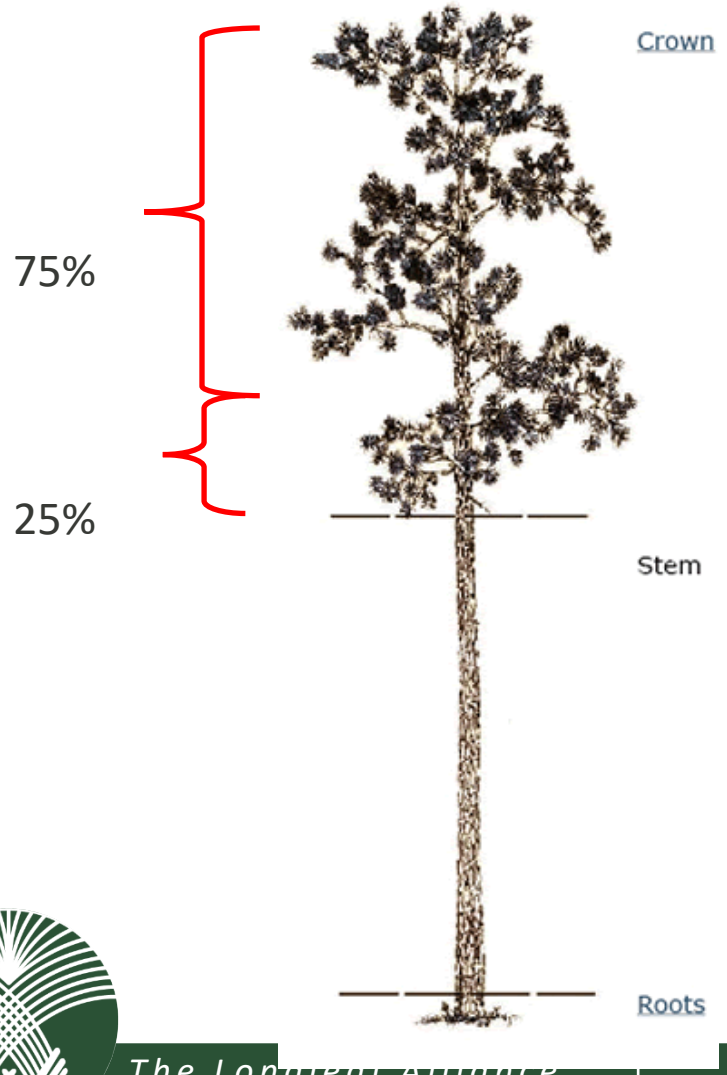


Photo: nature.org

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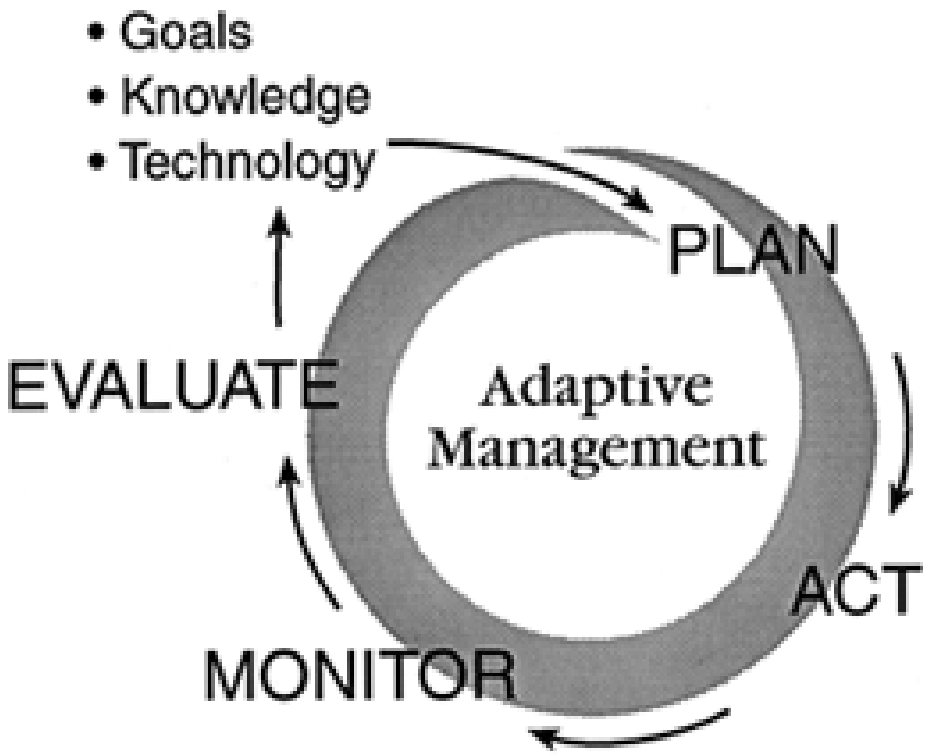
Summary: Evaluating the burn

- Monitoring informs management
  - Keep doing what you're doing?
  - Or change if the results aren't desirable
- Look to past results to evaluate appropriateness of burn-day conditions
  - "Adaptive management"



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