

Direct and indirect effects of fire in Bahamian Pineyards





UGA2651060



UGA1404018

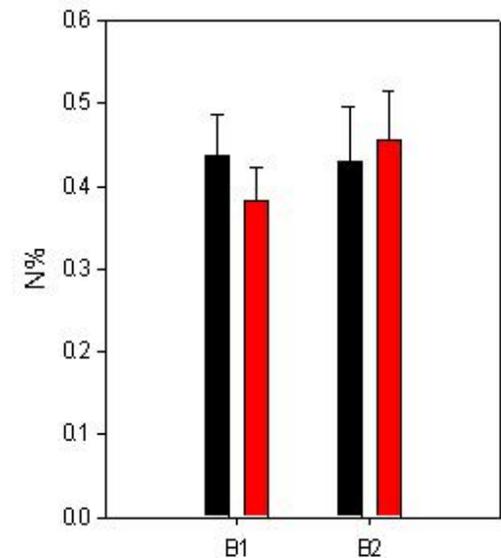
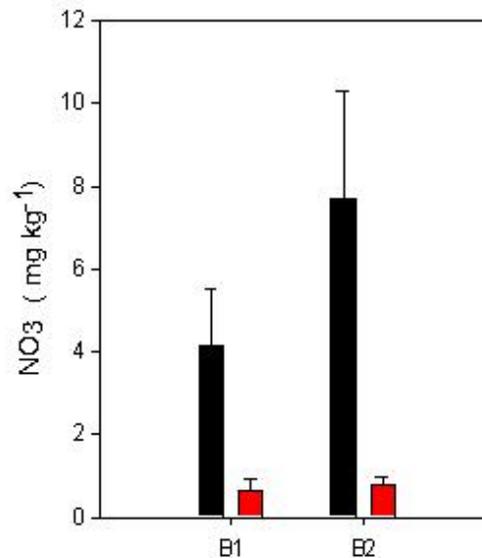
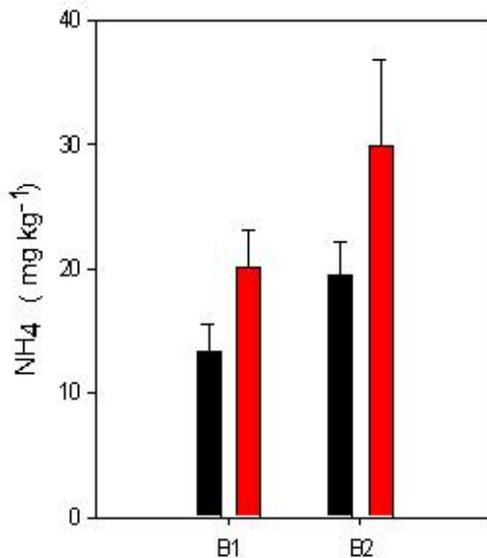
- Tools for fire management
– Research

Direct vs. Indirect Effects

- **Determined by presence or absence of an intermediate variable acting on another variable of interest...**
 - **Direct effect: Flames create lethal conditions in parrot nest cavity**
 - **Indirect effect: Fire effects on forest regeneration are mediated through fuel distribution**

Combined

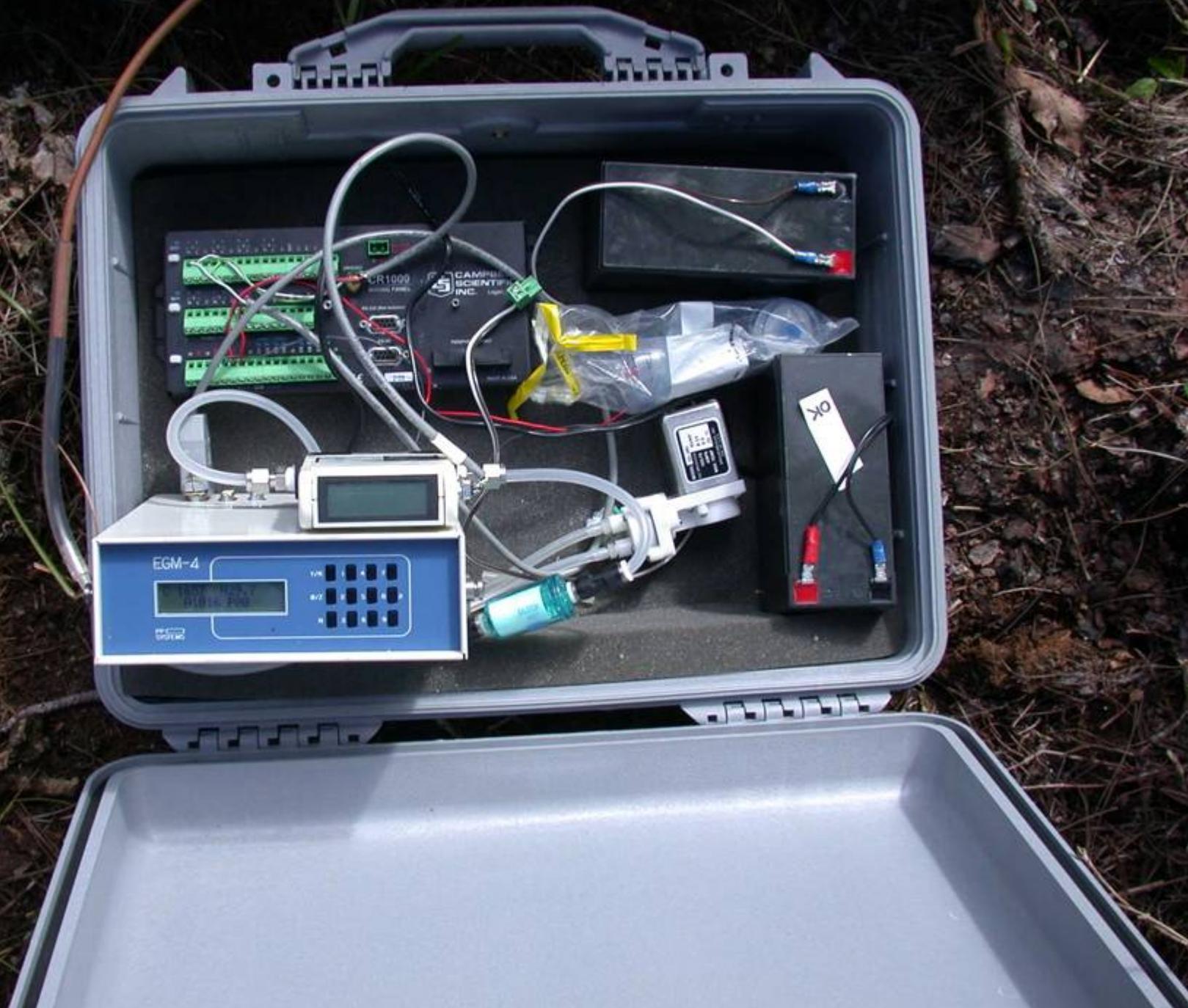
- Fire has both direct and indirect effects on soil nutrients
 - **Direct:** fires remineralize/volatilize nutrients, alter pools
 - **Indirect:** remineralized nutrients stimulate plant growth



Parrots and fire

- How do flames affect the conditions inside a parrot nest cavity?
 - Temperature
 - Carbon Dioxide
 - Smoke

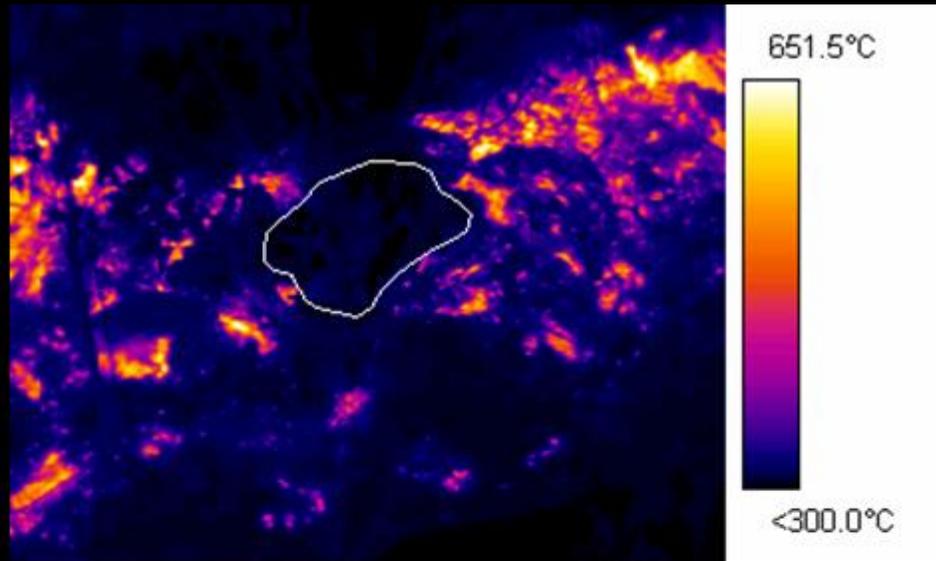


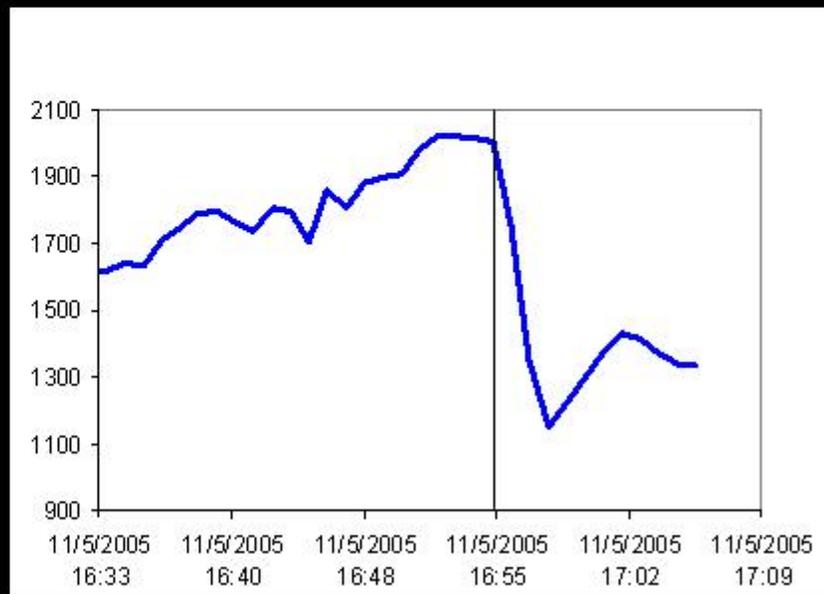
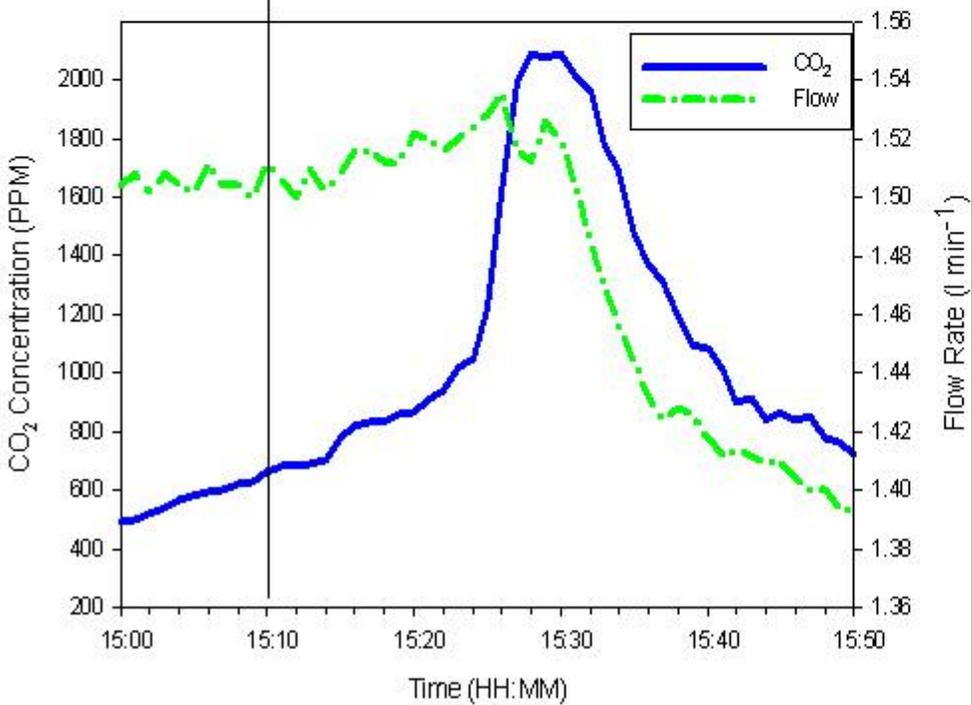
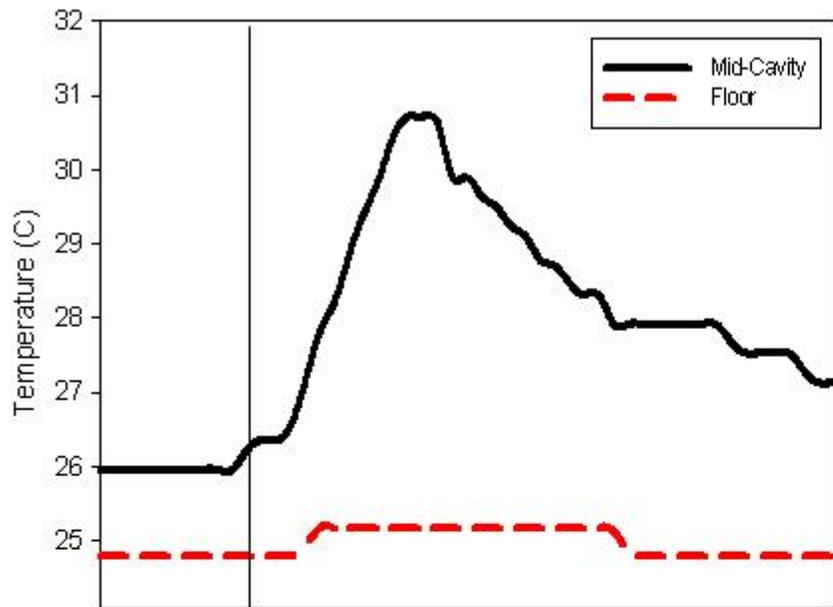


EGM-4
10K
5VZ
H
DS100

CR1000
CAMPUS SCIENTIFIC INC.

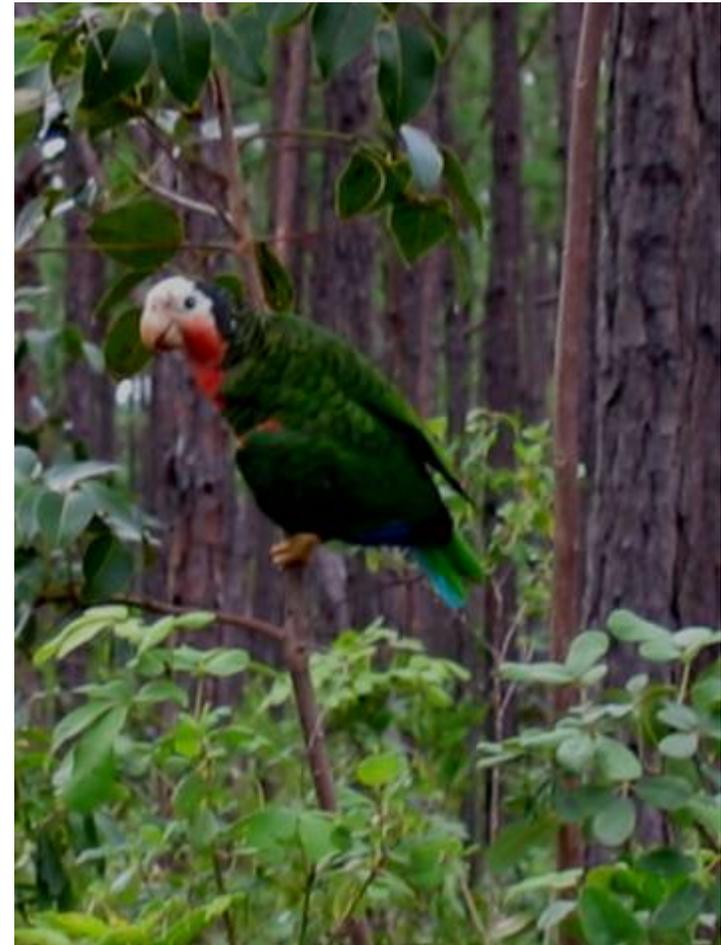
OK





Direct effects of fire likely minimal

- **Smoke tolerance a question.**
- **Temperature and CO₂ levels well below lethal. (Fires can actually reduce CO₂ levels)**
 - **G.P. Mori and C. Stahala observed low mortality after a fire passed several occupied nests**
- **Indirect effects extremely important: Pineyards are fire dependent**



Indirect effects of fire

Fuel indirectly affects stand regeneration patterns





High seedling density: ~2,000/ha

Fairly dense overstory: ~150 trees/ha

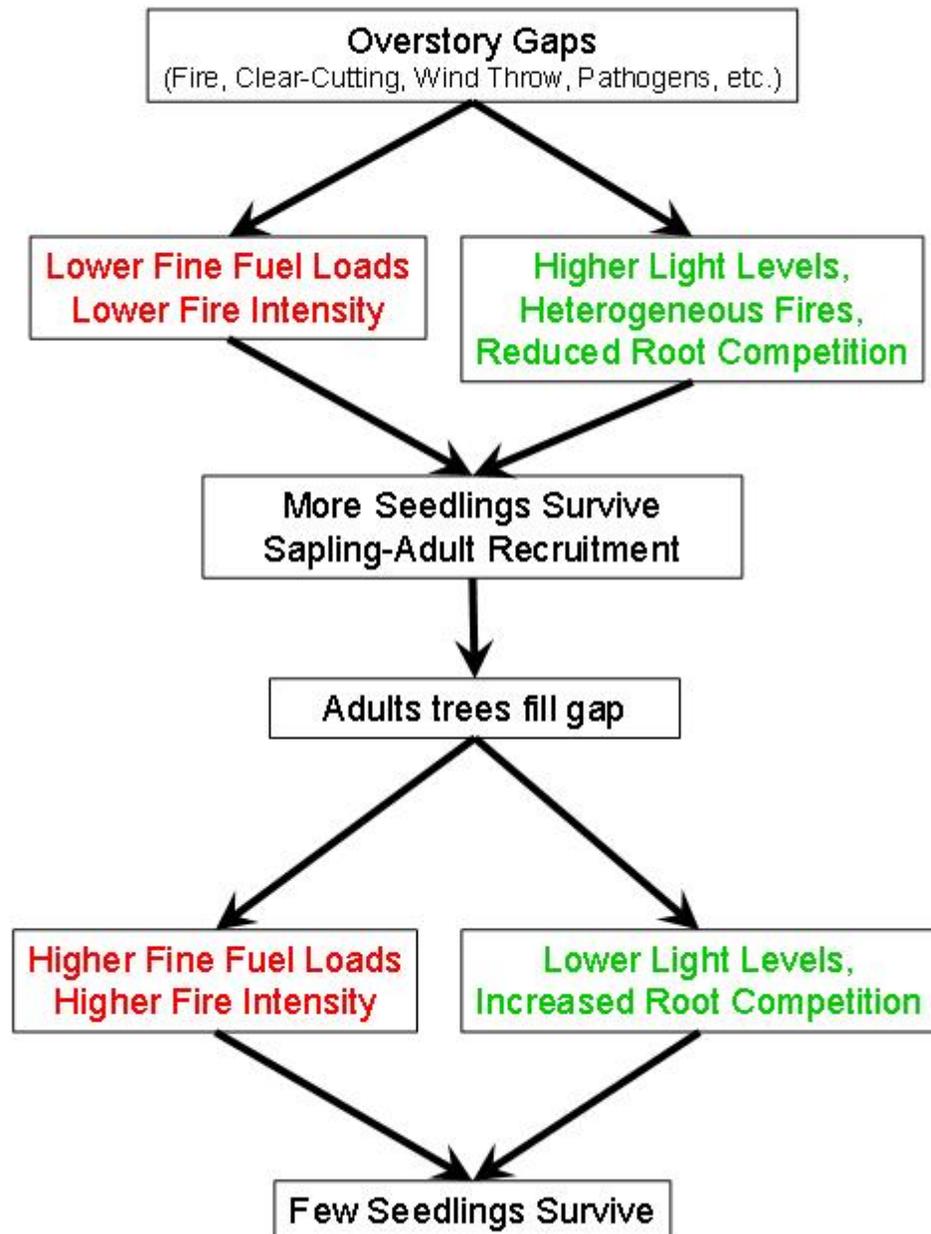
Few saplings: < 15/ha

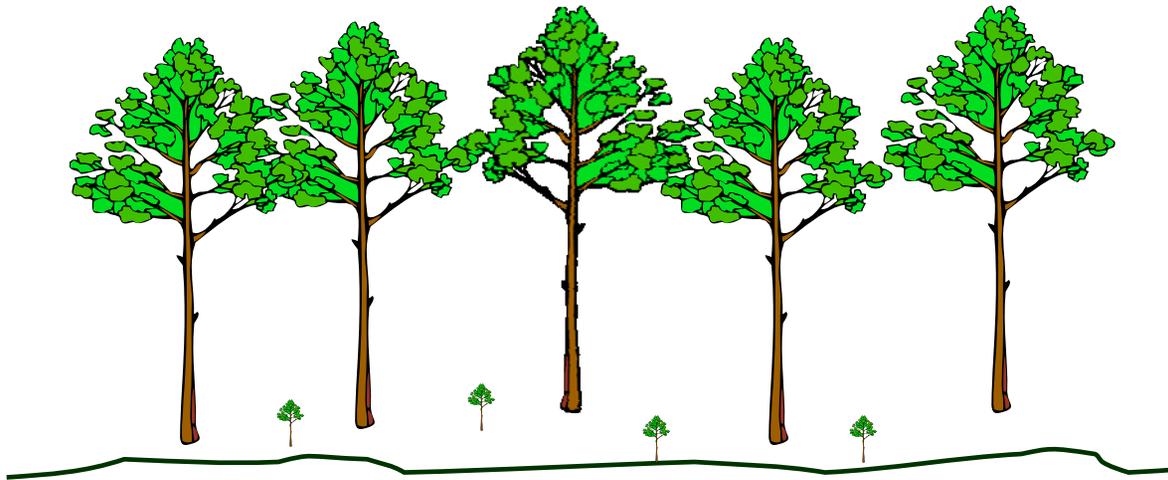
Gap regeneration as driven by fire



Fine Fuels

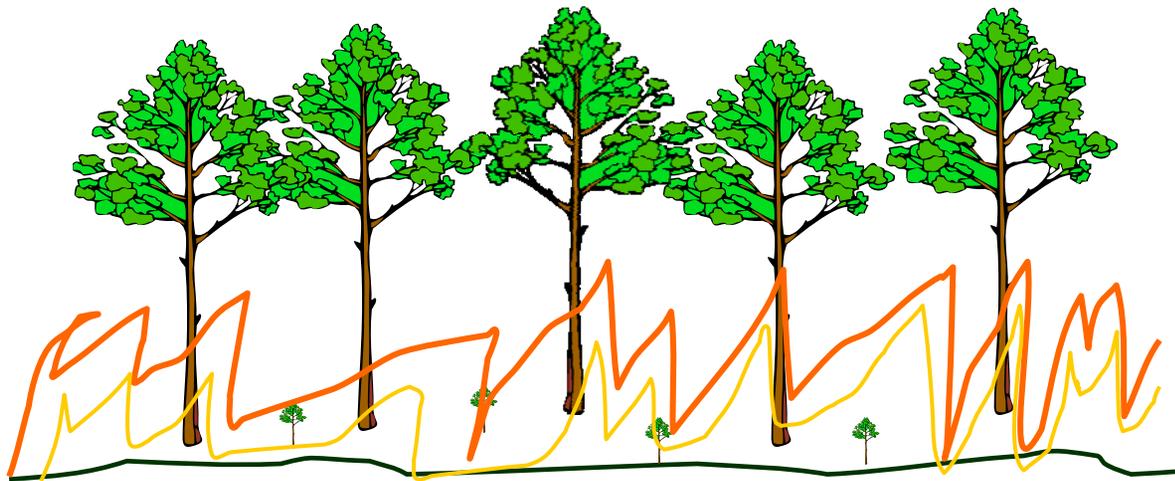
- **Pine needles, grasses, small twigs, etc. drive fire dynamics in frequently burned ecosystems.**
- **Pine needles are #1**
 - **fuel continuity**



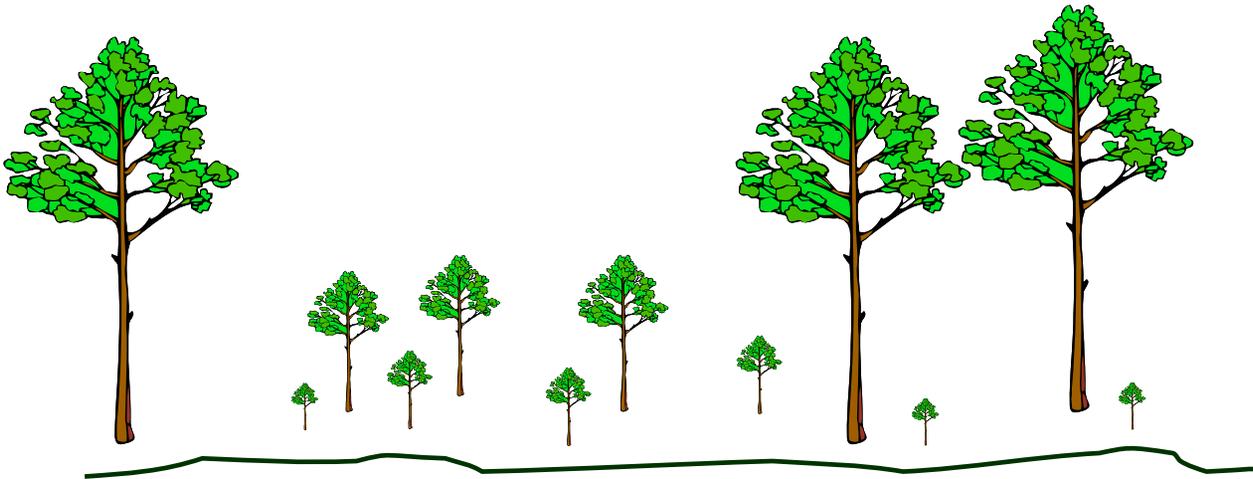


Closed Canopy = Homogeneous Fuel Bed

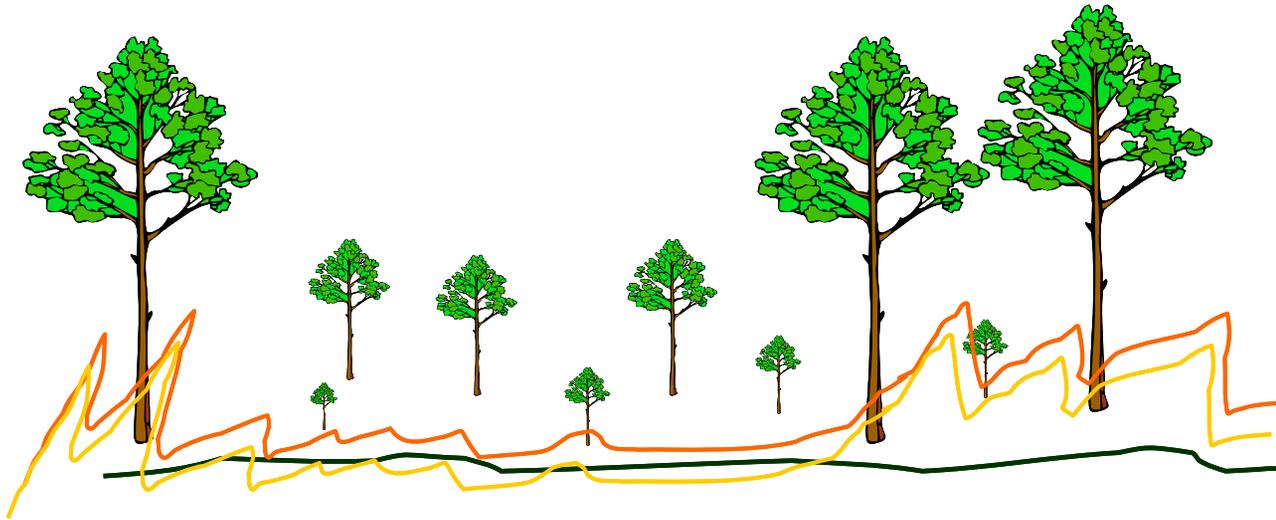
Abundant Seedlings, Few Saplings



Fire is frequent, relatively uniform, few seedlings survive.



**Canopy gaps create areas with less fuel
(also reduced competition from mature trees).**



Lower fire intensity in gaps, more seedlings survive and grow faster.



Information Gaps

- Impact of gap size: single tree death to stands flattened by hurricanes
- How long for seedlings to become fire tolerant?
- Fuel loading and distribution: micro- and macro- scales: impacts on other vegetation
- Micro-scale fire return interval: how patchy are fires?
- Timing of fires: Day vs. Night



Structural Equation Models can be used to test conceptual models.

