**Effects of Wildfire on Stream Ecosystems and Fish Exercise**

**Materials**

1. Stream simulation diorama
2. Watering can
3. Five or so small model fish (Optional)
4. Paint tray with vegetated sod
5. Paint tray with burned or hydrophobic soil
6. Green tree branches (riparian and conifer)
7. Burned tree branches
8. Rubbermaid wash tub to catch runoff from diorama (if indoors)
9. Bucket with macroinvertebrates on algae covered rocks (Optional)

**Exercise**

1. Discuss Unburned Stream
	1. Place green trees in holes on diorama and 3 pseudo fish in stream channel (current carrying capacity).
	2. Pour water over paint tray with vegetated sod into diorama stream.
	3. Explain how vegetation prevents erosion, promotes streambank stability, influences infiltration, and provides stream shading.
2. Discuss Immediate Effects of Wildfire on Stream Ecosystems
	1. Replace green trees with burned trees.
	2. Stream heating from the fire itself.
	3. Altered water chemistry from smoke and ash leaching (phosphorous, ammonium, nitrogen).
	4. Fish population declines and even complete fish kills are possible. Remove all fish from stream channel to simulate a fish kill.
3. Short Term Effects of Wildfire on Stream Ecosystems
	1. Decreased stream shading-increased solar radiation-increased stream temperature. Point out burned trees and open canopy.
	2. Increased nutrient inputs from burned trees.
	3. Increased productivity-algae, macroinvertebrates, fish condition and population size (if connectivity permits recolonization from complete fish kill). Put all five fish in stream channel to show increased production.
	4. Pour water over paint tray with hydrophobic soil.
	5. Discuss altered hydrology and sediment delivery effects: increased surface runoff, increased peak flow, increased erosion, increased sediment delivery (fines and gravel-debris flows cobble?)-may cause habitat and fish population instability-explain why fine sediment is bad for fish (take three fish out to show population instability). Contrast this with the unburned demonstration.
4. Discuss Long Term Effects of Wildfire on Stream Ecosystems
	1. Simulate a wind/blow down event. Place streamside burned trees in stream channel and discuss benefits of increased LWD recruitment-cover, pool formation, gravel deposition etc.
	2. Discuss how spring high water events eventually remove fine sediment exposing gravel recruited from the fire/debris flows. Explain or ask why gravel is important to trout.
	3. Increased size and abundance of fish (4-5 fish in stream channel for the long-term as opposed to the three fish we started out with in the unburned scenario-increased carrying capacity).
	4. Habitat and population stability.

Alternatively discuss macroinvertebrate population response and shifts in macroinvertebrate functional feeding groups following a wildfire (immediate, short term, and long term) in relation to habitat change and recovery (increased fine sediment and increased algae production). Show live macroinvertebrates.

**References (Gresswell 1999 is the best summary)**

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