

Protecting and Restoring Ponds Following a Wildfire

Quick facts....

- Ponds and streams are vulnerable to an influx of sediment, ash, fire retardant, nutrients and other potential contaminants following wildfire.
- Flame retardants used in wildfire control can affect pond water quality.
- If ponds have been severely impacted by post-fire ash and sediment provide an alternative water source for livestock until steps have been taken to assure water quality.

Surface water bodies such as ponds and streams are vulnerable to an influx of sediment, ash, fire retardant, nutrients and other potential contaminants following wildfire. Property owners in burned areas need to protect their ponds and streams from further degradation and evaluate the suitability of these water sources for pets and livestock.

Postfire delivery of ash and sediment is the greatest concern for pond health following wildfire. Ash is mainly composed of particulate organic matter from burned plant material but also contains nutrients and other elements found in the forest. High-alkalinity runoff from burned areas may increase pond pH temporarily but tends to become neutralized as it is diluted by sufficient quantities of fresh water. Research has shown that ash concentrations rapidly decrease through a series of moderate-intensity convective storms in the first rainy season after the fire. Maximum impacts from ash and other fine-grained sediment tend to occur soon after the fire. Ash may contain trace levels of lead, antimony, arsenic, copper, mercury or zinc, but concentrations in water that exceed guidelines for livestock drinking water have rarely been documented. It has been observed, however, that low concentrations of ash can clog fish gill surfaces leading to respiratory failure in fish.

Nutrient levels in surface water (ammonium, nitrate, phosphate, potassium) and alkalinity have been observed to increase following ash input. Concentrations of each returned to prefire conditions within several days to several months (depending upon refreshment rate and erosional events) and generally are not considered to be a significant threat to healthy livestock. Increased concentrations of major ions (calcium, chlorine, magnesium, sodium, sulfur, potassium) as well as turbidity, conductivity and pH have been documented in stream water below the point of ashing, while dissolved oxygen may decrease.

The potential for severe soil erosion is a consequence of wildfire because as a fire burns it destroys plant cover and the litter layer. Large quantities of post-fire sediment can overwhelm the habitat requirements for fish, as well as organisms that depend on water for some life stage, such as amphibians and insects. There are several steps landowners can take to reduce the amount of soil sediment and surface contaminants that reach your pond or stream. Contour log terraces can be constructed using dead trees placed upslope of the waterbody perpendicular to the direction of the slope to reduce the velocity of the runoff. In severe fires, the combustion of vegetative materials at the soil surface causes the soil form a waxy layer that repels water - a phenomena called hydrophobicity. This hydrophobic condition increases the rate of water runoff and can overwhelm pond capacity in the event of thunderstorms. Commercially available straw wattles and silt fences can be purchased and installed in areas where runoff is more dispersed over a broad flat area. Straw bales can be securely placed and staked in small drainages to act as dams - collecting sediments from upslope and slowing the velocity of water traveling down slope.

Fire retardants are water soluble ammonia-based chemicals generally considered to be non-toxic to terrestrial organisms and of low to moderate toxicity to aquatic organisms. They have no odor once in water but may create a noticeable red or orange coloration. Flame retardant contains an ammonium polyphosphate solution that can make its way into ponds and streams. Ammonium polyphosphate is a

common component in fertilizers and will sting if it gets into cuts or scratches. To be safe, do not allow pets and livestock to drink water that appears to contain fire retardant or other chemicals. If your animals appear ill after drinking from puddles or standing water, make sure your veterinarian knows that they may have ingested contaminated water.

Assuming your pond is refreshed by clean stream water or groundwater, pond water quality should improve over time. However, if steps are not taken to prevent up-gradient erosion, your pond can continue to deteriorate. Testing is recommended if you suspect the quality of your pond water has been impacted by flame retardant or contaminated runoff. Provide an alternative water source, preferably groundwater, until you are satisfied that the surface water is safe for your animals. CSU Factsheet 0.520 "Selecting an Analytical Laboratory" offers information on how to select a certified water quality testing laboratory and provides a list of commonly used laboratories throughout Colorado (<http://www.ext.colostate.edu/pubs/crops/00520.html>). Interpretations of water quality results for livestock and irrigation purposes are available at: <http://region8water.colostate.edu/wqtool/index.cfm>.

For More Information

- Colorado State University Extension Fact Sheets on Water
<http://www.ext.colostate.edu/pubs/pubs.html#water>
- Soil Erosion Control after Wildfire. CSU Extension Factsheet 6.308
<http://www.ext.colostate.edu/pubs/natres/06308.html>
- Caring for Livestock During Disaster CSU Extension Factsheet no. 1.815
<http://www.ext.colostate.edu/pubs/livestk/01815.html>

For additional information on using your pond or stream following a wildfire contact your local county department of health or your local county Extension agent (<http://www.ext.colostate.edu/contact2.html>).

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