

The background of the slide is a close-up photograph of parched, cracked soil. The cracks are deep and irregular, forming a complex network of lines across the surface. The color of the soil is a light tan or beige, and the lighting creates strong shadows within the cracks, emphasizing their depth and the overall texture of the dry earth.

Impacts of Drought on Environmental Resources

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Overview

- **About COA Watershed Protection Department (WPD)**
- **Topics:**
 - Ecosystem Services
 - Water Quality
 - Aquatic Ecosystems
 - Riparian Health
 - Stormwater Treatment
- **Research Needs**



About WPD

- **Mission:**
 - Water Quality Protection
 - Erosion Control (stream restoration)
 - Flood Hazard Mitigation
- **Enterprise fund department (drainage utility)**
- **Head count = ~260 FTEs**
- **Budget = ~\$60M/year (operating and CIP)**



WPD Mission

- **Water Quality Protection**
 - Pollution Prevention and Reduction
 - Monitoring and Evaluation
 - Regulation (TPDES MS4)
 - Stormwater Treatment
 - Public Education
- **Erosion Control / Stream Restoration**
 - Engineered Solutions
 - Passive/active Riparian Restoration
- **Flood Hazard Mitigation**
 - Floodplain Management
 - Flood Early Warning System
 - Creek and Localized Flood Hazard Mitigation



Ecosystem Services

Drought Diminishes Ecosystem Services:

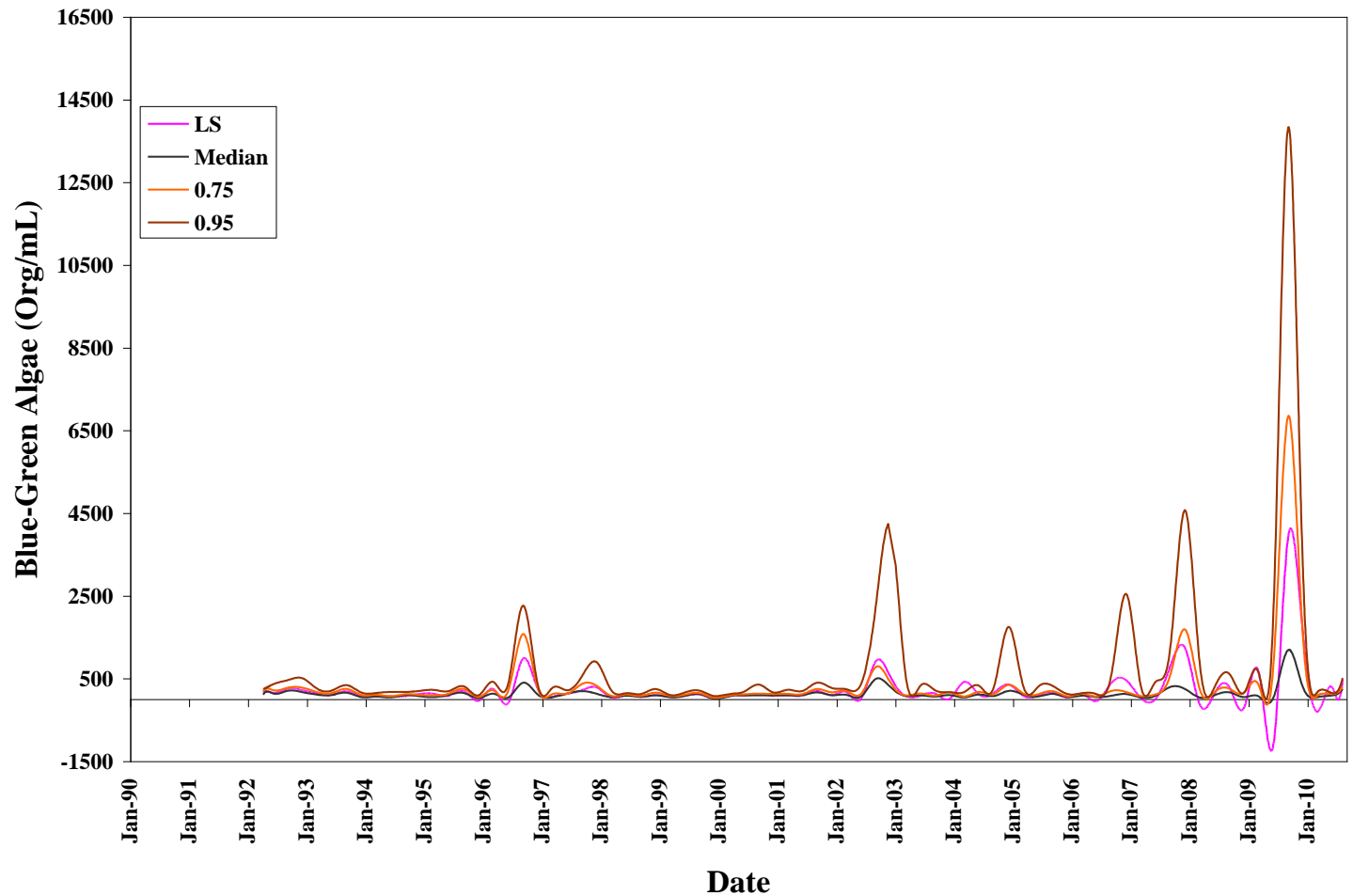
- Water supply (e.g., improving aquifer recharge)
- Erosion and sediment control
- Air and water pollution prevention and control
- Hazard mitigation (e.g., flooding, wildfire)
- Local and global climate regulation
- Habitat functions
- Food and renewable non-food products
- Social and cultural benefits (e.g., passive/active recreation)



Water Quality

- **Water Quality Degrades during Drought – Duh!**
 - Reduced assimilative capacity (dilution is the solution)
 - More pronounced impacts from wastewater discharges
 - Accumulation of non-point sources of pollution – loads spike with runoff events
 - Increasing frequency and magnitude of algae blooms
- **Indicators:**
 - Increased concentrations of chemical constituents
 - Elevated temperatures
 - Lower Dissolved Oxygen
 - Increased phytoplankton blooms
 - Increase algae growth in effluent dominated streams

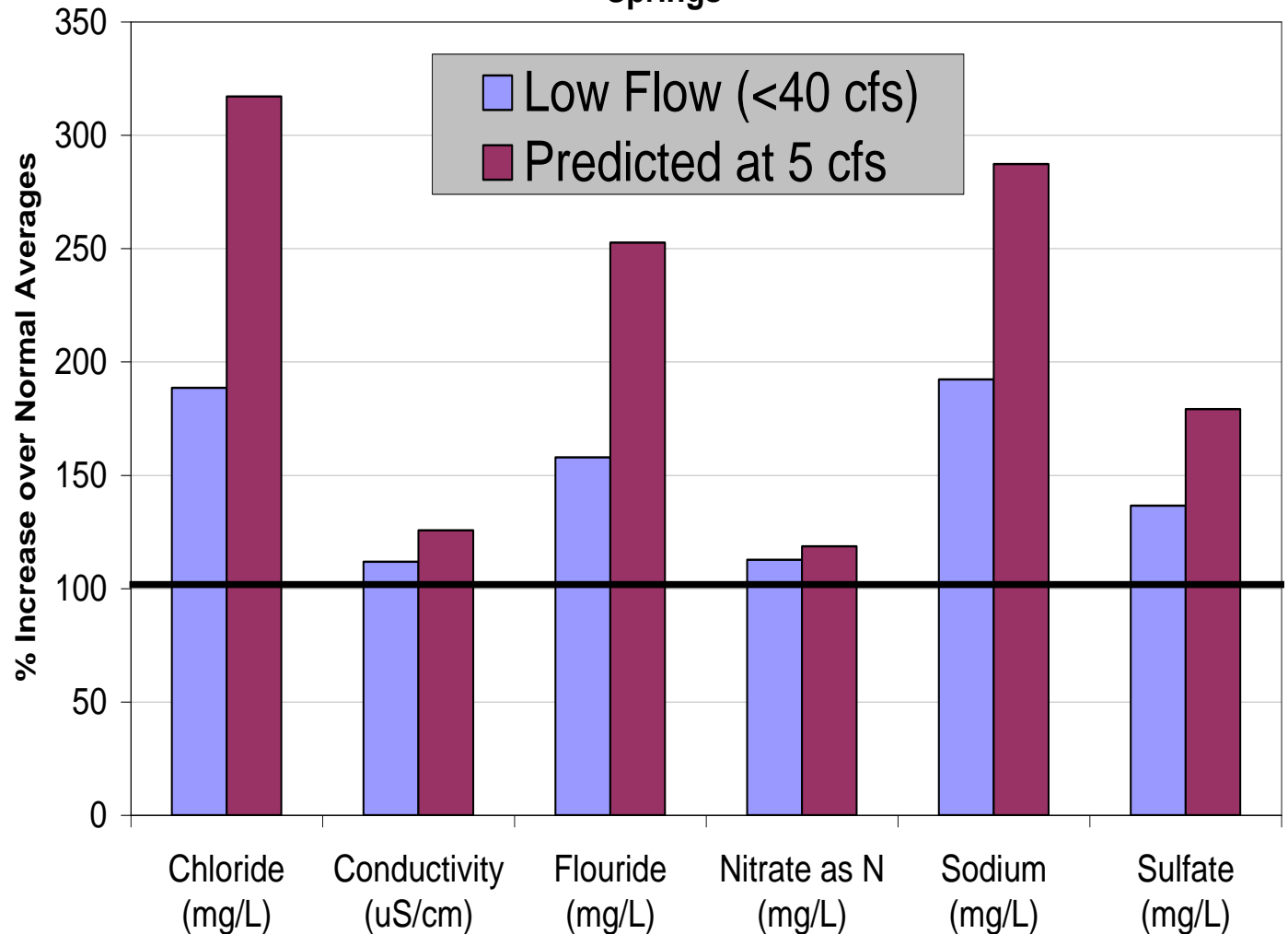
Water Quality



**Concentration of Blue-Green Algae at the
COA Ulrich Water Treatment Plant**

Water Quality

% Increase over Average Normal (>40 cfs) Conditions at Barton Springs



Water Quality



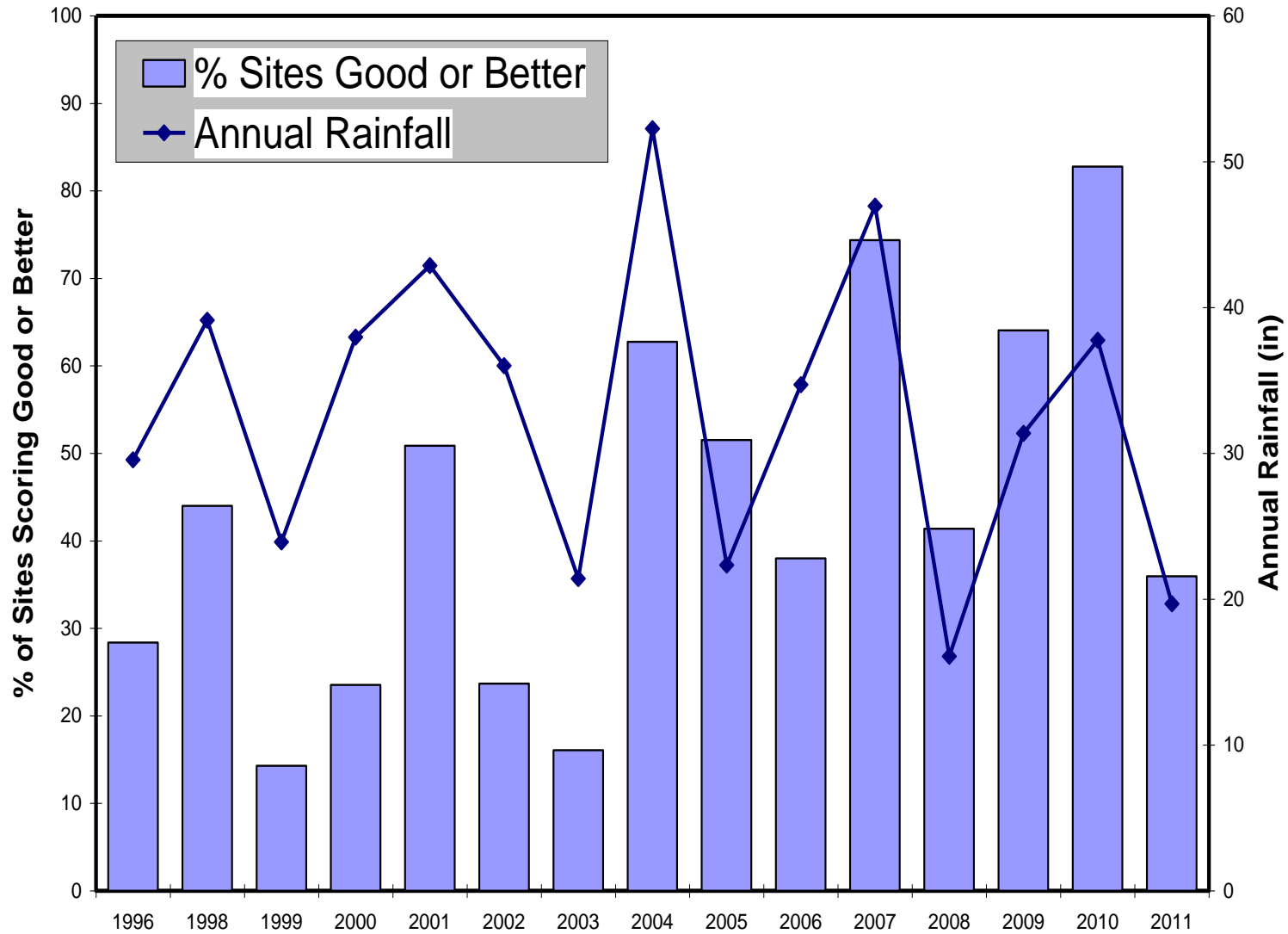
Impaired creeks during low flow (temp, DO, concentrated nutrients)



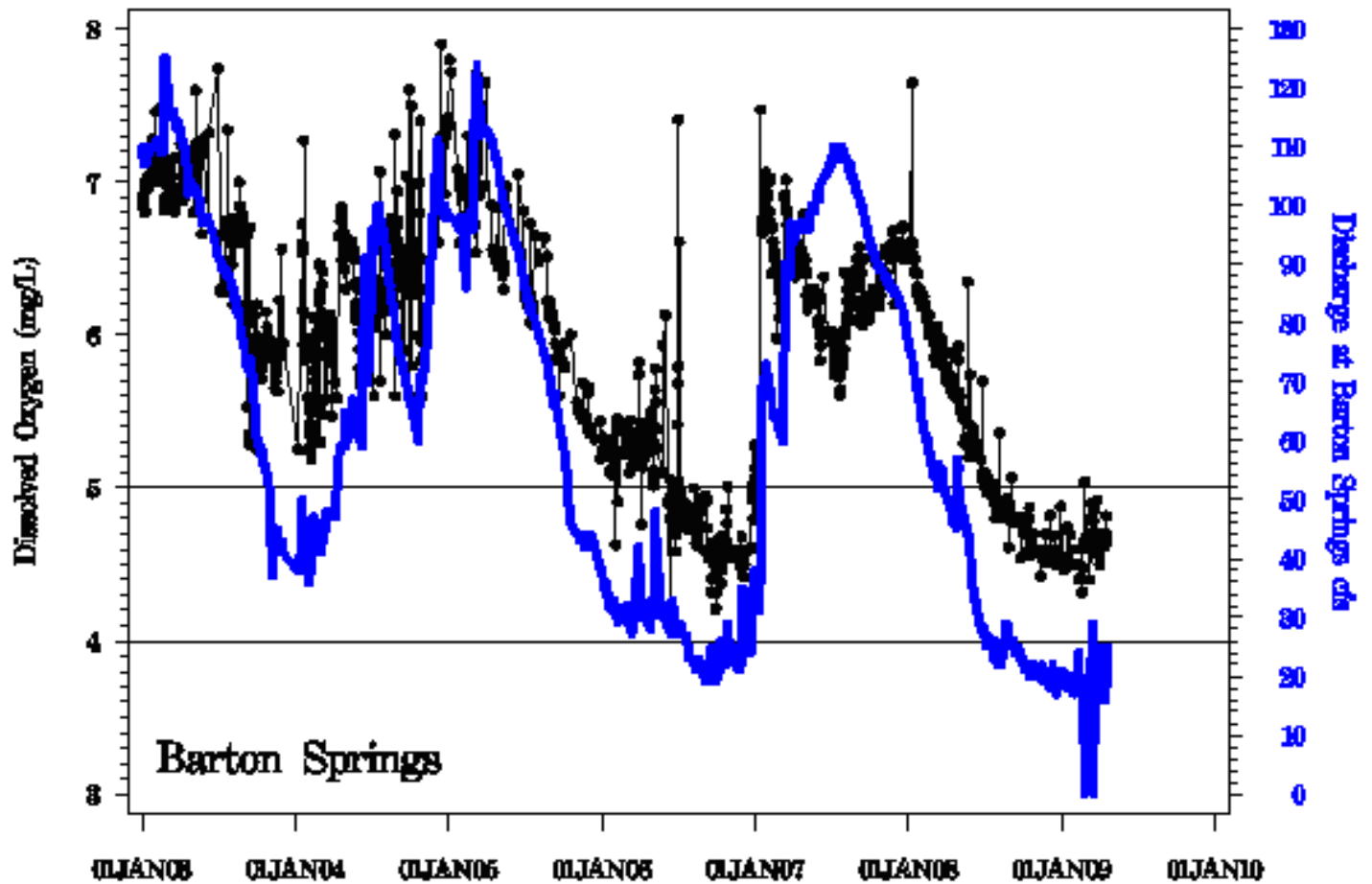
Aquatic Ecosystems

- **Health of Aquatic Ecosystems Degrades during Drought – Duh!**
 - Quality of habitat
 - Extent of habitat
- **Indicators:**
 - Lower aquatic life indicator scores
 - Population counts of endangered salamanders
 - Size of endangered salamanders

Aquatic Ecosystems

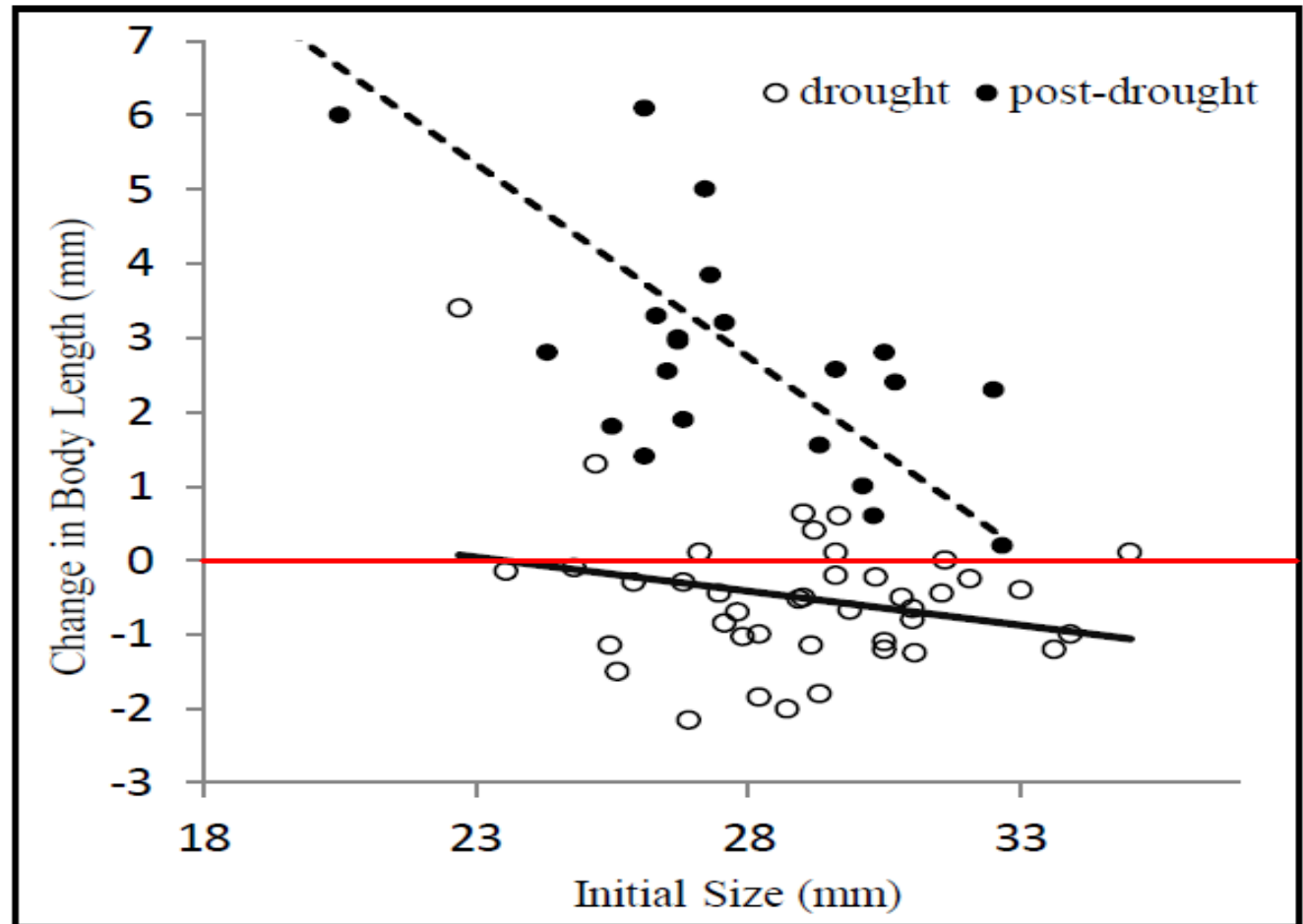


Aquatic Ecosystems



Dissolved Oxygen at Barton Springs

Aquatic Ecosystems



Size of Individual Jollyville Plateau Salamanders Impacted by Drought



Riparian Health

- **Stress on water dependent plants**
- **Erosion risk, due loss of root mass/soil structure**
- **More dead fuel and drier riparian areas are vulnerable to wildfire**
- **Open space/niches are vulnerable to invasive, nuisance plant communities**
- **Loss of bio-diversity and function**



Stormwater Treatment

Increased emphasis on the use of “green Infrastructure”, defined as:

- Engineered stormwater management facilities that utilize natural systems – vegetation and soils - to provide infiltration and filtration.

Some types of GI controls are vulnerable to drought:

- Wet Ponds
- Biofiltration
- Rain Gardens

Stormwater Treatment – Wet Ponds



← **September 2003**



August 2011 →

Stormwater Treatment – Biofiltration



← **August 2008**



August 2011 →

Stormwater Treatment - Wetponds



← **August 2009**



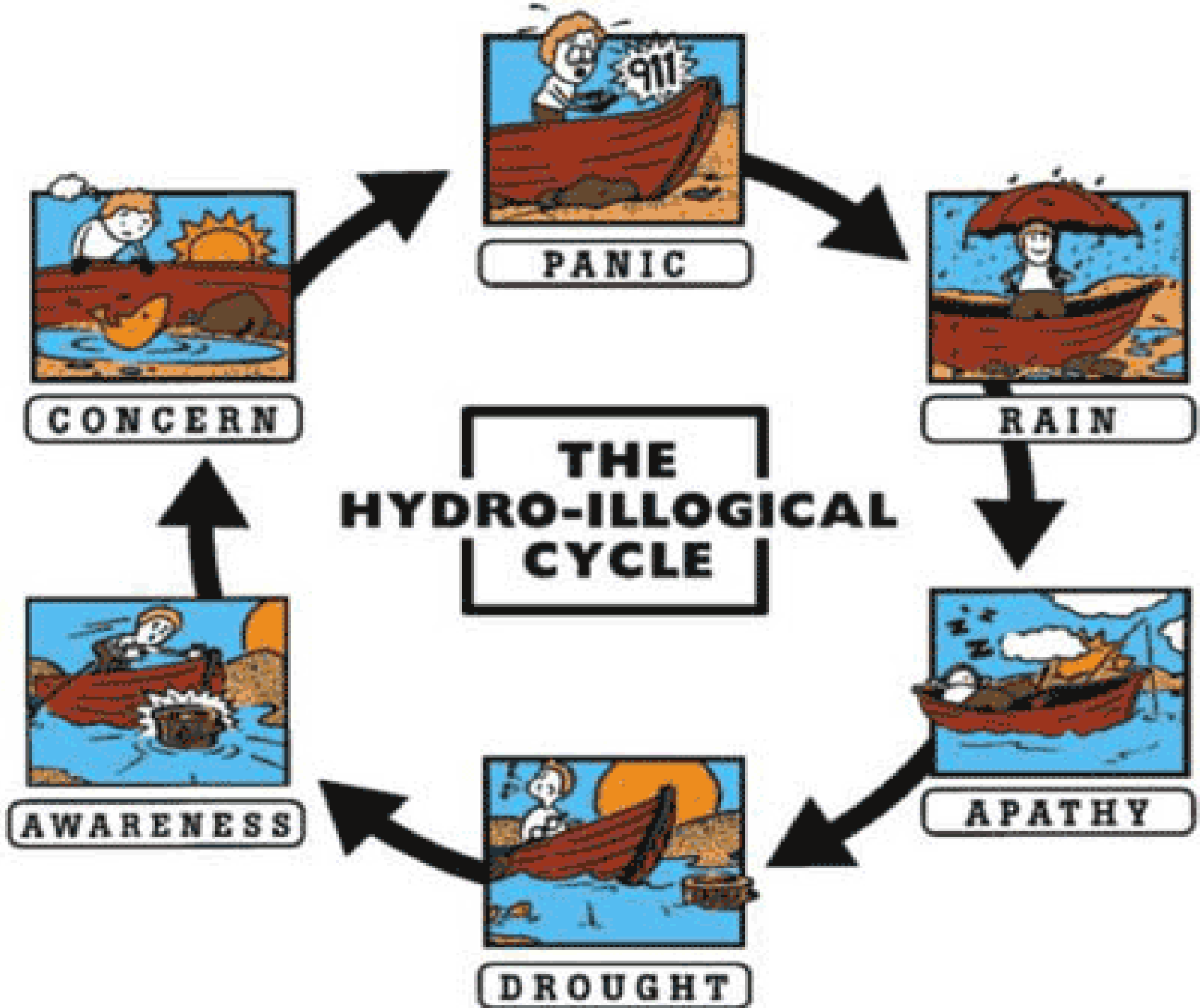
September 2011 →





Research Needs

- **Drought effects on riparian communities (losses, shifts, etc).**
- **Improved source tracking methods for identifying low-level chlorinated water or raw wastewater leaks in flowing ambient creek systems**
- **Methods for distinguishing nutrient sources (eg, OSSF, fertilizer, TLAP, animal waste, rain/soil) in ambient water samples**
- **Policy issues associated with a “new” hydrologic drought-of-record**
 - **Re-calculation of water supply yield**
 - **Adjustment of water rights, contracts?**



A photograph of a gravelly path leading into a wooded area. The path is made of light-colored gravel and stones, leading from the foreground into the distance. On either side of the path are various trees and bushes, some with green leaves and some bare. The sky is blue with white clouds. The word "Questions" is overlaid in the center of the image.

Questions

08.02.2006