

Brevard Bioretention 1



Brevard Bioretention 2



Lenoir Wet Pond



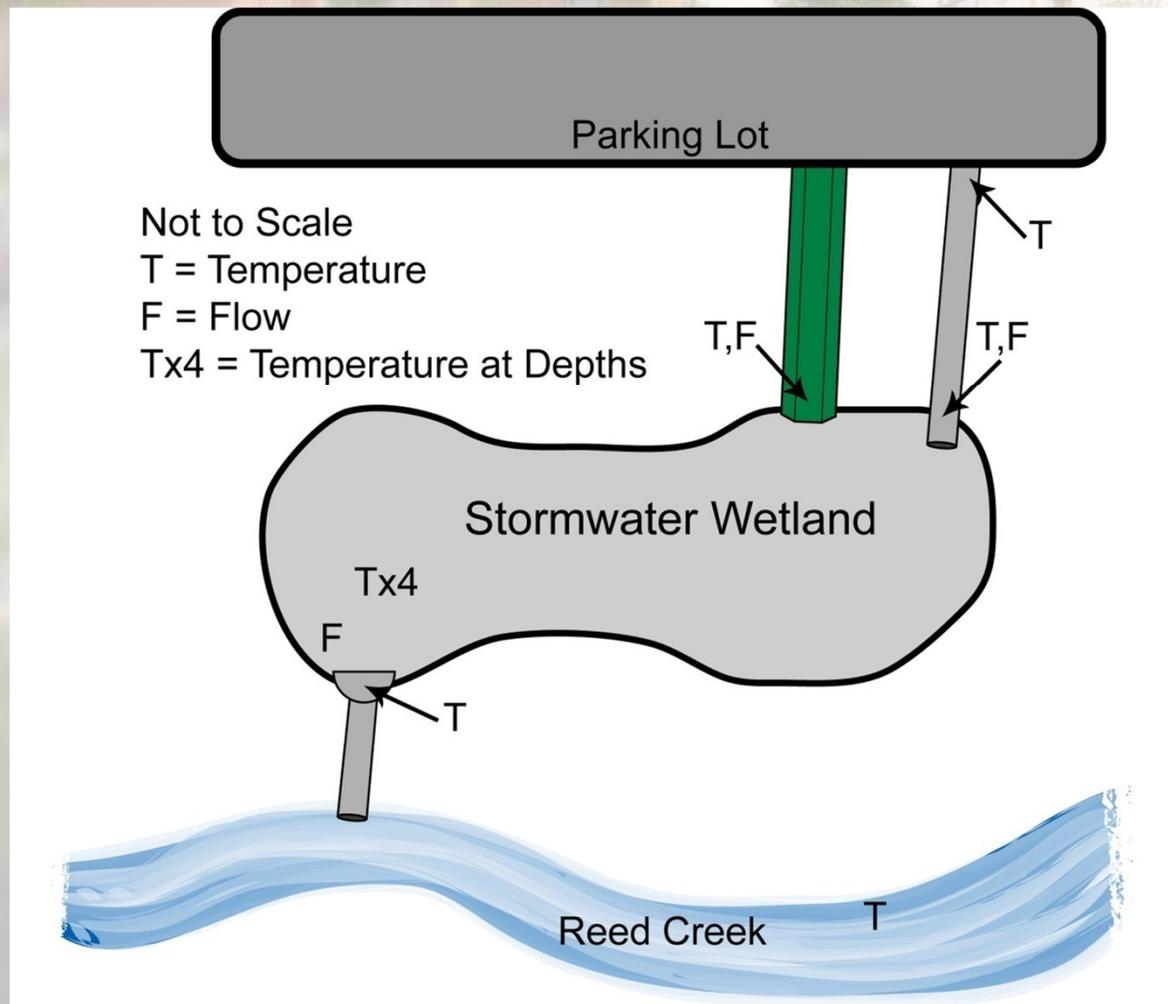
Lenoir Bioretention

Monitoring Strategy

- Water Temp Pro Logger
- 4 Channel Logger
- Tipping Bucket Rain Gauge
- Manual Rain Gauge
- Sargent Pulley-Float System
- Weir Boxes
- Logging Interval: 5 Minutes



Monitoring Strategy



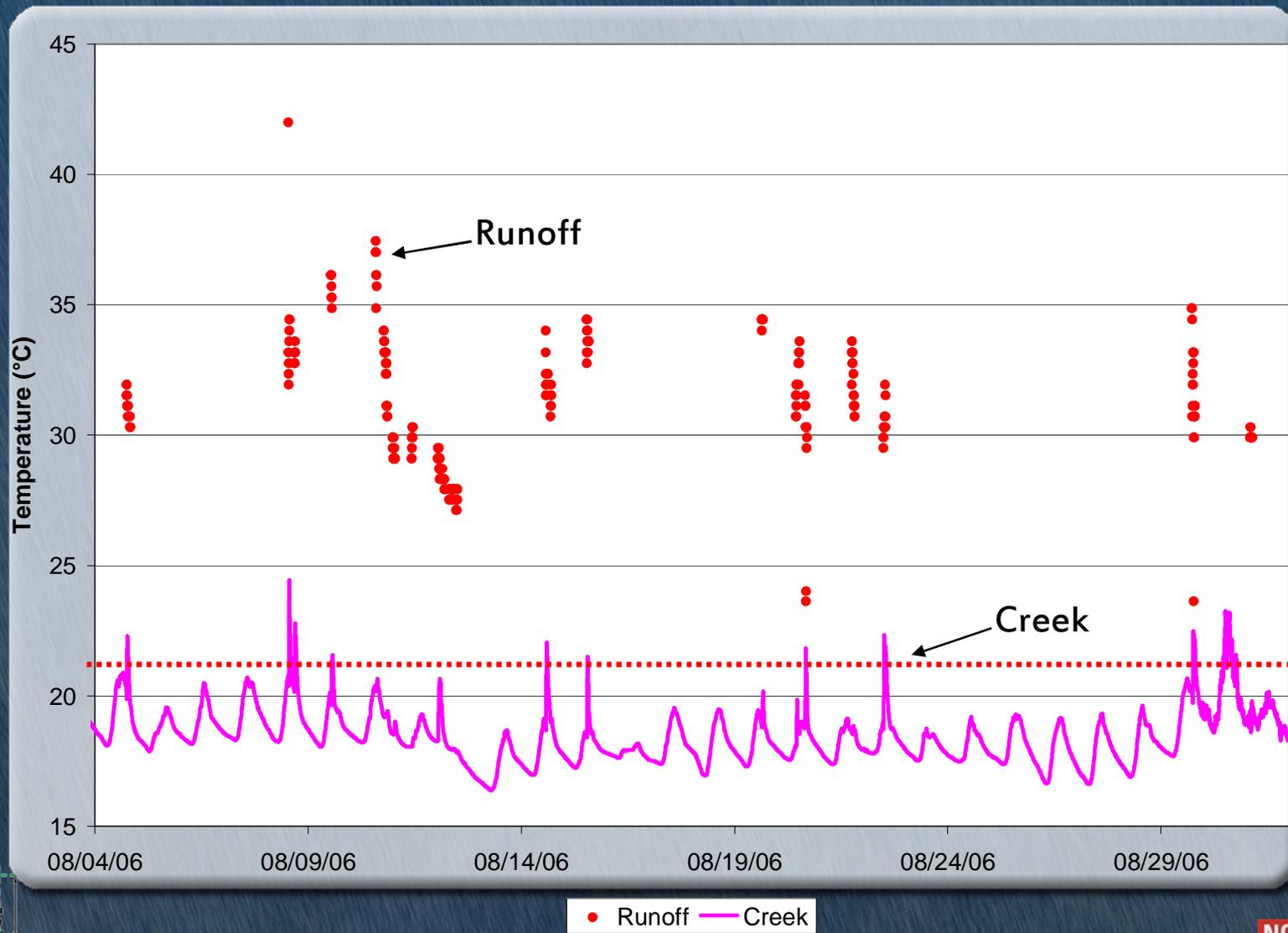
Monitoring Results

General Findings

- Median runoff temperatures warmer than 21°C at all sites during the summer
- Increase in stream temperature observed during rainfall events



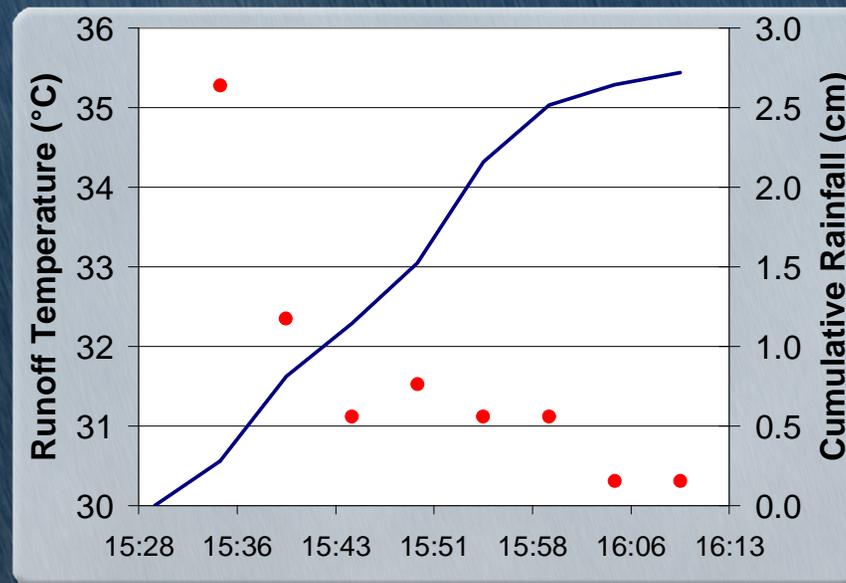
Monitoring Results



Design Guidance

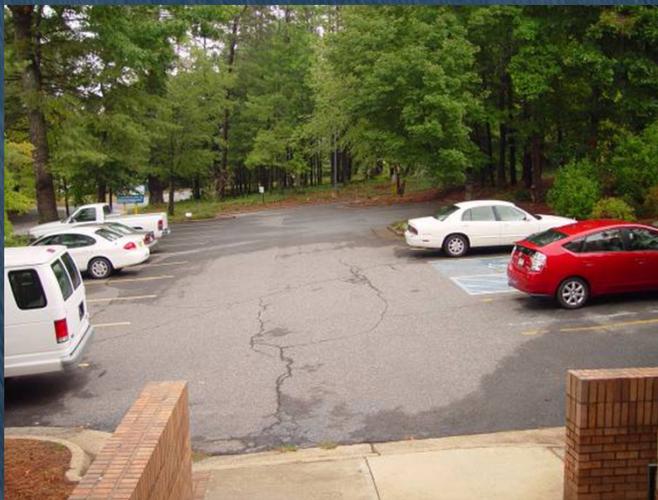
First Flush

- After 2.5 cm of rainfall, additional cooling unlikely, but still poses a concern
- Temperature is much more dynamic than conventional pollutants



Effect of Asphalt Shading

- Comparison between Lenoir sites
- Runoff from shaded site:
 - Significantly cooler than un-shaded site
 - Median runoff 0.43°C cooler



Light-Colored Chip Seal

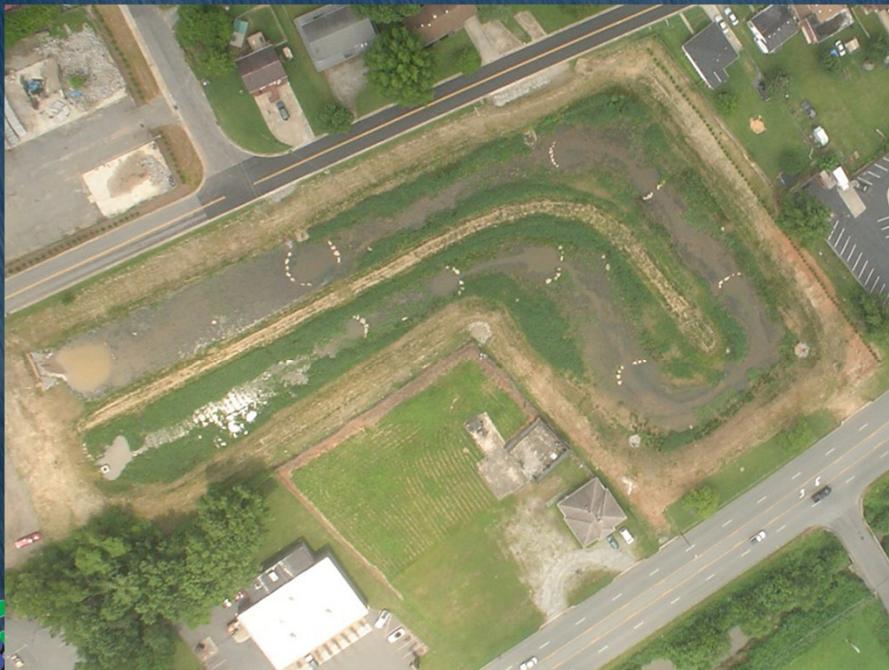
- Runoff from chip seal lot:
 - Not sig. different from standard asphalt runoff
 - Overall median was 0.73°C cooler
 - Potentially provided cooling similar to asphalt shading and older pavement surface



Stormwater Wetlands and Wet Ponds

Wet Ponds and, to a slightly lesser extent,
Wetlands provide exposure of open water to
sunlight.

Is that good for Thermal Load Reduction?



Stormwater Wetlands and Wet Ponds

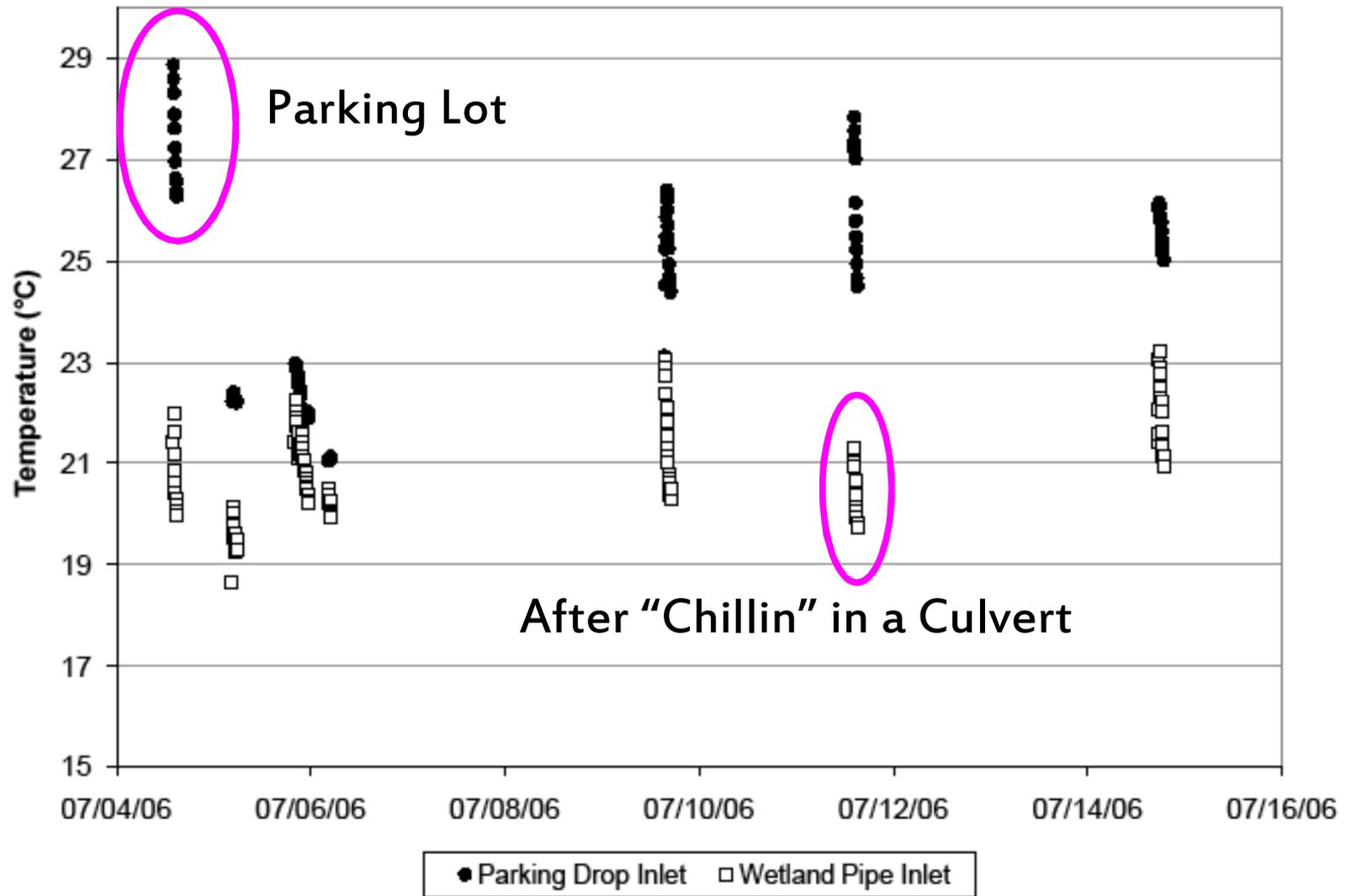
- An Advantage of Stormwater Wetlands:
PLANTS
 - Broad leaf plants
 - Leaves elevated above water surface
 - Avoid algae, duckweed
 - Promote mixing through plant stems



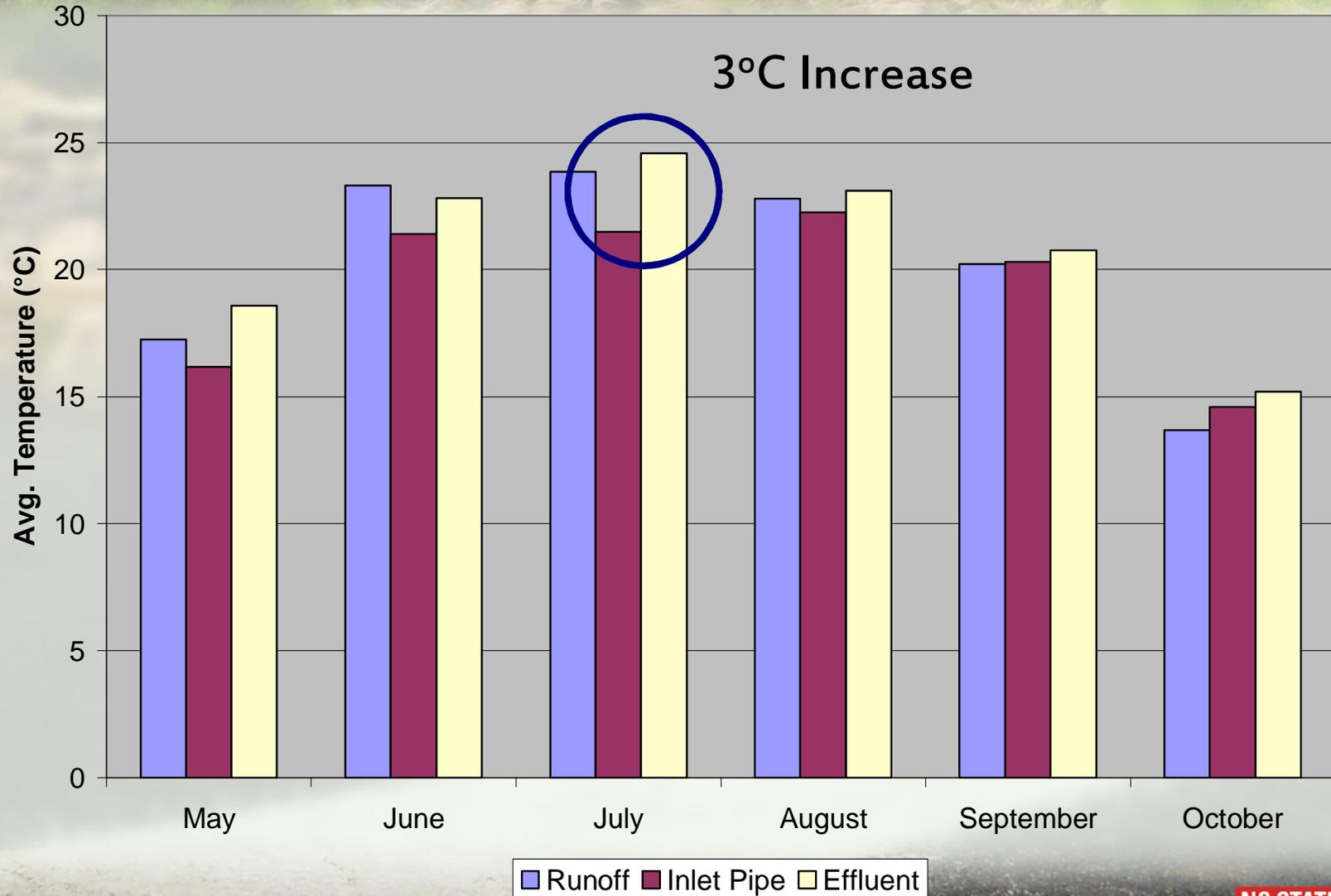
Stormwater Wetland

- Increased water temperature significantly from June through September
- Effluent temperatures decreased as storms progressed
- Substantial cooling occurred as water traveled through a buried metal corrugated pipe
- Effect of cooling was negligible due to warm water within the wetland

Side Note: A benefit of Pipes



Stormwater Wetland



Wet Pond

Wet Pond

- Results similar to stormwater wetland
- Effluent temperatures and water temperatures within the wet pond were warmer than wetland
- High fluctuation near surface due in part to algae and floating vegetation
- Effluent temperatures remained above 21°C from June through August

Wet Pond

- Runoff cooled in buried pipes before entering wet pond
- Bottom waters of wet pond warmer than incoming water
- Wet pond constant source of thermal pollution

Wet Pond

