



Streamflow and Rating Analysis of a Very Wet Year

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Technical Overview of a Very Wet Year
Oklahoma 2007
A "Hurricane" of a Year

National Weather Center, Norman, Oklahoma
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U.S. Department of the Interior
U.S. Geological Survey

Objectives

- Provide examples of extreme streamflow events (Water Year 2007, or WY 2007) for Oklahoma
- Summarize preliminary peak-flow conditions for WY 2007
- Compare year's events with historical data
 - Median runoff
 - Days of elevated flow (discharge)
- Summarize preliminary observations of channel geometry changes at streamflow gaging stations (erosion/deposition resulting in rating shift)



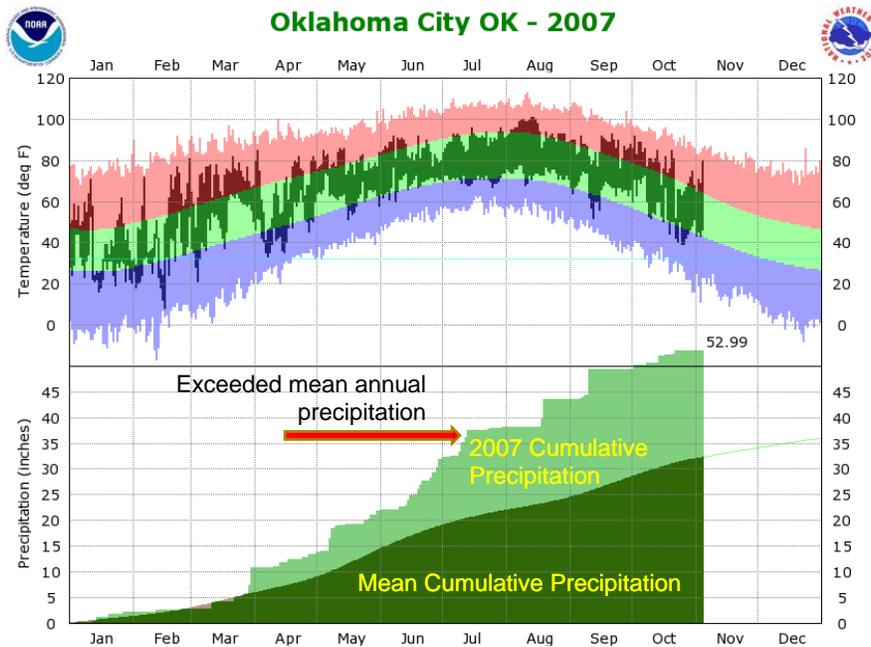
Preliminary Data - Subject to Revision

Summary

- Fourth-wettest year on record since 1925 (with respect to mean-annual runoff)
- Duration of elevated flow (discharge) was very high this year for many gages
- Streams on all major river basins experienced a change in channel geometry (erosion/deposition)



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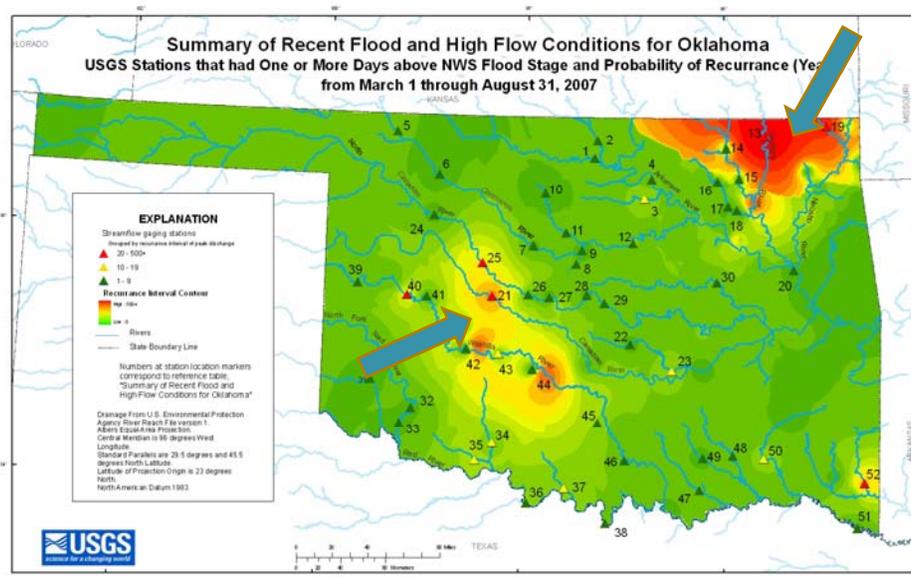


Peak-Flow Conditions

- Flood stage exceeded for one or more days at 52 of 75 USGS gages used by NWS
- An event of greater than 500 years occurred on the Verdigris River
- Another hot-spot of peak magnitude events occurred along the North Canadian, Canadian, and Washita Rivers (central and southwest)



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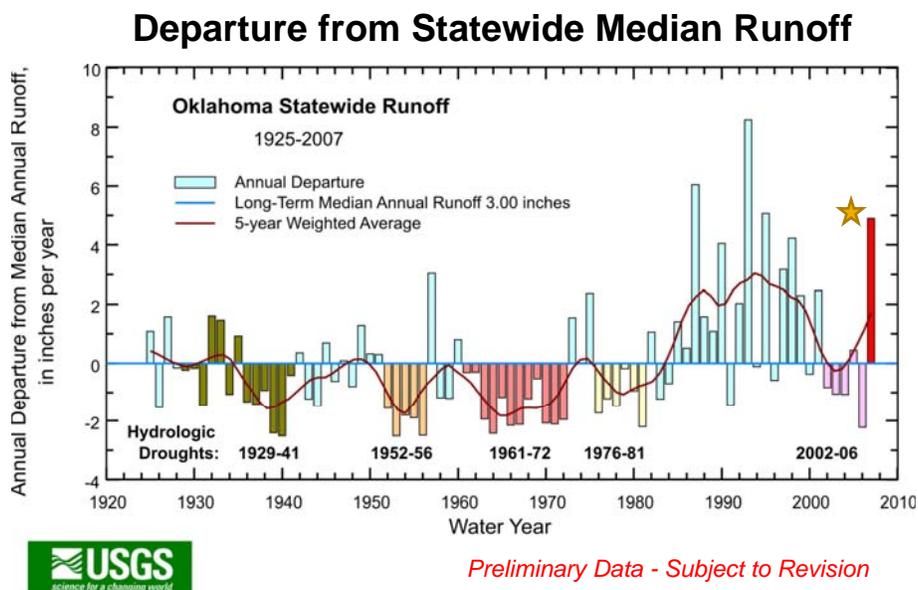


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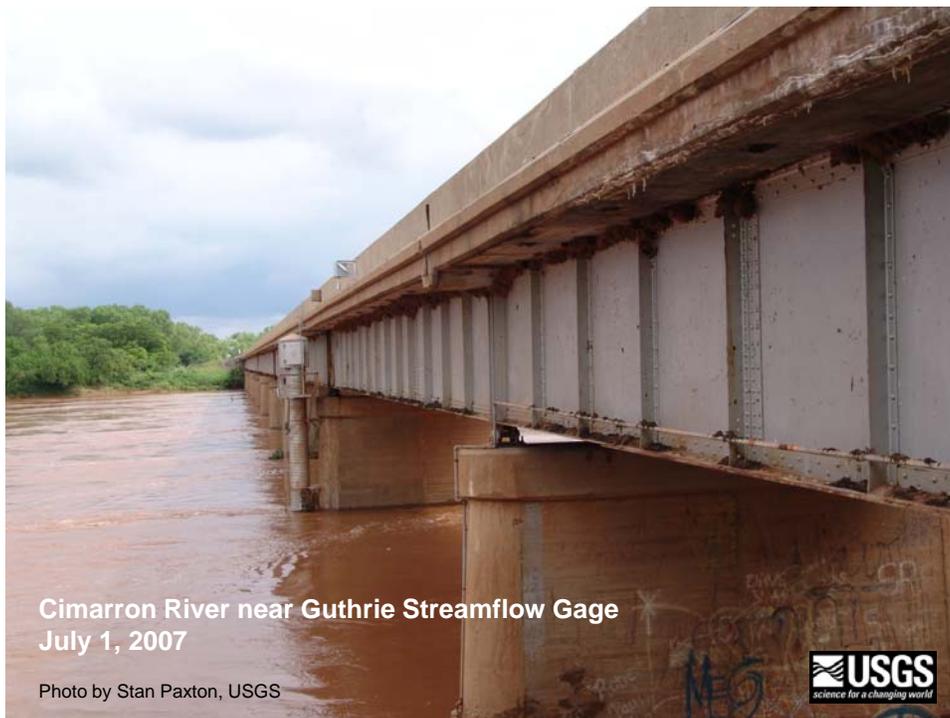
Magnitude of Runoff

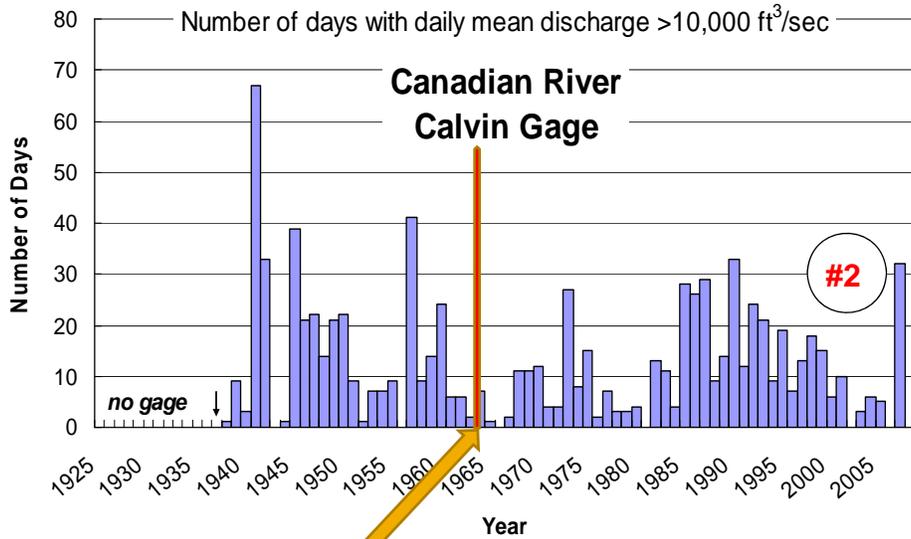
- WY 2007 4th wettest year on record since 1925 with respect to median annual runoff
- May have been higher if only later months were considered (wet year began in March)
- Rank also may have been higher if not for lower reservoir levels in October of 2006 (start of WY 2007)



Duration of High Flow

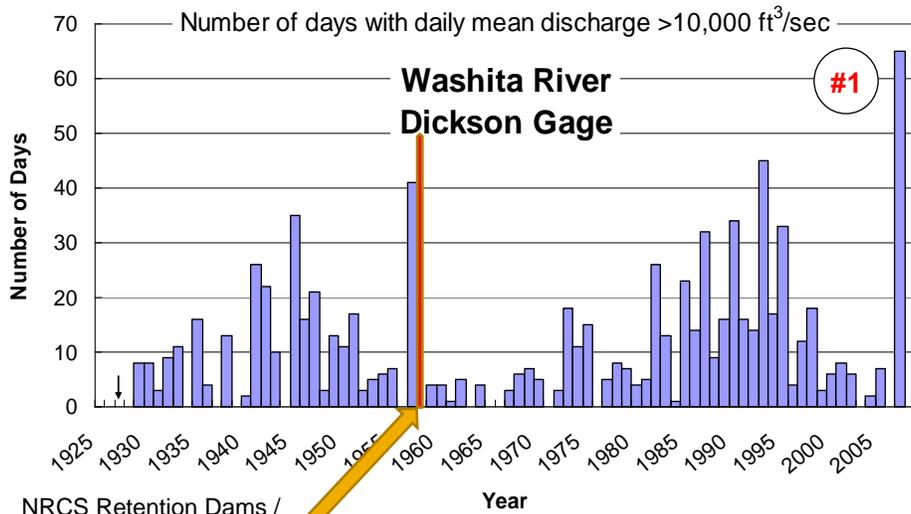
- WY 2007 flow for many gages ranked higher than 4th (since 1925) for days of elevated flow. For example, locations on:
 - Verdigris, Arkansas Rivers, 2007 ranked #3 for days above 10,000 cfs
 - Cimarron, Canadian Rivers; 2007 ranked #2
 - North Canadian, Washita Rivers; 2007 ranked #1
 - Red River; 2007 ranked #4
- Were there spatial correlations in high number of days of elevated flow?





Lake Thunderbird

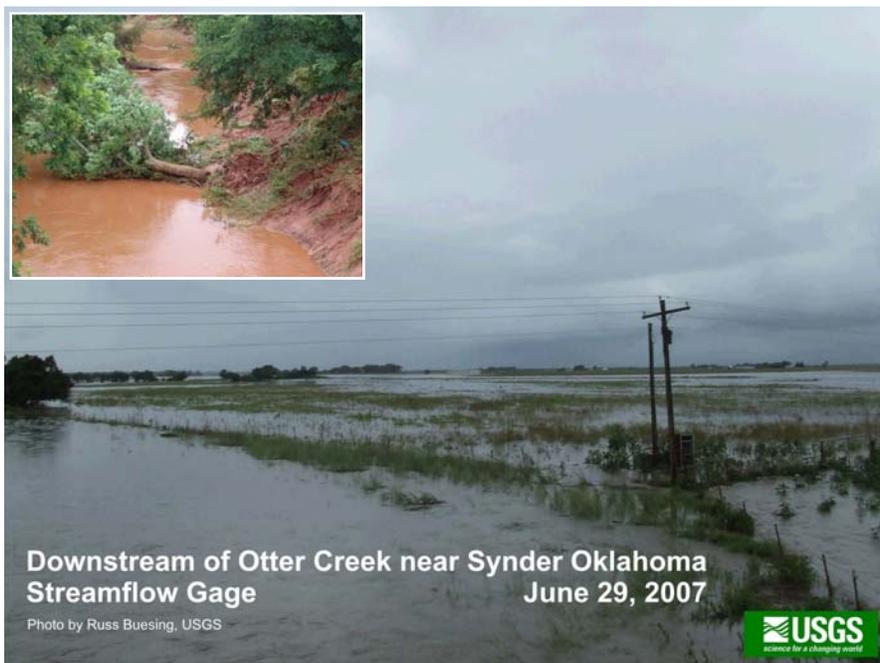
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NRCS Retention Dams /
Foss Reservoir / Fort
Cobb Reservoir



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**Before storm
8/27/2004**

Stream channel changes, lower middle reach of Lake Creek, in response to intense storm on June 12, 2005. There was no noticeable change in the stream channel from August 2004 until storm.



6/17/2005



9/20/2005

Photos courtesy of Patrick J. Starks, USDA-ARS

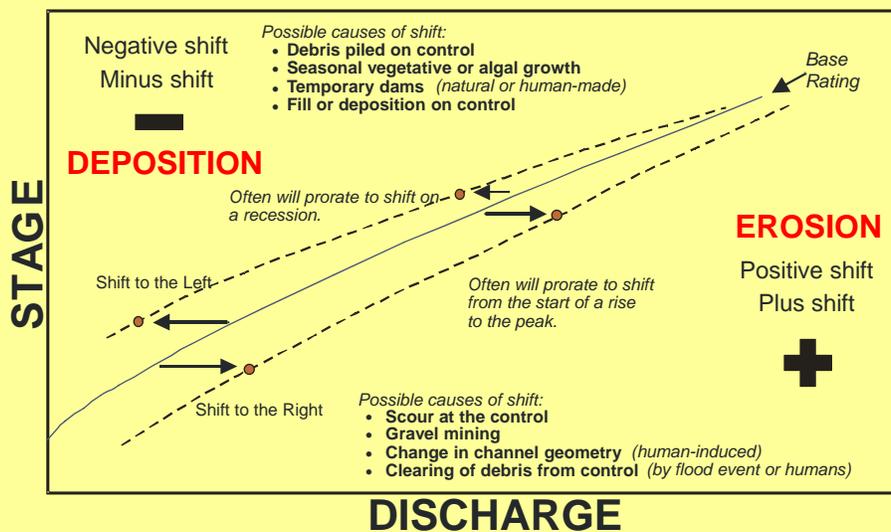
Channel Erosion/Deposition

- Many gages had significant scour or deposition along channel
- Changes in channel geometry can be quantified by examining shift in the stage-discharge relation curve
- All major river basins had gages with a major or moderate change in channel geometry
 - Most significant changes were seen along North Canadian, Canadian, Washita, and Red River
 - Preliminary data suggests South/Central Oklahoma most affected



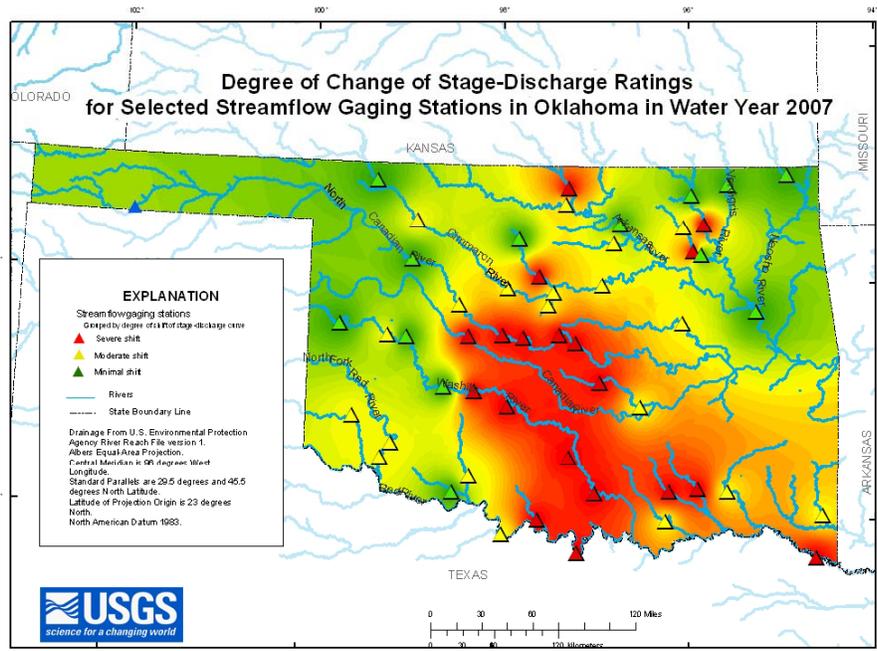
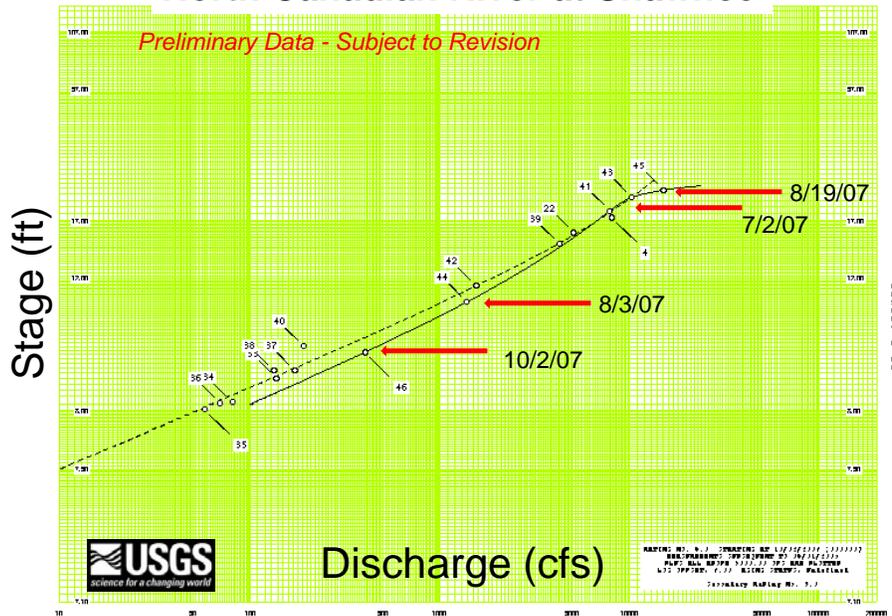
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Rating Curve Shifts



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North Canadian River at Shawnee



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Lessons Learned

- Events challenged USGS resources (175 days @ 24/7)
- Coordination with sister agencies was very good; we welcome suggestions
- Is variability in annual precipitation becoming more extreme?



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Thank You

