TULSA DISTRICT
US ARMY CORPS OF ENGINEERS

GOVERNOR'S CONFERENCE
ON THE FUTURE OF WATER IN KANSAS

FLOODING RESPONSE PANEL

COL Scott Preston

Commander, Tulsa District Corps of Engineers

November 7, 2019

Military

Multipurpose Reservoirs

Hydropower

Interagency and International Support

MKARNS

"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."

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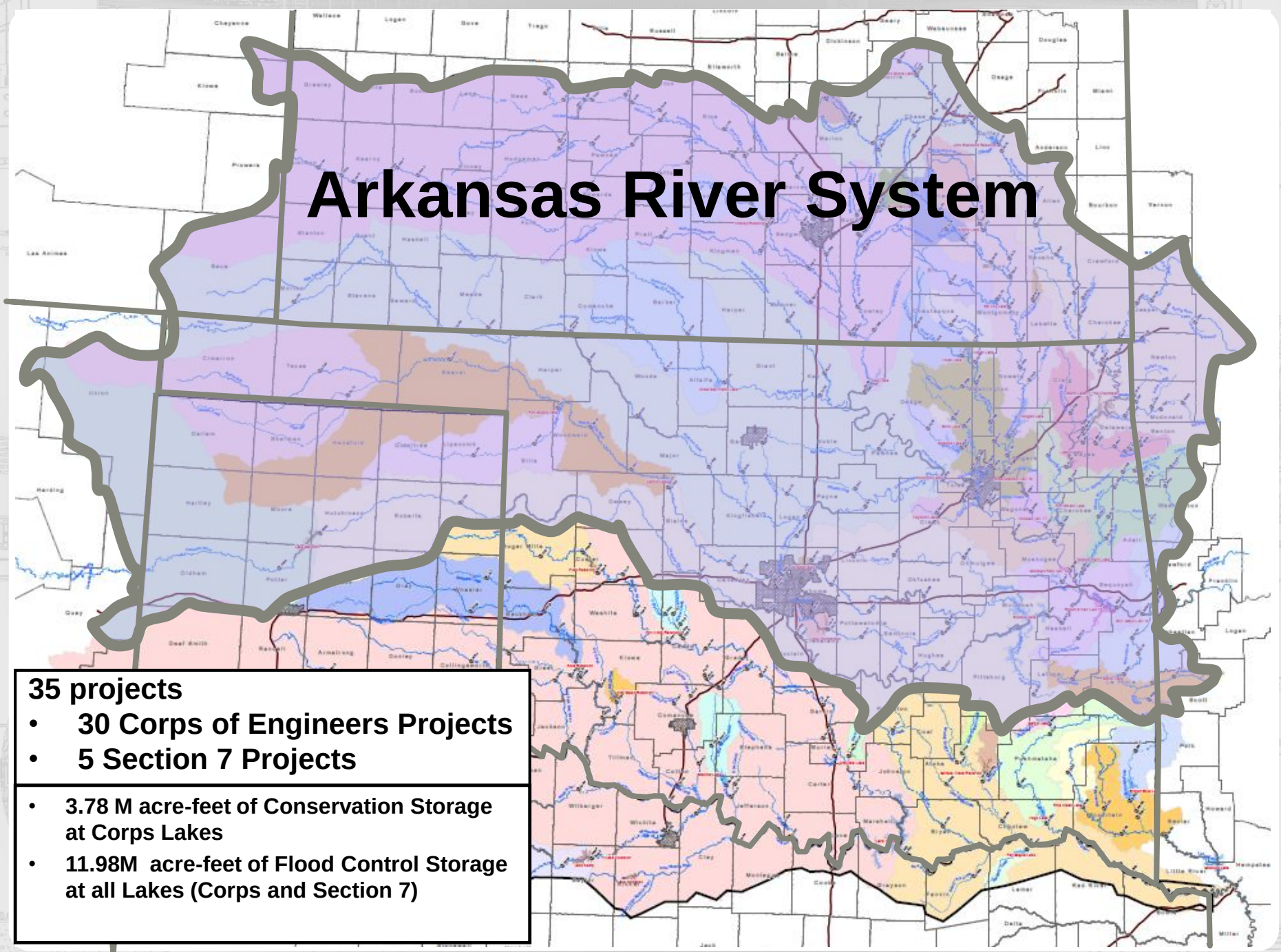
Arkansas River System

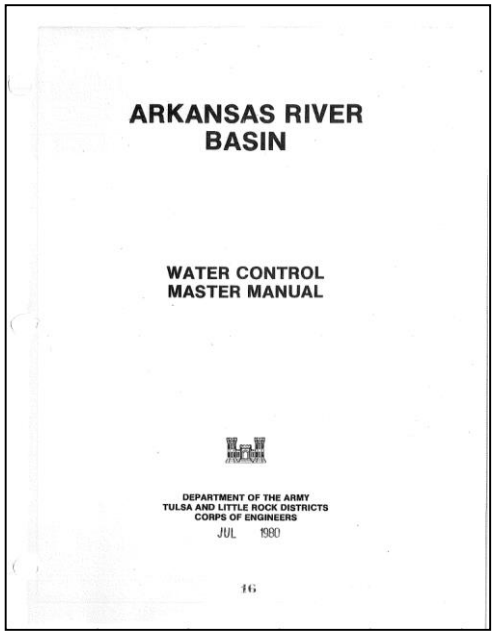


35 projects

- **30 Corps of Engineers Projects**
- **5 Section 7 Projects**

- **3.78 M acre-feet of Conservation Storage at Corps Lakes**
- **11.98M acre-feet of Flood Control Storage at all Lakes (Corps and Section 7)**

Arkansas River Basin Water Control Master Manual

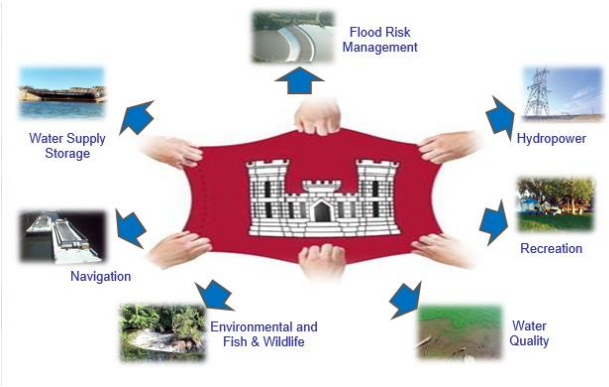

ARKANSAS RIVER
BASIN

WATER CONTROL
MASTER MANUAL

DEPARTMENT OF THE ARMY
TULSA AND LITTLE ROCK DISTRICTS
CORPS OF ENGINEERS
JUL 1980

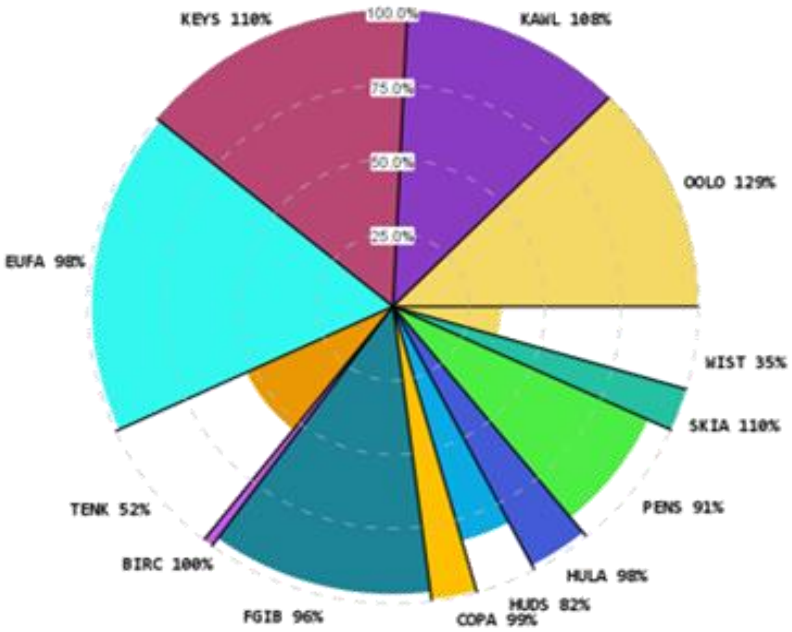
16

Arkansas River Basin Water Control Master Manual – dated July 1980



Chapter 7 - System Water Control Plan revisions:

- **July 11,1980**
- **July 1, 1986**
- **October 11, 2007**



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Arkansas River System Water Control Plan

- The system water control plan attempts to balance the percent of storage contained in individual project flood pools.
- All projects upstream of Van Buren share the control point at Van Buren.
- Flows at Van Buren are restricted to (22 ft stage) 150,000 cfs or less.

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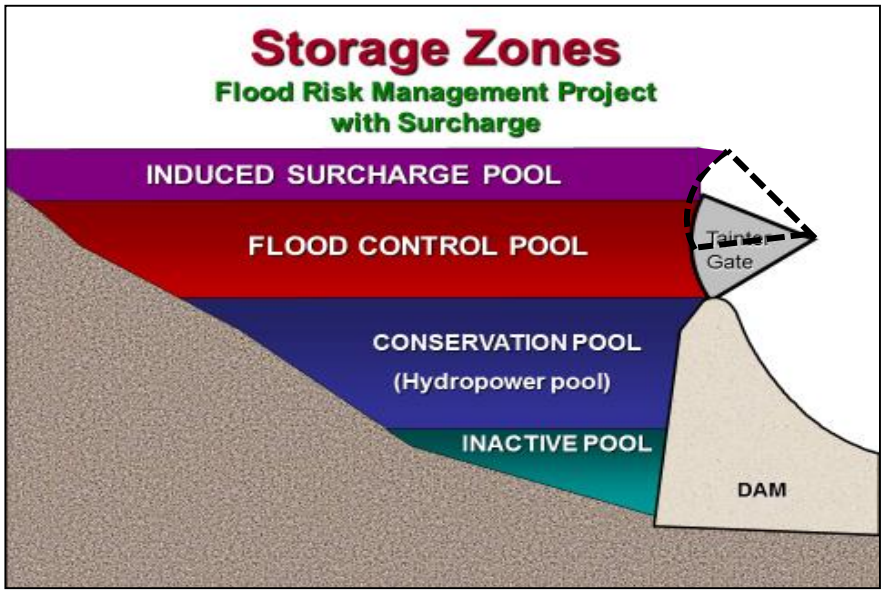
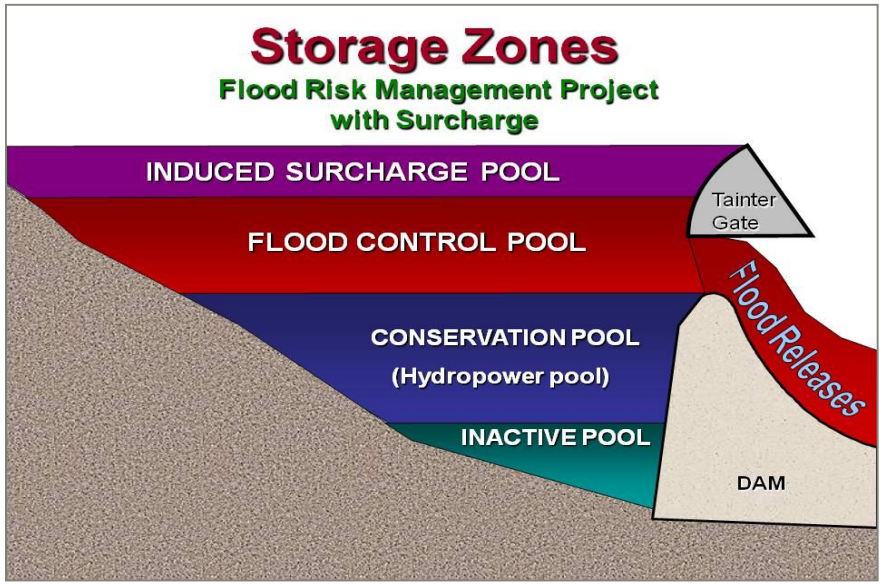
STORAGE ZONES - SURCHARGE





TIMELINE FOR THE 2019 FLOOD EVENT ARKANSAS RIVER SYSTEM

28 APR – 4 MAY

28 APR: 2% flood storage
4 MAY: 26% flood storage
Heavy rainfall continued

5-11 MAY

11 MAY: 56% flood storage

12-18 MAY

Van Buren gauge at 22.1ft

59%: peak flood storage
18 MAY: fell to 54% by flood water evacuation

19-25 May 2019

25 MAY: 88% flood storage
The most significant rainfall of the event occurred during this week.

26 MAY – 1 JUN

29 MAY: 92% flood storage
30 MAY: peaked at 98%
1 JUN: 91% flood storage.

2-8 June 2019

91% flood storage most of the week
8 JUN: 90%

9-15 June 2019

9 JUN: 90% flood storage
15 JUN: 77% flood storage

16-22 JUN

74%-77% flood storage
Heavy rainfall in KS and North OK

23-29 JUN

23 JUN: 74% flood storage
29JUN: 82% flood storage

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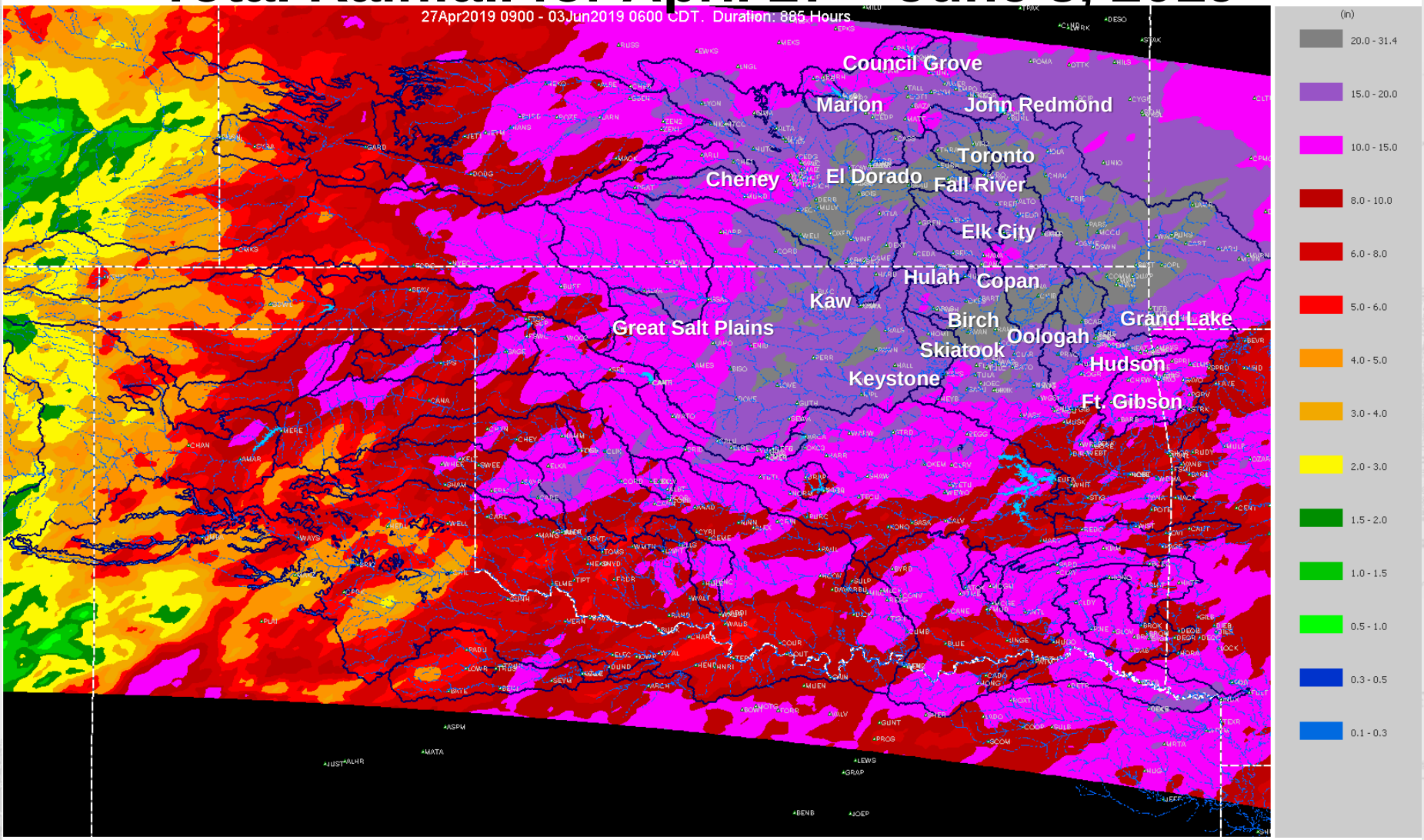
Total Rainfall for April 27 – June 3, 2019



NOTES:

- Lakes that flood pools filled during time period.
- Total of 19 above Muskogee.

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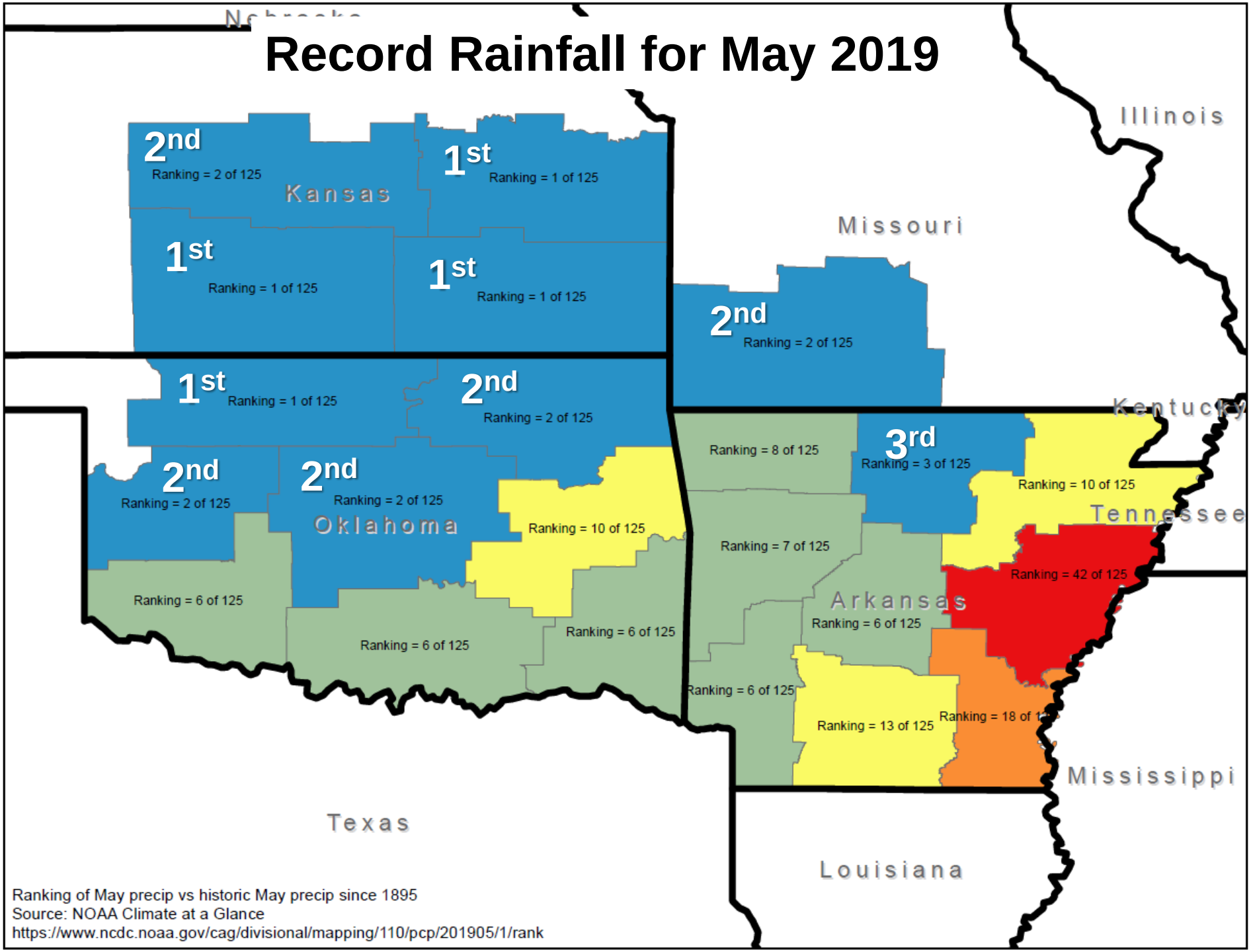
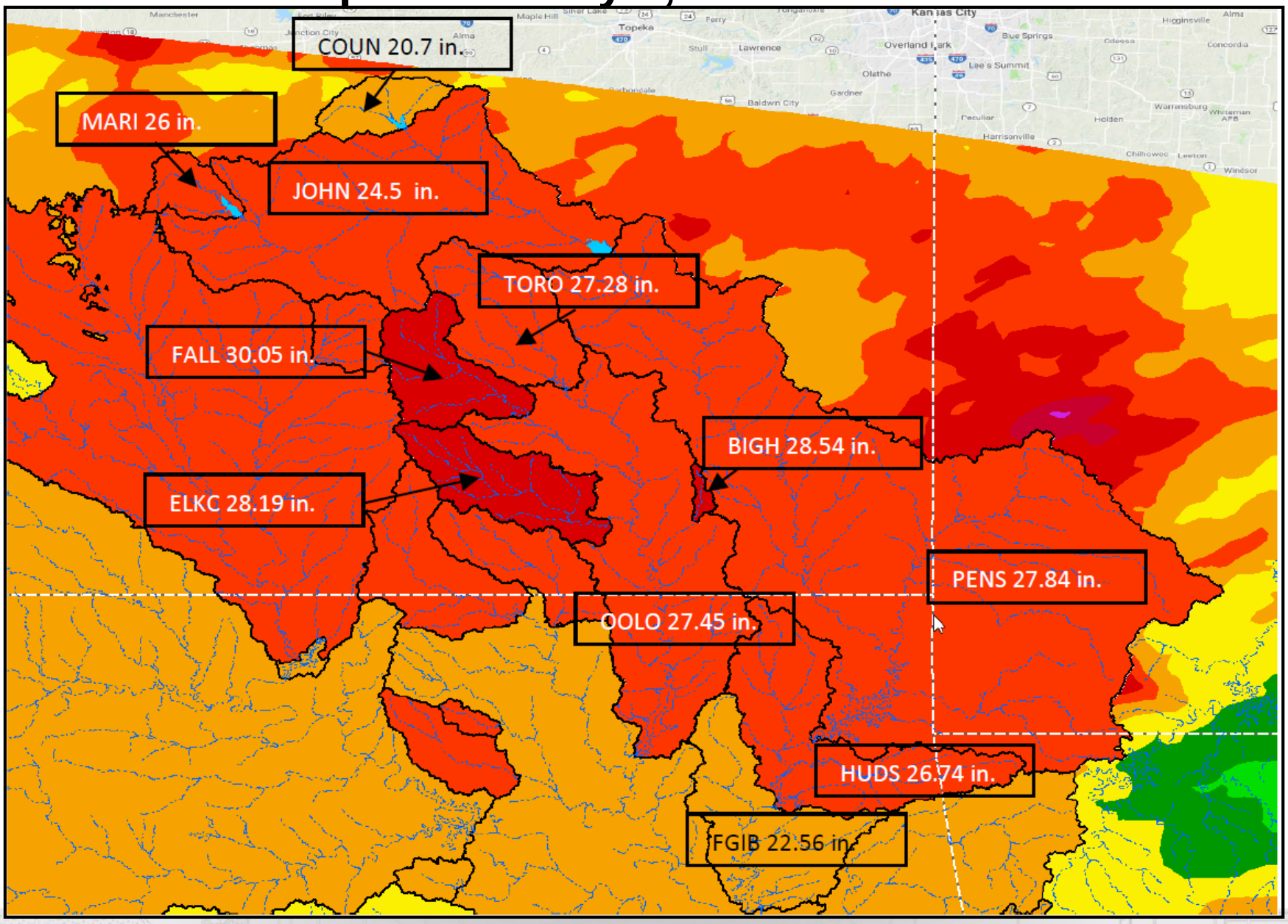
Record Rainfall for May 2019

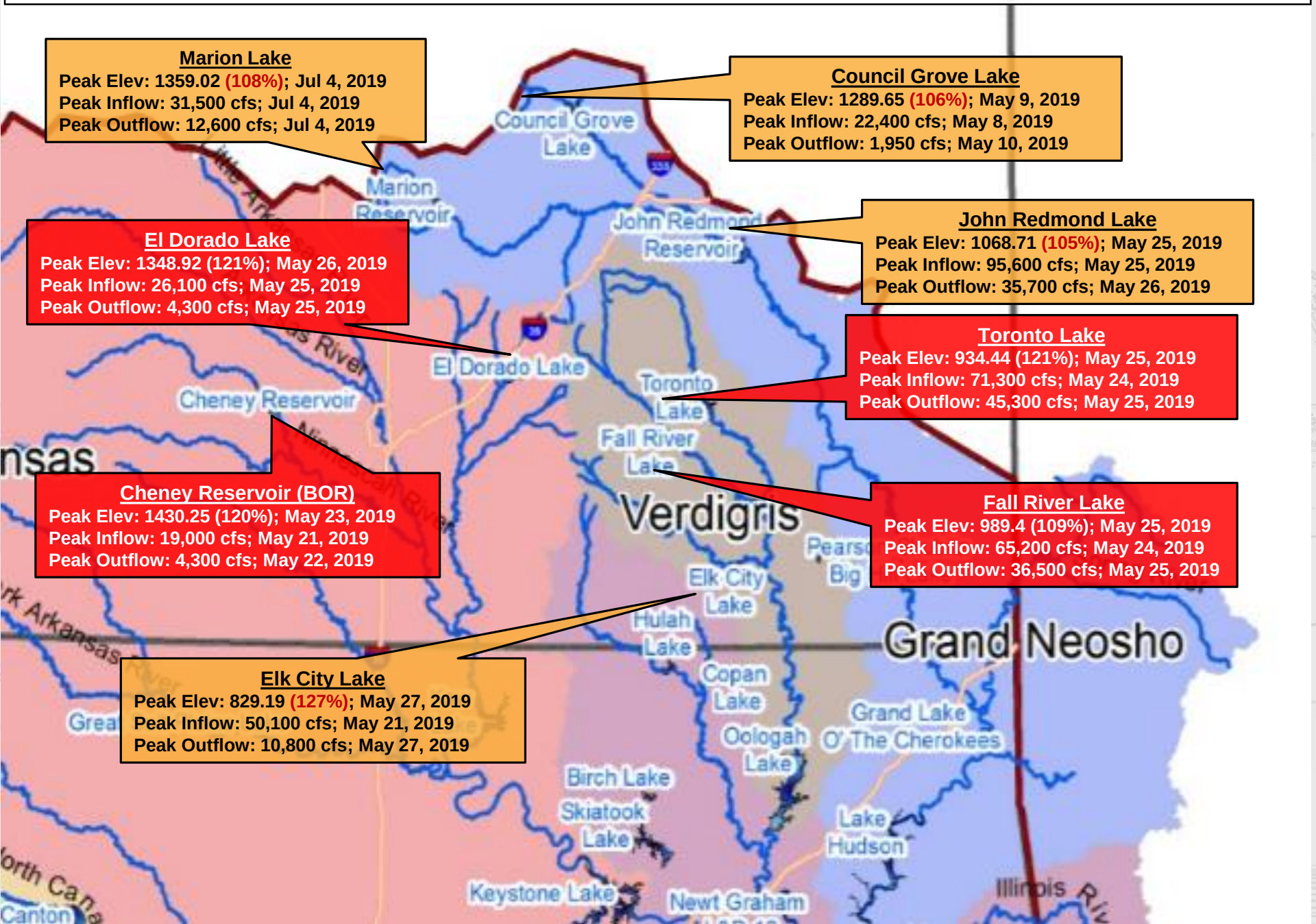


Ranking of May precip vs historic May precip since 1895
Source: NOAA Climate at a Glance
https://www.ncdc.noaa.gov/cag/divisional/mapping/110/pcp/201905/1/rank

Verdigris and Grand/Neosho River Basins
April 29 – July 5, 2019 Rainfall



Kansas Reservoirs that Filled during the 2019 Flood



Marion Lake
Peak Elev: 1359.02 (108%); Jul 4, 2019
Peak Inflow: 31,500 cfs; Jul 4, 2019
Peak Outflow: 12,600 cfs; Jul 4, 2019

Council Grove Lake
Peak Elev: 1289.65 (106%); May 9, 2019
Peak Inflow: 22,400 cfs; May 8, 2019
Peak Outflow: 1,950 cfs; May 10, 2019

John Redmond Lake
Peak Elev: 1068.71 (105%); May 25, 2019
Peak Inflow: 95,600 cfs; May 25, 2019
Peak Outflow: 35,700 cfs; May 26, 2019

El Dorado Lake
Peak Elev: 1348.92 (121%); May 26, 2019
Peak Inflow: 26,100 cfs; May 25, 2019
Peak Outflow: 4,300 cfs; May 25, 2019

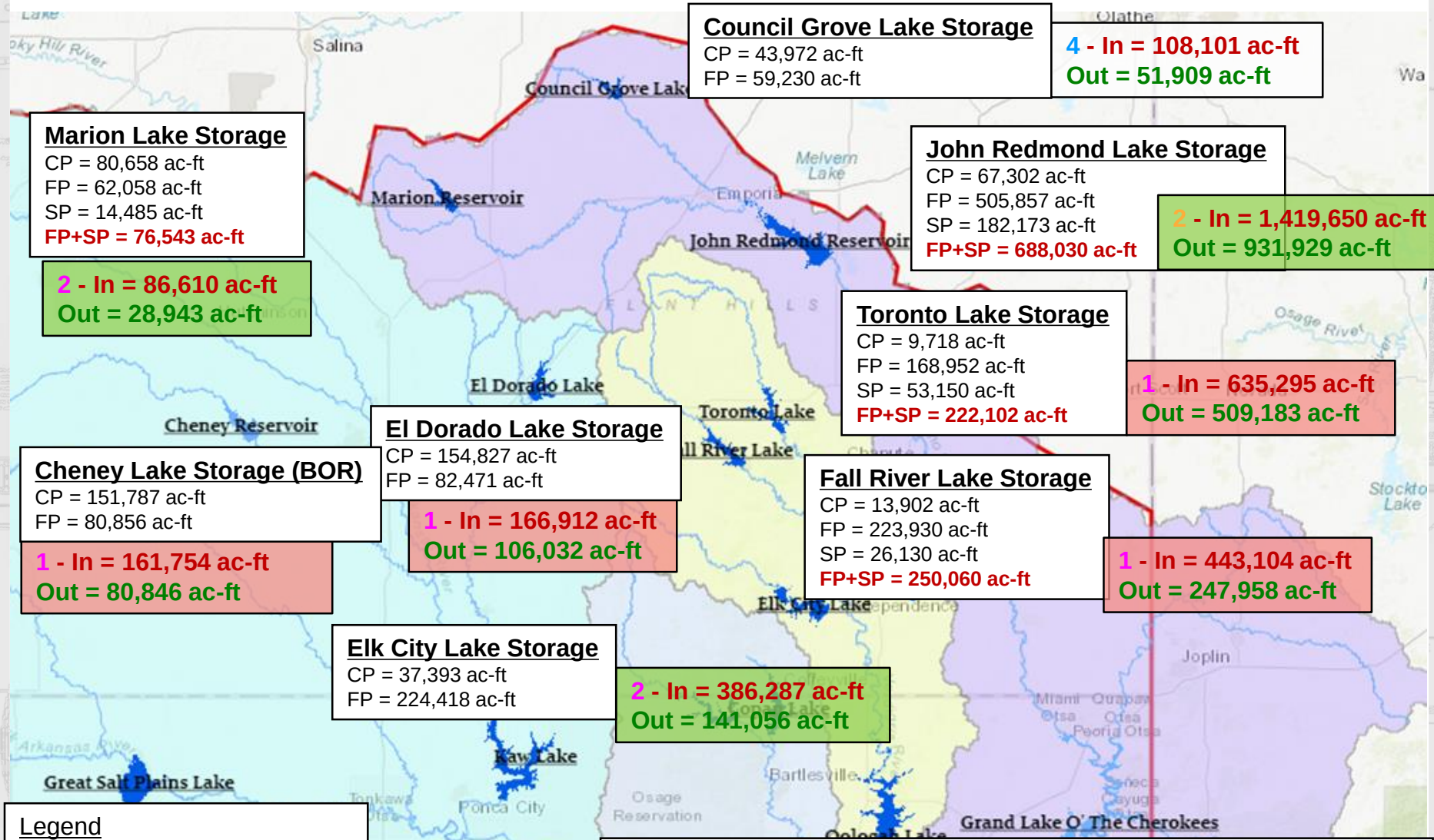
Toronto Lake
Peak Elev: 934.44 (121%); May 25, 2019
Peak Inflow: 71,300 cfs; May 24, 2019
Peak Outflow: 45,300 cfs; May 25, 2019

Cheney Reservoir (BOR)
Peak Elev: 1430.25 (120%); May 23, 2019
Peak Inflow: 19,000 cfs; May 21, 2019
Peak Outflow: 4,300 cfs; May 22, 2019

Fall River Lake
Peak Elev: 989.4 (109%); May 25, 2019
Peak Inflow: 65,200 cfs; May 24, 2019
Peak Outflow: 36,500 cfs; May 25, 2019

Elk City Lake
Peak Elev: 829.19 (127%); May 27, 2019
Peak Inflow: 50,100 cfs; May 21, 2019
Peak Outflow: 10,800 cfs; May 27, 2019

Flow Volumes for May 2019



Council Grove Lake Storage
CP = 43,972 ac-ft
FP = 59,230 ac-ft

4 - In = 108,101 ac-ft
Out = 51,909 ac-ft

Marion Lake Storage
CP = 80,658 ac-ft
FP = 62,058 ac-ft
SP = 14,485 ac-ft
FP+SP = 76,543 ac-ft

2 - In = 86,610 ac-ft
Out = 28,943 ac-ft

John Redmond Lake Storage
CP = 67,302 ac-ft
FP = 505,857 ac-ft
SP = 182,173 ac-ft
FP+SP = 688,030 ac-ft

2 - In = 1,419,650 ac-ft
Out = 931,929 ac-ft

Toronto Lake Storage
CP = 9,718 ac-ft
FP = 168,952 ac-ft
SP = 53,150 ac-ft
FP+SP = 222,102 ac-ft

1 - In = 635,295 ac-ft
Out = 509,183 ac-ft

El Dorado Lake Storage
CP = 154,827 ac-ft
FP = 82,471 ac-ft

1 - In = 166,912 ac-ft
Out = 106,032 ac-ft

Cheney Lake Storage (BOR)
CP = 151,787 ac-ft
FP = 80,856 ac-ft

1 - In = 161,754 ac-ft
Out = 80,846 ac-ft

Fall River Lake Storage
CP = 13,902 ac-ft
FP = 223,930 ac-ft
SP = 26,130 ac-ft
FP+SP = 250,060 ac-ft

1 - In = 443,104 ac-ft
Out = 247,958 ac-ft

Elk City Lake Storage
CP = 37,393 ac-ft
FP = 224,418 ac-ft

2 - In = 386,287 ac-ft
Out = 141,056 ac-ft

Legend
CP – Conservation Pool
FP – Flood Pool
SP – Surcharge Pool
BOR – Bureau of Reclamation

Notes:
1 – Ranked 1st for monthly inflow volume in period of record (1940-2019).
2 – Ranked 2nd for monthly inflow volume in period of record (1940-2019).
4 – Ranked 4th for monthly inflow volume in period of record (1940-2019).

TORONTO LAKE

Standing On the Dam Looking Downstream

Standing Downstream Looking at the Dam

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FALL RIVER LAKE

Standing on the Catwalk Looking Downstream.

Some of the Damages.

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JOHN REDMOND RESERVOIR

Looking across the Dam.

Downstream looking at the Dam during Night.

Flooding of the Lake at Sunrise.

Damages at Recreation Area.

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ELK CITY LAKE

Water Flowing over the Ogee Weir

Flooding Auxiliary Spillway

Inside the Gate Tower

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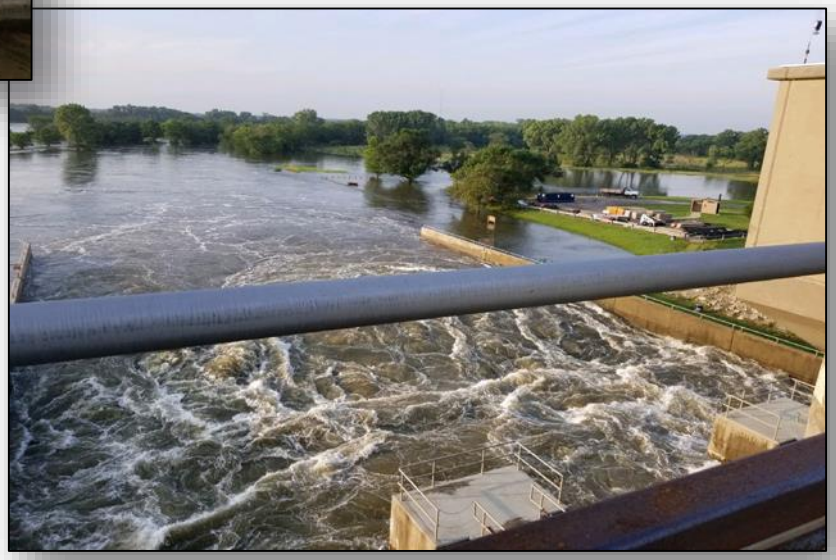
MARION RESERVOIR



Standing on the Dam Looking Downstream.

13 Pool of Records Set at USACE Reservoirs During 2019 Flood

US Army Corps of Engineers
Tulsa District

El Dorado Lake
Pool Elev. of Record : 1348.92
Date POR reached : 05/26/19

Cheney Reservoir (BOR)
Pool Elev. of Record : 1430.25
Date POR reached : 05/22/19

Toronto
Pool Elev. of Record : 934.44
Date POR reached : 05/25/19

Fall River Lake
Pool Elev. of Record : 989.40
Date POR reached : 05/25/19

Oologah
Pool Elev. of Record : 665.82
Date POR reached : 05/26/19

Kaw Lake
Pool Elev. of Record : 1047.31
Date POR reached : 05/24/19

Great Salt Plains Lake
Pool Elev. of Record : 1138.69
Date POR reached : 05/30/19

Hudson Lake (GRDA)
Pool Elev. of Record : 636.27
Date POR reached : 06/24/19

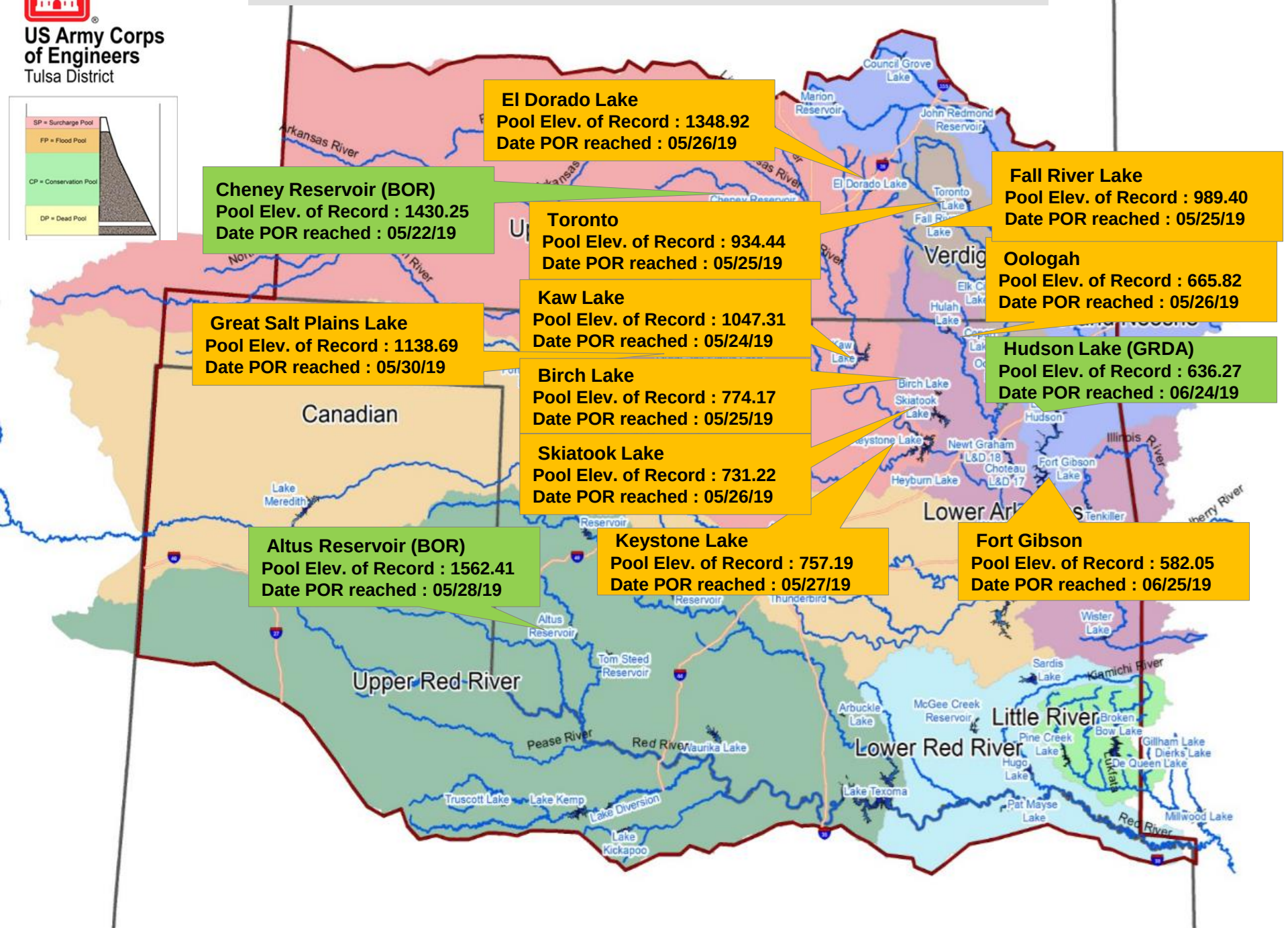
Birch Lake
Pool Elev. of Record : 774.17
Date POR reached : 05/25/19

Skiatook Lake
Pool Elev. of Record : 731.22
Date POR reached : 05/26/19

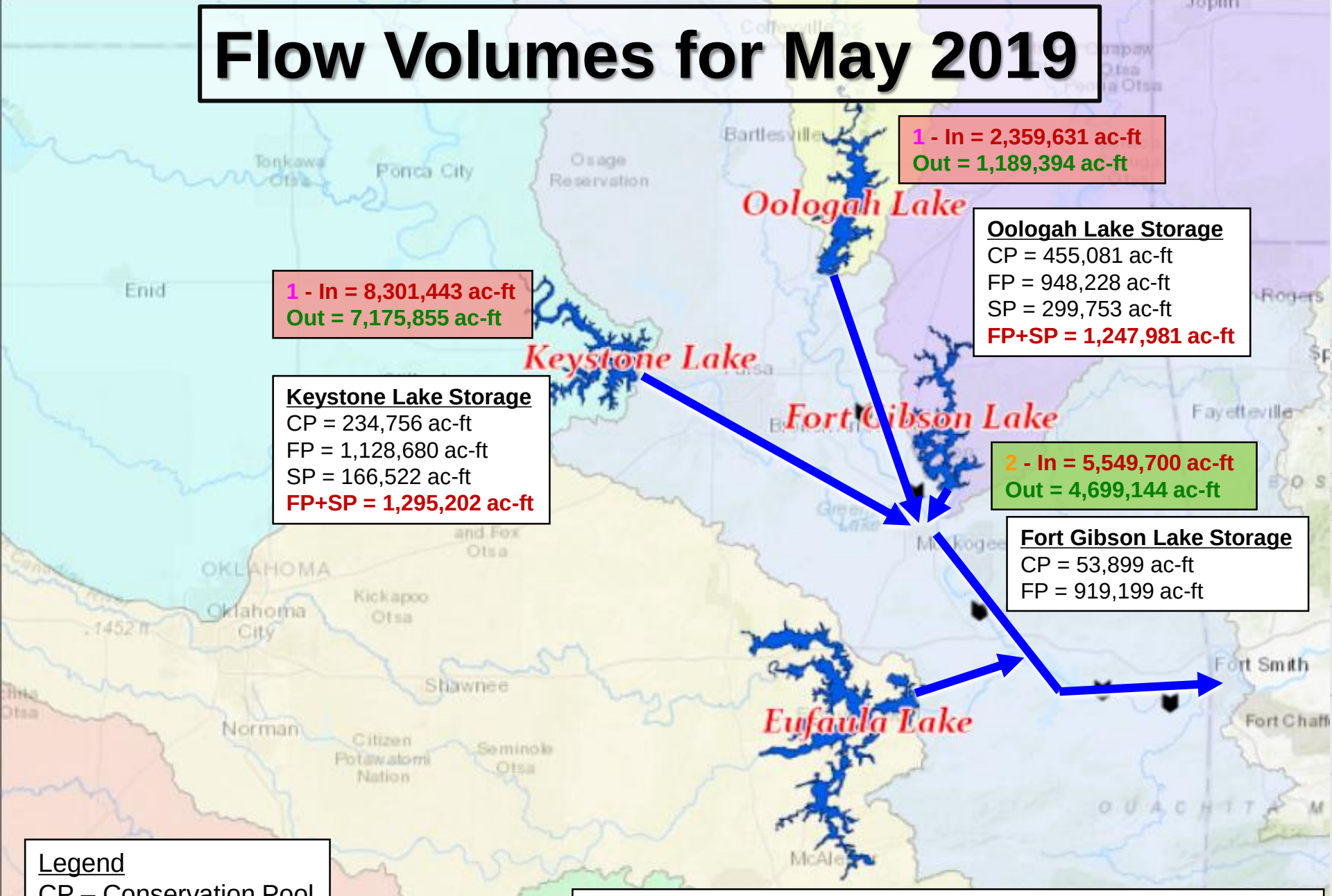
Altus Reservoir (BOR)
Pool Elev. of Record : 1562.41
Date POR reached : 05/28/19

Keystone Lake
Pool Elev. of Record : 757.19
Date POR reached : 05/27/19

Fort Gibson
Pool Elev. of Record : 582.05
Date POR reached : 06/25/19



Flow Volumes for May 2019



1 - In = 2,359,631 ac-ft
Out = 1,189,394 ac-ft

Oologah Lake Storage
CP = 455,081 ac-ft
FP = 948,228 ac-ft
SP = 299,753 ac-ft
FP+SP = 1,247,981 ac-ft

1 - In = 8,301,443 ac-ft
Out = 7,175,855 ac-ft

Keystone Lake Storage
CP = 234,756 ac-ft
FP = 1,128,680 ac-ft
SP = 166,522 ac-ft
FP+SP = 1,295,202 ac-ft

2 - In = 5,549,700 ac-ft
Out = 4,699,144 ac-ft

Fort Gibson Lake Storage
CP = 53,899 ac-ft
FP = 919,199 ac-ft

Legend
CP – Conservation Pool
FP – Flood Pool
SP – Surcharge Pool

Notes:
1 – Ranked 1st for monthly inflow volume in period of record (1940-2019).
2 – Ranked 2nd for monthly inflow volume in period of record (1940-2019).

Peak Flows for the Flood of 2019

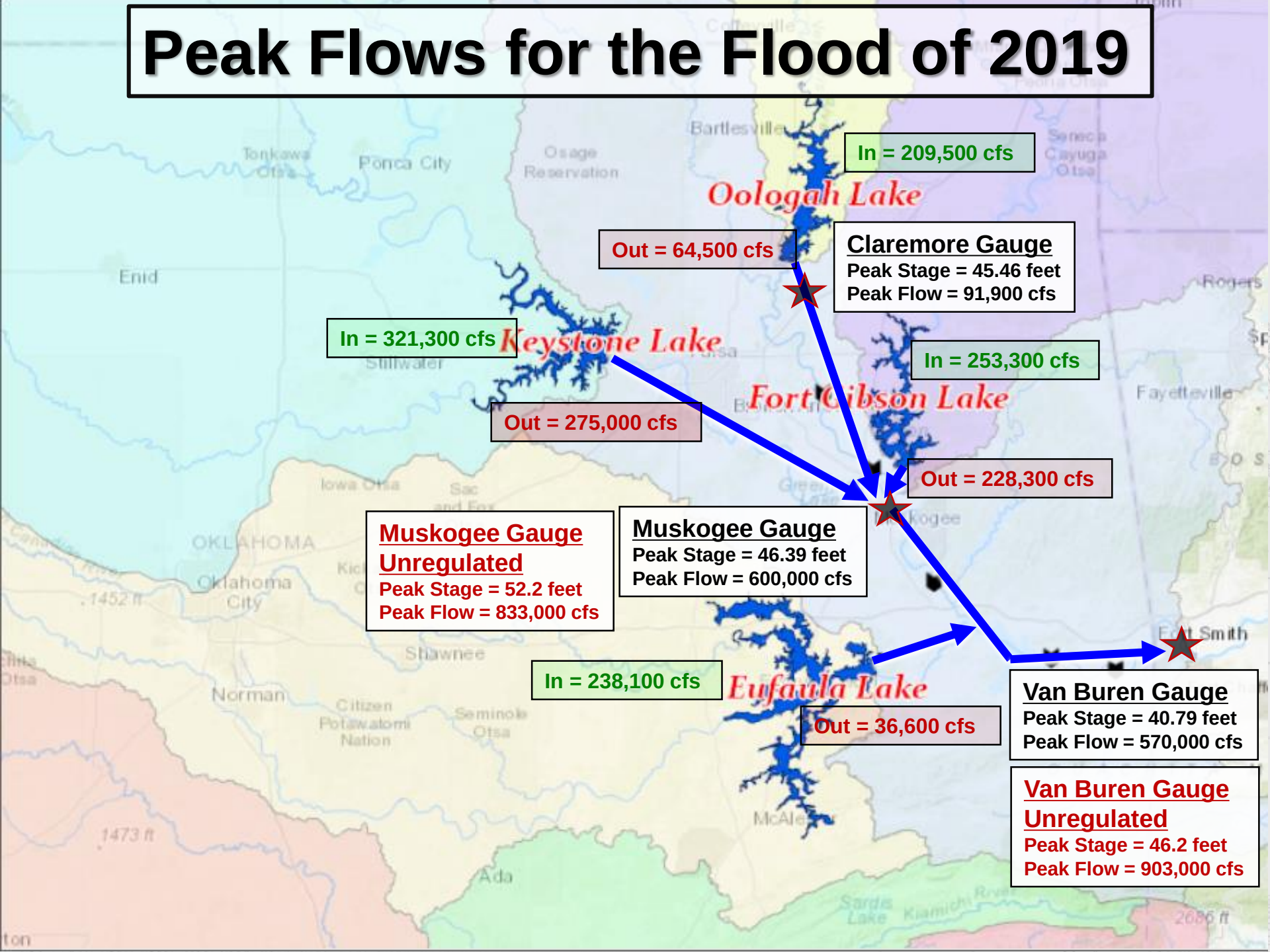


Image A. View of the confluence of 3 rivers, **Arkansas River (far left), Verdigris River (center) and Grand/Neosho River (right) merging into the Arkansas River (far right)**

Arkansas River flooding Webbers Falls, OK

Arkansas River flooding Moffett, OK

NAVIGATION PROJECTS

BARGES STRIKING WEBBERS FALLS

W.D. MAYO LOCK & DAM

R.S. KERR LOCK & DAM

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SWT PARK CLOSURES

Parks Closed or Partially Closed Due to Damages Associated with 2019 Flood

Council Grove - Project Impacts: 5 of 8 Parks
- North Richey Cove - FY18 visitation - 6,454
- Richey Cove – FY18 visitation - 70,893
- Kit Carson - FY18 visitation - 10,630
- Neosho Park - FY18 visitation - 17,202
- Canning Creek Cove – FY18 visitation - 45,559

Marion Reservoir – Project Impacts: 2 of 5 Parks
- Cottonwood Point - FY18 visitation - 305,888
- Spillway - FY18 visitation - 25,164

Fall River - Project Impacts: 3 of 3 Parks
- Damsite – FY18 visitation - 115,633
- Rock Ridge North - FY18 visitation - 22,120
- Whitehall Bay - FY18 visitation - 38,420

John Redmond - Project Impacts: 1 of 3 Parks
- Damsite Park - FY18 visitation - 30,893

Kaw - Project Impacts: 3 of 7 Parks
- Coon Creek – FY18 visitation - 125,523
- Sandy Beach – FY18 visitation – 7,633
- Sarge Creek - FY18 visitation - 85,117

Keystone - Project Impacts: 5 of 5 Parks
- Walnut Creek – FY18 visitation - 27,181
- Washington Irving – FY18 visitation - 12,025
- Cowskin Bay South - FY18 visitation - 27,181
- Cowskin Bay North - FY18 visitation - 12,052
- Keystone Ramp - FY18 visitation - 43,712

Fort Gibson - Project Impacts: 1 of 8 Parks
- Damsite - FY18 visitation - 15,652

Fort Supply – Project Impacts 1 of 2 Parks
- Supply Park – FY18 visitation – 92,446

Canton Lake – Project Impacts: 2 of 5 Parks
- Longdale – FY18 visitation – 30,497
- Sandy Cove – FY18 visitation – 27,327

Parks Currently Closed Due to FY19 Tornado

Tenkiller - Project Impacts: 2 of 8 Parks
- Elk Creek – FY18 visitation - 36,475
- Snake Creek - FY18 visitation - 78,763

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FY 2019 FLOOD IMPACTS TO LEVEES/ REQUESTS FOR ASSISTANCE

- SWT received 9 requests for assistance to inspect levees and assess flood damages related to May/June flood events. (Kansas – Dodge City, Florence, Halstead, Wichita and Coffeyville; Oklahoma – Tulsa West Tulsa (TWT), Jenks, Bixby, and Fry Creeks)
- 4 Project Information Reports (PIR) - HQ USACE approved and district received funds
  - $322,842 (Dodge City, KS)
  - $1,415,706 (Wichita, KS)
  - $666,301 (Coffeyville, KS)
  - $897,483 (Fry Creeks, OK)
- 1 PIR (Tulsa West Tulsa) is currently at Southwest Division.
- District is working Engineering and Design for the first 4 projects.

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2019 FLOOD DAMAGES

- Initial assessment of damages at SWT operating projects exceeds $165M. Damages primarily in Oklahoma and Kansas
- FEMA Disaster Declaration Oklahoma
  - 15 operating projects in Oklahoma
- FEMA Disaster Declaration for Kansas
  - 7 operating projects in Kansas
- Congress approved FY19 Flood $19.18B supplemental funding.
  - District tentatively scheduled to receive a portion of this funding.

Questions?

US ARMY CORPS OF ENGINEERS
80
YEAR
ANNIVERSARY
1939 - 2019
Respect, Teamwork, Integrity,
Service, and Enthusiasm
TULSA DISTRICT
KANSAS
TULSA
OKLAHOMA
US ARMY CORPS OF ENGINEERS

BACKUP SLIDES

THE FULL PIE IS 6,943,144.0 ac-ft OR 91%

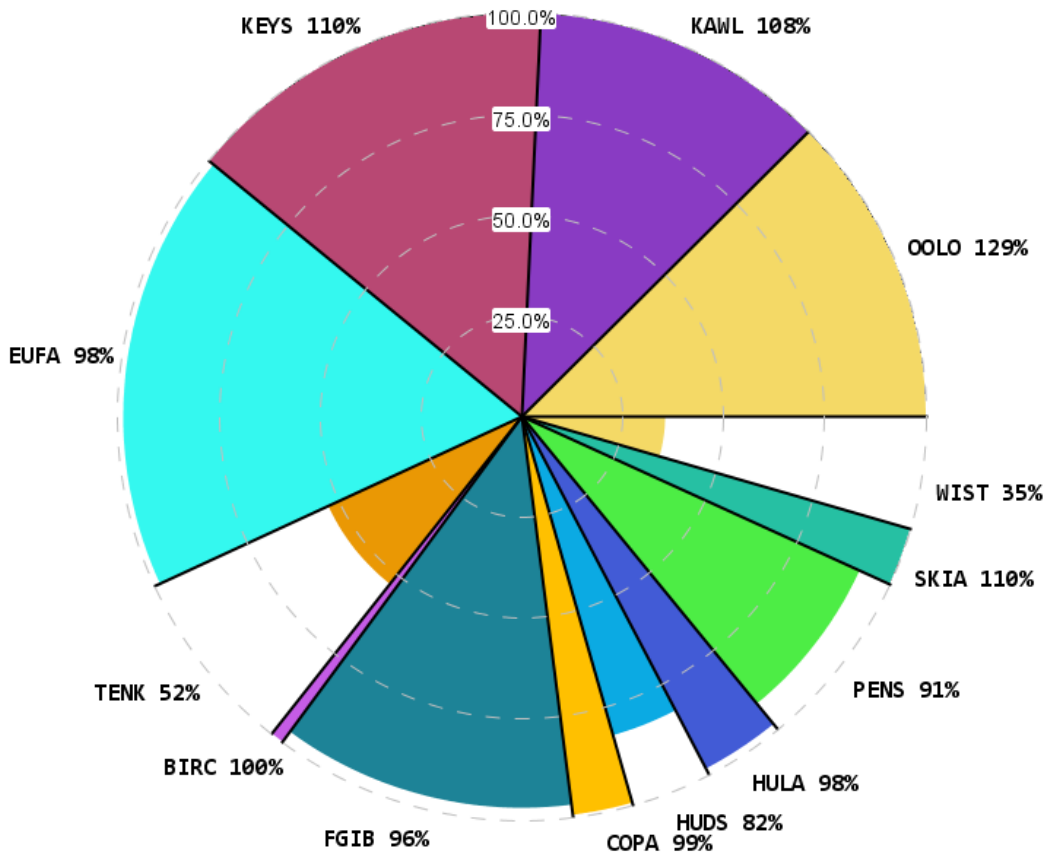

IMAGE DATE: Wed May 29 24:00:00 CDT 2019

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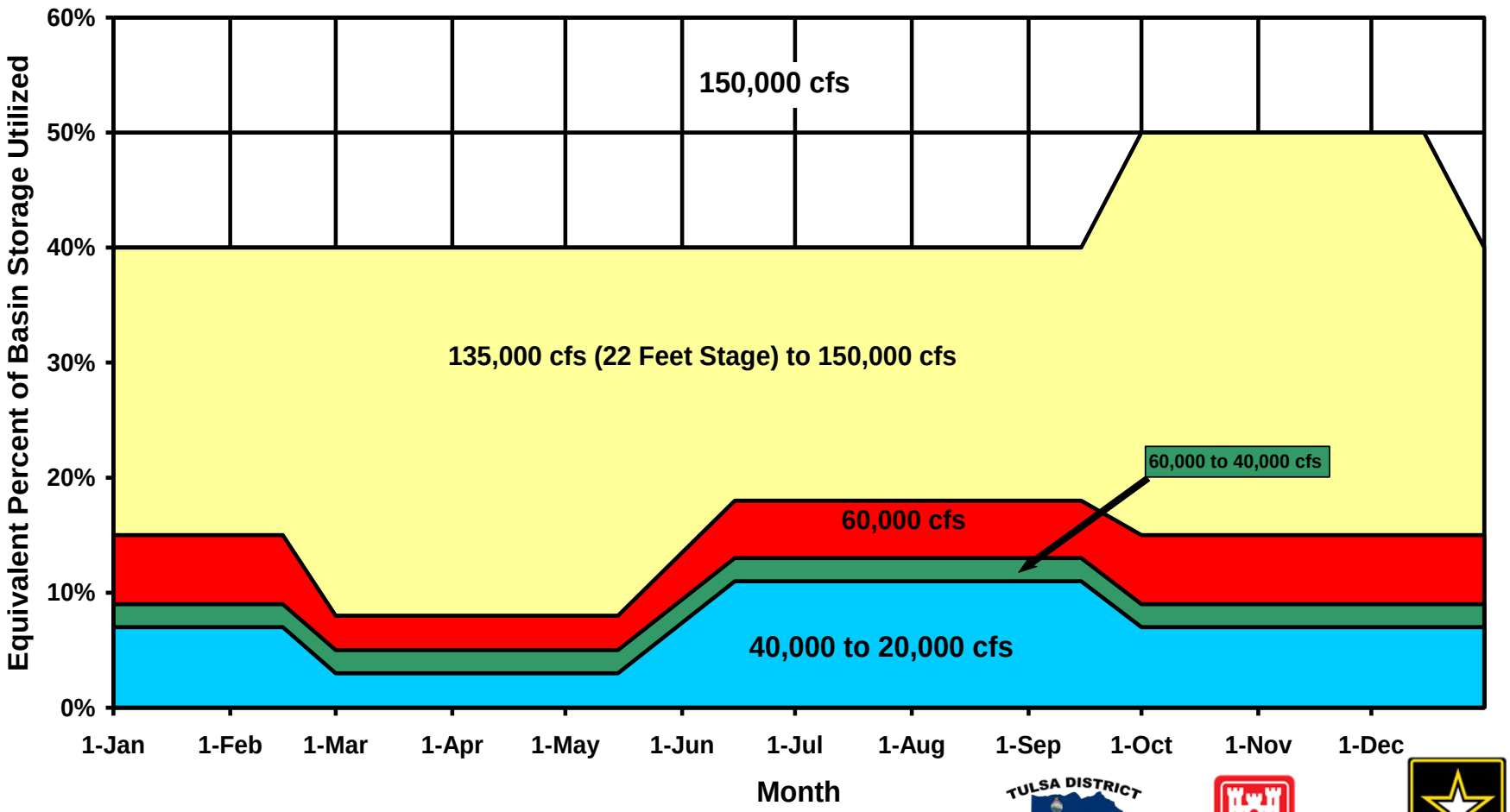
Van Buren Regulating Flows



Van Buren Guide Curve

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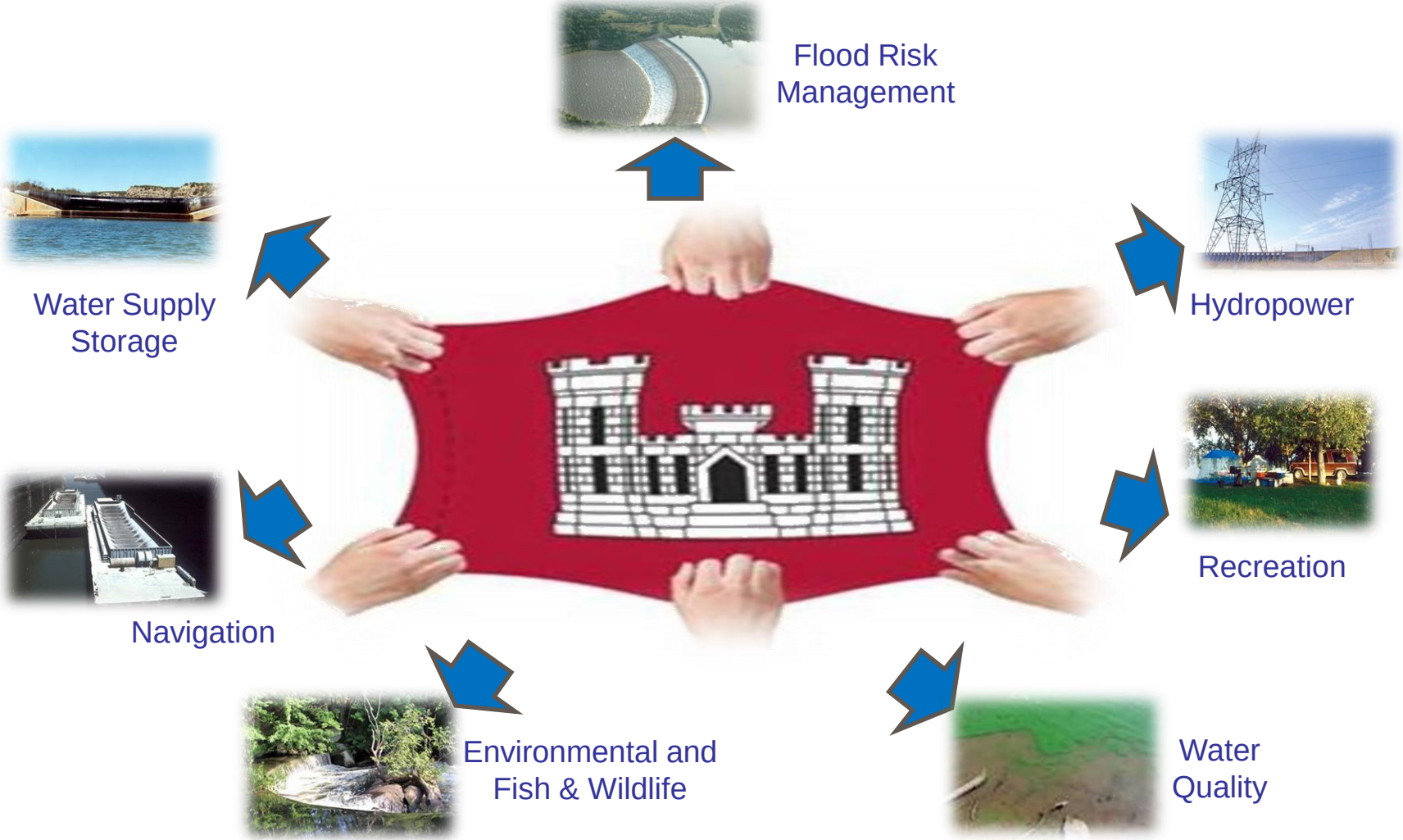
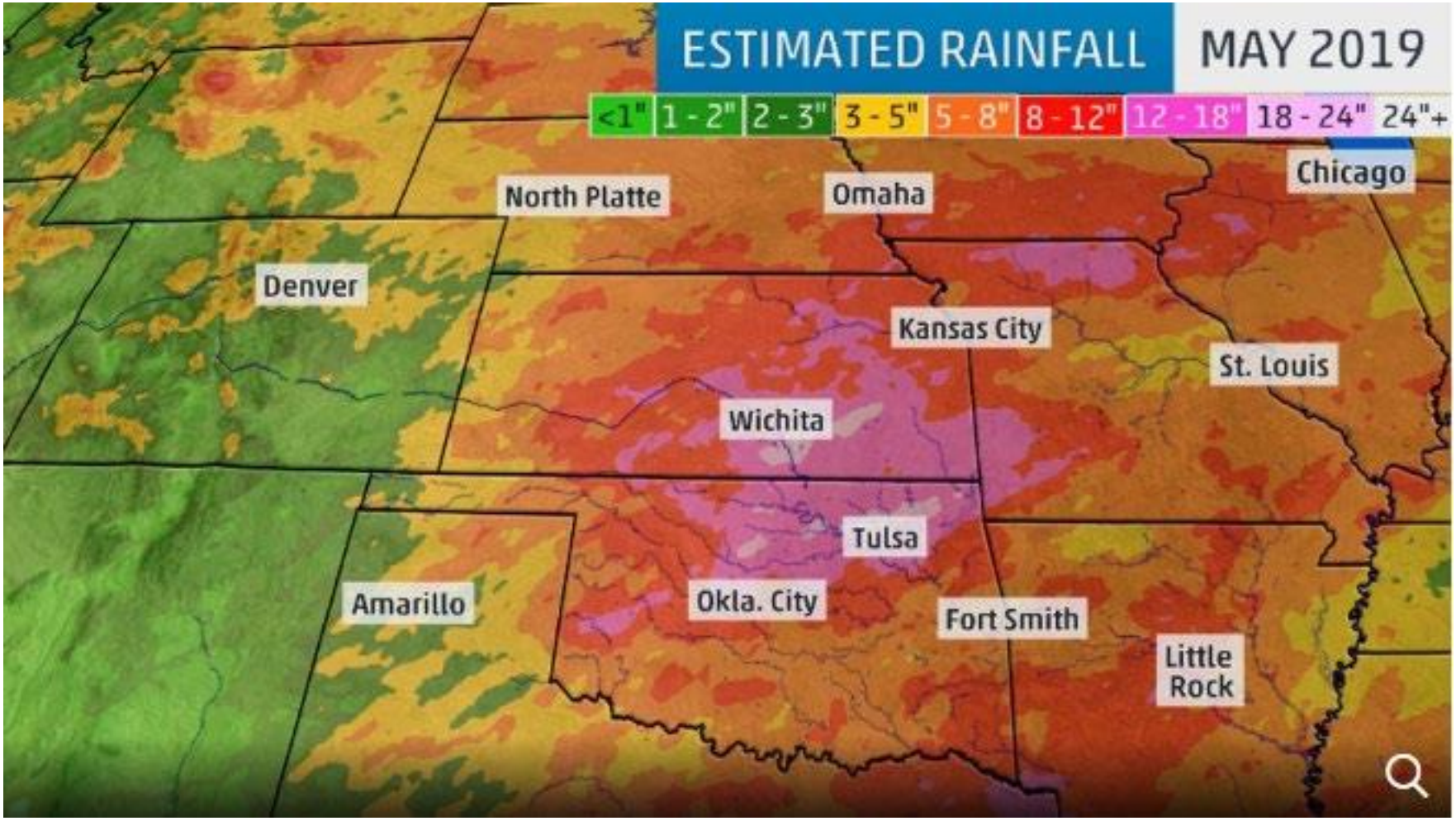
Maintaining a System Balance

Competing Water Resource Interests



ESTIMATED RAINFALL MAY 2019 (NWS)



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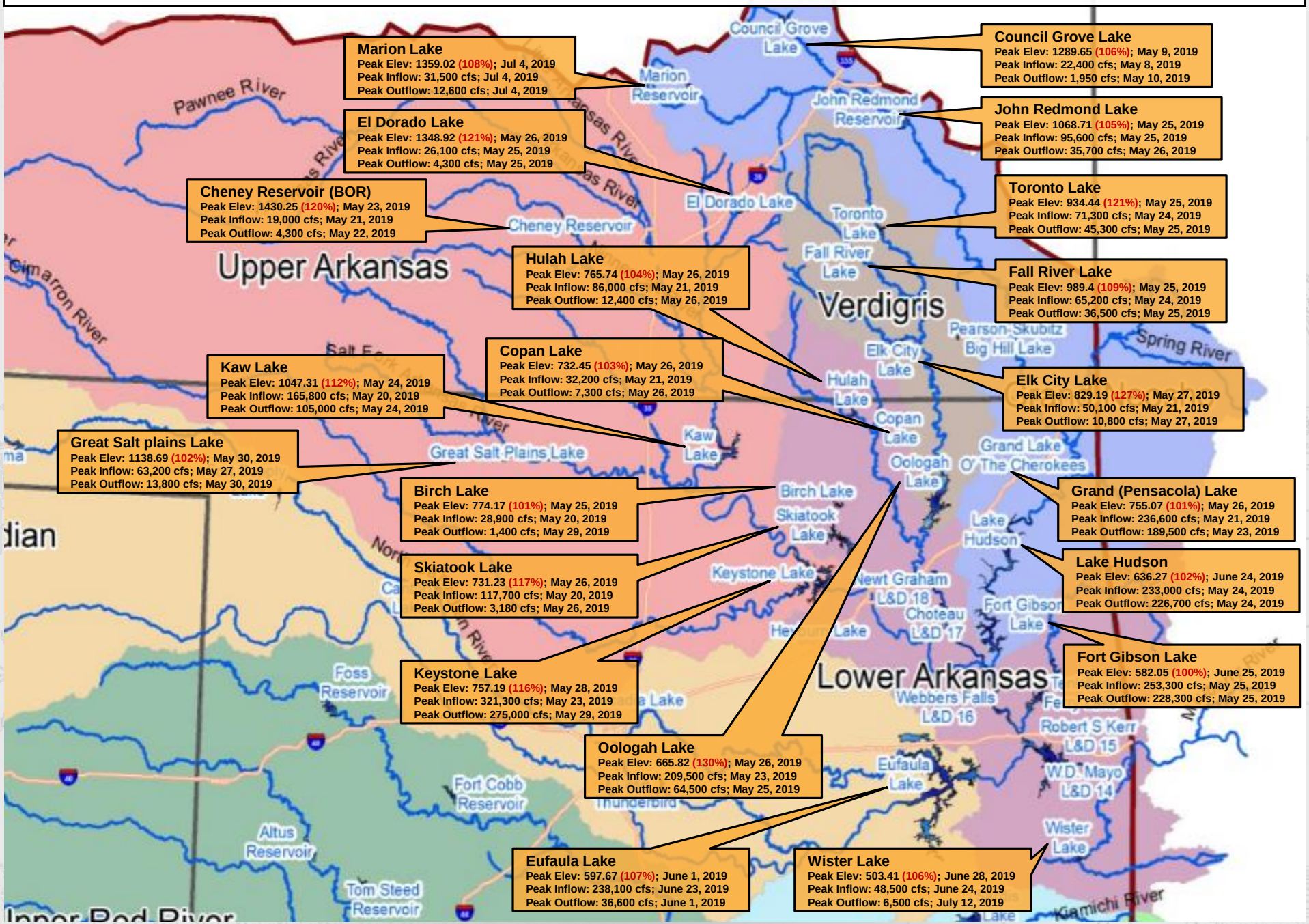
Arkansas River Basin Reservoirs that Filled during the 2019 Flood