

# **MANAGING DROUGHT**

**IN THE SOUTHERN PLAINS**

December 1, 2011

# Webinar Series Goals

- To improve communication among agencies and organizations in the Southern Plains who are being affected by the historic and exceptional drought
- To provide information on available resources and assistance to help monitor and manage drought
- To understand the impacts of drought in this region *from the perspective of those who are tasked with managing it*
- To document impacts that will help improve the weekly U.S. Drought Monitor assessment and our understanding of how drought impacts evolve and decay

# Webinar Format

- 2<sup>nd</sup> and 4<sup>th</sup> Thursdays of each month at 11:00 a.m. Central Time
- Overview of regional drought conditions and outlook for next several weeks to months
  - led by the Drought Monitor authors
- Discussion Topic
  - Alternating between an impact type (wildfire, agriculture) and a resource (monitoring tools, assistance programs)
- Comments & Updates from State Climatologists
- Open-ended time for questions and comments
- Total Time Commitment: 30 minutes for presentations, as much time as needed for discussion
- Past webinars, summaries, and Federal/State Assistance links posted on the U.S. Drought Monitor, <http://www.drought.gov> in the Southern Plains Region. Webinars posted on Youtube: <http://www.youtube.com/user/SCIPP01>

# Regional Drought Monitor Update

**Brian Fuchs, Climatologist**

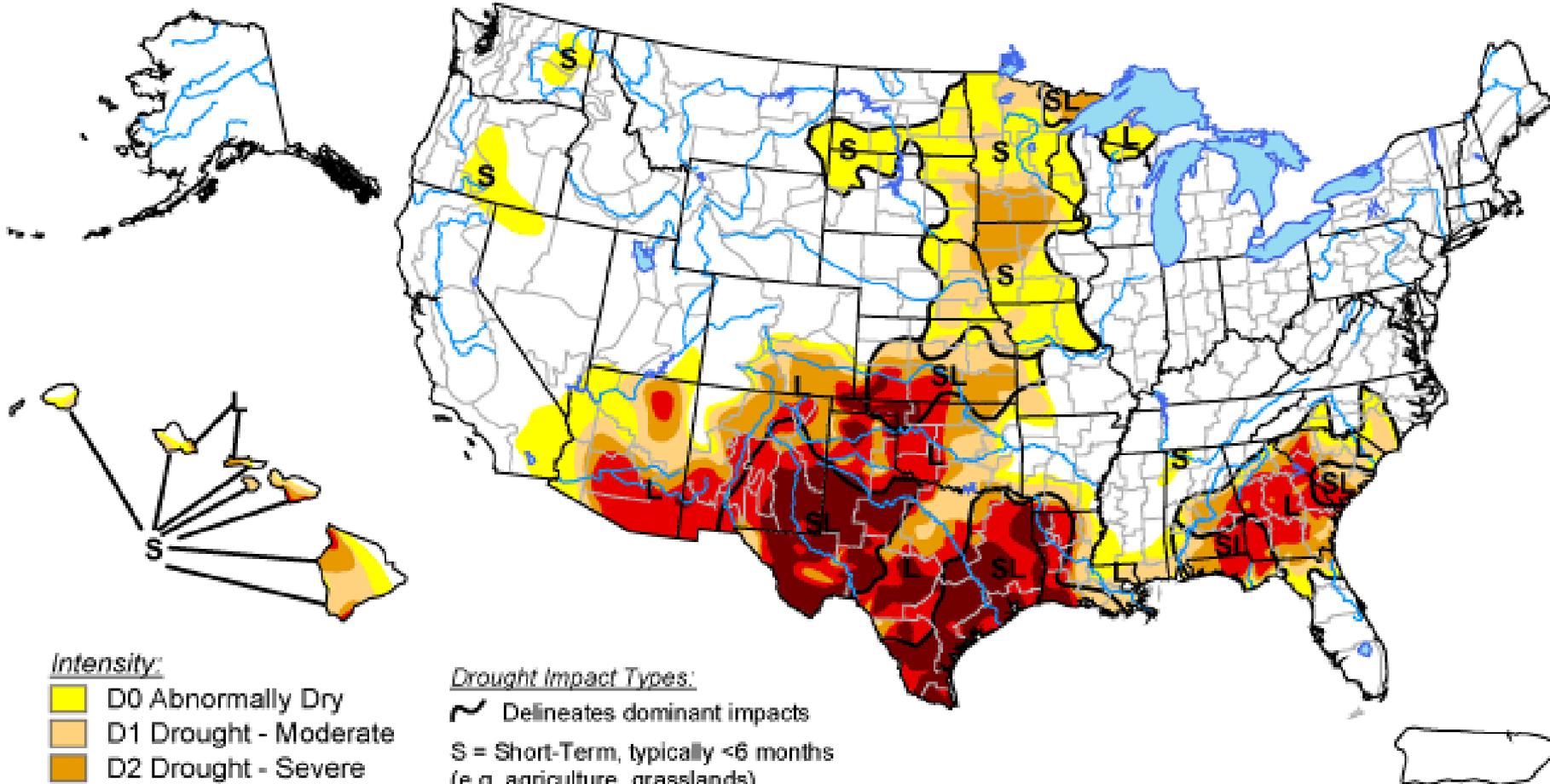
**National Drought Mitigation Center  
School of Natural Resources  
University of Nebraska-Lincoln**



# U.S. Drought Monitor

November 29, 2011

Valid 7 a.m. EST



## Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

## Drought Impact Types:

-  Delineates dominant impacts
- S = Short-Term, typically <6 months  
(e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months  
(e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements.

<http://droughtmonitor.unl.edu/>



Released Thursday, December 1, 2011

Author: David Miskus, NOAA/NWS/NCEP/CPC

# U.S. Drought Monitor

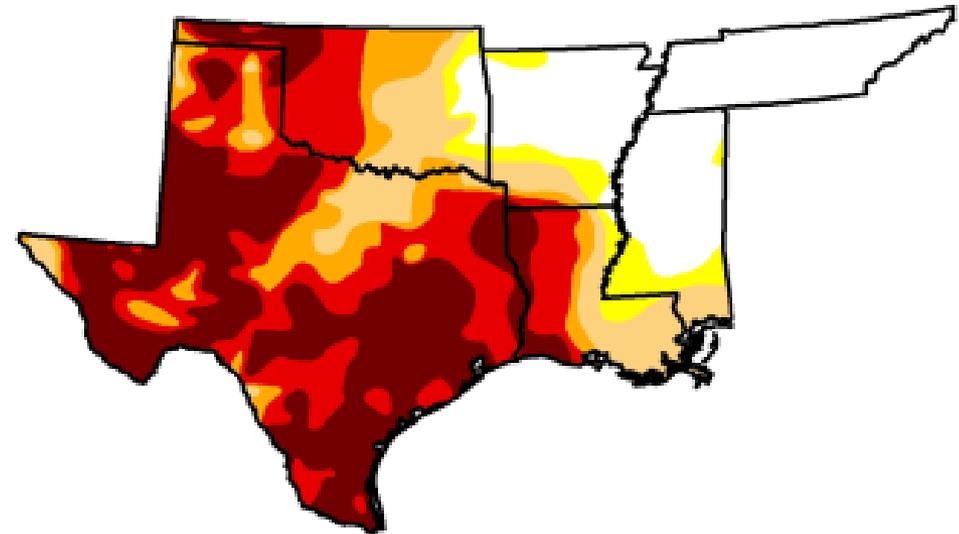
November 29, 2011

Valid 7 a.m. EST

## South

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	22.62	77.38	72.37	60.69	51.13	29.43
Last Week (11/22/2011 map)	15.07	84.93	76.43	64.48	54.43	37.62
3 Months Ago (08/30/2011 map)	2.44	97.56	85.82	75.52	66.34	53.74
Start of Calendar Year (12/28/2010 map)	8.86	91.14	67.65	35.21	10.17	0.00
Start of Water Year (09/27/2011 map)	18.34	81.66	76.26	70.61	63.67	53.77
One Year Ago (11/23/2010 map)	34.82	65.18	37.40	17.01	3.70	0.00



Intensity:

- D0 Abnormally Dry
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<http://droughtmonitor.unl.edu>

Released Thursday, December 1, 2011  
David Miskus, NOAA/NWS/NCEP/Climate Prediction Center

# U.S. Drought Monitor

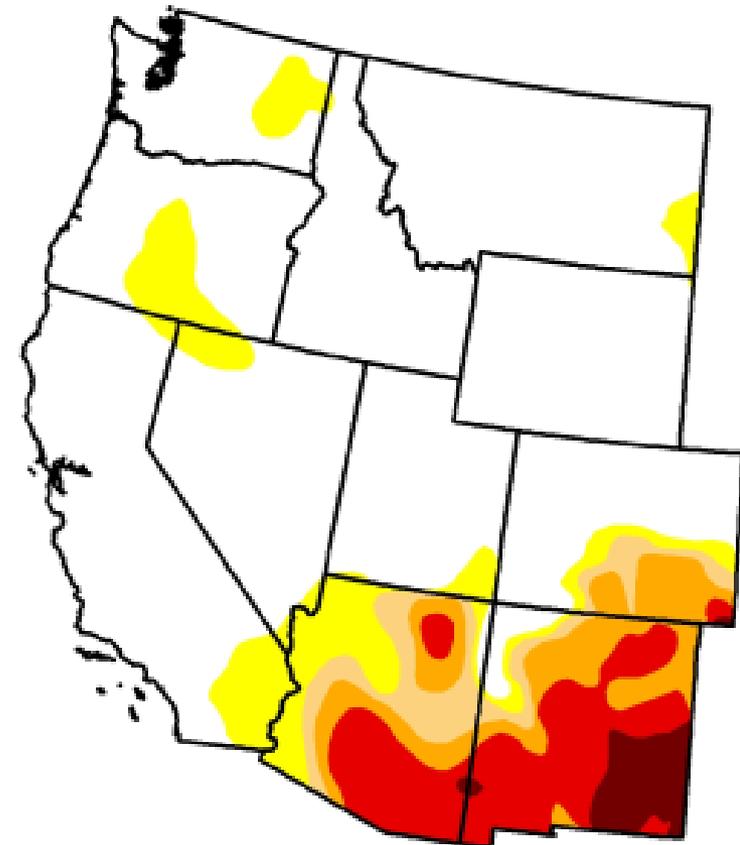
November 29, 2011

Valid 7 a.m. EST

## West

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	72.29	27.71	18.55	14.99	9.48	1.96
Last Week (11/22/2011 map)	72.72	27.28	18.57	15.00	9.51	2.85
3 Months Ago (08/30/2011 map)	74.10	25.90	19.67	14.88	9.24	3.43
Start of Calendar Year (12/28/2010 map)	73.26	26.74	11.98	0.89	0.00	0.00
Start of Water Year (09/27/2011 map)	66.72	33.28	19.04	14.99	9.30	3.81
One Year Ago (11/23/2010 map)	71.90	28.10	5.75	0.00	0.00	0.00



Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

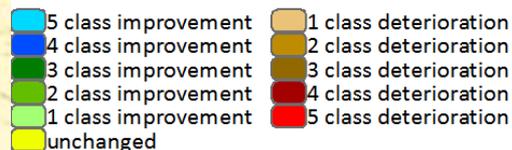
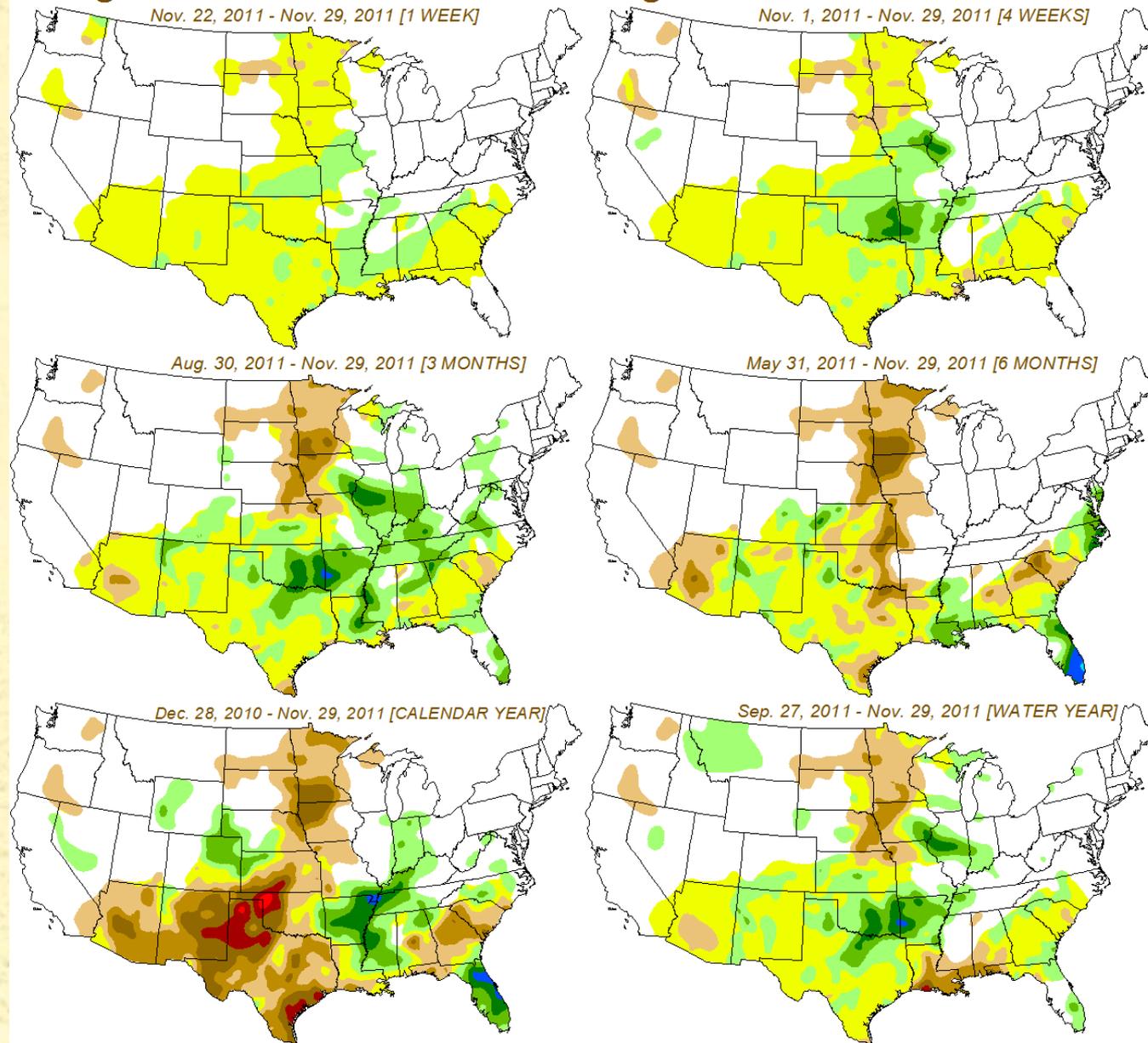
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu>



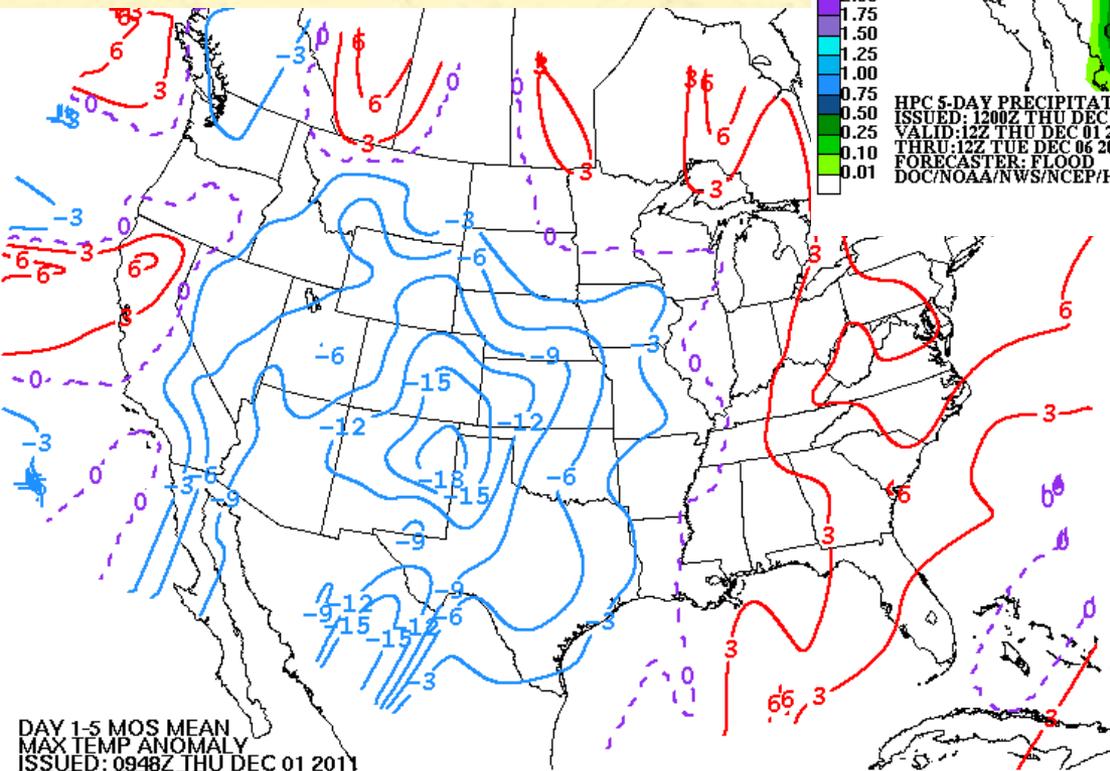
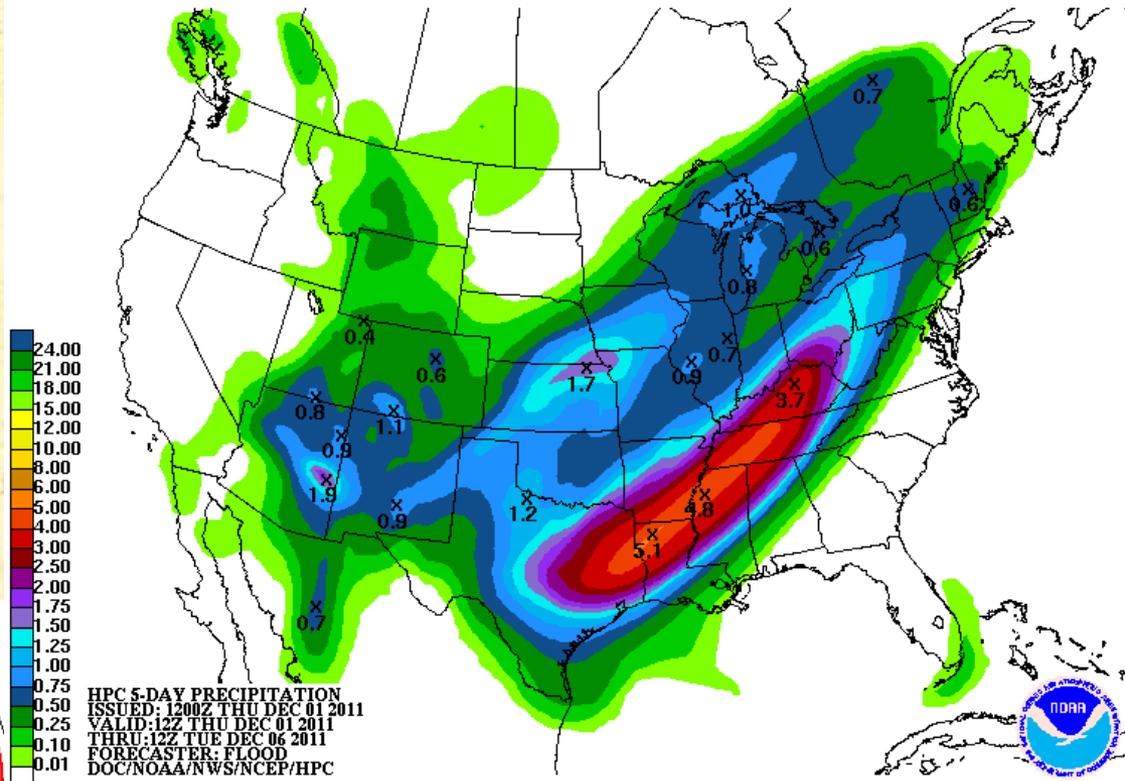
Released Thursday, December 1, 2011  
David Miskus, NOAA/NWS/NCEP/Climate Prediction Center

# Drought Monitor Classification Changes for Selected Time Periods

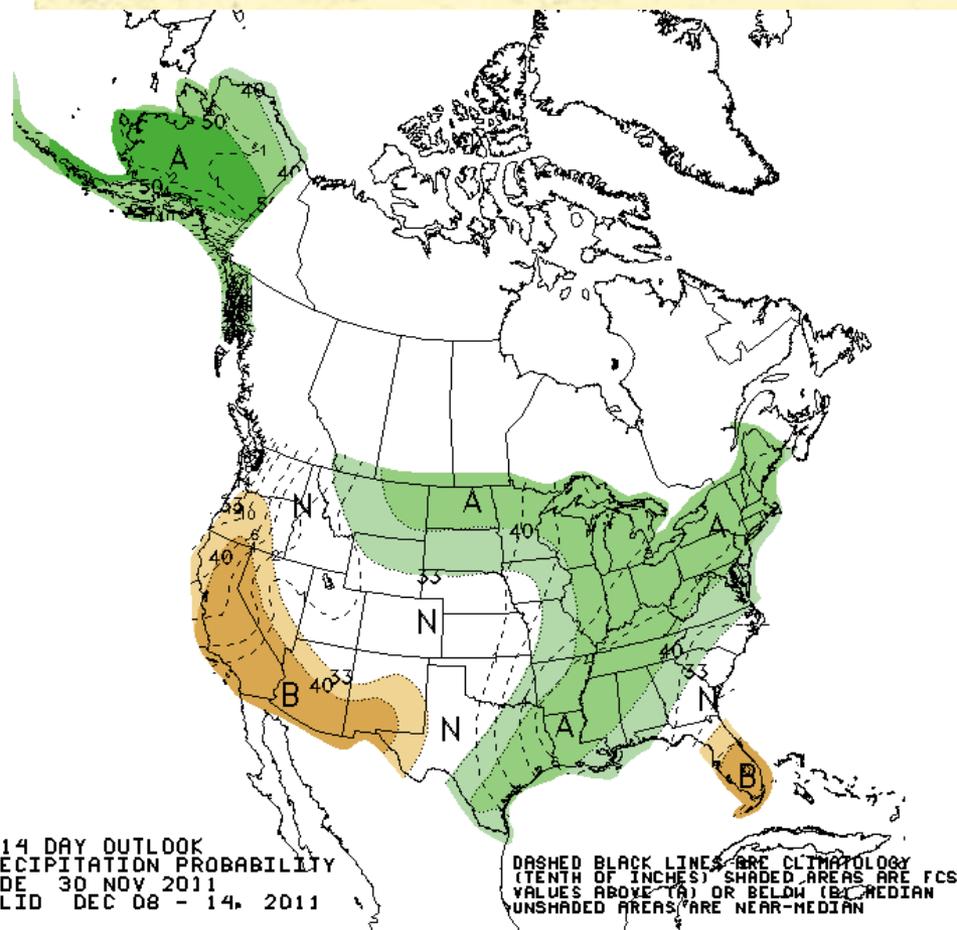
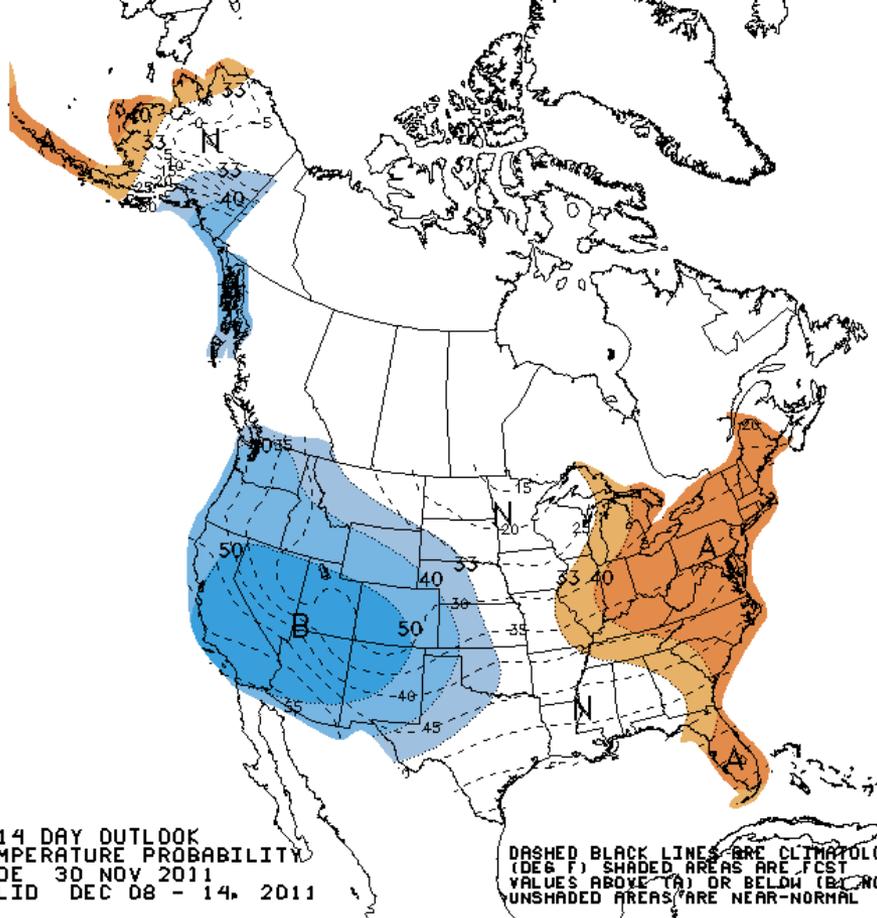


These maps depict approximate changes in drought intensity from selected initial times to the current week, with no consideration given to intervening weeks. The change calculations are based on interpolated 4 km grids of the Drought Monitor depiction, and as a result, will be smoother than if based on the published version.

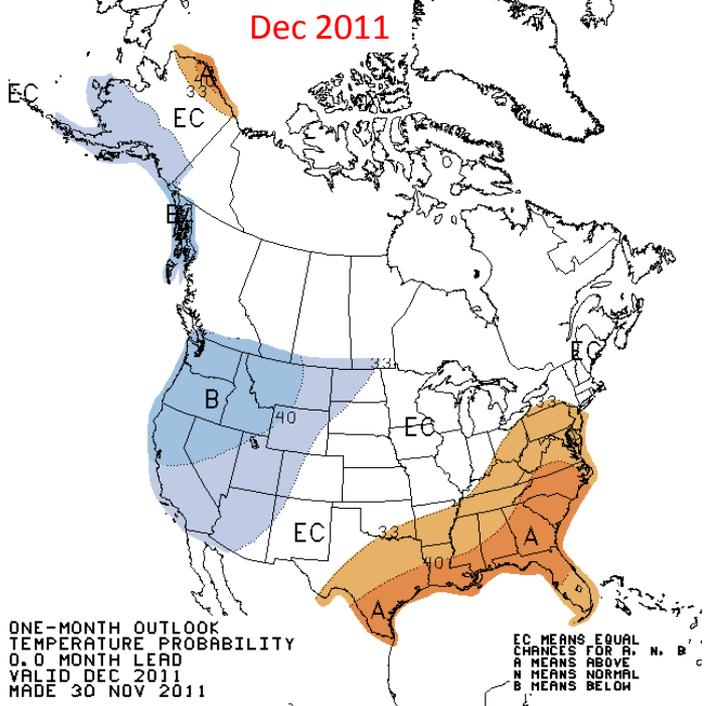
# HPC 5-Day Outlook



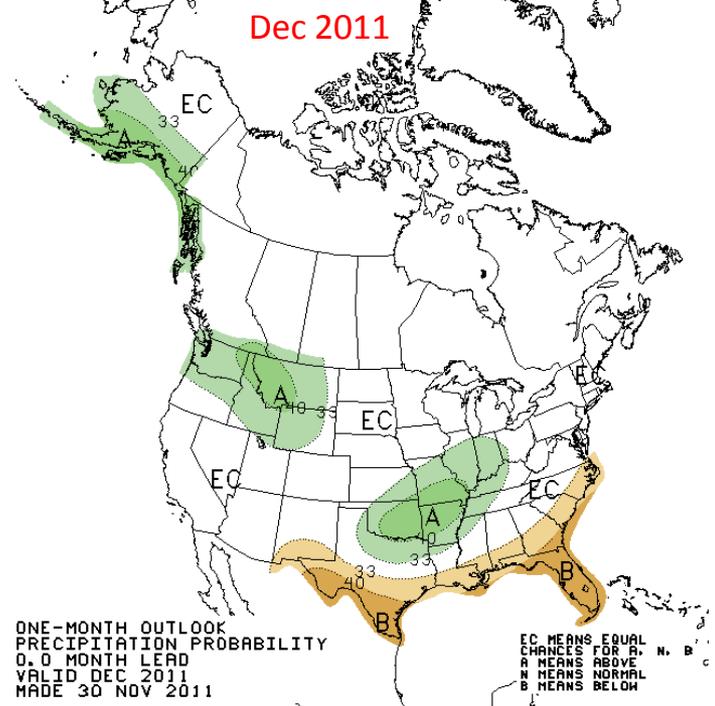
# CPC 8-14-Day Outlooks



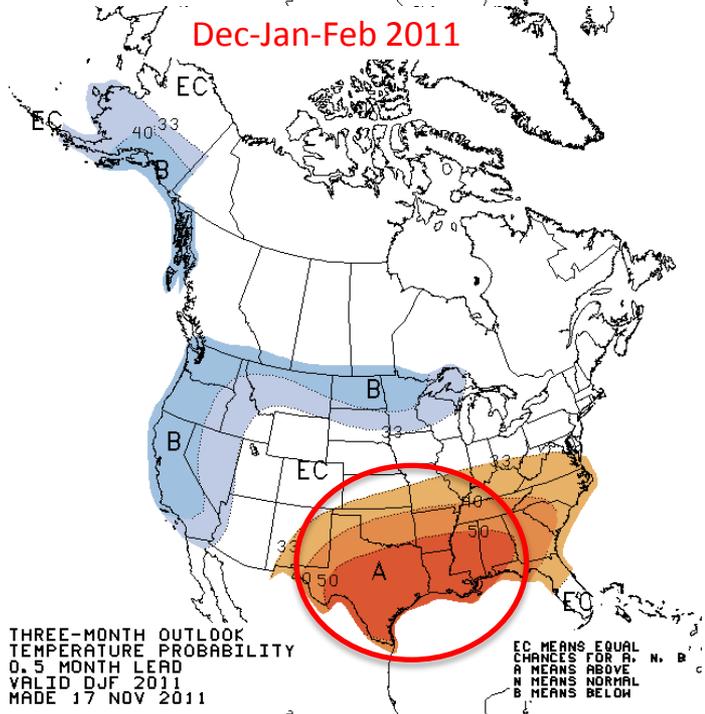
Dec 2011



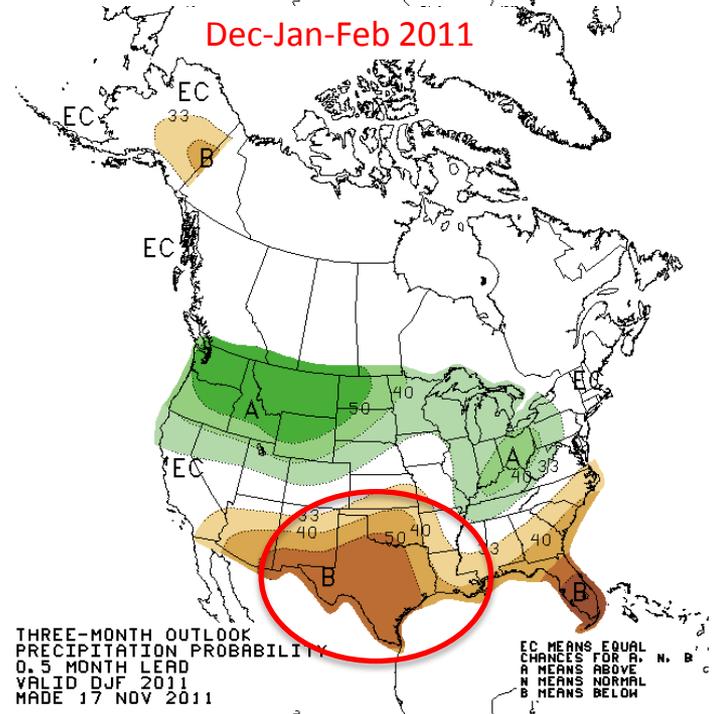
Dec 2011



Dec-Jan-Feb 2011



Dec-Jan-Feb 2011

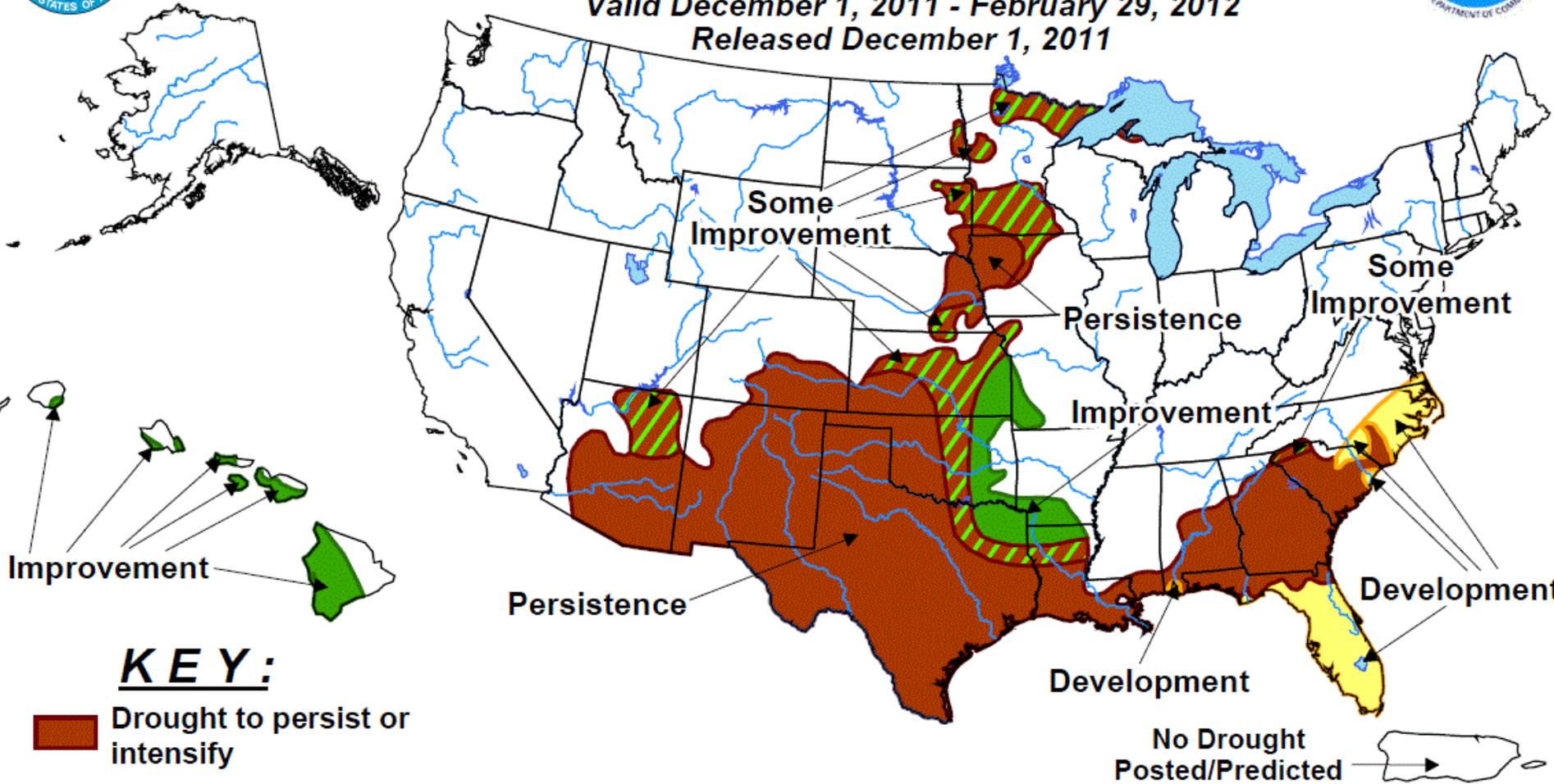




# U.S. Seasonal Drought Outlook

## Drought Tendency During the Valid Period

Valid December 1, 2011 - February 29, 2012  
Released December 1, 2011



### KEY:

-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

# Featured USDM Product

Did you know.....

There are more monitoring tools available focused on water supply and water availability from the NIDIS portal?



National Integrated Drought Information System

U.S. Drought Portal  
www.drought.gov

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[www.drought.gov](http://www.drought.gov)



### This Section Includes

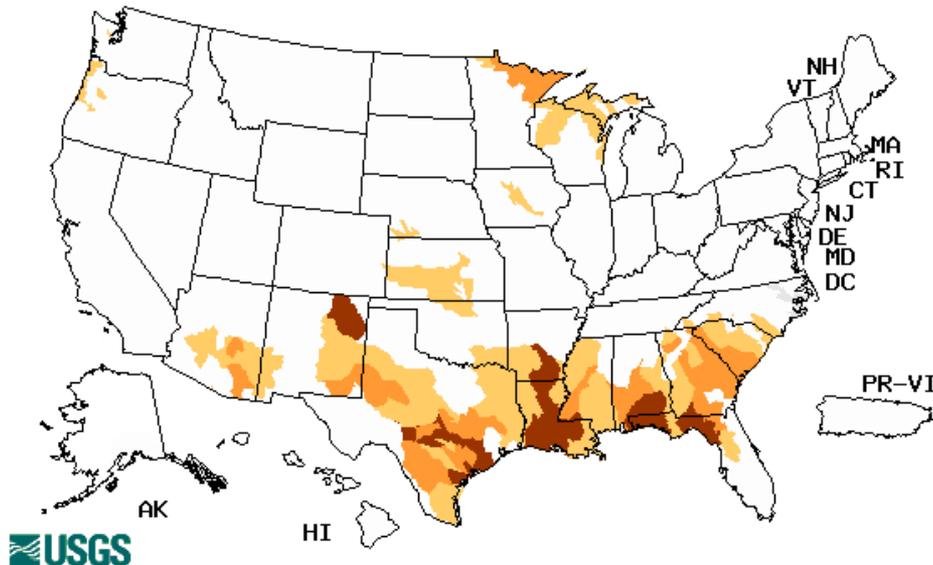
- [Hydrological Monitoring Home](#)
- [WaterMonitor.gov](#)
- [USGS's Water Data](#)
- [NRCS](#)
- [NOHRSC](#)
- [Bureau of Reclamation](#)
- [Army Corps of Engineers](#)

### Hydrological Monitoring

Hydrologists measure and forecast the amount of water in lakes, rivers, and aquifers. Drought takes longer to show up in hydrological systems than in agriculture, especially when reservoirs and rivers are managed to balance the extremes of wet and dry years. Snow is a major component of water supply in the western United States. Snow depth and water content can be measured months before it melts and fills streams and reservoirs.

[USGS Drought Watch](#) - Map of below normal 7-day average streamflow compared to historical streamflow for the day of year (United States)

Tuesday, November 08, 2011



#### Explanation - Percentile classes

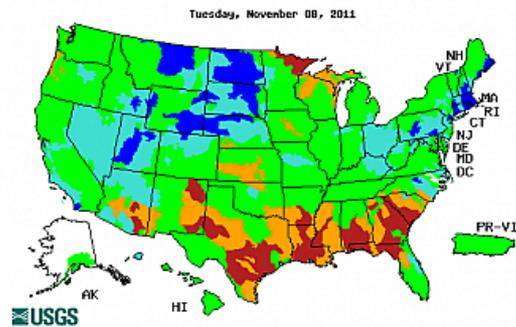
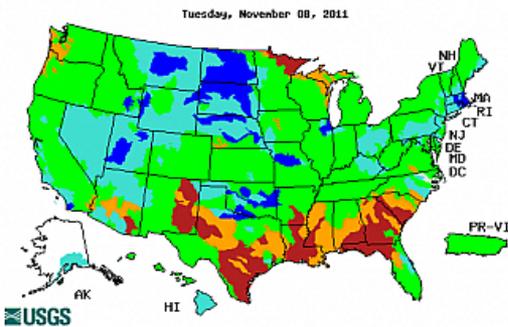
Low	<=5	6-9	10-24	Insufficient data for a hydrologic region
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	



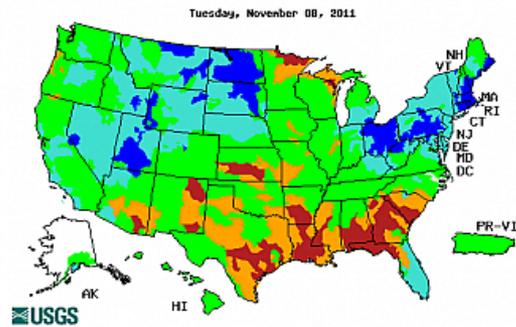
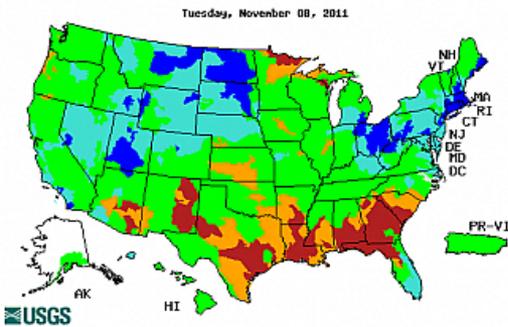
# U.S. Water Monitor -- A Portal To Federal Water Information -November 9, 2011

Companion to the *U.S. Drought Monitor* and the *Drought Impact Reporter*

- Streamflow
  - Reservoirs
  - Groundwater
  - Forecasts
  - Snow
- Yesterday** **Past 7 Days**



- Past 14 Days** **Past 28 Days**





# WaterWatch

Search WaterWatch

Home

Current Streamflow

Flood

Drought

Past Flow/Runoff

Animation

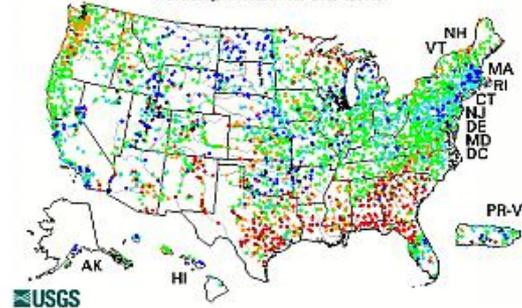
Toolkit

Additional Information

About WaterWatch

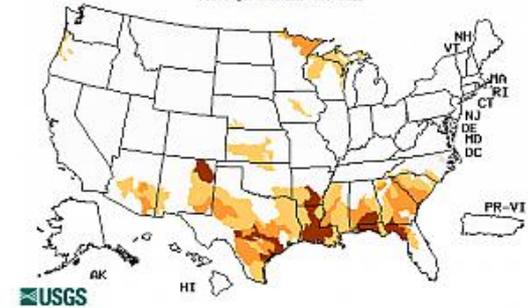
## Current Streamflow

Wednesday, November 09, 2011 12:30ET



## Drought

Tuesday, November 08, 2011



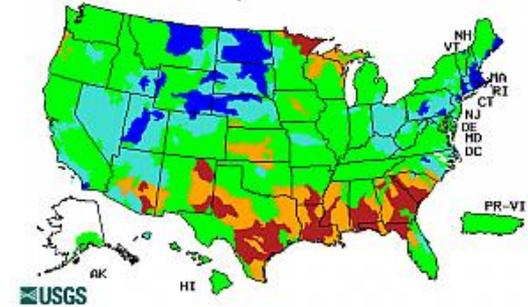
## Flood

Wednesday, November 09, 2011 12:31ET



## Past Flow/Runoff

Tuesday, November 08, 2011





# Streamflow Conditions on the Rio Grande

Greg Story

NWS/WGRFC HAS Forecaster

December 1, 2011



# Introduction

- **The Rio Grande gets its water from two primary weather phenomenon... Snow melt in Spring from the snow that falls in the mountains of northern New Mexico and southern Colorado from the Fall through early Spring, and... Rainfall during the late Summer monsoon season.**



# Recap of Last Year



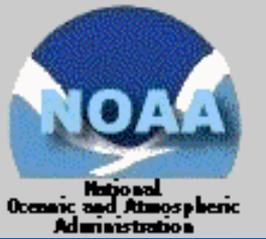
- **Fairly dismal for Winter 2010 - 2011**
- **The northwestern Rio Grande in Colorado fared the best with 50-60% of average flows from snowmelt.**
- **Northeastern part of the Rio Grande in Colorado averaged about 20% of normal flows.**
- **New Mexico came out very dismal with an average of about 14% of normal.**



# Recap of Last Year



- Mid to late season snowfall never did materialize, especially in the mid to lower elevations, leaving well below average snowpacks (especially in New Mexico) for the season.
- Higher elevation snow did accumulate within the Colorado portion of the upper Rio Grande basin.
- Far below average snow accumulation area wide resulted in drastically reduced flows within the Rio Grande basin in New Mexico.



# So Far for 2011

- First ten months of 2011 were the **second driest start of any year on record** for New Mexico.
- Statewide average precipitation has been only **63% of normal** through October.
- So far in November, New Mexico has been wetter than normal in the far northwest and northeast sections, including parts of the upper Rio Grande. It has been much drier than normal across the rest of the state (affecting the Pecos River and the lower Rio Grande).
- Monsoon rains were generally below normal.



# Significant Precipitation Deficits in the Rio Grande Valley



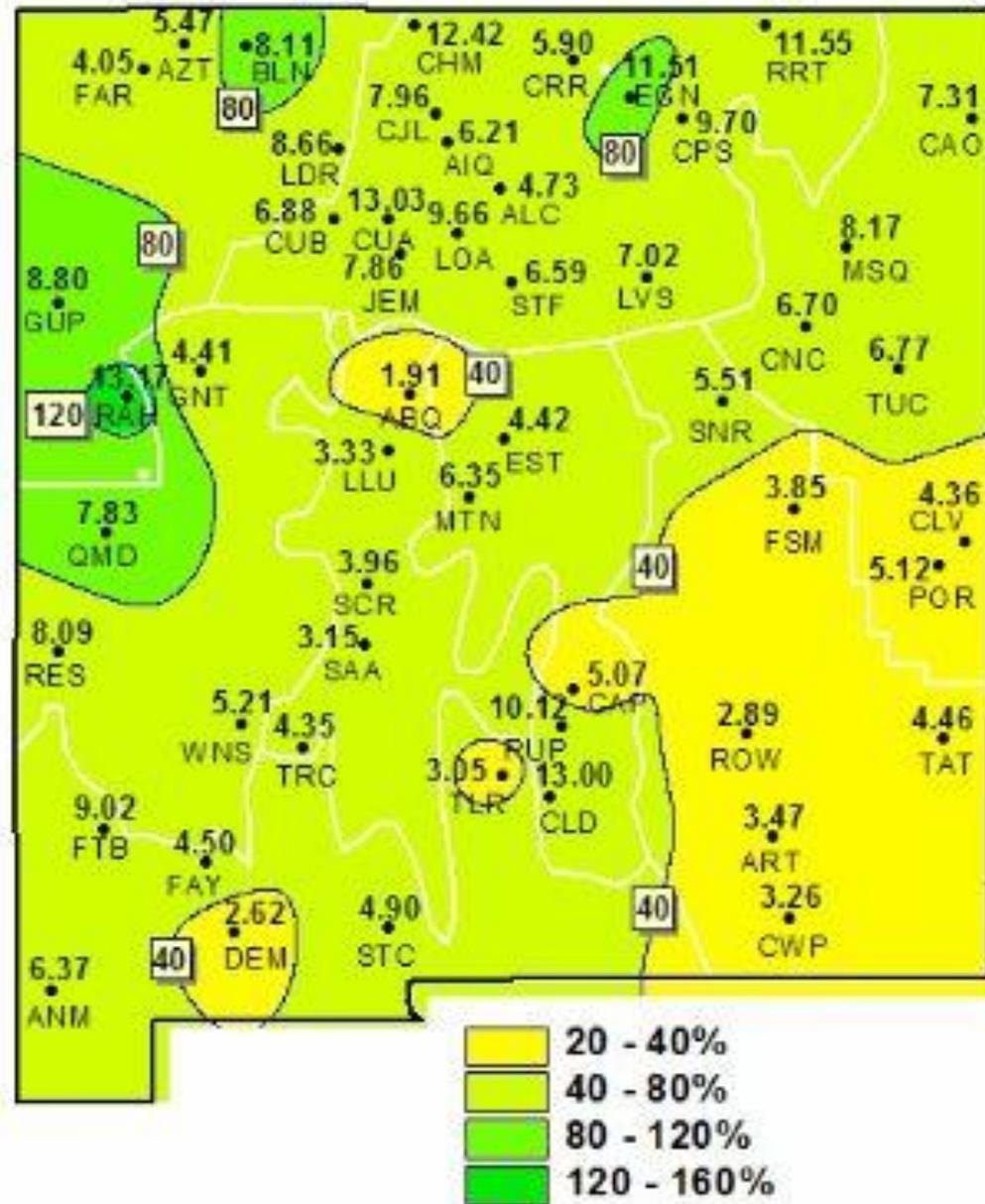
**January-October.** Looking at January through October 2011 precipitation totals for selected locations, significant precipitation deficits continue to be evident, especially in the Rio Grande Valley and southern New Mexico.

Station	January 2010 - October 2011	Departure From Normal
Alcade	6.30 inches	-3.70 inches
Conchas Dam	7.71	-5.35
Tatum	5.03	-9.90
NMSU Las Cruces	4.95	-2.90
Cloudcroft	14.51	-7.80
Carlsbad	3.53	-8.25
Ruidoso	11.33	-8.25
Socorro	4.60	-3.90
Albuquerque Sunport	3.39	-4.30
Glenwood	5.33	-13.40

As mentioned earlier, the NOAA National Climatic Data Center reported that the first ten months of 2011 had been the 2nd driest start to any year on record for New Mexico. Statewide precipitation was only 63 percent of normal (new image coming soon).



# January - September 2011 Precipitation Totals (plotted) and Percent of Normal (contours)

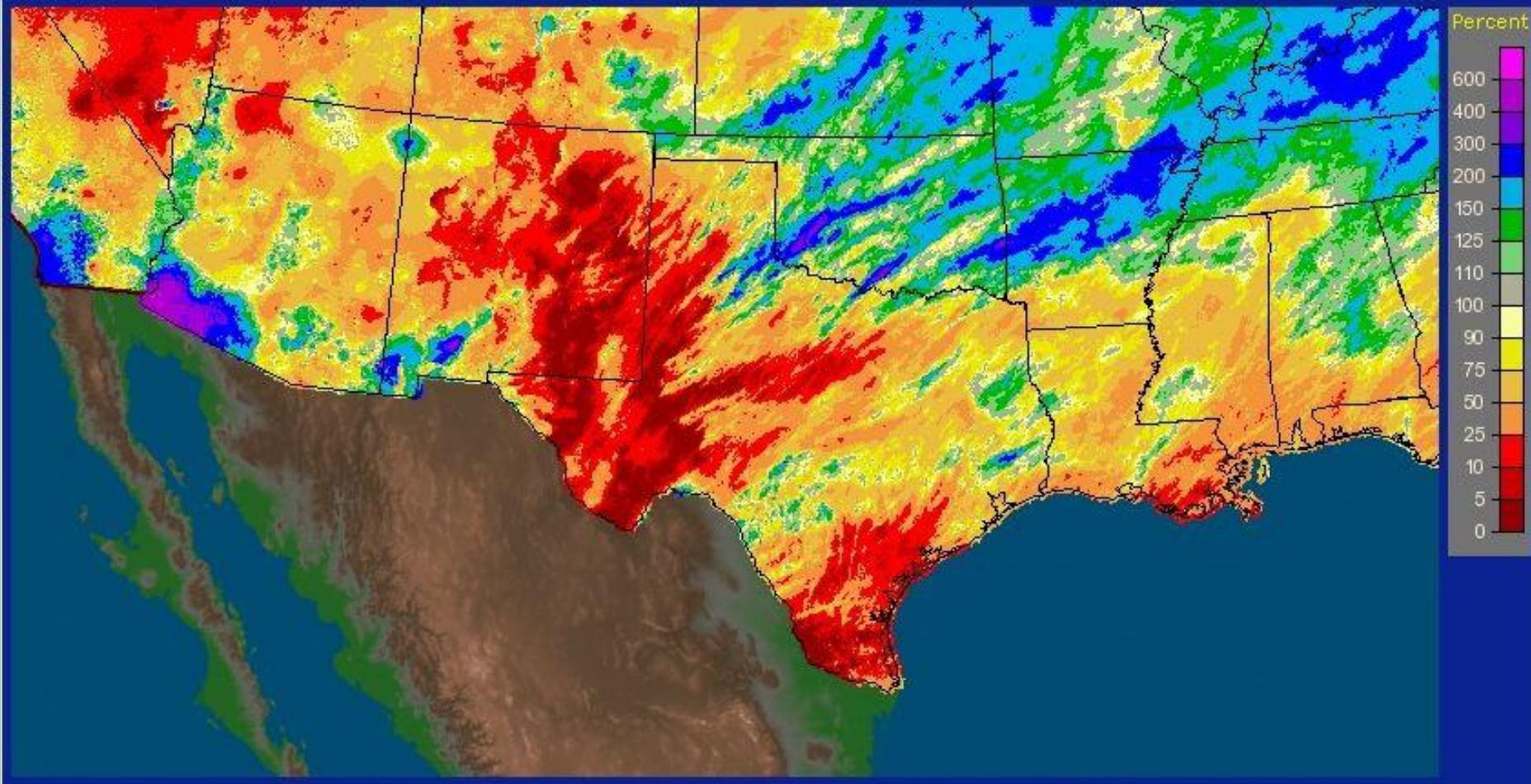




# November Percent of Normal Precipitation



West Gulf RFC Ft Worth, TX: Current 30-Day Percent of Normal Precipitation  
Valid at 11/29/2011 1200 UTC - Created 11/29/11 18:09 UTC

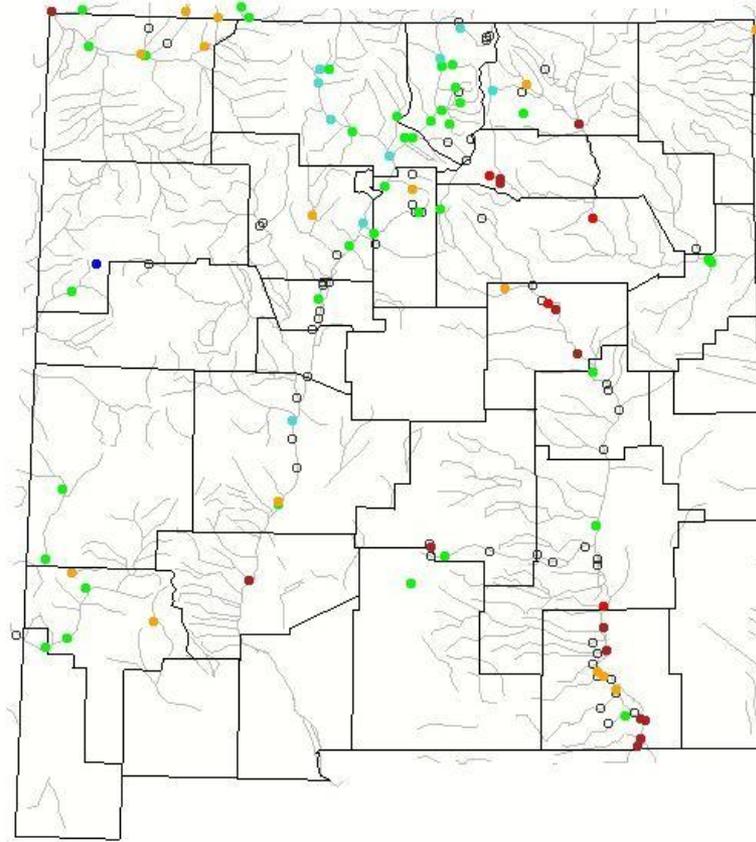




# New Mexico Streamflow



Tuesday, November 29, 2011 12:30ET



Choose a data retrieval option and select a location on the map

List of all stations 
  Single station 
  Nearest stations 
  Peak flow

Explanation - Percentile classes

Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		



# Downstream in South Texas...Rio Grande and Tributaries are at or Below Baseflow

Reservoir Storage Information as of 11/29/2011

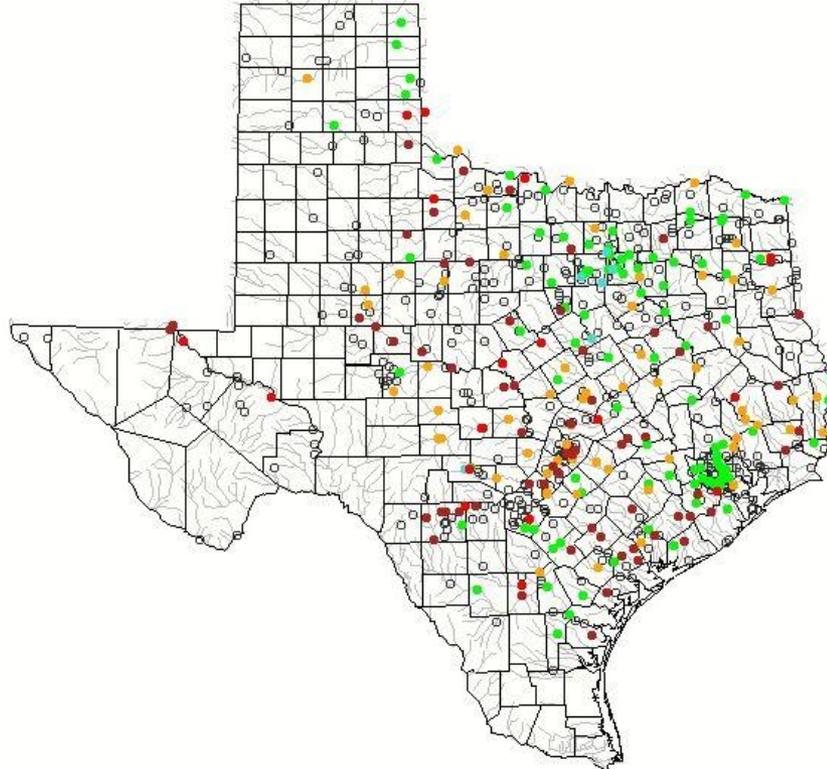
Lake ID	Reservoir Name	Top of Conservation Pool (feet above msl)	Stage (feet above msl)	Conservation Capacity (acre-feet)	Storage (acre-feet)	Percent Full	TX Share of Conservation Capacity (acre-feet)	TX Share of Storage (acre-feet)
23050	Amistad Reservoir, International	1,117.00	1,108.59	3,274,057	2,765,945	84.48	1,840,020	1,841,000
23070	Falcon Reservoir, International	301.20	277.50	2,645,646	1,104,600	41.75	1,550,349	696,000
23043	Red Bluff Reservoir	2,827.13	2,795.43	130,170	4,118	3.16	130,170	4,118



# Texas Streamflow



Tuesday, November 29, 2011 12:30ET



Choose a data retrieval option and select a location on the map

- List of all stations  Single station  Nearest stations  Peak flow

Explanation - Percentile classes

Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked



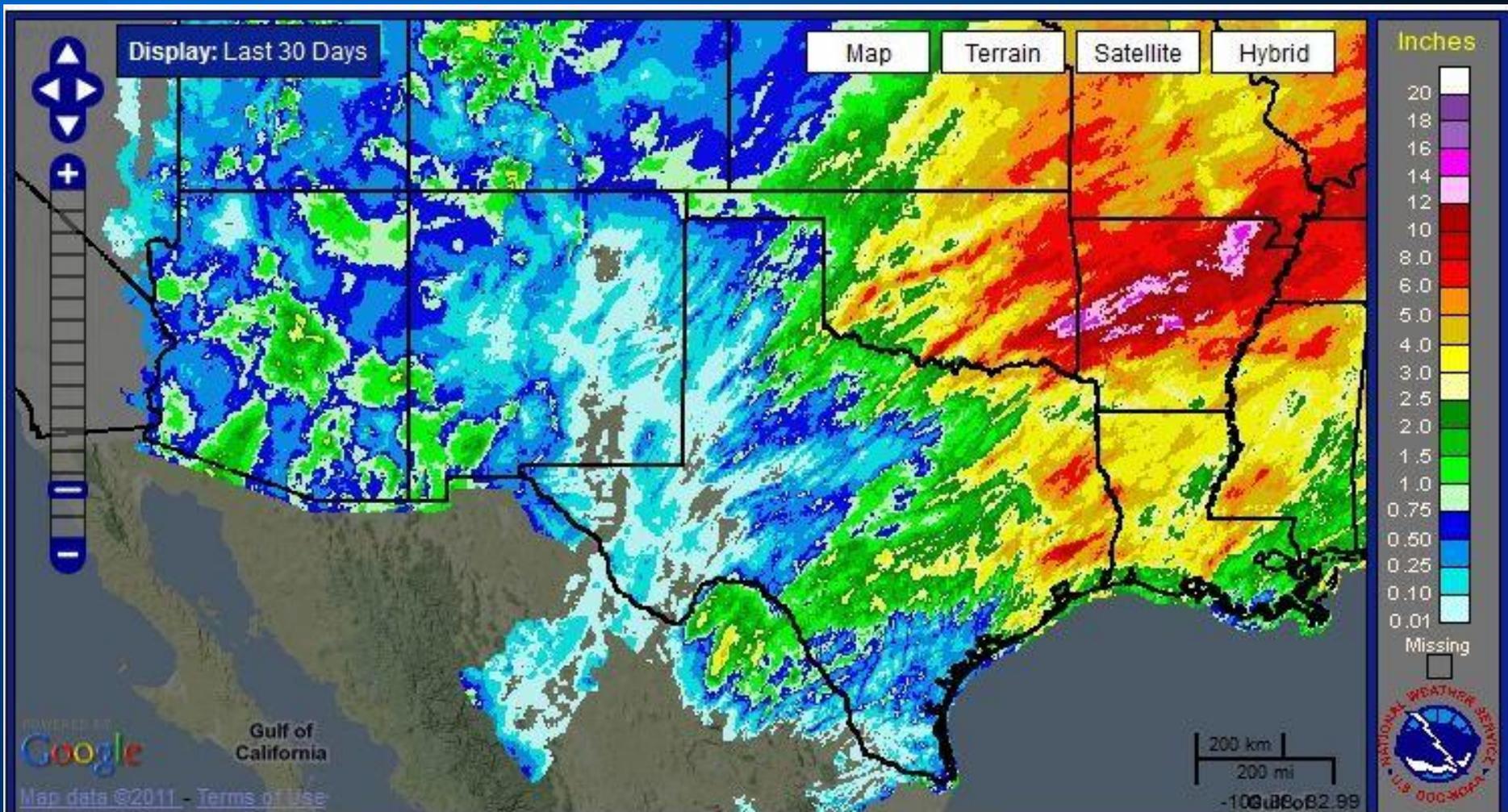
# So Far this Snow Season



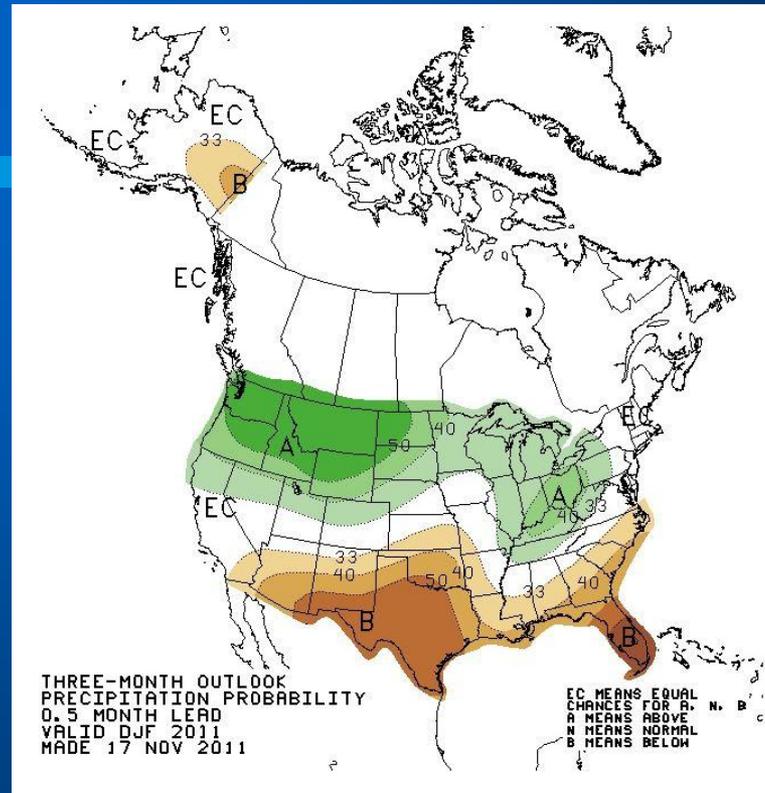
- It appears that a lot of the mid to higher elevation SNOTELS show SWE's, especially in Colorado over the San Juans, are tracking above what they were last winter. The average in Colorado is 90% of normal. The sites in NM are tracking higher and receiving snow much earlier than last year. 20% of the annual normal snowpack has been established.
- Soil moisture (down to -8 and -20 inches) seems good in the CO SNOTEL sites (those that have sensors) but are very dry in the NM sites, indicating that much of the snowmelt in the spring will recharge soils and shallow aquifers when the soils warm up next Spring.
- Future snowfall this cold season depends upon La Nina.



# November Precipitation



# Winter Outlook



- Generally, below normal precipitation is forecast. This, plus the rate of the temperature rise in Spring plus sublimation will determine 2012 water supply.



# Questions or Comments?



**AHPS Precipitation products are available on the web from the RFCs:**

**[http://www.srh.noaa.gov/ridge2/RFC\\_Precip/](http://www.srh.noaa.gov/ridge2/RFC_Precip/)**

**<http://water.weather.gov/precip/>**

**E-Mail: [Greg.Story@noaa.gov](mailto:Greg.Story@noaa.gov)**

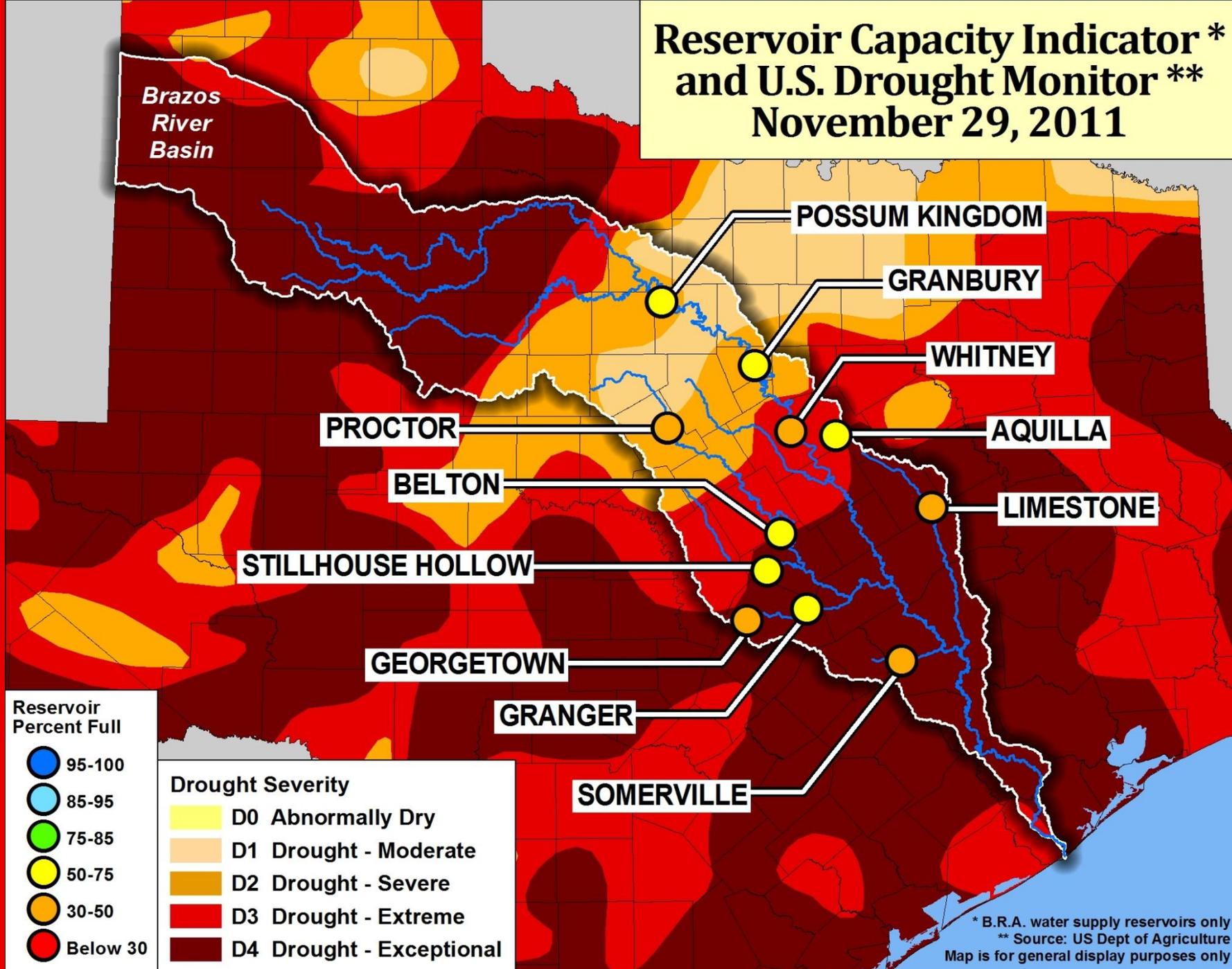
***Drought Impacts on the Brazos River  
Authority Water Supply System***

*Aaron Abel  
Sr. Water Resources Planner  
Brazos River Authority*

# Brazos River Authority Water Supply Reservoirs



# Reservoir Capacity Indicator\* and U.S. Drought Monitor\*\* November 29, 2011



Reservoir  
Percent Full

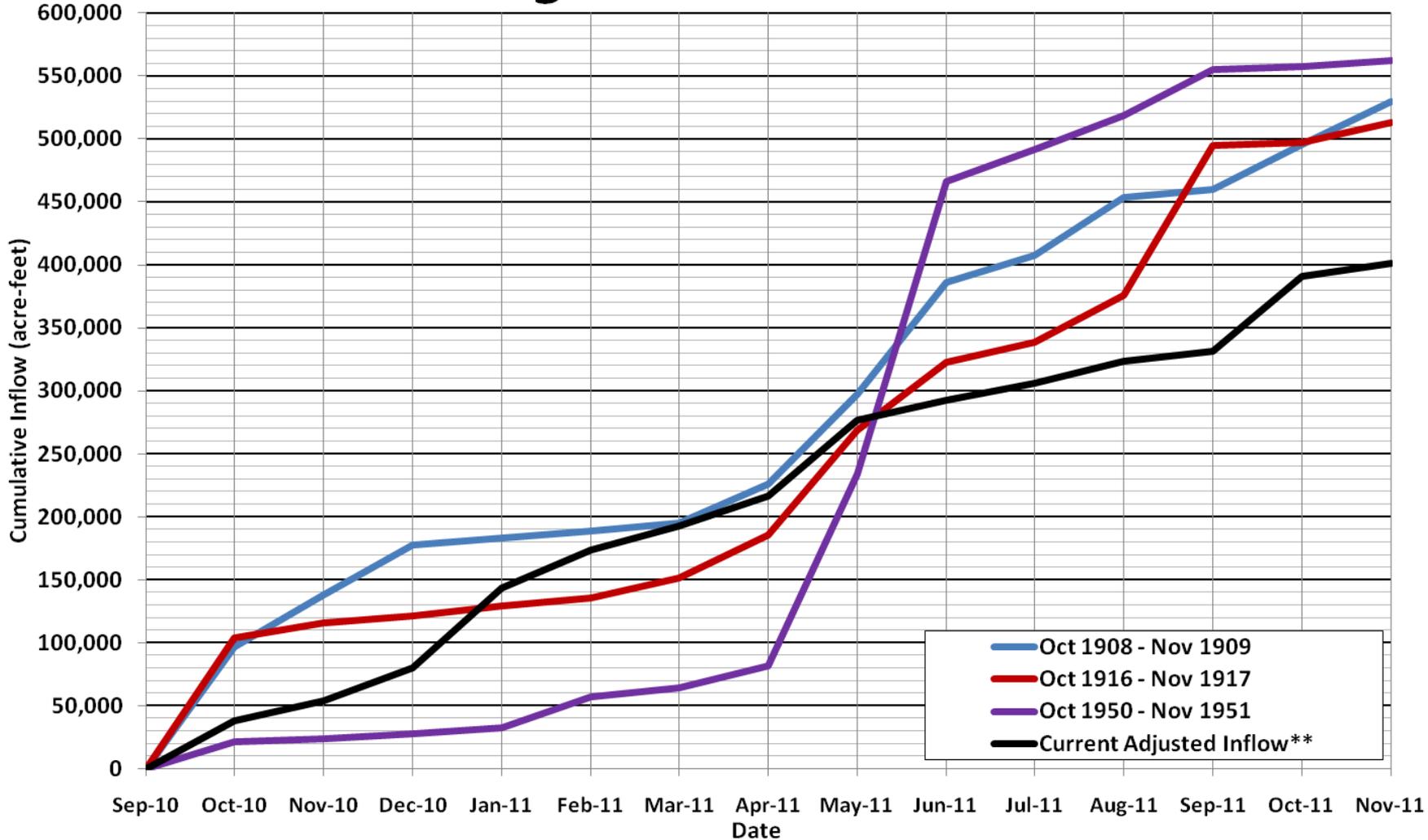
- 95-100
- 85-95
- 75-85
- 50-75
- 30-50
- Below 30

Drought Severity

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

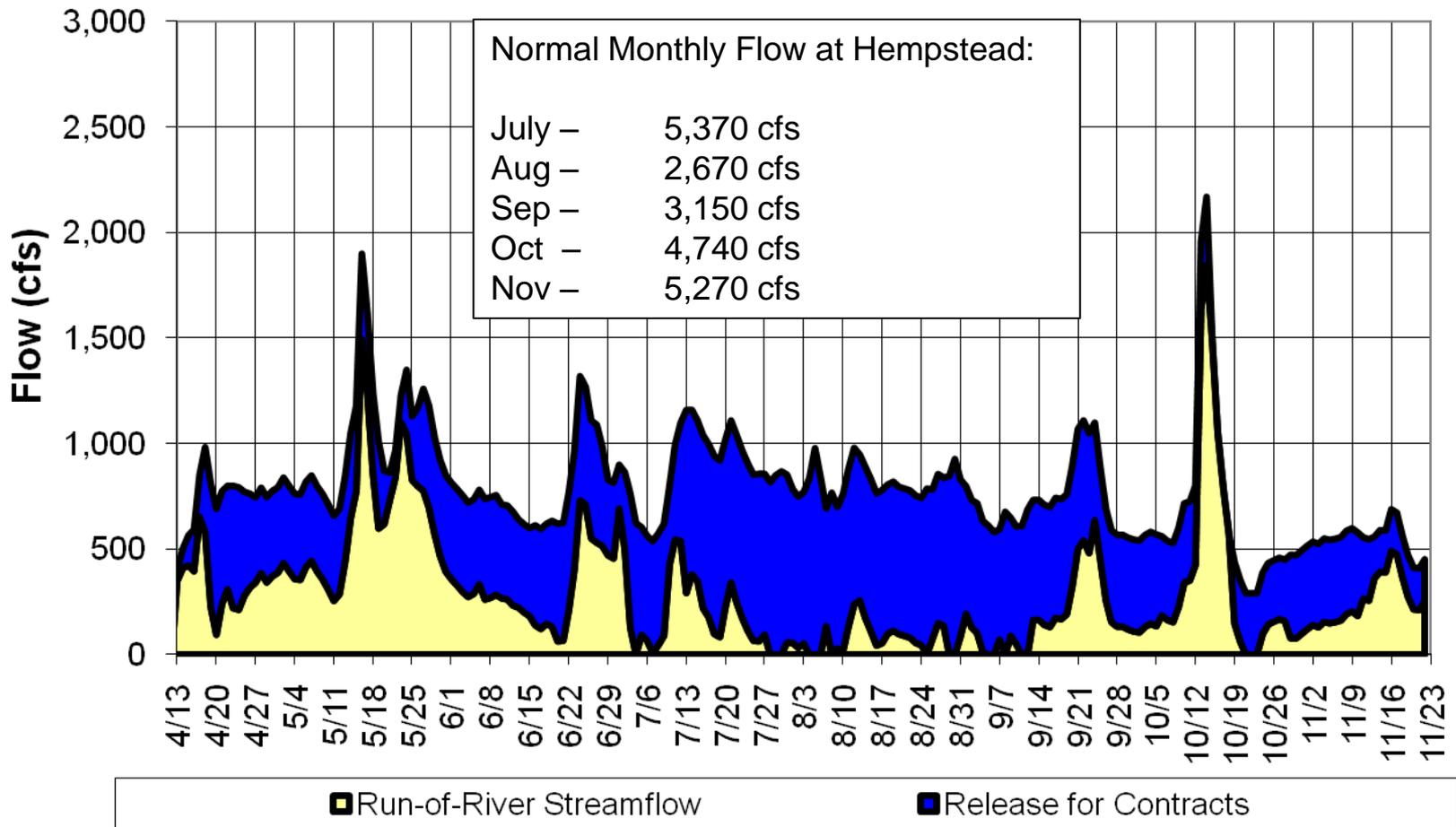
\* B.R.A. water supply reservoirs only  
\*\* Source: US Dept of Agriculture  
Map is for general display purposes only

# Total System\* Cumulative Inflow Tracking Since October 2010

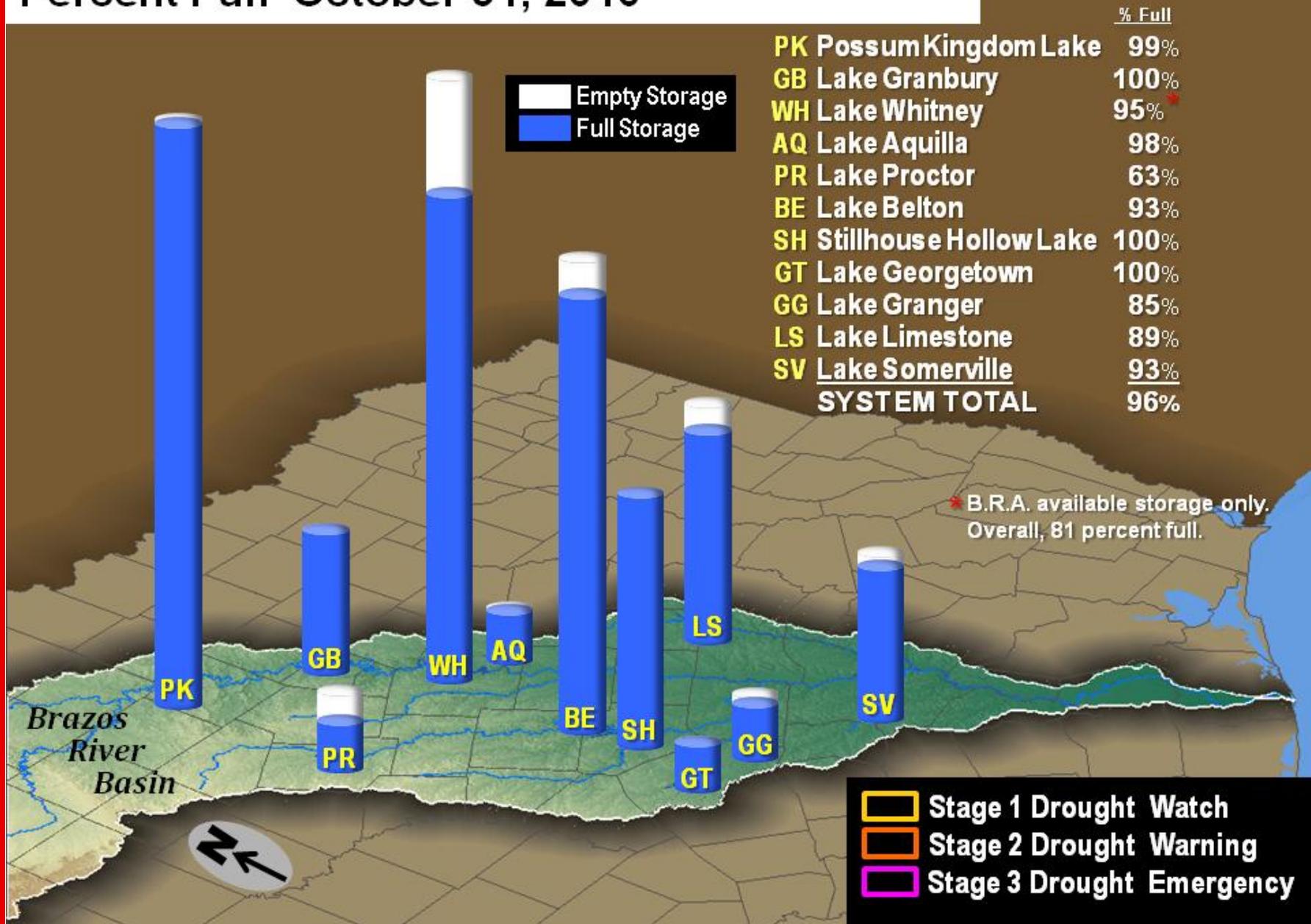


\*Does not include Lake Granbury & Lake Whitney \*\*November inflow values are unadjusted and include data through November 28th.

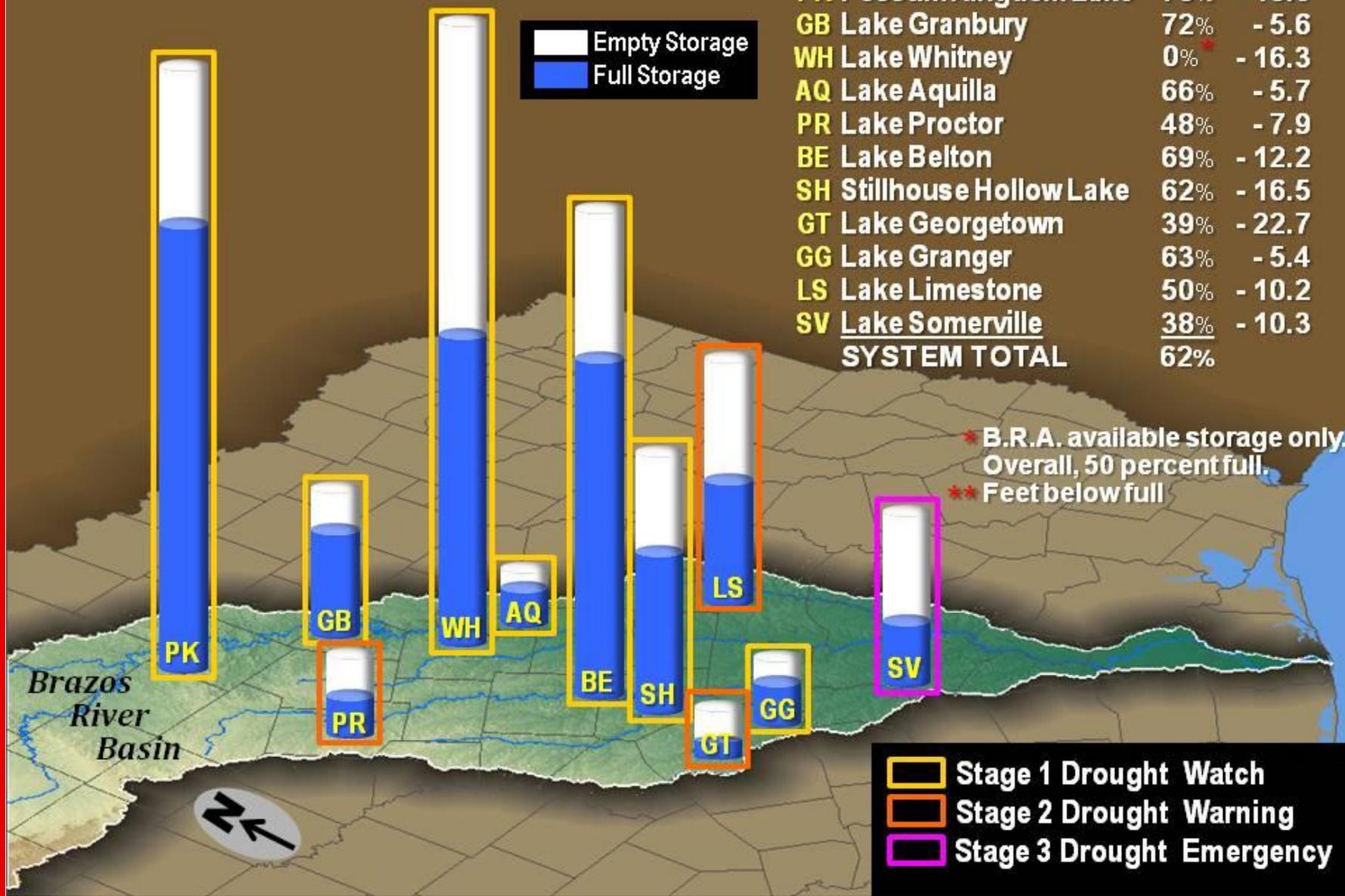
# Reservoir Releases Dominate Streamflow Brazos River near Hempstead



# Percent Full October 31, 2010

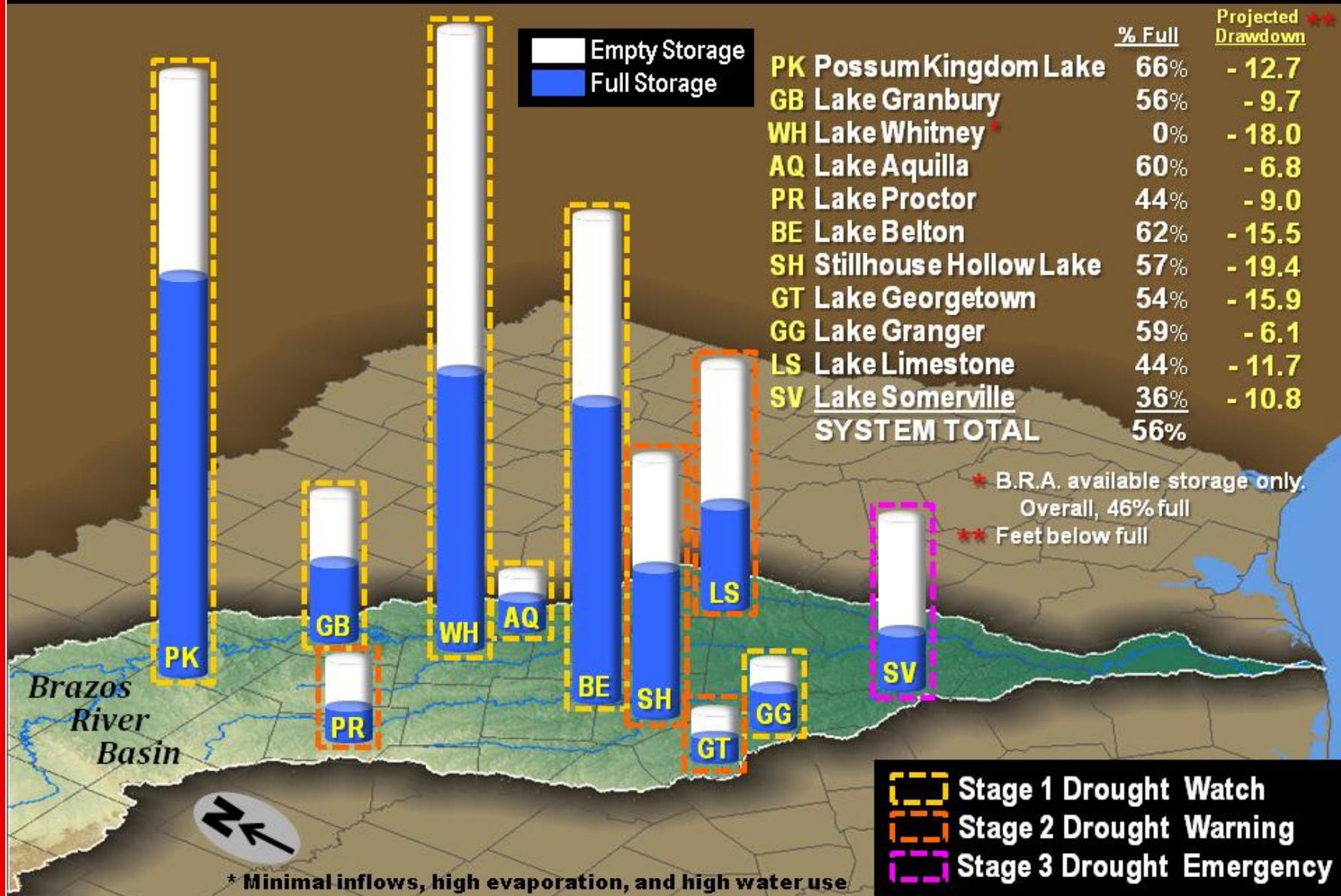


# Percent Full: November 30, 2011



## Projected Available Storage on February 29, 2012 (assuming continued drought conditions\*)

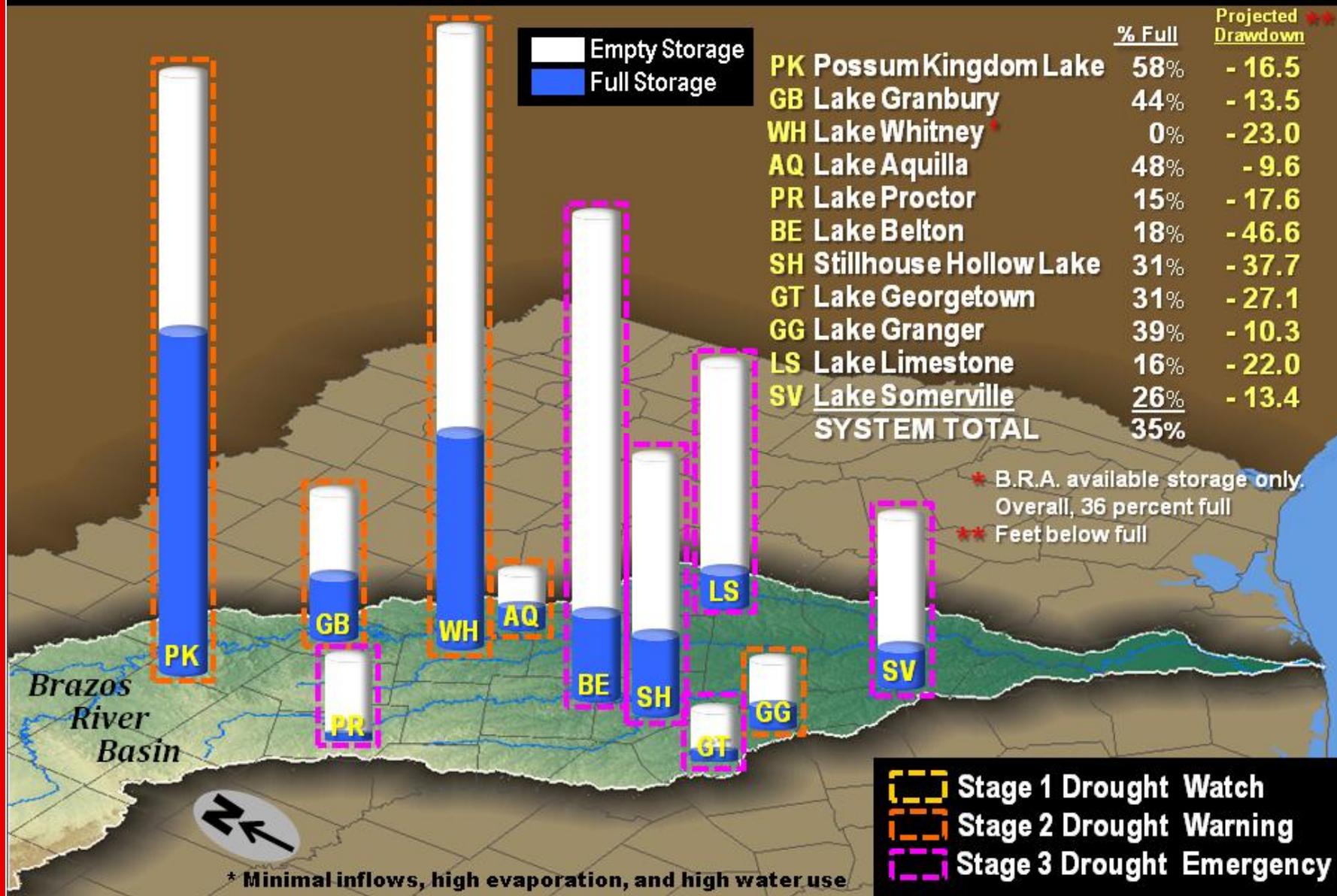
### Combined Storage of Authority System is Below Stage 1 Drought Watch Storage Trigger



## Projected Available Storage on September 30, 2012

(assuming continued drought conditions and only low flow release capabilities at PK below elevation 987)

**Combined Storage of Authority System is Below Stage 3 Drought Emergency Storage Trigger**





Brazos  
River  
Authority

# **Lower Colorado River Drought Update**



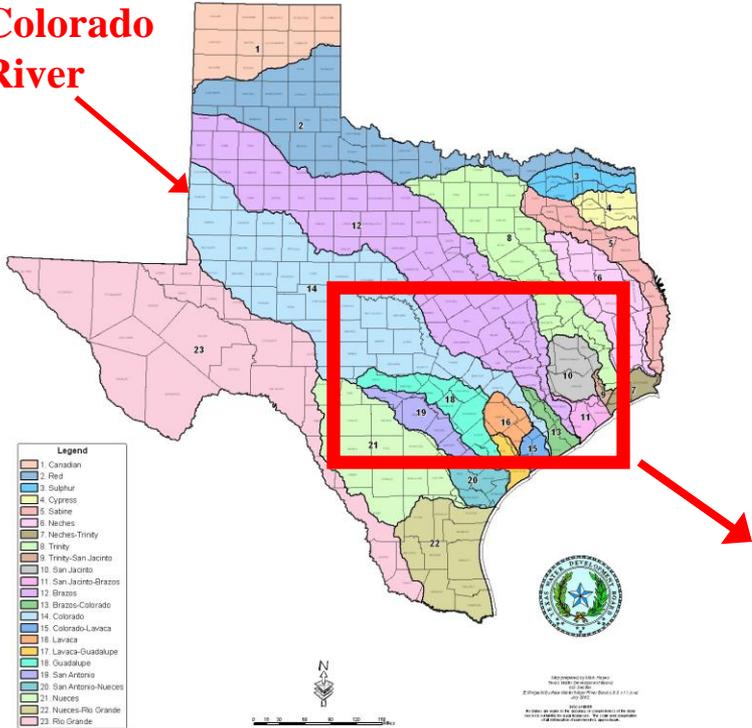
## **Water Resources Webinar**

**December 1, 2011**

**Bob Rose, LCRA Chief Meteorologist**

## Major River Basins In Texas

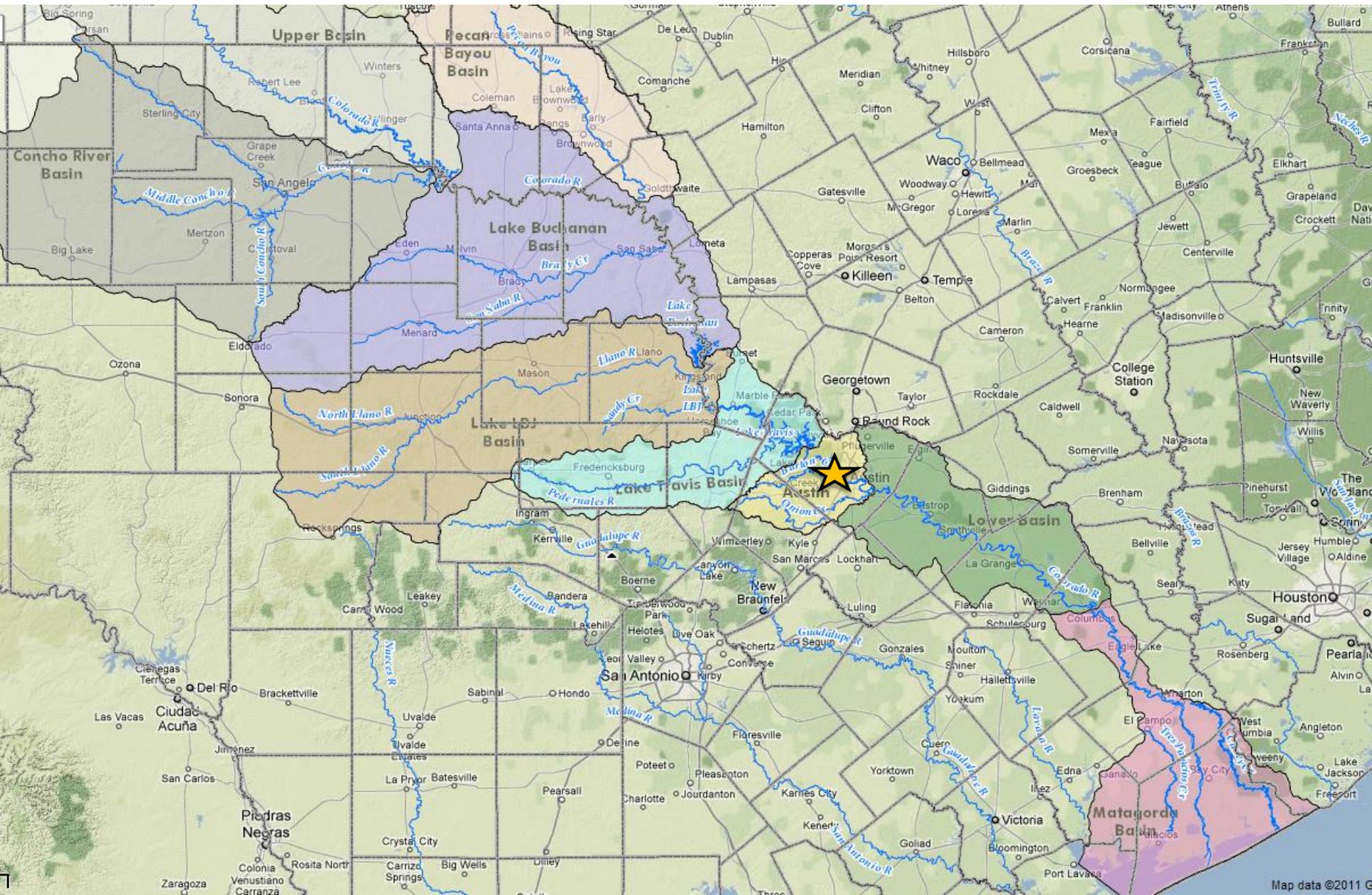
**Colorado River**

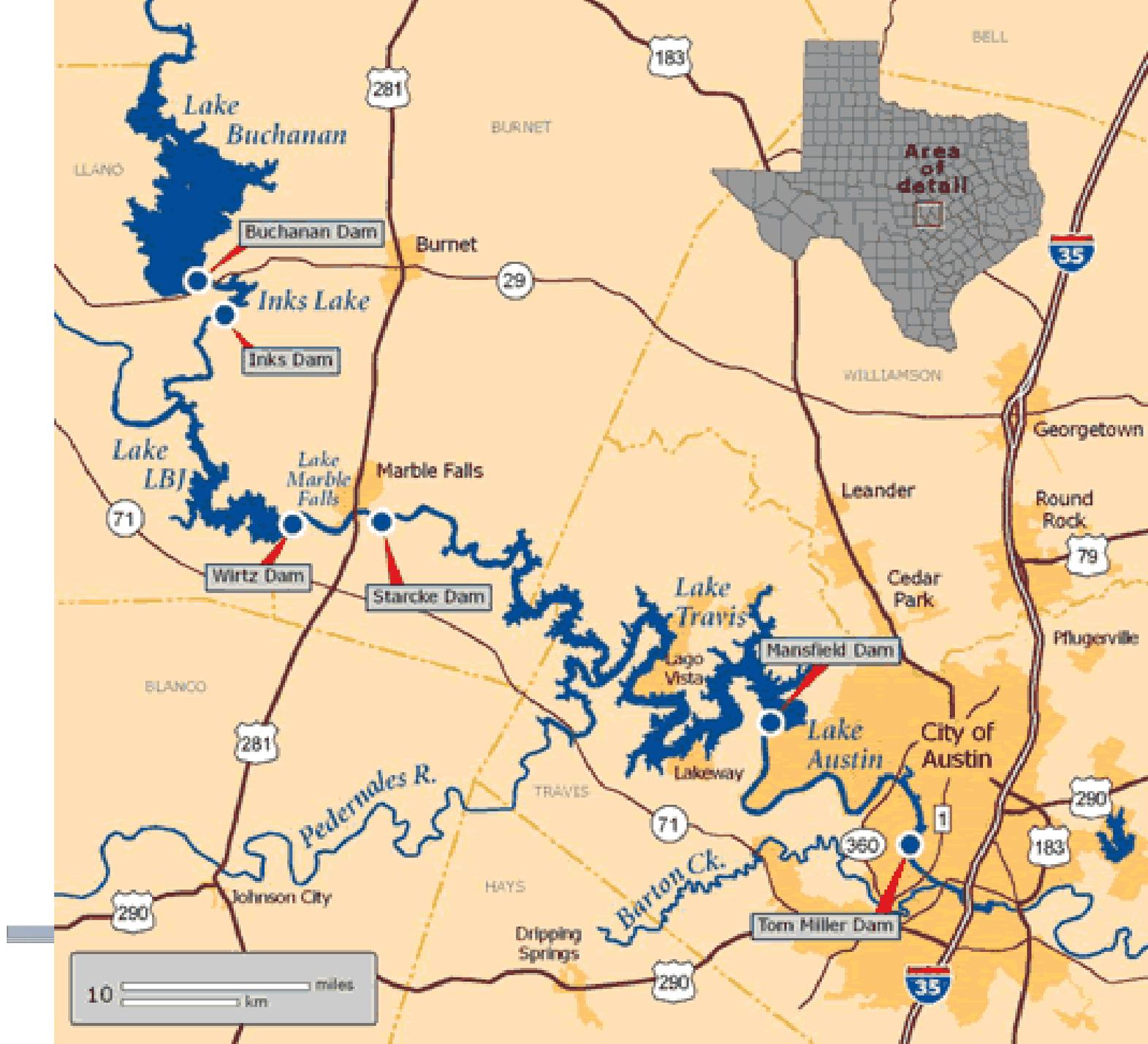


# Where is the Lower Colorado River of Texas?

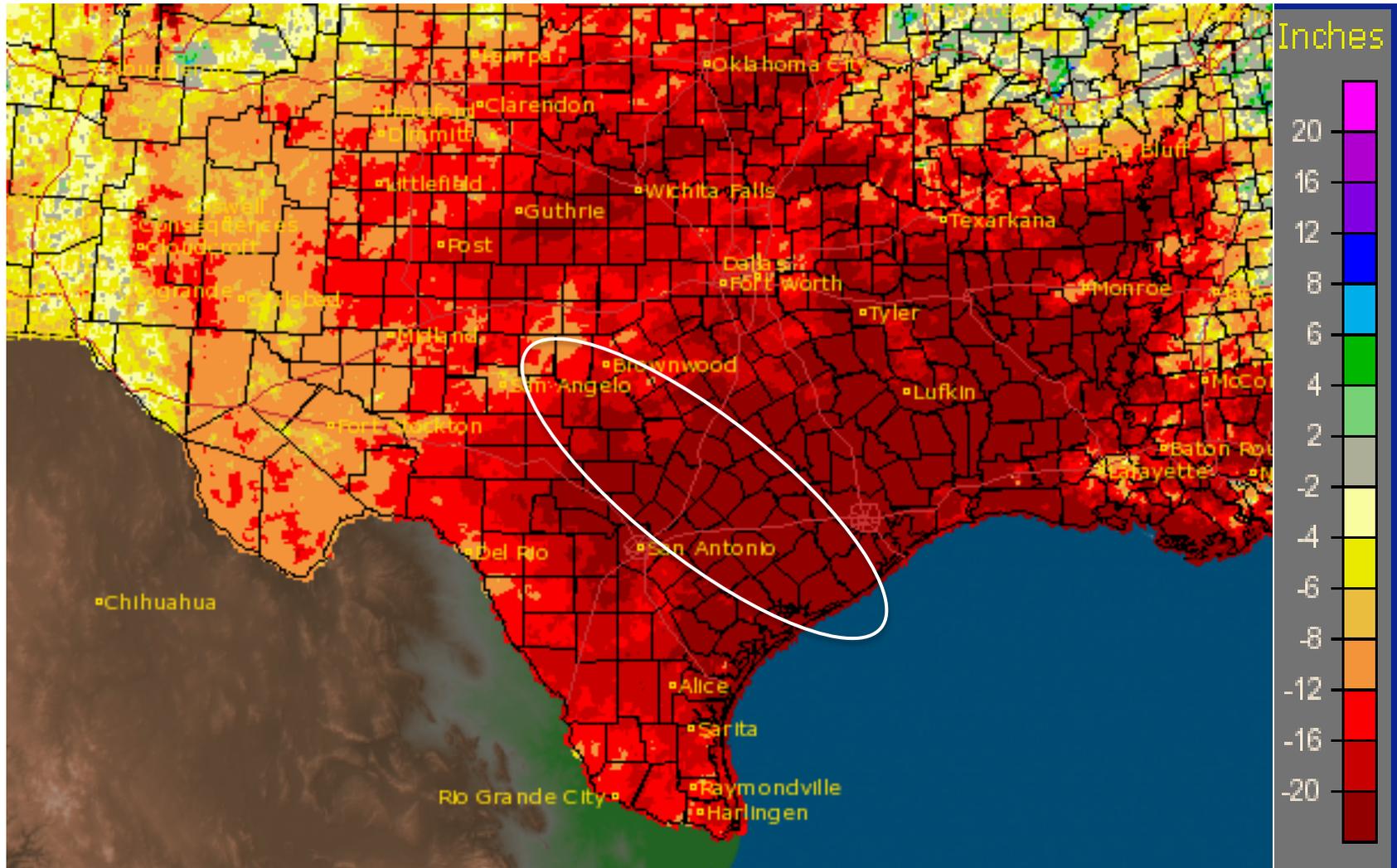


# The Lower Colorado River Basin





# Rainfall Departure from Normal October 2010-September 2011



# U.S. Drought Monitor

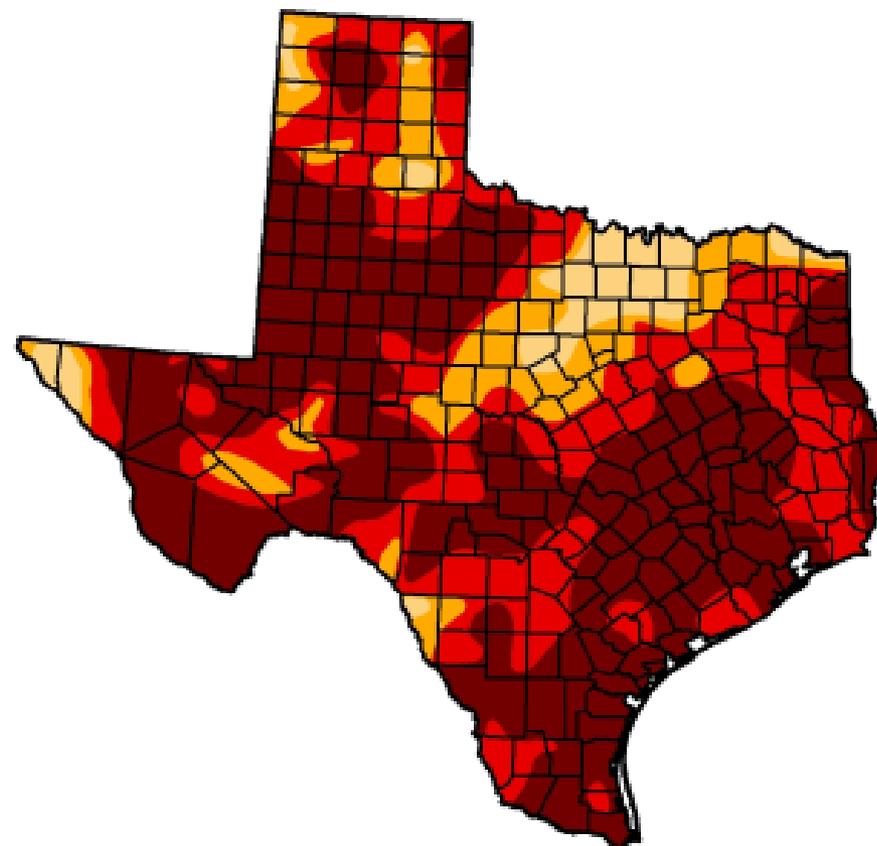
November 29, 2011

Valid 7 a.m. EST

## Texas

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	94.23	82.66	52.67
Last Week (11/22/2011 map)	0.00	100.00	100.00	97.44	86.75	62.97
3 Months Ago (08/30/2011 map)	0.00	100.00	99.92	99.01	95.04	81.08
Start of Calendar Year (12/28/2010 map)	7.89	92.11	69.43	37.46	9.59	0.00
Start of Water Year (09/27/2011 map)	0.00	100.00	100.00	99.16	96.65	85.75
One Year Ago (11/23/2010 map)	43.84	56.16	25.09	5.54	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

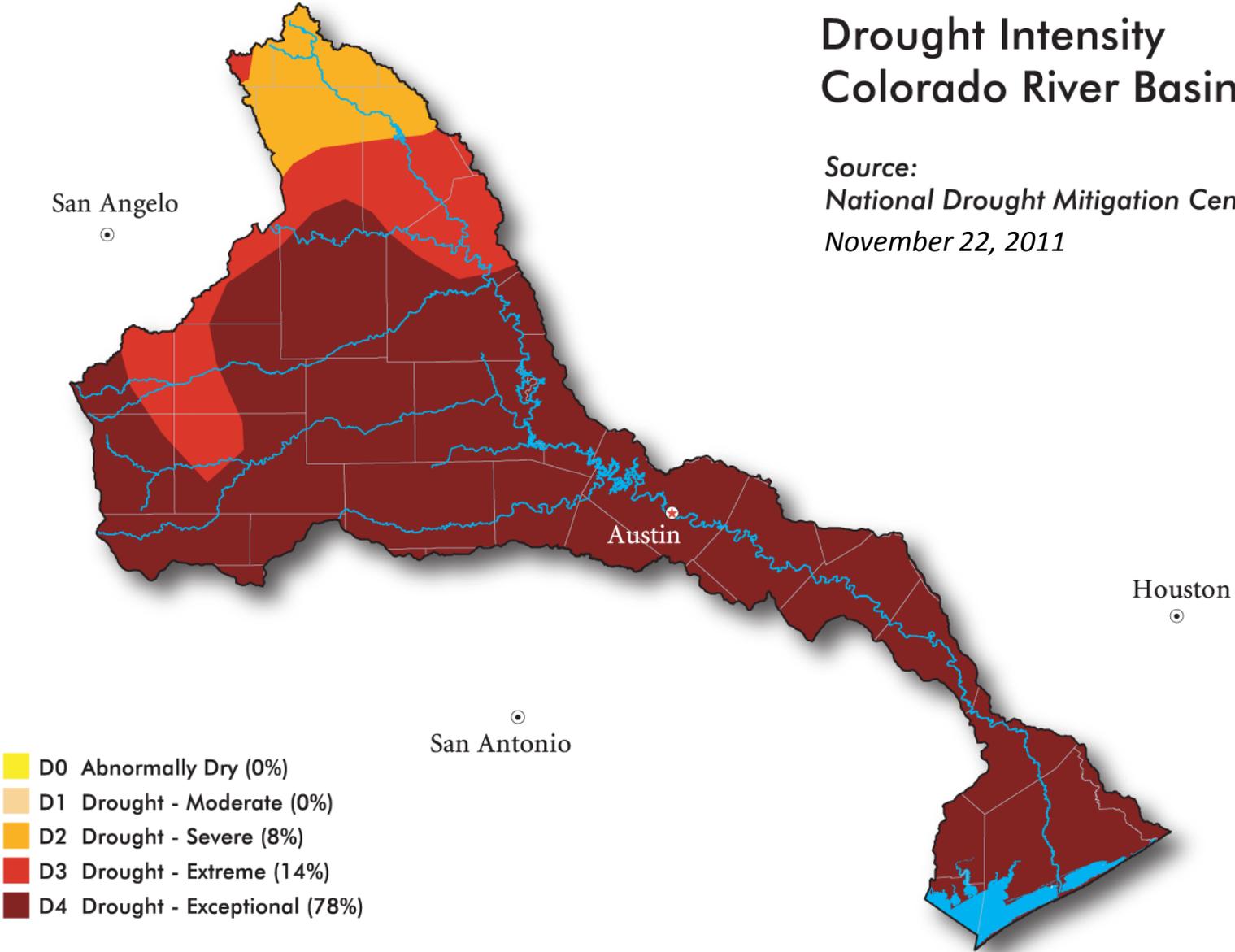


<http://droughtmonitor.unl.edu>

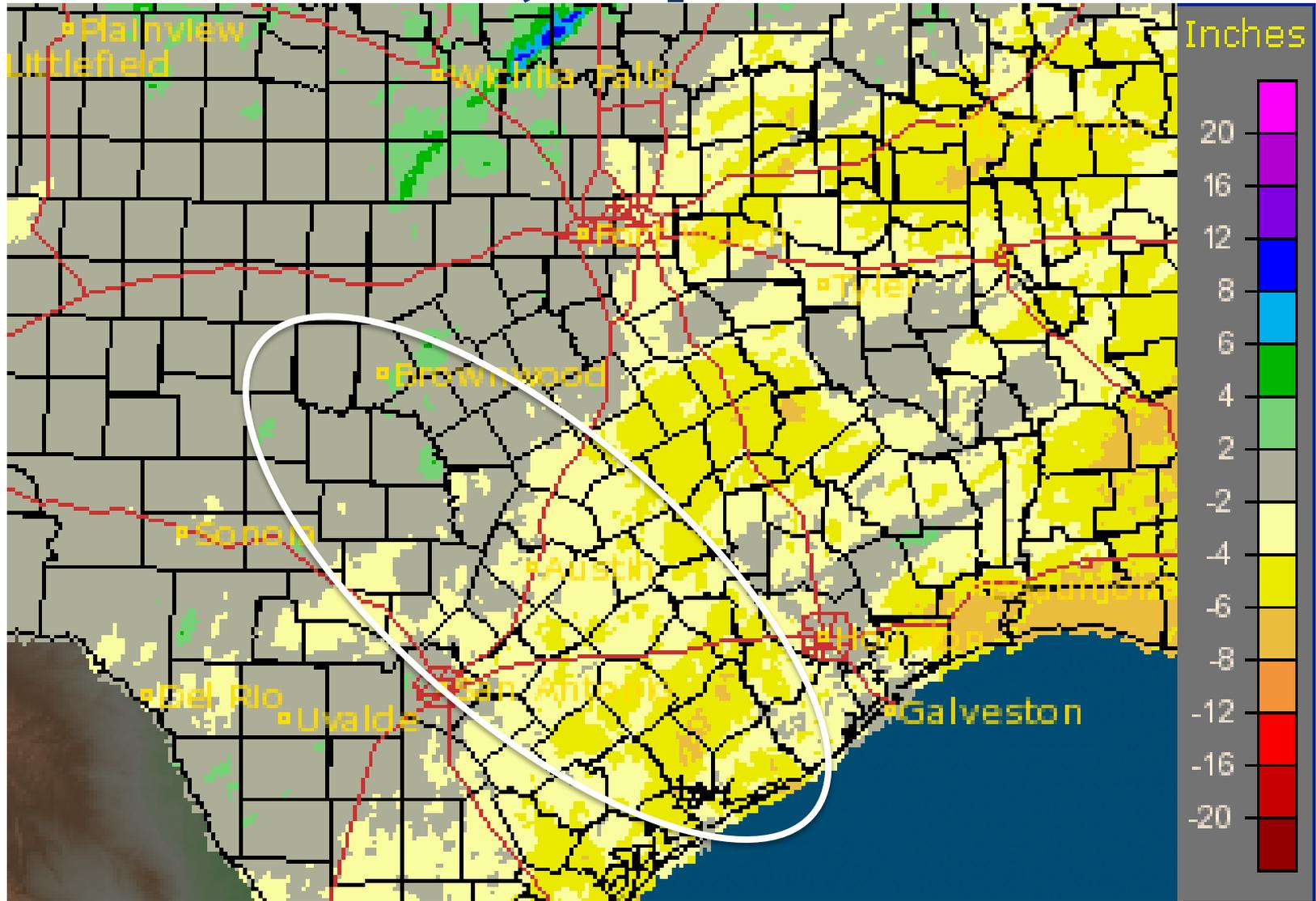
Released Thursday, December 1, 2011  
David Miskus, NOAA/NWS/NCEP/Climate Prediction Center

# Drought Intensity Colorado River Basin

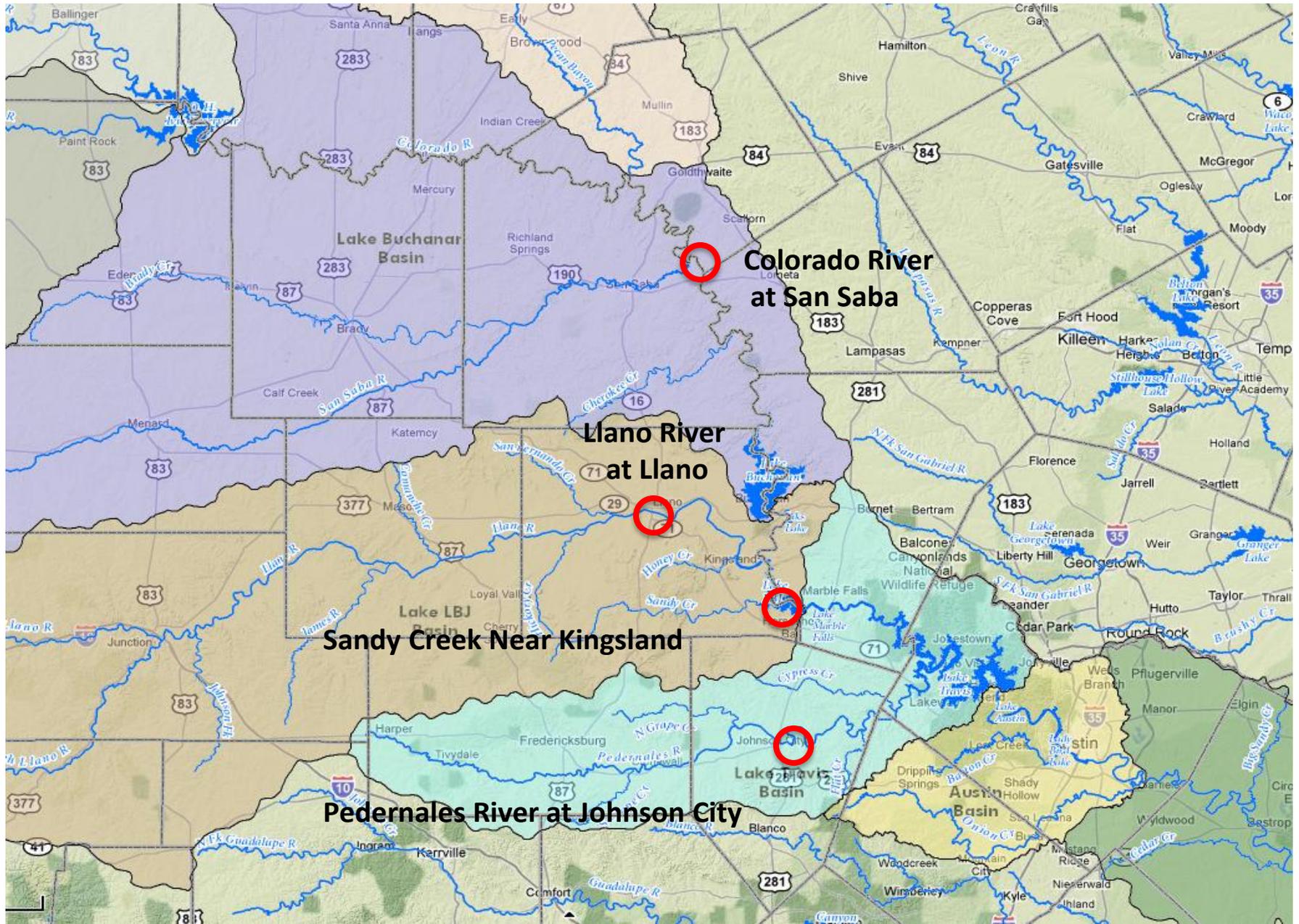
Source:  
National Drought Mitigation Center  
November 22, 2011



# Oct.-Nov. Rain, Departure from Normal

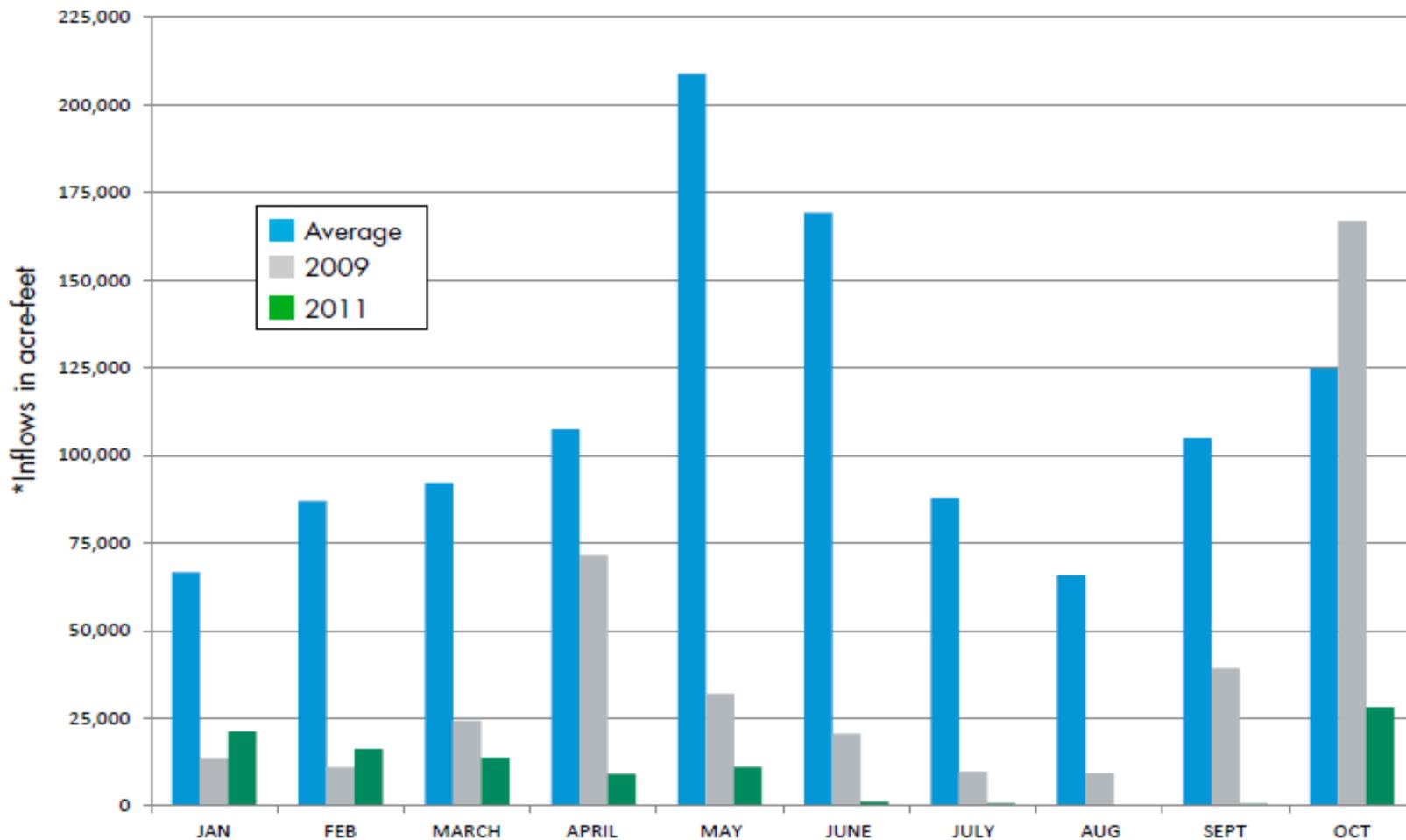


# Measuring Inflows



# Water flowing into the Highland Lakes

Rivers and streams are drying up



\*Inflows: the estimated amount of water flowing into the Highland Lakes from rivers and streams.

1,134

720

367

650

5th

3rd

4th

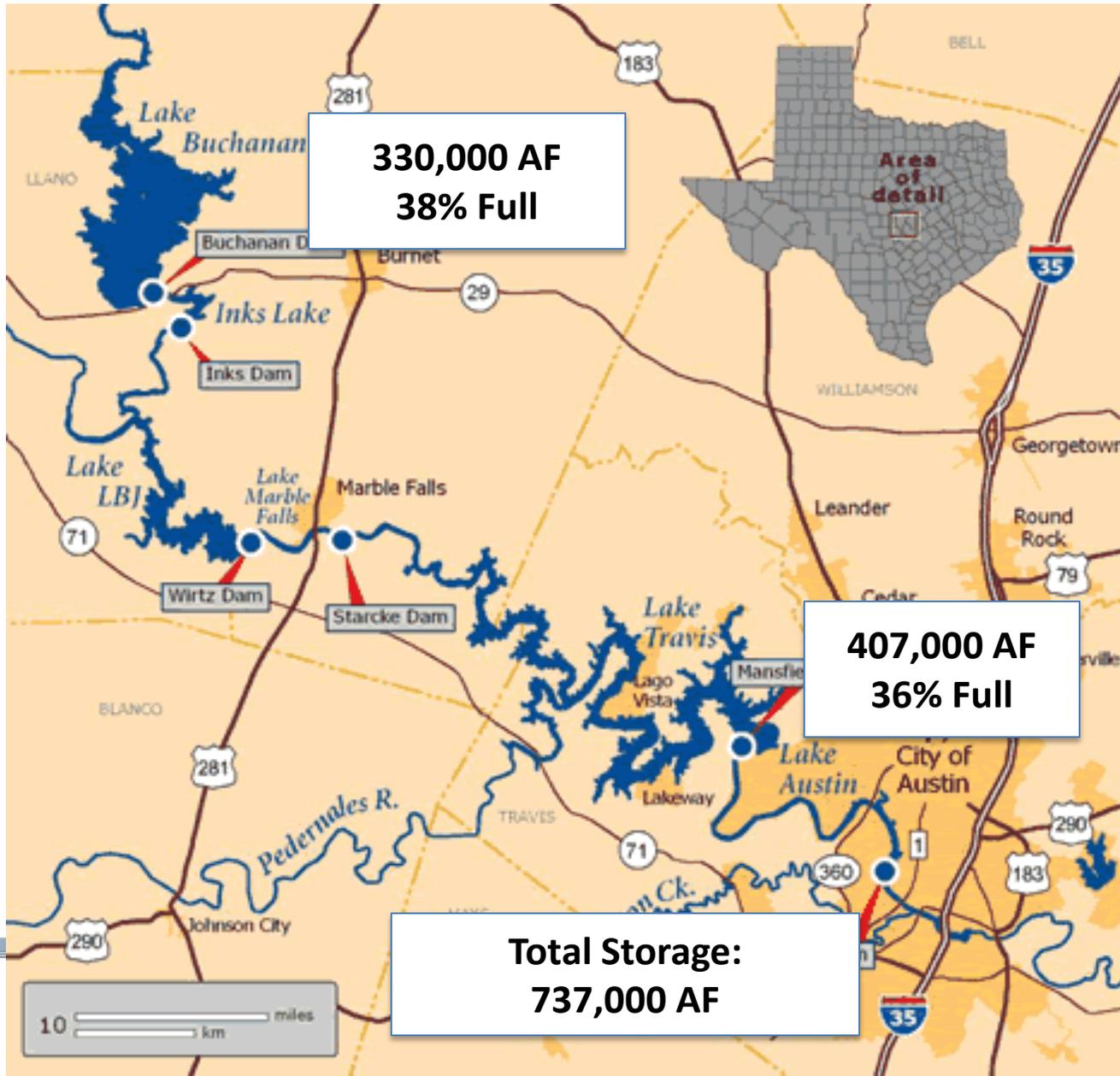
January - October totals (in acre-feet)

Average: 1,115,095

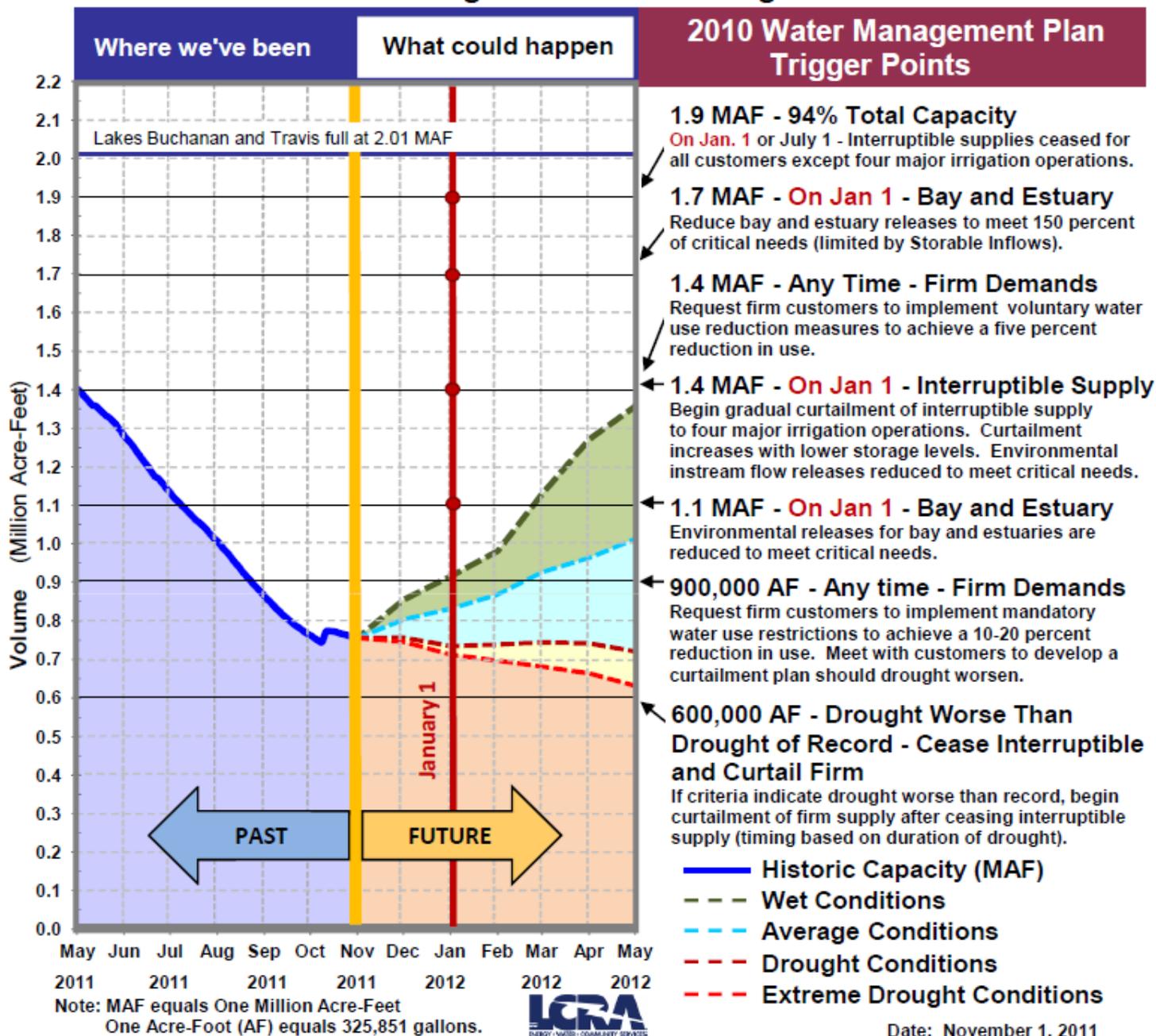
2009: 398,908

2011: 102,866

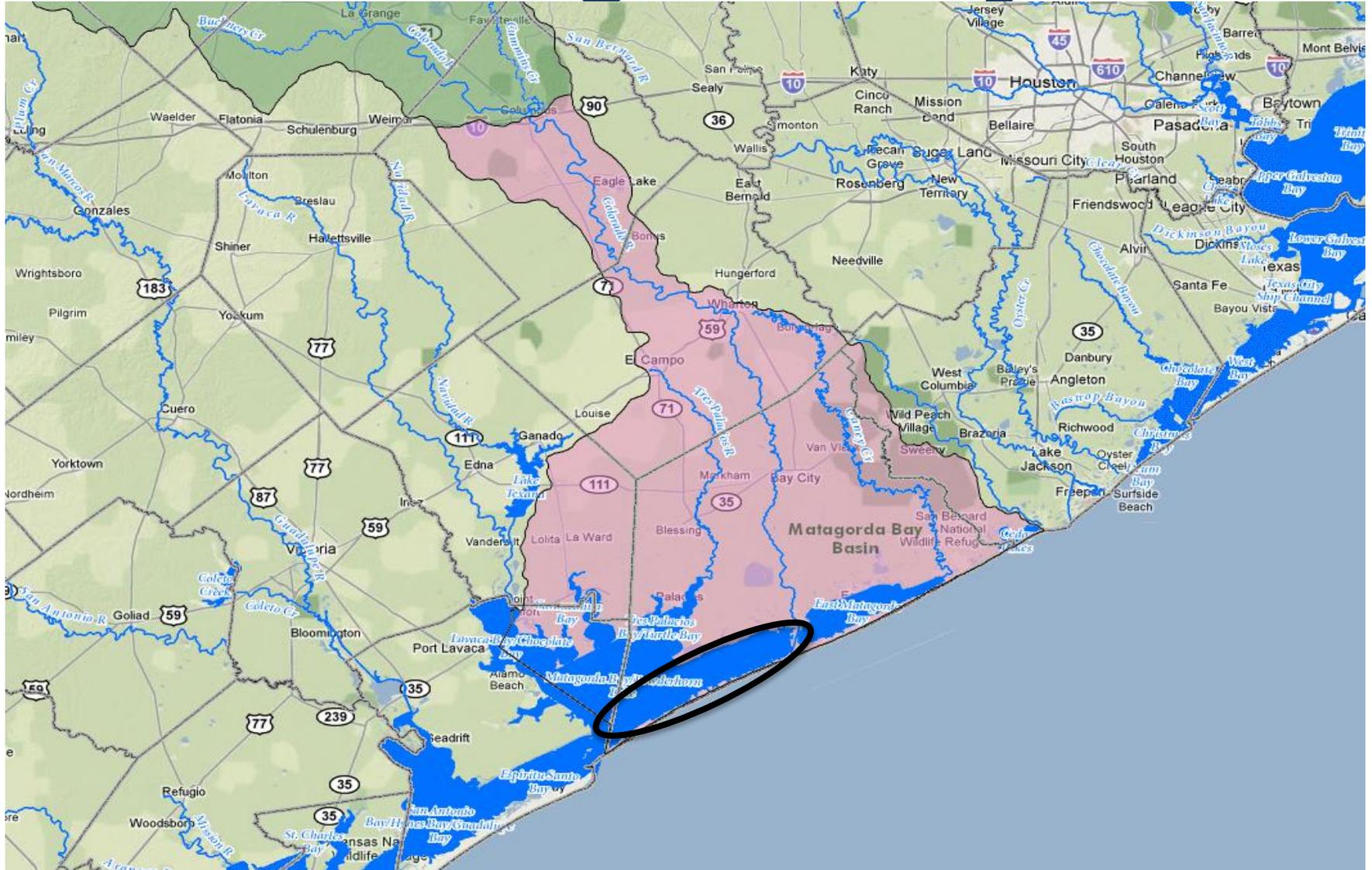
# Current Reservoir Levels



# Highland Lakes Storage



# Very High Salinity in Matagorda Bay





Lake Travis 113011 :: Photo credit LCRA



**Bob Rose**  
**Meteorologist, LCRA**  
**[bob.rose@lcra.org](mailto:bob.rose@lcra.org)**  
**512-473-3350**

# *Tulsa District Drought Overview*

**Jim Croston, P.E.**

Chief, Water Management Section  
USACE Tulsa District

December 1, 2011



US Army Corps of Engineers  
**BUILDING STRONG**®

Tulsa District Water Control Home Page - Windows Internet Explorer

http://www.swt-wc.usace.army.mil/

File Edit View Favorites Tools Help

Convert Select

Tulsa District Water Control Home Page

# WCDS



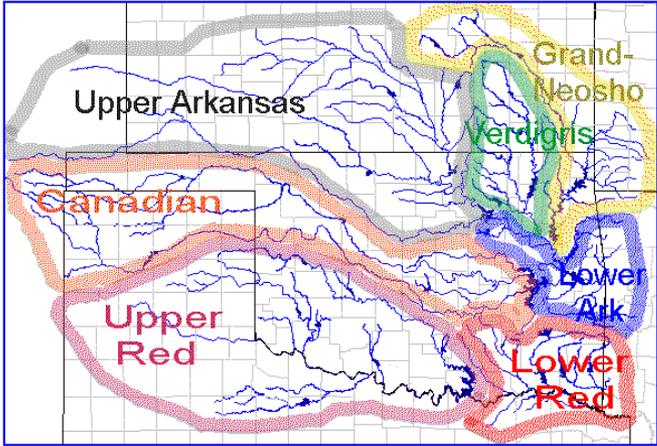
Tulsa District  
U.S. Army Corps of Engineers

## CONTENTS

- [Daily Report of Reservoir conditions](#)
- [Lake Information Recording \(text-only\)](#)
- [Real-time Gage Data for Reservoirs and Stream Gages](#)
- [Real-time Gage Data for All Stations](#)
- [Real-time Hydropower Data for Power Projects](#)
- [Southwestern Power Administration Hydropower Release Schedule](#)
- [Calculated Evaporation at Tulsa District Lakes](#)
- [Historical Power Generation](#)
- [Station Quality Assurance and Maintenance](#)

Click on a basin to get a zoomed-in view.

Lakes and river gages are selectable from the zoomed-in view.



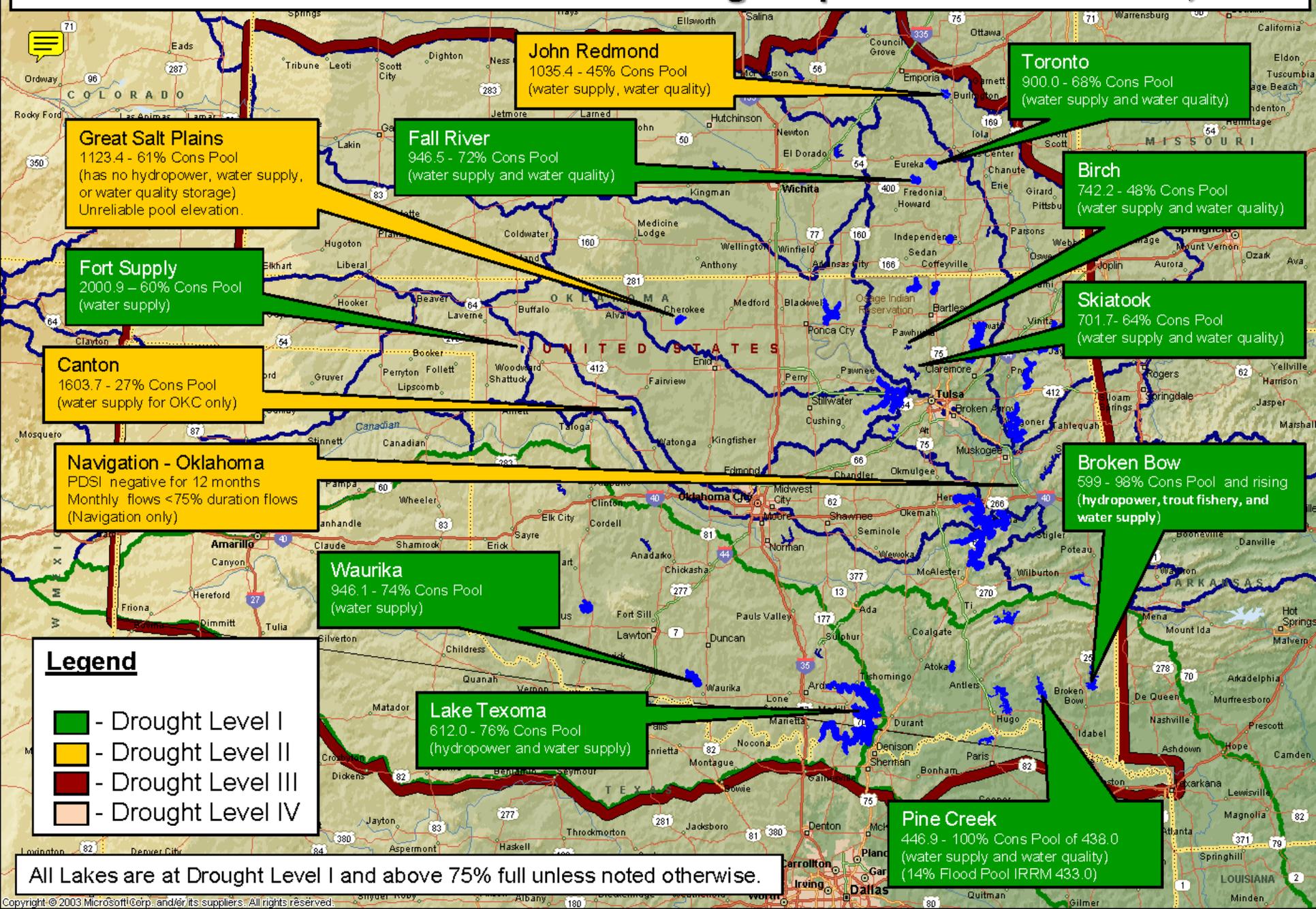
Local intranet 100%

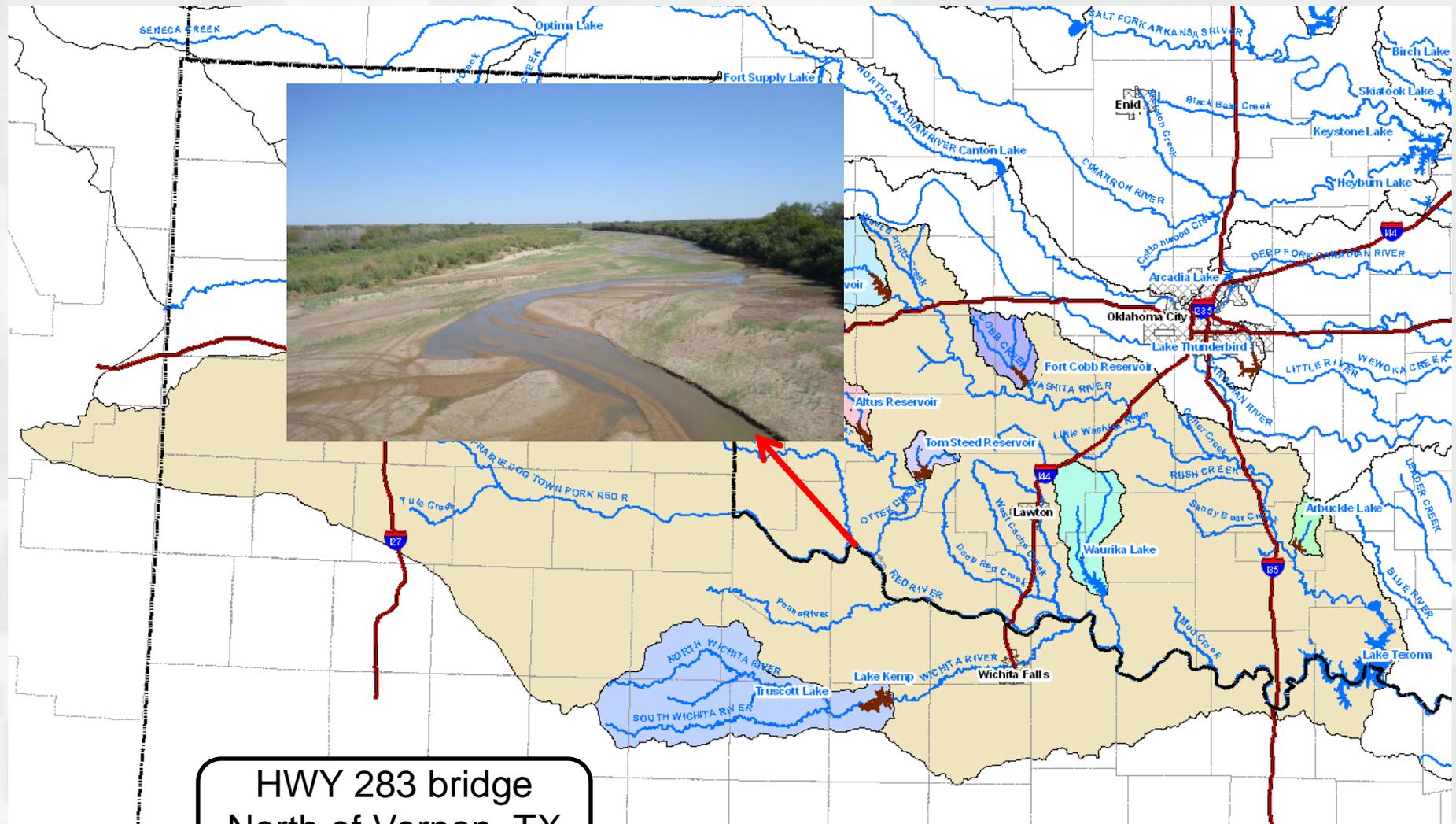
**Tulsa District  
Water Management Website:  
[www.swt-wc.usace.army.mil](http://www.swt-wc.usace.army.mil)**



**BUILDING STRONG®**

# Tulsa District Oklahoma Reservoir Drought Update – November 23, 2011

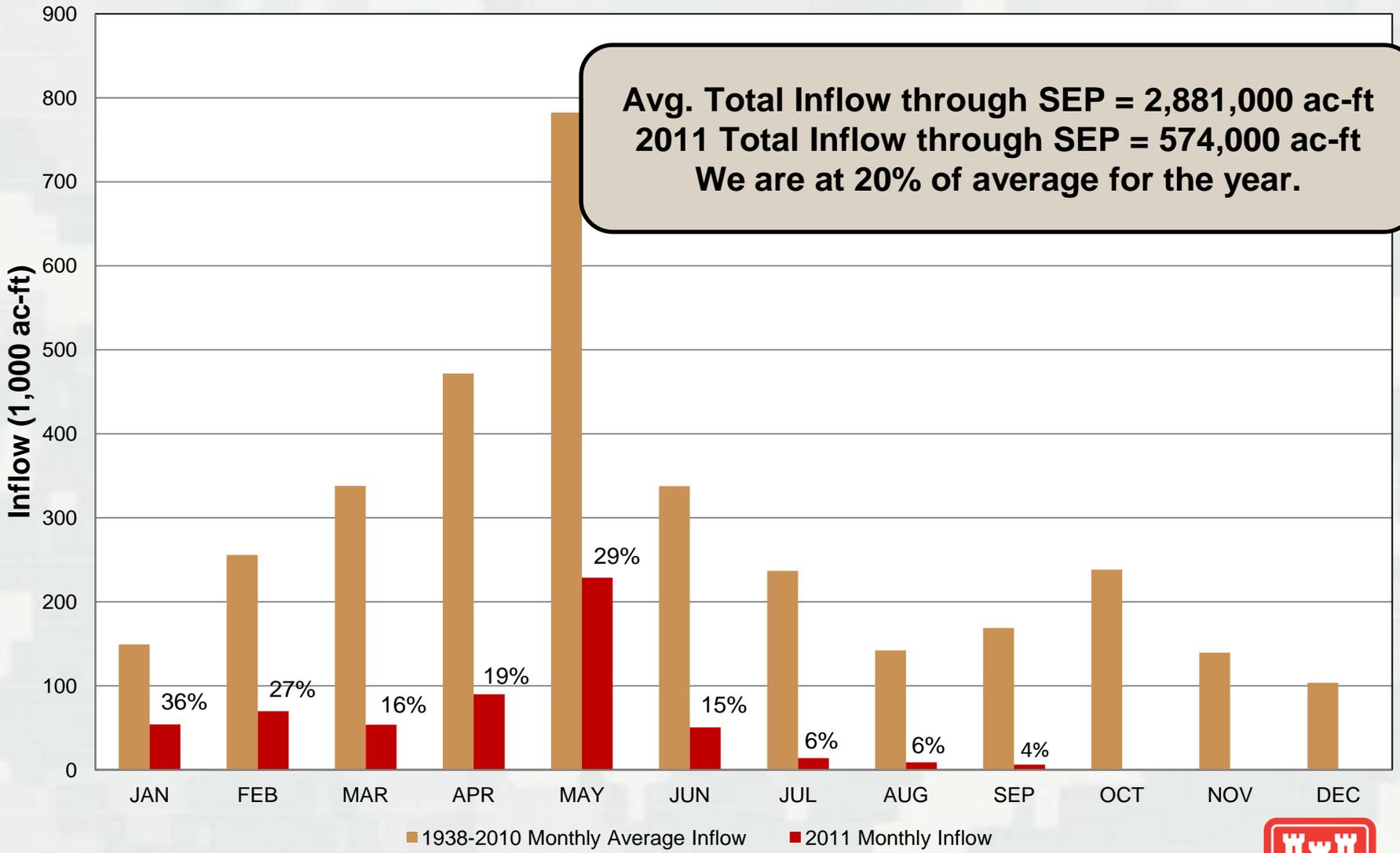




HWY 283 bridge  
 North of Vernon, TX  
 20-SEP-2011



# Lake Texoma Inflow



**Avg. Total Inflow through SEP = 2,881,000 ac-ft**  
**2011 Total Inflow through SEP = 574,000 ac-ft**  
**We are at 20% of average for the year.**



# Drought Contingency Plans

- Drought contingency plan for each Corps Project
- Provide a basic reference for water management processes during a water shortage.
- Provide **four levels** of response which are progressively initiated as the drought intensifies.



**Drought Level 1-**  
Alert Phase-Normal Operations

**Drought Level 2**  
Expanding Actions-CDMC

**Drought Level 3**  
Expanding Actions-IDMC

**Drought Level 4**



# Drought Level 1- Alert Phase-Normal Operations

- Water storage accounting of conservation storage by users on a monthly basis when 75% of the conservation pool remains
- Encourage a balanced drawdown of hydropower lakes
- Meet monthly with SWPA to allocate power for the following month; obtain water supply withdrawal rates from users
- Monitor Basin and Lake Conditions; Normal data collection



# **Drought Level 2**

## **Expanding Actions**

- Begin monthly water storage accounting for users
- Activate and schedule regular meetings of Corps Drought Management Committee to review project status, major issues and requests for assistance
- Recommend SWPA to limit power production within Public Law 100-71 (Texoma only); monitor pool draw down limits



# **Drought Level 2**

## **Expanding Actions CDMC**

- Promote conservation of water to users when they use over 50% of their authorized storage
- Provide resident offices with lake projections for concessionaires and dock owners
- Cease releases for non-critical project testing and inspections
- Schedule AD Hoc meeting of Interagency Drought Management Committee
- Notify public of possible boating safety hazards due to low lake levels



# Drought Level 3

## Expanding Actions (IDMC)

- Activate the Interagency Corps Drought Management Committee
- Post warnings closings and boating hazards
- Begin weekly storage accounting procedures and provide updates on storage balances
- Notify users when 25% of conservation storage will remain
- Comments are sought by the Corps Drought Management Committee from interested individuals and groups.
- Schedule more frequent meetings of Corps Drought Management as necessary



# Drought Level 3 (Cont'd)

- Evaluate water intakes of contracted in-lake water users
- Identify surplus water supply for municipal and industrial use and costs
- Notify contract water users of impending need to contract for emergency water needs
- Minimize special event recreation releases
- Notify SWPA of restrictions of hydropower production within Public Law 100-71 (Texoma only)
- Increase frequency of water supply accounting as needed
- District Engineer and staff to determine surplus water available at Corps projects.



# Drought Level 4

- Make no releases for special events except as approved by District Engineer
- Notify contract water users of impending need to arrange for emergency water needs
- Contract emergency water supplies if available
- Monitor downstream M&I and all lake users as releases are reduced to minimum releases
- Increase frequency of water supply accounting to weekly if needed



# The Impacts of the 2011 Drought on Corps of Engineers Reservoirs

- Water Supply Contracts-50% of Corps Total held in Tulsa District
- Water Storage Accounting
- Record Evaporation (Summer 2011)
- Blue-Green Algae Intensified in drought
- Endangered Species Challenges



# The Impacts of the 2011 Drought on Corps of Engineers Reservoirs

- Pine Creek Lake – Record Low Pool
- Non-Native Fish Challenges - Trout



# Comments? Questions?



Hulah Lake April 1, 2002

# **State Climatologists Updates**

**Mary Knapp**

**Kansas State Climatologist**

**Kansas Office of the State Climatologist**

# Resources

- U.S. Drought Portal
  - <http://www.drought.gov>
- Past webinars, summaries, and Federal/State Assistance
  - [http://www.drought.gov/portal/server.pt/community/southern\\_plains](http://www.drought.gov/portal/server.pt/community/southern_plains)
- Drought Impact Reporter
  - <http://droughtreporter.unl.edu/>
- State Climatologists
  - <http://www.stateclimate.org/>
- National Drought Mitigation Center
  - <http://drought.unl.edu/>
- Southern Climate Impacts Planning Program (SCIPP)
  - <http://www.southernclimate.org/>
  - Youtube: <http://www.youtube.com/user/SCIPP01>
- Climate Assessment for the Southwest (CLIMAS)
  - <http://www.climas.arizona.edu/>



We are now on facebook!  
Southern Climate Impacts Planning Program

Is drought properly classified in your region? If not, let us know!

- Drought Impact Reporter
- Contact your State Climatologist
- E-mail the DM Authors:  
[droughtmonitor@unl.edu](mailto:droughtmonitor@unl.edu)