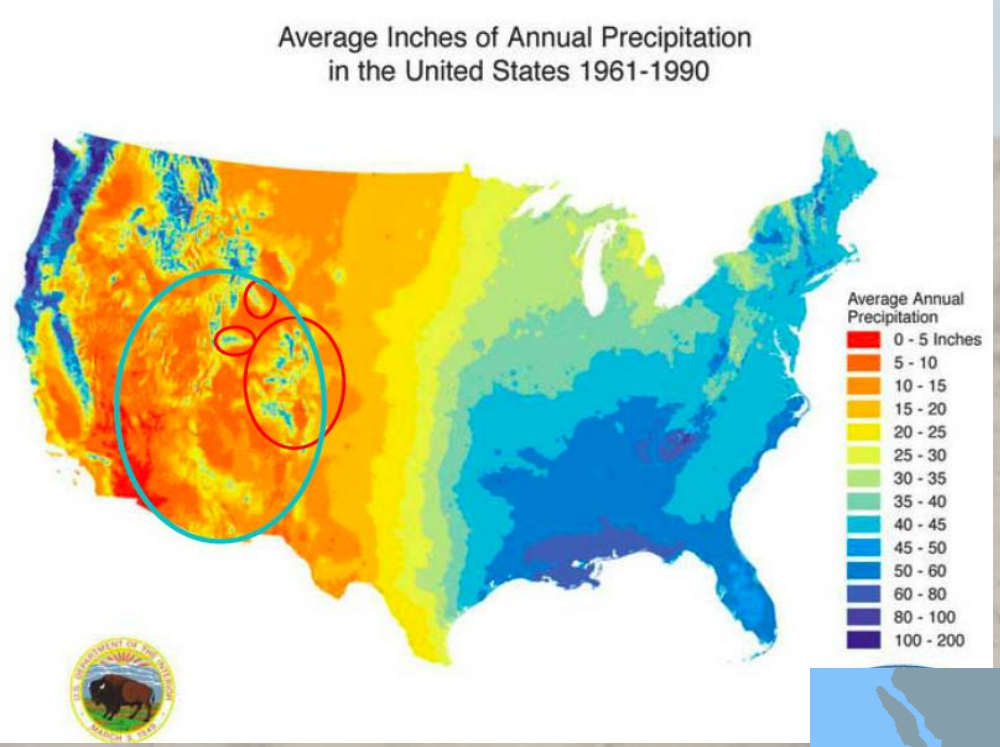
The Great Drought of 2012: Science, impacts and early warning

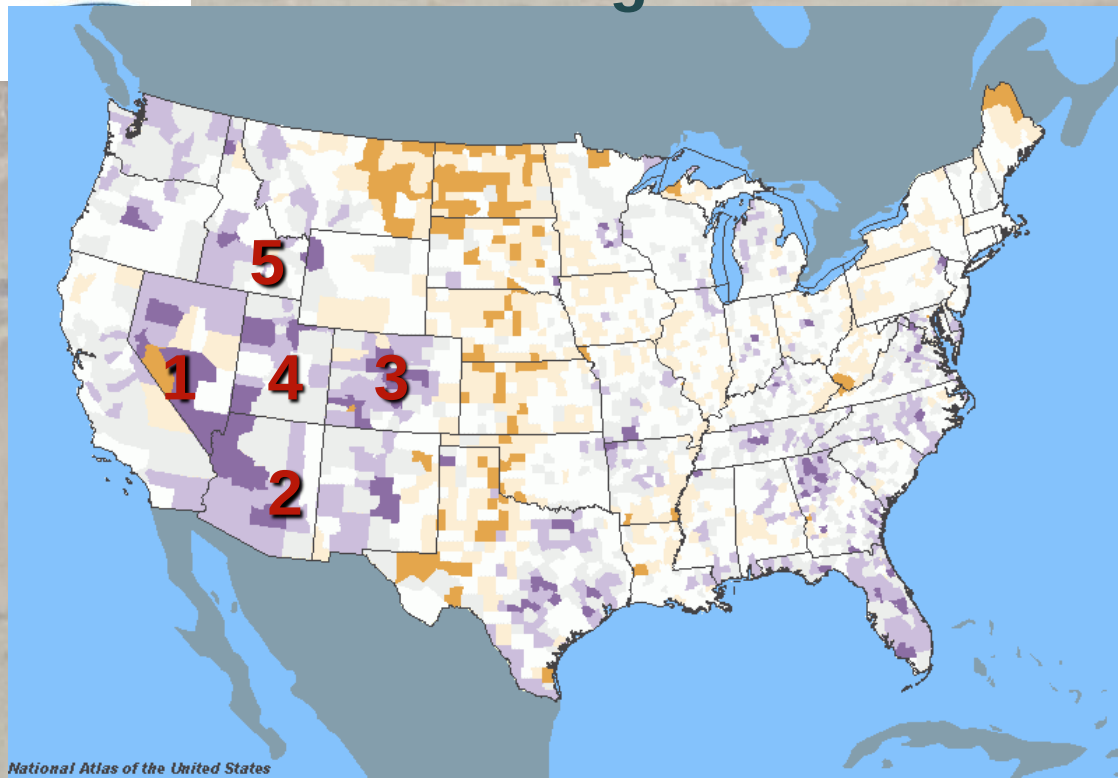
Roger S. Pulwarty PhD
Climate and Societal Interactions and
National Integrated Drought Information System
NOAA

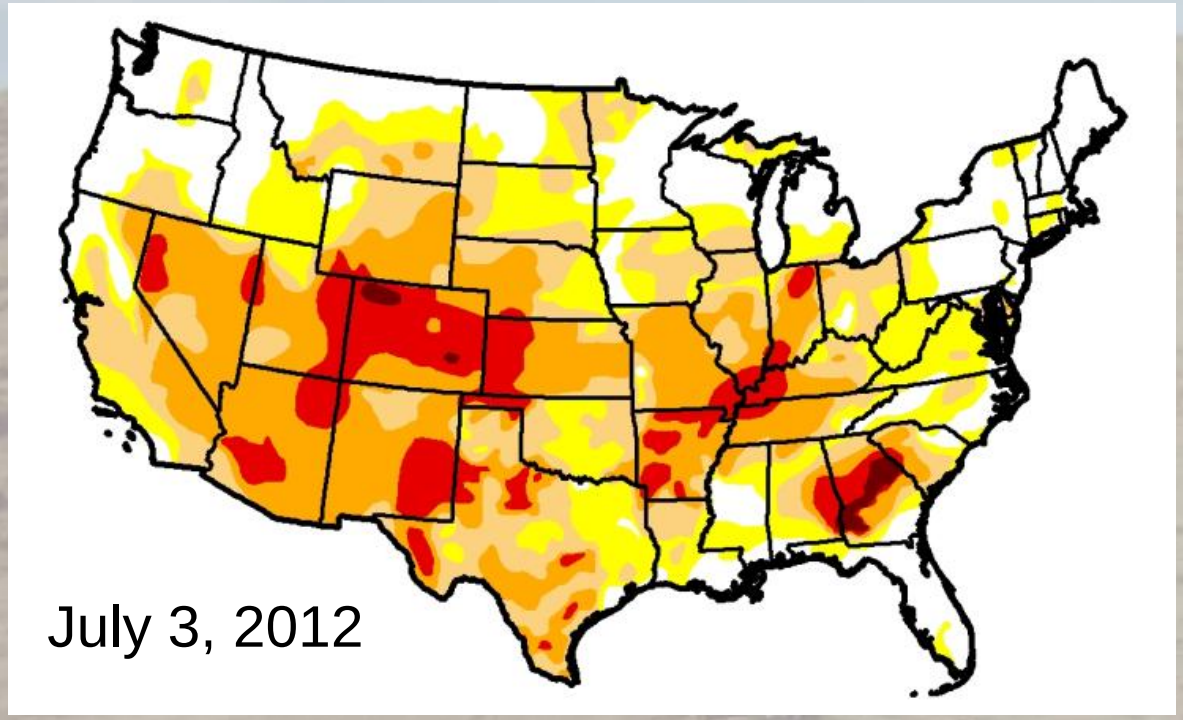
NDMC, Dept. Interior (USGS, Reclamation), USDA,USACE,
State Partners, SW Tribes, RISAs, RCCs,
State Climatologists, RCSDs, Municipalities,
NOAA Labs, CPC

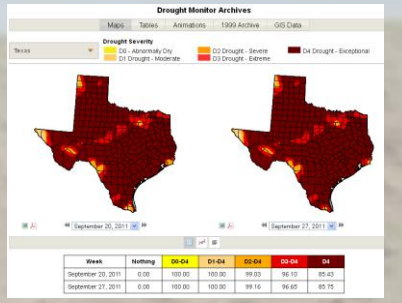
Average annual precipitation



Population growth



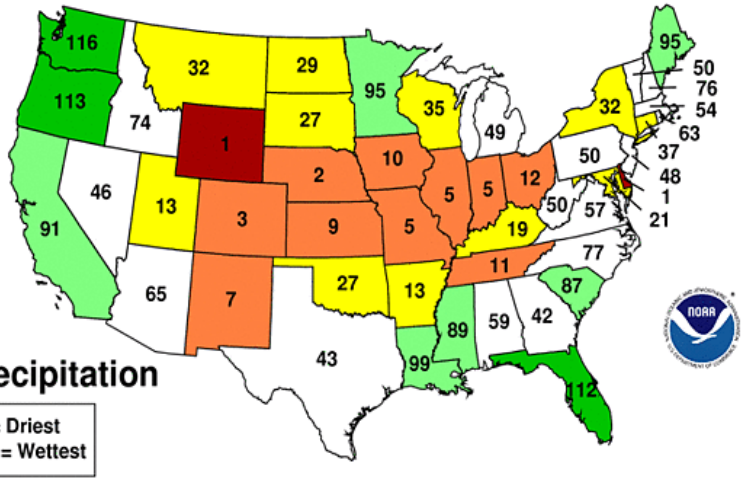




Over 63% of the contiguous United States in early September was suffering moderate to exceptional drought, nearly twice the land affected a year ago, according to the U.S. Drought Monitor. Using July data, the National Climatic Data Center reported that America is in the midst of its most expansive drought since December 1956.

March-August 2012 Statewide Ranks

National Climatic Data Center/NESDIS/NOAA



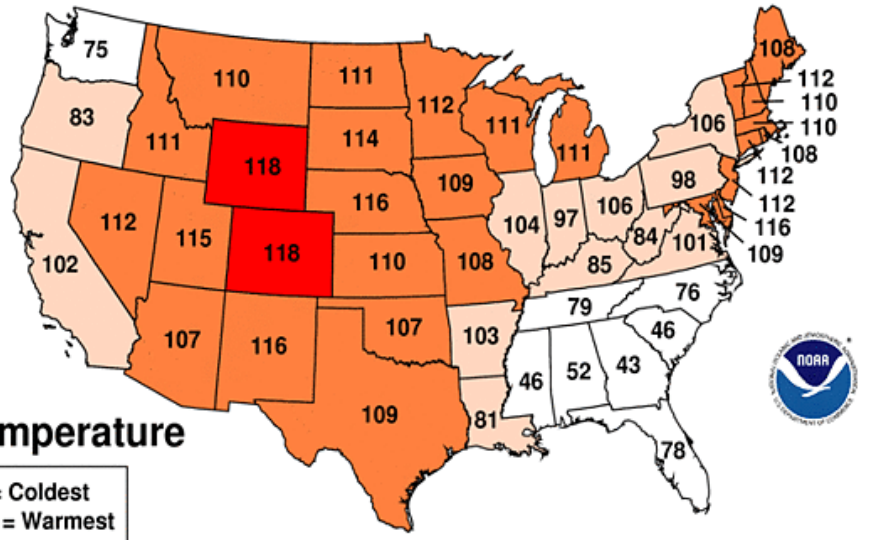
Precipitation

1 = Driest
118 = Wettest

Record Driest	Much Below Normal	Below Normal	Near Normal	Above Normal	Much Above Normal	Record Wettest

June-August 2012 Statewide Ranks

National Climatic Data Center/NESDIS/NOAA



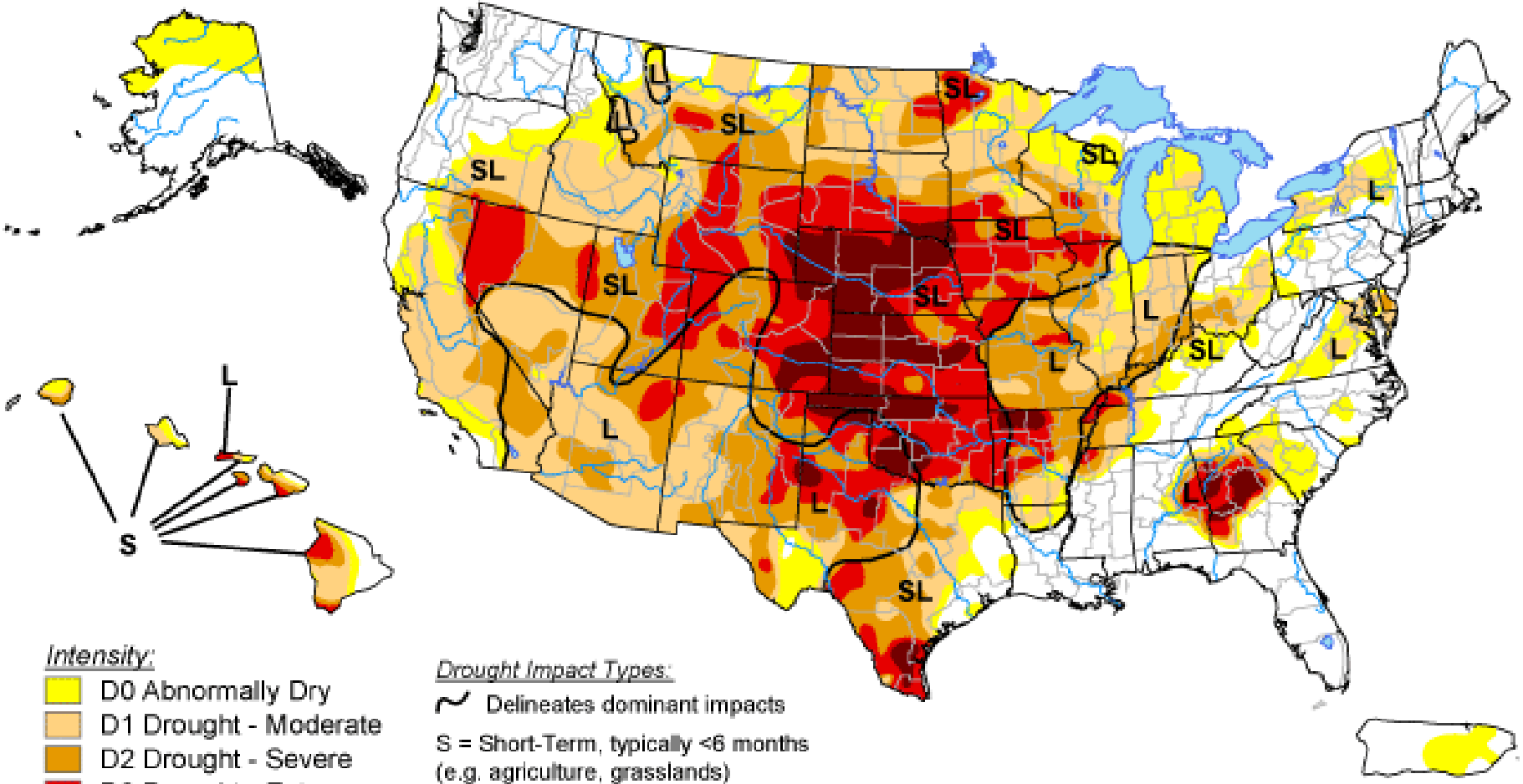
Temperature

1 = Coldest
118 = Warmest

Record Coldest	Much Below Normal	Below Normal	Near Normal	Above Normal	Much Above Normal	Record Warmest

U.S. Drought Monitor

September 25, 2012
Valid 7 a.m. EDT



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, September 27, 2012

Author: Anthony Artusa, NOAA/NWS/NCEP/CPC

Weather to Climate-A continuum and a deficit

Heat Waves

Storm Track Variations

Madden-Julian Oscillation

El Niño-Southern Oscillation + ?????

Decadal Variability

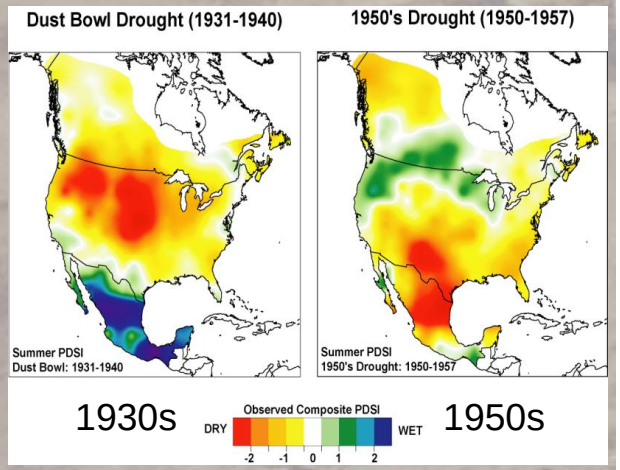
Solar Variability

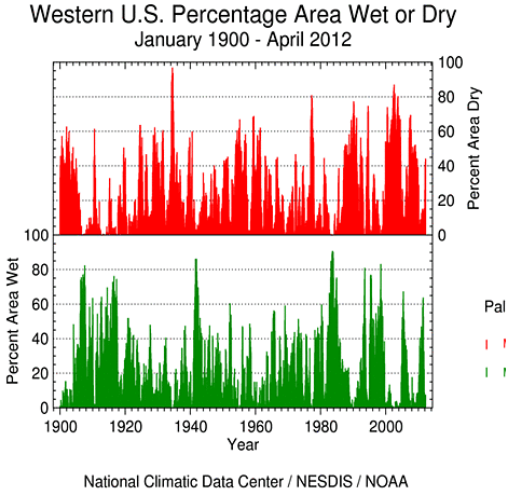
Deep Ocean Circulation

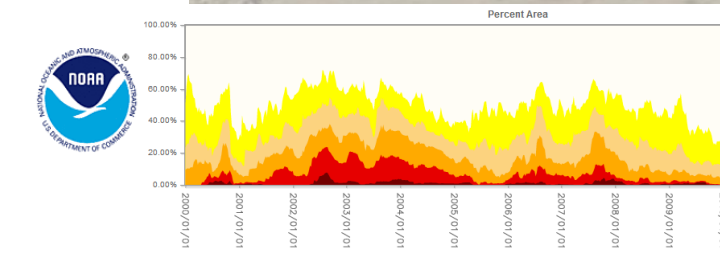
Greenhouse Gases

30 DAYS | 1 SEASON | 3 YEARS | 10 YEARS | 30 YEARS | 100 YEARS

SHORT-TERM **INTERANNUAL** **DECADE-TO-CENTURY**



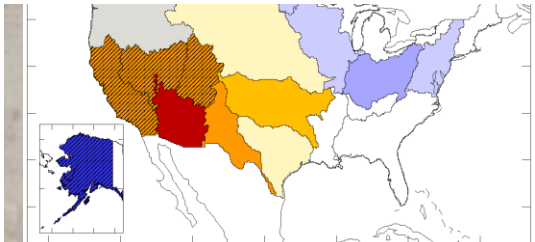


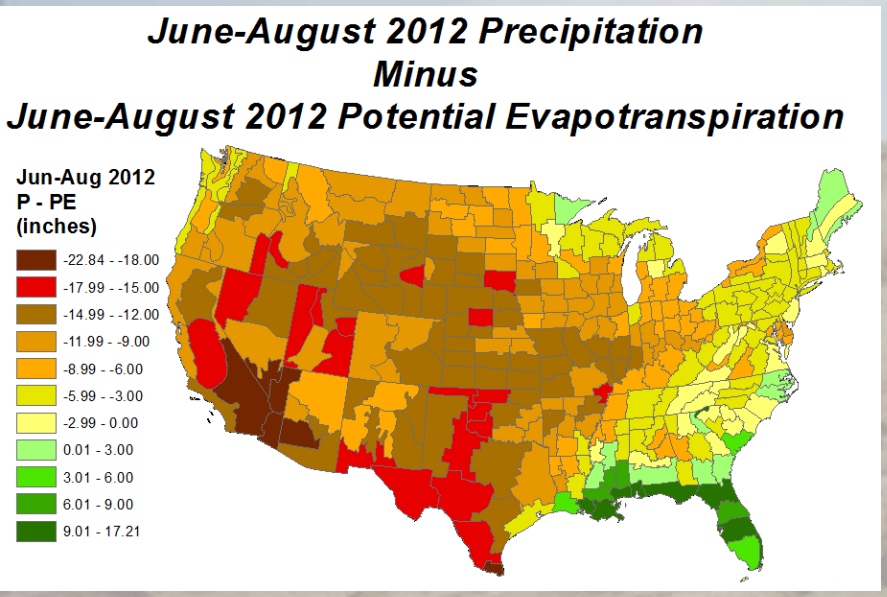


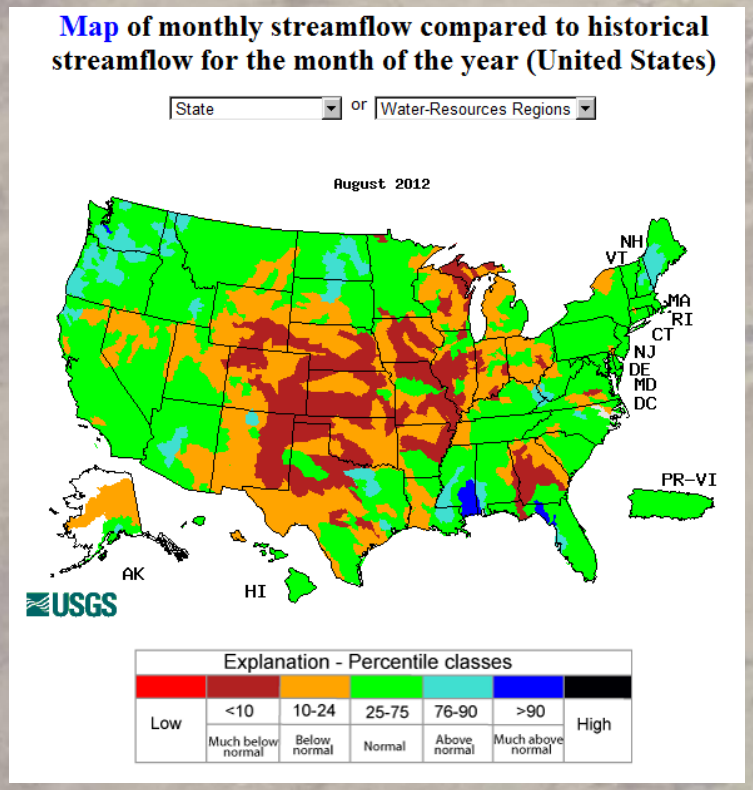
*Based on the Palmer Drought Index

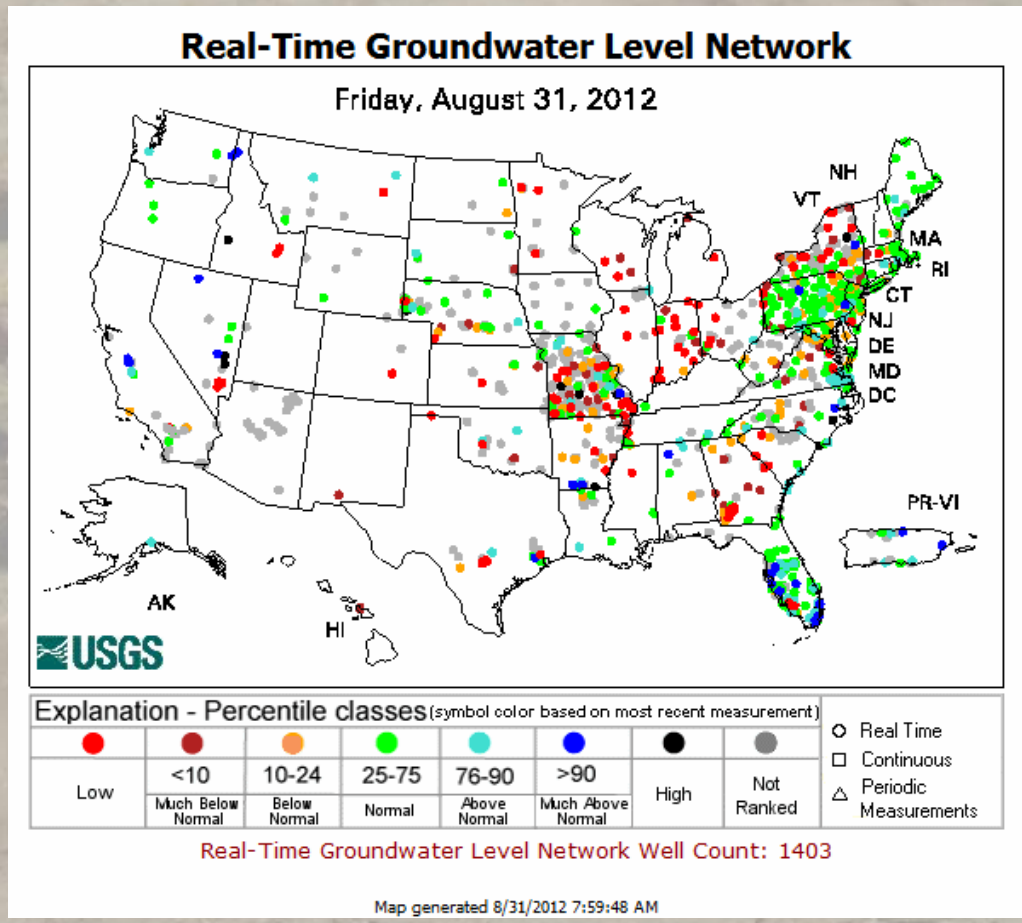
Moderate - Extreme Drought

Moderate - Extreme Wet





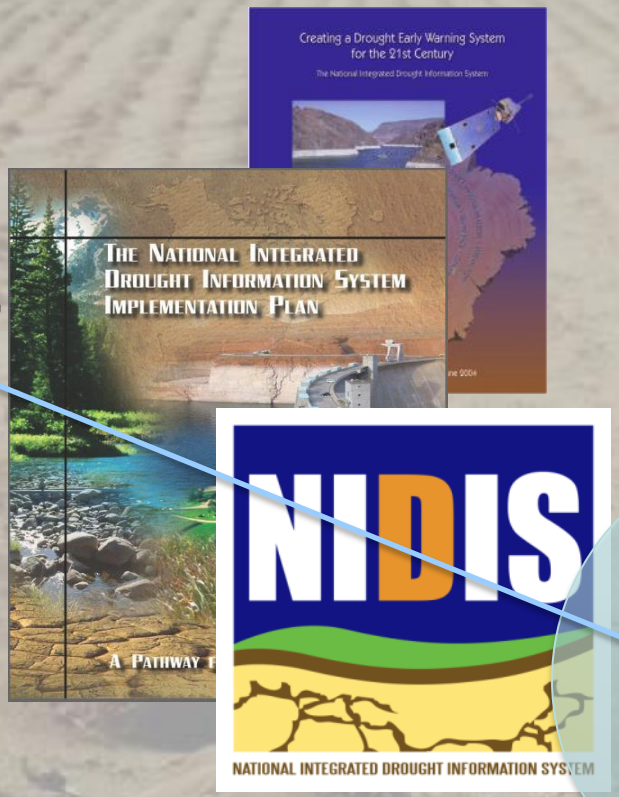




Groundwater Level network

NIDIS Public Law 109-430

Coping with Drought- Applications and Decision support Research Grants (RISAs, SARP)



Drought Portal (NCDC, NDMC)

NIDIS Program

Drought Prediction And Monitoring

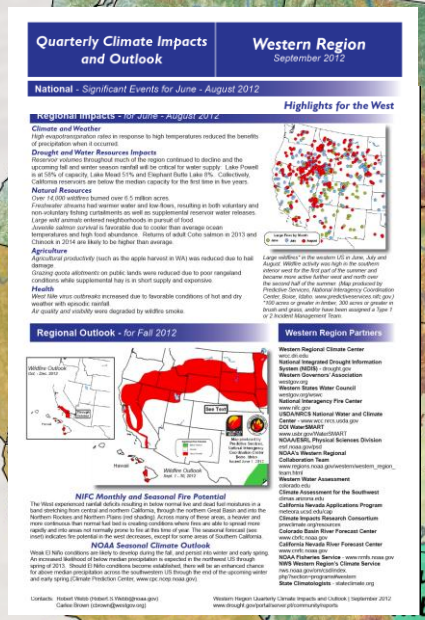
Climate Test Bed

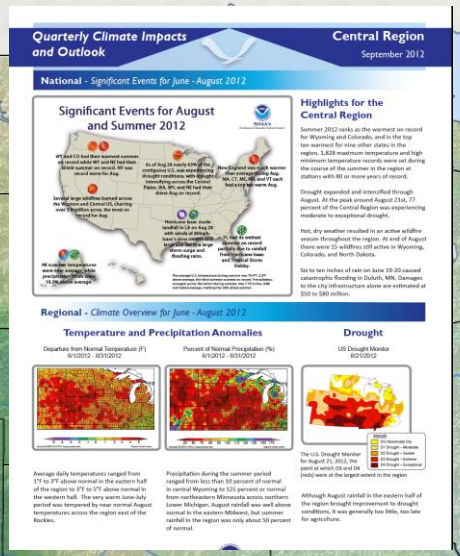
- CPC
- PSD
- IRI
- Academia
- NCDC Soil moisture sensors

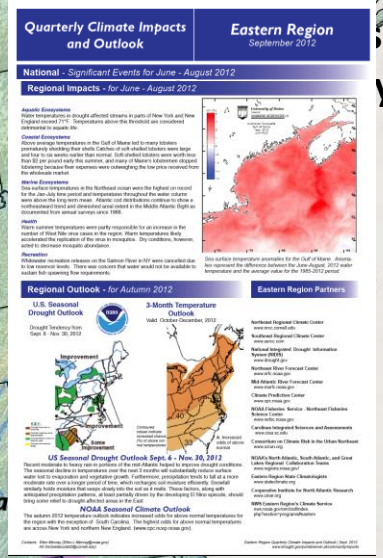
NIDIS Early Warning Information Systems

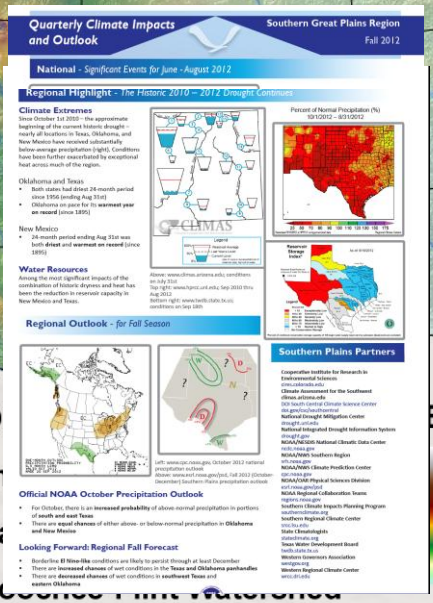
– Design, Prototyping, Implementation(multi-agency, multi-

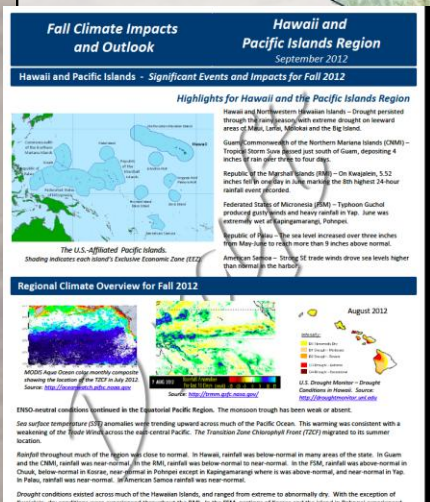
National Integrated Drought Information System (NIDIS)
Regional Drought Early Warning Systems











Montana

Upper Colorado River Basin

Four Corners Tribal Lands

Apalachicola-Chattahoochee-Flint Watershed

Apalachicola River Basin

al Drought Early
g Systems (DEWS)

California (Basin TBD

Upper Colorado Basin

Four Corners Tribal La

Apalachicola-Chattahoochee-Flint Watershed

udde

Elevation

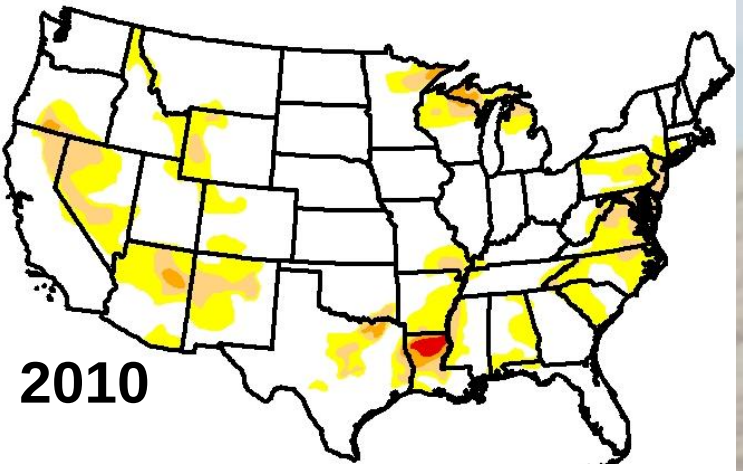
High

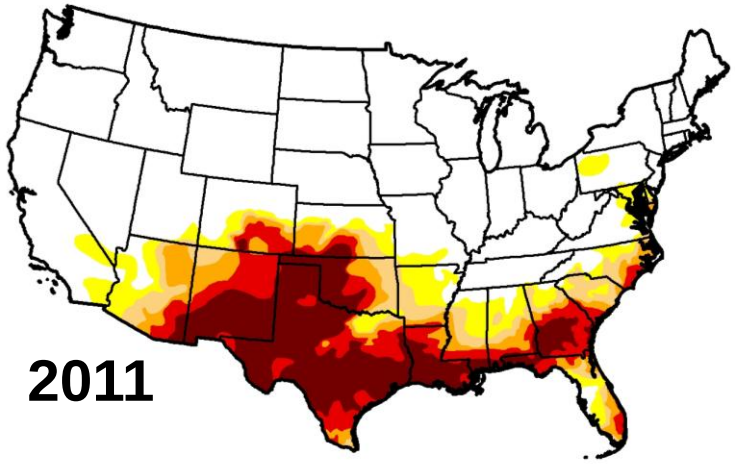
Low

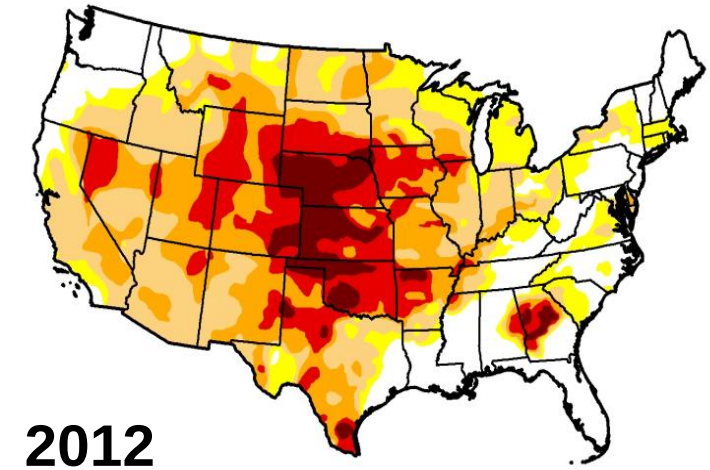
Rivers

Miles

0 75 150 300 450 600







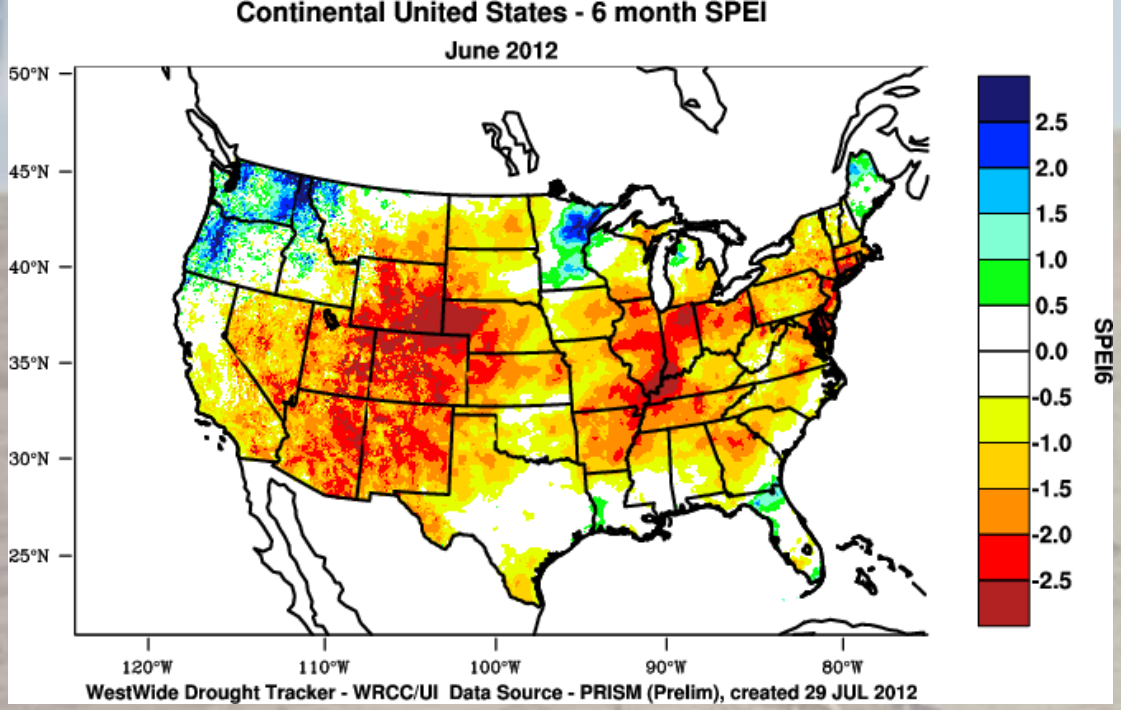
Two years ago (top left; U.S. Drought Monitor of 13 July 2010), much of the Upper Colorado and ACF basins were drought free.

One year later (center left; 12 July 2011), exceptional drought was covering much of the south-central and southeastern U.S.

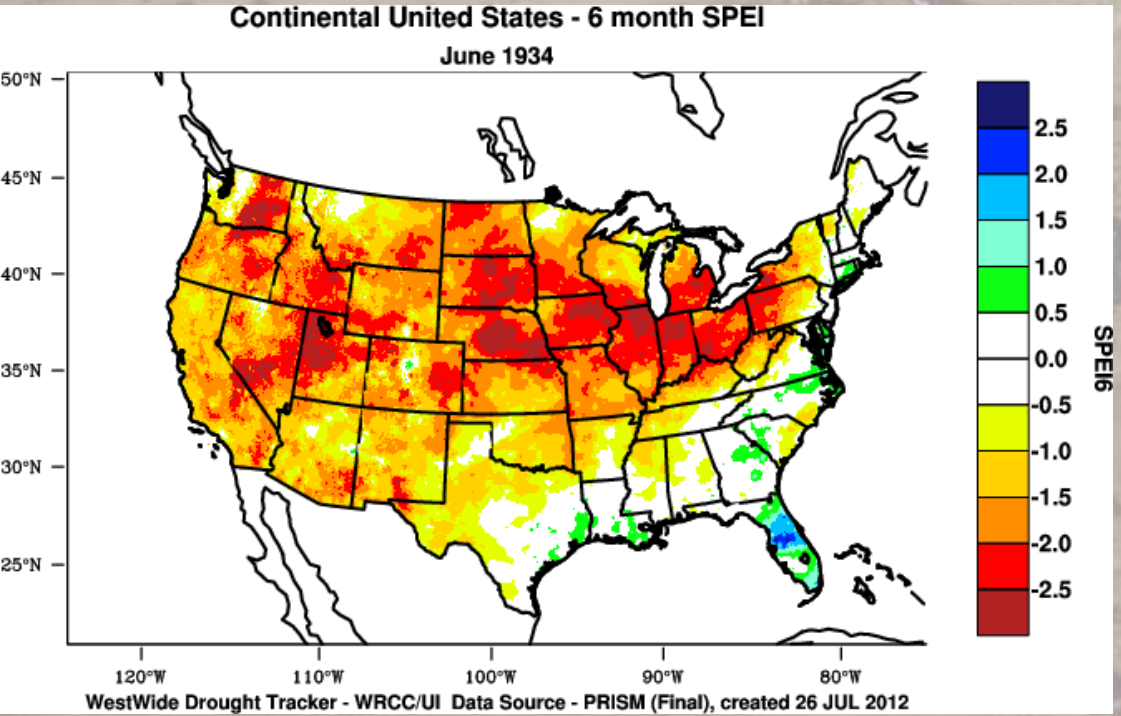
This summer (bottom left): drought is now covering much of the lower 48 states – talk about a growth business…

Was is the predictable outcome of La Niña?

Standardized Precipitation Evapotranspiration Index

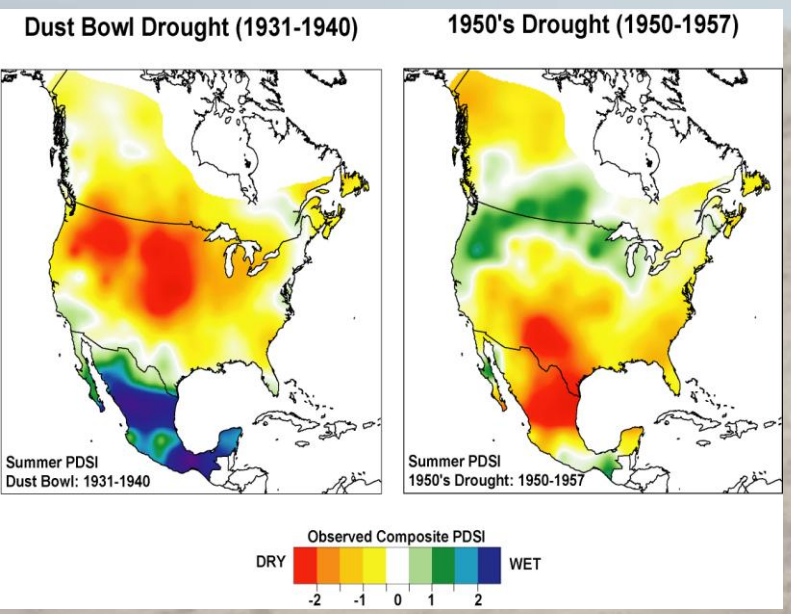


2012 6-month through June

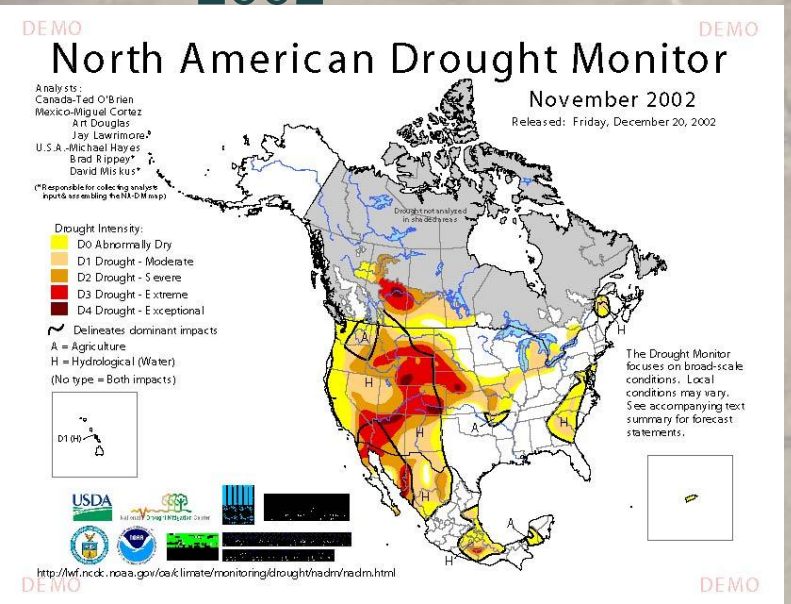


1934 6-month through June

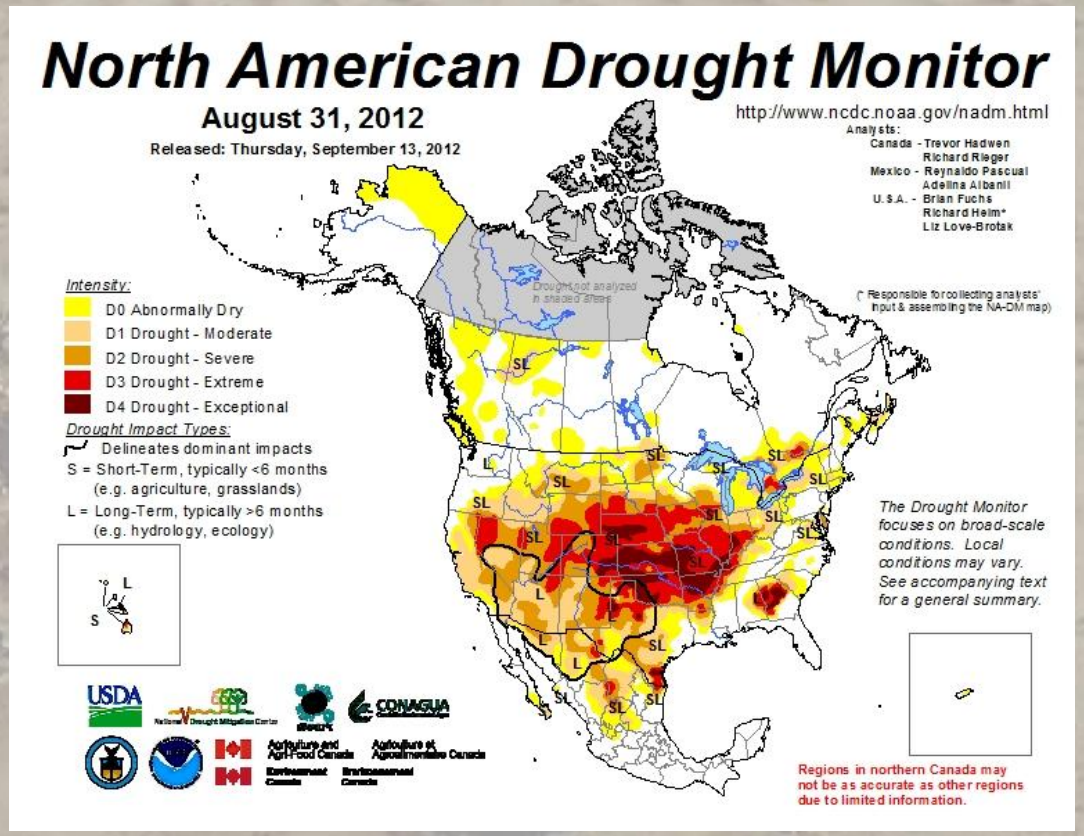
1930s 1950s



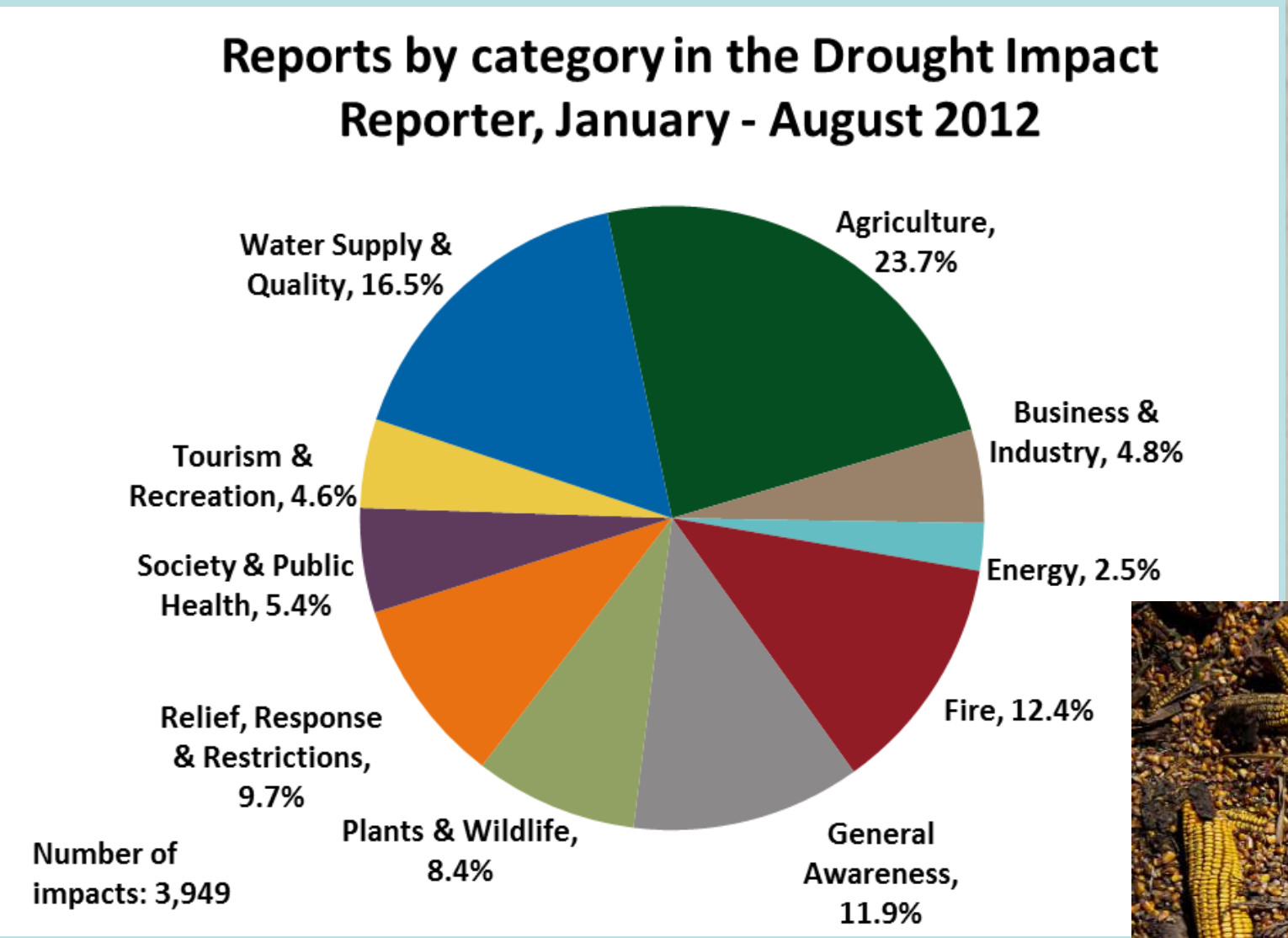
2002



August 31, 2012

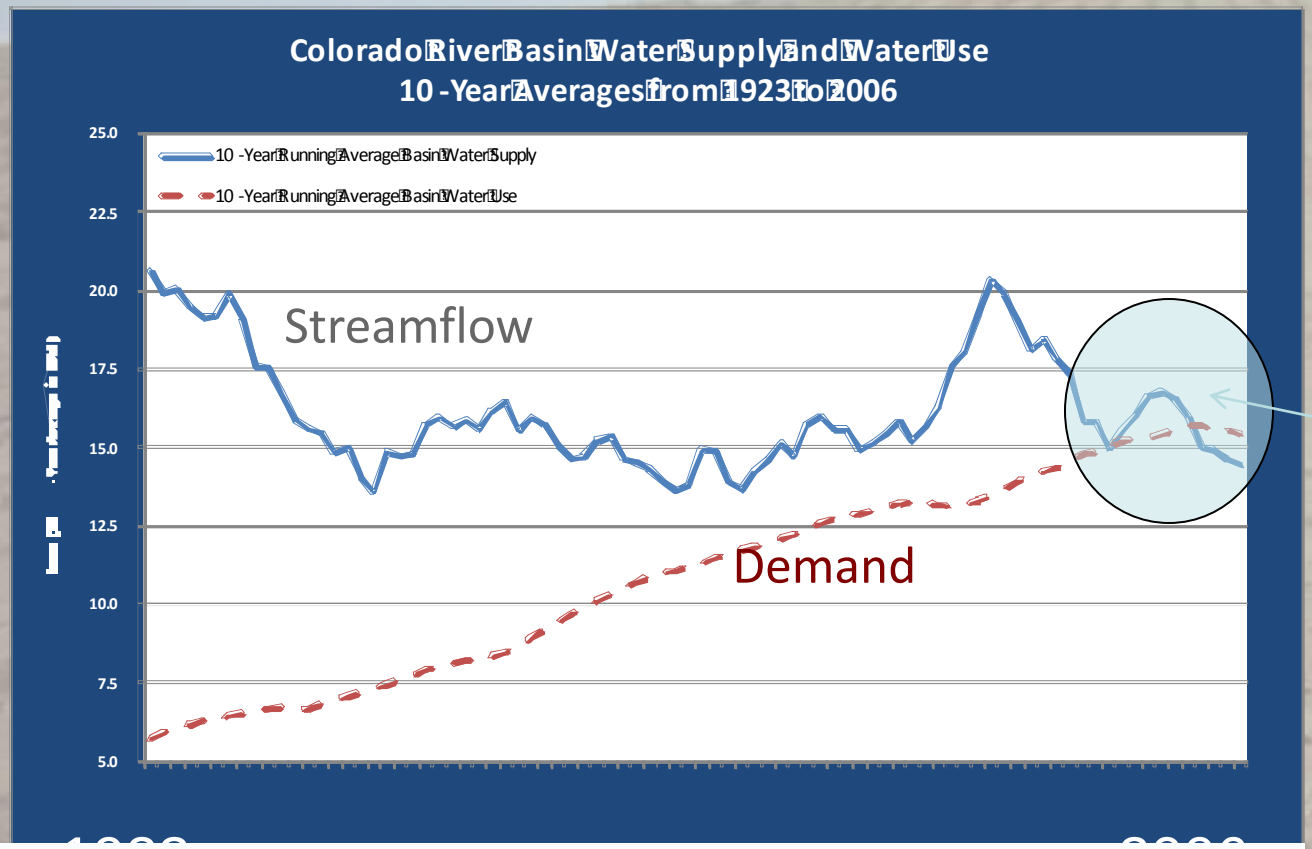


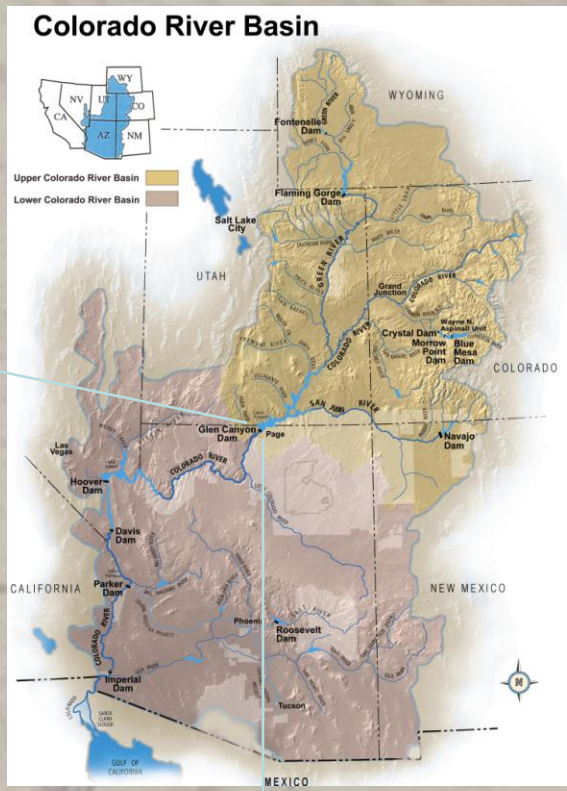
2012 Drought Impacts by Sector

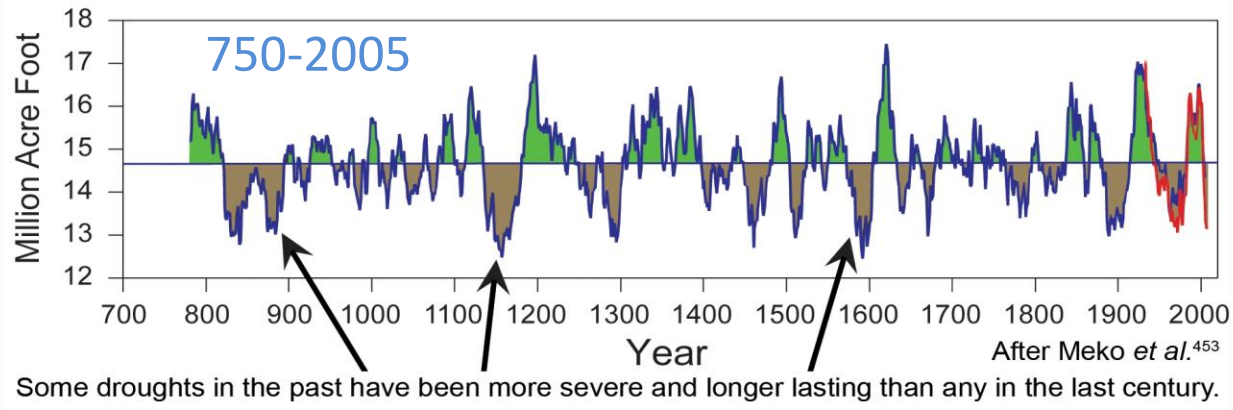


NDMC

Colorado River Water Supply & Use



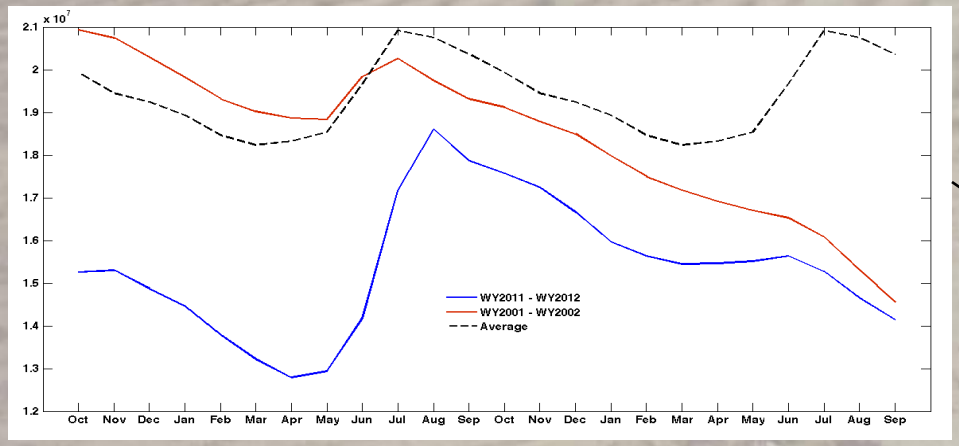


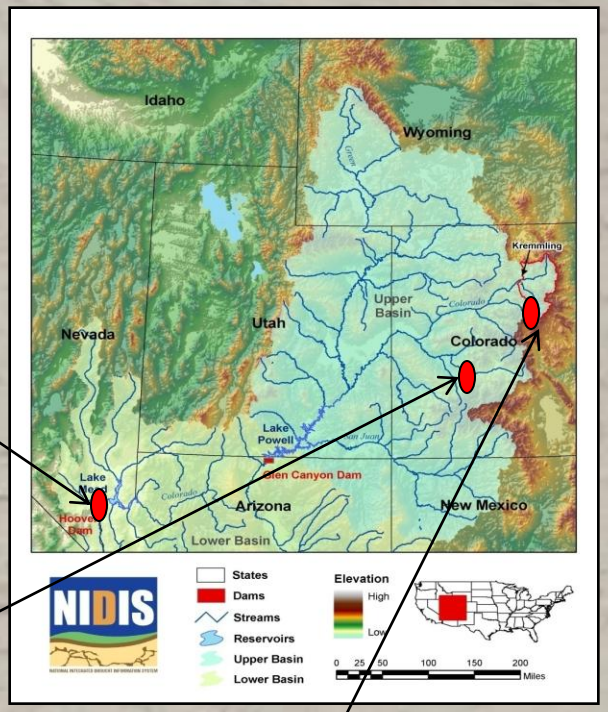


Monthly storage

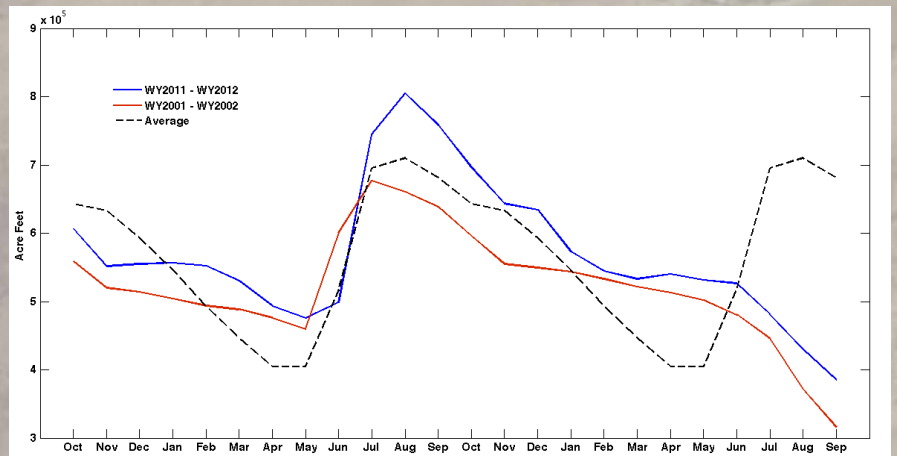
2001-2002 2011-2012 Average

Lake Powell

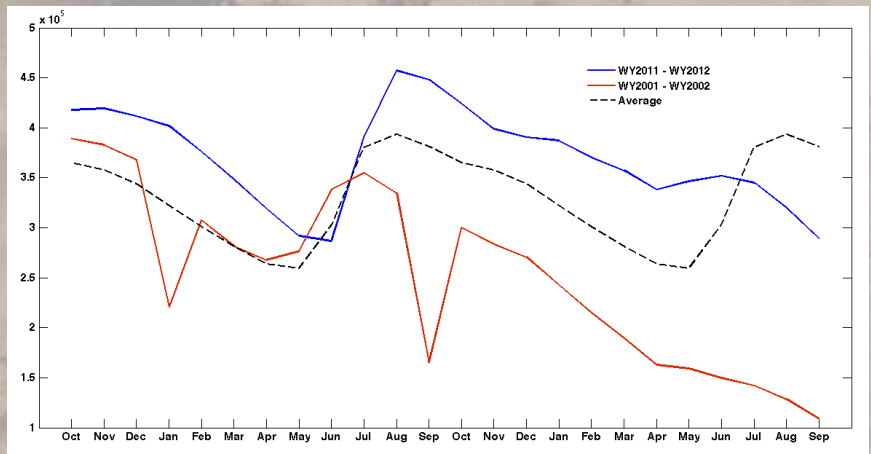




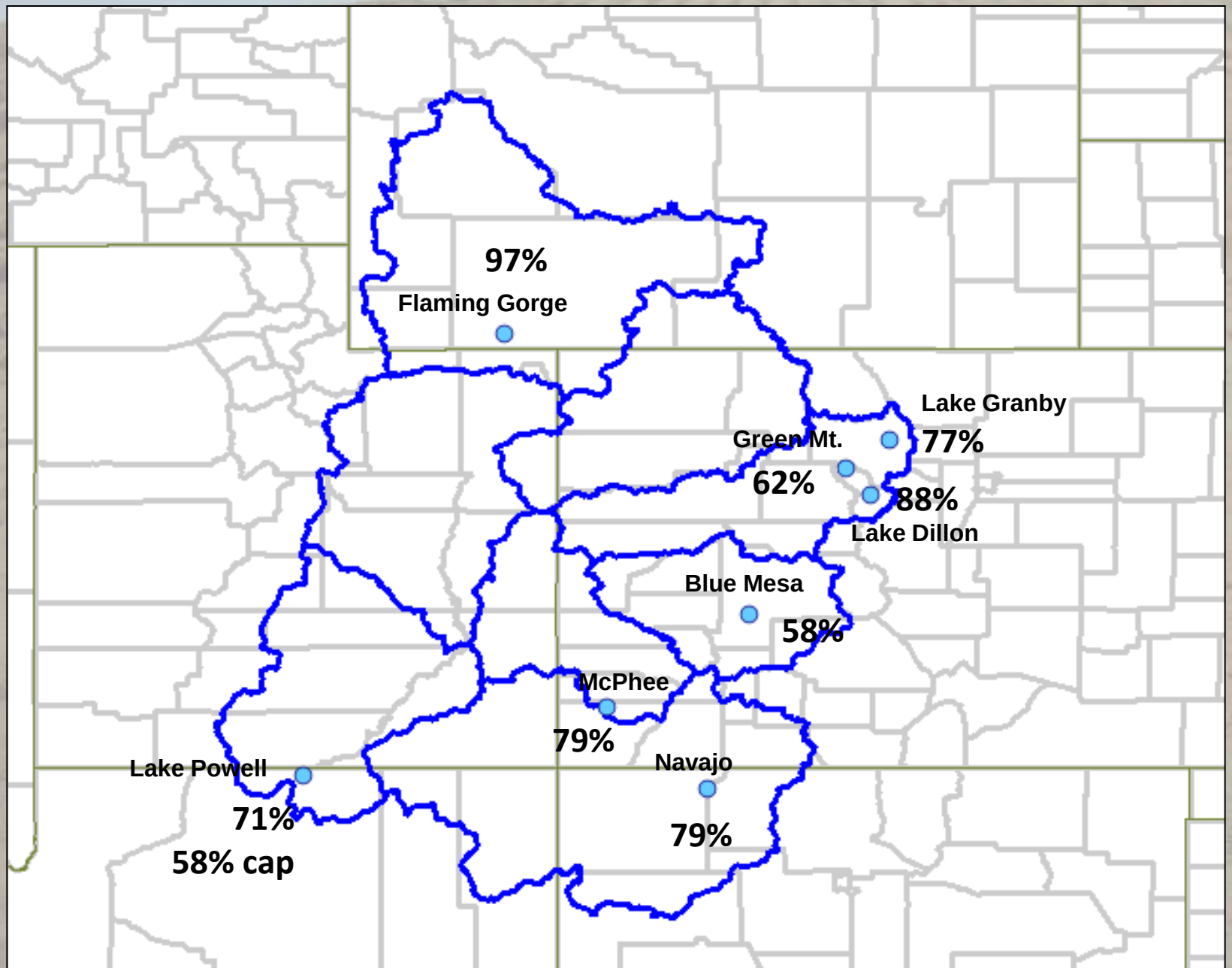
Blue Mesa

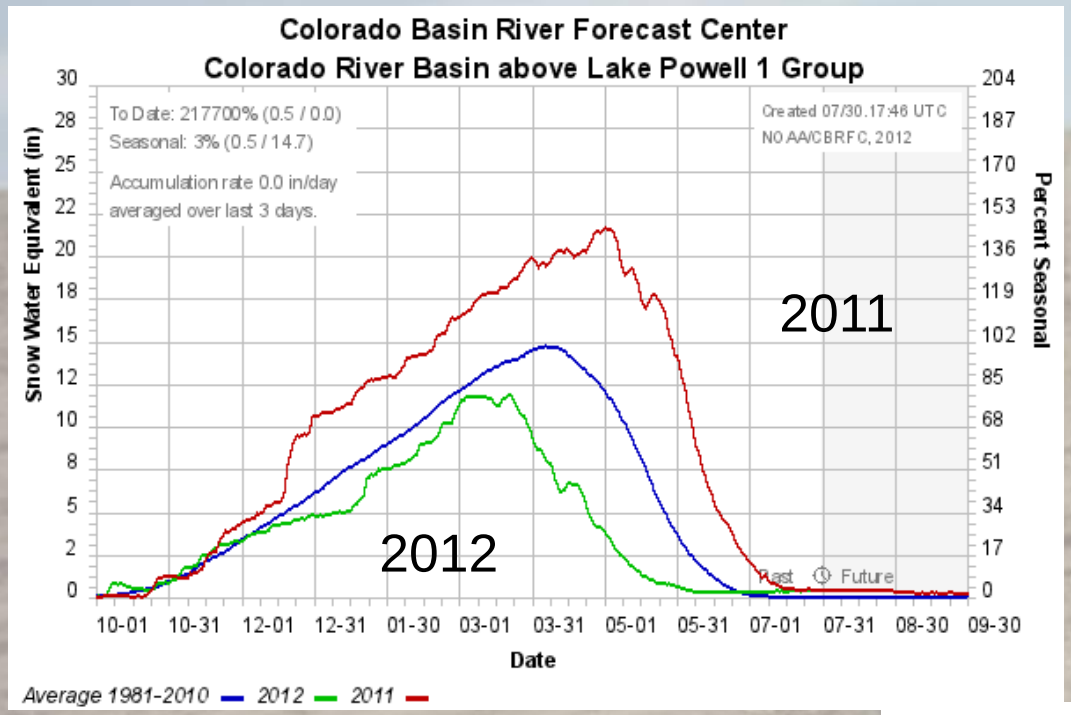


Lake Granby



September Average Reservoir Storage Volume

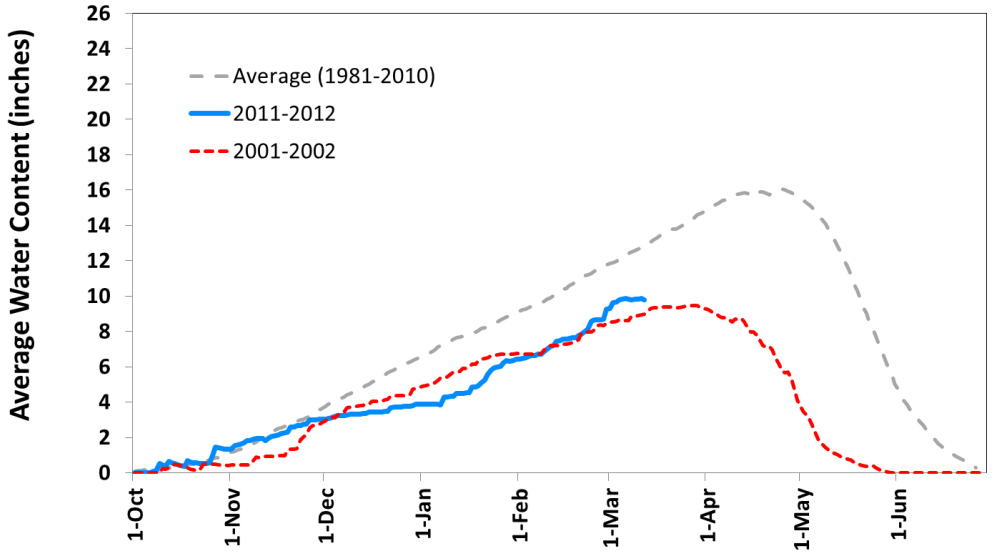


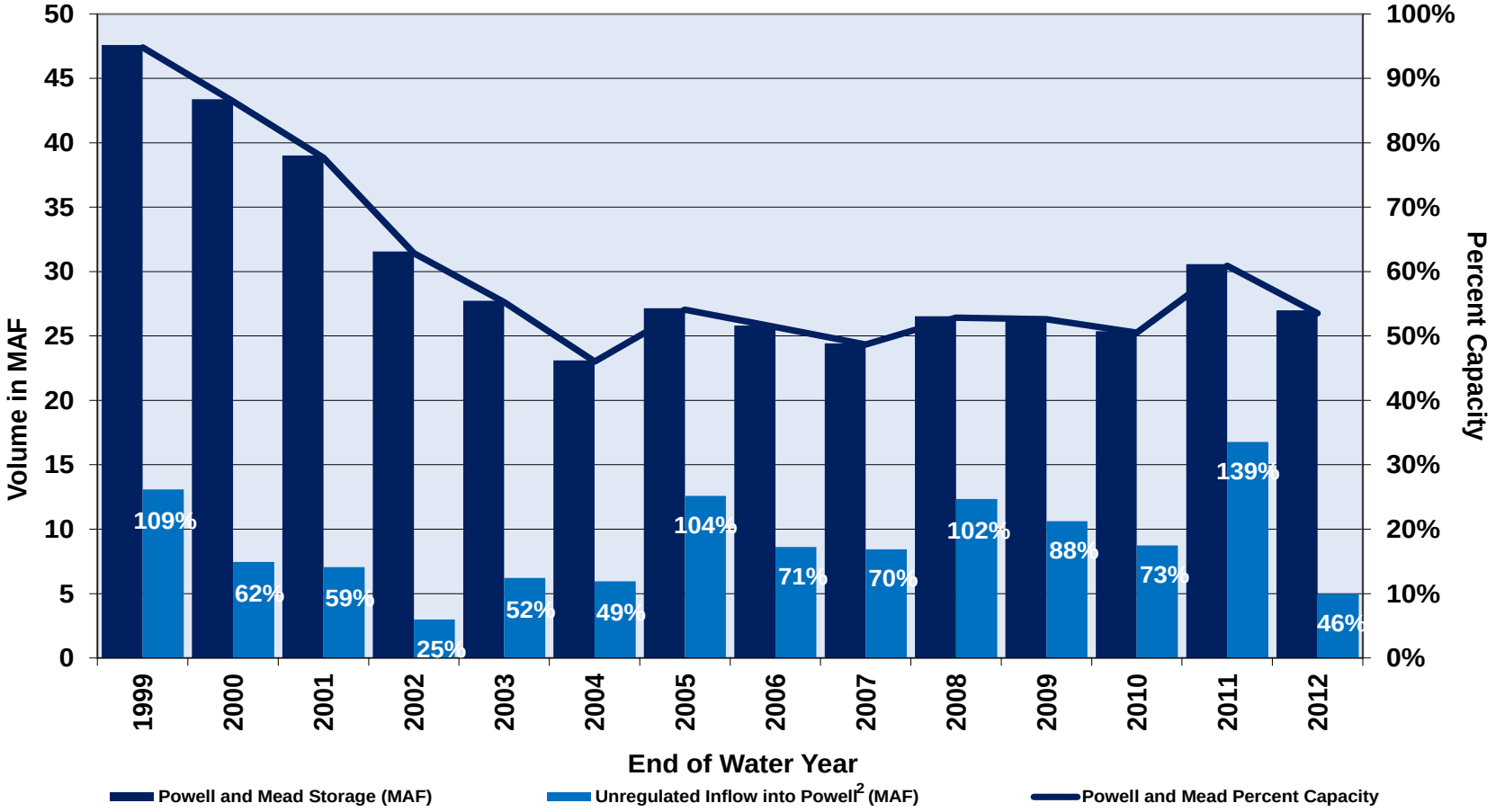


Snowpack: Colorado River Watershed (liquid water content)

developed with Snotel data as of 7/30/2012

[1] **Percent of average is based on the period of record from 1971-2000.**





[1] Values for water year 2012 are projected. Unregulated inflow is based on the latest CBRFC forecast. Storage and percent capacity are based on the July 2012 24-Month Study.

[2] Percentages at the top of the light blue bars represent percent of average unregulated inflow into Lake Powell for a given water year. Water years 1999-2011 are based on the 30-year average from 1971 to 2000. Water year 2012 is based on the 30-year average from 1981-2010.

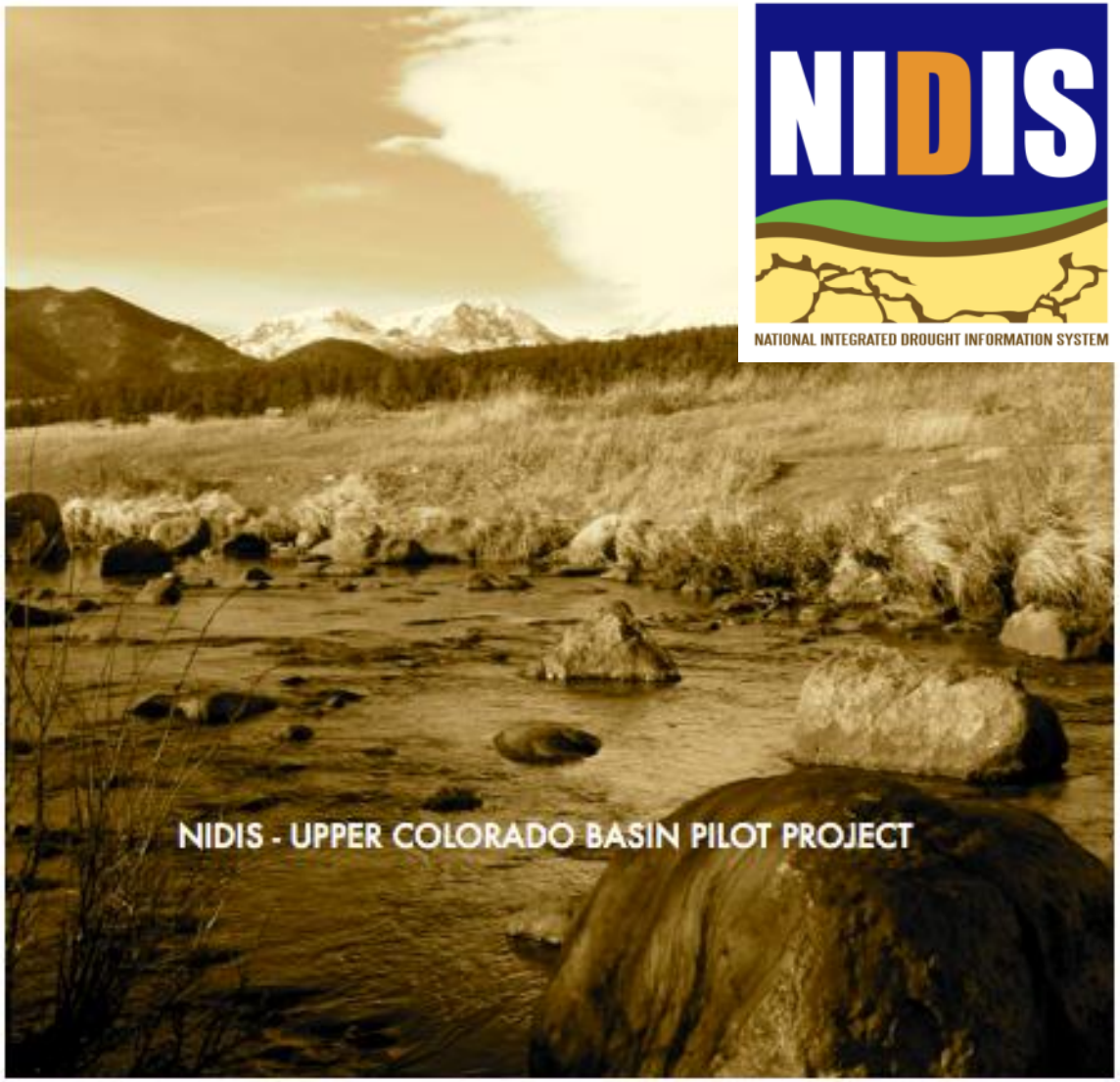
In the Colorado River's 100-year recorded history, 1999 through 2010 ranks as the second-driest 12-year period,

Barr Lake

South Platte-Weld County

B. Biggs Metro Wastewater Reclamation

Summer 2012

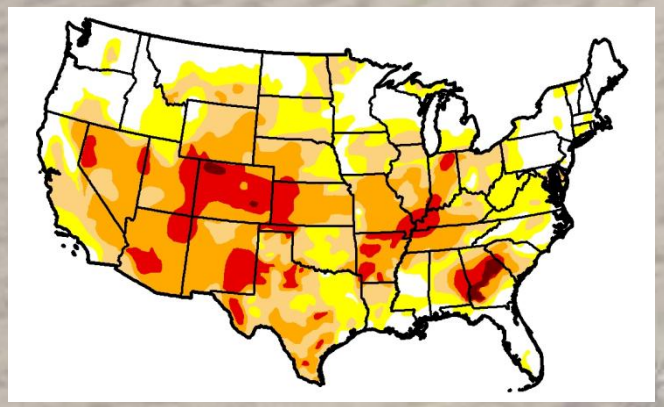


NIDIS

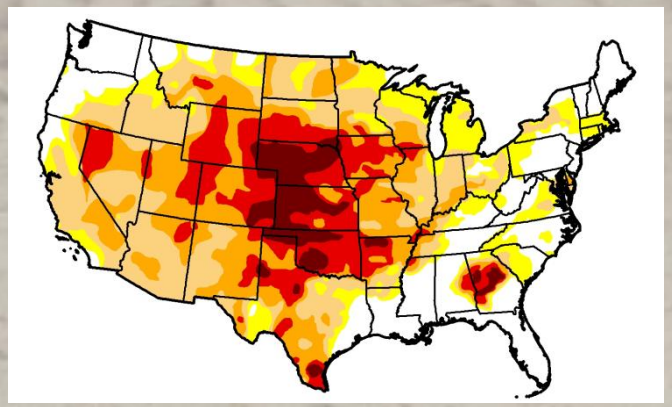
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

Weekly Climate, Water & Drought Assessment

Experiences from 2012

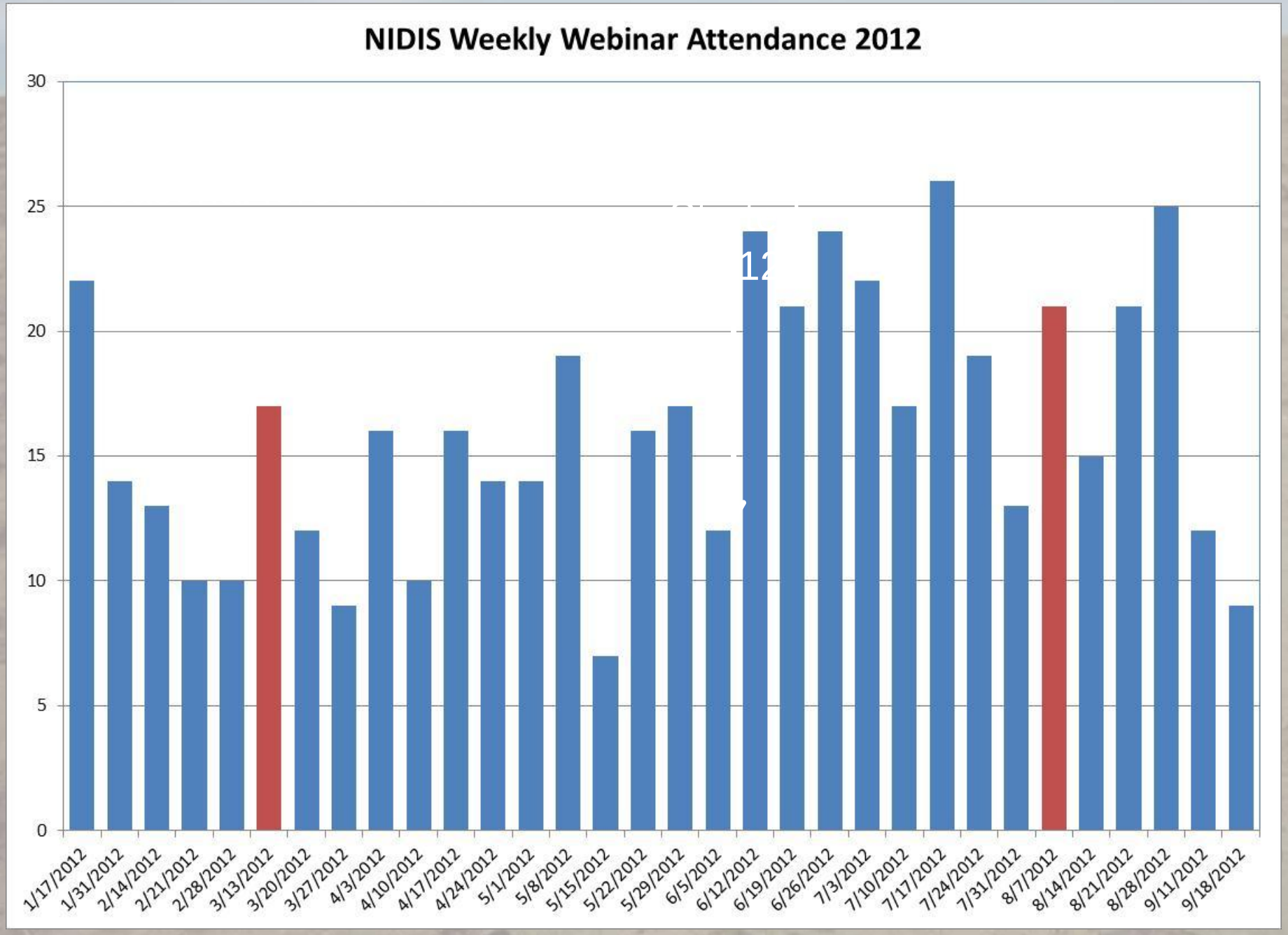


July 3, 2012

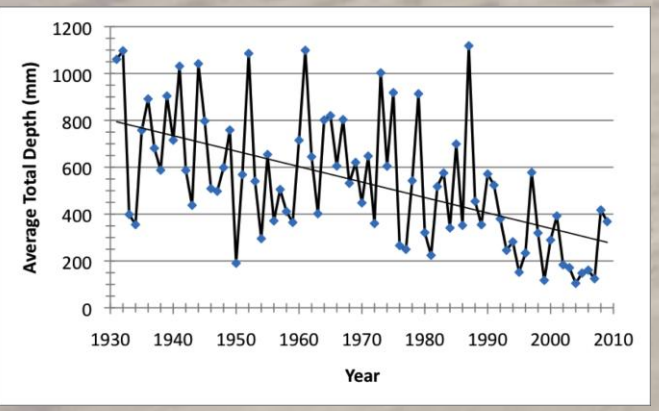


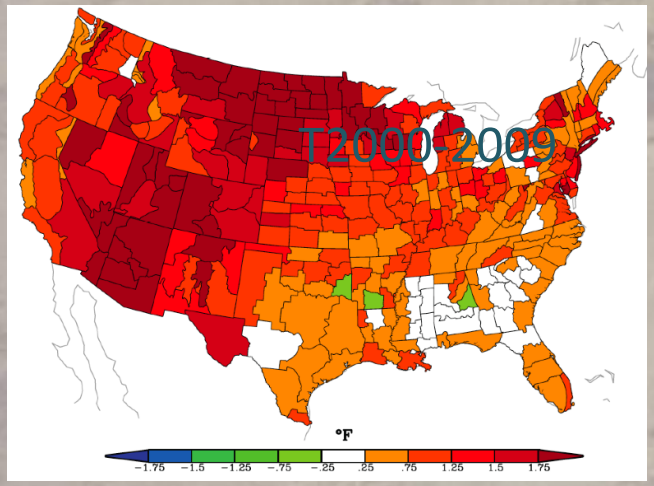
September 18, 2012

- The drought goes on for the UCRB and our NIDIS drought monitoring efforts.
- Started webinars mid-January, by February weekly and stayed that way through the present
- D4 in two different areas of the state, it transitioned from NW Colorado to SE Colorado over just a few months, but the Upper Basin is not out of the woods yet!
- Highest attendance in June, July and August as conditions continued to deteriorate.

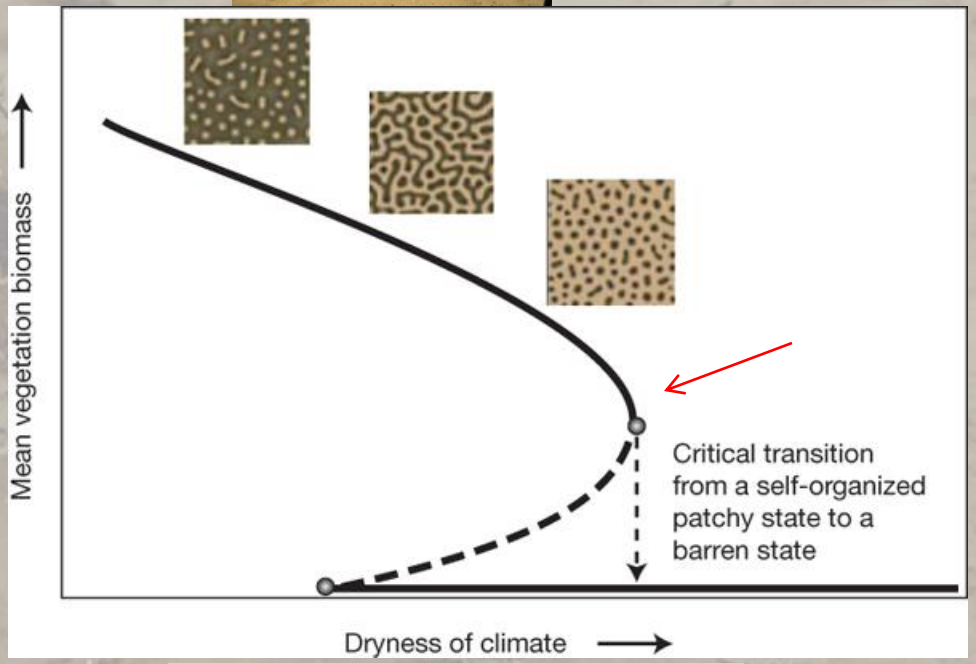

NIDIS Weekly Webinar Attendance 2012
30
25
20
15
10
5
0
1/17/2012
1/31/2012
2/14/2012
2/21/2012
2/28/2012
3/13/2012
3/20/2012
3/27/2012
4/3/2012
4/10/2012
4/17/2012
4/24/2012
5/1/2012
5/8/2012
5/15/2012
5/22/2012
5/29/2012
6/5/2012
6/12/2012
6/19/2012
6/26/2012
7/3/2012
7/10/2012
7/17/2012
7/24/2012
7/31/2012
8/7/2012
8/14/2012
8/21/2012
8/28/2012
9/11/2012
9/18/2012

Landscape changes- Tribal Lands in the Four-Corners Region





Mean vegetation biomass



Dryness of climate

(Nature, 2009)

M. Hiza Redsteer, USGS, NIDIS)

Sand Dune Mobility = W/(P/PE)

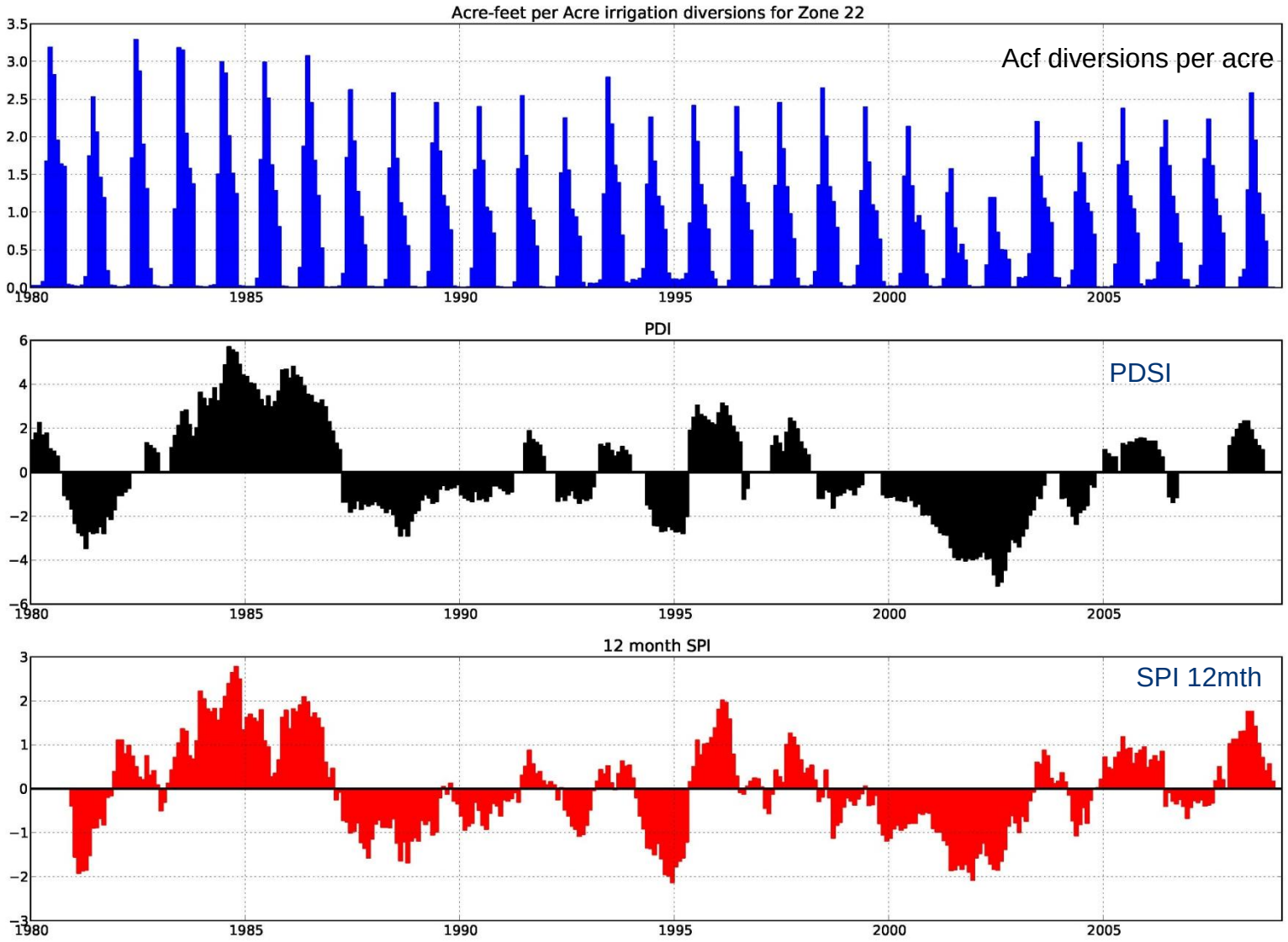
Stable Sand Dunes
= P/PE > 0.31

Partly Active Dunes

Fully Active Dunes
= P/PE< 0.125

Relating Drought Indices to management

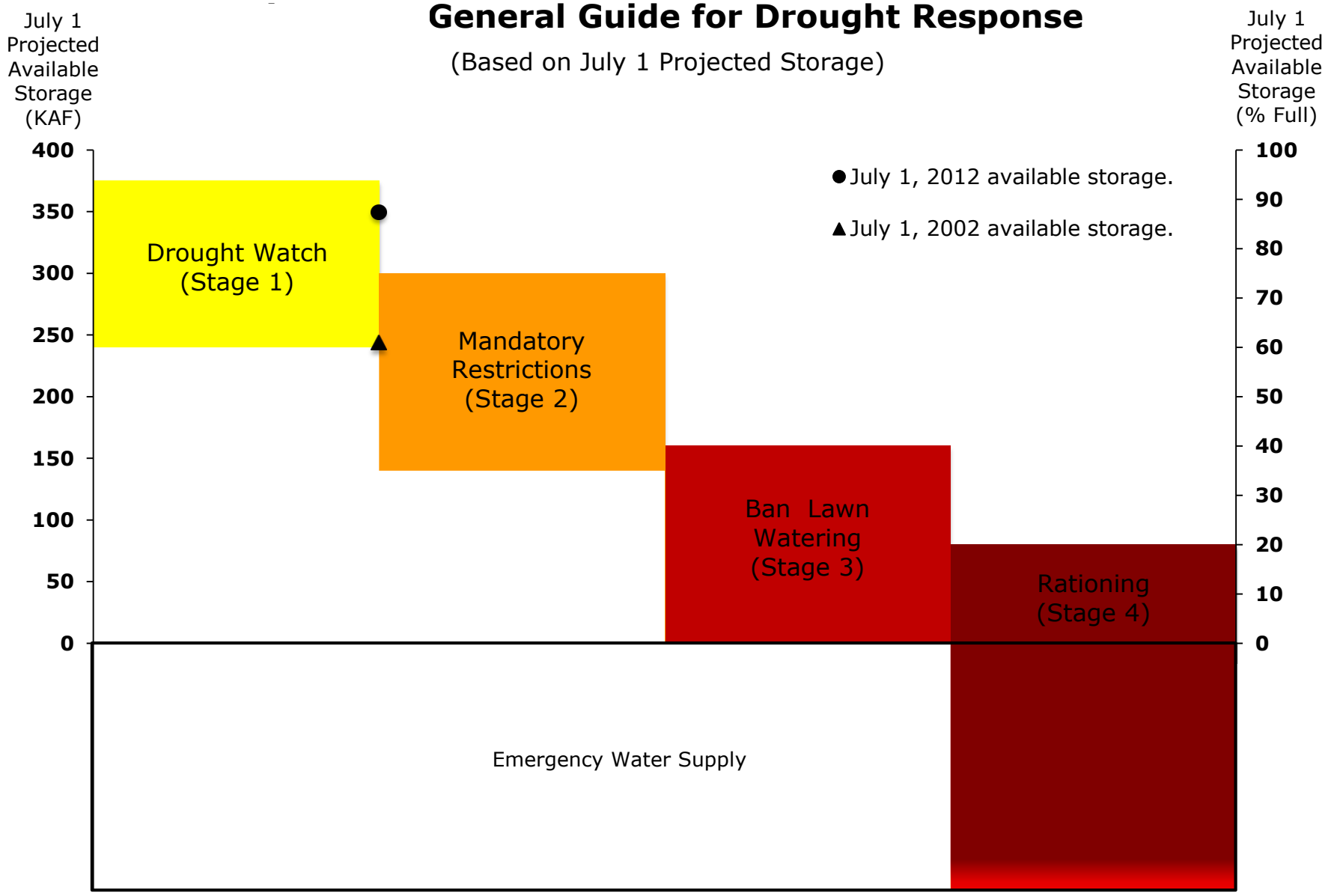
Irrigation diversions



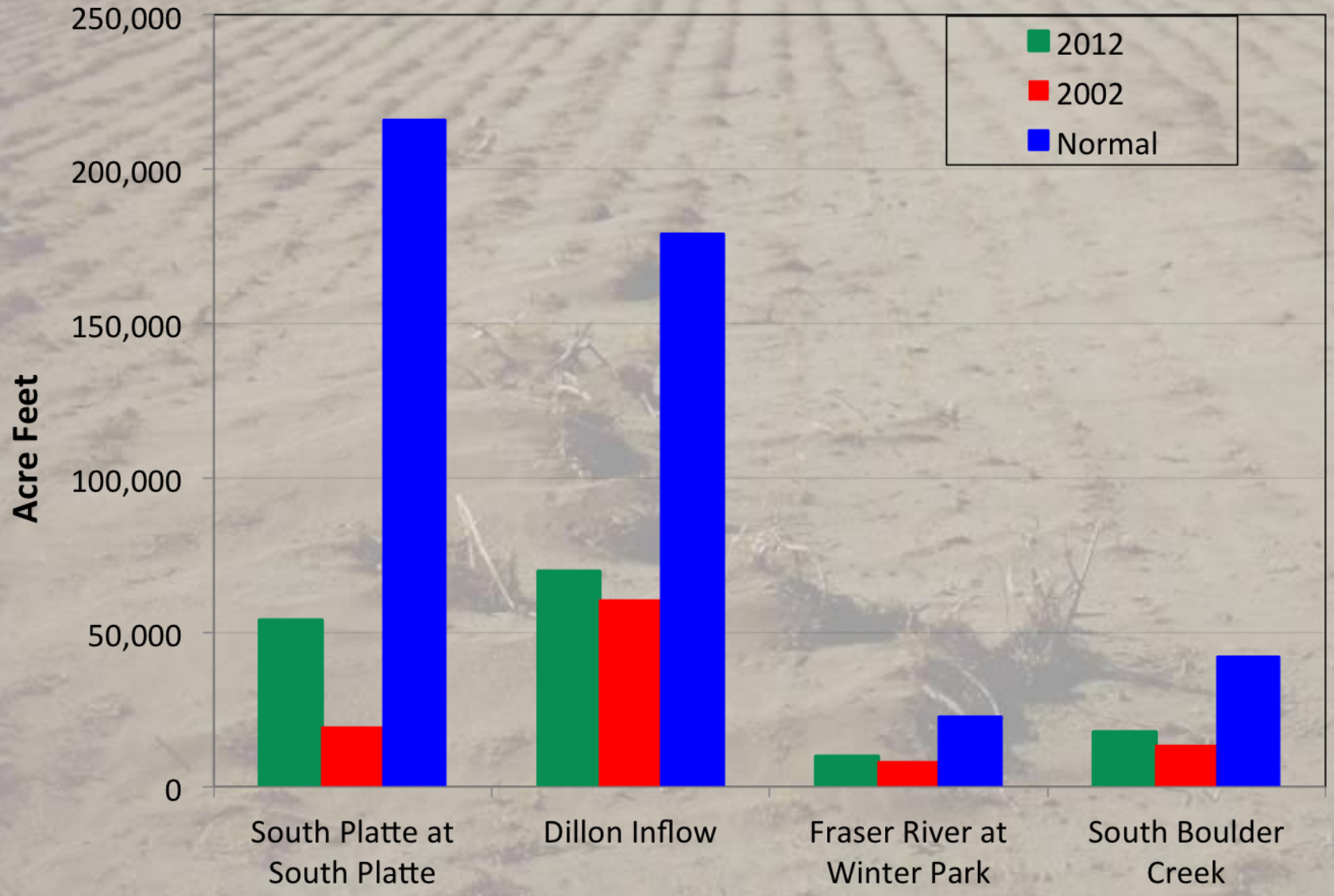
Uses of Drought Information-Municipal water (Denver, Boulder)

Drought Stage	Water Budget Reductions	Penalties for Violating Water Use Limitations
Moderate ***(Storage Index 0.85 to 0.70)***	**More emphasis on basic water use reduction measures and wise water use practices. Use of water monitors to track usage. Target high volume water users. Required budget reductions sufficient to achieve overall 8% reduction in water use.**	**Fines for violating water conservation and water waste per the Boulder Revised Code. Examples: fines for sidewalk or driveway washing or sprinklers spraying streets).**
Stage II Serious ***(Storage Index 0.70 to 0.55)***	Keep the following vegetation alive: Trees, shrubs, vegetable and flower gardens and lawns. Required budget reductions sufficient to achieve overall **14%** reduction in water use.	Penalize block 5 water use for several months with flow restrictors
Stage III Severe ***(Storage Index 0.55 to 0.40)***	Keep the following vegetation alive: major trees, major shrubs, and limited vegetable gardens. Greatly reduce outdoor water use and non-essential uses. Required budget reductions sufficient to achieve overall **22%** reduction in water use.	Implement Stage II plus fines for "more limited" uses. Examples: lawn watering between 10 am - 6 pm subject to warnings and fines; fines for repeat water waste offenders; fine blocks 4, 5 water use.
Extreme ***(Storage Index less than 0.40)***	Sustain some mature trees, but recognize there may be a major die-off of lawns, trees, and shrubs. Implement aggressive public education and outreach program. Required budget reductions sufficient to achieve overall **40%** reduction in water use.	Stage II and III penalties and flow restrictors; consider moratorium on building permits; consider termination of water service for extreme water waste offenders.

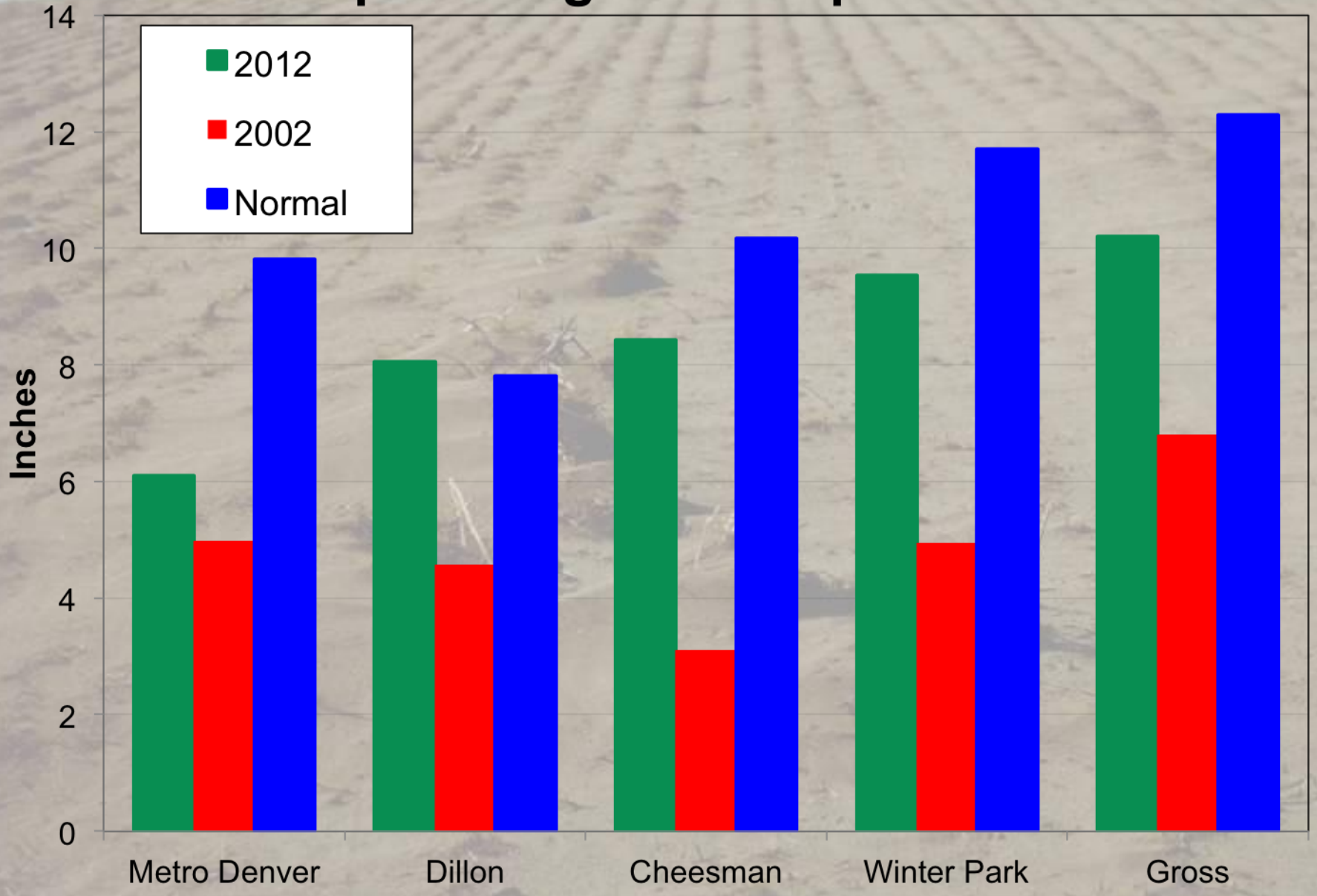
Denver Water



April - August Natural Streamflow



April - August Precipitation



AP

Wildfires threaten Colorado's summer tourism

By Thomas Peipert
The Associated Press
Updated: 06/26/2012 05:05:13 PM MDT

Wildfires threaten summer Rocky Mountain tourism

TODAY

Colorado wildfires spark concerns over tourism fallout

By Jayne Clark, USA TODAY

Updated 6/26/2012 6:00 PM

USA TODAY Travel

YAHOO! NEWS

Vicious wildfires spread to Colo. tourist centers

By THOMAS PEIPERT | Associated Press – Mon, Jun 25, 2012

Mass evacuations ordered as wildfires rage in Colorado

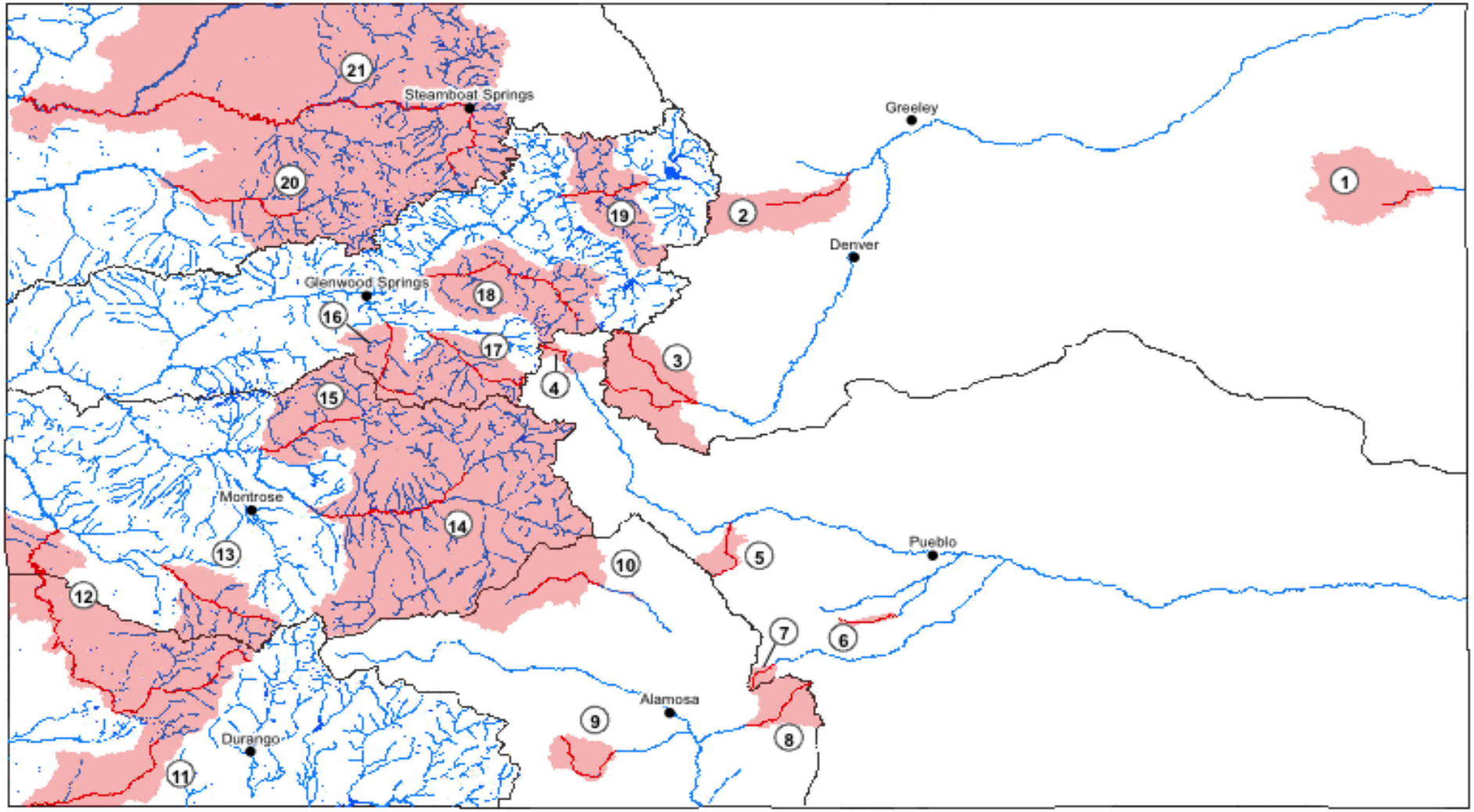
32,000 people flee homes in the Colorado Springs area, including parts of the Air Force Academy, and Boulder is under threat.

Los Angeles Times

Water Use and Weather (April 1 – September 23)

Year	Use (MG)	Avg High Temperature (°F)	Precipitation (inches)
2002	51,200	81.8	6.8
2006	50,500	79.5	7.6
2005-2011 Avg	45,300	78.7	11.0
2012	48,300	83.5	7.4

Colorado Water Trust Short-Term Leasing Program 2012 Priority Streams and Basins



Priority Stream Basins

1. North Fork of the Republican River upstream from Holy Joe Creek
2. Boulder Creek
3. Middle and South Forks of the South Platte River above their confluence
4. Lake Fork of the Arkansas River
5. Texas Creek
6. Greenhorn Creek upstream from Graneros Creek
7. Huerfano River upstream from Stanley Creek
8. Sangre de Cristo Creek upstream from Ute Creek
9. La Jara Creek upstream from Hot Creek
10. Saguache Creek upstream from the North Branch of the Saguache
11. Mancos River
12. Dolores River upstream from the San Miguel River
13. San Miguel River upstream from Horsefly Creek
14. Gunnison River upstream from the Crystal Dam
15. North Fork of the Gunnison River
16. Crystal River
17. Roaring Fork River upstream from the Frying Pan River
18. Eagle River
19. Colorado River between Windy Gap Reservoir and Kremmling
20. White River upstream from Piceance Creek
21. Yampa River

Perennial Streams and Rivers (Second Order or Larger)

Lakes, Ponds, and Reservoirs

2012 Priority Stream Reaches

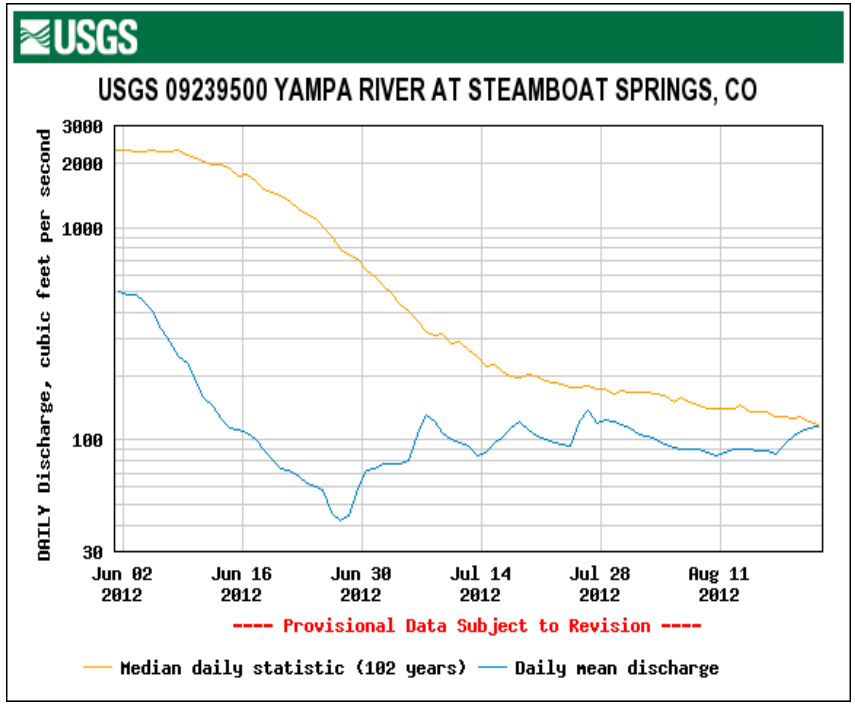
2012 Priority Basins

Water Division Boundaries

Miles

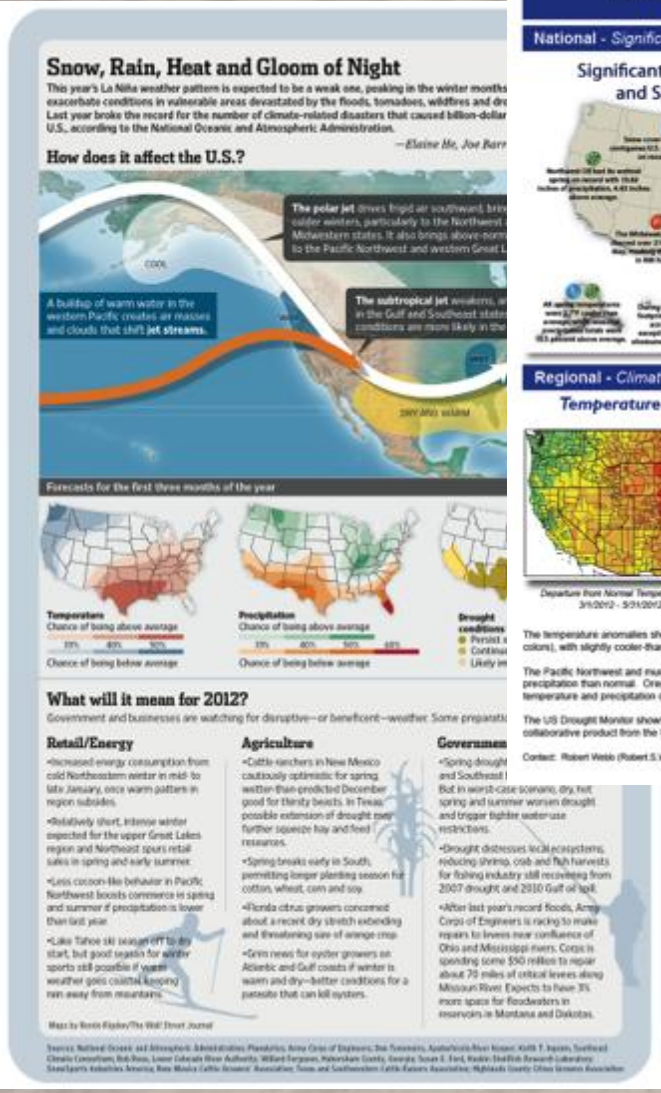
0 10 20 30 40 50

N



Yampa River streamflow increased to levels that allowed the river to re-open for recreational uses (Source A. Beattie CO River Trust)

Regional Outlooks



Snow, Rain, Heat and Gloom of Night

This year's La Niña weather pattern is expected to be a weak one, peaking in the winter months exacerbate conditions in vulnerable areas devastated by the floods, tornadoes, wildfires and dr Last year broke the record for the number of climate-related disasters that caused billion-dollar U.S., according to the National Oceanic and Atmospheric Administration.

—*Elaine He, Joe Barr*

How does it affect the U.S.?

The polar jet drives frigid air southward, brin colder winters, particularly to the Northwest, Midwestern states. It also brings above-norm to the Pacific Northwest and western Great L

A buildup of warm water in the western Pacific creates air masses and clouds that shift jet streams.

The subtropical jet weakens, a in the Gulf and Southeast state conditions are more likely in the

Forecasts for the first three months of the year

Temperature
Chance of being above average
Chance of being below average

Precipitation
Chance of being above average
Chance of being below average

Drought conditions
Persist
Continue
Likely in

What will it mean for 2012?

Government and businesses are watching for disruptive—or beneficent—weather. Some preparati

Retail/Energy

•Increased energy consumption from cold Northeastern winter in mid- to late January, once warm pattern in region subsides.

•Relatively short, intense winter expected for the upper Great Lakes region and Northeast spurs retail sales in spring and early summer.

•Less cocoon-like behavior in Pacific Northwest boosts commerce in spring and summer if precipitation is lower than last year.

•Lake Tahoe ski season off to dry start, but good season for winter sports still possible if warm weather goes colder, keeping rain away from mountains.

Agriculture

•Cattle ranchers in New Mexico cautiously optimistic for spring water-than-predicted December good for thirsty beasts. In Texas, possible extension of drought over further squeeze hay and feed resources.

•Spring breaks early in South, permitting longer planting season for cotton, wheat, corn and soy.

•Florida citrus growers concerned about a recent dry stretch extending and threatening size of orange crop.

•Grim news for oyster growers on Atlantic and Gulf coasts if winter is warm and dry—better conditions for a parasite that can kill oysters.

Governmen

•Spring drough and Southeast

But in worst-case scenario, dry, hot spring and summer worsen drought and trigger tighter water-use restrictions.

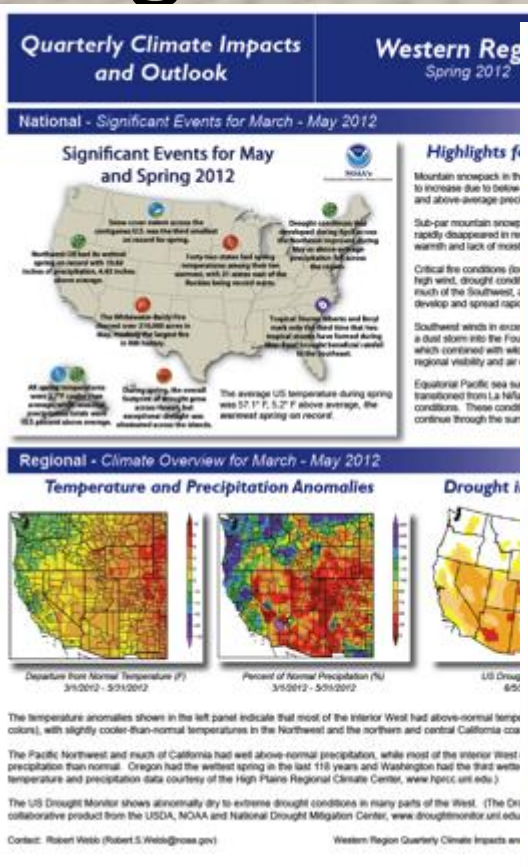
•Drought distresses local ecosystems, reducing shrimp, crab and fish harvests for fishing industry still recovering from 2007 drought and 2010 Gulf oil spill.

•After last year's record floods, Army Corps of Engineers is racing to make repairs to levees near confluence of Ohio and Mississippi rivers. Corps is spending some $90 million to repair about 70 miles of critical levees along Missouri River. Expects to have 3% more space for floodwaters in reservoirs in Montana and Dakotas.

Maps by Kevin Fiorko/The Wall Street Journal

Sources: National Oceanic and Atmospheric Administration; Planalytics; Army Corps of Engineers; Des Transmetrics; Apalachicola River Keeper; Keith T. Ingram, Southeast Climate Consortium; Rob Ross, Lower Colorado River Authority; Willard Ferguson, Habersham County, Georgia; Susan E. Ford, Rankin Smith Fish Research Laboratory; SnowSports Industries America; New Mexico Cattle Growers' Association; Texas and Southwestern Cattle Raisers Association; Highlands County Citrus Growers Association

2 Jan 2012 Wall Street Journal



Quarterly Climate Impacts and Outlook — **Western Reg** — Spring 2012

National - *Significant Events for March - May 2012*

Significant Events for May and Spring 2012

The average US temperature during spring was 57.1° F, 5.2° F above average, the warmest spring on record.

Highlights f

Mountain snowpack in th to increase due to below and above-average prec

Sub-par mountain snow rapidly disappeared in re warmth and lack of moist

Critical fire conditions (lo high wind, drought condi much of the Southwest, develop and spread rapi

Southwest winds in exce a dust storm into the Fou which combined with wi regional visibility and air

Equatorial Pacific sea su transitioned from La Niñ conditions. These condi continue through the sur

Regional - *Climate Overview for March - May 2012*

Temperature and Precipitation Anomalies

Drought i

Departure from Normal Temperature (F) 3/1/2012 - 5/31/2012

Percent of Normal Precipitation (%) 3/1/2012 - 5/31/2012

US Drou 6/5/

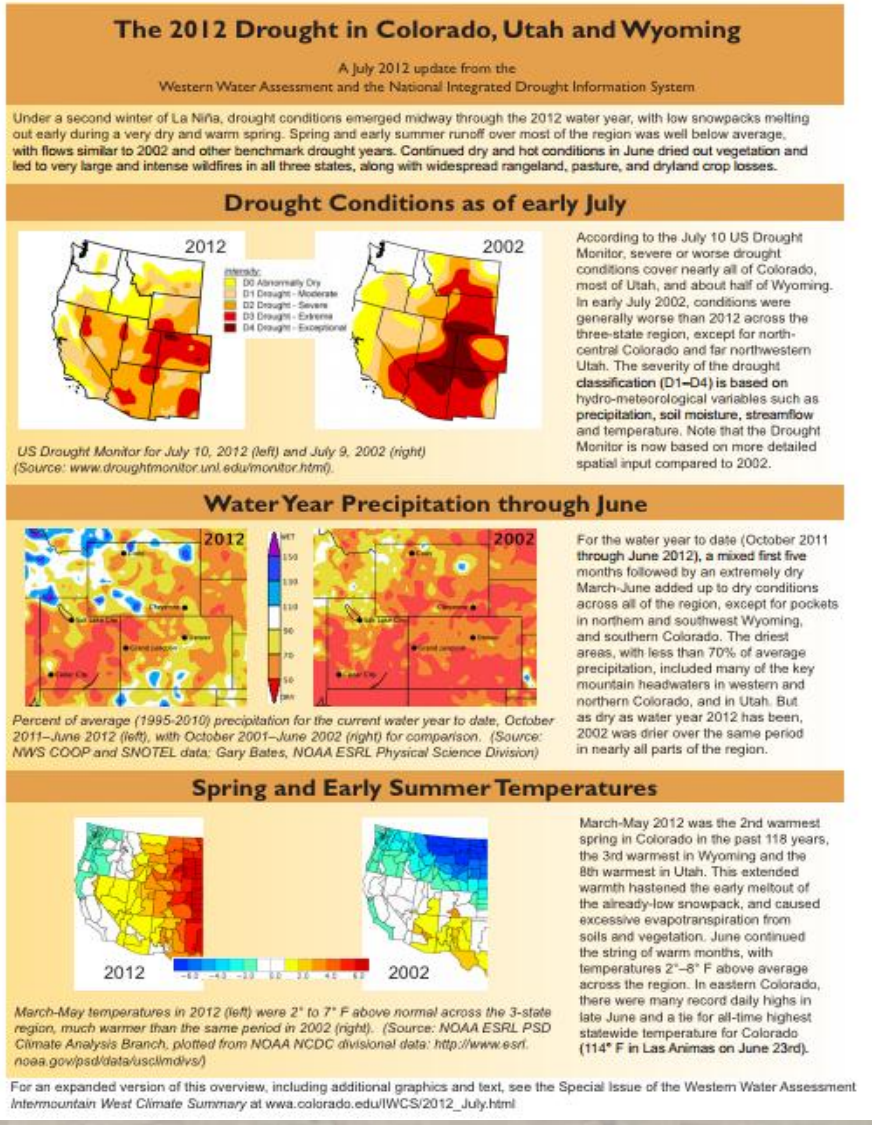
The temperature anomalies shown in the left panel indicate that most of the interior West had above-normal temp colors), with slightly cooler-than-normal temperatures in the Northwest and the northern and central California coa

The Pacific Northwest and much of California had wet above-normal precipitation, while most of the interior West precipitation than normal. Oregon had the wettest spring in the last 118 years and Washington had the third wette temperature and precipitation data courtesy of the High Plains Regional Climate Center, www.hprcc.unl.edu.)

The US Drought Monitor shows abnormally dry to extreme drought conditions in many parts of the West. (The Dr collaborative product from the USDA, NOAA and National Drought Mitigation Center, www.droughtmonitor.unl.edu

Contact: Robert Webb (Robert.S.Webb@noaa.gov) Western Region Quarterly Climate Impacts an

Western Govs-NIDIS Regional Outlook



The 2012 Drought in Colorado, Utah and Wyoming

A July 2012 update from the
Western Water Assessment and the National Integrated Drought Information System

Under a second winter of La Niña, drought conditions emerged midway through the 2012 water year, with low snowpacks melting out early during a very dry and warm spring. Spring and early summer runoff over most of the region was well below average, **with flows similar to 2002 and other benchmark drought years. Continued dry and hot conditions in June dried out vegetation and led to very large and intense wildfires in all three states, along with widespread rangeland, pasture, and dryland crop losses.**

Drought Conditions as of early July

2012 2002

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

US Drought Monitor for July 10, 2012 (left) and July 9, 2002 (right) (Source: www.droughtmonitor.unl.edu/monitor.html).

According to the July 10 US Drought Monitor, severe or worse drought conditions cover nearly all of Colorado, most of Utah, and about half of Wyoming. In early July 2002, conditions were generally worse than 2012 across the three-state region, except for north-central Colorado and far northwestern Utah. The severity of the drought **classification (D1–D4) is based on** hydro-meteorological variables such as **precipitation, soil moisture, streamflow** and temperature. Note that the Drought Monitor is now based on more detailed spatial input compared to 2002.

Water Year Precipitation through June

2012 2002

WET 150 130 110 90 70 50 DRY

Percent of average (1995-2010) precipitation for the current water year to date, October 2011–June 2012 (left), with October 2001–June 2002 (right) for comparison. (Source: NWS COOP and SNOTEL data; Gary Bates, NOAA ESRL Physical Science Division)

For the water year to date (October 2011 **through June 2012), a mixed five** months followed by an extremely dry March-June added up to dry conditions across all of the region, except for pockets in northern and southwest Wyoming, and southern Colorado. The driest areas, with less than 70% of average precipitation, included many of the key mountain headwaters in western and northern Colorado, and in Utah. But as dry as water year 2012 has been, 2002 was drier over the same period in nearly all parts of the region.

Spring and Early Summer Temperatures

2012 2002

March-May temperatures in 2012 (left) were 2° to 7° F above normal across the 3-state region, much warmer than the same period in 2002 (right). (Source: NOAA ESRL PSD Climate Analysis Branch, plotted from NOAA NCDC divisional data: http://www.esrl.noaa.gov/psd/data/usclimdivs/)

March-May 2012 was the 2nd warmest spring in Colorado in the past 118 years, the 3rd warmest in Wyoming and the 8th warmest in Utah. This extended warmth hastened the early meltout of the already-low snowpack, and caused excessive evapotranspiration from soils and vegetation. June continued the string of warm months, with temperatures 2°–8° F above average across the region. In eastern Colorado, there were many record daily highs in late June and a tie for all-time highest statewide temperature for Colorado **(114° F in Las Animas on June 23rd).**

For an expanded version of this overview, including additional graphics and text, see the Special Issue of the Western Water Assessment *Intermountain West Climate Summary* at wwa.colorado.edu/IWCS/2012_July.html

NIDIS-WWA Drought Status and Outlook

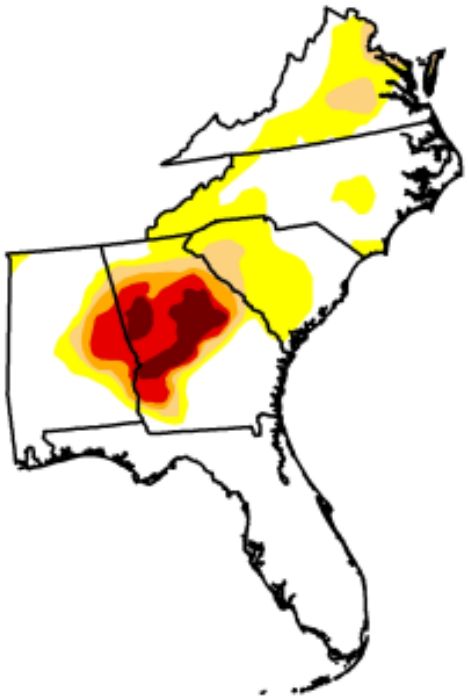
U.S. Drought Monitor

September 18, 2012
Valid 7 a.m. EST

Southeast

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	62.76	37.24	17.36	11.50	8.47	3.30
Last Week (09/11/2012 map)	62.60	37.40	17.36	11.50	8.47	3.46
3 Months Ago (06/19/2012 map)	41.26	58.74	35.08	20.92	8.63	3.02
Start of Calendar Year (12/27/2011 map)	40.38	59.62	43.05	28.62	18.71	0.00
Start of Water Year (09/27/2011 map)	42.24	57.76	41.82	31.77	23.48	0.00
One Year Ago (09/13/2011 map)	39.54	60.46	45.29	32.22	24.37	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

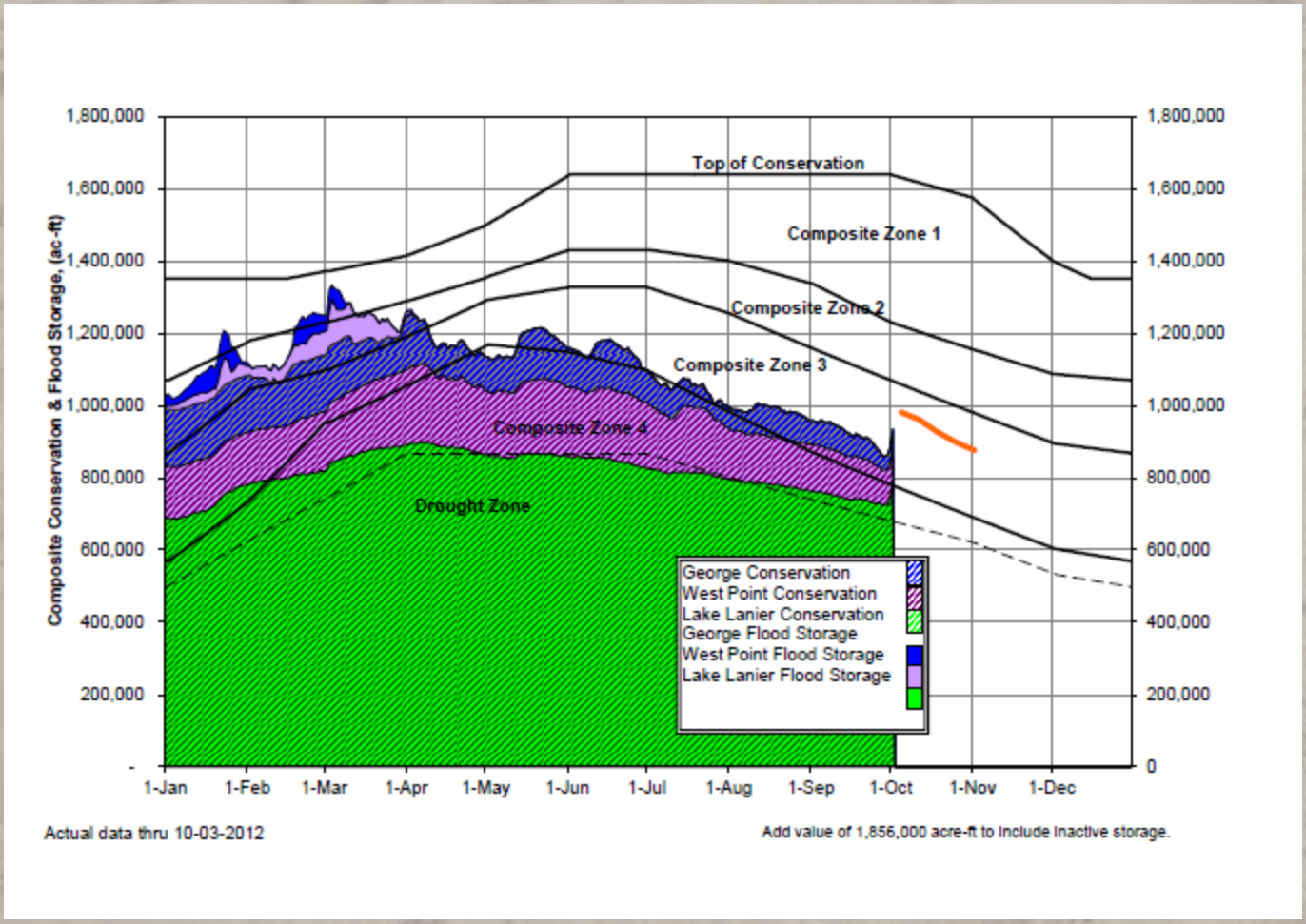
USDA National Drought Mitigation Center

Released Thursday, September 20, 2012
David Simeral, Western Regional Climate Center

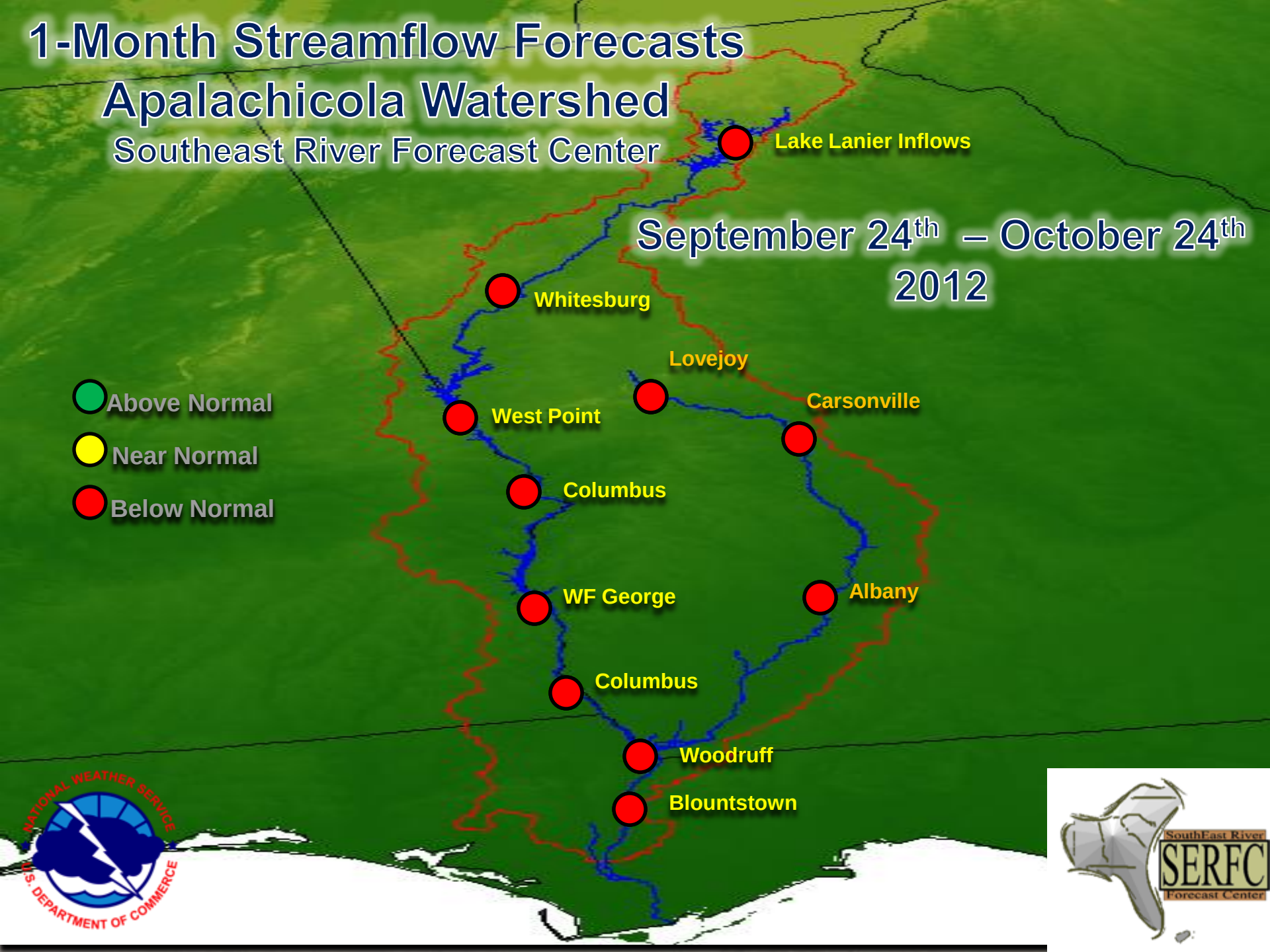
http://www.drought.unl.edu/dm/monitor.html

ACF Basin Composite Storage

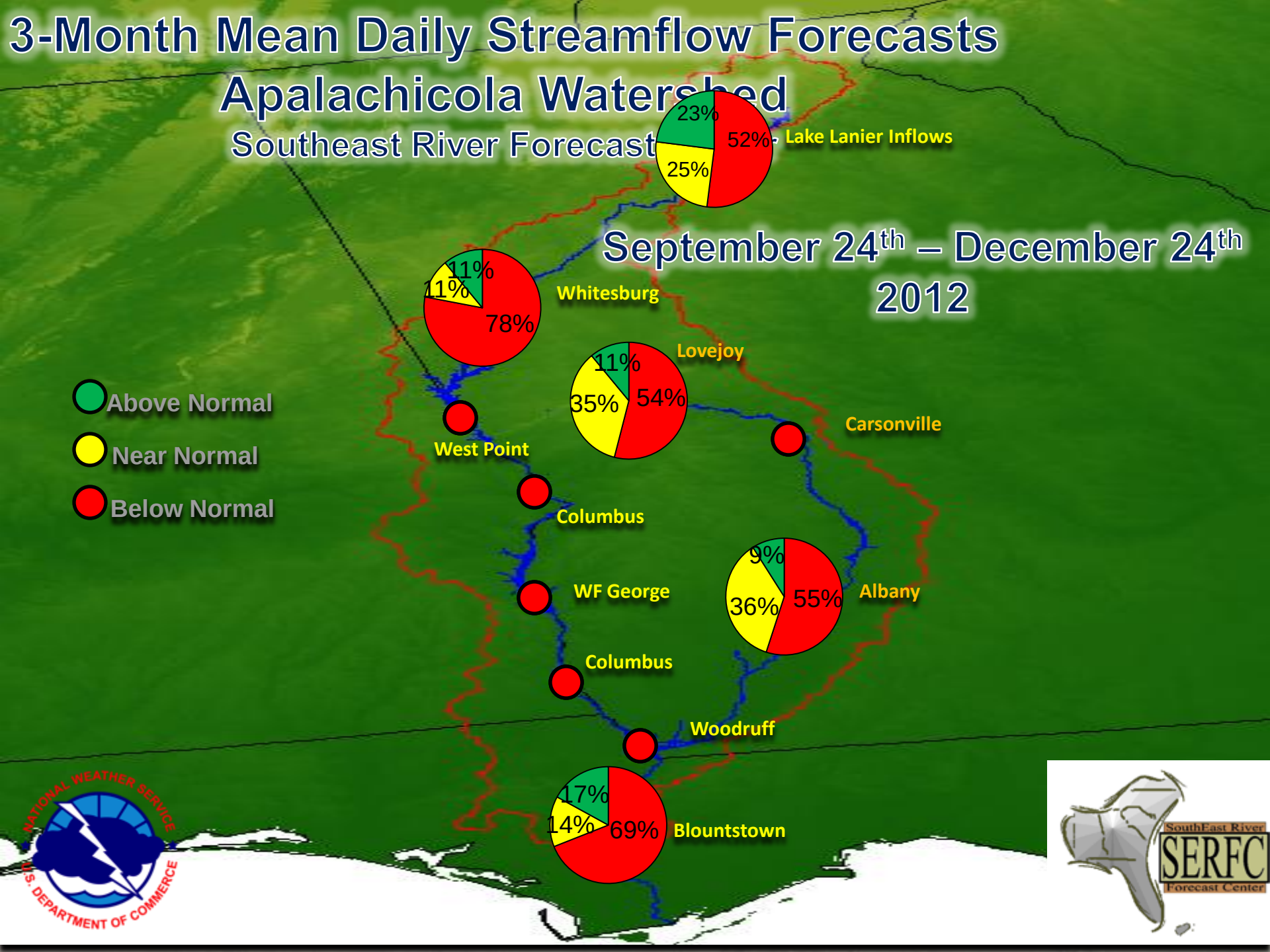
(Lakes Lanier, Westpoint and George)

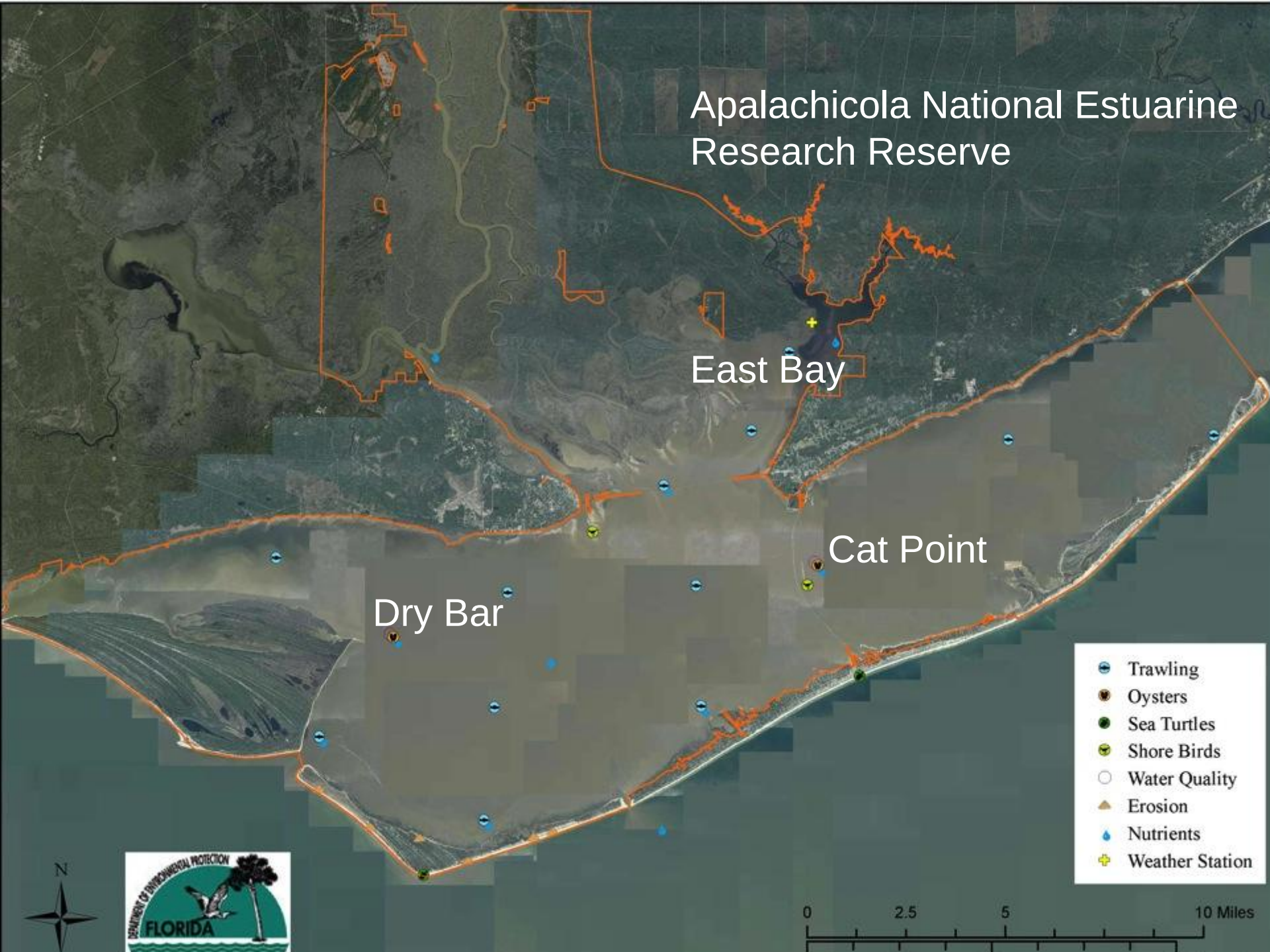


USACE Mobile District

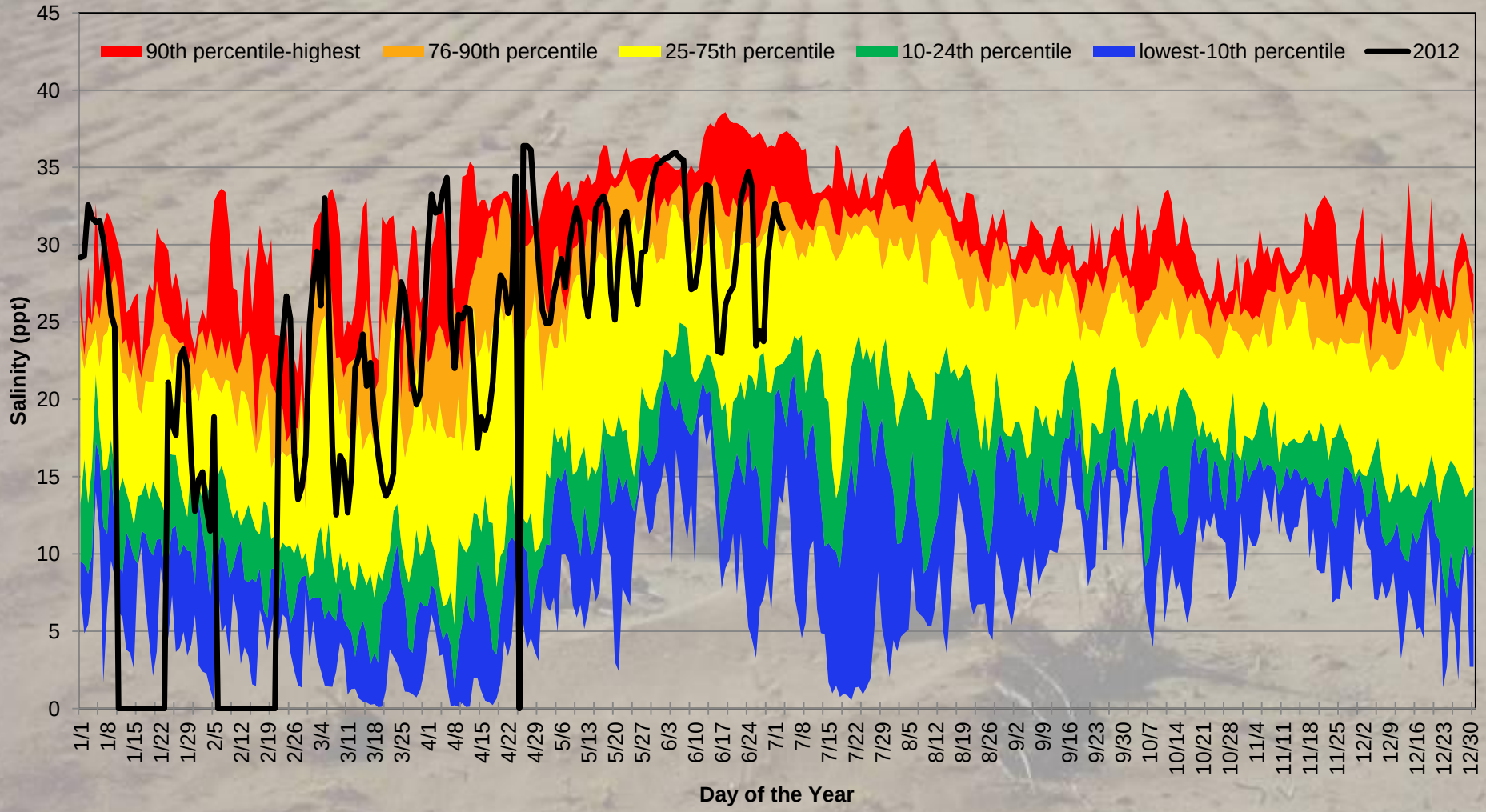

1-Month Streamflow Forecasts
Apalachicola Watershed
Southeast River Forecast Center
September 24th – October 24th
2012
Above Normal
Near Normal
Below Normal
Lake Lanier Inflows
Whitesburg
Lovejoy
Carsonville
West Point
Columbus
WF George
Albany
Columbus
Woodruff
Blountstown
NATIONAL WEATHER SERVICE
U.S. DEPARTMENT OF COMMERCE
SouthEast River
SERFC
Forecast Center

3-Month Mean Daily Streamflow Forecasts
Apalachicola Watershed
Southeast River Forecast



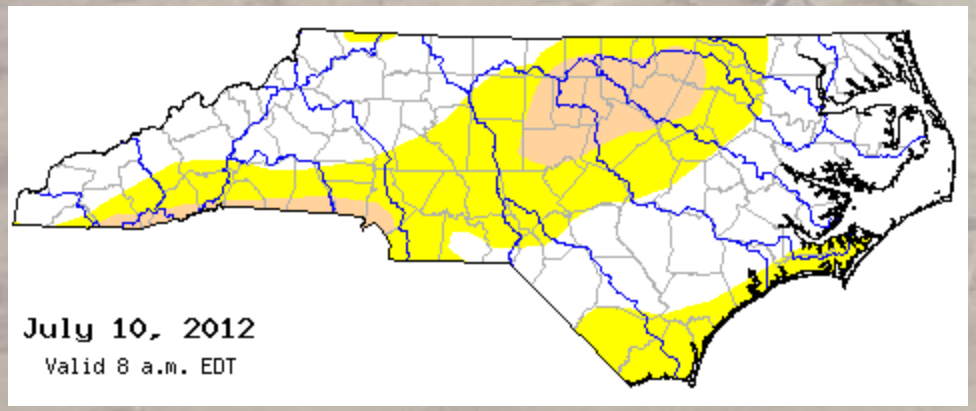

Apalachicola National Estuarine Research Reserve
East Bay
Cat Point
Dry Bar
Trawling
Oysters
Sea Turtles
Shore Birds
Water Quality
Erosion
Nutrients
Weather Station
N
FLORIDA
0
2.5
5
10 Miles

Daily Salinity at Dry Bar



Management Triggers

NORTH CAROLINA
Drought Management
Advisory Council



http://www.ncdrought.org/

Drought Classification and Response Actions

D1 - Moderate Drought

The NCDMAC advises all water users in the counties that are indicated on the US Drought Monitor Map as suffering from Moderate Drought (D1) conditions to enact the following precautions in addition to previous advisories until further notice:

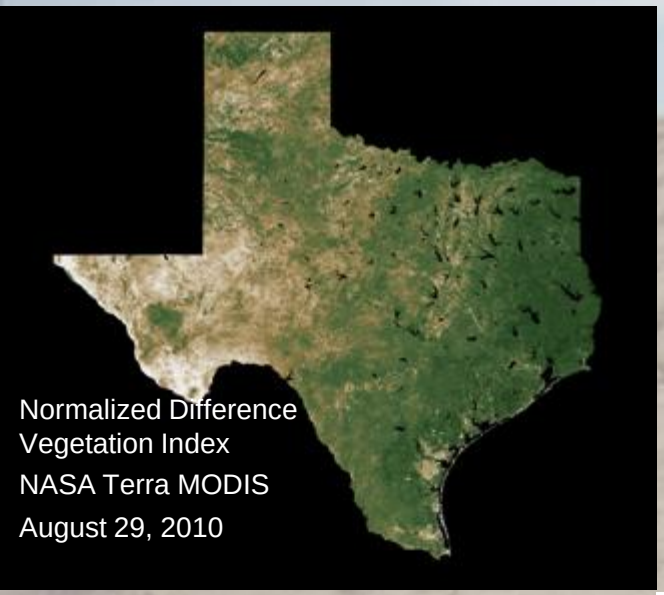
- Adhere to local water use restrictions.
- Participate, as appropriate, in regional and local coordination for the management of water resources.
- Stay informed on drought conditions and advisories (www.ncdrought.org).
- Project water needs and available water supply for a ninety day period from the issuance of this advisory.
- Assess your vulnerability to the drought conditions and adjust water usage to prolong available supply.
- Inspect water delivery system components (e.g. irrigation lines, fixtures, processing equipment, water system lines, etc.), repair leaks and ensure that existing equipment is operating as efficiently as possible.
- Minimize nonessential uses of water.
- Implement available public awareness and educational outreach programs emphasizing the need to conserve water.

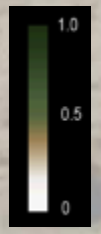
D0 - Abnormally Dry

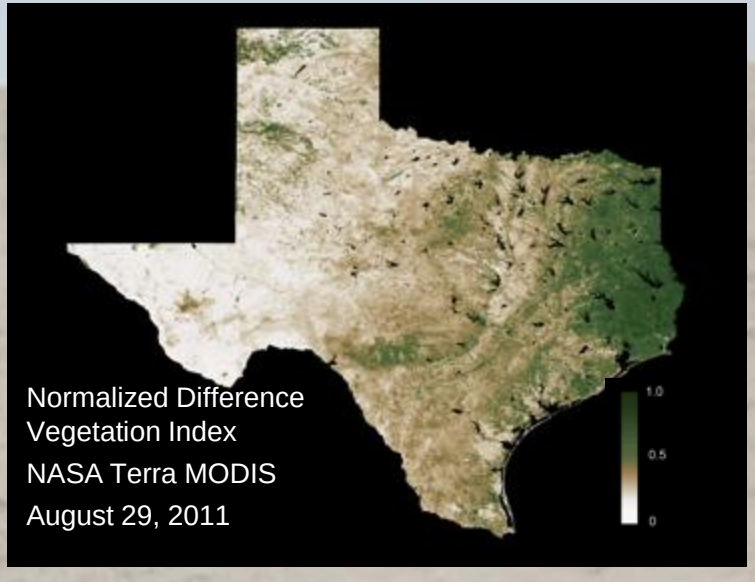
The NCDMAC requests all water users in the counties that are indicated on the US Drought Monitor Map as suffering from Abnormally Dry (D0) conditions to closely monitor their water supply source for diminished capacity and take precautions to prepare for impending drought conditions.

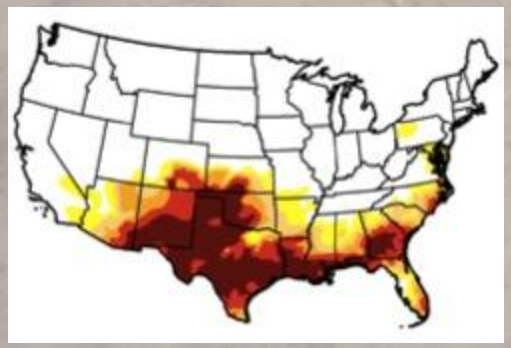
- Review and be prepared to implement your Water Shortage Response Plans at the appropriate time.
- Participate, as appropriate, in regional and local coordination for the management of water resources.
- Stay informed on drought conditions and advisories (www.ncdrought.org).

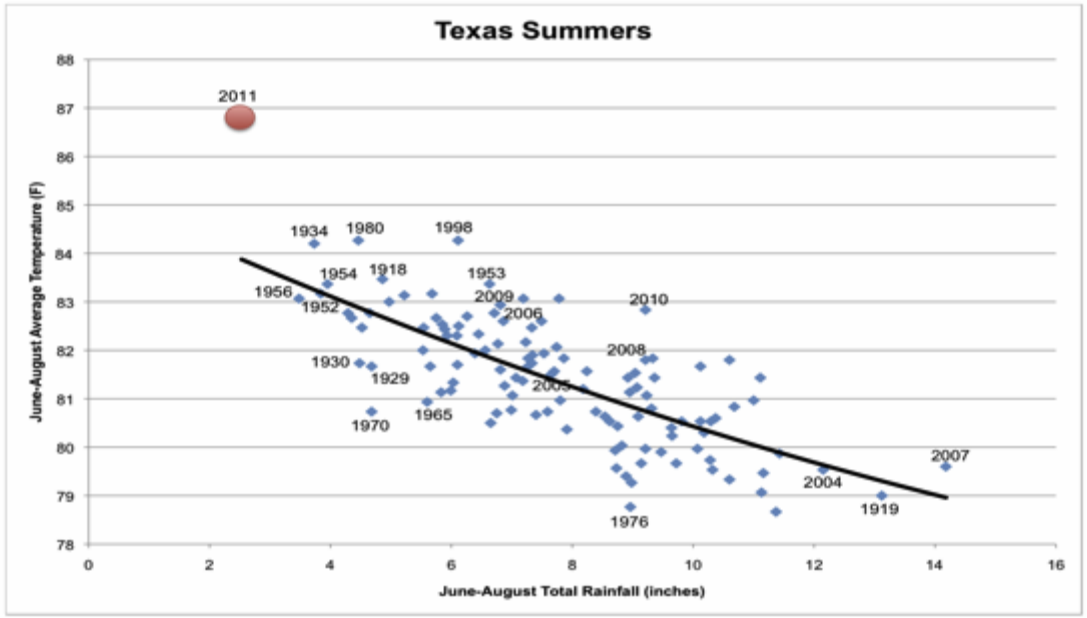
MODIS telemetry received and processed by the MAGIC DBRS Center for Space Research, University of Texas at Austin











June-Aug T (^{0}F)

June-Aug rainfall (in)

Nielson-Gammon, Bewley, Rose

MANAGING DROUGHT

IN THE SOUTHERN PLAINS

You are invited to join us in a webinar (web-based seminar) series to discuss drought conditions, impacts and resources available to help manage drought in the Southern Plains. Webinars will be held on the 2nd Thursday of each month at 11:00 A.M. Central Time. A shortened briefing will also be offered on the 4th Thursday. The content is geared toward a general audience – anyone who has responsibility to manage or assist others in managing drought and its related impacts.

If you would like to join in these webinars, you need to register via the SCIPP website: http//www.southernclimate.org or e-mail scipp@mesonet.org. For each webinar, you will receive an e-mail with the link to access the webinar. Each webinar will last 45-60 minutes.

Each webinar will include an overview of the current drought assessment and outlook, summary of impacts across the region, and a topic or resource, such as La Niña or wildfire conditions. You will have an opportunity to suggest topics for following webinars. The primary focus is in the states most heavily impacted from the current drought - Texas, Oklahoma and New Mexico – but participation from surrounding states is encouraged.

The webinar series is sponsored by a partnership of the National Integrated Drought Information System (NIDIS), National Oceanic and Atmospheric Administration (NOAA), National Drought Mitigation Center, Southern Climate Impacts Planning Program, Climate Assessment for the Southwest, and the region's State Climatologists.

Information from the webinars will be posted on a website linked through http//www.southernclimate.org A two-page summary will be produced and posted for each webinar. Please pass on this announcement to relative organizations or groups that are involved in managing or monitoring drought and its related impacts.

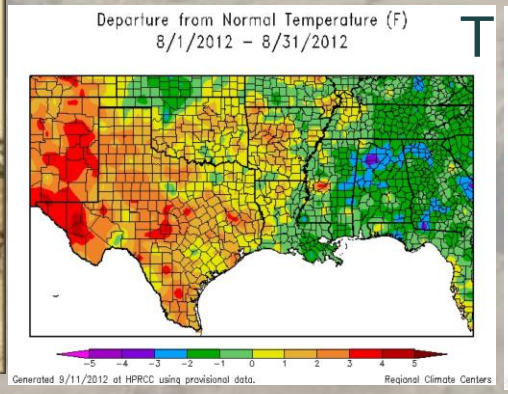
To register or for more information, contact:

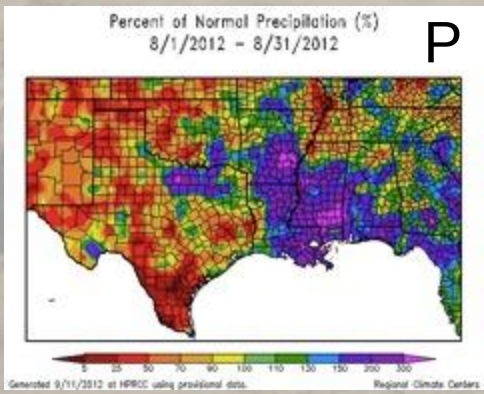
Southern Climate Impacts Planning Program
http//www.southernclimate.org
405-325-2541 or scipp@mesonet.org

Webinar Topics:

- La Niña
- Cattle & Livestock
- U.S. Drought Monitor
- Ecological Impacts
- Seasonal Forecasting
- Flash Drought
- Water Supply
- Wildfire
- Drought Ready Communities
- Agricultural Impacts

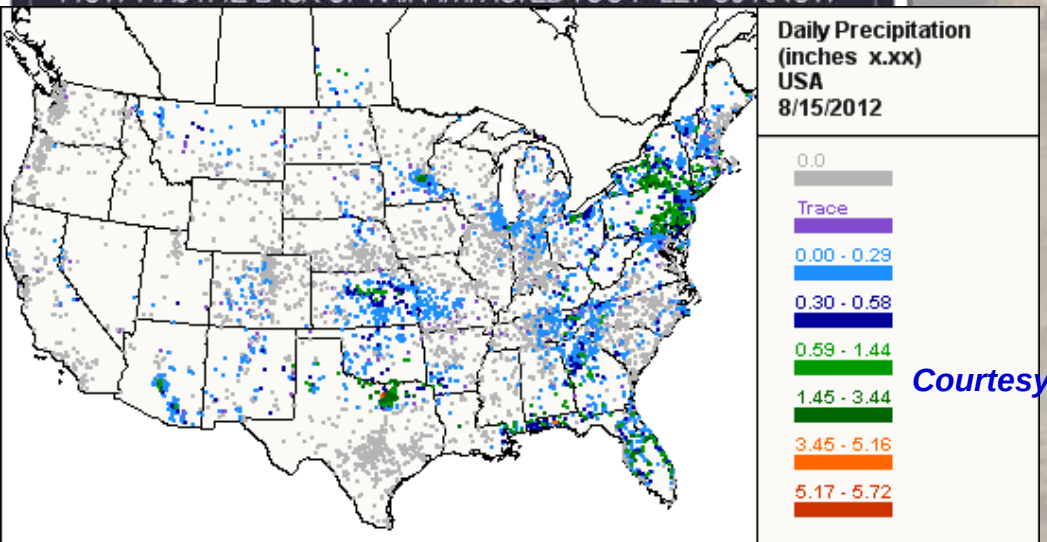
RISA/SCIPP is holding bi-weekly discussions of the drought and its impacts, on the 2nd and 4th Thursdays of each month at 11:00 a.m. Central Time.





Departures from 1971-2000 normal average temperatures and precipitation for August 2012, across the South.

Promoting the "drought impact reporting" idea to volunteers…



* **14,000+ volunteers covering all 50 states and now into Canada!!**

* **CoCoRaHS "Message of the Day"**

* **Monthly e-mail reminders**

* **Guide to reporting drought impacts**

* **Banners on the Web**

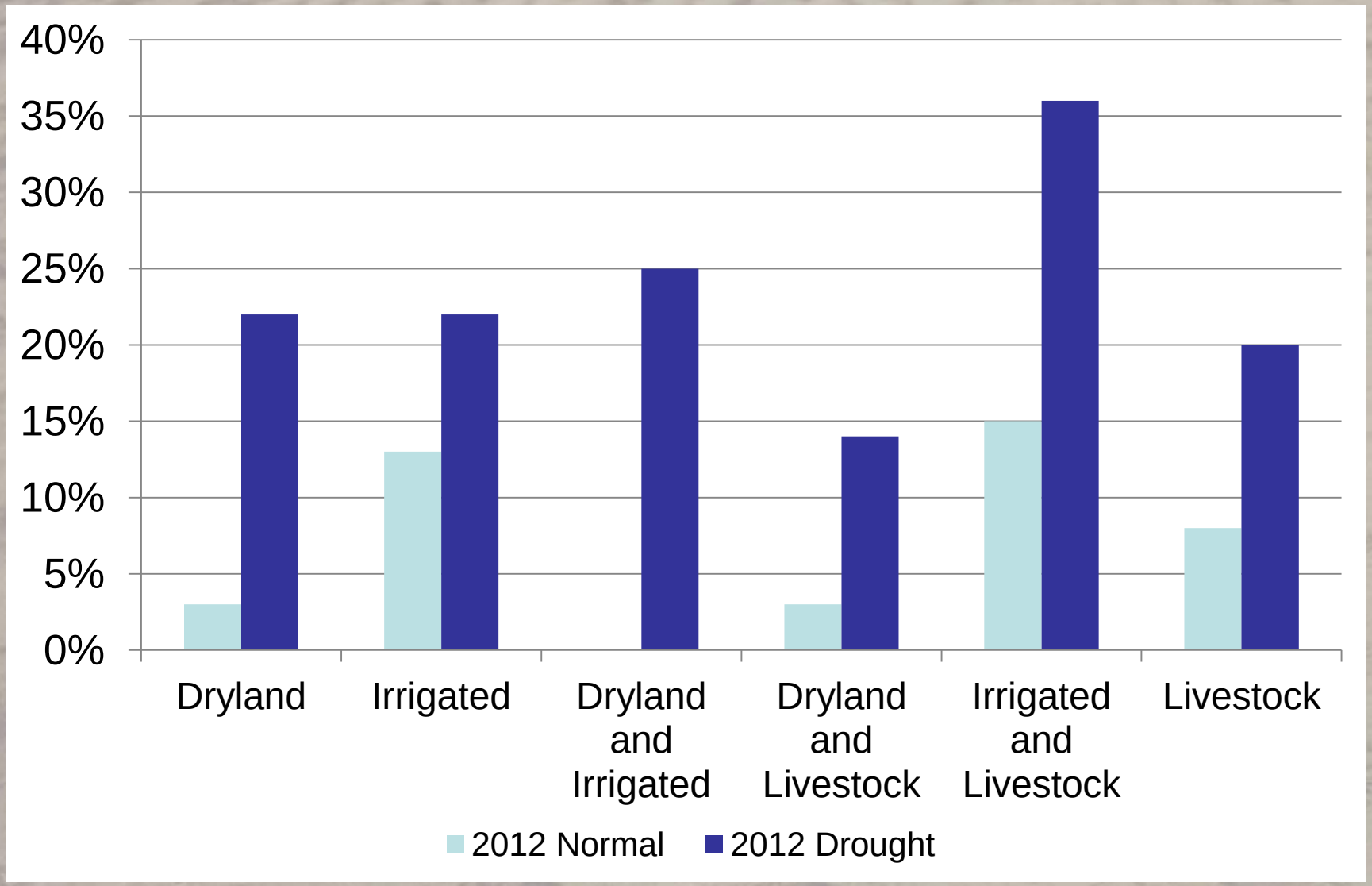
Courtesy: Henry Reges, Colorado State University

Drought Impacts on Harvested Acres and Yields (S.Colorado)		
Please enter the following information about your 2011…	% Difference in planted and harvested acreage	% Difference in actual and expected yields
dryland wheat crop.	73%	46%
dryland corn crop.	91%	40%
dryland sorghum crop.	84%	24%
irrigated barley.	95%	81%
irrigated potatoes.	100%	101%
irrigated wheat.	100%	82%

Goemans
2012

How likely are you to leave farming?

(0% certain to stay, 100% certain to leave)

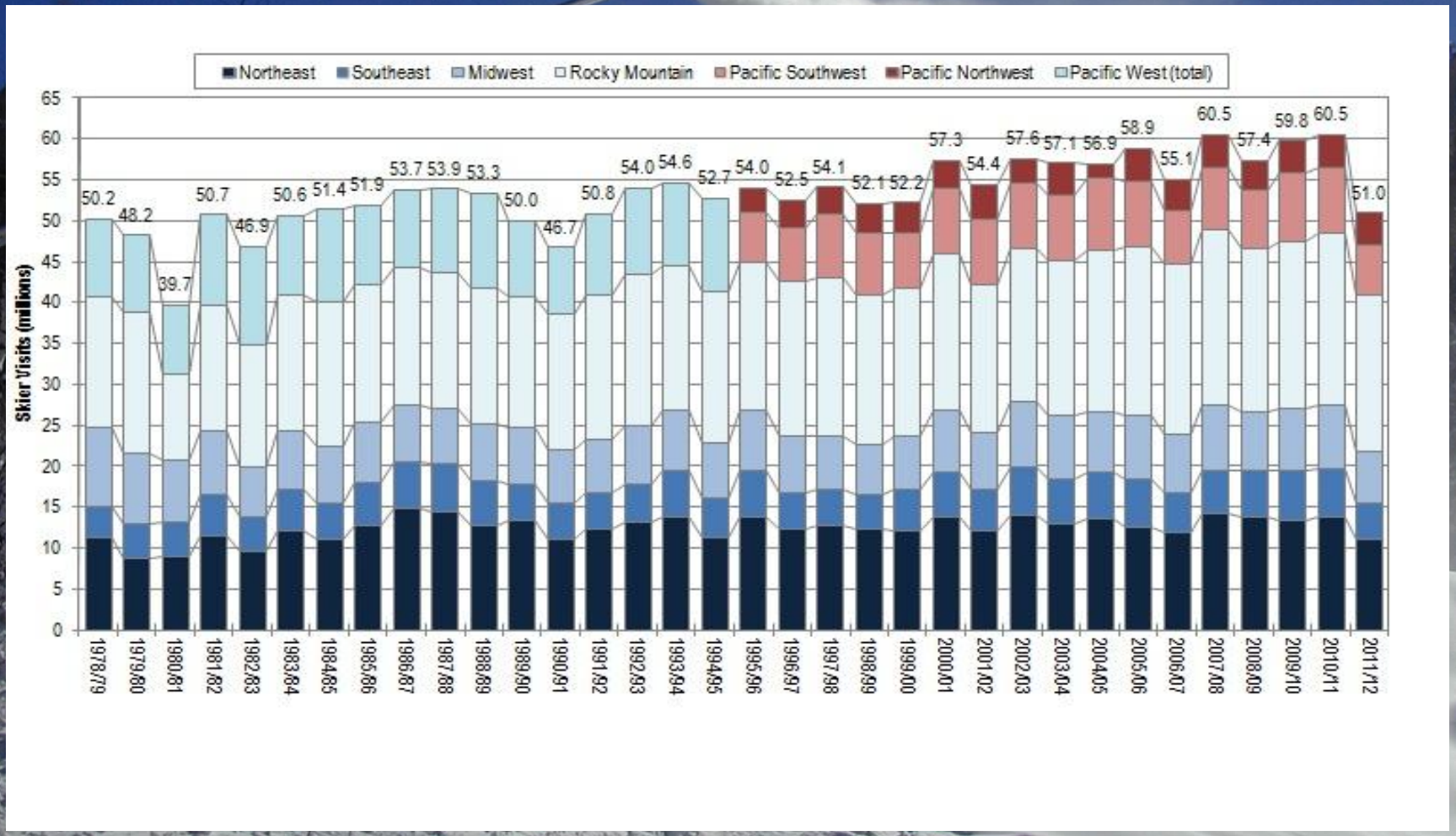


Drought Impacts on Businesses

- Anecdotal stories from our business members reflect a range of effects from this years drought. Many businesses say that perception of low water, fire, and other aspects of the drought have affected people coming out to visit and spend money. Some businesses changed the way they marketed themselves and added other types of services to stay competitive this summer-

- **"Our outfitting business was down $118,000 this summer relative to last. This represents a 58% decline"- western slope outfitting company.**

National Skier Visits 1978-2012



Courtesy of RRC Associates, Boulder, Colorado

The current conditions

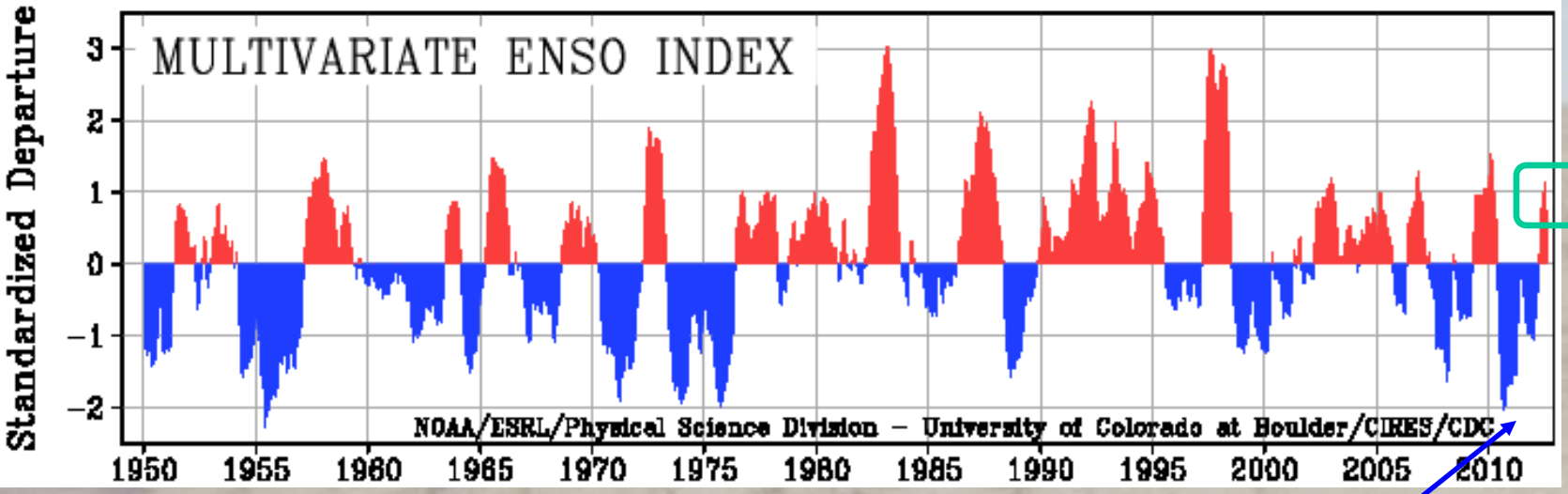
- **40:** Number of states with drought-designated counties as determined by the federal government, making them eligible for emergency aid

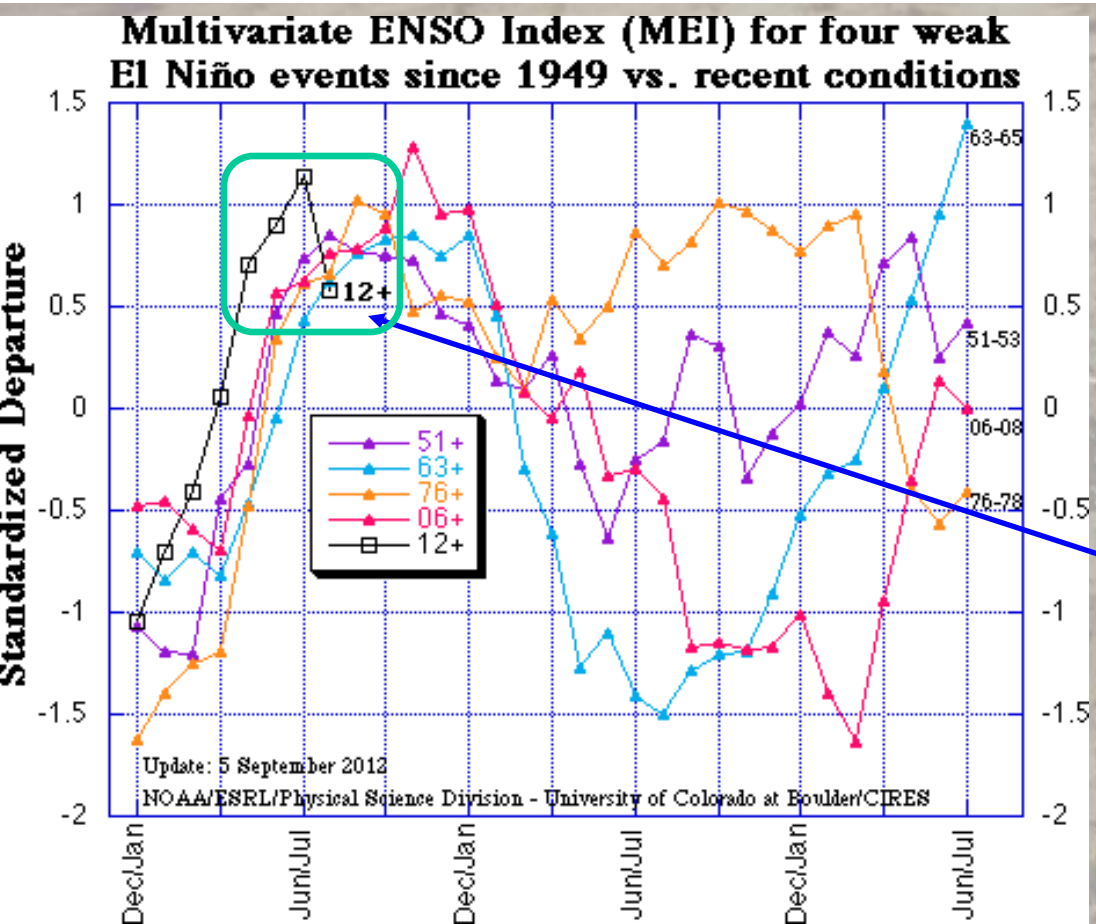
- **63%:** Amount of the contiguous U.S. experiencing moderate to exceptional drought conditions

- **33%:** Amount of the contiguous U.S. last year, indicating 30% more of the country now faces such conditions

- **#1:** The historic rank for July 2012, nationally, in temperature, making it the hottest July since records were first kept in 1895

- **123.4:** The bushels of corn per acre predicted by the USDA, the lowest yield since 1995 (**4 billion lower than forecast) :**



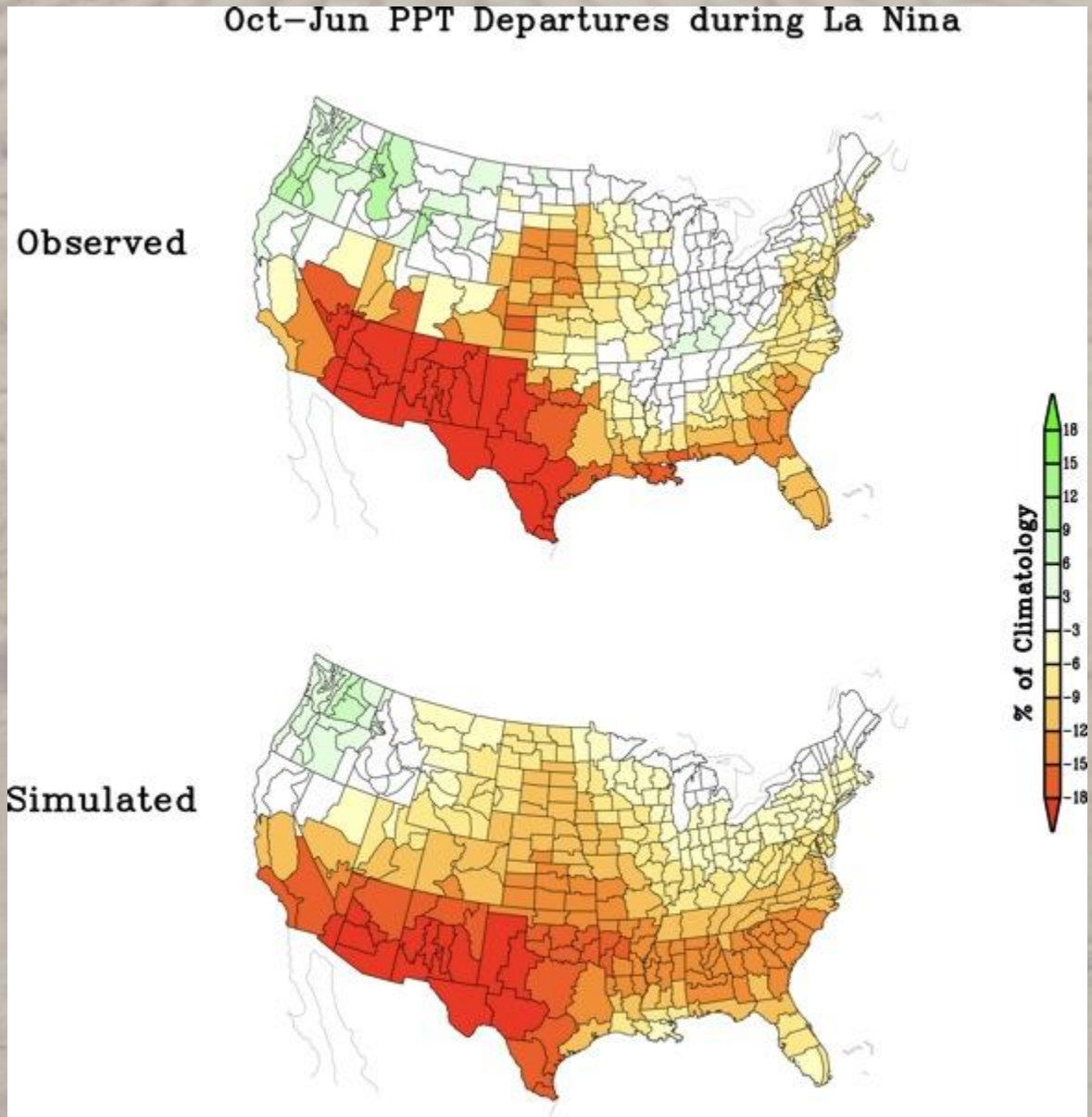


2010-12 La Niña event reached its biggest peak since the mid-70s in late 2010, followed by a brief excursion to ENSO-neutral conditions during mid-2011; it reached a second peak last winter, and is now being followed by a weak El Niño event.

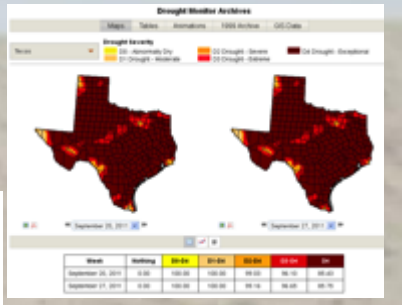
http://www.esrl.noaa.gov/psd/enso/mei

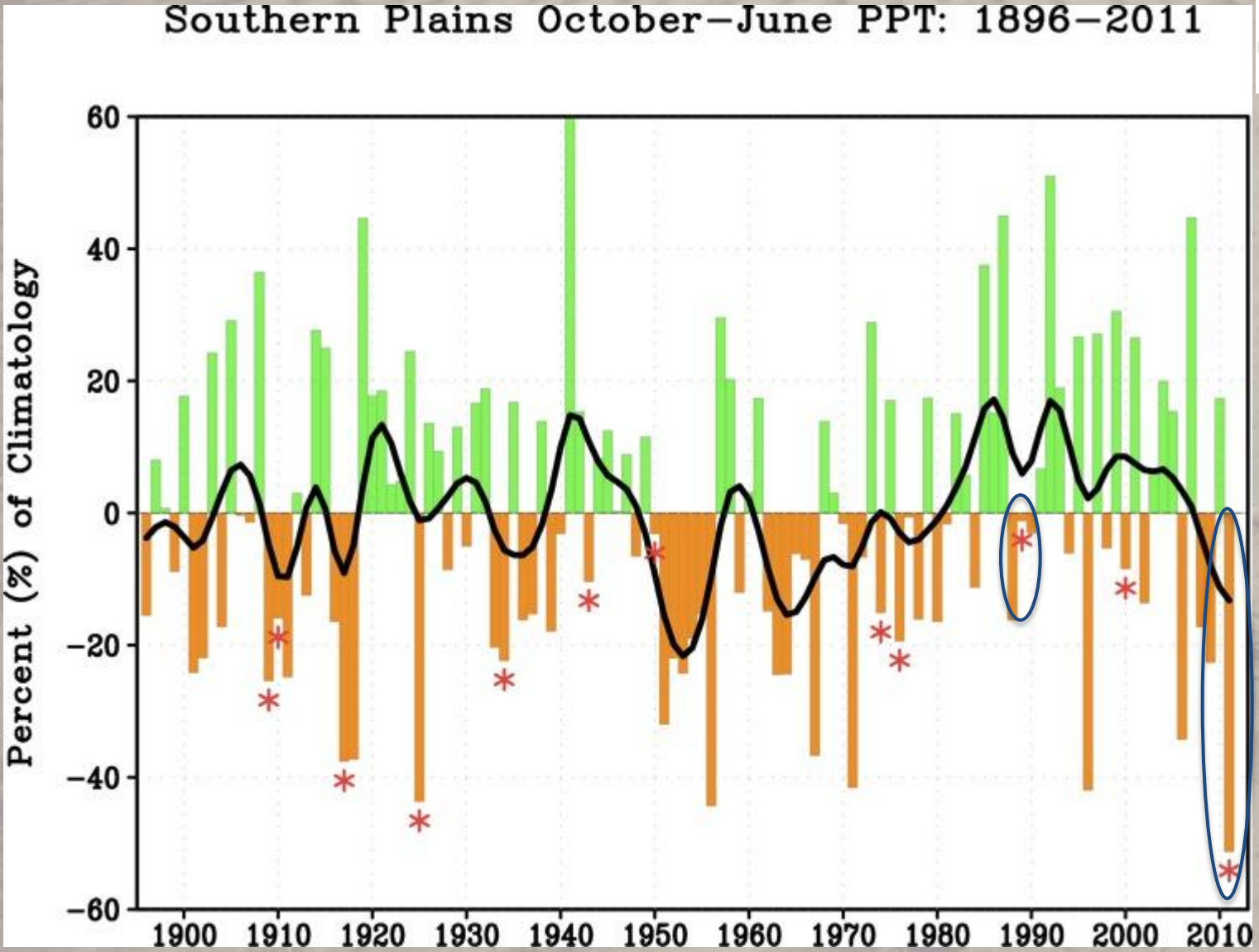
Climate Model Simulations of Historic La Niñas

Creating Perfect SST Analogs….24 simulations for each La Niña Since 1950

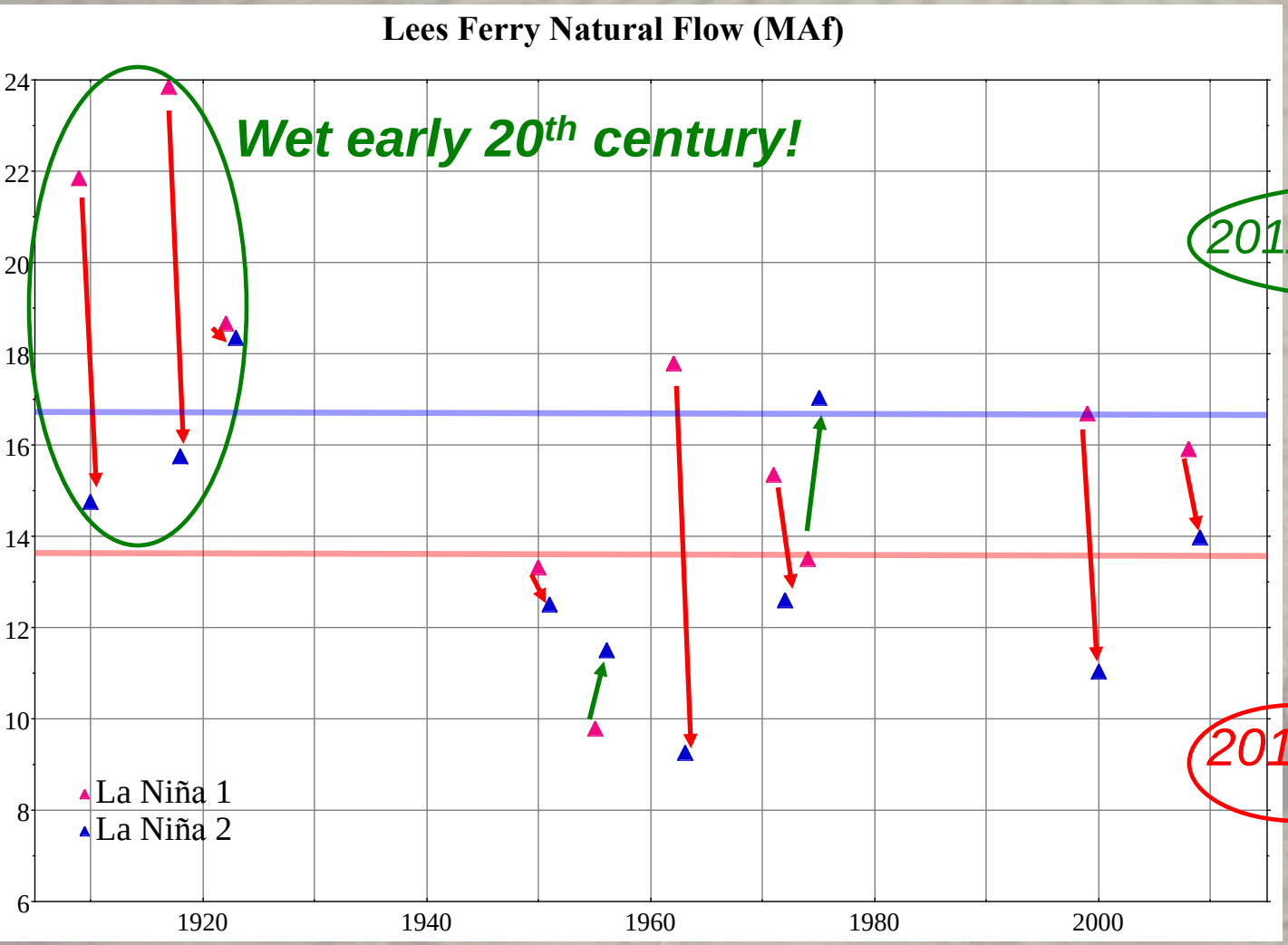


What role did this particular La Niña play in causing this record drought?





'Double-dip' Las Niñas



2011: 20.49MAf(e)

Mean flow for Year 1:
16.7 MAf (Δ= +1.7MAf)

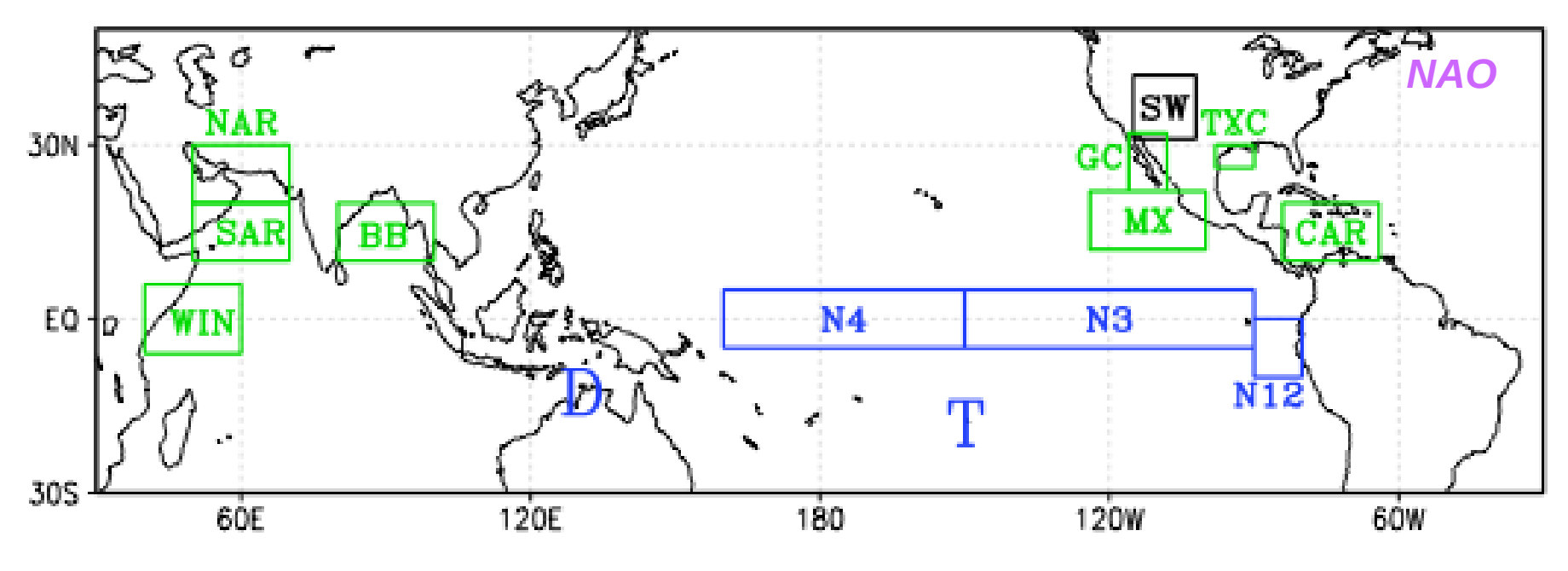
Mean flow for Year 2:
13.7 MAf (Δ= -1.3MAf)

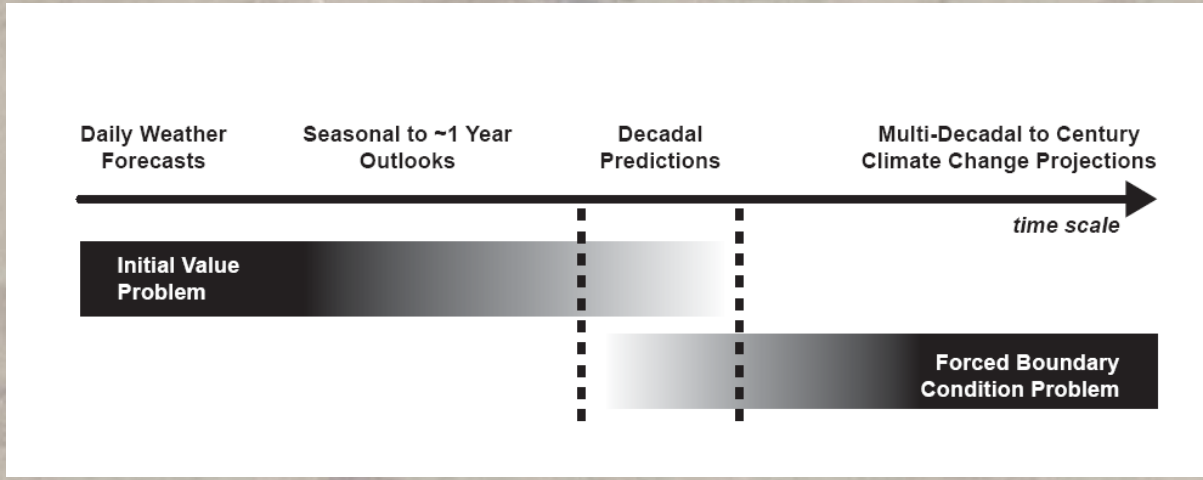
Natural flow data courtesy of James Prairie (Bur. Rec

2012?!

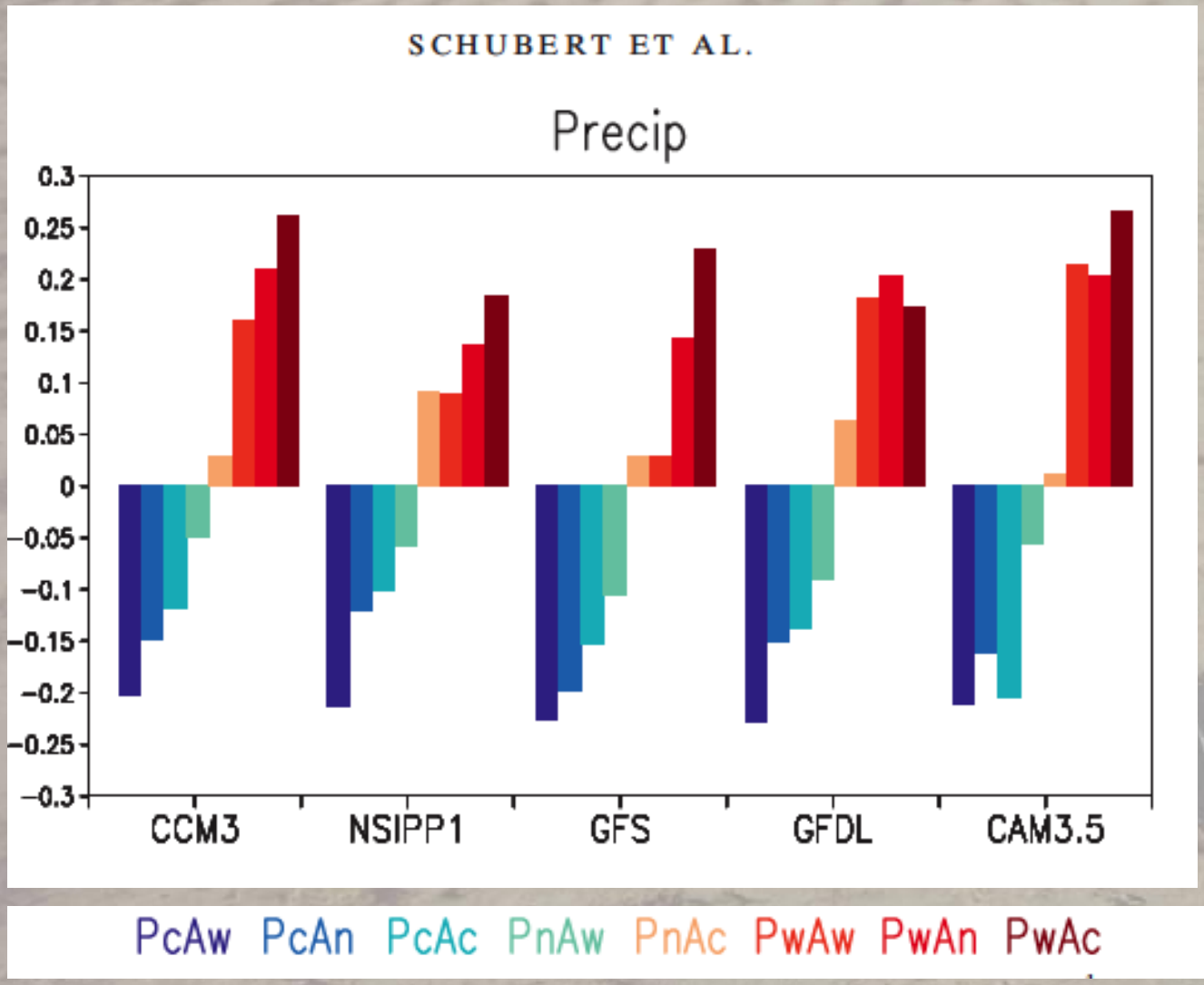
Before 2010, a drop in runoff has been typical (8 of 10 cases) for 2nd La Niña year runoff for the Colorado River. This reduction tends to be biggest for cases that start out wet – so, the decline in 2012 runoff vs. 2011 is not unexpected!

Useful predictor regions for the US Southwest





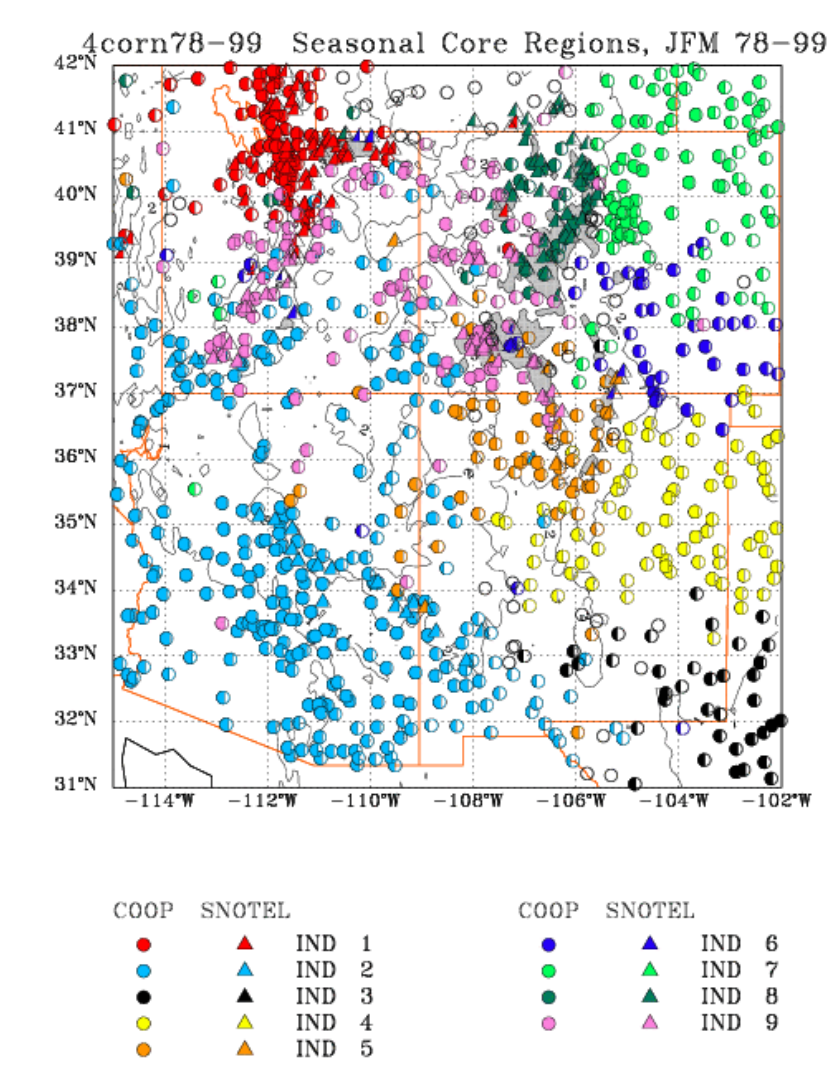
Other interannual climate drivers (National scale)

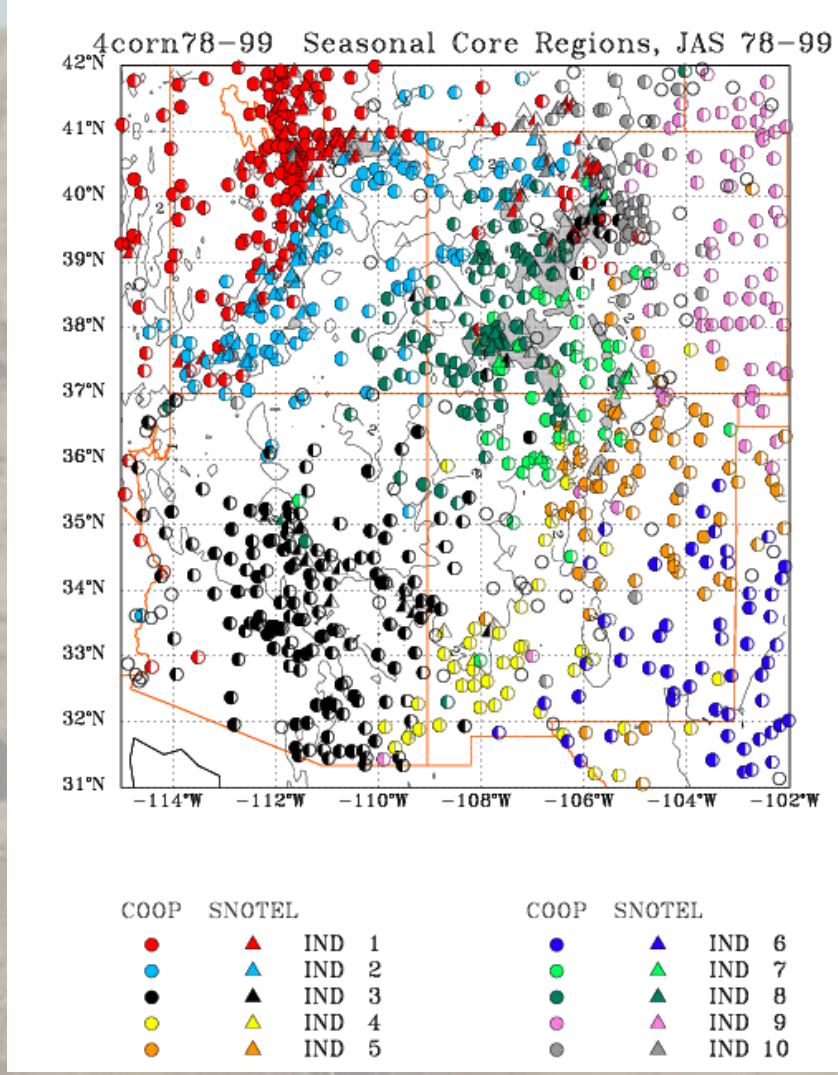


Pacific versus Atlantic

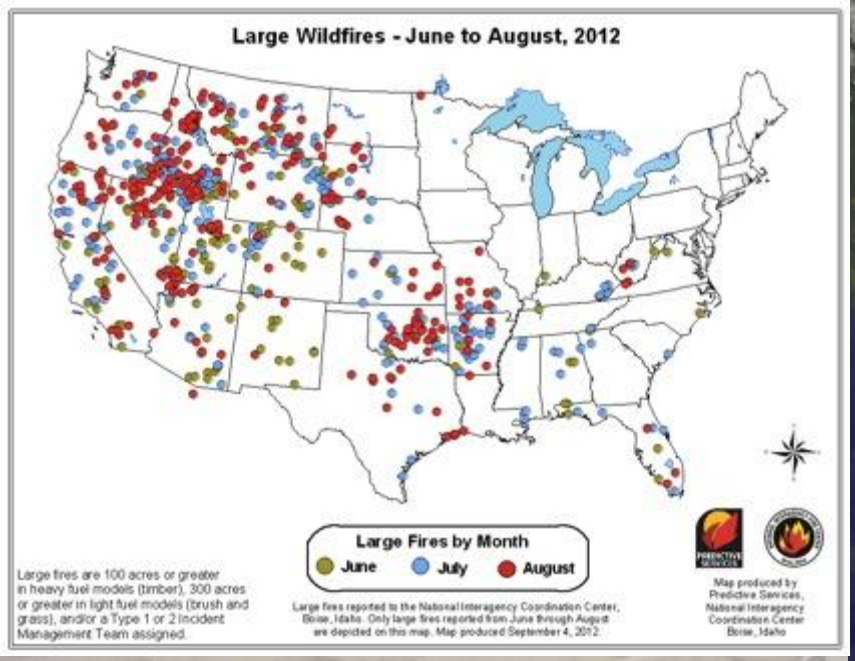
In five different General Circulation Models, a cold Pacific combines with a warm North Atlantic to produce most pervasive drought conditions in continental U.S.

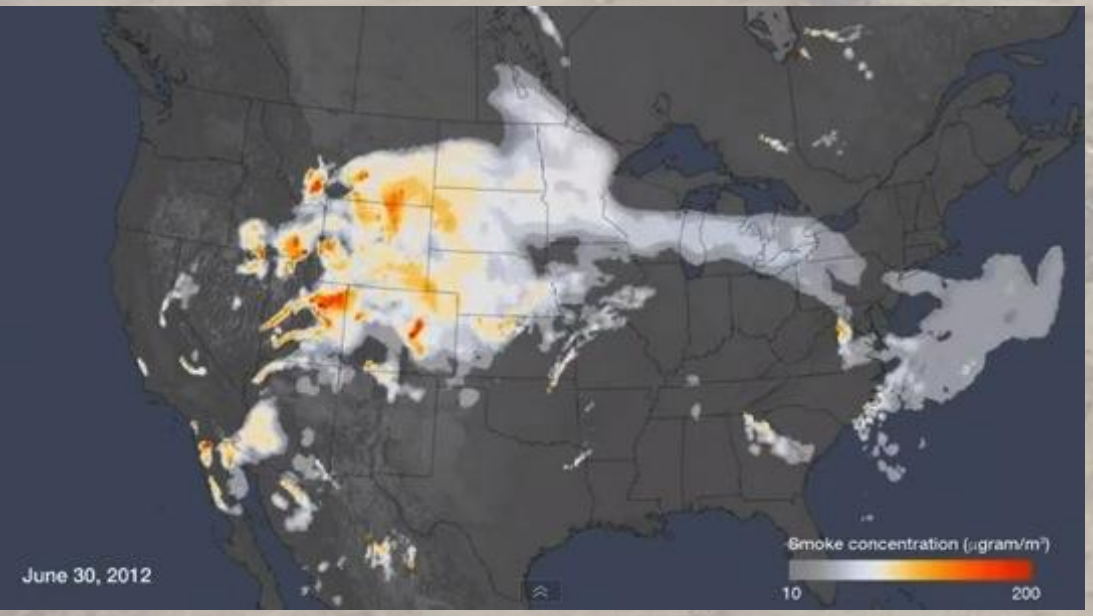
Interior Southwest 1st generation 'climate divisions'





Climate tends to show similar anomalies at a time where the coloring is the same. Fractional fill-in for each station symbol is proportional to locally explained variance by "core region" time series. This formed the basis for a decade of seasonal forecasting.





Other factors to consider: *Wildfires*

Smoke reduces incoming solar radiation, inhibits convection, and overseeds clouds – major factor during summers of 2000, 2002, and 2012

Are we better off?

- The number of states, communities, and institutions with improved capacity to inform risk management and reduce exposure to climatic risks
- The number of staff in or working with those institutions trained to develop and communicate local drought information and help reduce impacts
- The number of research projects that conduct and update drought impacts and user needs assessments in drought-sensitive parts of the US and
- The percentage of the Western U.S. population covered by adequate climate risk and early warning information systems

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

HEARING CHARTER

Drought Forecasting, Monitoring, and Decision-Making: A Review of the National Integrated Drought Information System

Wednesday, July 25th, 2012
10:00 a.m. to 12:00 p.m.
2318 Rayburn House Office Building

PURPOSE

On Wednesday, July 25th, 2012, the Committee on Science, Space, and Technology will hold a legislative hearing to examine the state of drought forecasting, monitoring, and decision-making and the role the National Integrated Drought Information System (NIDIS) serves in drought planning. Additionally, the Committee will receive testimony on draft legislation entitled, "The National Integrated Drought Information System Reauthorization Act of 2012." Witnesses have been asked to provide comments on and suggestions to this discussion draft.

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it

literally looks like a desert. I was there last weekend.

First of all, Dr. Pulwarty, I would like to send a compliment your way. The Lower Colorado River Authority in Texas that you are familiar with has told me that they very much appreciate your willingness to disseminate information to them, to the landowners, to the farmers, to the policymakers as well, and they appreciate that good communication.

Really due to- Bob Rose Texas- LCRA

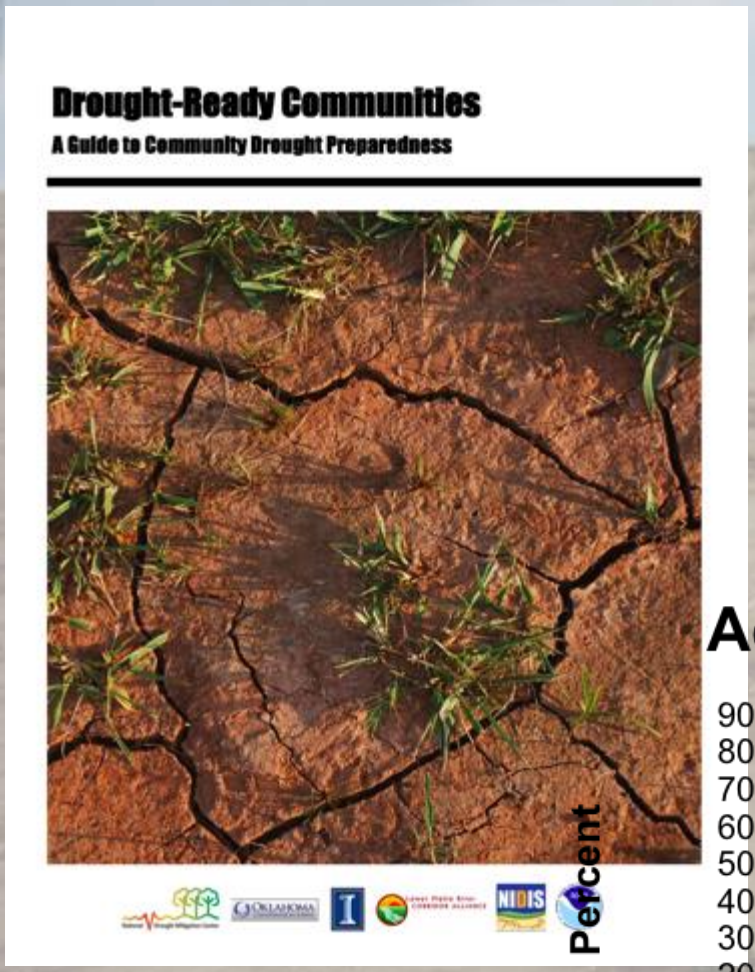
Hon. L. Smith. TX)

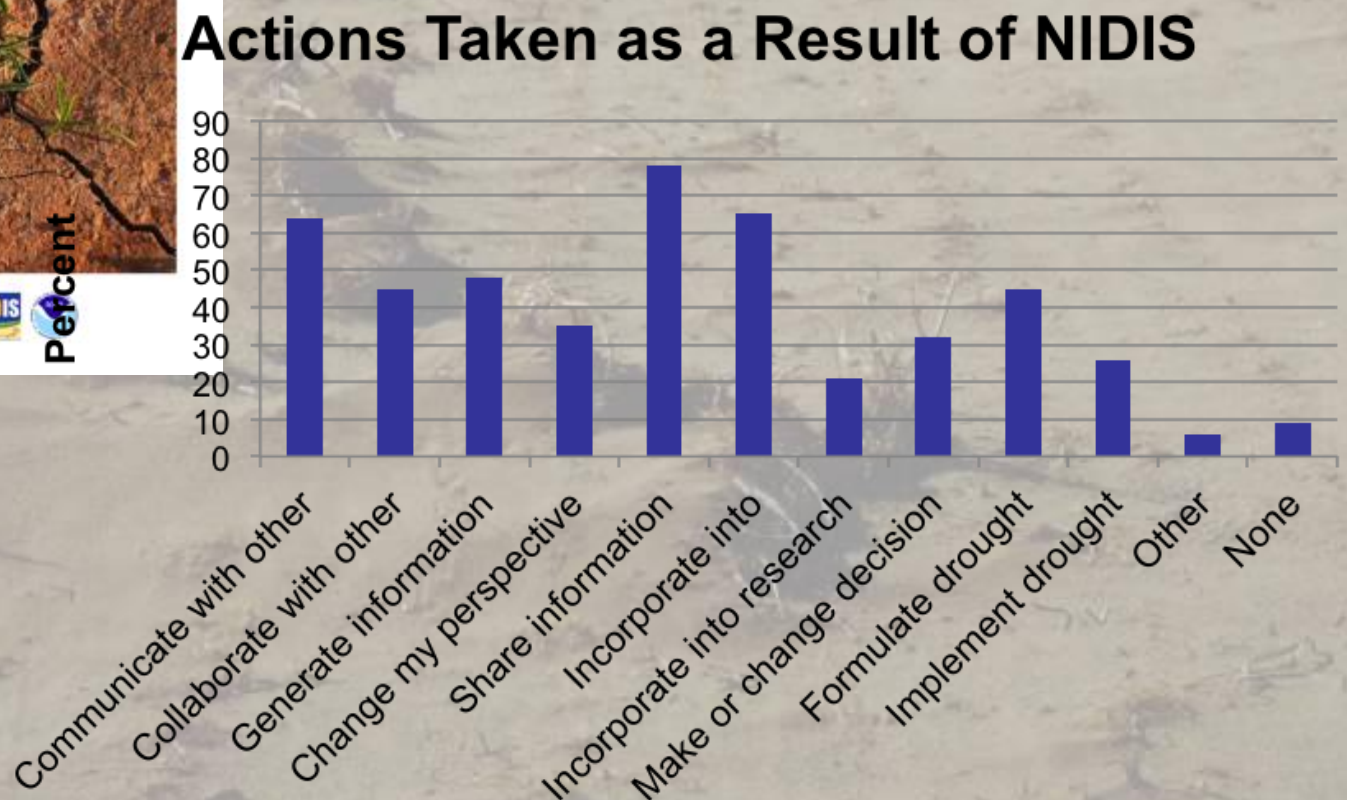
9/20/2012- S.3584
A bill to reauthorize NIDIS and for other purposes. Sponsor: Sen Pryor, Mark L. [AR], D.Moran (KS) (introduced 9/20/2012)
Cosponsors Pryor, Moran Boren (1) Referred to the Committee on Commerce, Science, and Transportation.

A BILL

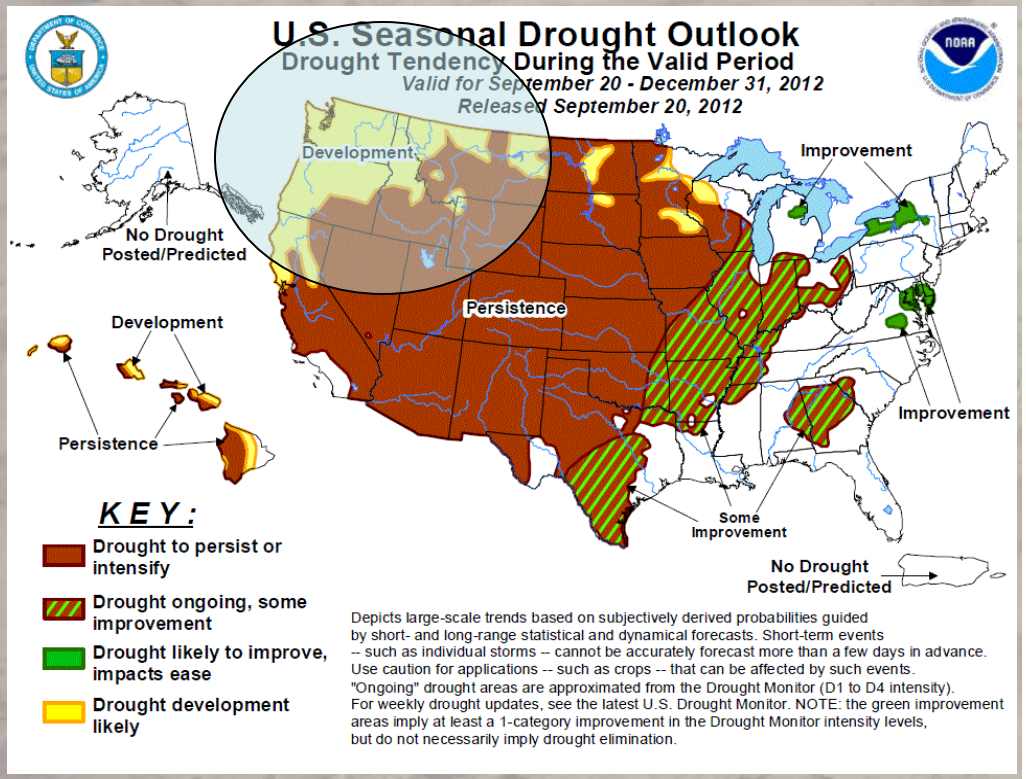
To reauthorize the National Integrated Drought Information System, and for other purposes.

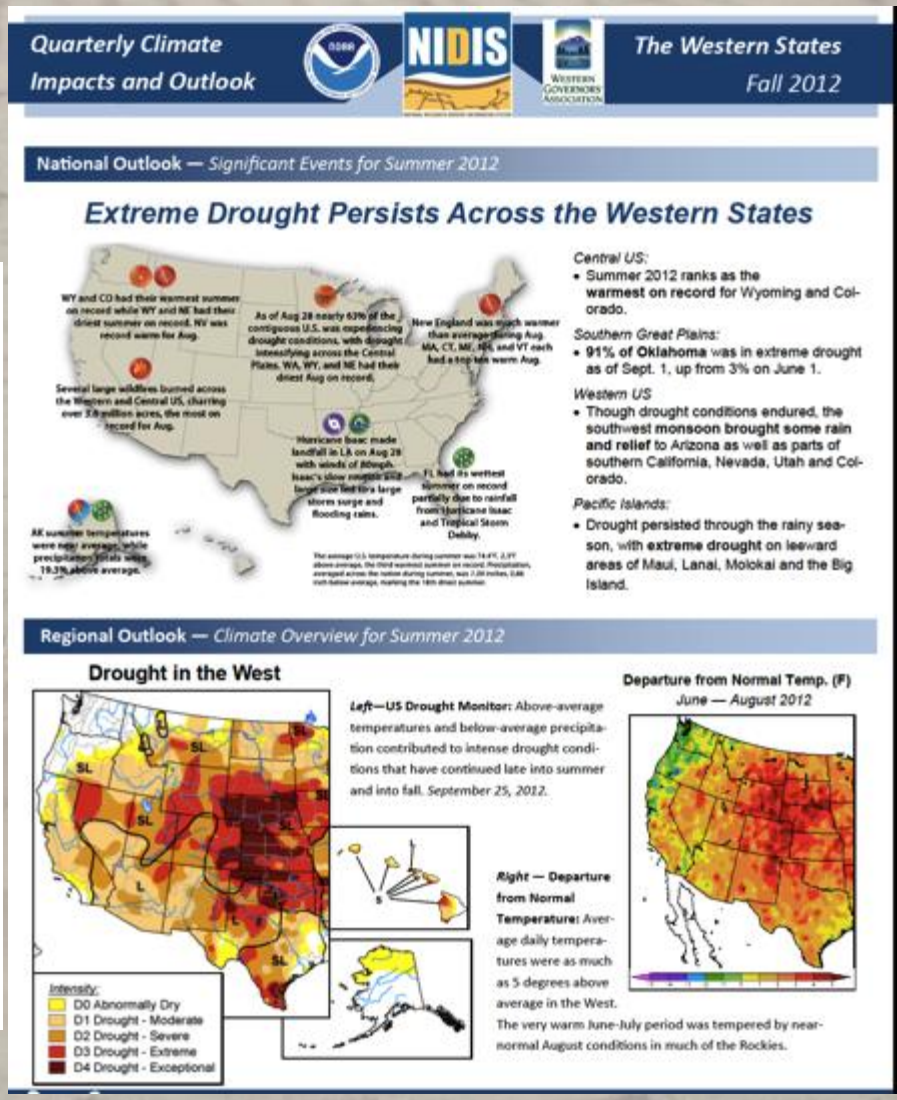
Be it enacted by the Senate and House of Representa-


Drought-Ready Communities
A Guide to Community Drought Preparedness
NIDIS


Actions Taken as a Result of NIDIS
Percent
90
80
70
60
50
40
30
20
10
0
Communicate with other
Collaborate with other
Generate information
Change my perspective
Share information
Incorporate into
Incorporate into research
Make or change decision
Formulate drought
Implement drought
Other
None

Drought 2012-A focusing event ?
If so, how can/should it be used?






USE ONLY WHAT YOU NEED.
DENVER WATER