The Drought Risk Atlas: A Drought Climatology Decision Support Tool

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NIDIS Texas and Oklahoma Climate Extremes Workshop
Fort Worth, TX October 13-14, 2015

Photo credit: CoCoRaHS observer near Lamar, Colorado

Drought Risk Atlas (DRA):

- **Launched March 2014**
- **~3000 stations archived**
  - **139 clusters/regions developed and analyzed**
  - **SPI, SPEI, PDSI, sc-PDSI and Deciles through 2010**
  - **1 billion indice records**
  - **Weekly/monthly gridded maps for all parameters back to early 1900s (over 500,000 maps)**
- **Created to answer questions about the characteristics of drought:**
  - **Frequency/return periods**
  - **Duration**
  - **Trends**
  - **Intensity**
  - **Spatial extent**

- ***OPEN for business!***
- ***Droughtatlas.unl.edu***

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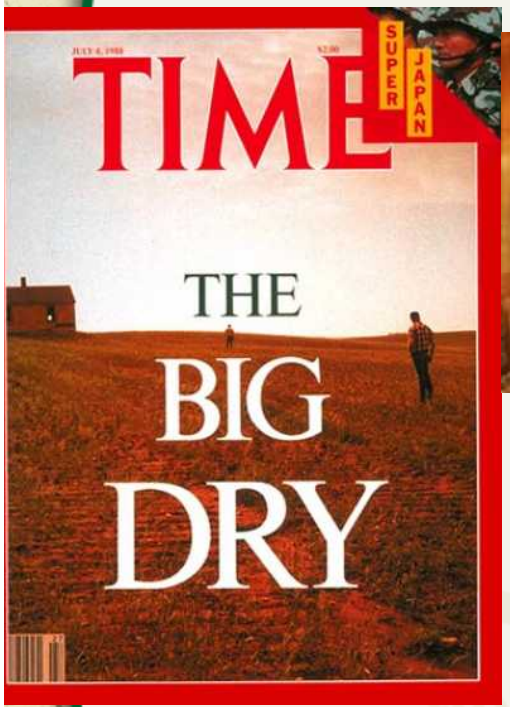
Why a Drought Risk Atlas?



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What Questions Will the Drought Risk Atlas Help Answer?

- How does the drought ***compare historically***?
- How often does a drought of this magnitude happen? (***frequency/return periods***)
- When was the last time a drought like this happened? (***analogs***)
- What did the ***spatial footprint*** of the last drought look like? (areal extent via maps)
- Expand drought planning ***horizons***?
  - Add ***paleo*** (tree rings) data in the future?

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The Drought Risk Atlas Methodology

- Using the best, most complete, long-term weather stations from the **COOP network**.
- Calculating the climatology and various **drought indices** (SPI, SPEI, Deciles, PDSI, SC-PDSI, Drought Monitor) for each station.
- Providing the data for **various time steps** (weekly, monthly, annually).
- **Gridded maps** of each index for each aggregated time step.

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Data Criteria for the Drought Atlas

- Station must be **currently open**
- **Minimum** of 40 years of Data
- No more than **2 consecutive** months missing at ***any time*** in the period of record
- Established **unique start dates** for each station's period of record

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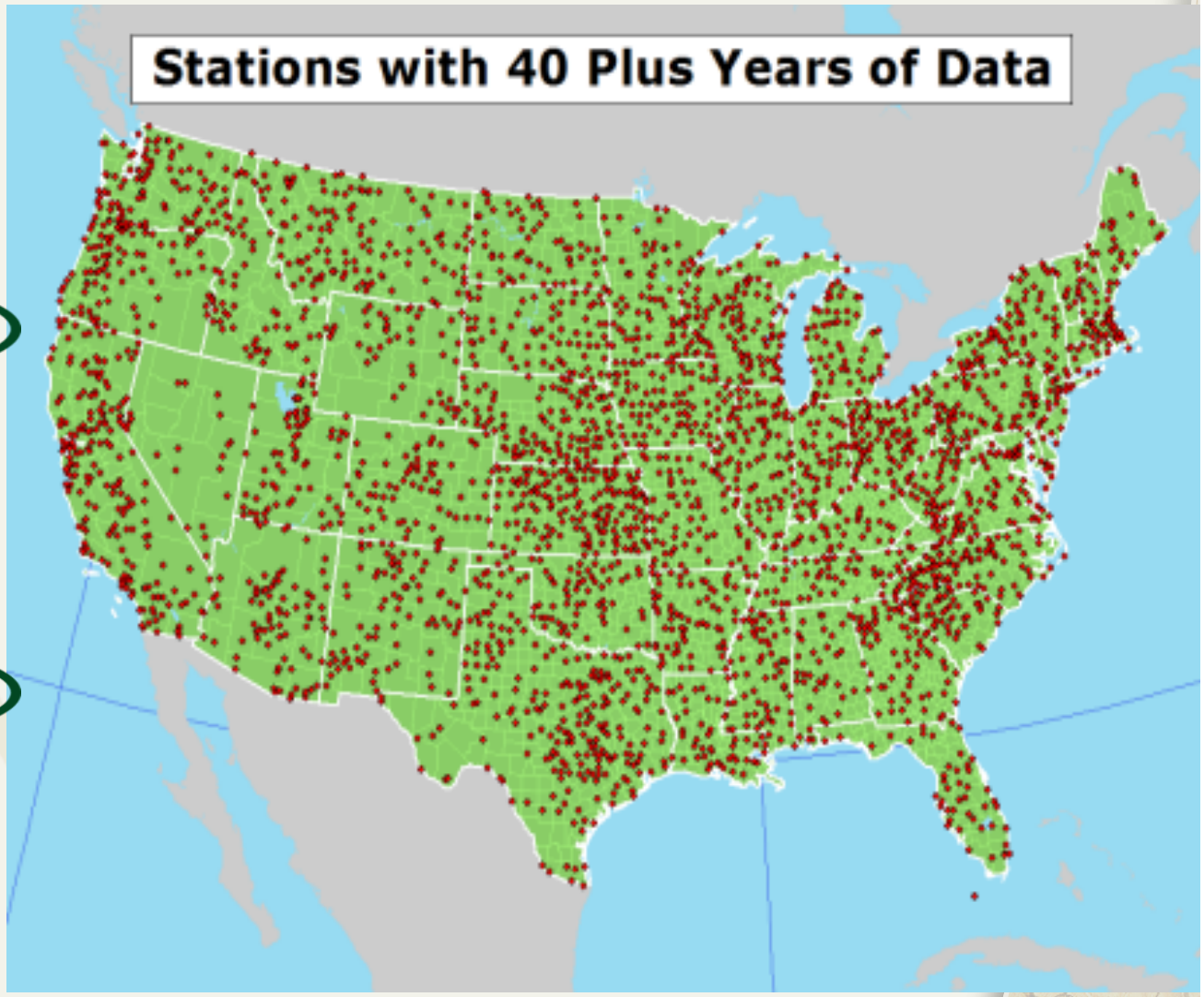
Drought Risk Atlas Stations:

Here is the final breakdown of stations used in the DRA meeting all our criteria:

- **3059** stations with **40+ years of data**
- 2462 stations with 50+ years of data (81.04%)
- **1733** stations with **60+** years of data **(57.04%)**
- 1170 stations with 70+ years of data (38.51%)
- **827** stations with **80+** years of data **(27.22%)**
- 537 stations with 90+ years of data (17.68%)
- **349** stations with **100+** years of data **(11.50%)**



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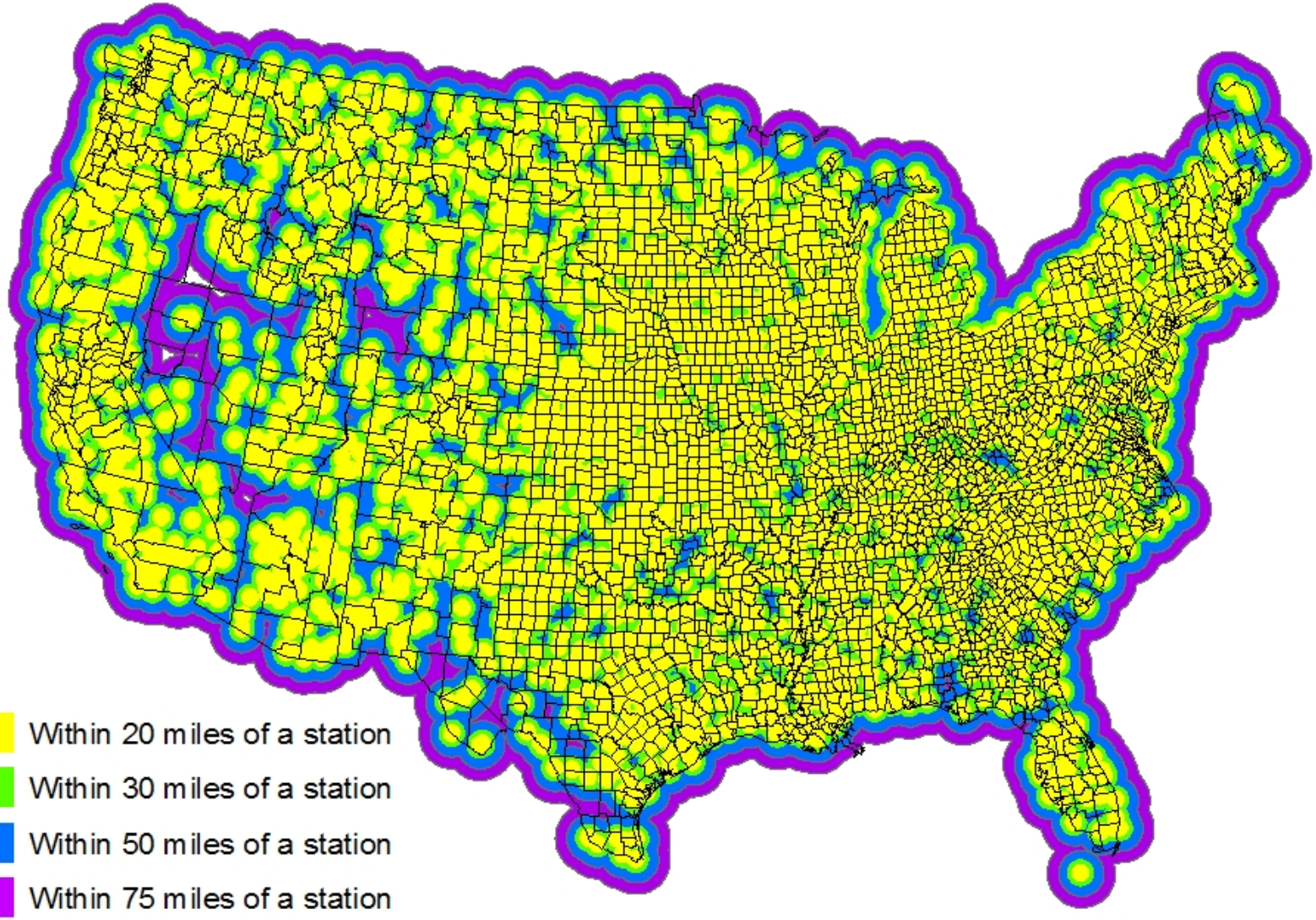
Stations with 40 Plus Years of Data

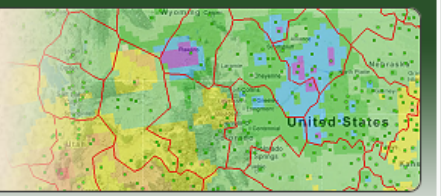


droughtatlas.unl.edu

Login

Thursday, April 09, 2015

Drought Risk Atlas



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Welcome to the Drought Risk Atlas

Introduction

The idea of updating and expanding a national drought atlas was developed from the original Drought Atlas that was done in conjunction with the United States Army Corps of Engineers by Hoskings, Wallis and Guttman in the early 1990s. The original Drought Atlas consisted of those stations in the Historical Climate Network (HCN), numbering approximately 1,000 stations. The period of record at the time was limited, as many stations only had records from the 1940s to present, and these data points were put into their respective climate divisions. A monthly time step was used to calculate the Palmer Drought Severity Index (PDSI). The new Drought Risk Atlas brings precise climatological data down to spatial scales that would allow decision makers to use this tool to better understand drought in their respective region and to make better decisions.

For the new national Drought Risk Atlas, the idea was to expand the data both in the number of stations analyzed and the period of record to include the most complete long-term stations, some of which are not part of the HCN. Using a weekly time-step to calculate multiple drought indices at each station location, not on a climate division scale, allows for a more precise representation of drought histories. The Standardized Precipitation Index (SPI), Standardized Precipitation-Evapotranspiration Index (SPEI), Palmer Drought Severity Index (PDSI), Deciles, United States Drought Monitor and other climatological data are included in the new Drought Risk Atlas. Along with the climatological data, gridded maps created on a weekly time-step are available for the entire United States.

This work is funded under a grant from the **Sectoral Applications Research Program (SARP) of the NOAA-Climate Program Office**. Additional Funding was provided by the **NIDIS Program Office** and the **USDA-Risk Management Service (RMA)**.

Map Viewer

View gridded datasets for the continental United States.

Data

Select a station and view data for a number of drought indices. Frequency statistics of drought thresholds, drought period information and index comparisons are also available.

Methodology

Learn about the criteria used to select the stations, the drought indices chosen, and more.

About

An overview of why the Drought Risk Atlas was created and who was involved.

Help

Instructions on how to use the various features and tools of the Drought Risk Atlas.

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Climate Data

Selected Atlas Station: **none selected**

Use one of the options to select a station.

Close [x]

By State

Texas

Search

By Station Name

Enter the station name or COOP ID

Search

By Location

Enter a latitude and longitude (in decimal degrees) or click on the map.

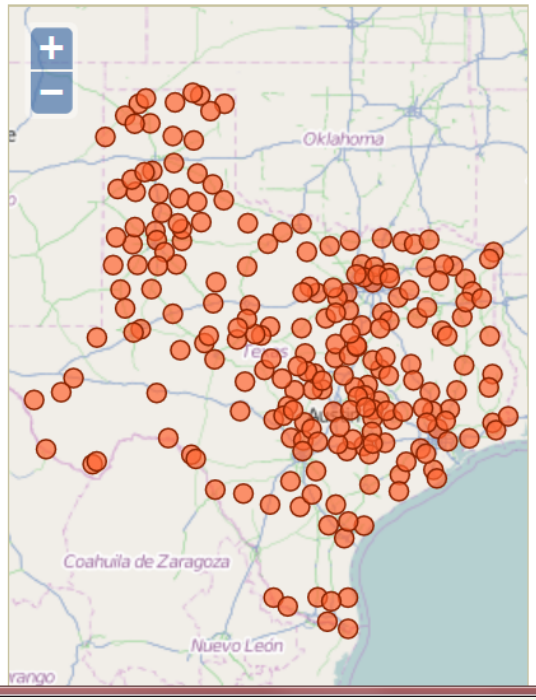
Latitude

Longitude

Search Radius

25 (miles)

Station Map



Dataset

Raw Data Serially Complete

Note: *The PDSI and Self-calibrated PDSI are only available for the Serially Complete dataset.*

Station List

Select a station from the list below or from the map. After making your selection, click Update selection to view Atlas data.

410012: ABERNATHY

410016: ABILENE RGNL AP

410211: AMARILLO INTL AP

410225: AMISTAD DAM

Climate Data

Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

414257: HONEY GROVE

Latitude
33.588

Longitude
-95.904

Elevation (ft)
680

State
Texas

County
Fannin

Climate Division
3

Time Period
3/1/1916 - 5/23/2008

Years on Record
92

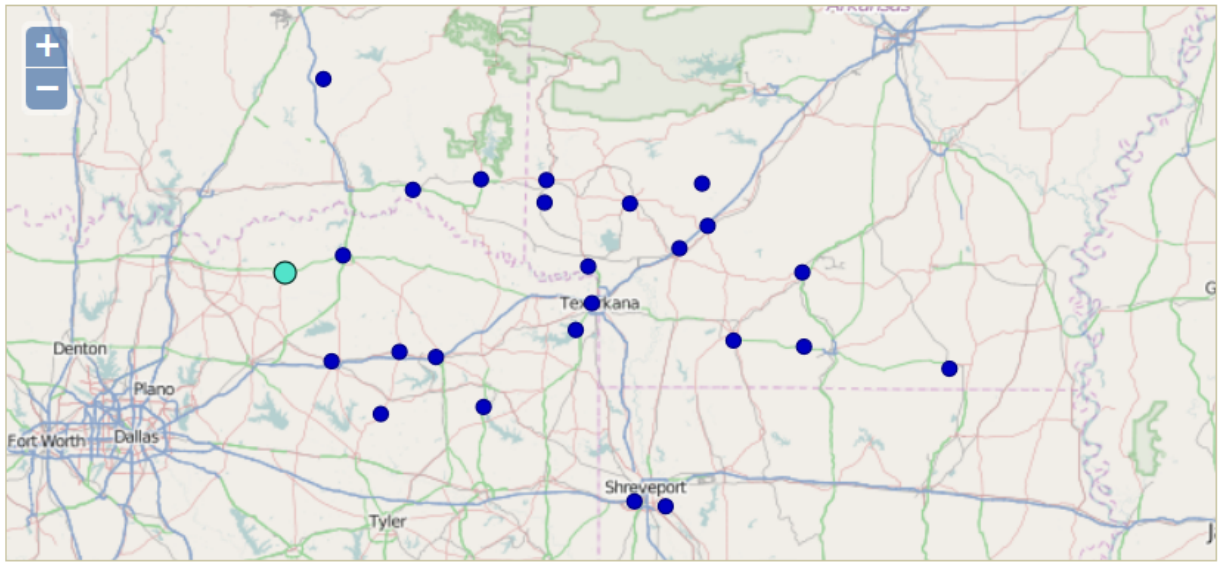
Precipitation Only
No

Download Metadata

The Atlas period of record can and will vary from the ACIS period of record. Stations may have had data periods that did not meet the criteria used in the Atlas. Those data periods are not

Similar Stations

Atlas Region



Related Stations:

(Click to select)

030178: ANTOINE

030286: ASHDOWN

031152: CAMDEN 1

Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

Date

1/1/1916 to 12/31/2012

Period of Record

Station start date: 3/1/1916

Aggregate

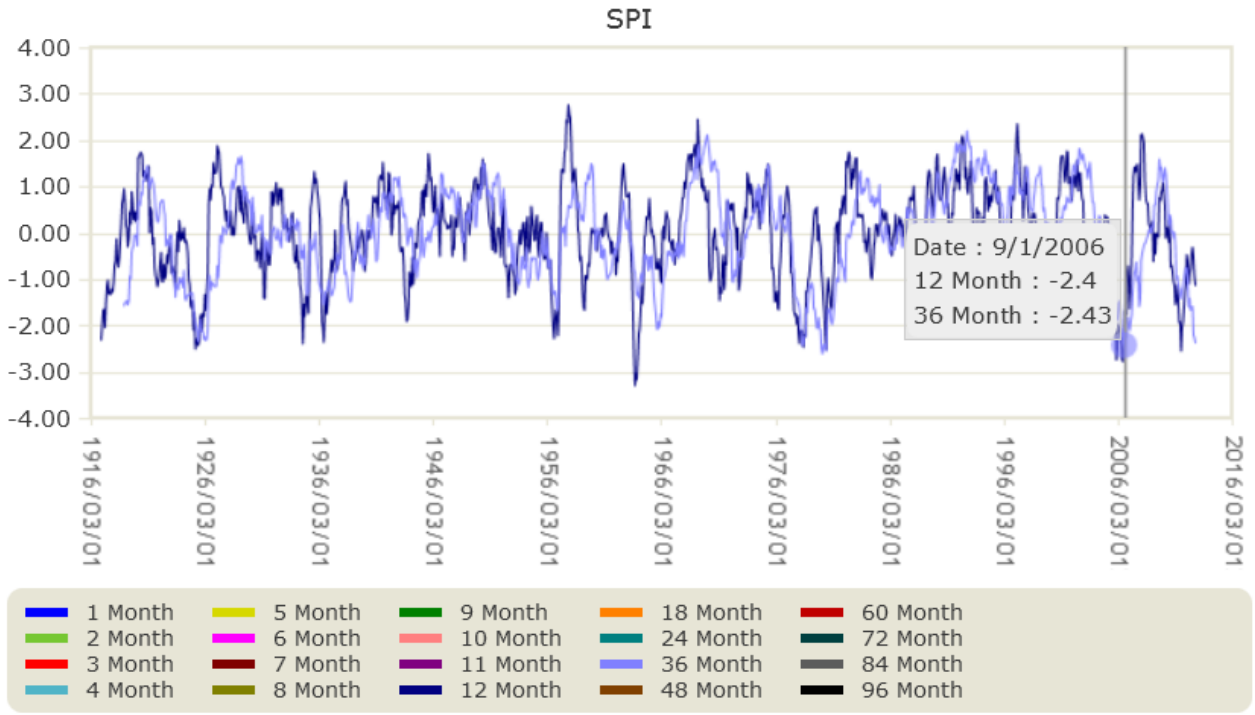
Month

Timestep

Select one or more timesteps to compare.

- 1 month
- 2 month
- 3 month
- 4 month
- 5 month
- 6 month
- 7 month
- 8 month
- 9 month
- 10 month
- 11 month
- 12 month
- 18 month
- 24 month
- 36 month
- 48 month

Results for **HONEY GROVE (414257)** for the 12, 36 Month timestep(s) between 3/1/1916 and 12/31/2012 and aggregated by month.



To zoom in on the chart, click and drag across the chart area. To return to the complete chart, double-click in the chart area.

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Climate Data

Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

Date

1/1/1916 to 12/31/2012

Period of Record

Station start date: 3/1/1916

Aggregate

Month

Timestep

Select one or more timesteps to compare.

- 1 month
- 2 month
- 3 month
- 4 month
- 5 month
- 6 month
- 7 month
- 8 month
- 9 month
- 10 month
- 11 month
- 12 month
- 18 month
- 24 month
- 36 month
- 48 month

Results for **HONEY GROVE (414257)** for the 12, 36 Month timestep(s) between 3/1/1916 and 12/31/2012 and aggregated by month.

Show 10 entries Search:

Month	12 Month	36 Month
11/1/1963	-3.31	-0.83
1/1/1964	-3.18	-1.35
12/1/1963	-3.05	-1.16
8/1/2006	-2.79	-2.25
1/1/2006	-2.75	-1.88
7/1/2006	-2.74	-2.09
2/1/1964	-2.64	-1.31
10/1/1963	-2.62	-0.84
9/1/2011	-2.56	-1.44
2/1/2006	-2.54	-1.88

Showing 1 to 10 of 1161 entries

Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

Date

1/1/1916 to 12/31/2012

Period of Record

Station start date: 3/1/1916

Aggregate

Month

Timestep

Select one or more timesteps to compare.

- 1 month
- 2 month
- 3 month
- 4 month
- 5 month
- 6 month
- 7 month
- 8 month
- 9 month
- 10 month
- 11 month
- 12 month
- 18 month
- 24 month
- 36 month
- 48 month

Results for **HONEY GROVE (414257)** for the 12, 36 Month timestep(s) between 3/1/1916 and 12/31/2012 and aggregated by month.

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

December

12 Month

Rank	Year	SPI
1	1963	-3.05
2	1925	-2.13
3	2005	-1.94
4	1943	-1.88
5	1934	-1.80
6	1977	-1.76
7	1956	-1.67
8	2011	-1.62
9	1924	-1.58
10	1936	-1.55

36 Month

Rank	Year	SPI
1	2012	-2.38
2	1925	-2.13
3	2005	-1.97
4	1965	-1.92
5	1979	-1.84
6	2006	-1.83
7	1978	-1.73
8	1980	-1.64
9	1938	-1.50
10	1956	-1.41

Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

Date

1/1/1916 to 12/31/2012

Period of Record

Station start date: 3/1/1916

Aggregate

Month

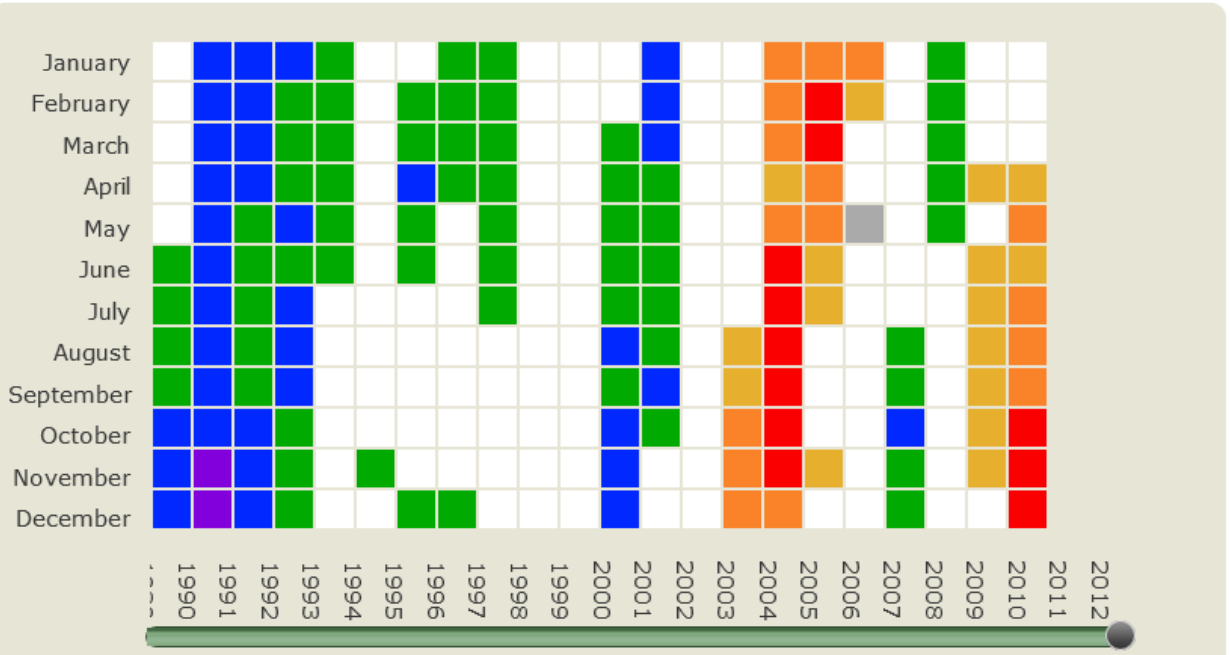
Timestep

Select one or more timesteps to compare.

- 1 month
- 2 month
- 3 month
- 4 month
- 5 month
- 6 month
- 7 month
- 8 month
- 9 month
- 10 month
- 11 month
- 12 month
- 18 month
- 24 month
- 36 month
- 48 month

Results for **HONEY GROVE (414257)** for the 36 Month timestep(s) between 3/1/1916 and 12/31/2012 and aggregated by month.

Note: Only the shortest duration timestep that is selected will be displayed below.



-3.00 and below
-2.99 to -2.50
-2.49 to -2.00
-1.99 to -1.50
-1.49 to -1.00
-0.99 to 0.99
1.00 to 1.50
1.51 to 2.00
2.01 to 2.50
2.51 to 2.99
3.00 and above
No Data

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Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

Date

1/1/1916 to 12/31/2012

Period of Record

Station start date: 3/1/1916

Index

Select an index

- SPI
- SPEI
- PDSI
- Self-calibrated PDSI

Drought Classification

-3

Timestep

12 Month

Results for **HONEY GROVE (414257)** at the 12 Month timestep with a minimum drought class of -3 between 1/1/1916 and 12/31/2012.

Note: the drought period ends when the index returns to zero.

Number of Droughts: 2

Longest Drought: 75 weeks

Average Duration: 61 weeks

Time in Drought: 2.53%

Show 50 entries Search:

Drought Start	Drought End	Duration (weeks)
1/1/2006	6/11/2007	75
10/29/1963	9/23/1964	47

Showing 1 to 2 of 2 entries

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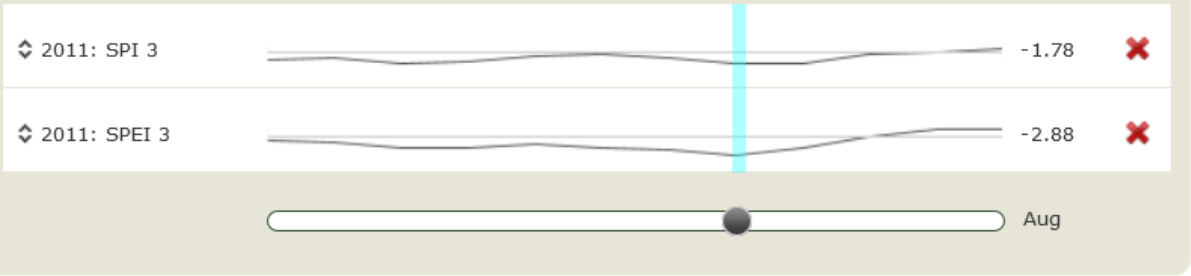
Selected Atlas Station: **414257 (HONEY GROVE)**

Select New Station

Station | Climate | Deciles | SPI | SPEI | PDSI | SC-PDSI | Drought Monitor | Drought Periods | Compare Indices | Frequencies

Drought Index Comparisons for **414257 (HONEY GROVE)**.



Select up to six datasets for comparison. To remove a dataset from the comparison, click the Remove Dataset button. To clear all datasets from the comparison, click the Clear All button. The datasets can be reordered at any time by dragging the rows.

All data for the comparisons is aggregated by week. Drought Monitor data represents the county-level data for the selected station.

Year

2011

Station start date: 3/1/1916

Index

- SPI
- SPEI
- PDSI
- Self-calibrated PDSI
- Deciles

Timestep

3 Month

Add Index | Clear All

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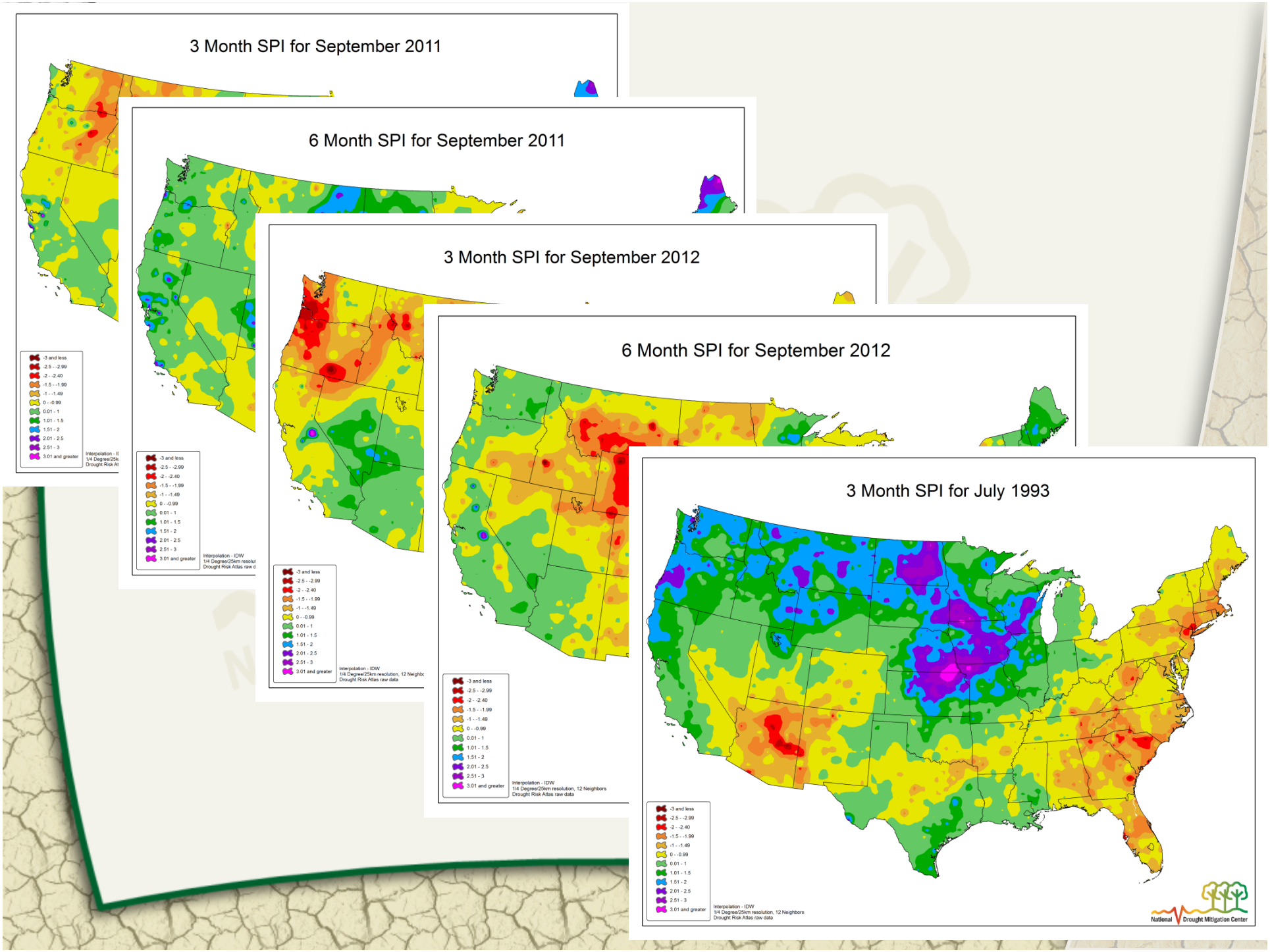
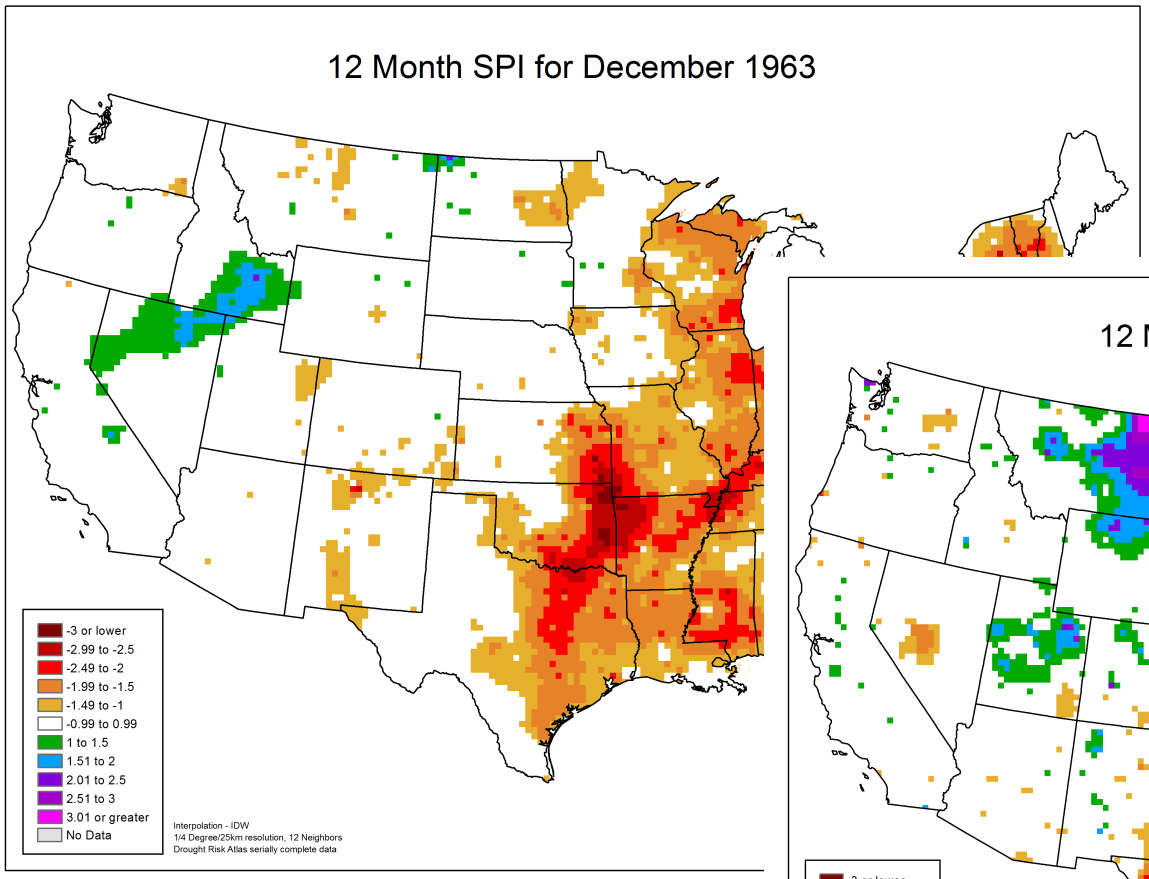
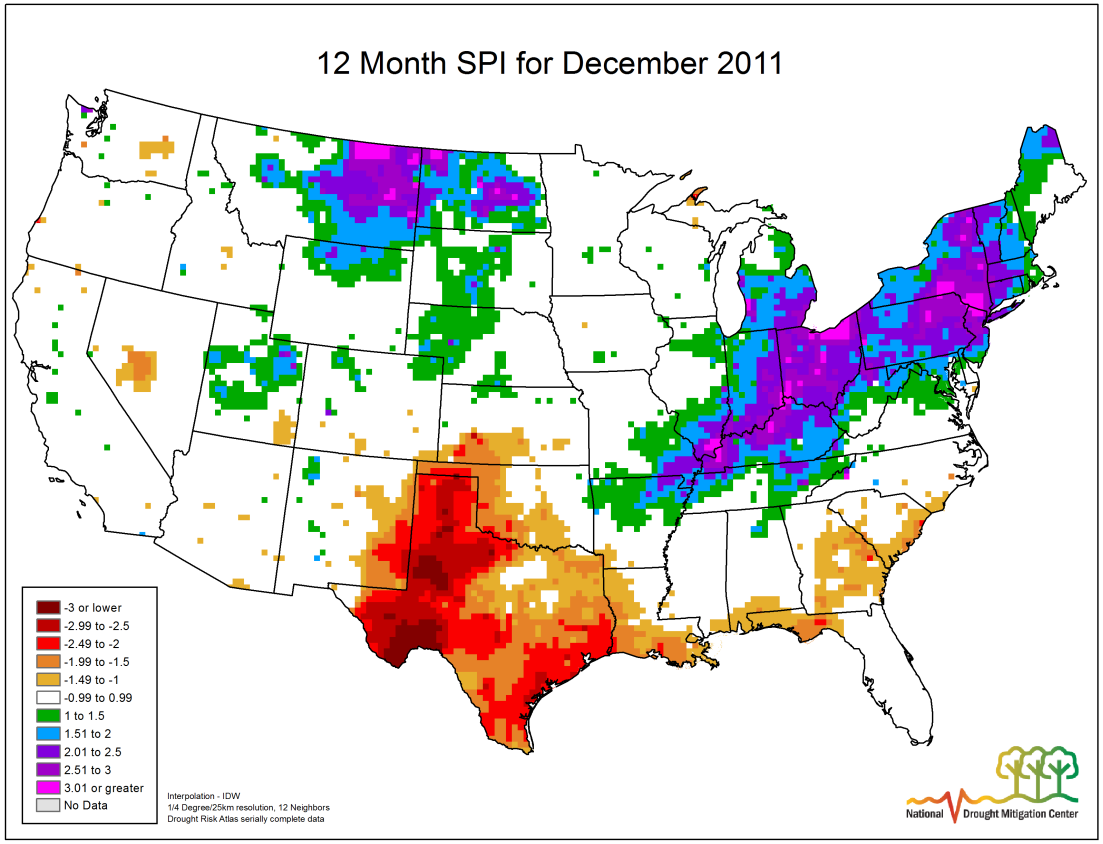

3 Month SPI for September 2011
6 Month SPI for September 2011
3 Month SPI for September 2012
6 Month SPI for September 2012
3 Month SPI for July 1993
-3 and less
-2.5 - -2.99
-2 - -2.40
-1.5 - -1.99
-1 - -1.49
0 - -0.99
0.01 - 1
1.01 - 1.5
1.51 - 2
2.01 - 2.5
2.51 - 3
3.01 and greater
Interpolation - IDW
1/4 Degree/25km resolution, 12 Neighbors
Drought Risk Atlas raw data
National Drought Mitigation Center

Comparing Drought Periods

How did drought look in 1963 vs 2011?





Next Steps

- **Hydrology** (700+ stations) work is underway (USGS HCDN)
- Update climate stations **through 2015**
  - Add new sites and remove closed sites
  - Adjust station criteria (?) to include SNOTEL and other more recent networked sites
- **Seamlessly integrate** with near real-time ACIS indices, US Drought Monitor and Drought Impact Reporter
- Tie to drought **impacts and triggers**
- Add a **Paleo** perspective?
- **Trend/Frequency/Magnitude analyses** and other drought characteristics (gridded maps)

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