

# **Drought Information Services of the NDMC: *Bridging the Science/Policy Interface***

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National Drought Mitigation Center  
University of Nebraska-Lincoln**

*NOAA/MAPP Drought Task Force Meeting, Ft. Collins, CO, October 25-26, 2012*



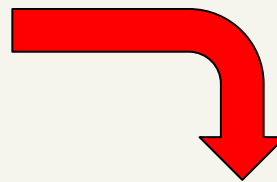
HOW DRY IS IT?



VICHARVILLE  
ENTERTAINMENT MEDIA GROUP



# Standard Ranguage



# New Nebraska Ranguage



# National Drought Mitigation Center: Developing Information

- ▣ ***Bridge and translate science*** to policy, decision makers and the public
- ▣ ***3 Program Areas:*** Monitoring, Planning and Social Science, GIScience

***"End-to-End": Research-Applications-Operations-Outreach Continuum working w/ NIDIS and our users...***



# “Service”

**Processes**... for the acquisition, archiving, indexing, quality assessment, synthesis, interpretation, communication, and evaluation of **data, knowledge, and information** that contributes to the welfare of the nation.

Services work especially well when there is recognition that resources and **their effective use** are inseparable

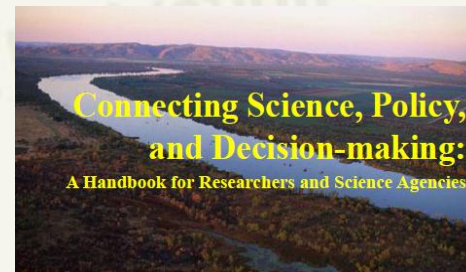




# Providing Useful Services and Products: Information Delivery

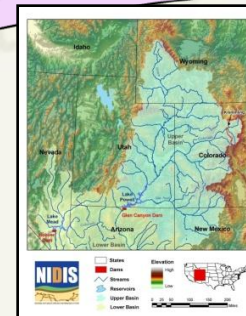
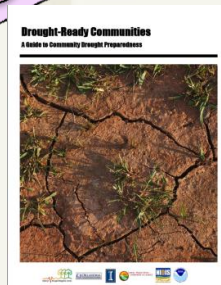
- ▶ *"To increase the impact of scientific information, there should be a focus on **usability**, not just **availability** of information. This means moving to **"value added"** products, where findings are provided in a format that allows for policy applications"*

Taken from: *(Jacobs/NOAA OGP)*  
**Connecting Science, Policy and Decision Making: A Handbook for Researchers and Science Agencies**



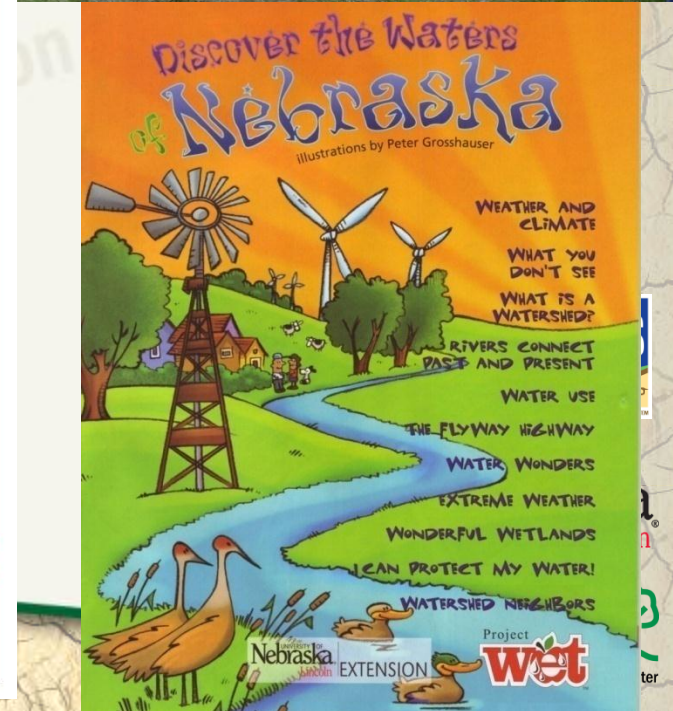
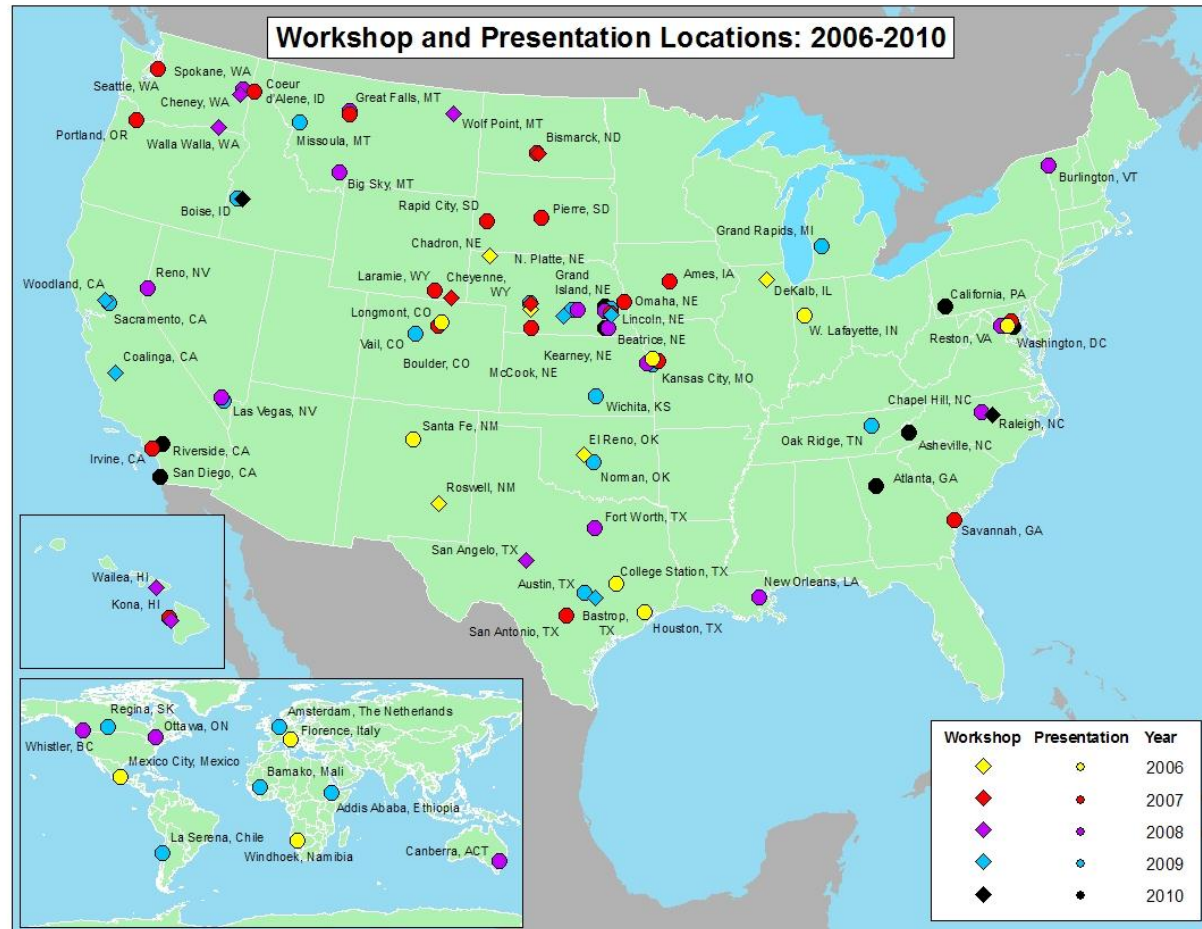
# Tools for Planning: NDMC and NIDIS

- ▶ Planning at ***all scales***
- ▶ All droughts are ***"local"***
- ▶ Planning should start local and involve the ***"locals"***
- ▶ Planning is a ***"living"*** process





# Outreach

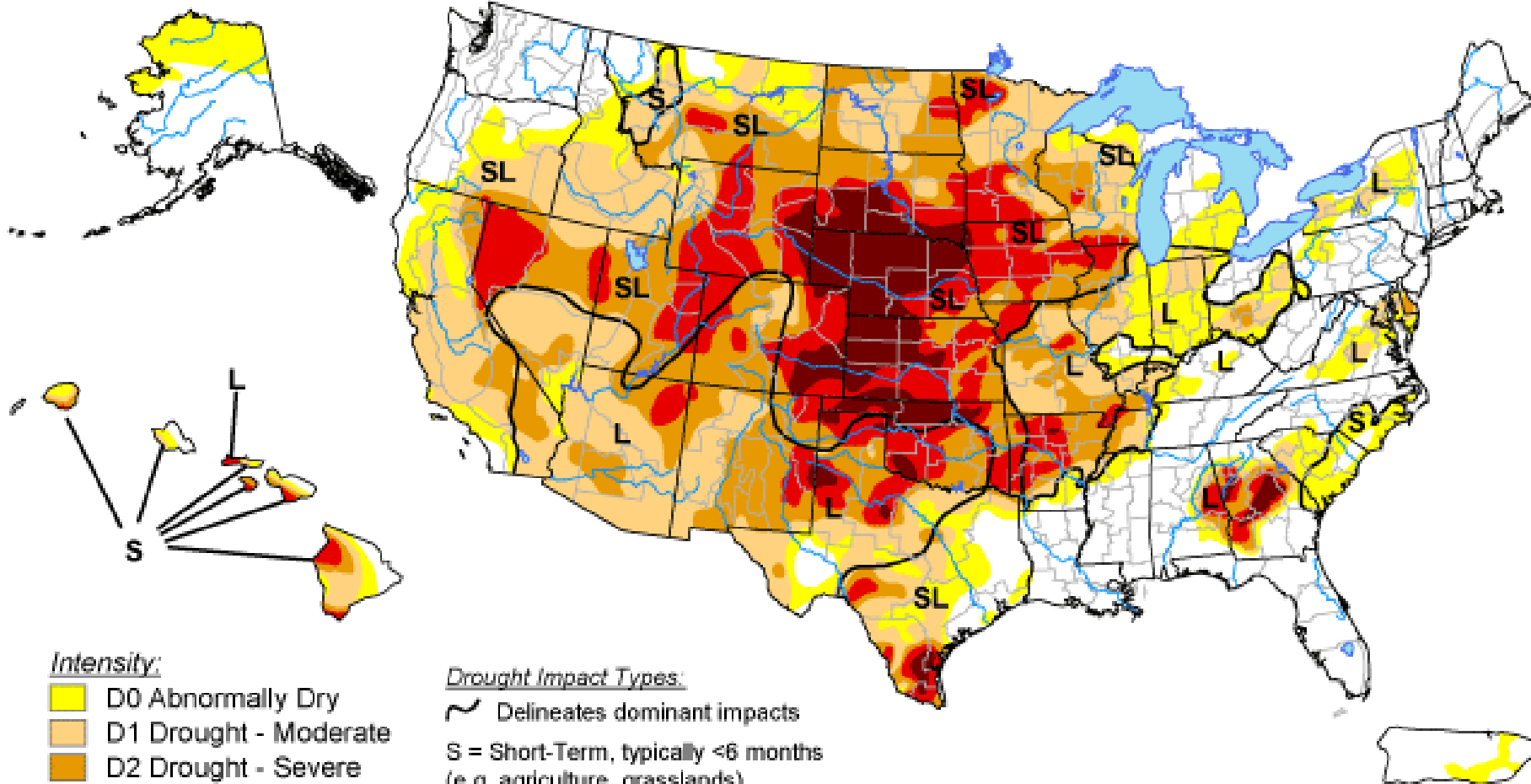









# U.S. Drought Monitor

October 16, 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.



Released Thursday, October 18, 2012

Author: Matthew Rosenkrans, NOAA/NWS/NCEP/CPC

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

# Some Examples of Decision Making Using the DM (Science before Policy)

- ▶ **Policy:** 2008 Farm Bill/Internal Revenue Service/US Department of Agriculture/National Weather Service/Environmental Protection Agency/State drought plan triggers
- ▶ **~3.5M+** page views and **~2M+** visitors/year
- ▶ **Media:** The Weather Channel/USA Today and all major newspapers/Internet Media/Network News/ CNN/NPR/etc.
  - 2012 NDMC July-September **interviews: ~650+**
  - 2012 NDMC July-September **data/emails: ~700+**
- ▶ **Presidential/Congressional/Governor briefings**



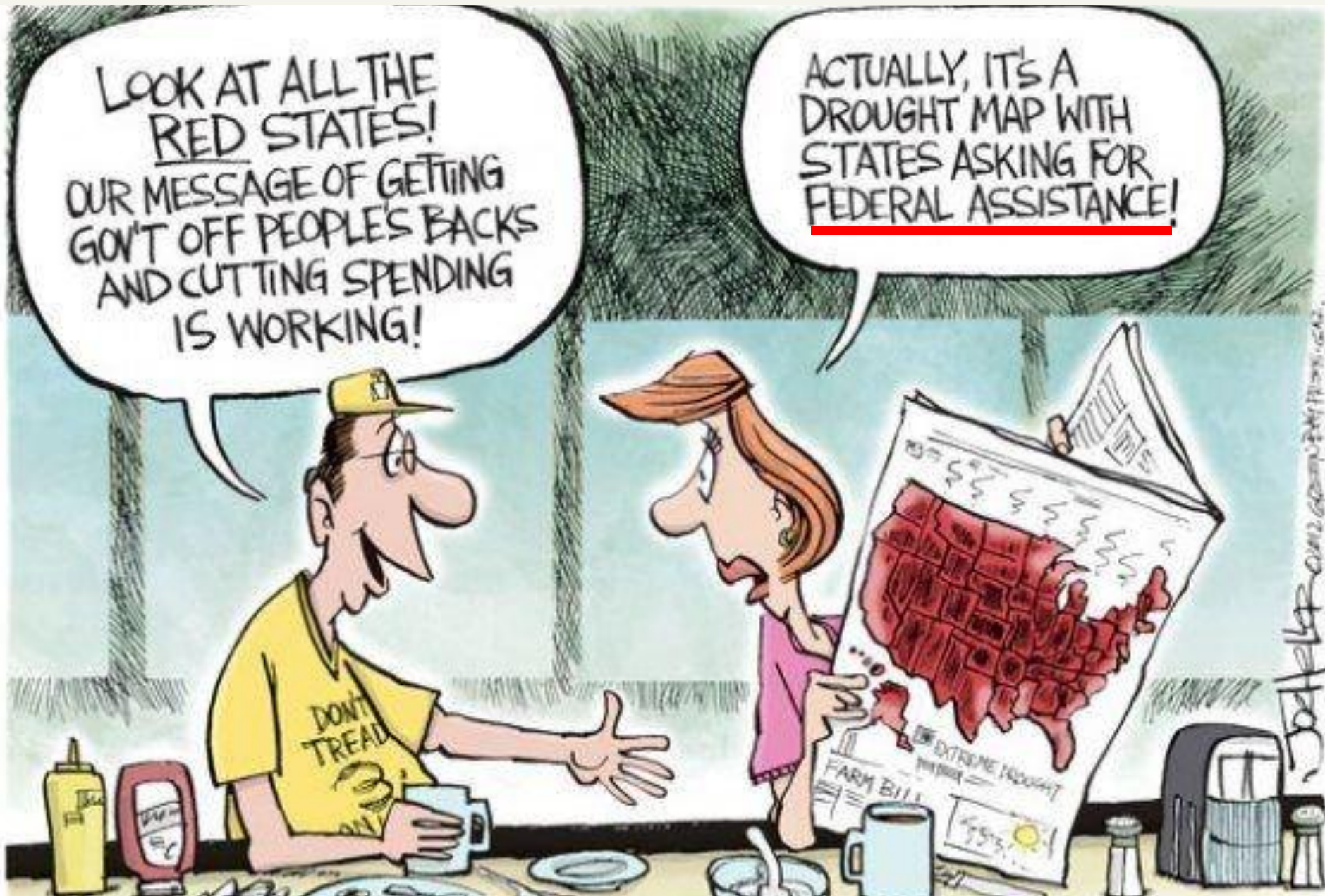


# The U.S. Drought Monitor: Lessons Learned

- ▶ Decision makers/policy makers **want one product with one value**
  - Scientists and resource managers want the details/options
  - Annual feedback Forum's around Canada, Mexico and the U.S.
- ▶ USDM **NOT** based on decision making...**decision making IS based on USDM** though!
- ▶ **Transparency**
  - Fostered **trust** and became **credible** slowly over time
- ▶ **Communication** (has become U.S. State-of-the-Science)
  - Media/public/feedback forums/professional conferences/etc.
  - Agency/State Drought Task Forces
  - Expert list server (local participation and buy-in since Day 1)
- ▶ **Flexible**....continues to adapt and evolve (new tools)
- ▶ **Composite**/hybrid approach (innovative)
- ▶ Has a built in **"historical"** component (ranking percentile approach)
- ▶ **Blend** of Objective (95%)/"Subjective" (5%) works
  - Eyes and ears on the ground
  - Subjective= Local experts provide data, impacts, products to support/refute



# The Politics of Drought





# Why Track Drought Impacts?

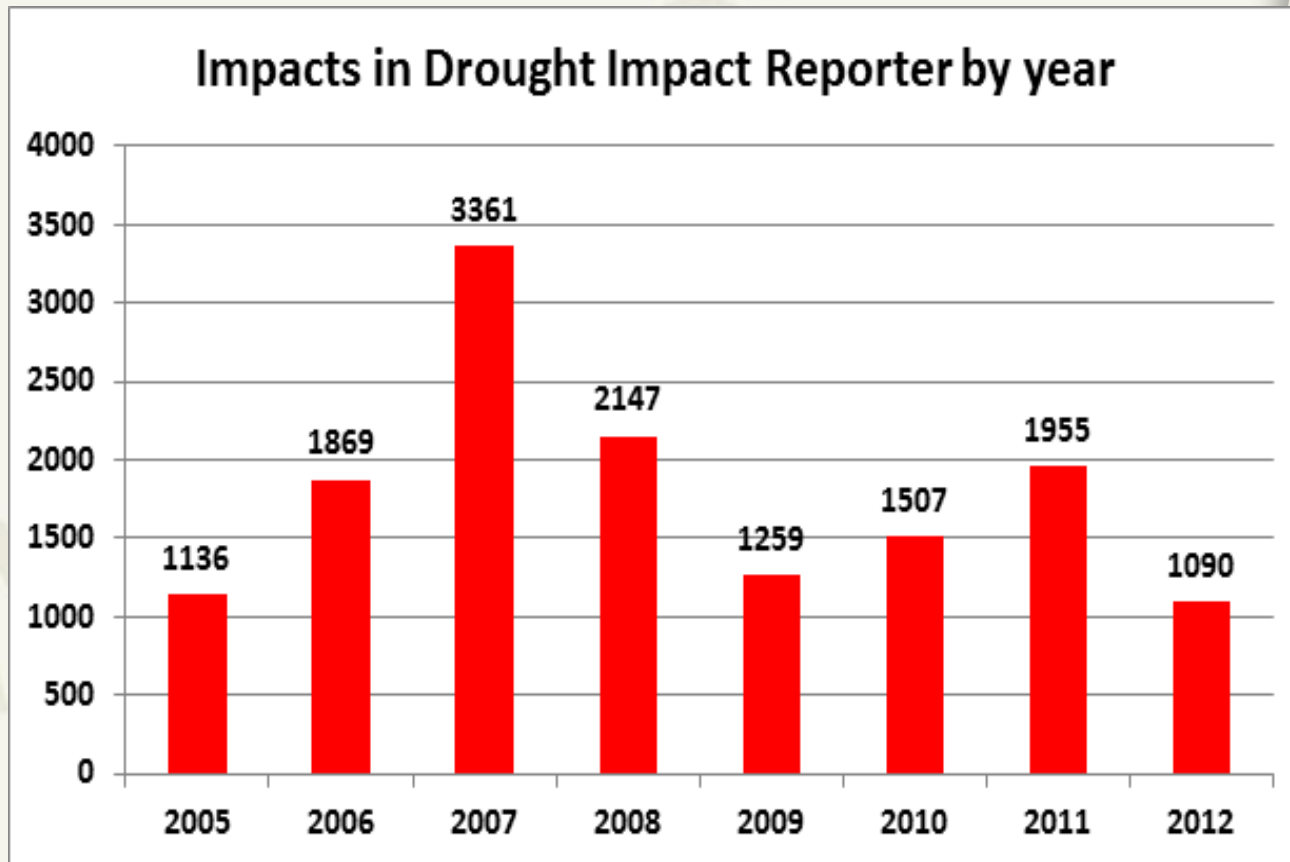
- ▶ Establish an impacts **baseline** for monitoring
  - Face of drought (vulnerability)
  - Climate change
- ▶ To know where to direct **relief**
- ▶ To reduce **risk** in advance of the next drought
- ▶ "**Ground truth**" indices and models
- ▶ No single method exists for collecting and/or **quantifying** drought losses
- ▶ Very little in the way of **environmental** or **qualitative** collection



# Some DIR Facts

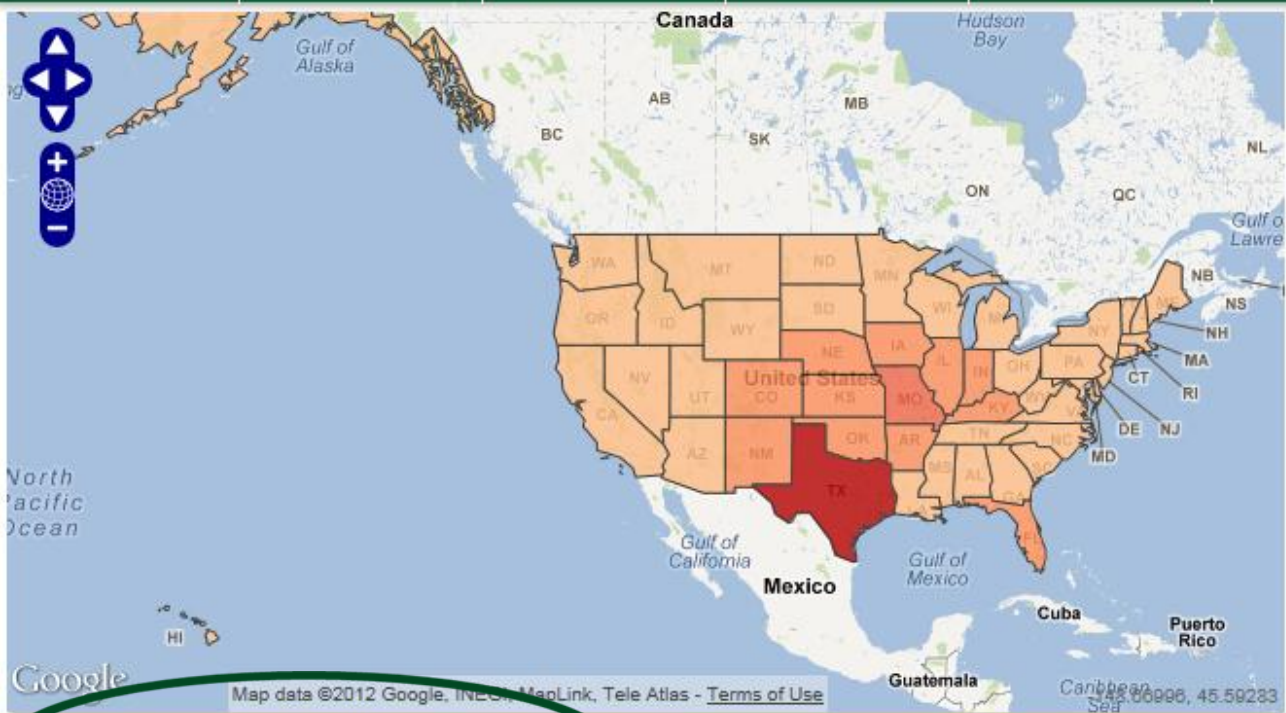


- ▶ **Established July 2005**
- ▶ **DIR DB now contains >14,000 impacts**
- ▶ **10,000+ articles per week during the peak of the 2012 drought**



<http://droughtreporter.unl.edu>





[Refresh](#)

Impacts & Reports    Overlays

▼  Impacts

**Opacity**

80%

**Impacts**

- 0
- 17 - 67
- 68 - 118
- 119 - 168
- 169 - 218
- 219 - 268

▶  Reports

▼ Time Period

Start:

End:

▶ Location

▶ Categories

All States | 01-01-2012 - 10-24-2012 |

**Total Impacts | All States** 1387

Category	
Agriculture	702
Energy	15
Plants & Wildlife	299
Society & Public Health	181
Water Supply & Quality	447
Business & Industry	98
Fire	254
Relief, Response & Restrictions	431
Tourism & Recreation	116
Report Source	
Media	928
User	244
Other Agency	52
Burn Ban	5

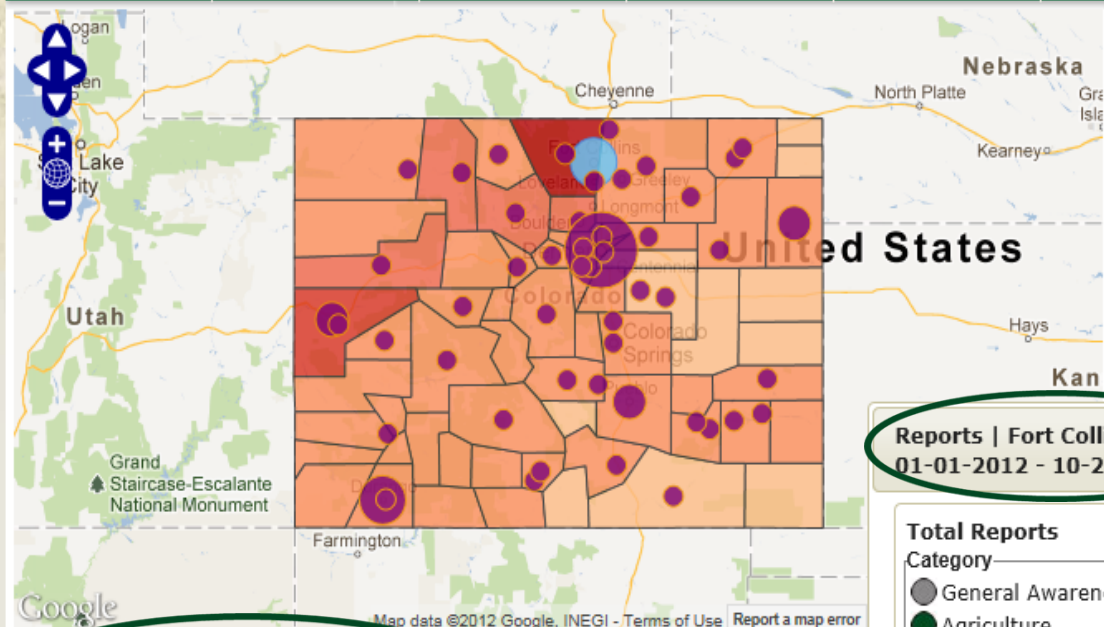
Map

Advanced Search

Submit a Report

About the DIR

Help



Refresh

Impacts & Reports | Overlays

Impacts

Opacity

Impacts

Colorado | 01-01-2012 - 10-24-2012

**Total Impacts | Colorado** 102

Statewide Impacts 32

Category	Count
Agriculture	56
Energy	1
Plants & Wildlife	25
Society & Public Health	17
Water Supply & Quality	38
Business & Industry	
Fire	
Relief, Response & Restrictions	
Tourism & Recreation	

Report Source

Media	77
User	

Reports | Fort Collins, CO  
01-01-2012 - 10-24-2012

**Total Reports** 22

Category	Count
General Awareness	9
Agriculture	4
Business & Industry	1
Fire	7
Plants & Wildlife	3
Relief, Response & Restrictions	2
Society & Public Health	1
Tourism & Recreation	1
Water Supply & Quality	7

Report Source

Media	22
-------	----

Reports List | All-States View

Reports | Fort Collins, CO  
01-01-2012 - 10-24-2012  
Page 1 of 3

Publication Date: 06-13-2012

**Short hay supplies stressed by wildfire - Fort Collins Coloradoan (CO)**

Publication Date: 07-13-2012

**Drought, tree stress bringing early fall color to Fort Collins - Fort Collins Coloradoan (CO)**

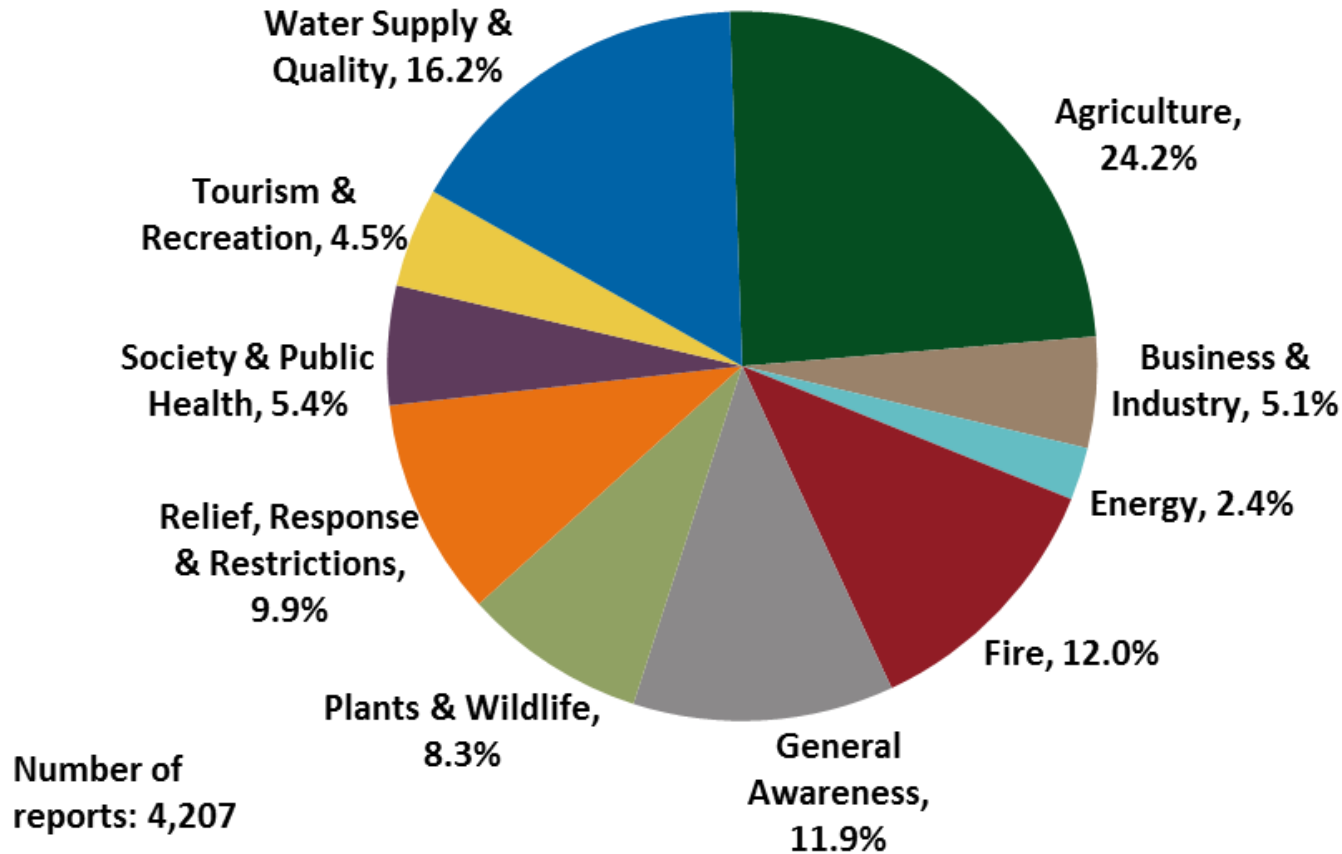
Publication Date: 08-27-2012

**Driest-ever August shatters record for most enduring heat - Fort Collins Coloradoan (CO)**



# 2012 U.S. Drought Impacts by Sector

## Reports in the Drought Impact Reporter January - September 2012



# 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**

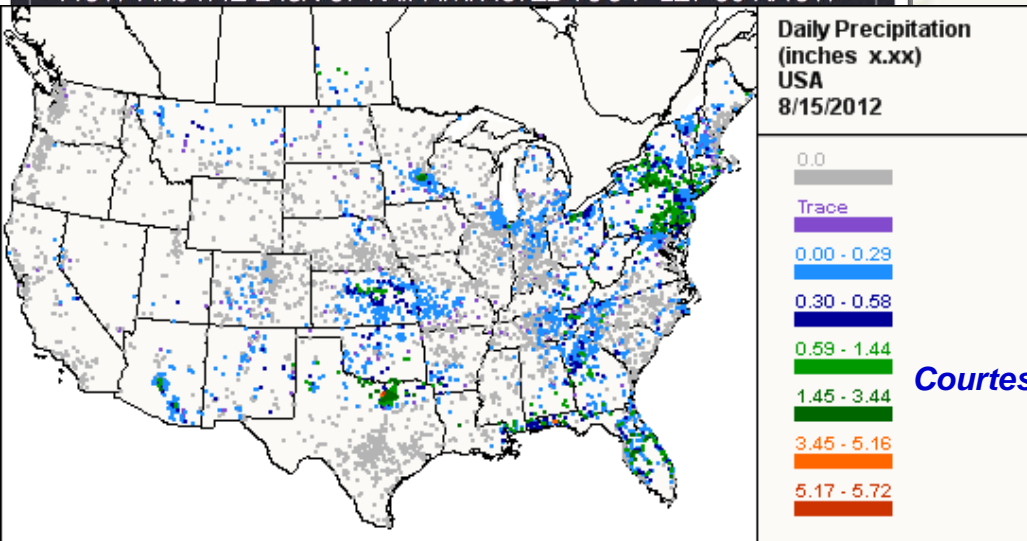
\* **Guide to reporting drought impacts**

\* **Banners on the Web**

*Courtesy: Henry Reges, Colorado State University*



**COCORAHS & DROUGHT**  
HOW HAS THE LACK OF RAIN IMPACTED YOU? LET US KNOW





# Tools: A New and Enhanced National Drought Risk Atlas

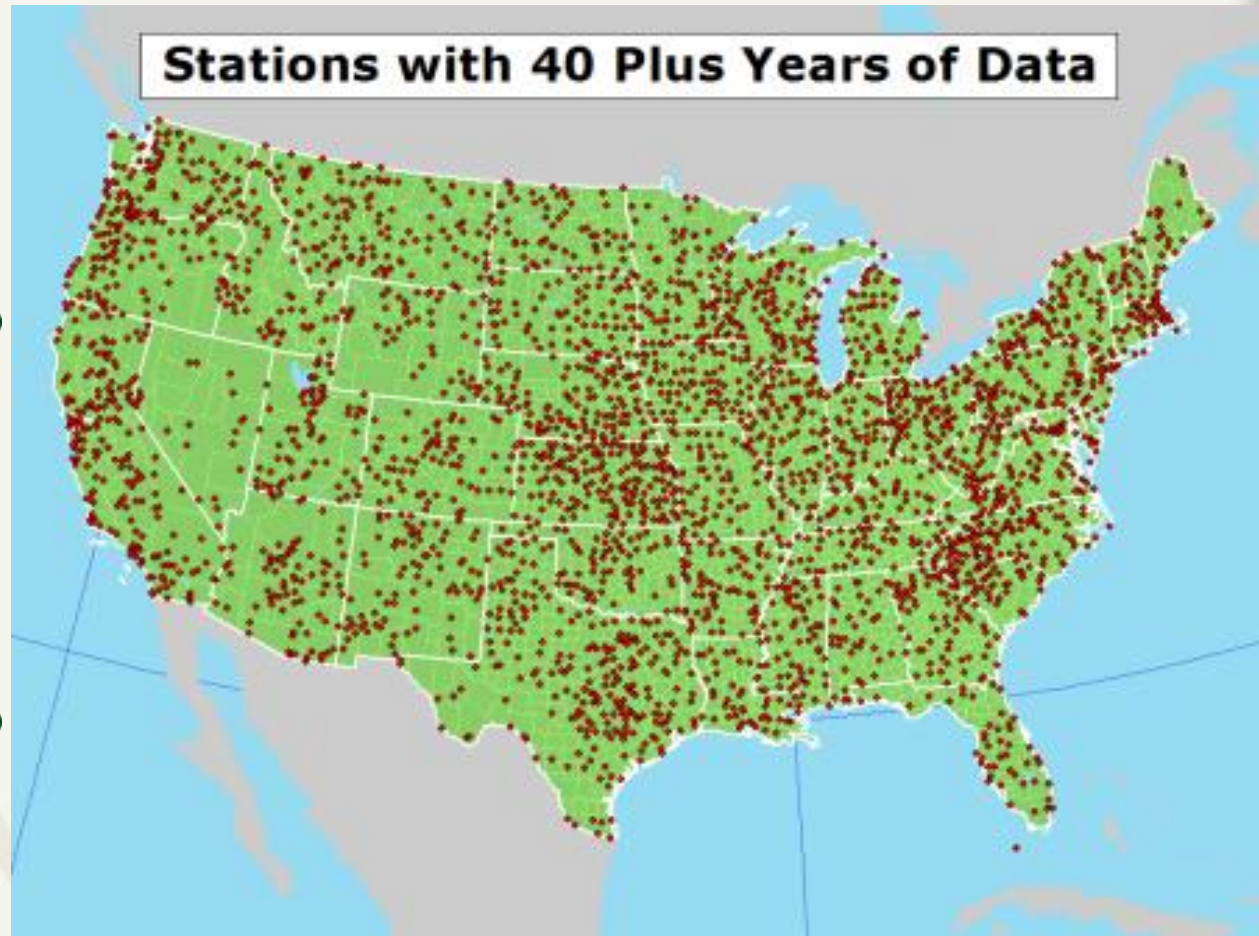
- ▶ First drought atlas study done by the ACE, IBM and NOAA (Hosking, Wallis and Guttman)(early 90's)
  - Used **HCN: ~1000 stations (1948 to late 1980s POR)**
- ▶ New atlas utilizes GIS, **digital pre-1948 data and two more decades** since the first atlas release
  - Currently open, at least 40 years of data, no more than 2 consecutive missing months in the POR
  - 139 clusters/regions developed and analyzed
  - SPI, SPEI, PDSI, sc-PDSI and Deciles through 2010
  - Weekly gridded maps for all parameters back to early 1900s
- ▶ New Drought Risk Atlas (DRA) bottom line, **~3100 (P) and ~ 2500 (P+T) stations w/ ~ double the period of record** when compared to the original atlas (allows for more robust statistical calculations)



## Drought Risk Atlas Stations:

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

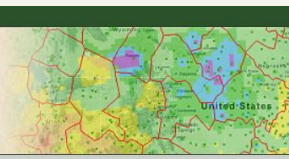
- **3059** stations with **40+** years of data
- 2462 stations with 50+ years of data (81.04%)
- **1733** stations with **60+** years of data (**57.04%**)
- 1170 stations with 70+ years of data (38.51%)
- **827** stations with **80+** years of data (**27.22%**)
- 537 stations with 90+ years of data (17.68%)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







# Drought Risk Atlas



- Home
- Climate
- Data
- Methodology
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Current Location » Home

## 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 United States



# Drought Risk Atlas



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Current Location » Climate

## Climate Data Map



- Climate Layers
  - Atlas Stations
  - Homogeneous Clusters
  - Deciles (12/24/2009; 1 Month)
  - U.S. Drought Monitor (09/04/2012)
  - SPI (12/24/2009; 12 Month)
- Base Layers
  - Counties
  - Climate Divisions
  - County Warning Areas
  - RMA Regions
  - River Basins (HUC 2)
  - Congressional Districts
  - Tribal Lands





## Climate Data

Selected Atlas Station: none selected

Use one of the options to select a station. Close [x]

### By State

Colorado

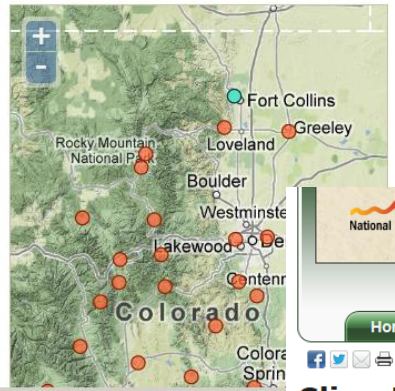
### By Station Name

Enter the station name or COOP ID

### By Location

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

### Station Map



### Station List

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

050130: ALAMOSA SAN LUIS AP

## Climate Data

Selected Atlas Station: 053005 (FT COLLINS)

[Select New Station](#)



### Atlas Station General Information

Each station in the Drought Atlas is assigned to a homogeneous region, or cluster with station that have similar climatic characteristics. The station selected is highlighted with its homogeneous cluster below and all the other recording stations available in the atlas are noted as well. All of the stations in the cluster are also listed to allow the user to have an idea of other stations they can consider when studying the climatology of the region. In some instances, the next closest station may be part of another homogeneous cluster, but may provide ample information to the user of interest.

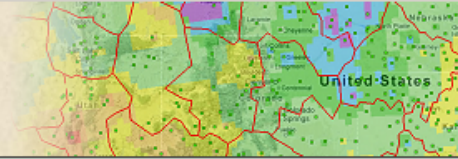
Use one of the options below to view more information about this station. More options are also available in the toolbar at the top of the box in the left.

#### 053005: FT COLLINS

**Latitude**  
40.615  
**Longitude**  
-105.131  
**Elevation (ft)**  
5004  
**State**  
CO  
**County**  
Larimer  
**Climate Division**  
4  
**Time Period**  
1/1/1895 - 12/31/2011  
**Years on Record**  
116  
**Percent Complete**  
95

Similar Stations | Related Links | L-Moments | Quantiles | **Discordancy and Homogeneity**





## Climate Data

Selected Atlas Station: **053005 (FT COLLINS)**

[Select New Station](#)



Results for **FT COLLINS (053005)** for the 12 Month timestep(s) between 1/1/1895 and 12/31/2011

**Date**

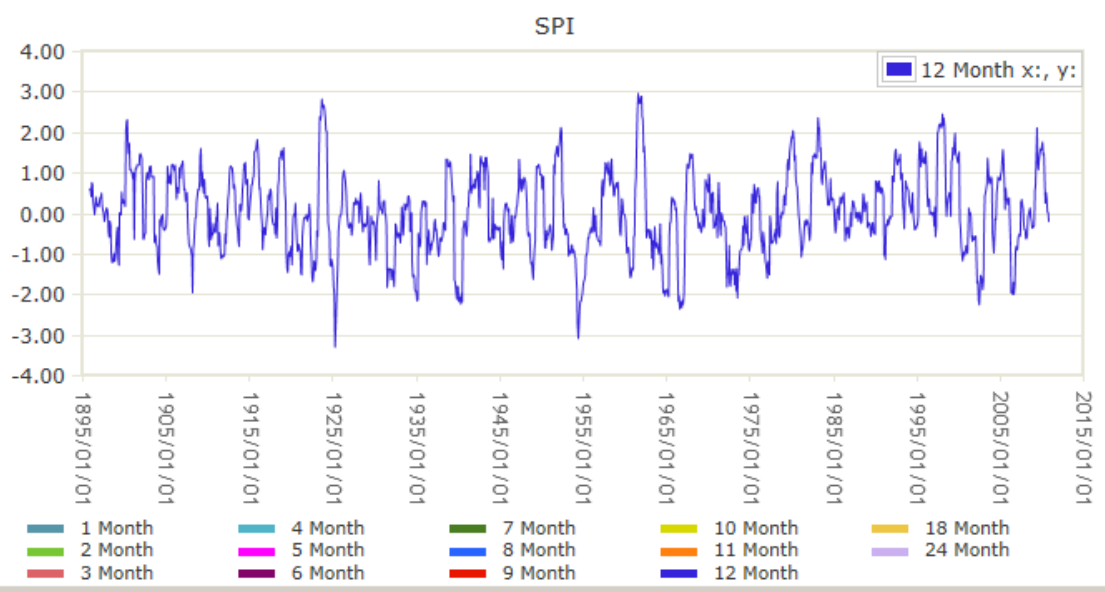
to   
 Period of Record:

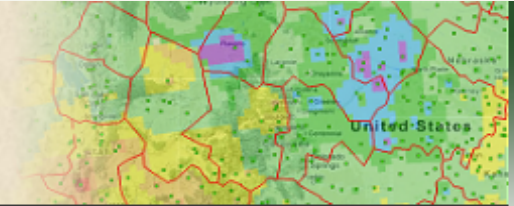
Station start date: 1/1/1895

**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




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 Current Location » Data

## Climate Data

Selected Atlas Station: **053005 (FT COLLINS)**

[Select New Station](#)

[Station](#)
[Climate](#)
[Deciles](#)
[SPI](#)
[SPEI](#)
[PDSI](#)
[Drought Monitor](#)
[Drought Periods](#)


Results for **FT COLLINS (053005)** for the 3, 12 Month timestep(s) between 1/1/1895 and 12/31/2011



### Date

1/1/1895 to 12/31/2011

Period of Record

Station start date: 1/1/1895

### Timestep

Select one or more timesteps to compare.

 1 month

 2 month

 3 month

 4 month

 5 month

 6 month

 7 month

 8 month

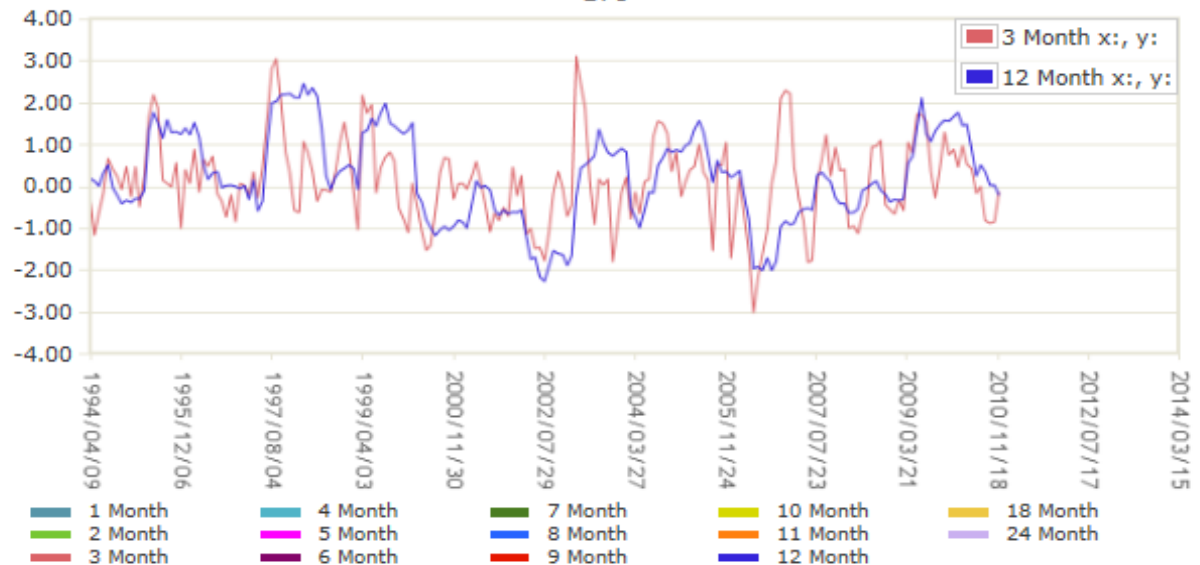
 9 month

 10 month

 11 month

 12 month

### SPI



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.





Results for CHESTERTOWN (181750) for the 3, 9, 18 Month timestep(s) between 1/1/1940 and 12/31/1949



## Date

1/1/1940 to 12/31/1949  
1940s

Station start date: 1/1/1937

## Timestep

Select one or more timesteps to compare.

1 month  
2 month  
3 month  
6 month  
9 month  
12 month  
18 month  
24 month

Show 50 entries

Search:

Week	3 Month	9 Month	18 Month
12/3/1941	-1.92	-2.12	-1.77
11/26/1941	-2.19	-1.97	-1.83
11/12/1941	-2.6	-1.88	-1.72
1/1/1942	-0.87	-1.87	-1.68
1/8/1942	-1.15	-1.8	-1.7
11/5/1941	-1.62	-1.79	-1.53
11/19/1941	-2.18	-1.72	-1.66
4/30/1942	-0.72	-1.72	-1.59
10/22/1941	-1.83	-1.68	-1.49
4/23/1942	-0.35	-1.68	-1.45
12/10/1941	-0.96	-1.66	-1.48
10/29/1941	-1.76	-1.64	-1.49
12/17/1941	-0.81	-1.61	-1.5
3/12/1942	-0.35	-1.61	-1.48
5/14/1942	-0.52	-1.61	-1.63
1/22/1942	-0.6	-1.57	-1.64
1/15/1942	-0.64	-1.55	-1.51
12/17/1943	-0.34	-1.55	-0.85
12/24/1941	-0.92	-1.54	-1.57





Date

1/1/1940 to 12/31/1949

1940s

Station start date: 1/1/1937

Timestep

Select one or more timesteps to compare.

1 month

2 month

3 month

6 month

9 month

12 month

18 month

24 month

Results for CHESTERTOWN (181750) for the 3, 9, 18 Month timestep(s) between 1/1/1940 and 12/31/1949



### October

3 Month ▲

9 Month ▲

18 Month ▲

Rank	Year	SPI
1	1941	-1.58
2	1943	-1.27
3	1947	-0.66
4	1940	-0.56
5	1944	-0.33
6	1948	-0.27
7	1949	0.01
8	1946	0.04
9	1945	0.24
10	1942	0.65

Rank	Year	SPI
1	1941	-1.44
2	1943	-1.22
3	1946	-0.65
4	1947	-0.62
5	1949	-0.13
6	1944	-0.13
7	1940	0.08
8	1942	0.08
9	1948	0.37
10	1945	0.90

Rank	Year	SPI
1	1941	-1.30
2	1942	-0.98
3	1944	-0.77
4	1943	-0.77
5	1947	-0.72
6	1940	-0.24
7	1945	0.45
8	1946	0.48
9	1948	0.54
10	1949	0.86

### November

3 Month ▲

9 Month ▲

18 Month ▲

Rank	Year	SPI
1	1941	-2.15
2	1948	-1.03
3	1945	-0.60
4	1944	-0.56
5	1940	-0.43
6	1949	-0.15

Rank	Year	SPI
1	1941	-1.84
2	1943	-1.00
3	1946	-0.72
4	1949	-0.68
5	1944	-0.09
6	1947	0.00

Rank	Year	SPI
1	1941	-1.69
2	1944	-0.95
3	1942	-0.76
4	1947	-0.58
5	1943	-0.57
6	1940	-0.11







Date

1/1/1940 to 12/31/1949

1940s

Station start date: 1/1/1937

Timestep

Select one or more timesteps to compare.

1 month

2 month

3 month

6 month

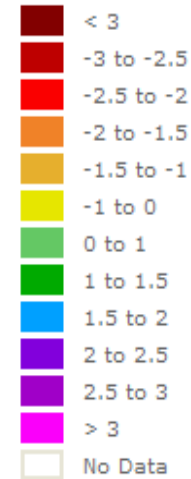
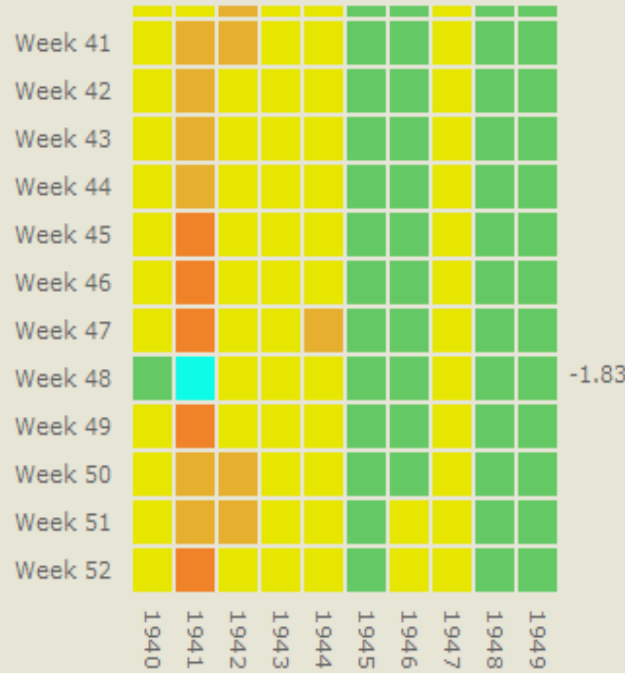
9 month

12 month

18 month

24 month

Results for CHESTERTOWN (181750) for the 18 Month timestep(s) between 1/1/1940 and 12/31/1949



-1.83

Select range





Year

2002

Station start date: 1/1/1937

Index

- SPI
- Deciles
- Drought Monitor

Timestep

9 Month

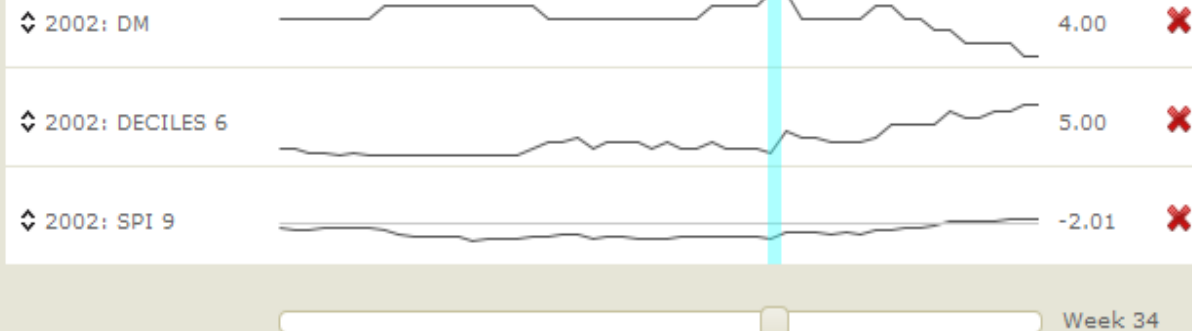
Add Index

Clear All



U.S. Drought Monitor ([source](#))

Drought Index Comparisons for 181750 (CHESTERTOWN).



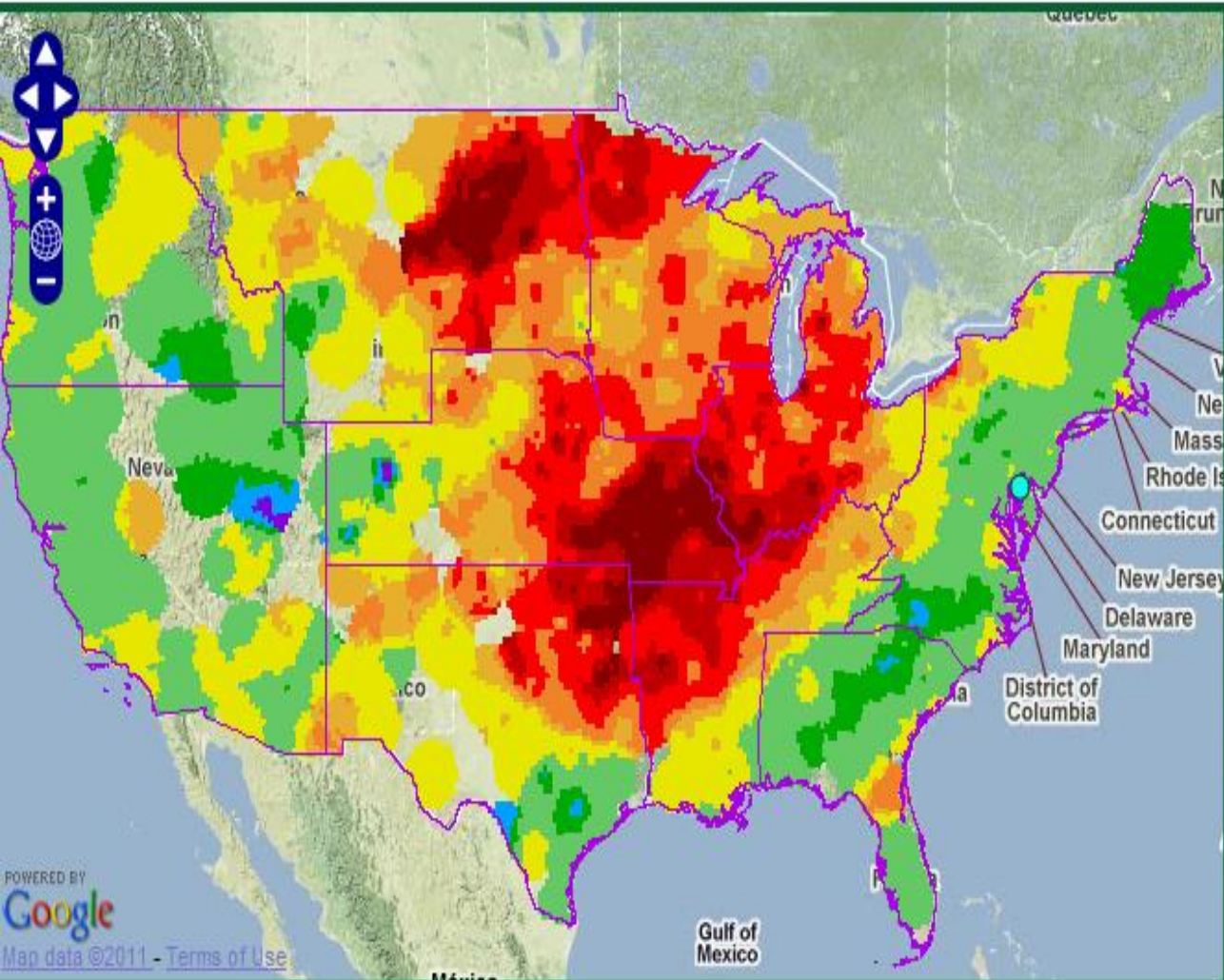
Select up to six datasets for comparison. To remove a dataset from the comparison, click the Remove Dataset button. To clear all datasets from the comparison, click the Clear All button. The datasets can be reordered at any time by dragging the rows.

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



Selected Atlas Station: 181750 (CHESTERTOWN)

[Jump to the Data](#)



Year: 1936  
Week: Aug 19  
Timestep: 9 Month

Transparency: 100%

- Counties
- Climate Divisions
- County Warning Areas
- RMA Regions

RMA Regions

# Takeaway Thoughts on Drought Information Services

- ▶ All droughts are **LOCAL so let's start there!**
  - Optimal to monitor at all scales (local/regional/national/global) (bottom-up or top-down or a combination of both)
  - Plans at all levels (local/basin/regional/national) rely on this operable/real-time monitoring information system and delivery
  - Involve users up front (no loading docks)
- ▶ **Collaboration**
  - Leverage resources
  - Encourage citizen science (social media/smart phones)
- ▶ Value added drought information services must be **useful and usable**
- ▶ **Transparency/A**ccessibility/**C**ommunication
- ▶ The **"I's"** have it! **DEWIS/NIDIS**
  - **I**mpacts, **I**ntegration and **I**nformation

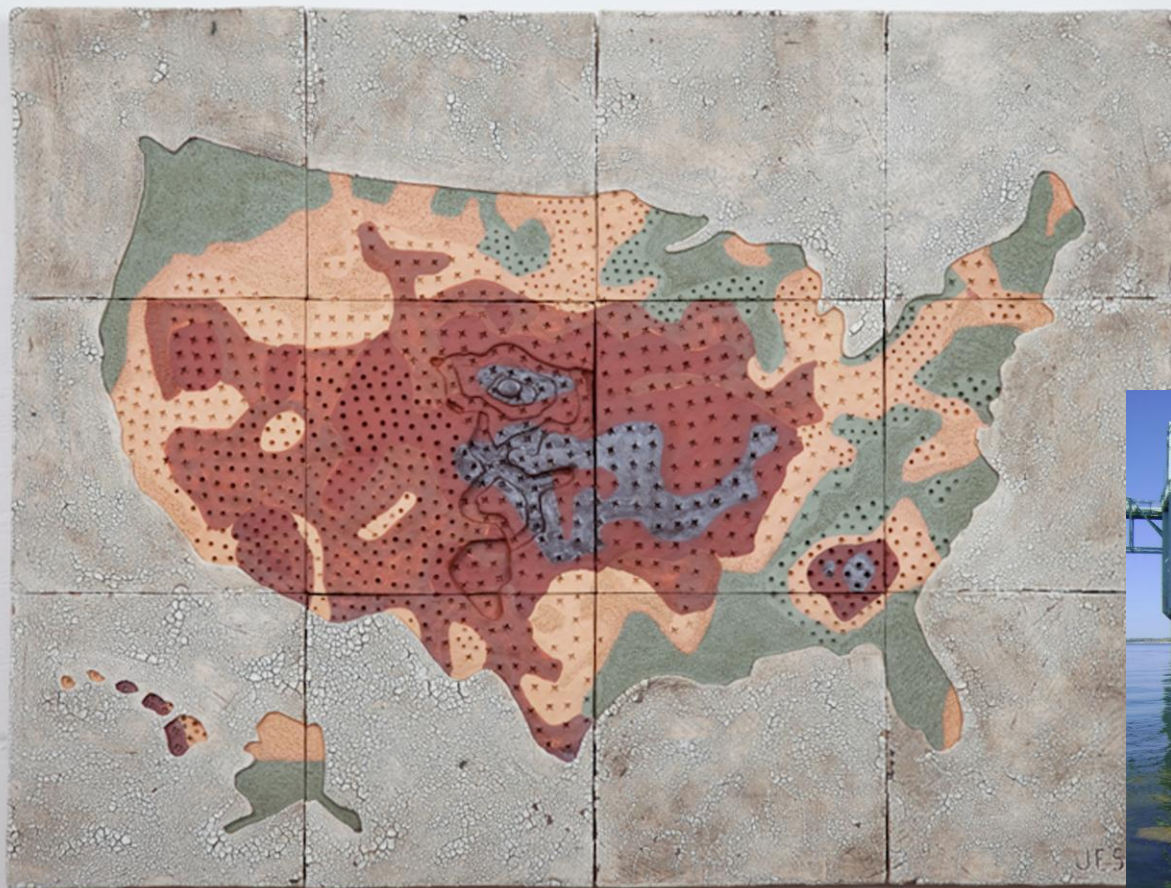




**When life gives you lemons, make lemonade;  
when drought gives you jackstone, make a  
USDM sculpture?!?!**

**Thanks!**

**Contact me at:  
Mark Svoboda  
402-472-8238  
msvoboda2@unl.edu**



*Sculpture and photo courtesy of Jess Benjamin*

