Iowa Department of Natural Resources

Leading Iowans in caring for our natural resources

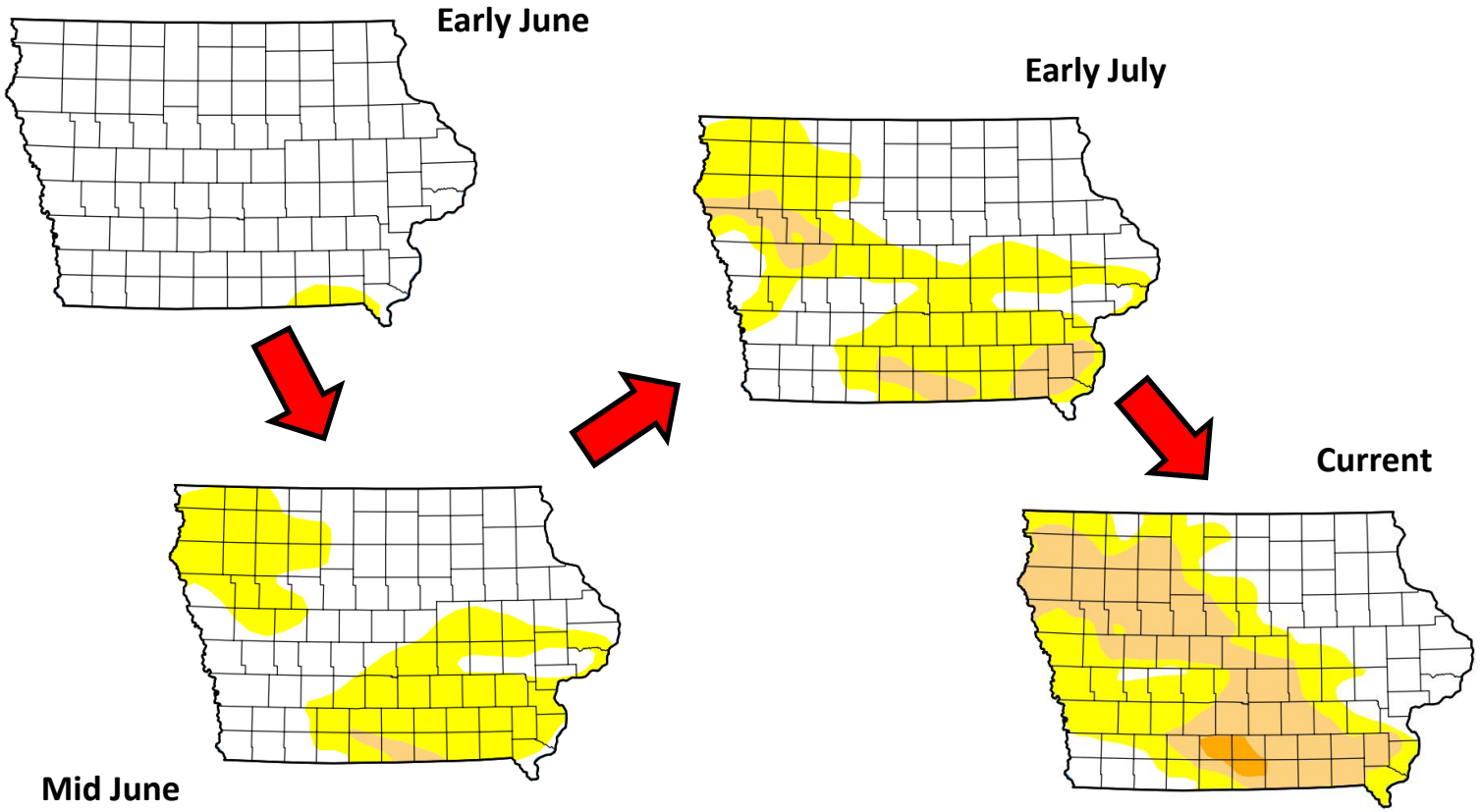
Drought Conditions Update

Tim Hall, DNR Hydrology Resources Coordinator

Cherokee, Iowa
July 31, 2017

Background

As conditions have slowly evolved across the state, the decision was made about two weeks ago to provide this update . . .



Meeting Structure

- Informational Presentations
- Q/A Formal
- Q/A Informal

Informational Presentations

Iowa Geological Survey – Groundwater Conditions
Iowa DNR – Allocation and Water Demand
National Weather Service – Conditions and Outlooks
USDA Midwest Climate Hub – National Drought Monitor
IDALS – Climatology and Ag Sector Impacts

Questions and Answer

We will take some questions after each presentation.
We will take questions to all the presenters.
Presenters will be available after the meeting.

Handouts

One of the handouts has contact information for all the presenters.

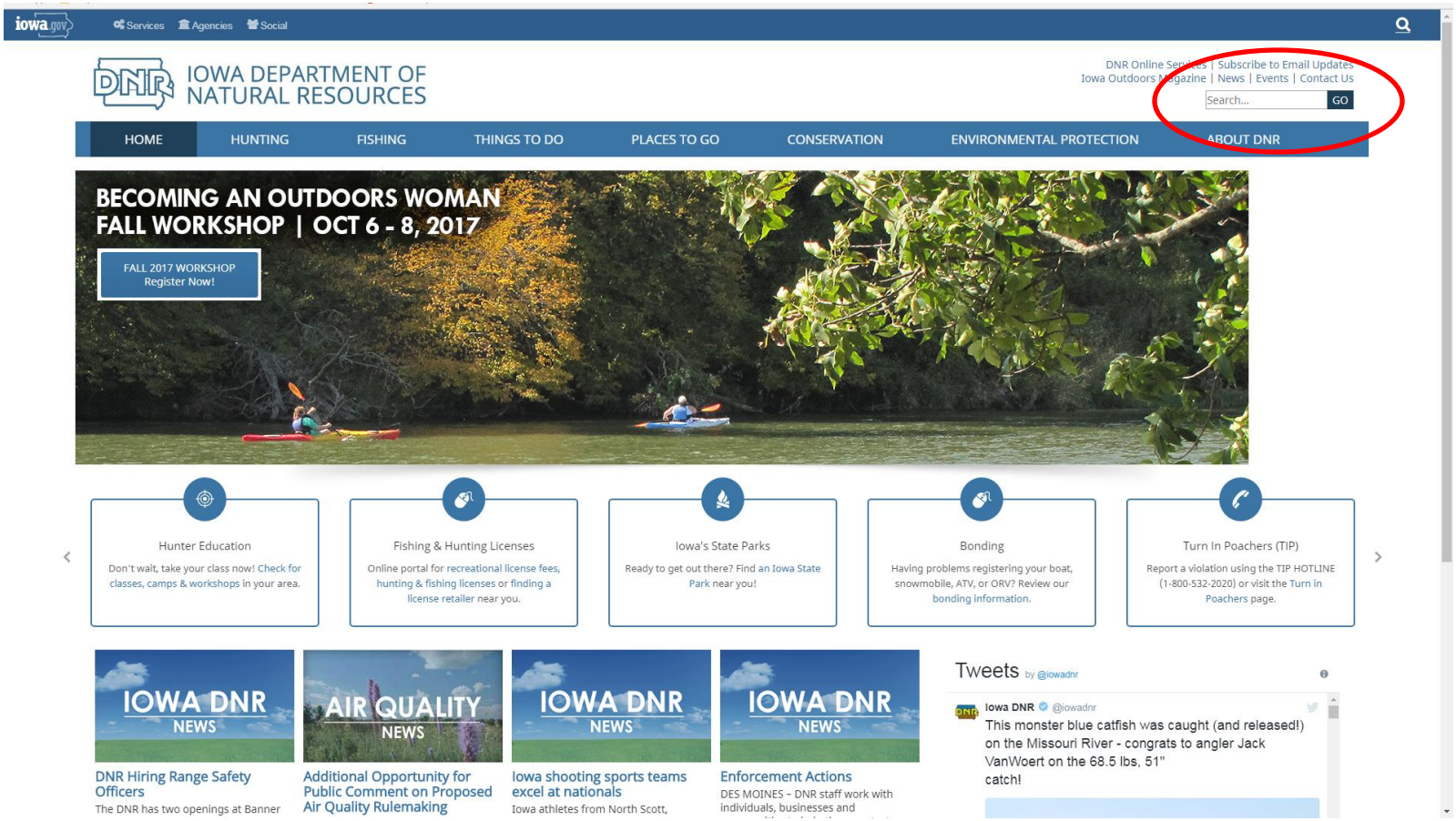
Feel free to contact them after today with further questions.

Let’s Get Started

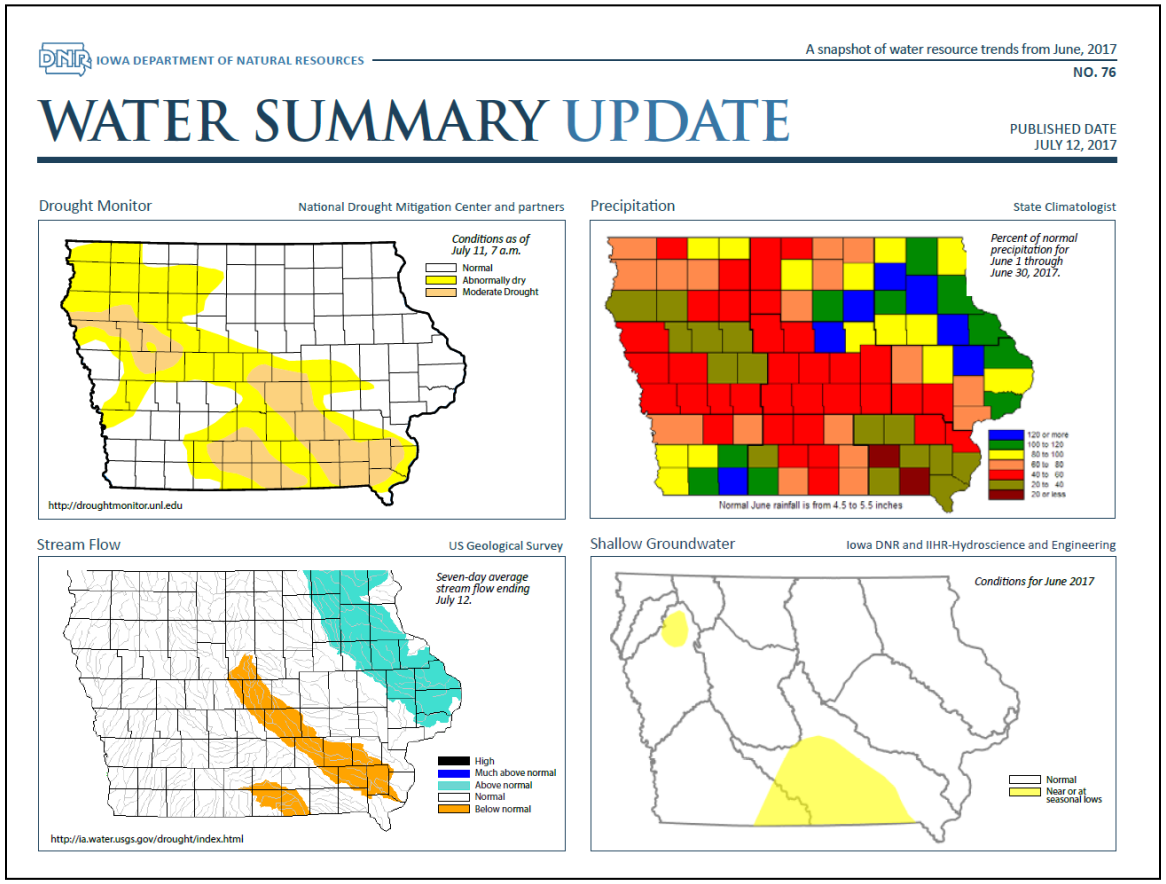
An ongoing publication that is available on the DNR website:

www.iowadnr.gov

Search for “Water Summary Update” in the search box.



Much of what you will see today is provided on monthly basis – or more frequent if needed.



IOWA DEPARTMENT OF NATURAL RESOURCES

A snapshot of water resource trends from June, 2017

NO. 76

WATER SUMMARY UPDATE

PUBLISHED DATE
JULY 12, 2017

Drought Monitor — National Drought Mitigation Center and partners

Precipitation — State Climatologist

Stream Flow — US Geological Survey

Shallow Groundwater — Iowa DNR and IIHR-Hydroscience and Engineering

Figures on the front side . . .

Recent Developments and Changes

Summary

The small area of dryness that existed in early June has been expanded to cover nearly half of the state – including significant areas of D1-Moderate Drought. Lack of rain in early June gave way to more normal rains later in the month, but the average precipitation in Iowa for the month of June was nearly 1.5 inches below normal. The rain that did fall was not distributed evenly, which has resulted in a large portions of Northwest and Southeast Iowa being classified as abnormally dry or moderate drought, while northeastern Iowa has experienced localized flooding. Regional dryness is reflected in the stream flow and groundwater conditions in Iowa.

Drought Monitor

The small area of dryness that was present in Iowa in early June has grown to cover almost half of the state. These conditions are similar to those that existed about one year ago. More than 16 percent of Iowa is now rated as being in D1-Moderate Drought, covering portions of Southeast and Northwest Iowa. Northeast and Southwest Iowa remain drought free. In the Dakotas and Montana the area of D3-Extreme Drought continues to grow, now covering 22 percent of the total areas of the Dakotas, and a large area of eastern Montana.

Current Stream Flow

Streamflow conditions are above normal in the northeast corner of the state, and below normal on the Chariton and Skunk Rivers. Over the last month streamflow conditions across the majority of the state moved to the normal condition, including the western third of the state moving from above normal to normal flow.

June Precipitation

Iowa June temperatures averaged 1.5° warmer than normal, while precipitation totaled 3.53 inches or 1.49 inches less than normal. The first half of June was very dry, with an average of only 0.09 inches of rain falling statewide (compared to the normal 2.5 inches for that period.) Rain fell almost daily somewhere in the state for the remainder of June but rain amounts and areal coverage were frequently limited. Lowest totals were over the far southeast where Donnellson (0.87 inches), Fairfield (0.88) and Ottumwa Airport (0.97) recorded under an inch of rain in what is usually the most reliable month of the year for rainfall. At Ottumwa and Donnellson this was the third driest June on record, and at Fairfield it is the fifth lowest June recorded. On the other extreme, very wet conditions prevailed over portions of north central and northeast Iowa.

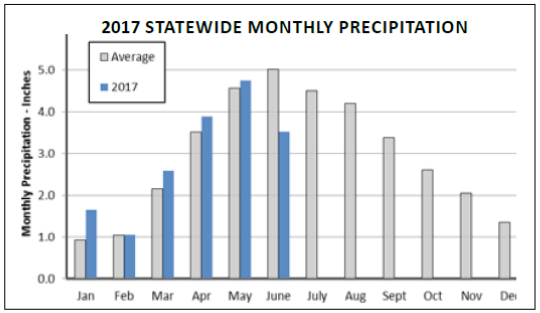
July has started off dry and warm. The statewide average rainfall has been about an inch below normal, but eastern Iowa has seen wet conditions. Temperatures have averaged 1.3 degrees above normal. An intense rain event in southeastern Clayton County brought more than 5 inches of rain to some locations - the heaviest rains seen so far this year in Iowa.

Shallow Groundwater

Shallow groundwater conditions in the first week of July have deteriorated in parts of southeast, south central, and northwest Iowa. Parts of southcentral, southeast, and northwest Iowa have been placed in a slight drought classification. Additional precipitation is needed in the month of July to prevent more regions of Iowa from falling into a slight drought category.

Annual Rainfall Update

Up until June, precipitation had been at or above normal each month of this year. Despite the June total of 1.49 inches below normal, the overall rainfall for all of 2017 is still just above normal. For the water year, which began on October 1, 2016, the state is about 0.8 inches below normal.



Summer Water Use

As conditions continue to be dryer than normal in Northwest Iowa, the hot and humid weather has resulted in an increase in water usage in that part of the state. As the supply of water (rainfall and stream flow) goes down and the demand for water goes up, local and state officials are carefully monitoring the situation. Some local water utilities may implement voluntary water conservation as the summer continues.

Contacts

General Information ..... Tim.Hall@dnr.iowa.gov 515-725-8298
Drought Monitor ..... Harry.Hillaker@iowaagriculture.gov 515-281-8981
Precipitation ..... Harry.Hillaker@iowaagriculture.gov 515-281-8981
Stream Flow ..... Daniel Christiansen, dechrist@usgs.gov 319-358-3639
Stream Flow ..... Michael.Anderson@dnr.iowa.gov 515-725-0336
Shallow Groundwater ..... Michael.Anderson@dnr.iowa.gov 515-725-0336

Prepared by the Iowa DNR in collaboration with the Iowa Department of Agriculture and Land Stewardship, the U.S. Geological Survey, IIHR–Hydroscience and Engineering and The Iowa Homeland Security and Emergency Management Department.

Text on the back side . . .

Links to all of the WSU documents are also available on that site.

Now – on to the information.

Hydrogeologic Conditions Northwest Iowa

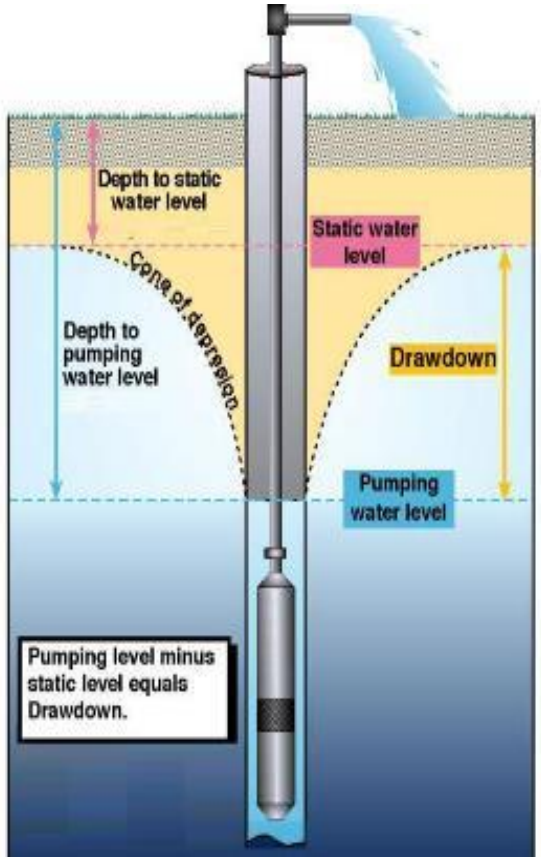
IOWA GEOLOGICAL SURVEY

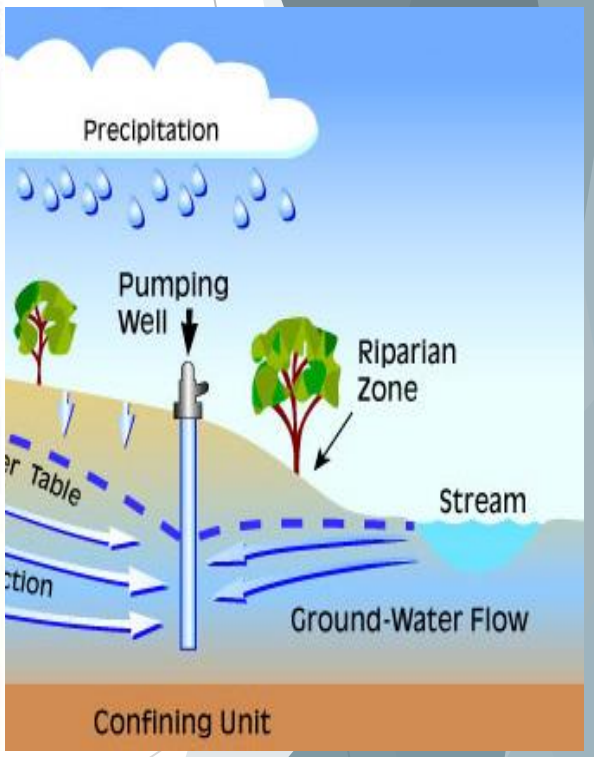
IIHR Hydroscience & Engineering

The University of Iowa

Why is NW Iowa so Vulnerable to droughts?

1. Much of NW Iowa relies on shallow alluvial sand and gravel aquifers.
2. Most alluvial aquifers in NW Iowa have saturated thickness that average 15 to 30 feet.
3. Droughts reduce the saturated thickness by 5-10 feet or more.
4. Usage also increases which creates additional drawdown.
5. River stages drop and some streams go dry.
6. PWLs approach the pump settings and pumps are shut off.





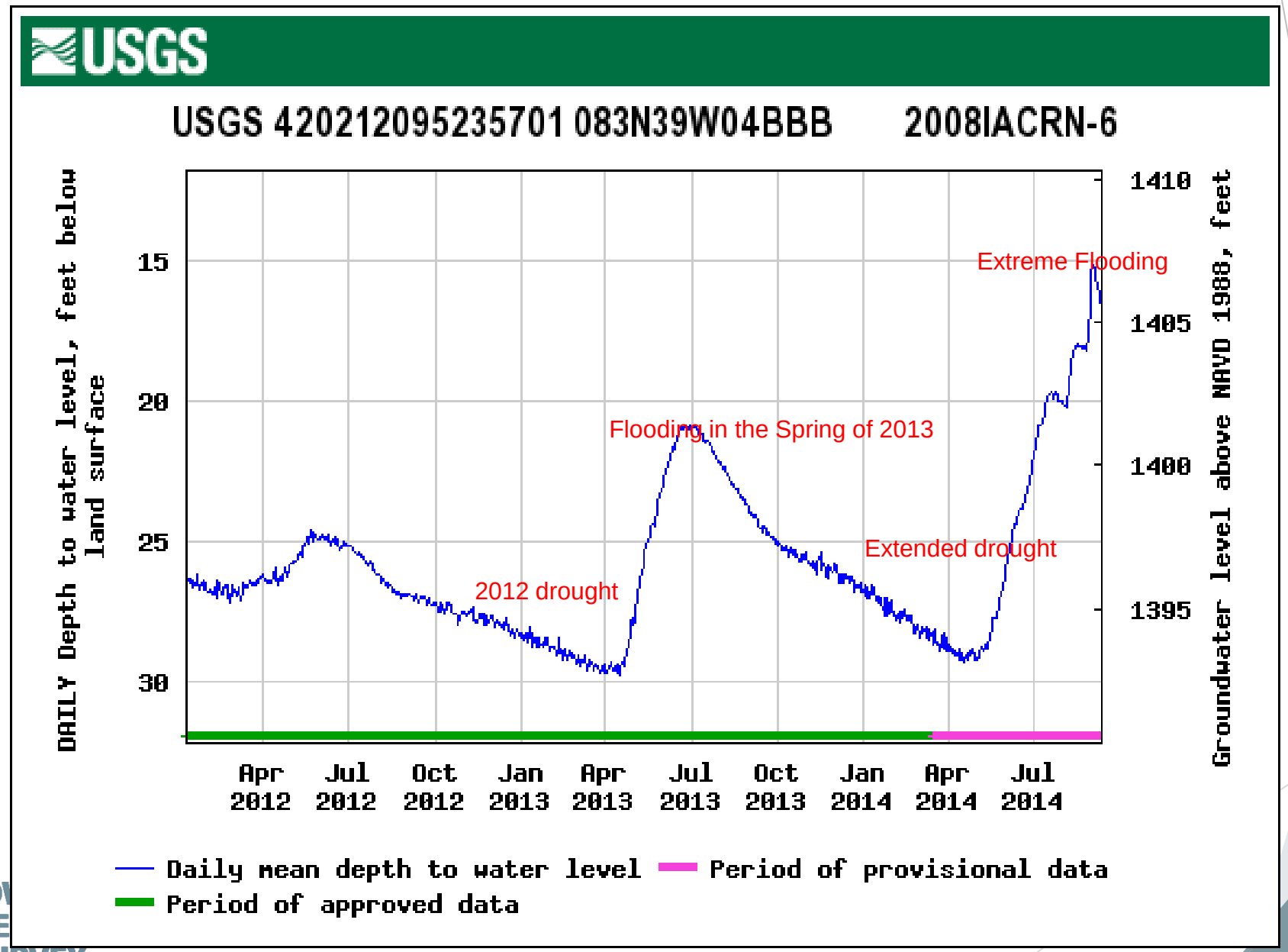
IOWA GEOLOGICAL SURVEY

Last Major Drought in Iowa was 2012 to 2014

1. River Reaches went dry
2. Shallow GW levels dropped 5-10 Feet
3. PWLs dropped to ~pump levels
4. Production wells had to be cycled On/off to allow for recovery
5. Conservation plans were implemented
6. 1 Water Utility implemented an emergency plan

IOWA GEOLOGICAL SURVEY

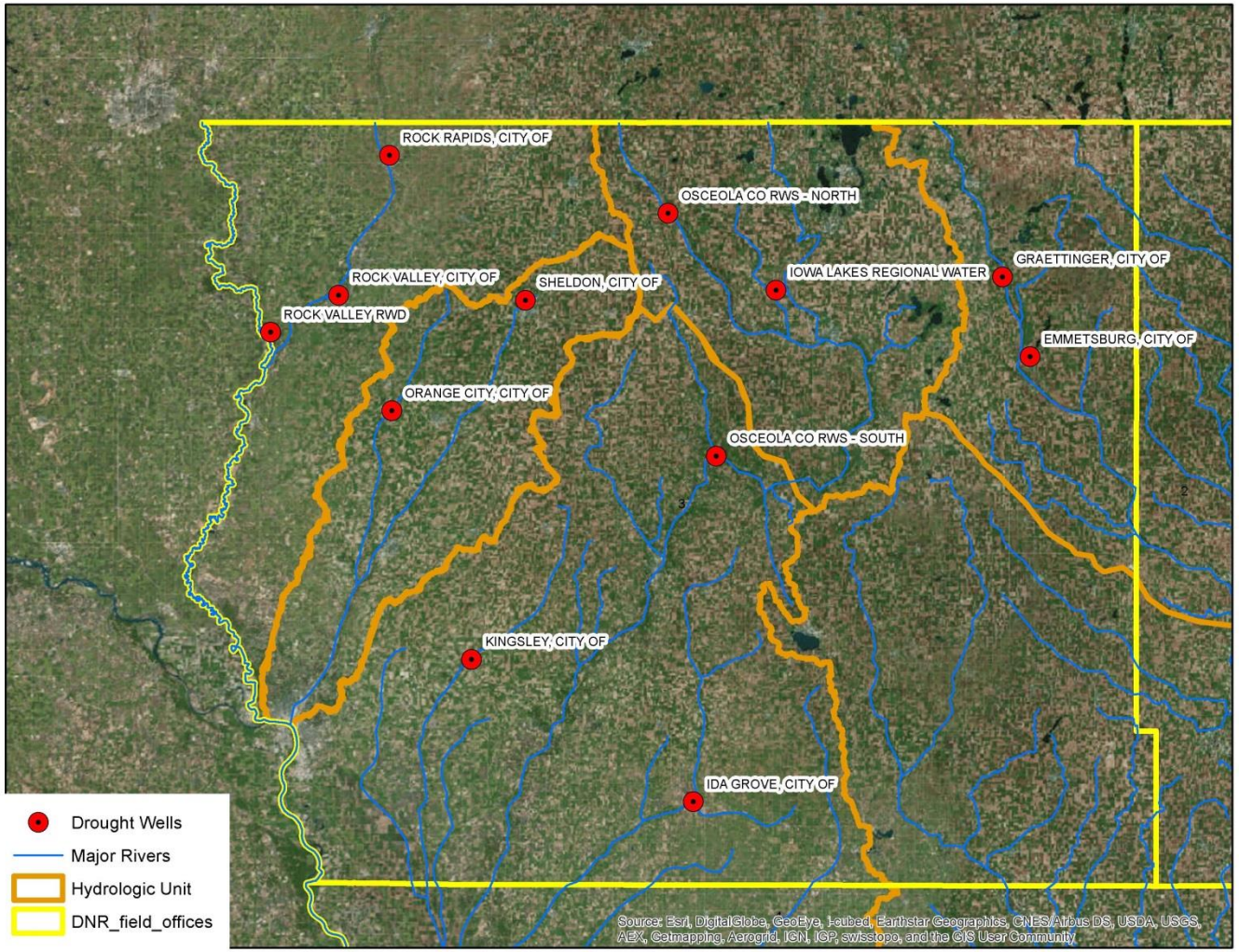
2012 to 2014 Drought Was Actually 2 Droughts in Iowa



IOWA GEOLOGICAL SURVEY

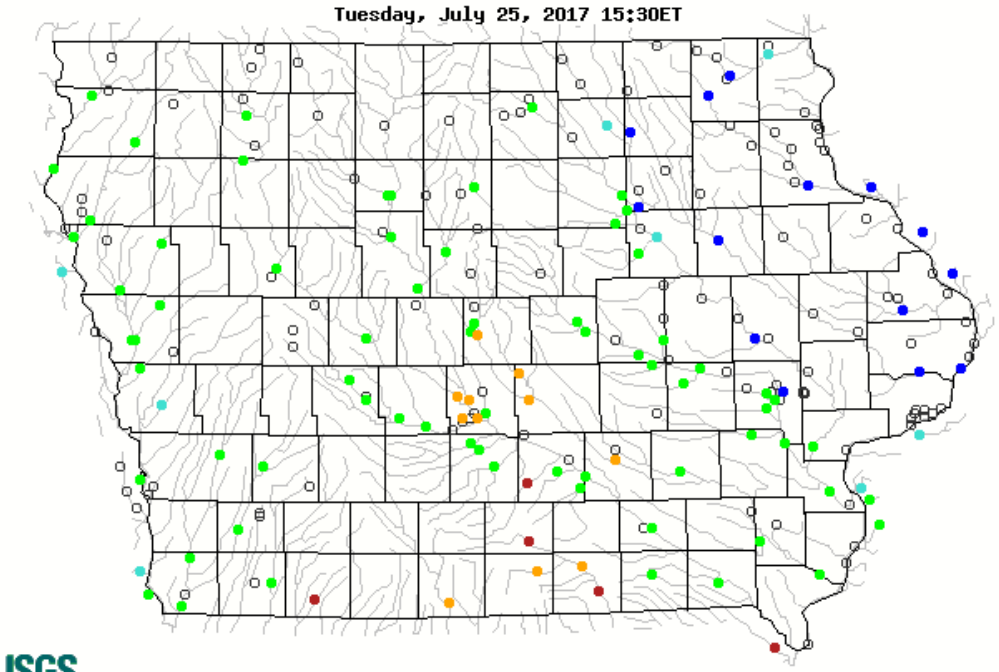
Problems with Monitoring GW levels

1. No Historical reference to previous droughts
2. Poor Statewide distribution
3. Ongoing collection
4. July 2017 IGS Began Using IDNR Water Supply MOR Data.
5. Using 2012-2014 data as our drought datum or benchmark
6. Comparing Current water levels to benchmark
7. Prior to MOR Data we used baseflow to estimate drought

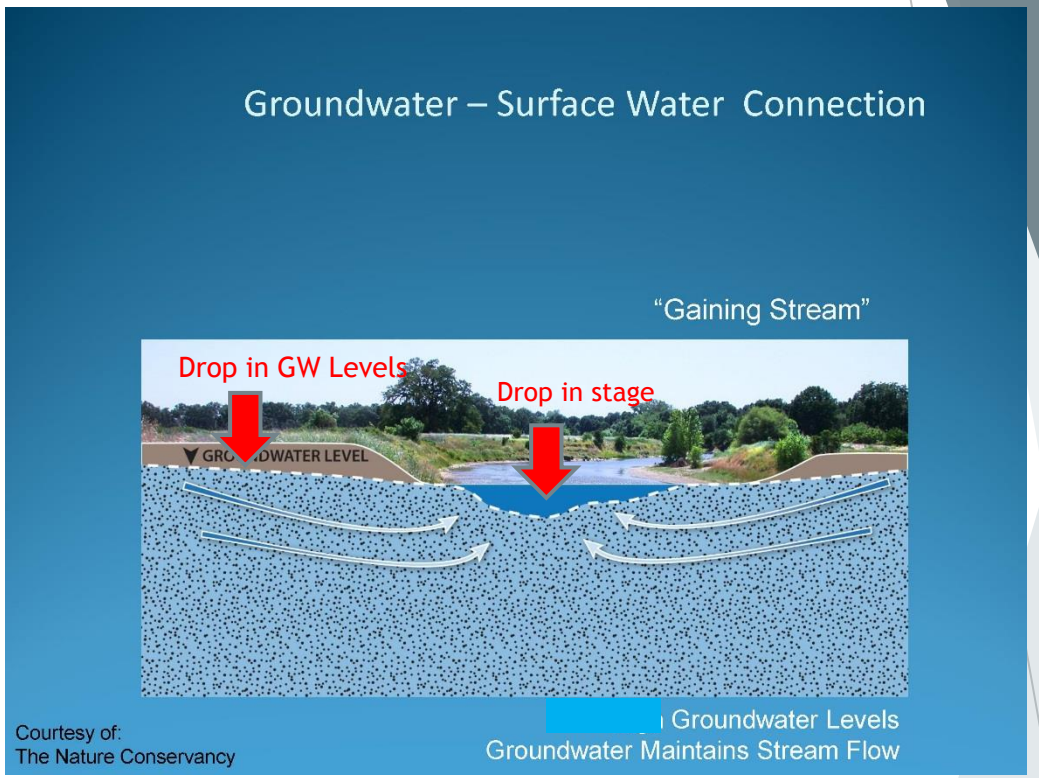


IOWA GEOLOGICAL SURVEY

Baseflow and stage as an Estimate of Shallow GW Levels

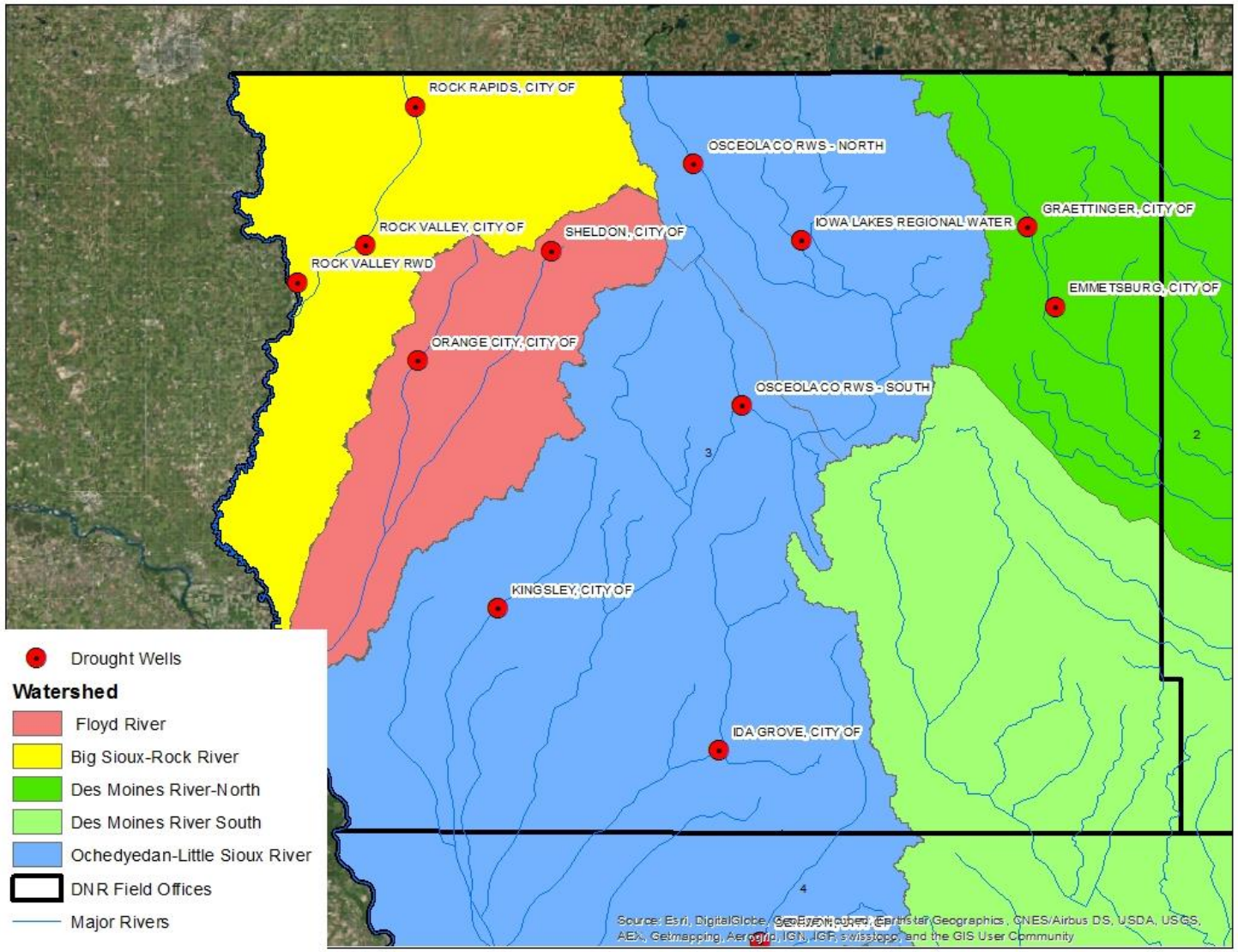


USGS



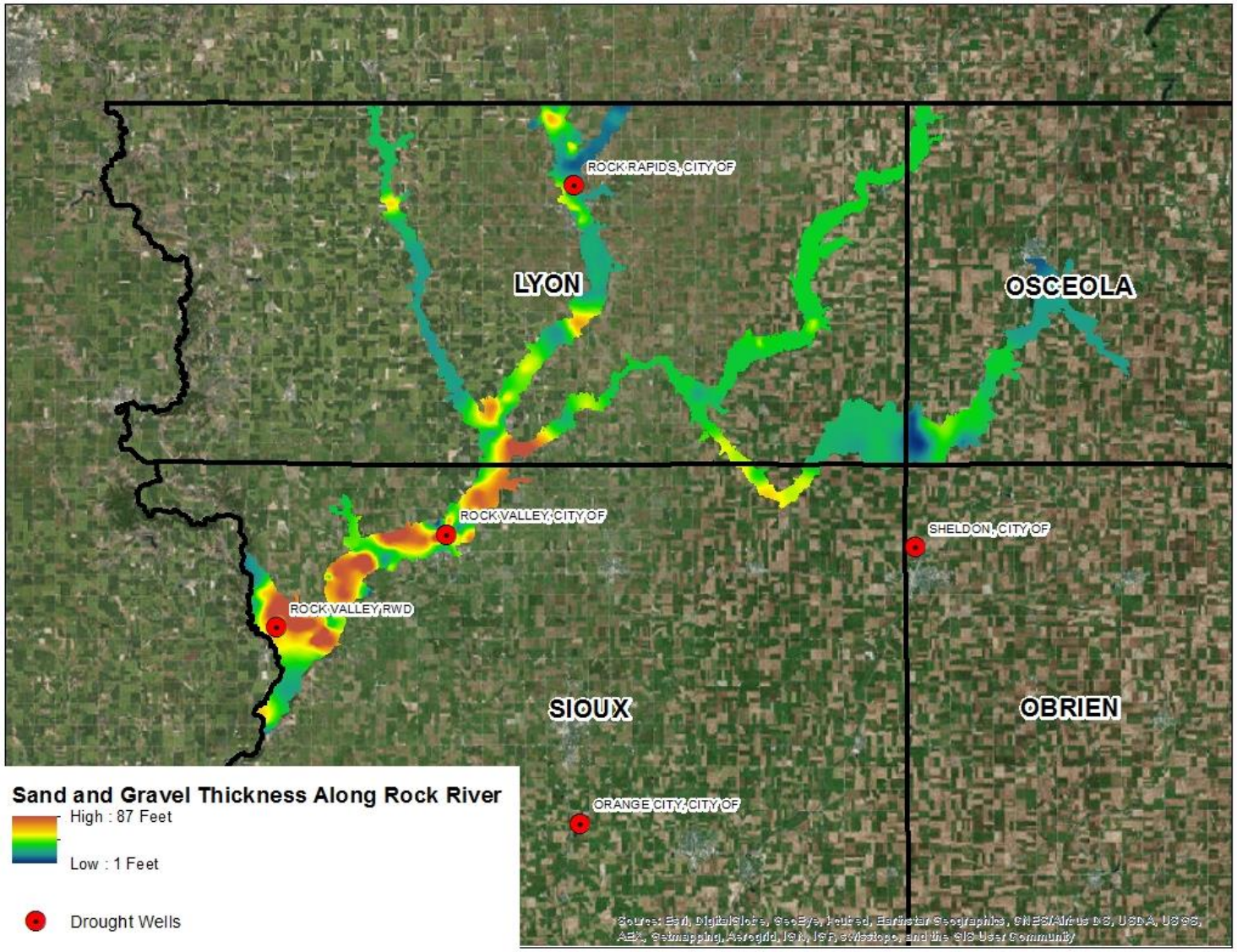
IOWA GEOLOGICAL SURVEY

Monitoring Network Targeting Major Watersheds



IOWA GEOLOGICAL SURVEY

Alluvial S&G is Restricted Primarily to the River Valleys



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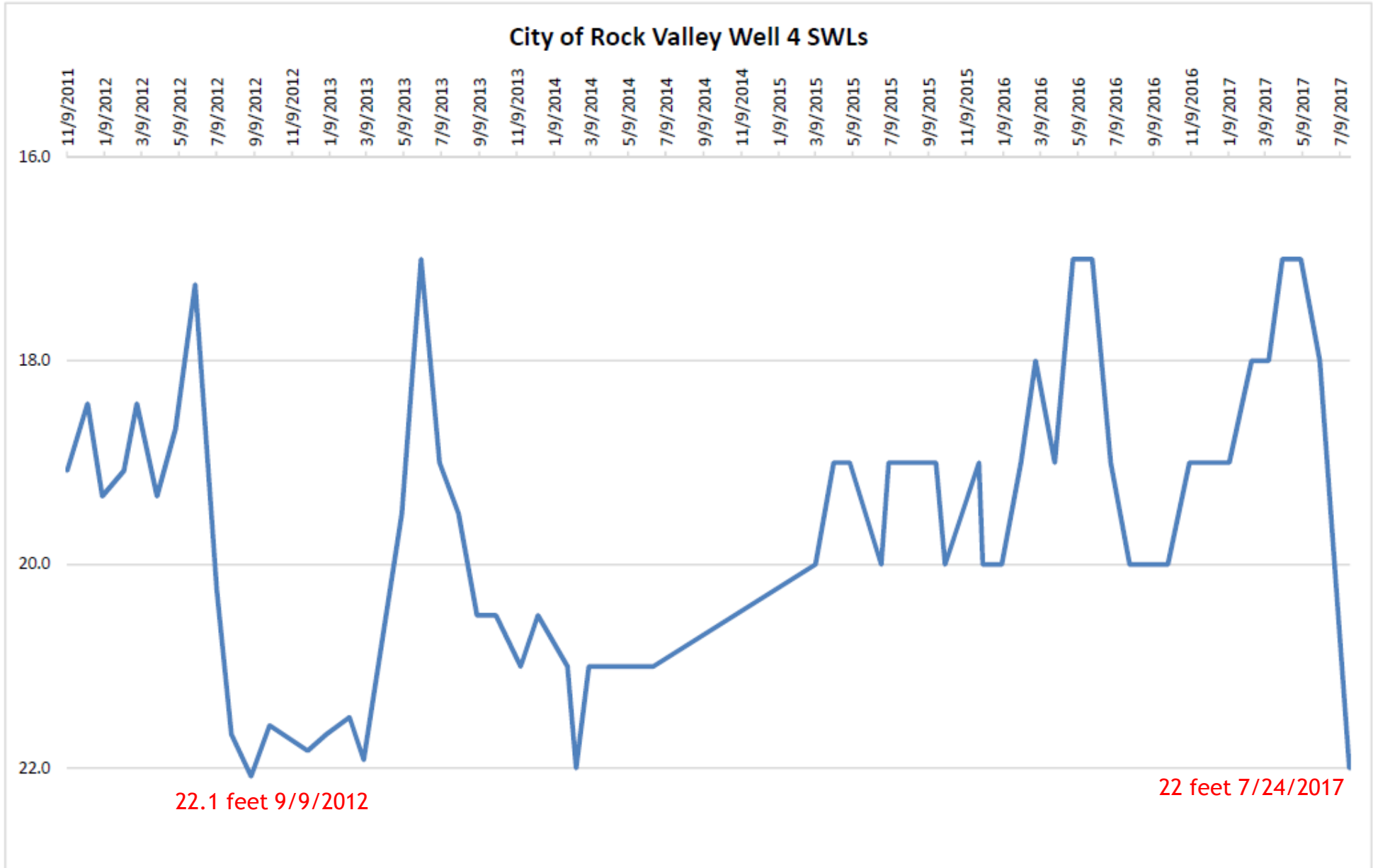

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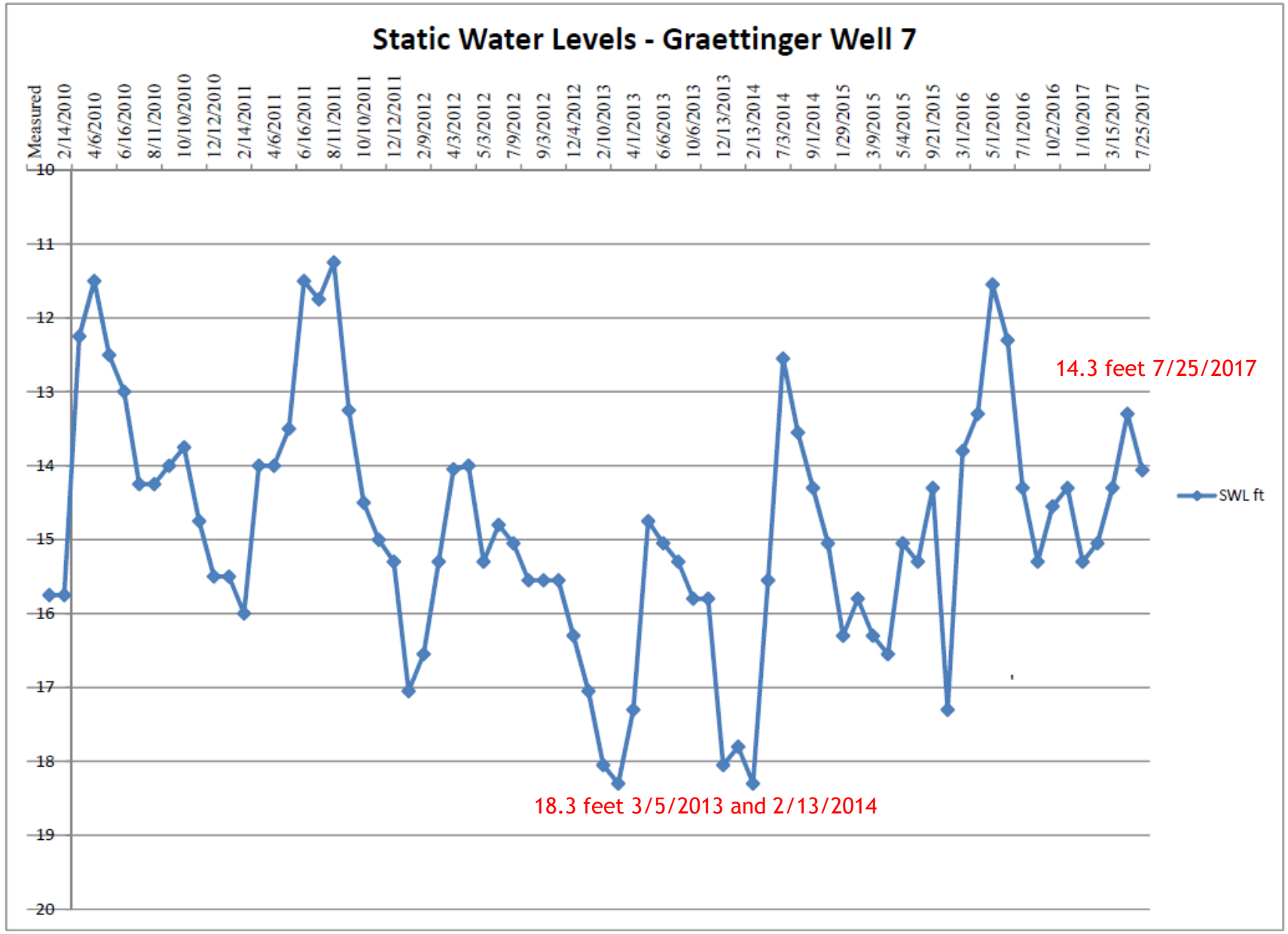

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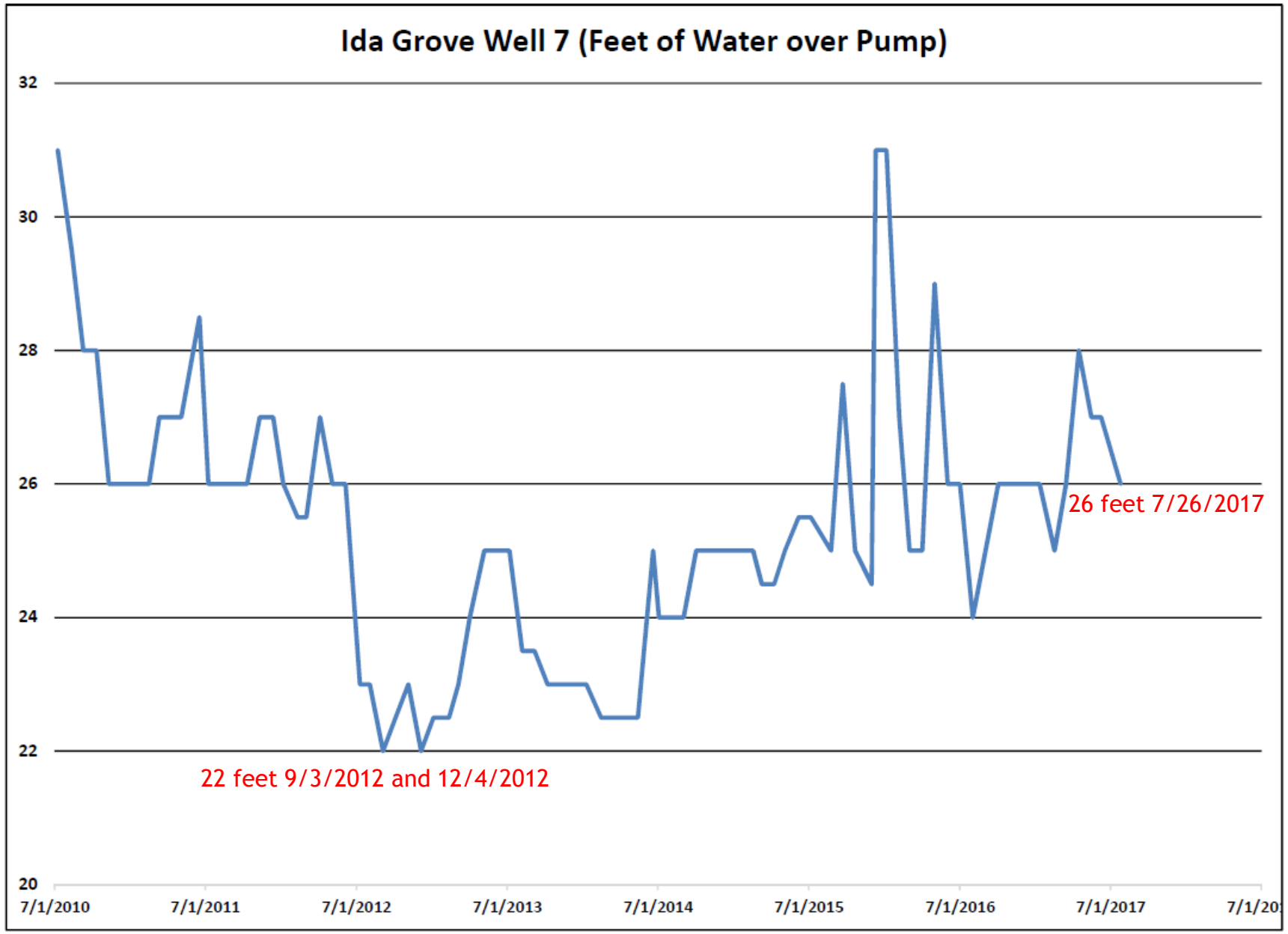

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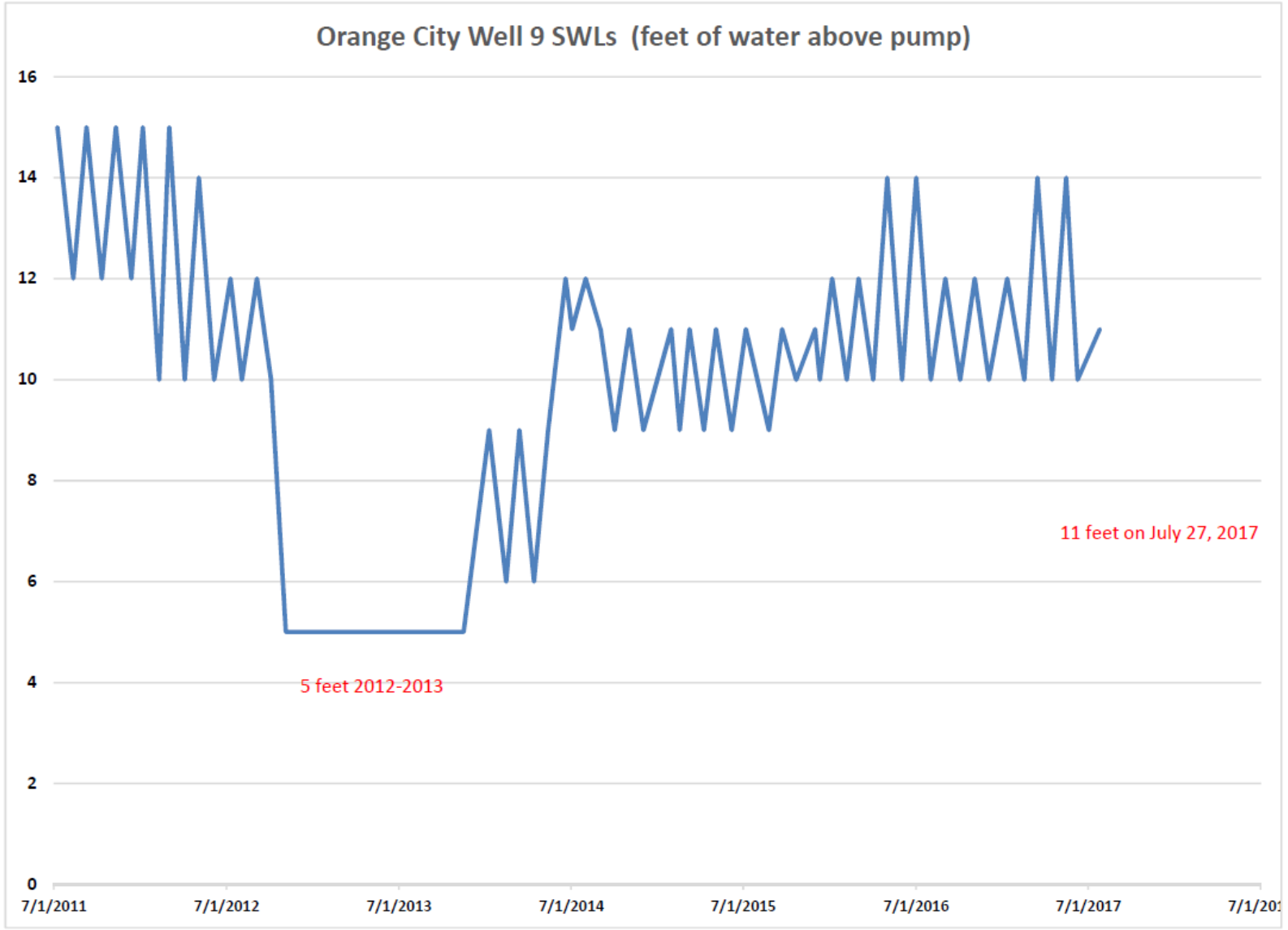

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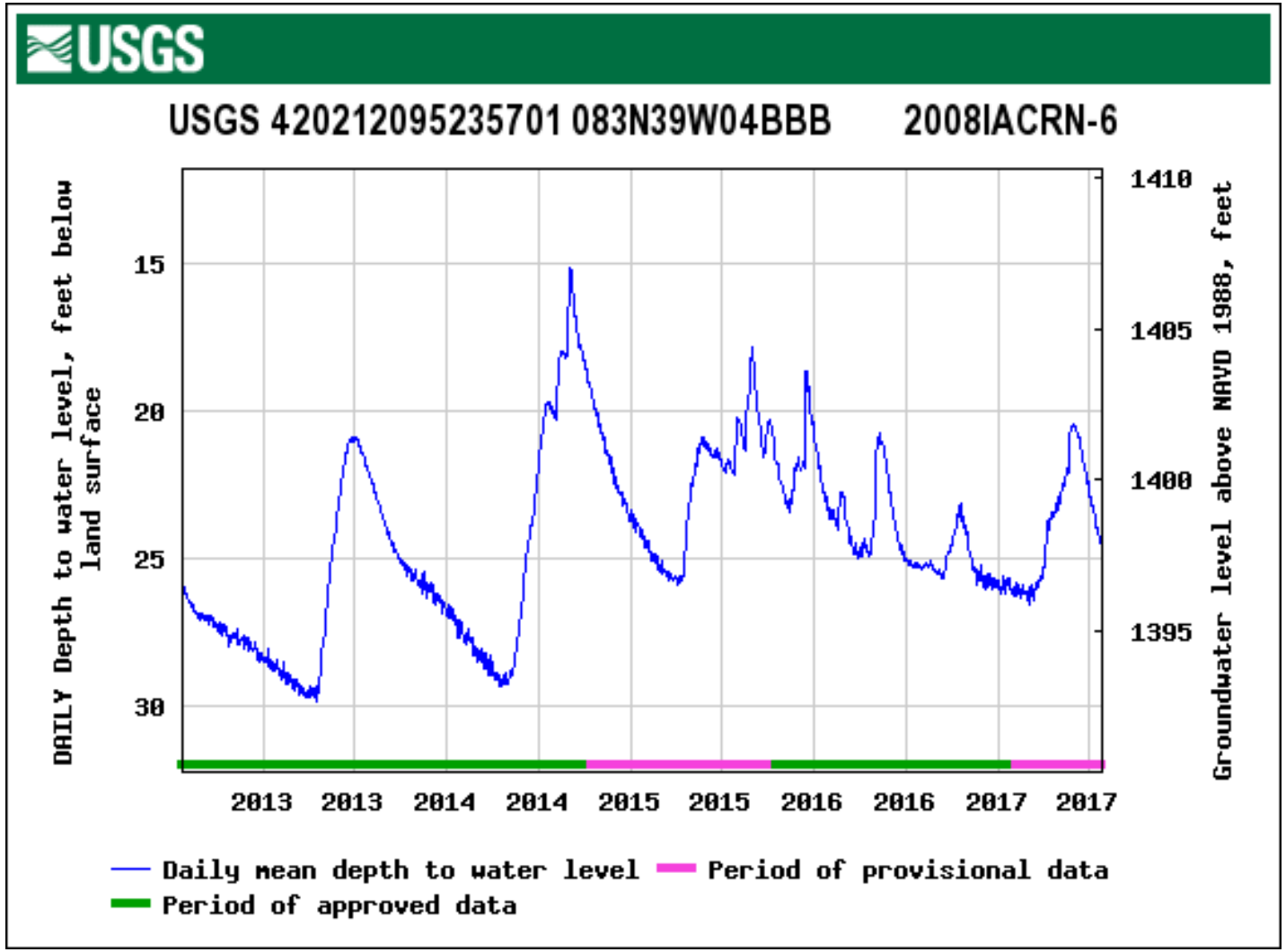
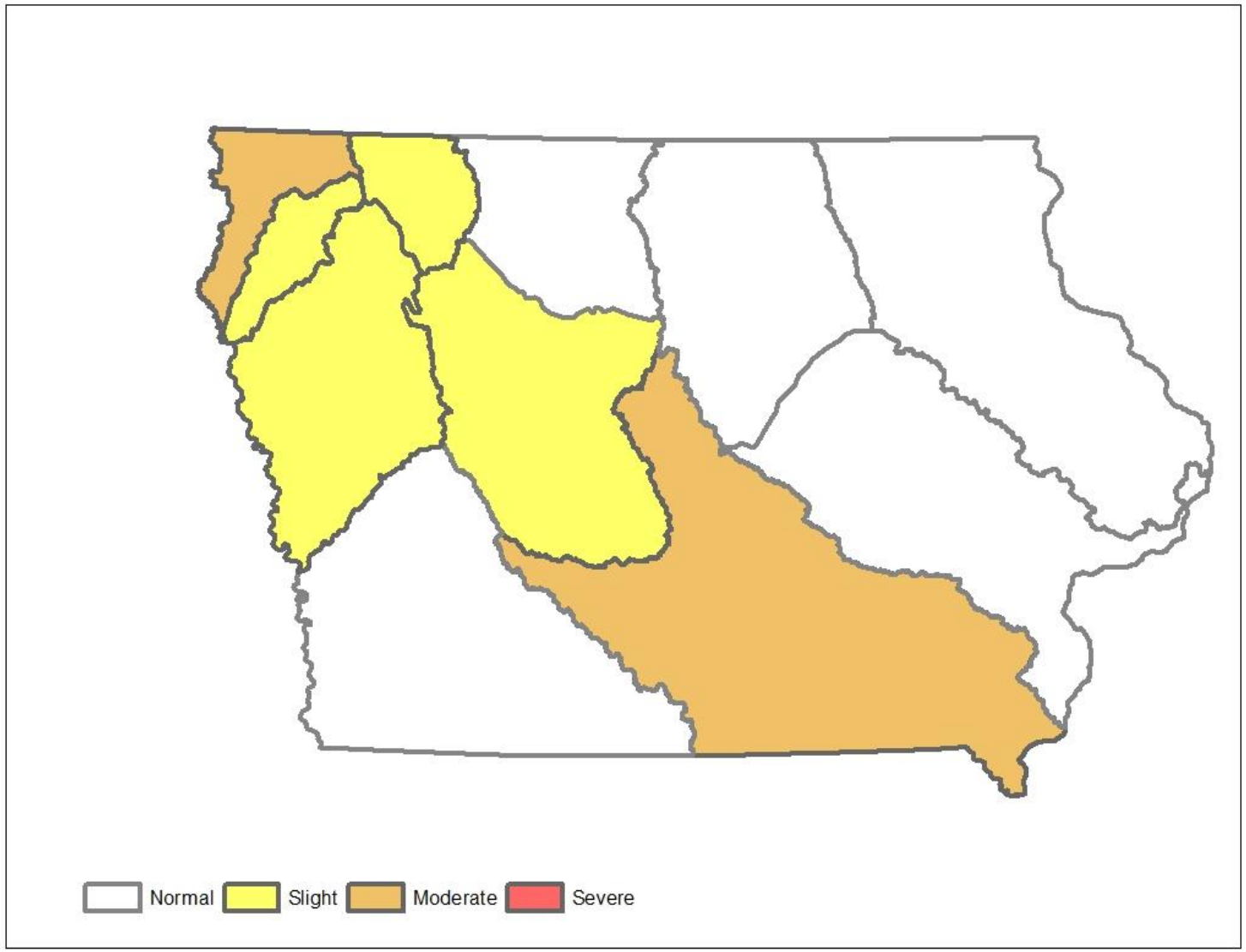
Near Denison in Crawford County



IOWA GEOLOGICAL SURVEY

Shallow Groundwater Conditions July 27, 2017



IOWA GEOLOGICAL SURVEY

Discussion

1. Shallow GW levels indicate slight to moderate drought conditions in NW, Central, and SE Iowa.
2. Measure SWLs, PWLS, and SPC more frequently.
3. Do you have secondary sources? Can you increase mixing ratio?
4. Keep a close eye on the streamflows upgradient and downgradient of your wellfield.
5. Do you have observations wells within your wellfield? Trigger levels for conservation?
6. Consider a drought assessment to help establish appropriate trigger levels.

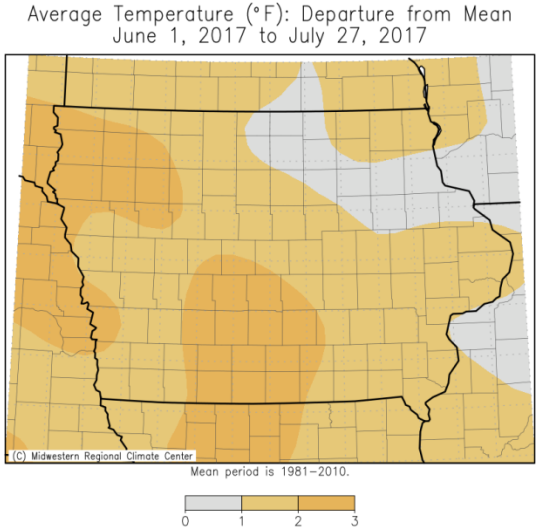
IOWA GEOLOGICAL SURVEY

IOWA GEOLOGICAL SURVEY IIHR Hydroscience & Engineering

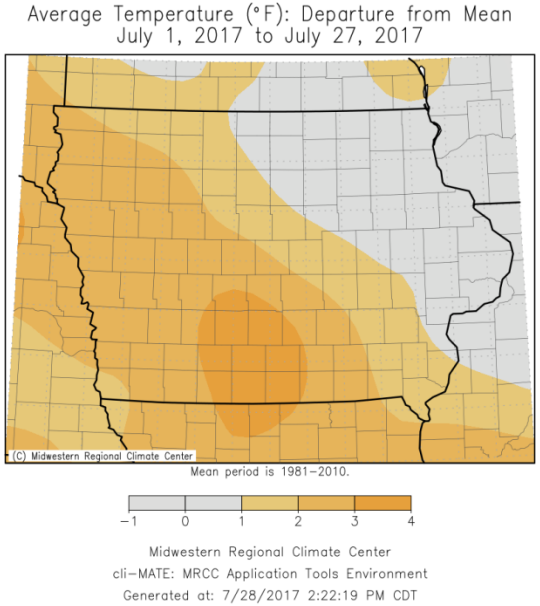
Summer 2017 Observed Weather and Outlooks for this Fall

Mike Gillispie, Hydrologist
National Weather Service
Sioux Falls, SD

Temperature Anomalies

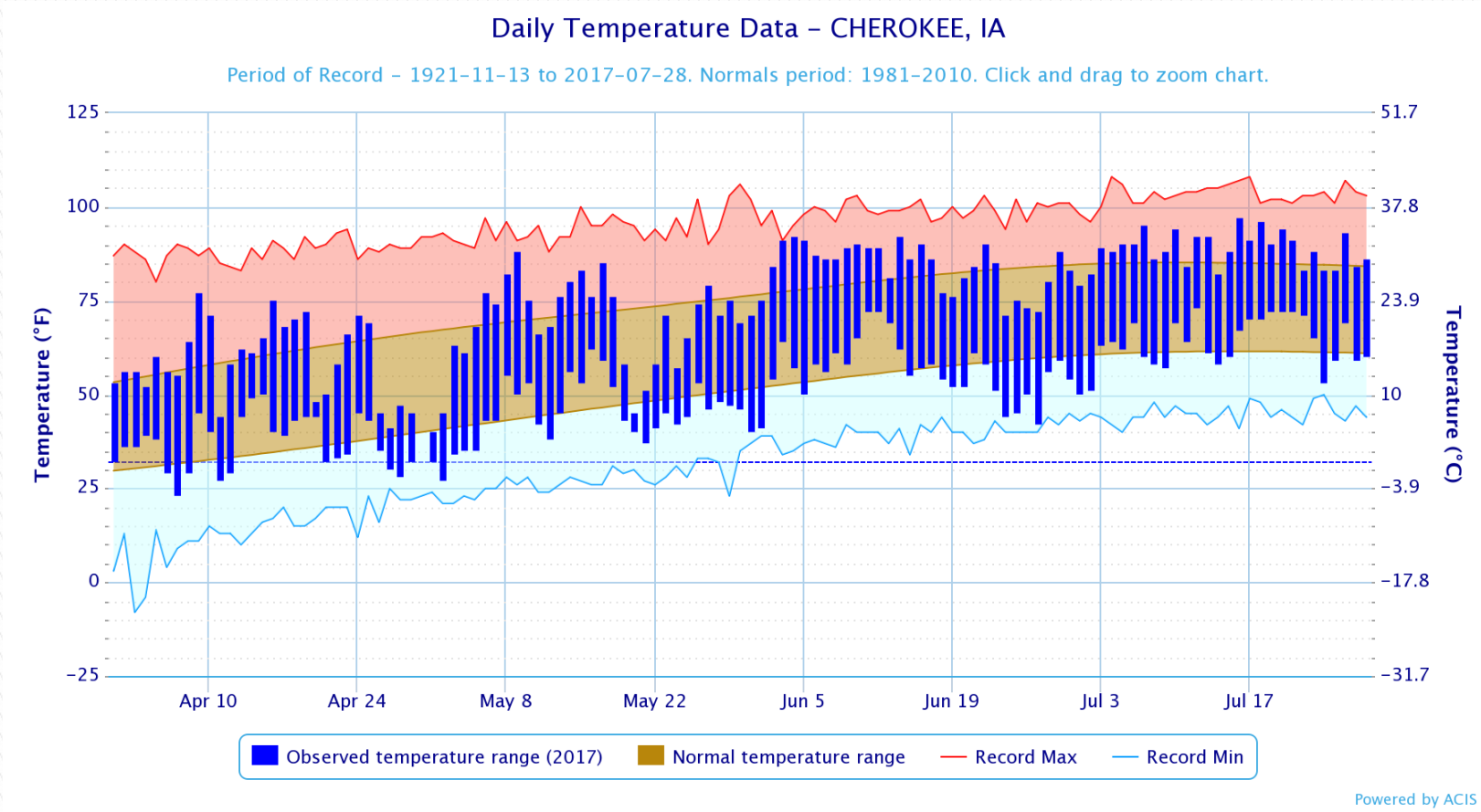


June – July 2017 Anomaly

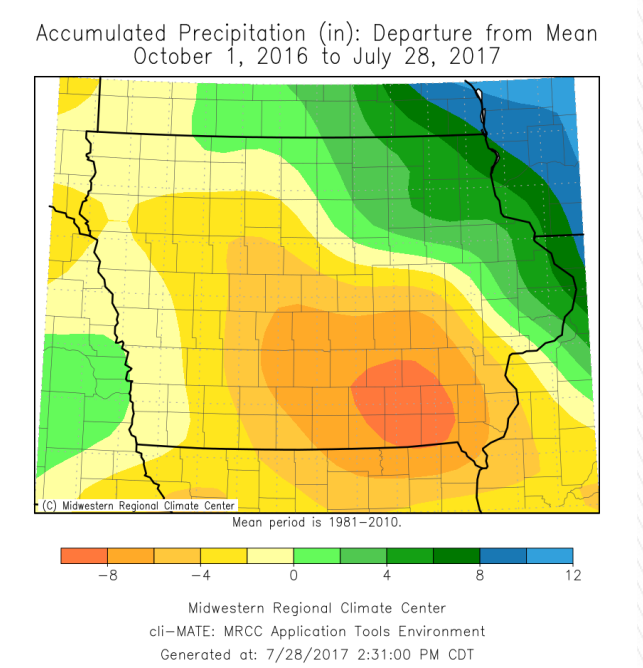


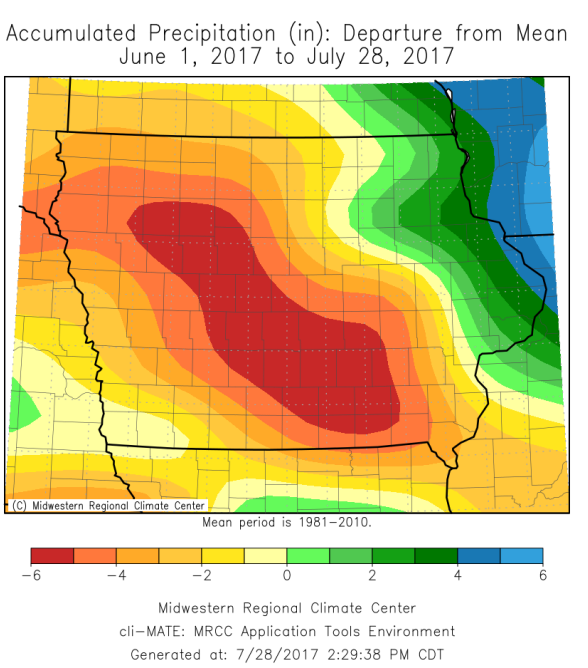
July 2017 Anomaly

Temperatures since April



Precipitation Anomalies

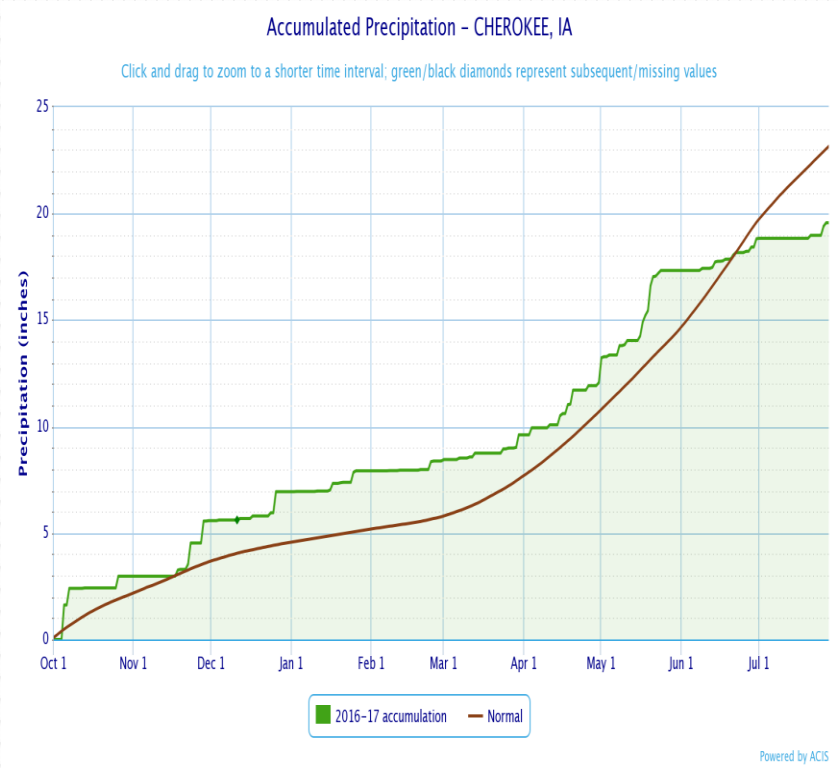


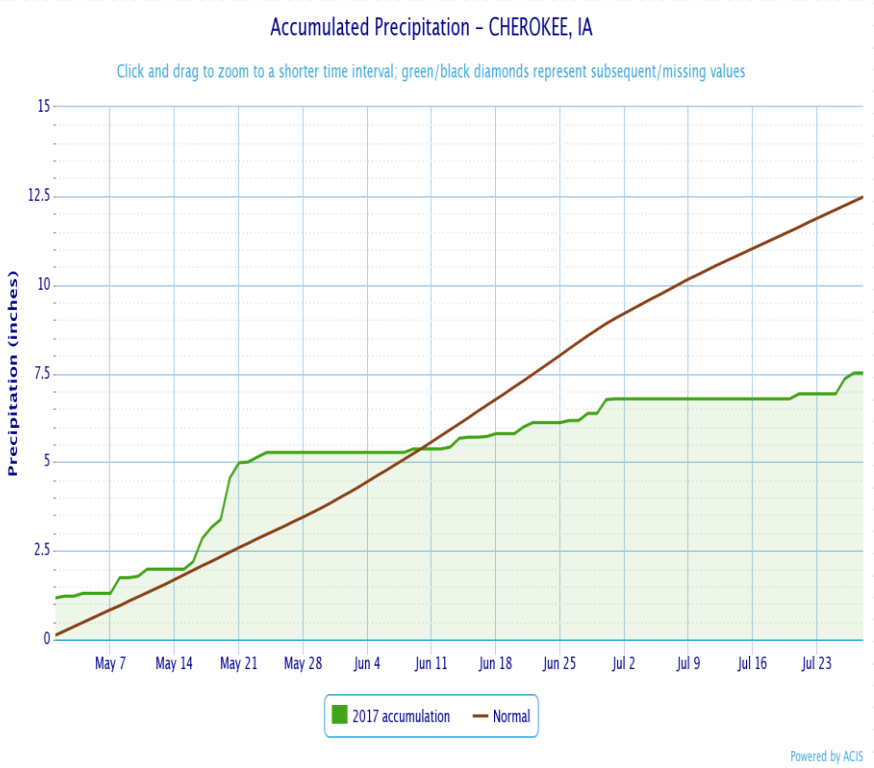


2017 Water Year (Oct – Jul)

Summer 2017 (Jun – Jul)

Precipitation Anomalies

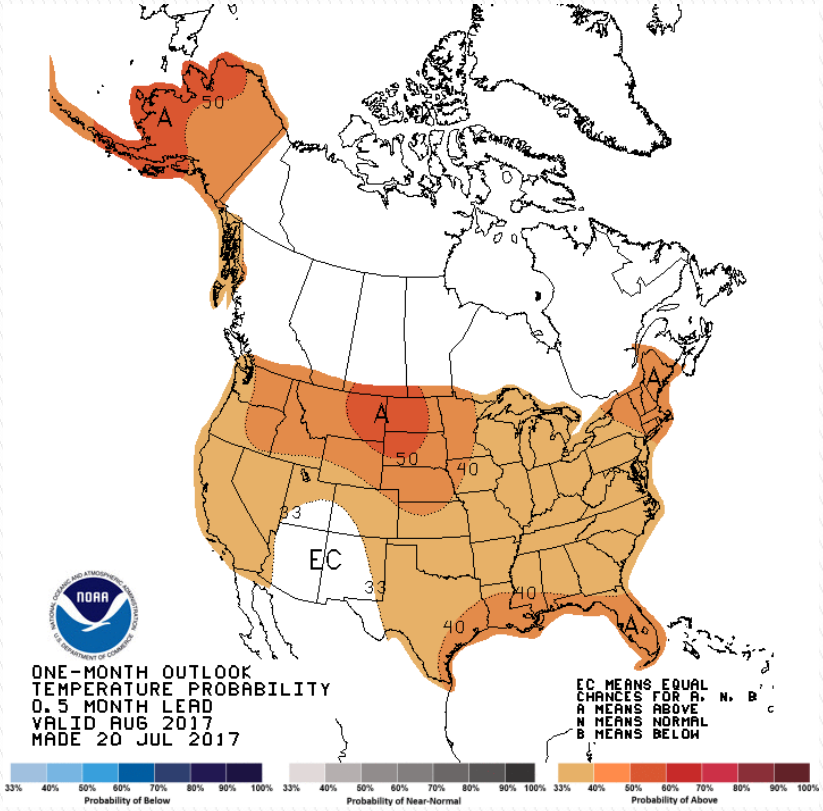




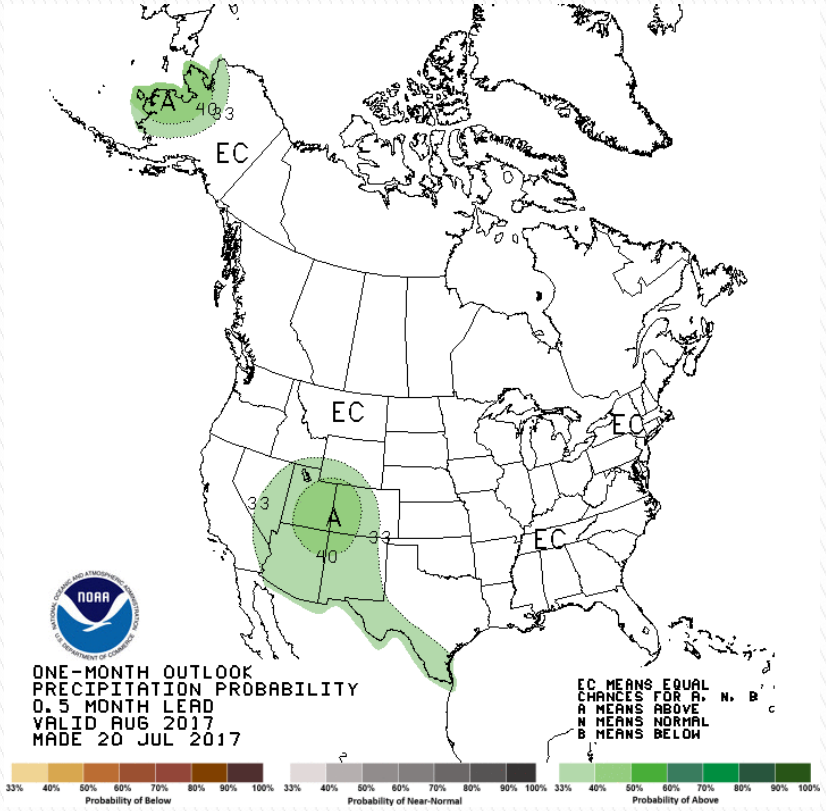
2017 Water Year (Oct – Jul)

May 1 – July 28, 2017

30 – 90 Day Outlooks

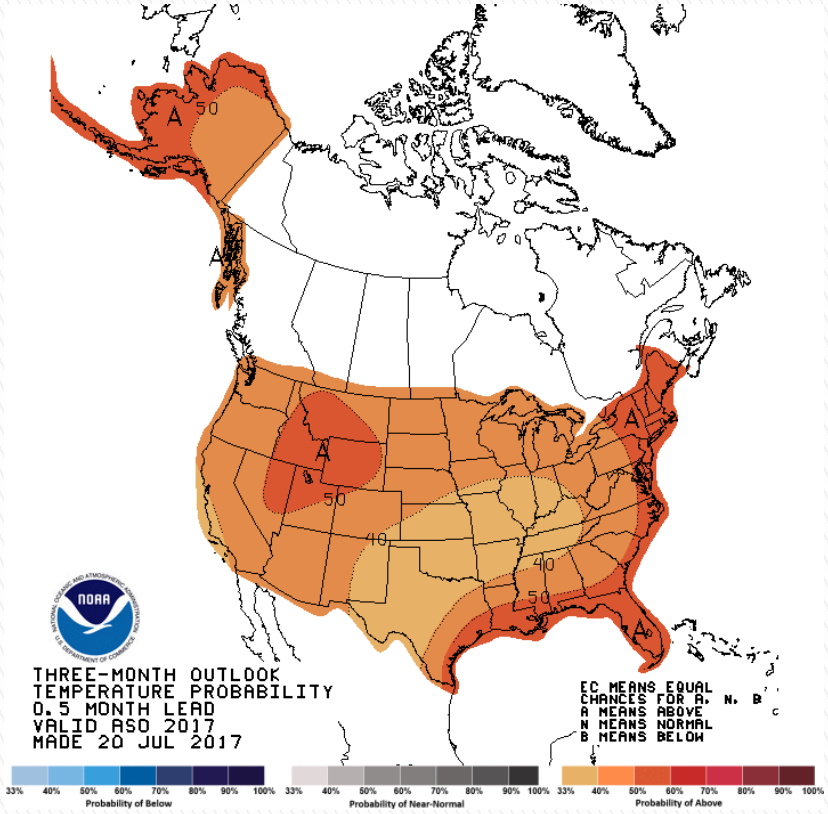


August Temperatures (CPC)

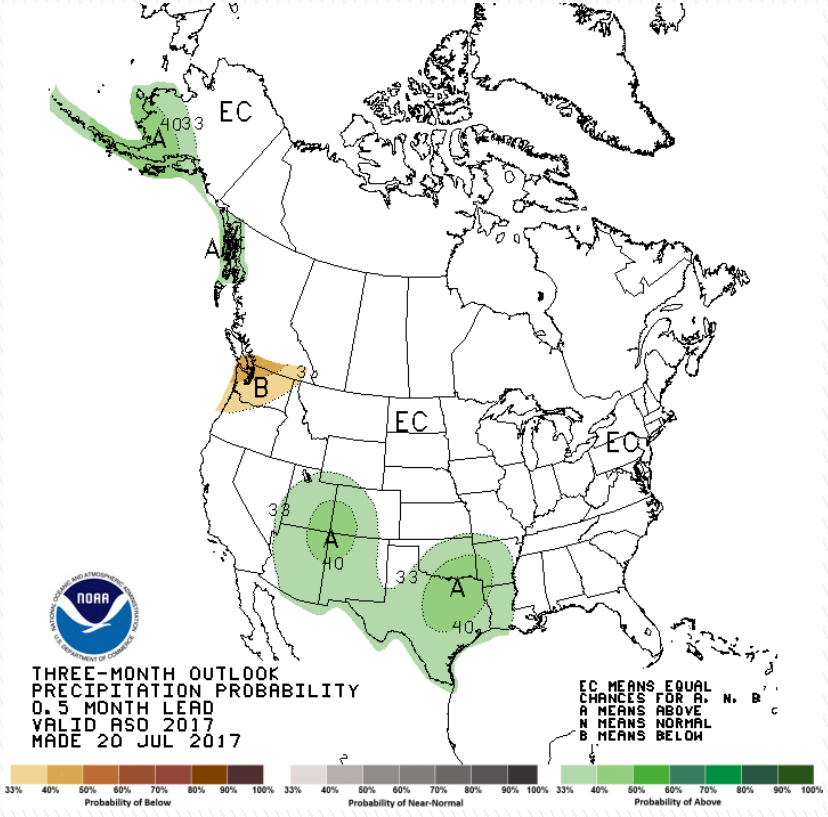


August Precipitation (CPC)

30 – 90 Day Outlooks

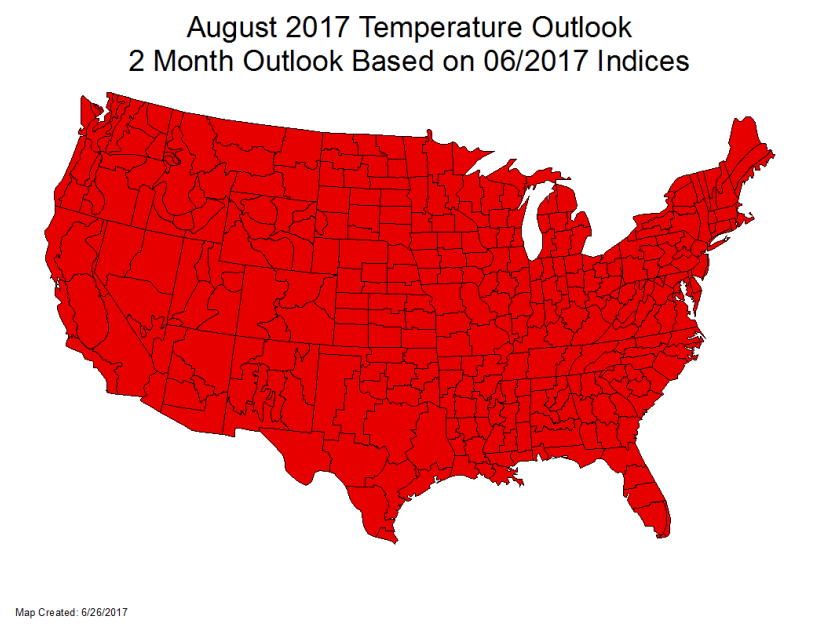


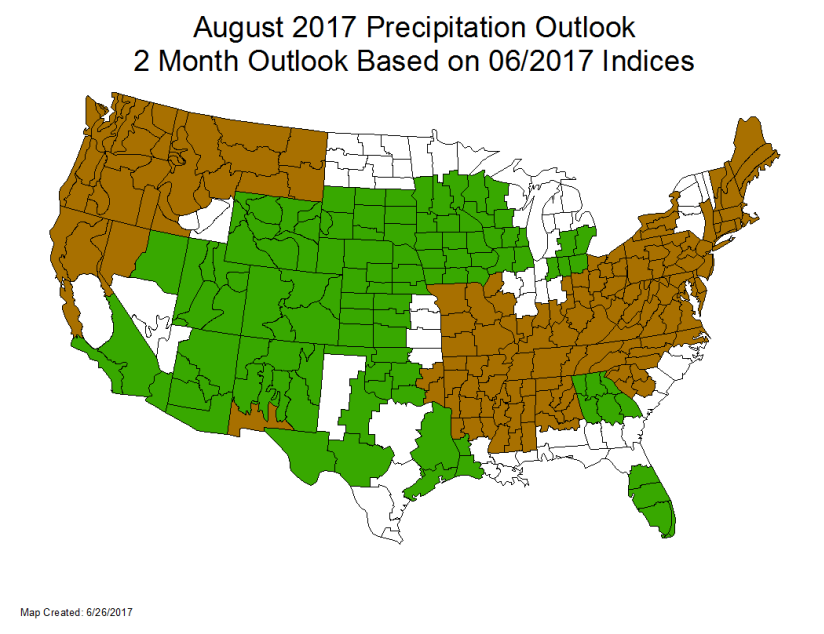
Aug – Oct Temperatures (CPC)



Aug – Oct Precipitation (CPC)

Experimental FSD Outlooks

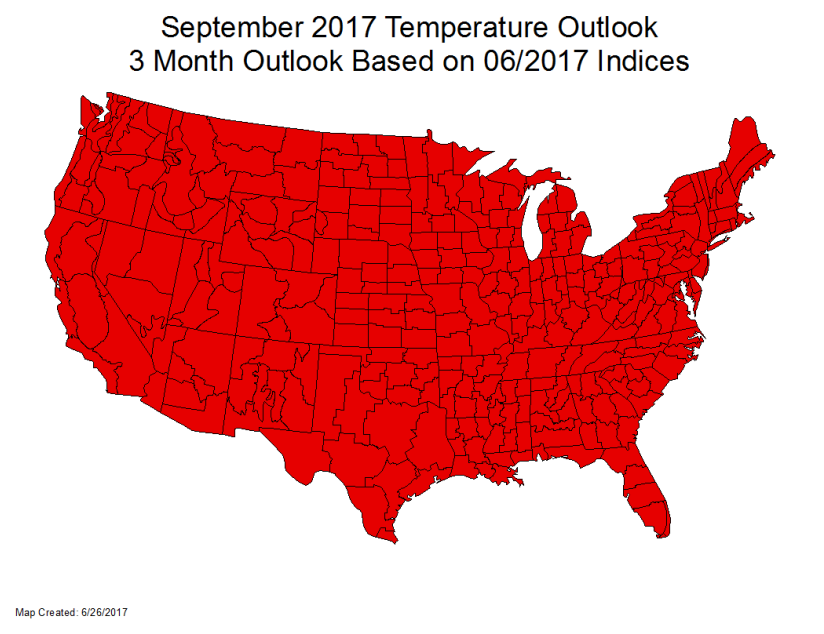


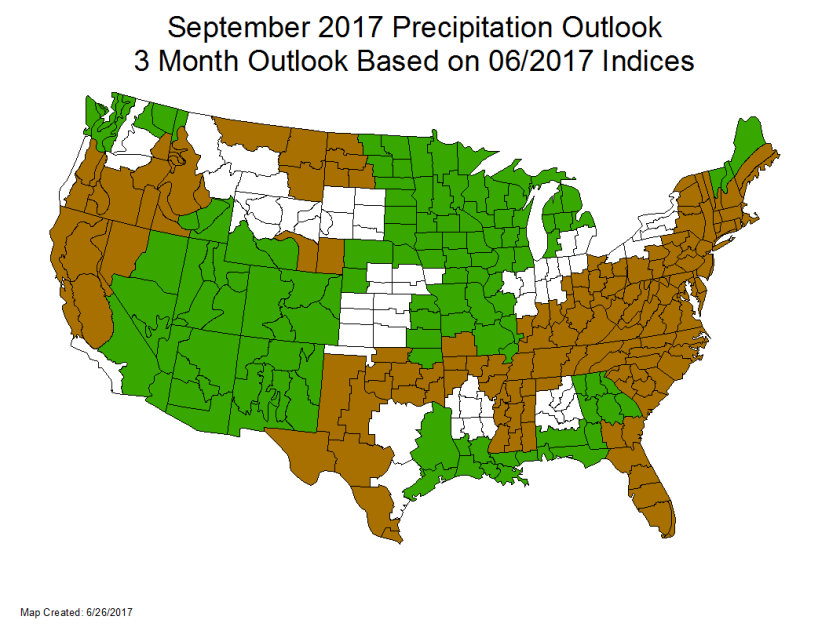


August Temperatures

August Precipitation

Experimental FSD Outlooks

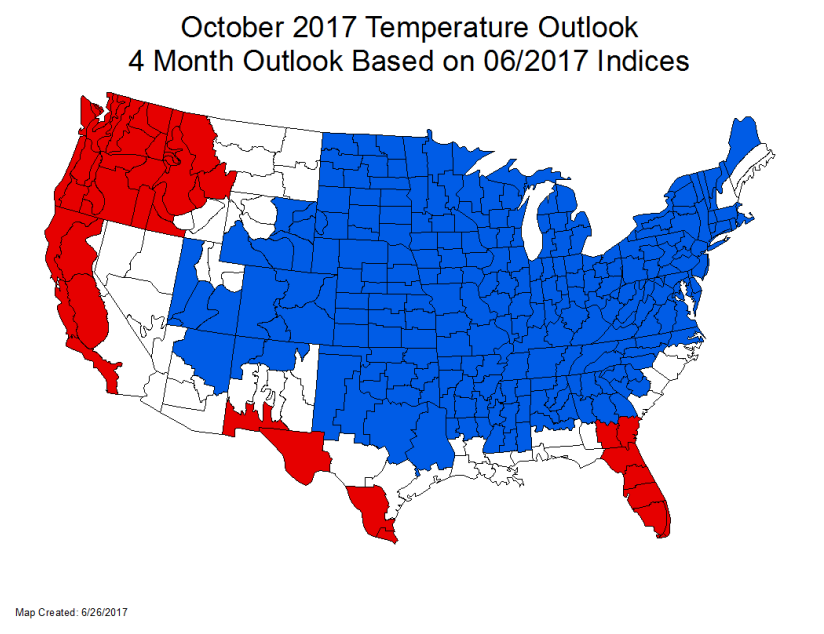


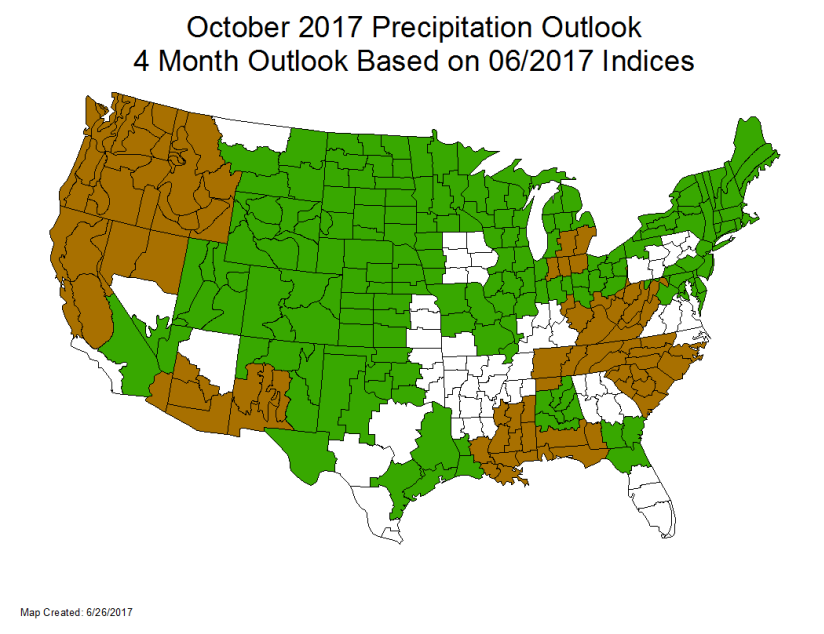


September Temperatures

September Precipitation

Experimental FSD Outlooks





October Temperatures

October Precipitation

Contact Information

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Sioux Falls, SD 57104

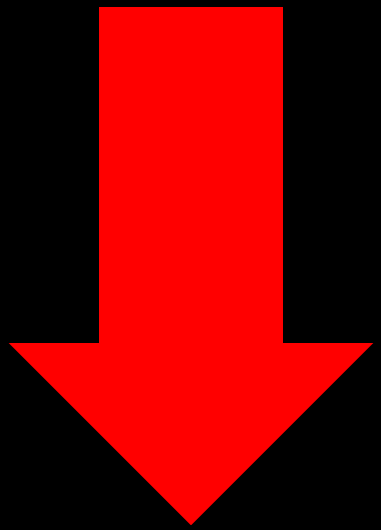
Email: michael.gillispie@noaa.gov

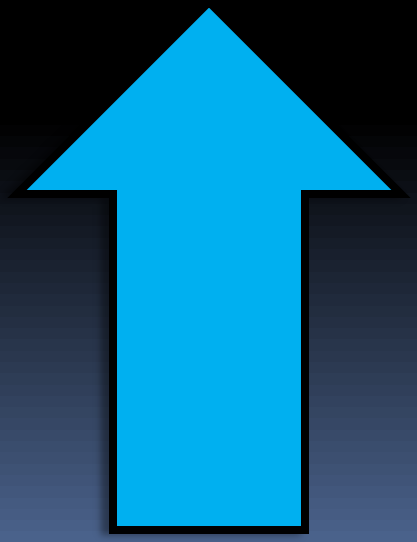
Phone: (605) 330-4247

Northwest Iowa Drought Issues

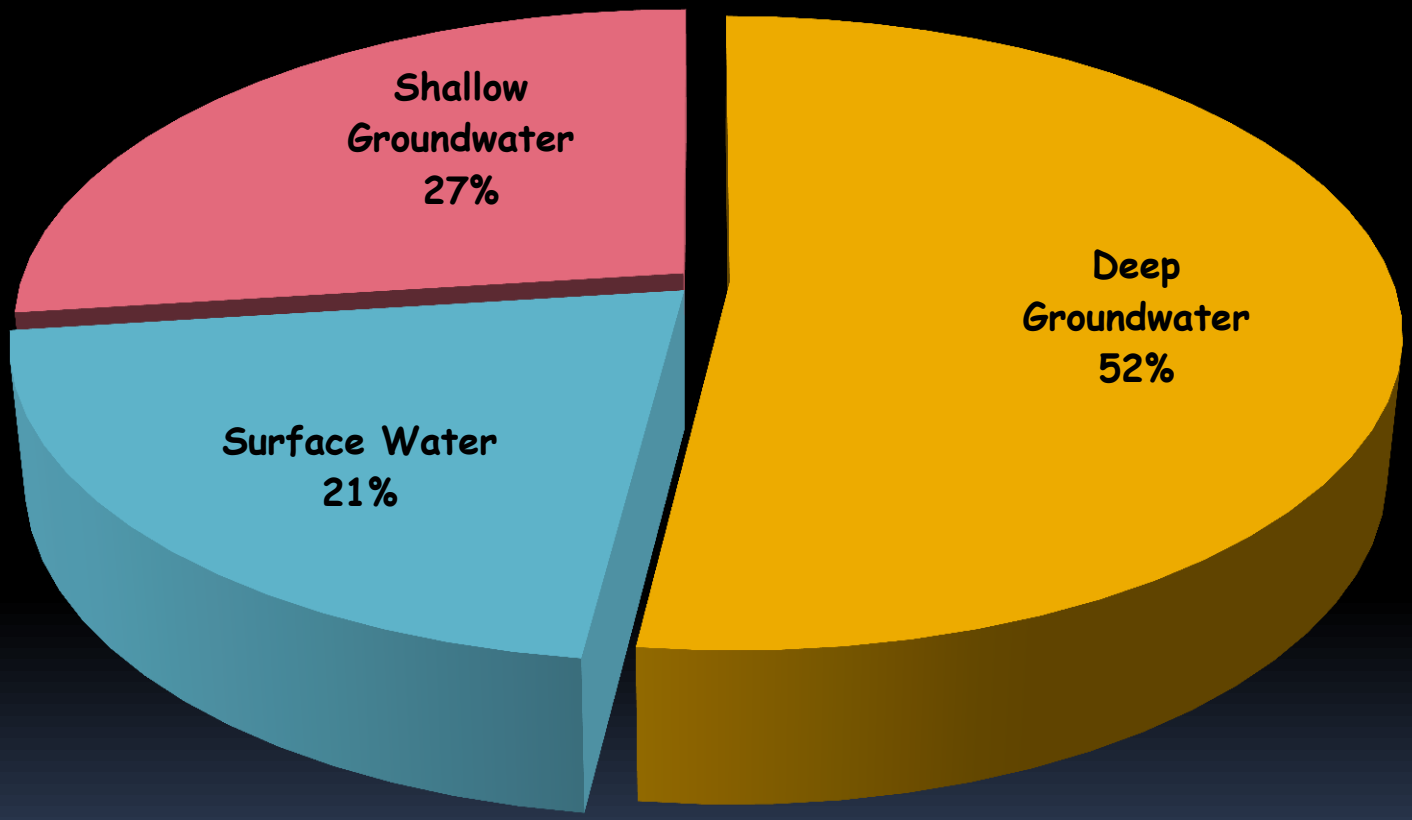
Julie Sievers
Iowa DNR
July 31, 2017

Supply and Demand - Groundwater



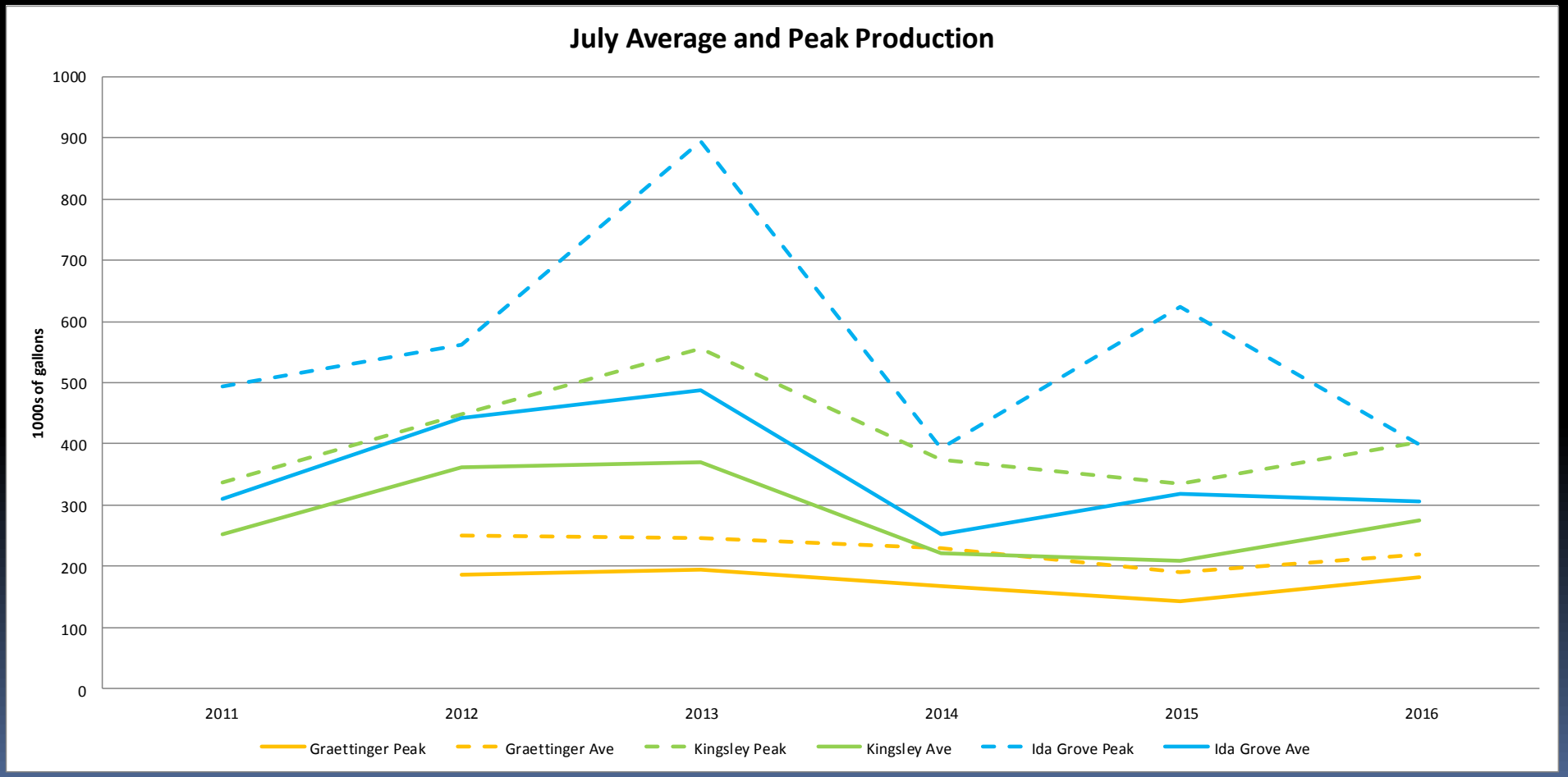


Source of Drinking Water in Iowa

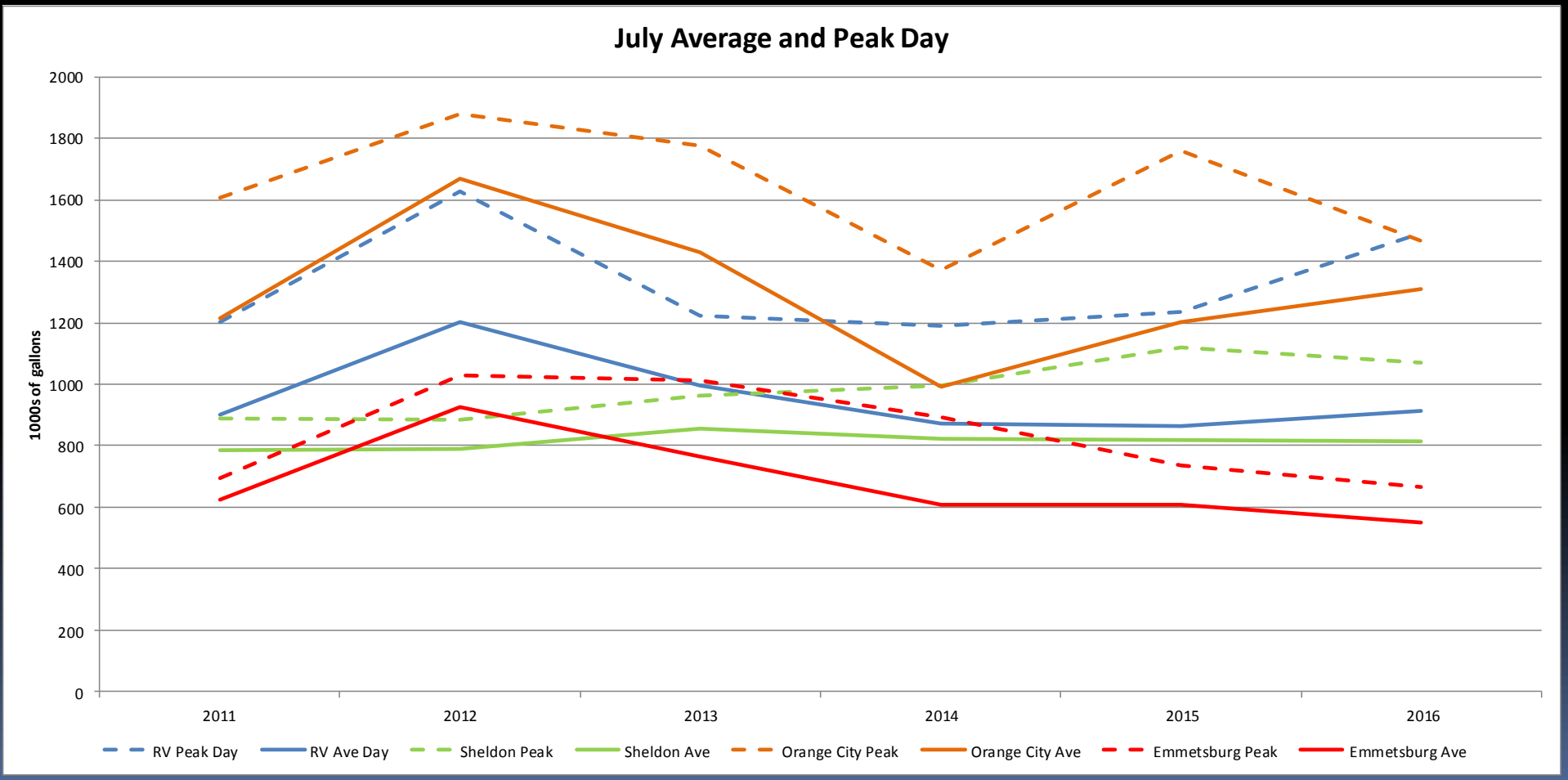


In Northwest Iowa, water is limited so many systems rely on shallow groundwater sources.

July Average and Peak Day Usage for 3 Small Municipal Systems



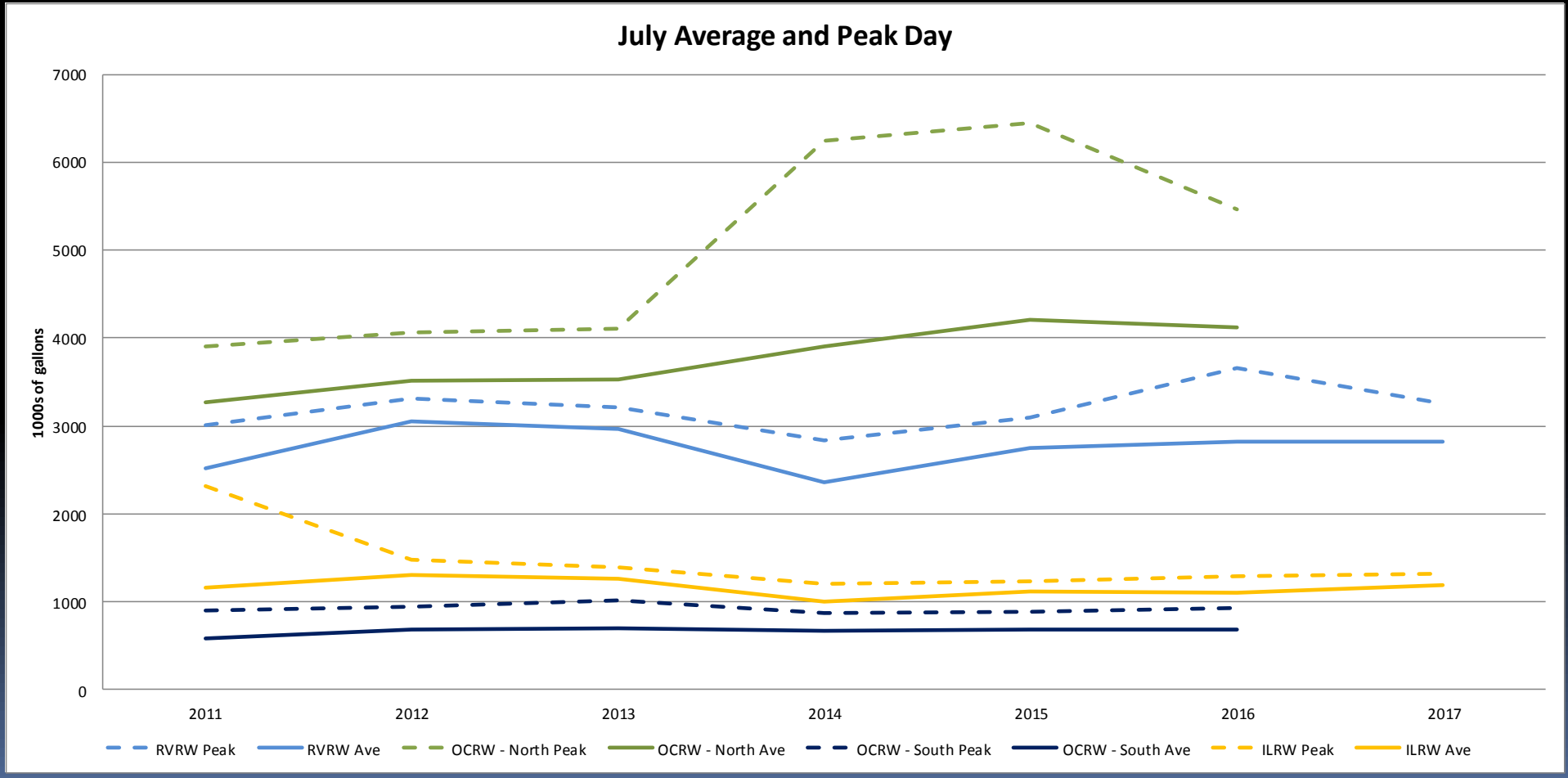
July Average and Peak Day Usage for 4 Larger Municipal Systems



Municipal Water Systems

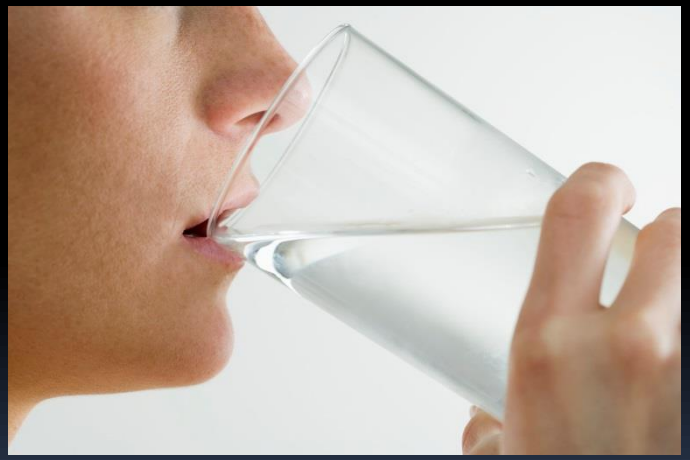
- Include many uses that can be limited or curtailed in drought situations
- Prepare/update conservation plan - 2 elements
  - Actions and steps
    - Limit/ban irrigation & lawn watering, car washing, etc.
  - Triggers on when to request/require – based on what?
- Generally see significant reduction in water use during conservation

July Average and Peak Day Usage for Four Rural Water Systems



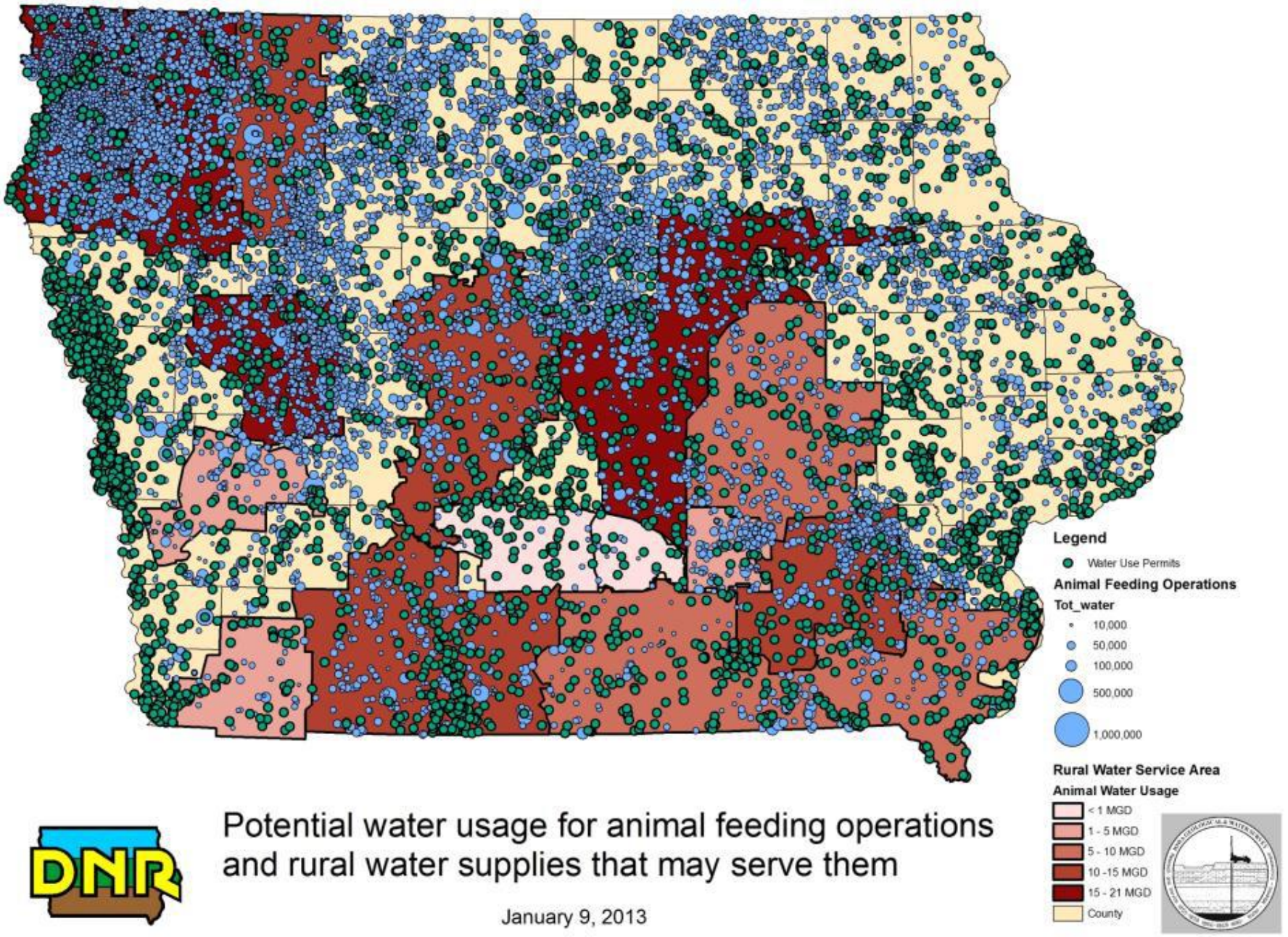
Rural Water Systems

- Supply for human needs
- Supply for livestock water needs



Livestock Usage

- Considerable portion of rural water system demand is for livestock
  - One system ~ 25%
  - Remainder ~ 60 – 95%
- Little reduction in use under conservation
  - Cannot decrease livestock use in hot, dry weather conditions



Potential water usage for animal feeding operations and rural water supplies that may serve them

January 9, 2013

Actions and Discussion

- Monitor conditions
- Prepare for the worst, hope for the best
- Failure of private wells
- Water quality concerns
- Not just a source issue – treatment and hydraulics
- Concerns about being able to get water to location needed if trucking or hauling water
- On-site storage for livestock facilities
- Interference complaints

Tools

- Drought monitor
- Water Summary
- WaterWise
- System specific information
- Handout

Typical Drought Planning Process

Where does the public think we are now?

Where should we be now?

Questions???

Julie Sievers
IDNR FO3
Spencer
712-262-4177
Julie.sievers@dnr.iowa.gov

Monday, July 31, 2017

WATER ALLOCATION AND PRIORITIZATION

CHEROKEE

Iowa's Water Use Program

Michael Anderson - Iowa DNR – Water Supply Engineering

EXISTING ALLOCATION/PRIORITIZATION SYSTEM

BASED ON IOWA WATER LAW ADOPTED IN THE 1950's

THE PURPOSE OF THE LAW IS TO:

"...assure that water resources be put to beneficial use to fullest extent possible, that waste or unreasonable use of water be prevented, and that conservation be required".

BENEFICIAL USE

USE, NOT OWNERSHIP

"WATER IS CONSIDERED A "WEALTH" OF THE PEOPLE OF THE STATE.

HOW DO WE ALLOCATE WATER?

IOWA CODE: ALL WATERS ARE "*PUBLIC WATERS AND PUBLIC WEALTH*" OF IOWA CITIZENS. IOWA STATUTE PROVIDES AN ALLOCATION SYSTEM BASED ON "*BENEFICIAL USE*".

Waste, unreasonable use, and unreasonable methods of water use are prevented.

Water conservation is expected.

COMPETING USES: Iowa's water allocation program sorts through competing uses

A permitting program to ensure consistency in decisions on use of water.

Ensure water is available for normal [unregulated] domestic and livestock use.
Provisions for public involvement in issuing water allocation permits.

Administrative procedure to resolve use conflicts.

WHY A PERMIT SYSTEM?

WATER PERMITS ARE USED IN IOWA TO ASSURE "WATER RIGHTS".

ALL WATER PERMITS ARE 'TIED" TO THE LAND IN QUESTION. THEY REMAIN AN APPURTENANCE TO THE LAND. IF A PROPERTY IS SOLD, IT DOES NOT FOLLOW THE PERSON.

ALL PERMIT MUST CONSIDER "EFFECT ON THE NATURAL FLOW" AND THE RIVER'S ESTABLISHED "AVERAGE MINIMUM FLOW".

GOAL IS TO MAINTAIN LEVEL TO SATISFY DEMAND.
ALSO MUST CONSIDER EFFECTS ON LANDOWNERS WITH "PRIOR OR SUPERIOR RIGHTS

PERMIT SYSTEM

WITHDRAWALS IN EXCESS OF 25,000 GALLONS/DAY FROM STREAMS OR AQUIFERS REQUIRE A PERMIT FROM IDNR.

PERMIT EVALUATIONS/SUMMARY REPORTS

WHO GETS WATER?

FROM 1985 IOWA WATER PLAN:

DROUGHT ALLOCATION PRIORITIES

COMMONLY REFERRED TO AS THE PRIORITY LIST . . . OR "WHO GETS CUT OFF FIRST."

1. Self-supplied domestic: non-regulated, self-supplied withdrawal with limited ability for water elsewhere.
2. Domestic part of rural water & municipal systems: water for preserving human life & welfare.
3. Livestock: water for preservation of animal life.
4. Power: water used incidental to power generation.
5. Industrial: water used by commercial and industrial facilities.
6. Non-traditional irrigation: water for fruit, vegetables & other newly introduced crops.
7. Irrigation of traditional Iowa crops: water for soybeans, corn, alfalfa, etc.
8. Recreation: water for lawn and golf course watering, car washing, other incidental uses.
9. Out of state export: water exported to another state.

PRIORITY ALLOCATION RESTRICTIONS

567 – 52.10(455B), IAC. TRIGGERING EVENTS --- "DROUGHT" IS AN ELUSIVE CONCEPT. GOVERNOR'S TASK FORCE OFTEN DEFINES.

DROUGHT MONITOR USES CONCEPT OF AGRICULTURAL, HYDROLOGICAL DROUGHTS.

NOT INVOKED IN "DROUGHTS" OF 1988-89, OR IN 2000-2002. NOR IN 2005. OR LAST DROUGHT EITHER.

EXPECTATIONS FOR THIS SUMMER

It is likely that we will see situations where the demand for water exceeds the supply of water . . . what happens then?

SO WHAT HAPPENS?

PRACTICALLY, IT IS DNR'S RESPONSIBILITY TO SORT THIS OUT.

HOW WOULD WE DO THAT?

REALITY: WATER USE AND WATER AVAILABILITY IS LOCALIZED . . .

SUPPLY AND DEMAND CAN VARY GREATLY FROM ONE COMMUNITY OR REGION TO THE NEXT.

DECISIONS ABOUT WATER USE, ALLOCATION, AND PRIORITIES BEST TAKE PLACE AT THE LOCAL LEVEL –

GUIDED BY DNR SCIENCE, DATA, AND TECHNICAL ASSISTANCE.

A STATEWIDE “REDUCTION” OR STATEWIDE CONSERVATION MEASURES WOULD NOT MAKE A GREAT DEAL OF SENSE.

TECHNICAL ASSISTANCE?

WHAT WOULD THAT LOOK LIKE?

ASSISTANCE IN THE DEVELOPMENT OF WATER CONSERVATION PLANS.

ASSISTANCE IN UNDERSTANDING LOCAL GROUNDWATER OR STREAM FLOW CONDITIONS.

ASSISTANCE IN EVALUATING POTENTIAL LOCATIONS FOR A NEW WELL – FOLLOWED BY EXPEDITED PERMITTING.

Addressing complaints

- The rule in question: 52.4(2)”d” What does that look like?

  ”Other conditions may be imposed if they are necessary to ensure protection…for fish and wildlife, for recreational use, for the preservation and the enhancement of aesthetic values, and for other uses of a public nature”

  Adjusting operation conditions is superior to imposing conditions to an existing permit

Some available plans

- Bloomfield
- Chariton
- Shenandoah
- Spirit Lake
- UNI
- Alliant
- Many others

For Information:

- **Water Supply-Allocation Program**

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The U.S. Drought Monitor 101: Percentiles, Parameters, People and Process

Dennis Todey
Director USDA Midwest Climate Hub
Ames, IA

Mark Svoboda, Director, Climatologist

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

NW IA Drought Meeting, Cherokee, IA

July 31, 2017

The Climate Hubs

Regional Climate Hubs are providing **Information and Tools** to **Decision Makers** to **Build Resilience** to climate variability.

Midwest Climate Hub

National Drought Mitigation Center

Agricultural Research Service

The Need for Climate Hubs

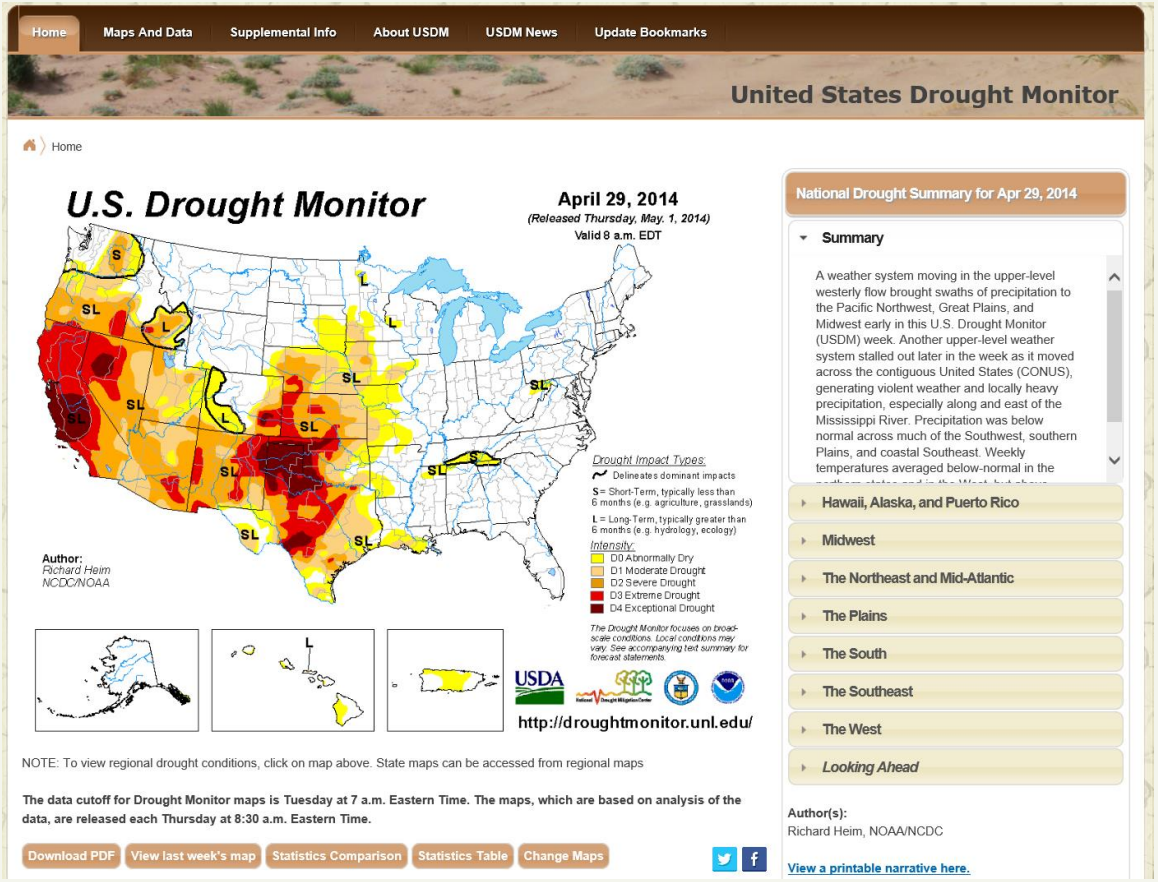
- Increasing climate variability
- An increase in number and intensity of extreme events
- Changing trends in climate and weather
- Added stress that to agriculture and the natural resources

The More you Know…
Information Leads to Action

U.S. Drought Monitor (USDM):

- *droughtmonitor.unl.edu*

- State-of-the-science drought assessment in the U.S. since 1999
  - Collaborative effort between NOAA, USDA and NDMC
- Composite indicator blends objective indicators and indices with field input from over ~400 experts
- Policy implications in Farm Bill (USDA), IRS, NOAA-NWS and several state drought plans and task forces
- "Go to source" for media and the public

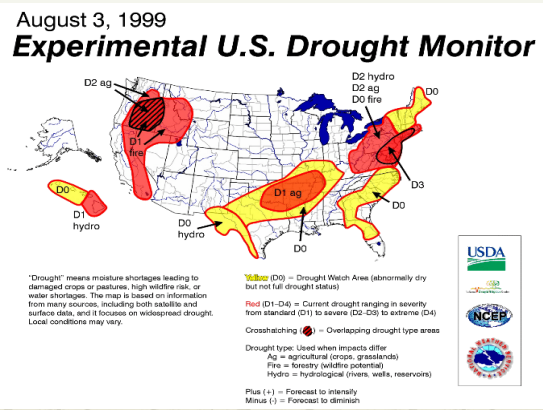


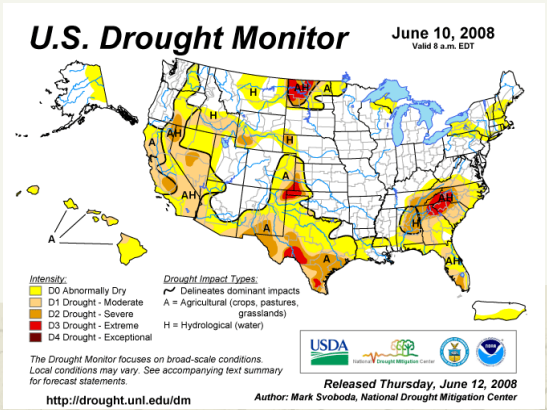
National Drought Mitigation Center

The U.S. Drought Monitor

Since 1999, NOAA (CPC, NCDC, WRCC), USDA, and the NDMC have produced a weekly composite drought map -- the U.S. Drought Monitor -- with input from numerous federal and non-federal agencies

- **Western Region Climate Center on board 2008**
- **12 authors in all**
- **Incorporate relevant information and products from all entities (and levels of government) dealing with drought (RCC's, SC's, federal/state agencies, etc.) *(~425 experts)***





National Drought Mitigation Center

Objectives

- Assessment of **current** conditions
- ***NOT*** a forecast or drought declaration
  - Can be used in this way though
- Identify **impacts** (S, L)
- Incorporate **local expert** input
- Be as **objective** as possible (percentiles)
- ***"Convergence of evidence"*** approach

USDM Approach

- **"Convergence of Evidence"**
  - Many types of drought "information" can be collectively analyzed to *determine if the majority of information is 'converging' (telling the same story)* about the accuracy, or inaccuracy, of the drought as depicted by the USDM
  - Need to *look at 100% of the data, BUT don't believe in any one piece of data input 100%* in making a decision…
  - *Multiple indicators and types of information* that describe different hydroclimatic parameters are needed to get a complete picture of a drought indicator's performance
  - *Impacts are the "ground truth"*, yet aren't monitored….you can't measure what you don't monitor!

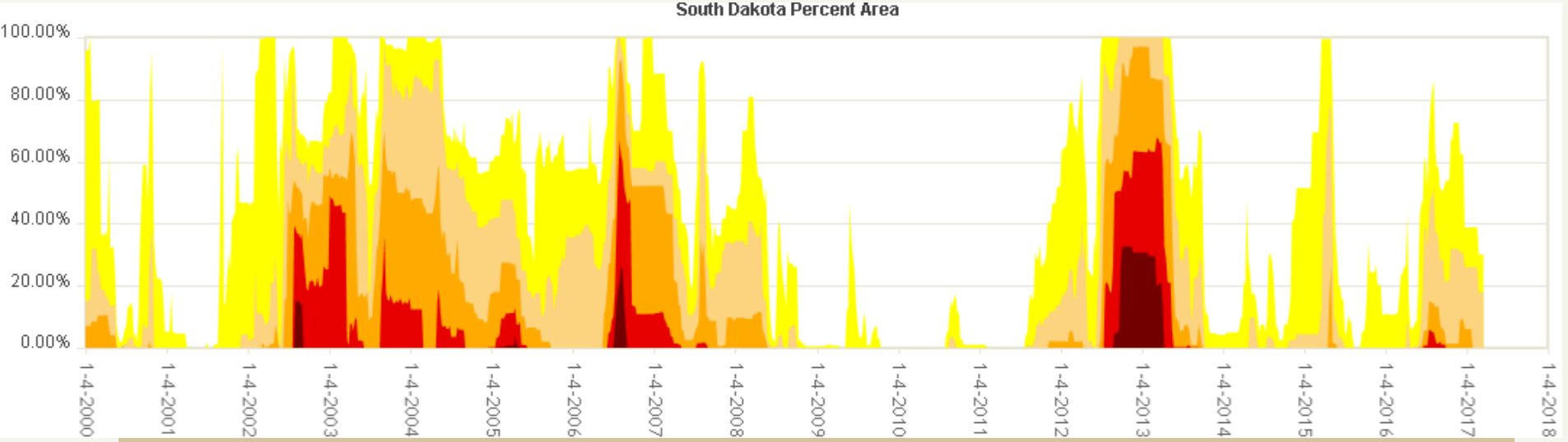
National Drought Mitigation Center

PERCENTILES

Percentiles and the U.S. Drought Monitor

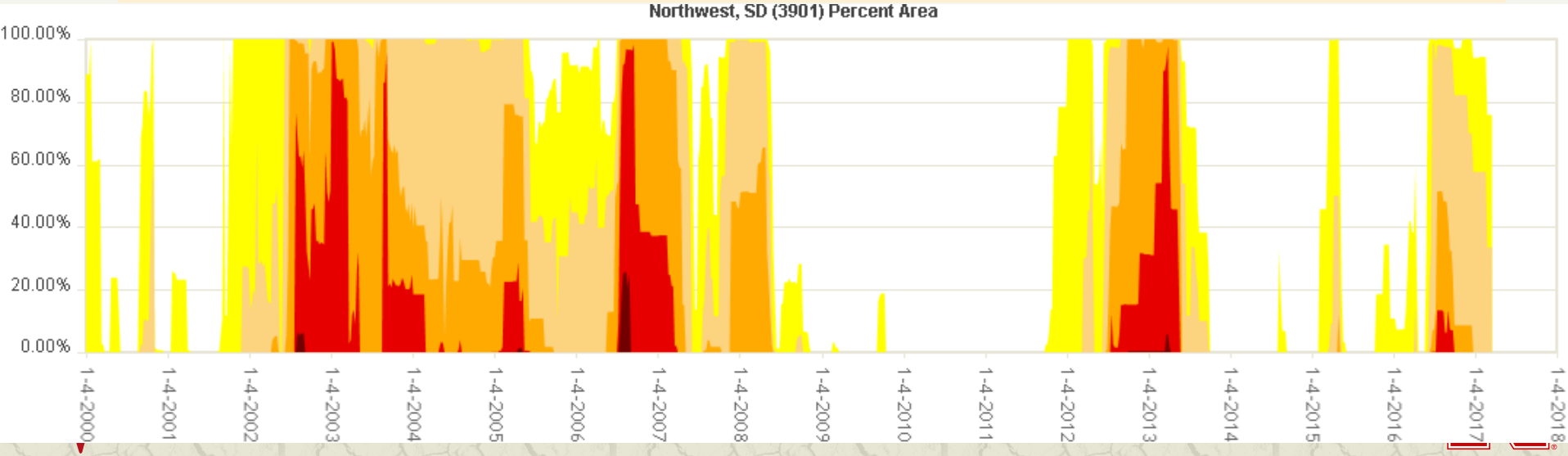
- **Advantages of percentiles:**
  - Can be applied to any parameter
  - Can be used for any length of data record
  - Puts drought in historical perspective
    - How many occurrences in a given period of time

- D4: Exceptional Drought  (*1st-2nd* percentile)
- D3: Extreme Drought  (*3rd-5th* percentile)
- D2: Severe Drought  (*6th-10th* percentile)
- D1: Moderate Drought  (*11th-20th* percentile)
- D0: Abnormally Dry  (*21st-30th* percentile)



The drought categories are associated with historical occurrence/likelihood (percentile ranking)

It is not anecdotal or subjective, like "It's really, really dry!!" ….or, "I don't remember it ever being this dry, we have to be D4!!"



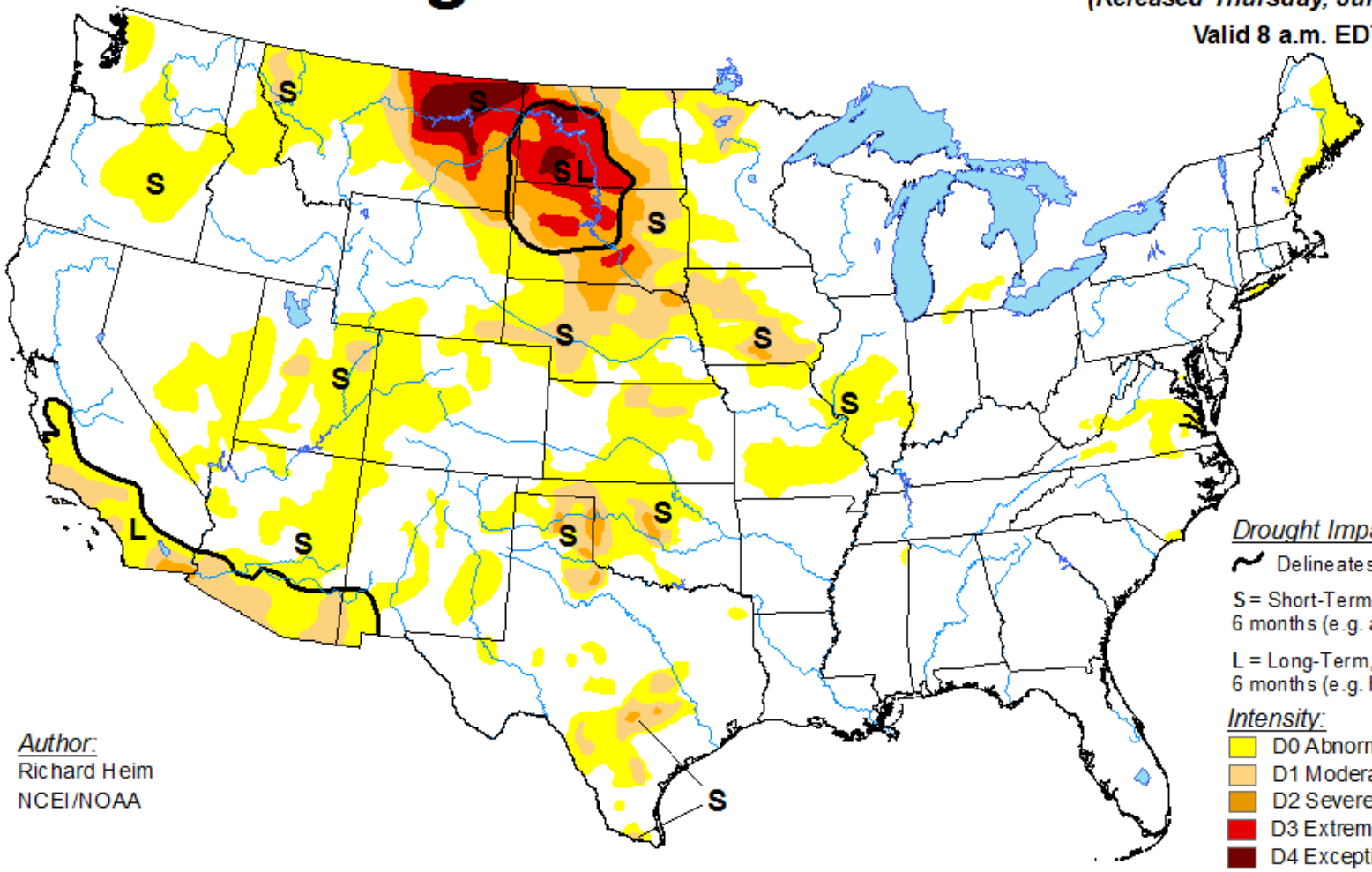
Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

U.S. Drought Monitor

July 25, 2017

(Released Thursday, Jul. 27, 2017)

Valid 8 a.m. EDT



Author:
Richard Heim
NCEI/NOAA

Drought Impact Types:

Delineates dominant impacts

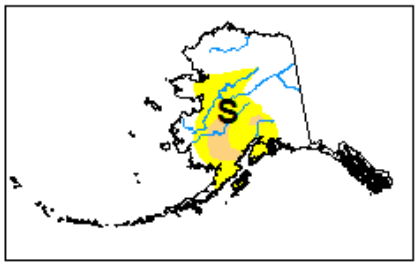
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

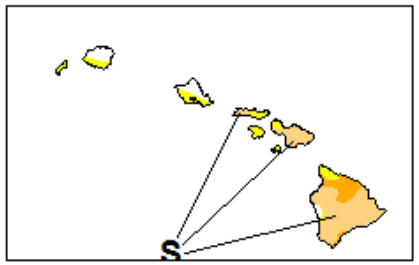
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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

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





USDA NDMC

http://droughtmonitor.unl.edu/

PEOPLE

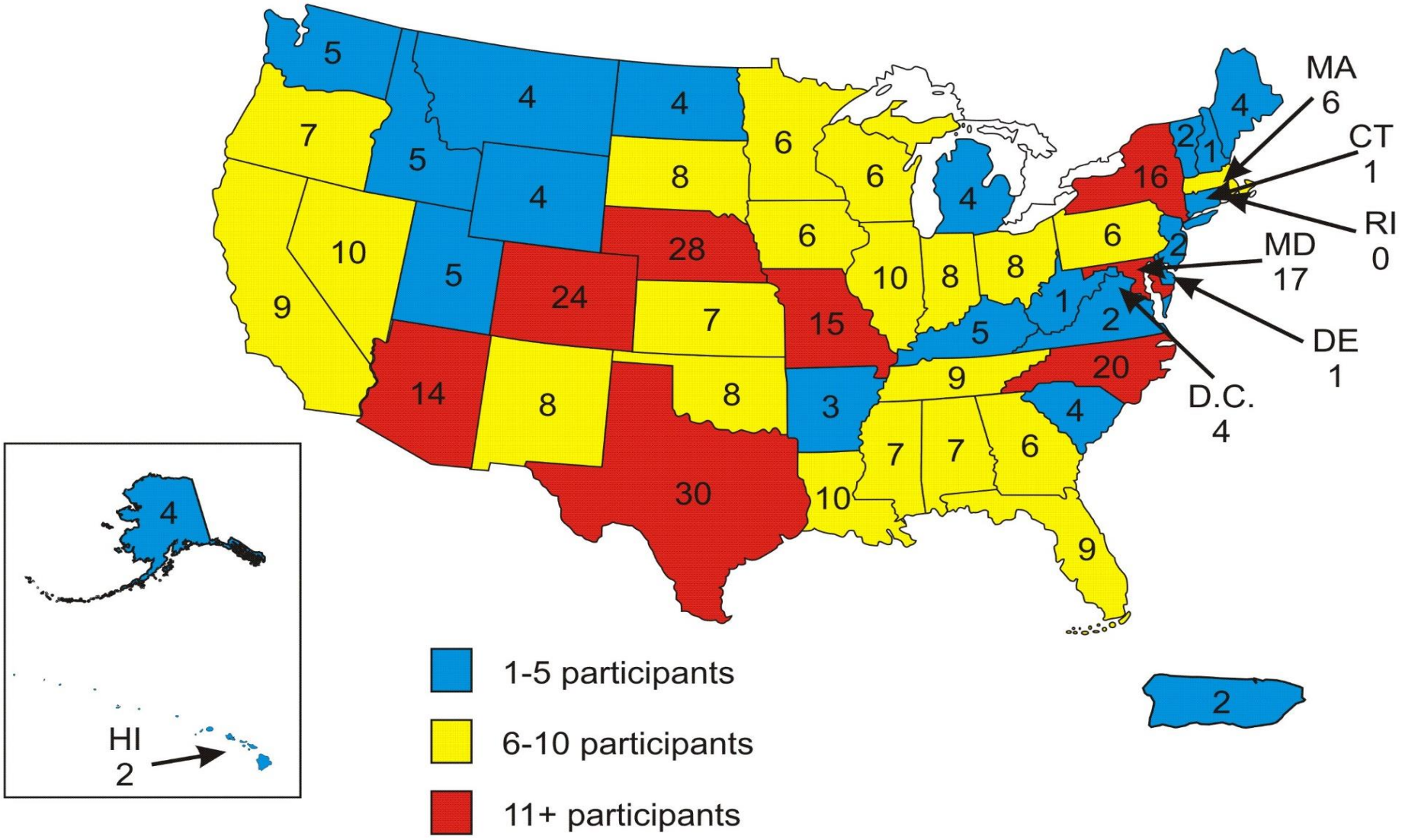
Requirement: Authors must work at a regional or national "center", government or academia/research

There are currently 12 authors, and all are volunteers

USDA World Agricultural Outlook Board

USDM Listserve Subscribers

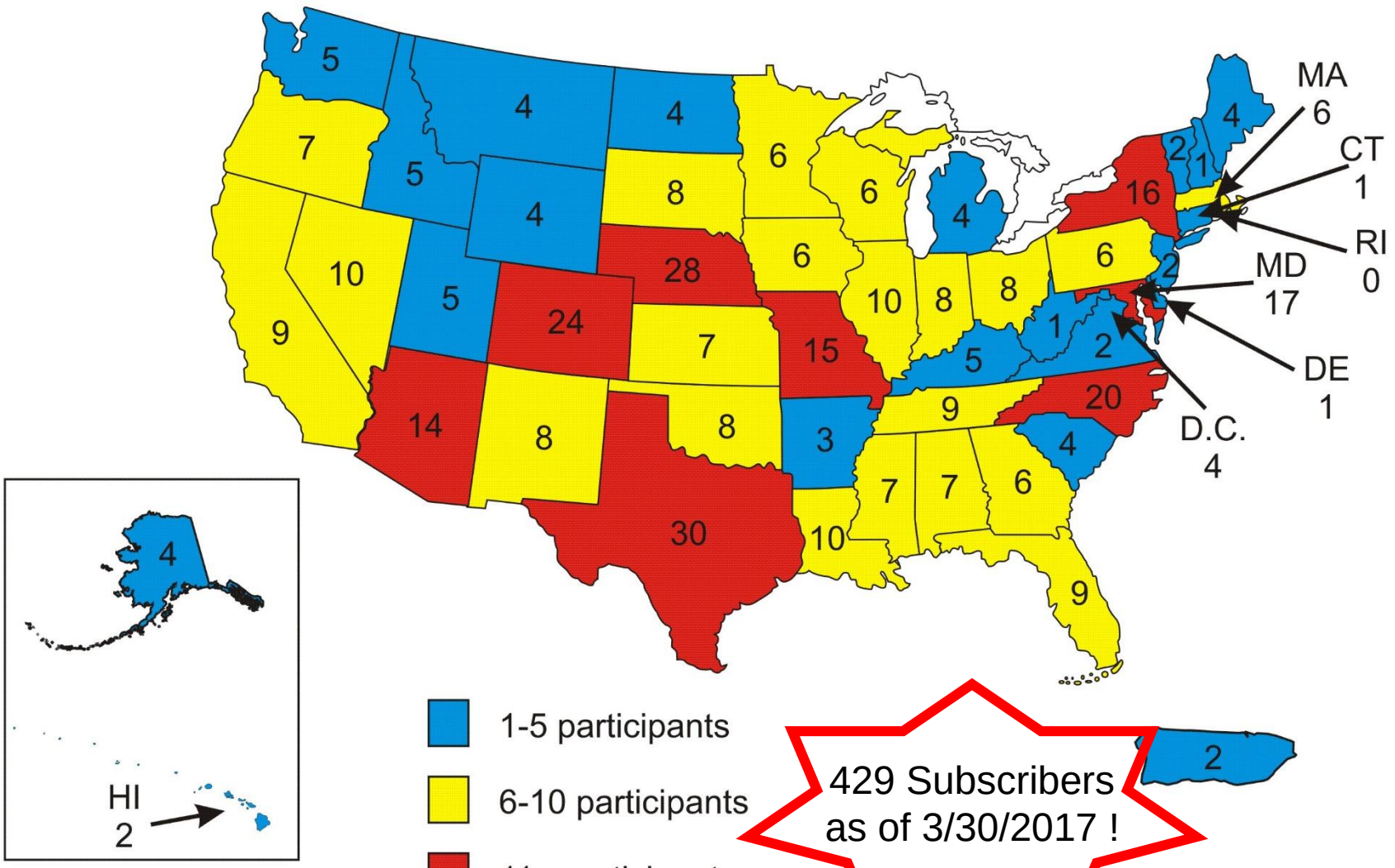
(as of August 24, 2016)



Total: 394 (does not include 2 participants from Canada and 2 participants from Brazil)

USDM Listserve Subscribers

(as of August 24, 2016)



Total: 394 (does not include 2 participants from Canada and 2 participants from Brazil)

U.S. Drought Monitor Objectives

- Assessment of **current** conditions and **current** impacts
- The U.S. Drought Monitor is ***NOT*** a model
  - The map is made manually each week based off the previous map
- The U.S. Drought Monitor is ***NOT*** interpreting just precipitation
- The U.S. Drought Monitor is ***NOT*** a forecast or drought declaration
  - Can be used by decision makers in this way though
- Identifying **impacts**
  - "**S**" short-term impacts, "**L**" long-term impacts or "**SL**" for a combination of both
  - "**S**"-6 month time scales or less, "**L**"-greater than 6 month time scales
- Incorporate **local expert** input
  - Accomplished via email and impact reports
- Authors try to be as **objective** as possible (using the percentiles methodology)
  - The physical data and indicators ***must*** support the depiction on the map
  - Impact data validates physical data
- ***"Convergence of evidence"*** approach

U.S. Drought Monitor Approach

"Convergence of Evidence"

- Many types of drought "information" can be collectively analyzed
  - ***Determining if the majority of information is 'converging' (telling the same story)*** about the accuracy, or inaccuracy, of the drought as depicted by the U.S. Drought Monitor
- Authors need to ***look at 100% of the data, BUT don't believe in any one piece of data input 100%*** in making a decision…
- ***Multiple indicators and many types of information are part of the analysis***
  - These data will identify different climatic and hydrologic parameters which are needed to understand the complete picture of a drought indicator's performance and how they interact
- ***Impacts are the "ground truth"***, yet aren't monitored to the extent which other data are….**you can't measure what you don't monitor!**

National Drought Mitigation Center

Regional and Local Feedback/Input Process

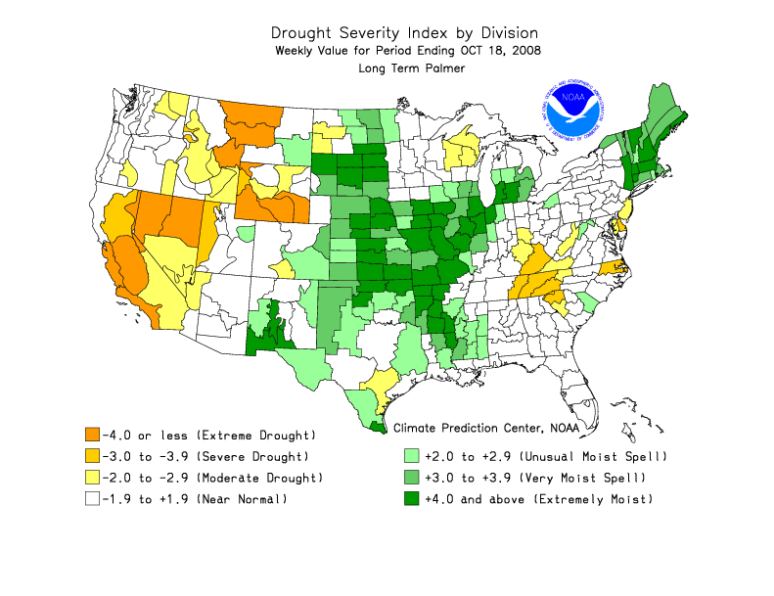
- Annual User **Feedback Forums** (USDM/NADM) since 2000
- Various webinars/telecons/assessments/reports/data/products
- NOAA's Regional Climate Centers and Regional Climate Service Directors and Coordinators along w/ Weather Forecast Offices (WFOs) and USDA Service Centers
- ***State Climatologists***
- ***Navajo Tribe***
- ***CoCoRaHS (impacts!)***
- National Integrated Drought Information System ***(NIDIS) RDEWS*** basin webinars:
  - UCRB (Upper Colorado River Basin)
  - ACF (Apalachicola-Chattahoochee-Flint)
  - Southern Plains
  - MORB (Missouri River Basin)
- ***Drought Task Forces***: North Carolina, Hawaii, Oklahoma, Texas, New Mexico, Alabama, Florida, South Dakota, Kentucky, Arizona, Montana and California

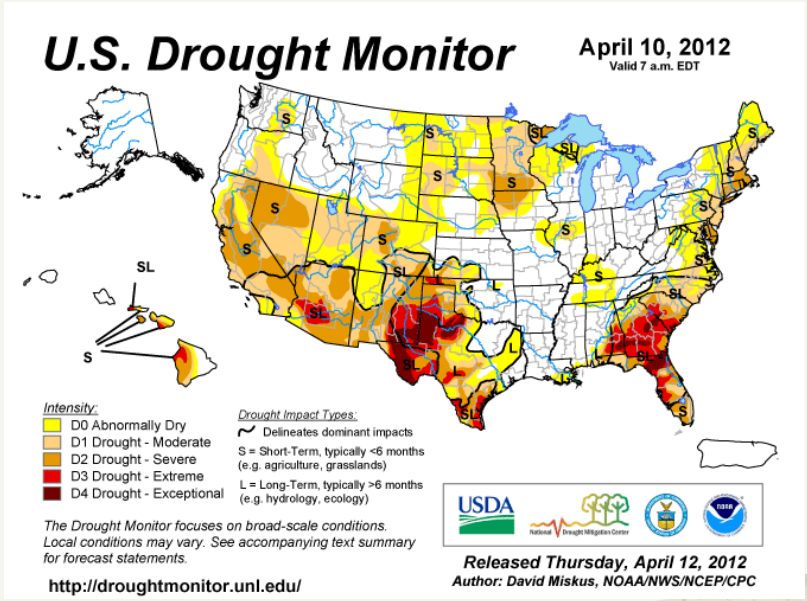
National Drought Mitigation Center

PARAMETERS

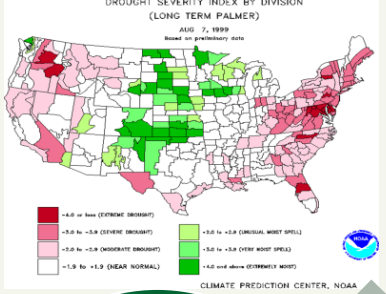
Approaches to Drought Assessment

- Single index or indicator (parameter)
- Multiple indices or indicators
- *Composite (or "hybrid") Indicator*

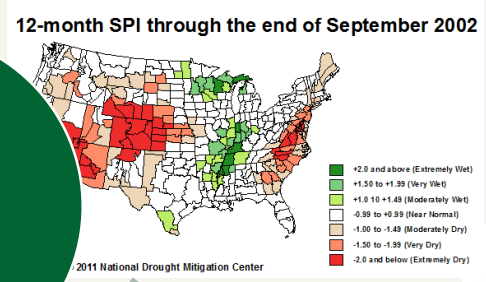




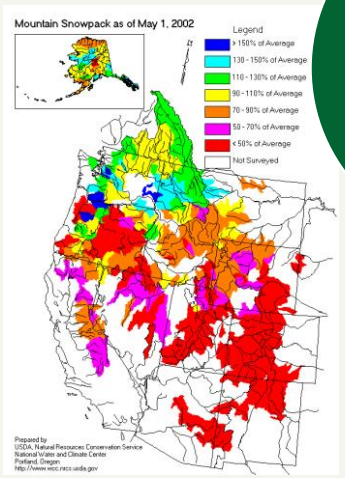
National Drought Mitigation Center



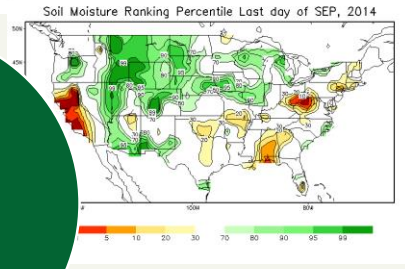
Indices: SPI/PDSI

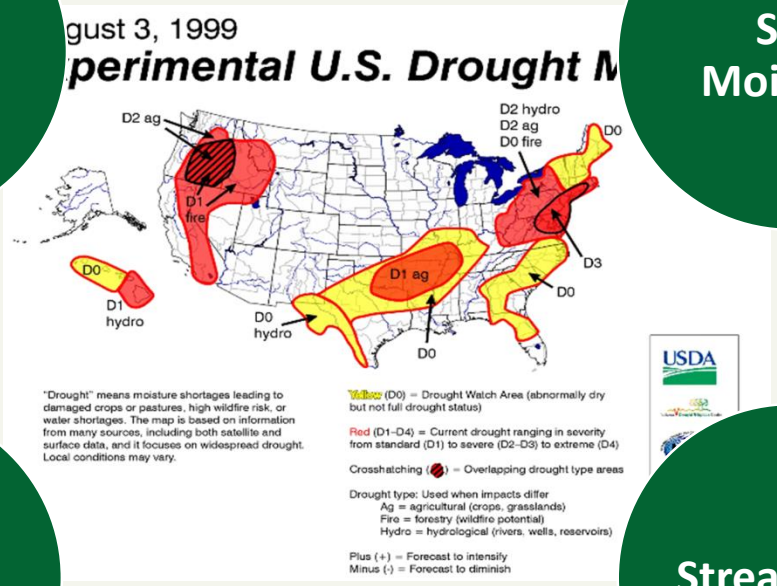


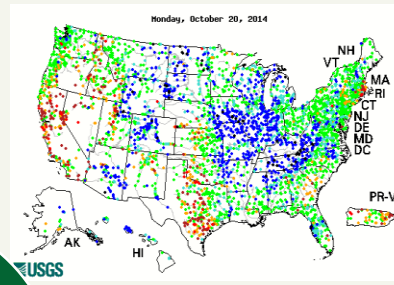
Snow



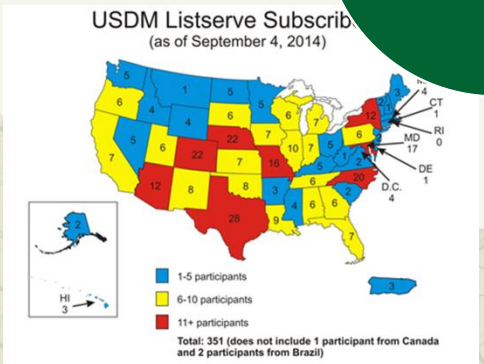
Soil Moisture





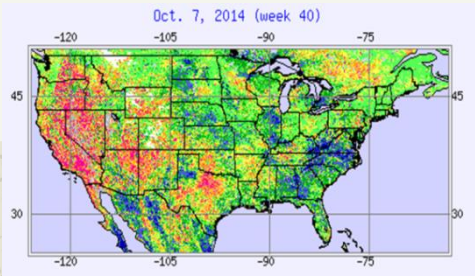


Expert Local Input



Streamflow

Remote Sensing



PROCESS

So just how does the USDM get edited/created every week?

April

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17		19	20
21	22	23	24			25
28	29	30				

Draft 1

Draft 2

Draft 3

Final Map

Final Files Sent

Data cutoff

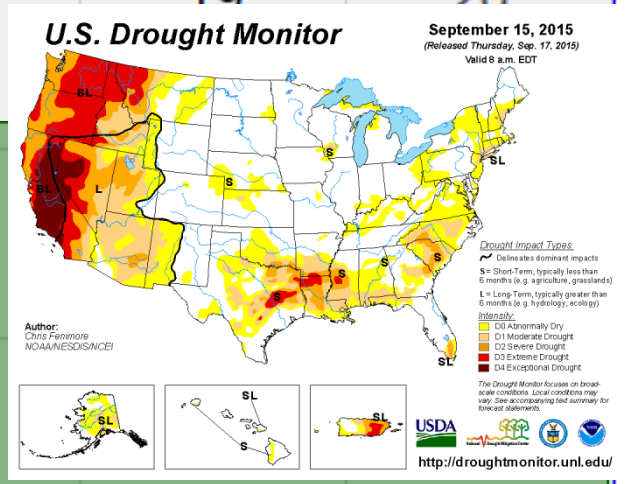
8 am

Input cutoff

2 pm

8:30 am

http://droughtmonitor.unl.edu/



National Drought Mitigation Center

Critical Elements of the USDM Process

- Started *simple* and built over time
- *Flexible* and adaptable to new data/products as they come on-line
- Collaboration: It's about the *Process*!
  - *Sharing* the data, products and credit
- *"Convergence of Evidence"*
- Communication
  - *Transparency and Trust*
- Involving *local experts*, data and feedback
  - Building an *ownership and validation* process
  - *"Value added"* knowledge taps into local expertise

National Drought Mitigation Center

Critical Observations:

1) Typically, ***No single*** indicator/index is used solely in determining appropriate actions

2) Instead, ***different*** thresholds from ***different*** combinations of inputs is typically (not always) the best way to approach monitoring and triggers using a variety of indices and indicators

National Drought Mitigation Center

Final Thoughts:

- *CDI: "Convergence of Evidence"* approach allows for:
  - Ensemble-like approach
  - Don't Cry Wolf….or "all clear", too soon!
- Decision makers want *ONE* map, not multiple maps
  - Annual User Forums and stakeholder engagements tell us this repeatedly…
  - However, scientists like *MANY* maps! ☺
- Multiple CDI *(regional/seasonal/sectoral-thematic)* can be tested or made operational depending on the need and ability to validate them
- *PCA/Data Mining* to explore CDI input parameter relationships/weighting

National Drought Mitigation Center

Questions?

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402-472-8238

http:/drought.unl.edu

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

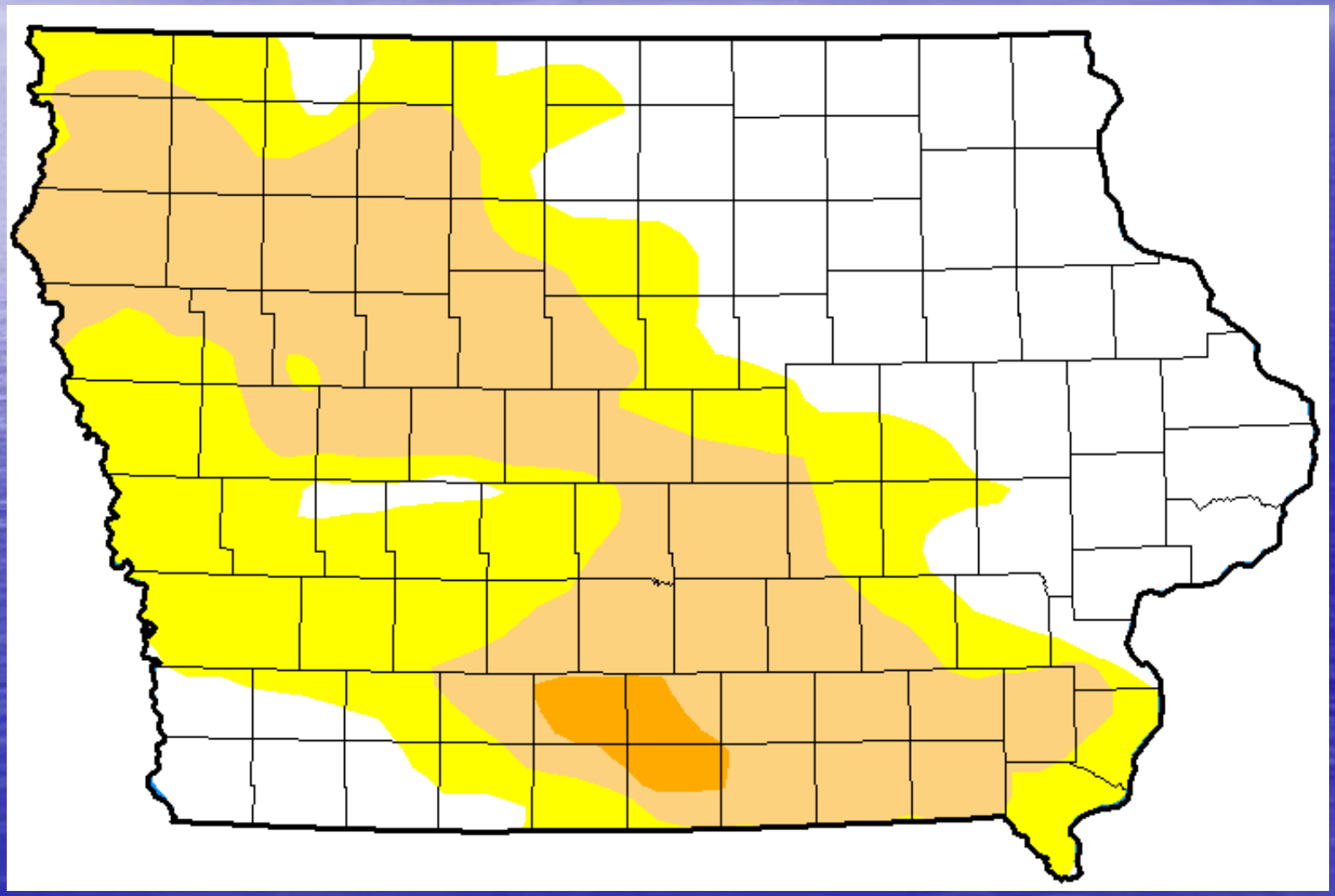
Photo Credit: Daniel Griffin

Harry J. Hillaker
State Climatologist
Iowa Dept. of Agriculture & Land Stewardship

Wallace State Office Bldg.
Des Moines, IA 50319

Telephone: (515) 281-8981
E-Mail: HarryHillaker@iowaagriculture.gov

United States Drought Monitor
7 a.m. CDT, Tues., July 25, 2017



U.S. Drought Monitor

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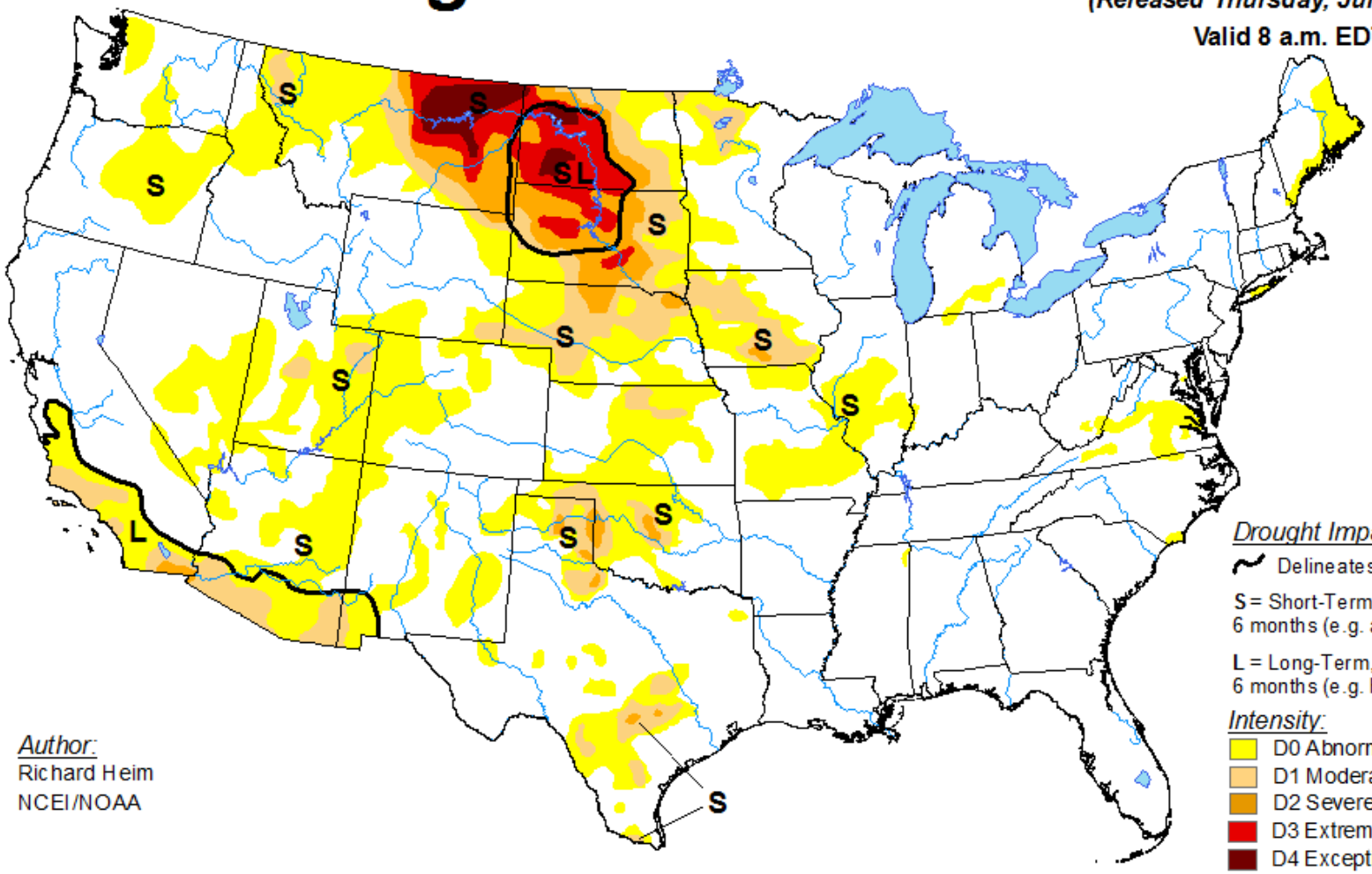


Author:
Richard Heim
NCEI/NOAA

Drought Impact Types:

Delineates dominant impacts

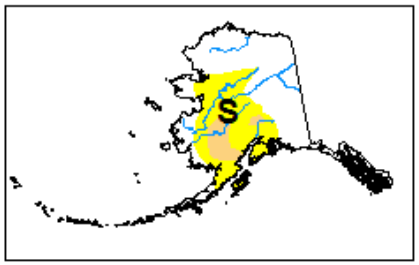
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

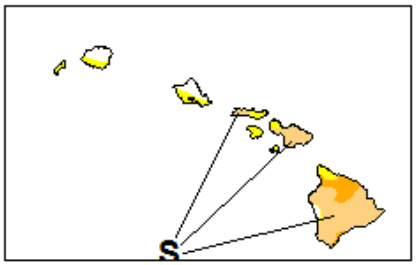
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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

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

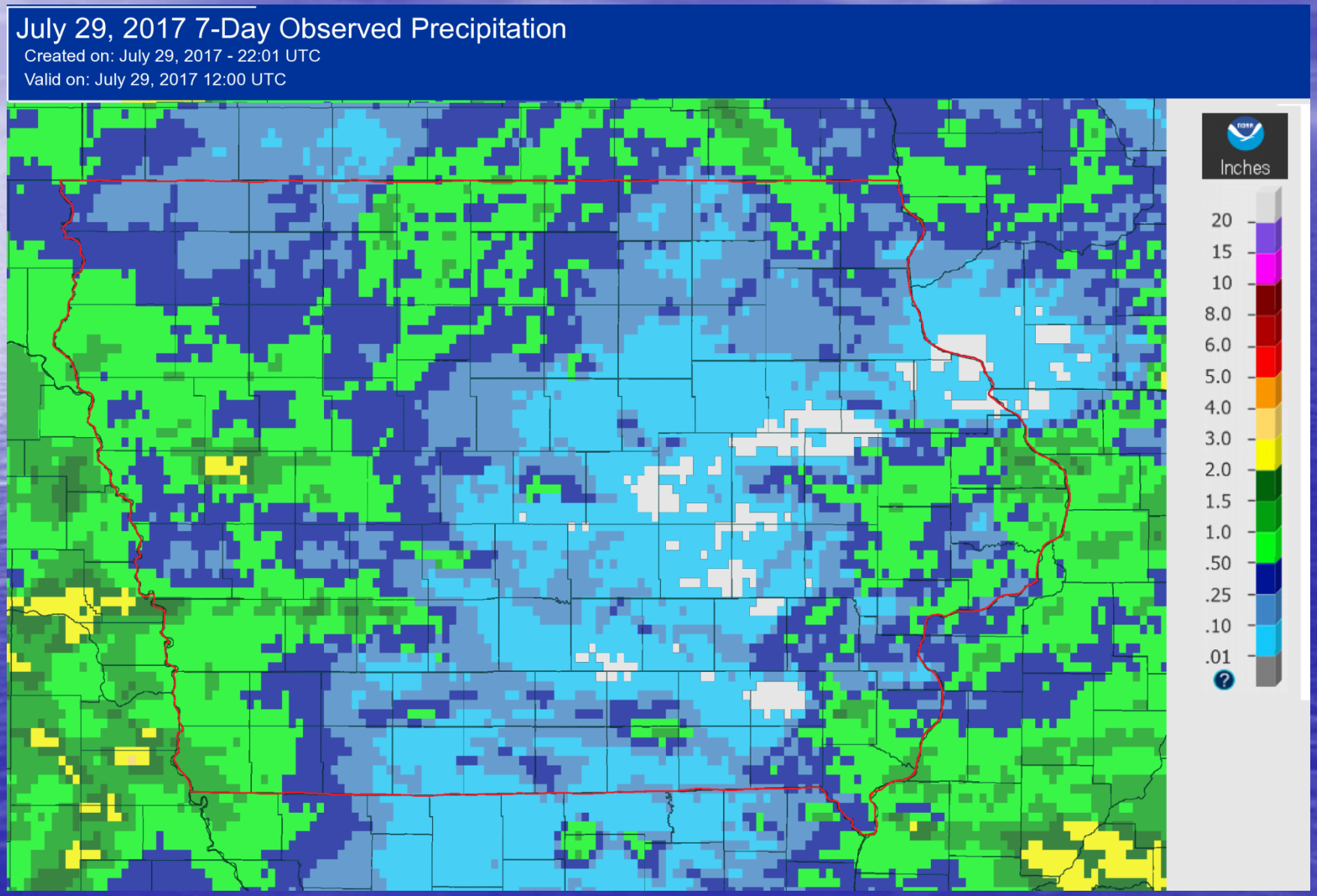




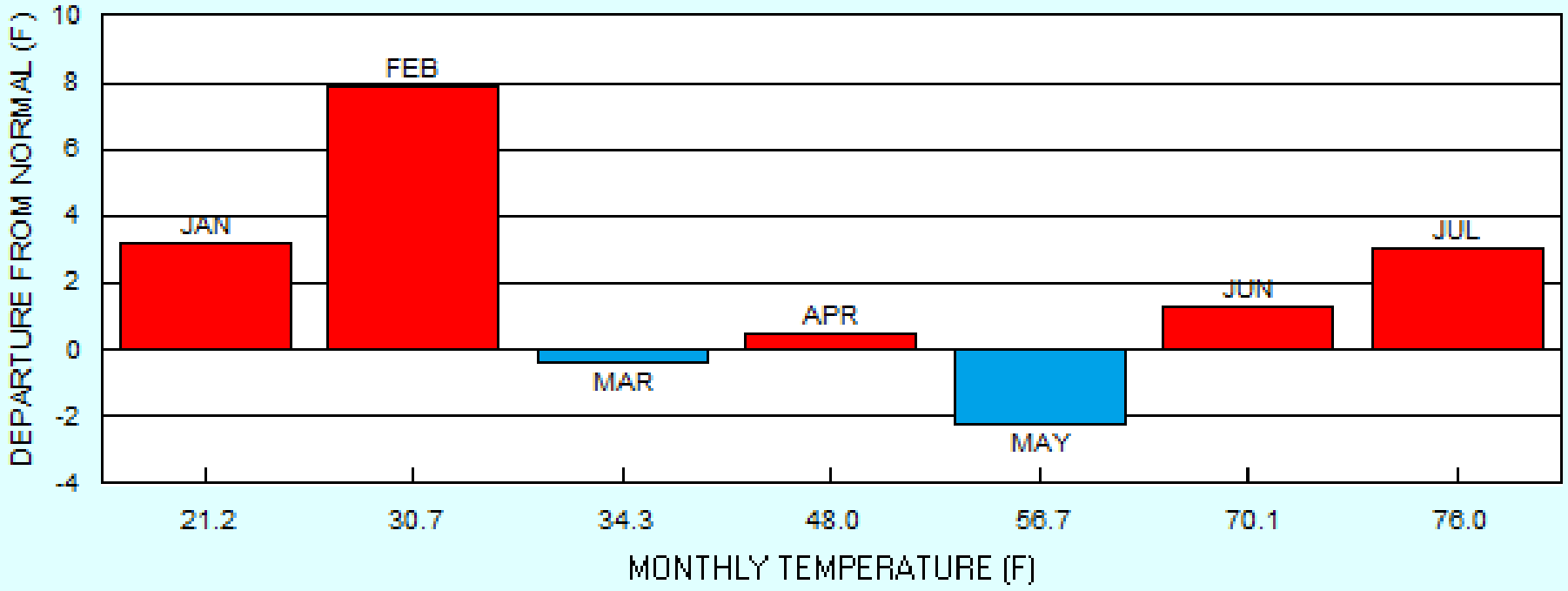
USDA NDMC NOAA

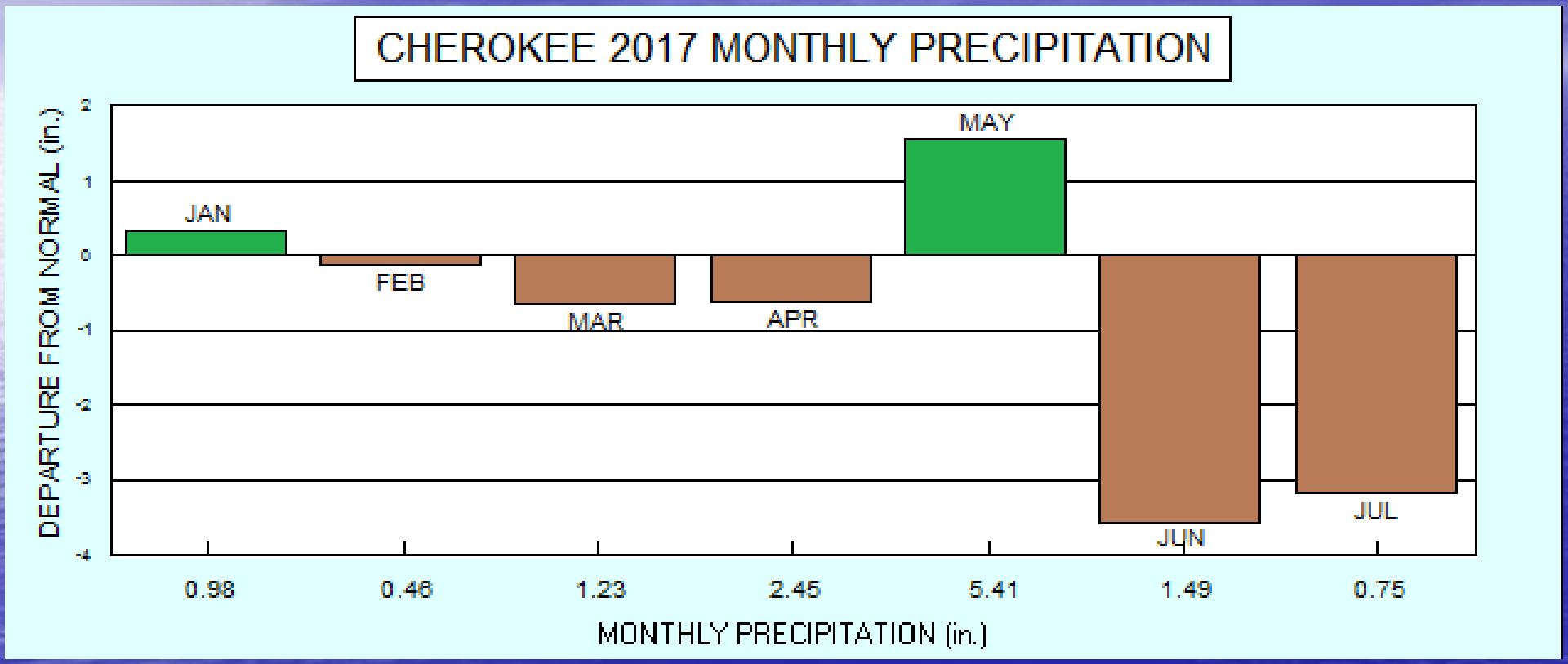
http://droughtmonitor.unl.edu/

Rainfall since last USDM



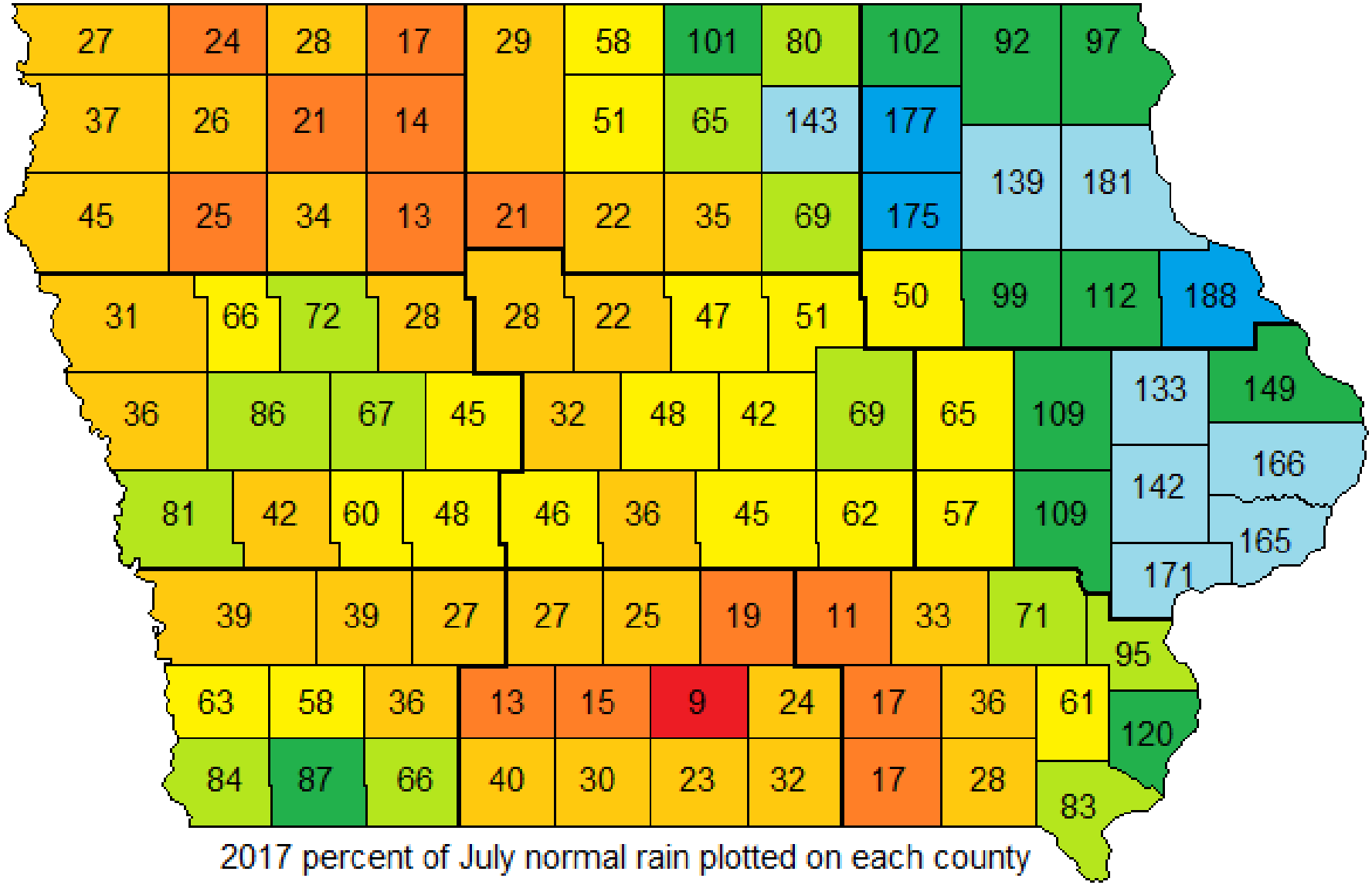
CHEROKEE 2017 MONTHLY TEMPERATURES



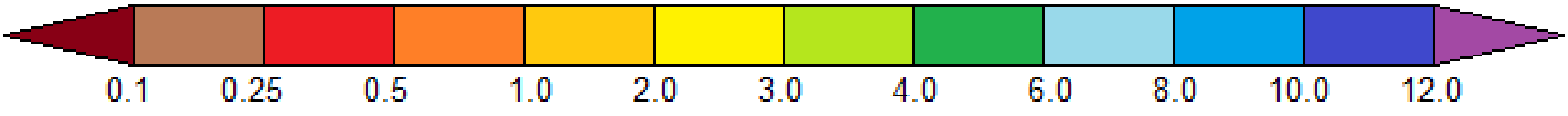

CHEROKEE 2017 MONTHLY PRECIPITATION
DEPARTURE FROM NORMAL (in.)
2
1
0
-1
-2
-3
-4
JAN
FEB
MAR
APR
MAY
JUN
JUL
0.98
0.46
1.23
2.45
5.41
1.49
0.75
MONTHLY PRECIPITATION (in.)

State Climatologist, Iowa Dept. of Agriculture & Land Stewardship

PRELIMINARY COUNTY PRECIPITATION ESTIMATES, JULY 2017 (inches)

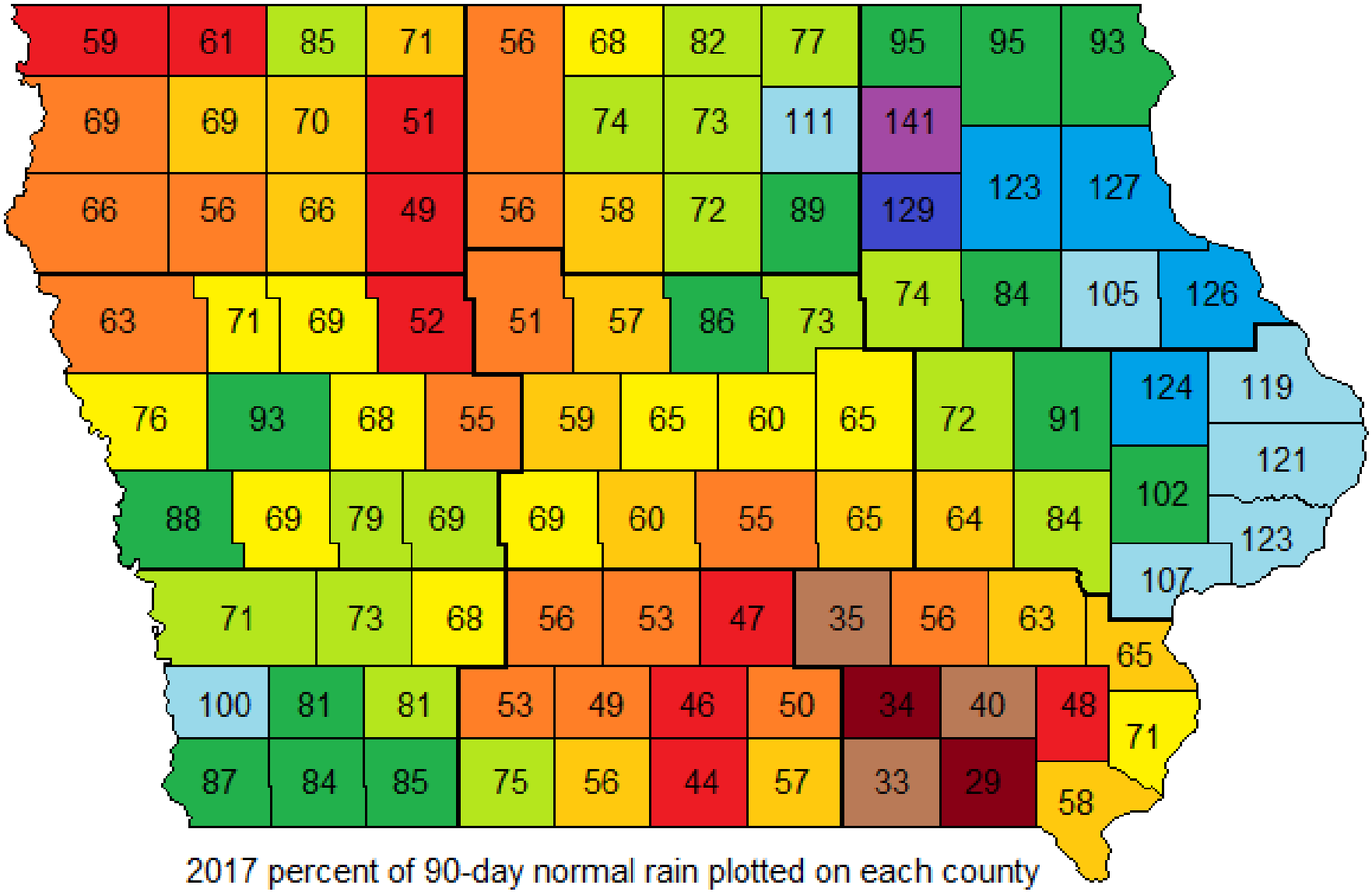


2017 percent of July normal rain plotted on each county



State Climatologist, Iowa Dept. of Agriculture & Land Stewardship

COUNTY PRECIPITATION ESTIMATES, MAY 3 to JULY 31, 2017 (inches)

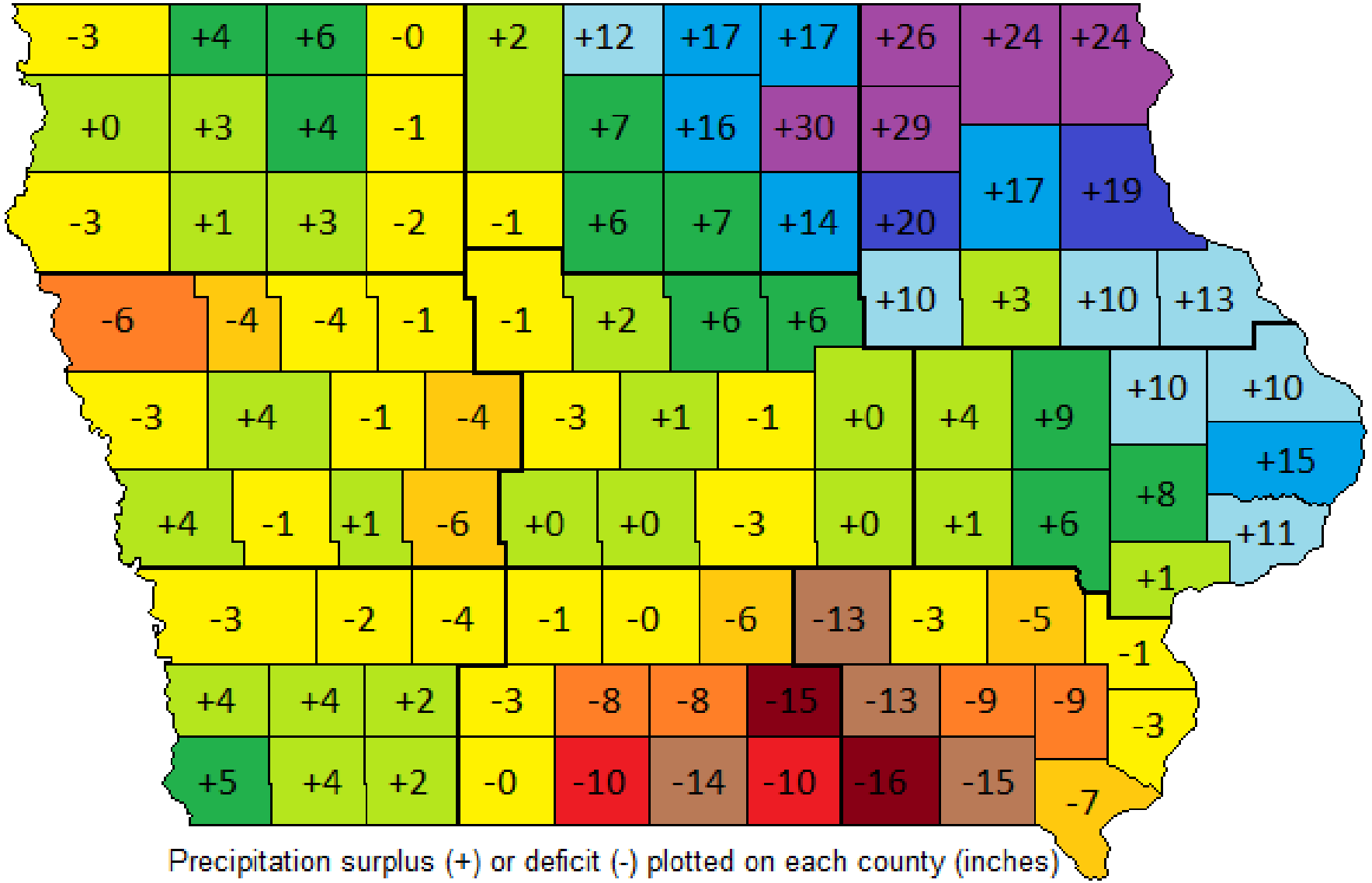


2017 percent of 90-day normal rain plotted on each county

5 6 7 8 9 10 12 14 16 18 20

State Climatologist, Iowa Dept. of Agriculture & Land Stewardship

PERCENT OF NORMAL PRECIPITATION, JUNE 2016 TO JULY 2017



Precipitation surplus (+) or deficit (-) plotted on each county (inches)

What's the Big Deal about Heat?

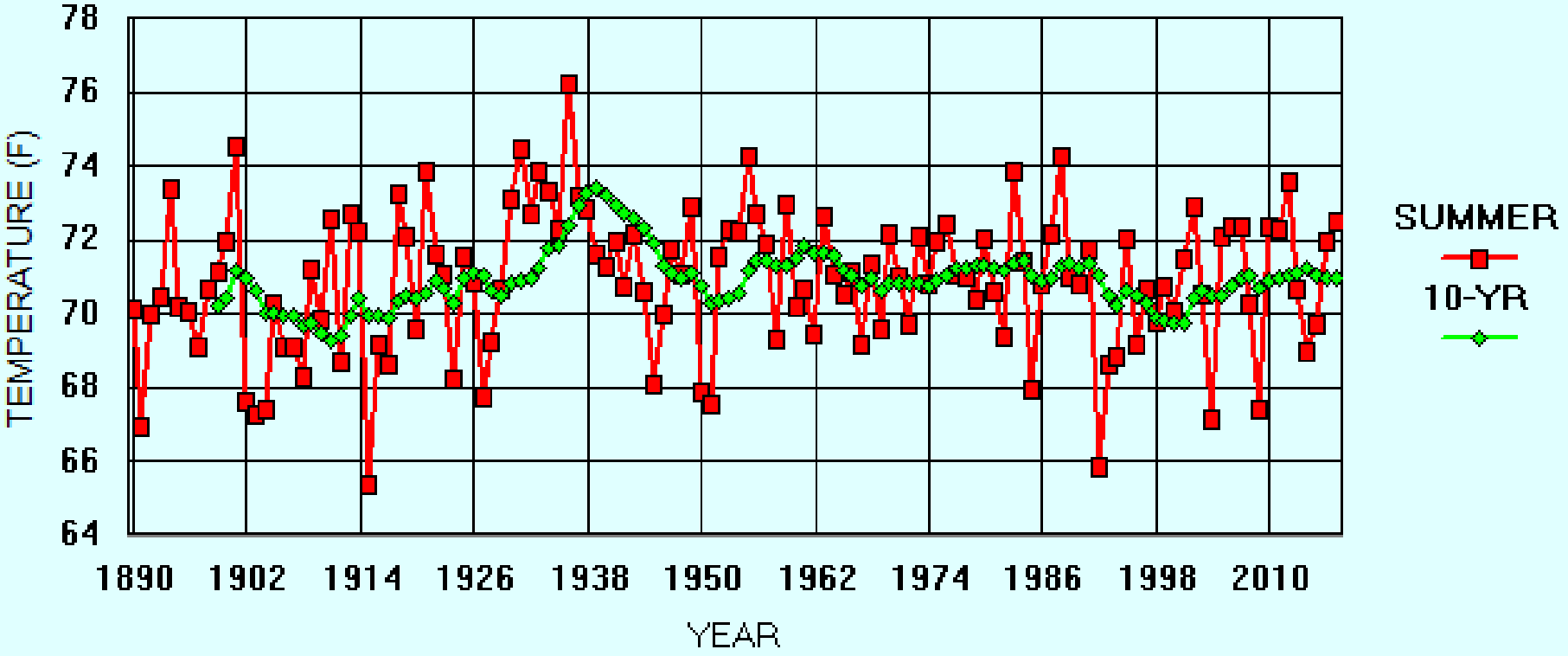
- 90° 13% greater drying potential than at 86°.
- 96° 37% greater.
- 100° 54% greater.
- 104° 74% greater.
- 108° 95% greater.

Cherokee 2012 vs 2017 Max Temps

1.	100	JULY	23	97	JULY	15
2.	99	JULY	30	96	JULY	17
3.	99	JULY	22	95	JULY	6
4.	99	JULY	24	94	JULY	9
5.	98	JUNE	27	94	JULY	19
6.	97	JULY	17	93	JULY	25
7.	97	JULY	6	92	JULY	11
8.	97	JULY	7	92	JULY	12
9.	96	JULY	25	92	JUNE	3
10.	95	JULY	19	92	JUNE	13

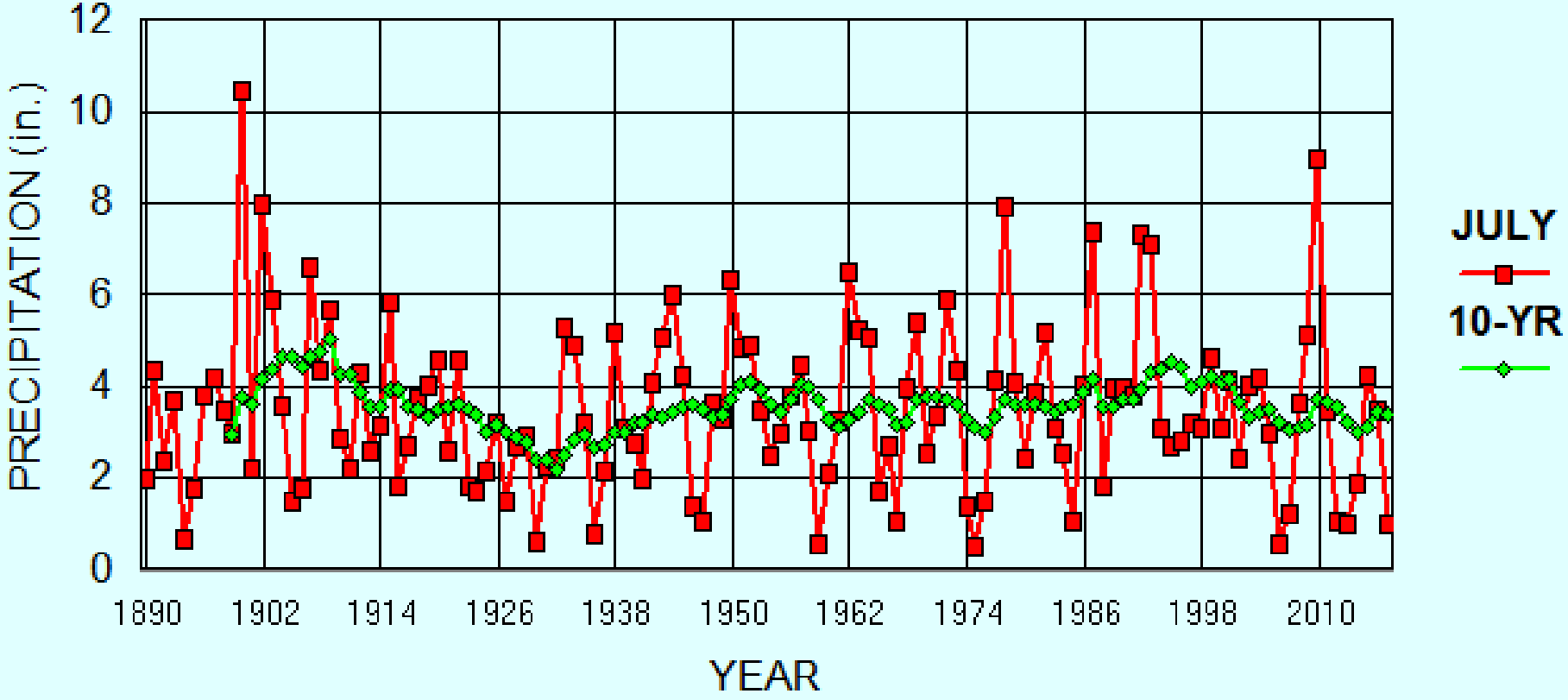
NW IOWA SUMMER TEMPERATURES

1890-2017 (NORM = 70.9)



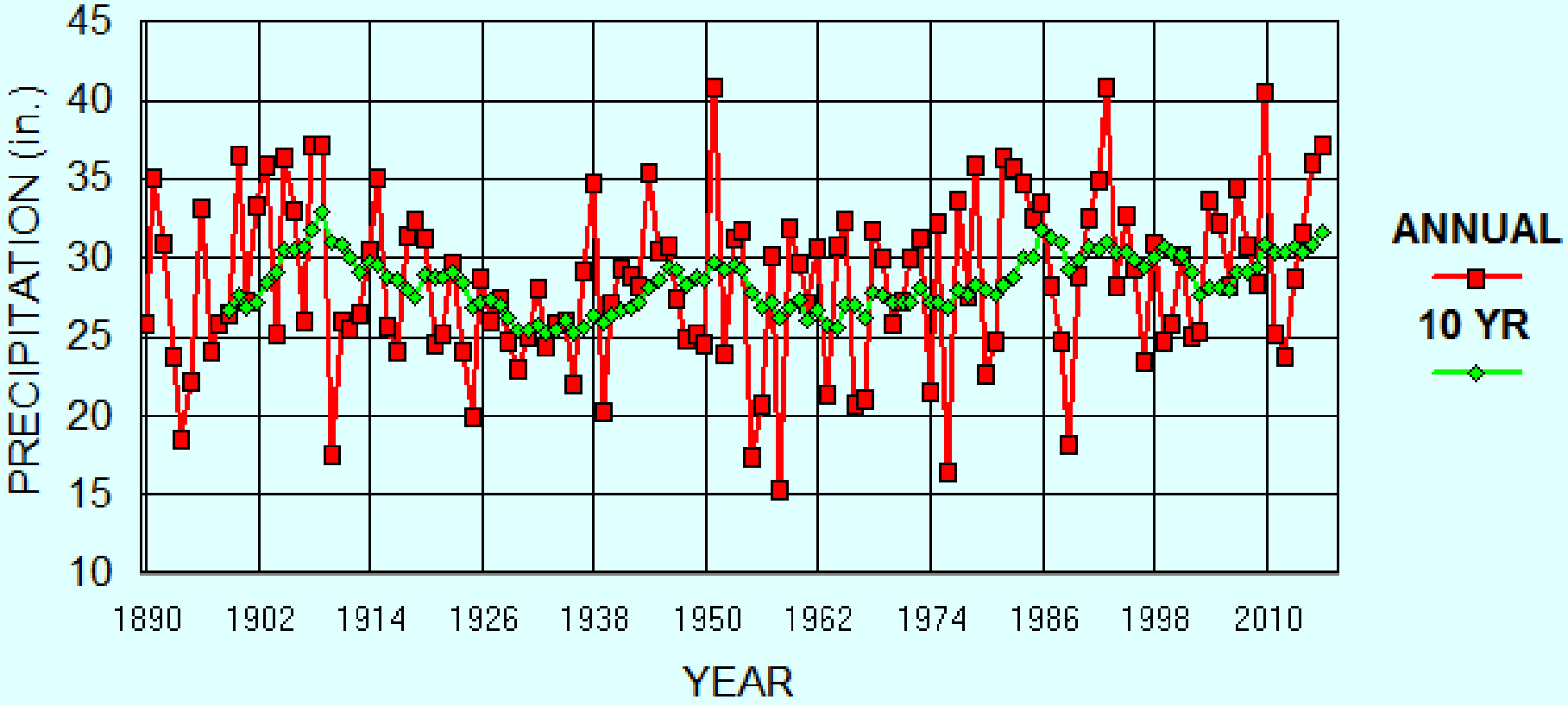
NW IOWA JULY PRECIPITATION

1890-2017 (AVG = 3.51")



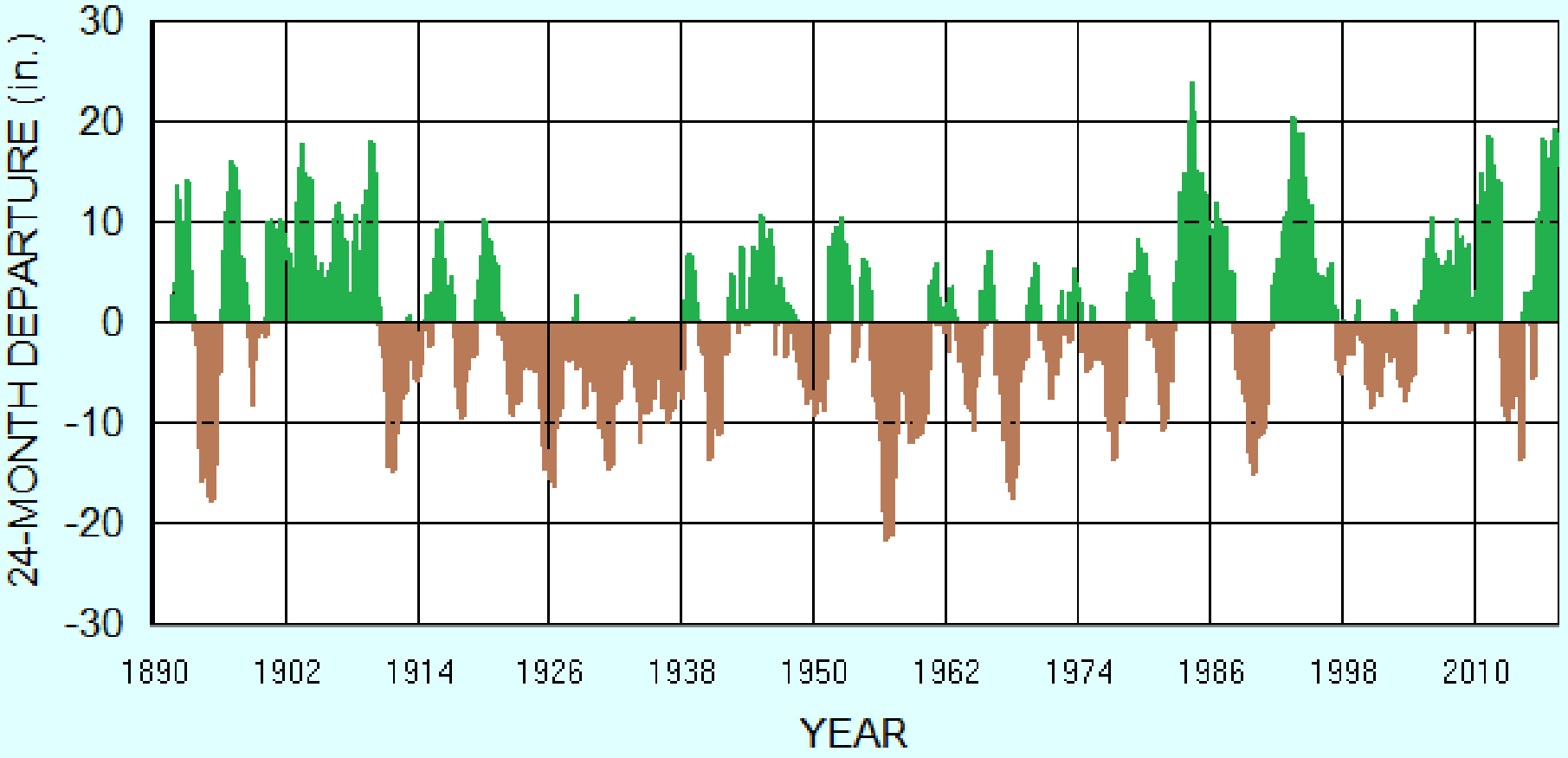
NW IOWA ANNUAL PRECIPITATION

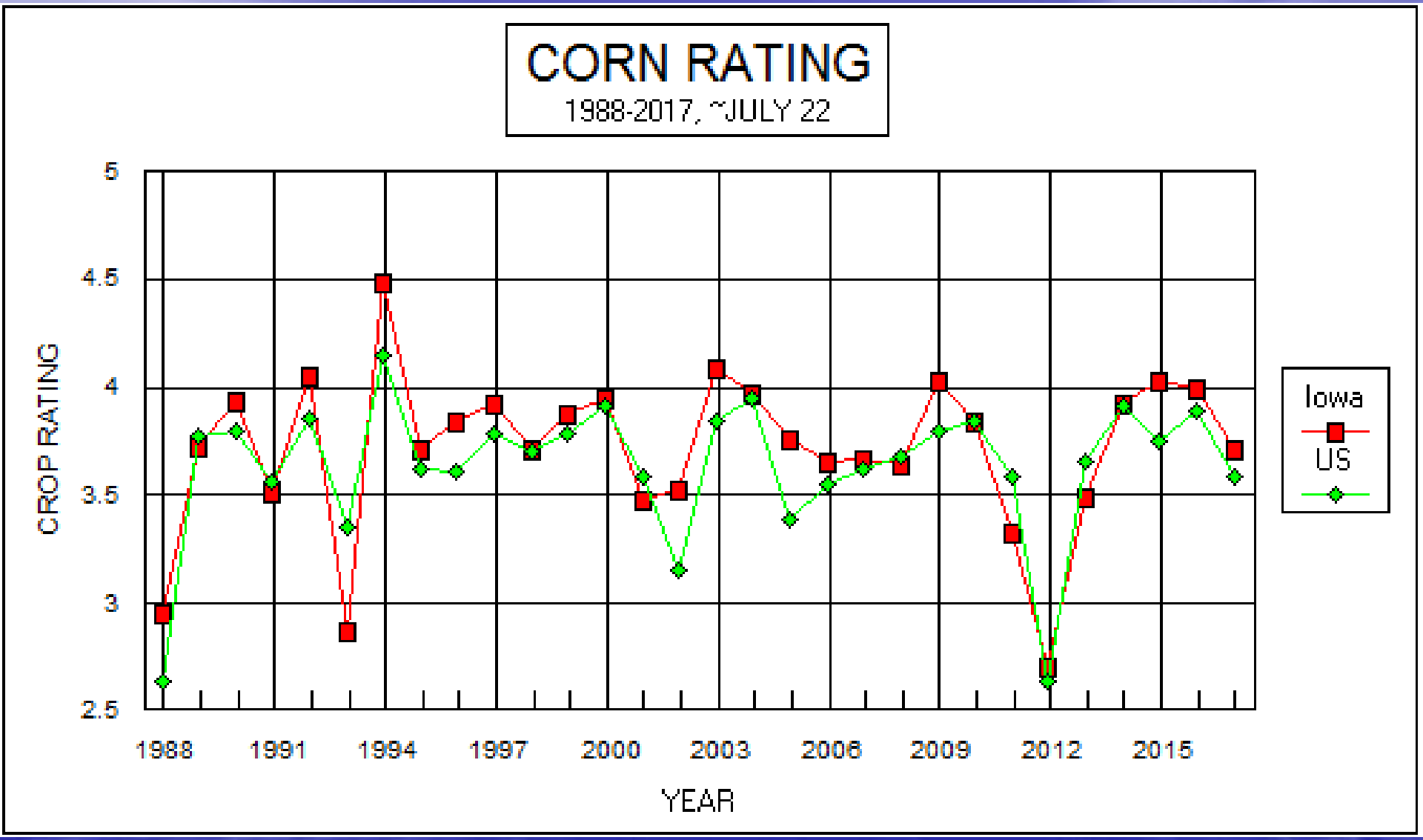
1890-2016 (AVG = 28.54")

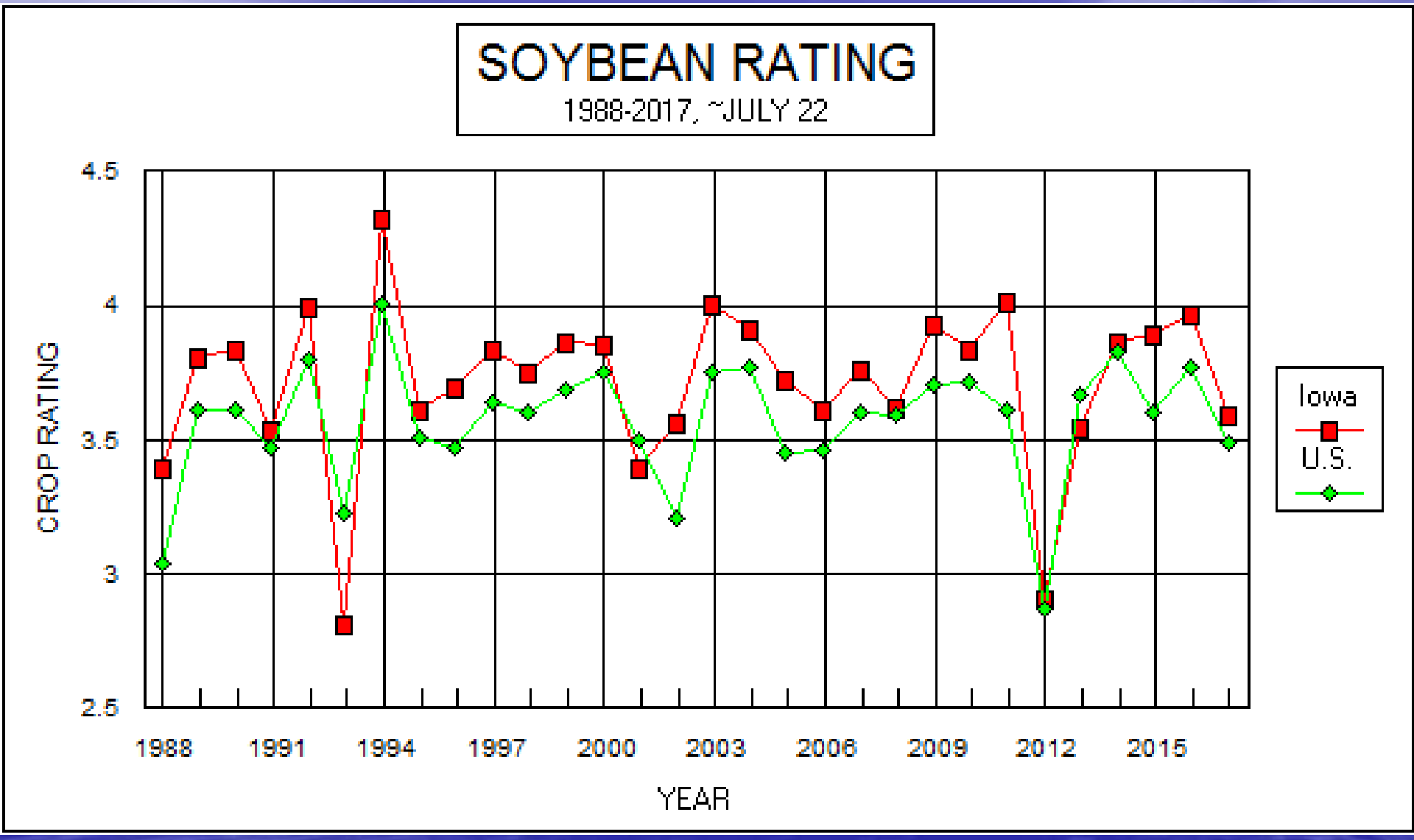


NW IOWA 24-MONTH RUNNING AVG

JAN 1890 - JUL 2017

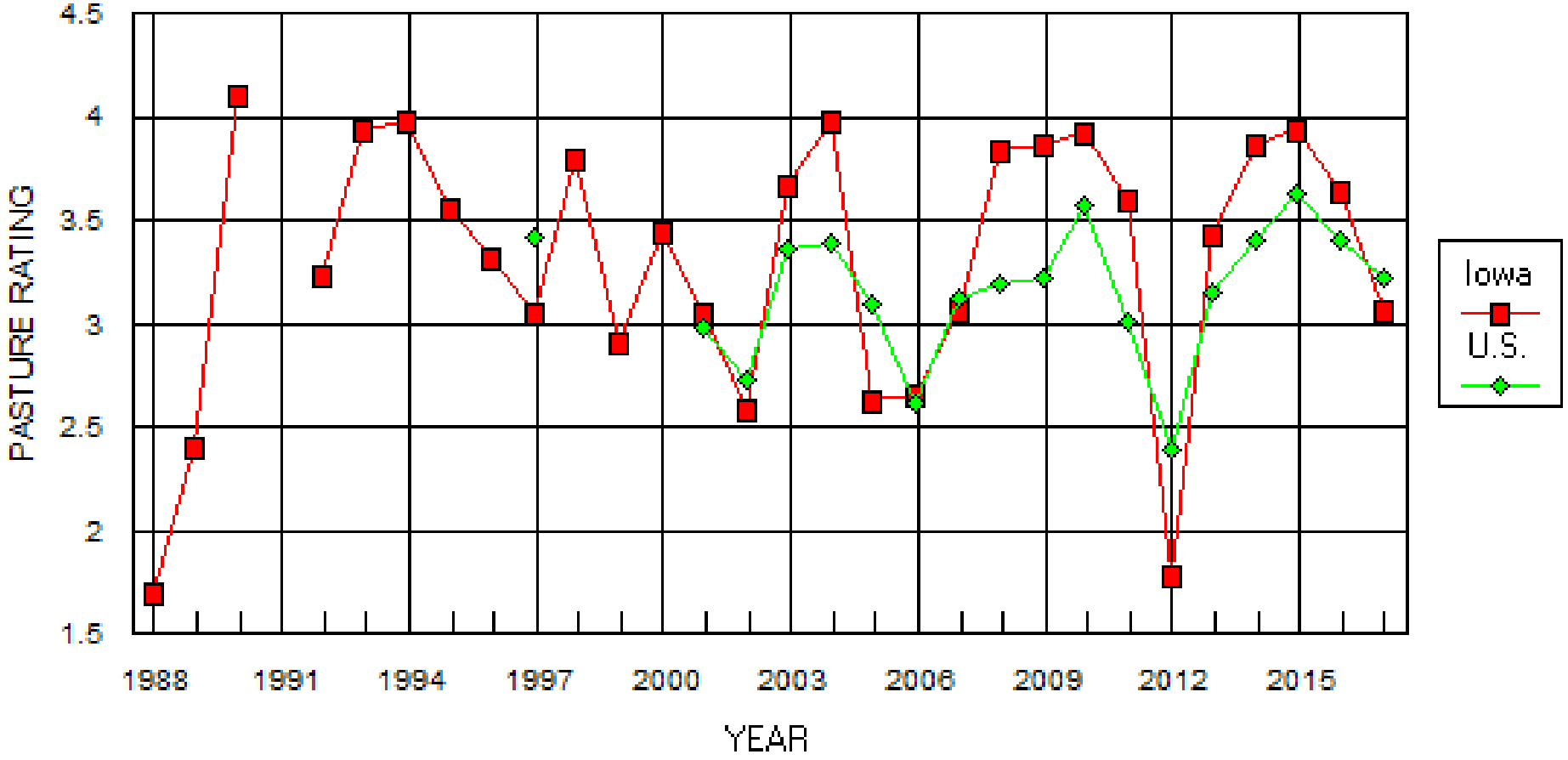



CORN RATING
1988-2017, ~JULY 22
CROP RATING
5
4.5
4
3.5
3
2.5
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
YEAR
Iowa
US


SOYBEAN RATING
1988-2017, ~JULY 22
CROP RATING
4.5
4
3.5
3
2.5
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
YEAR
Iowa
U.S.

PASTURE & RANGE RATING

1988-2017, ~JULY 22

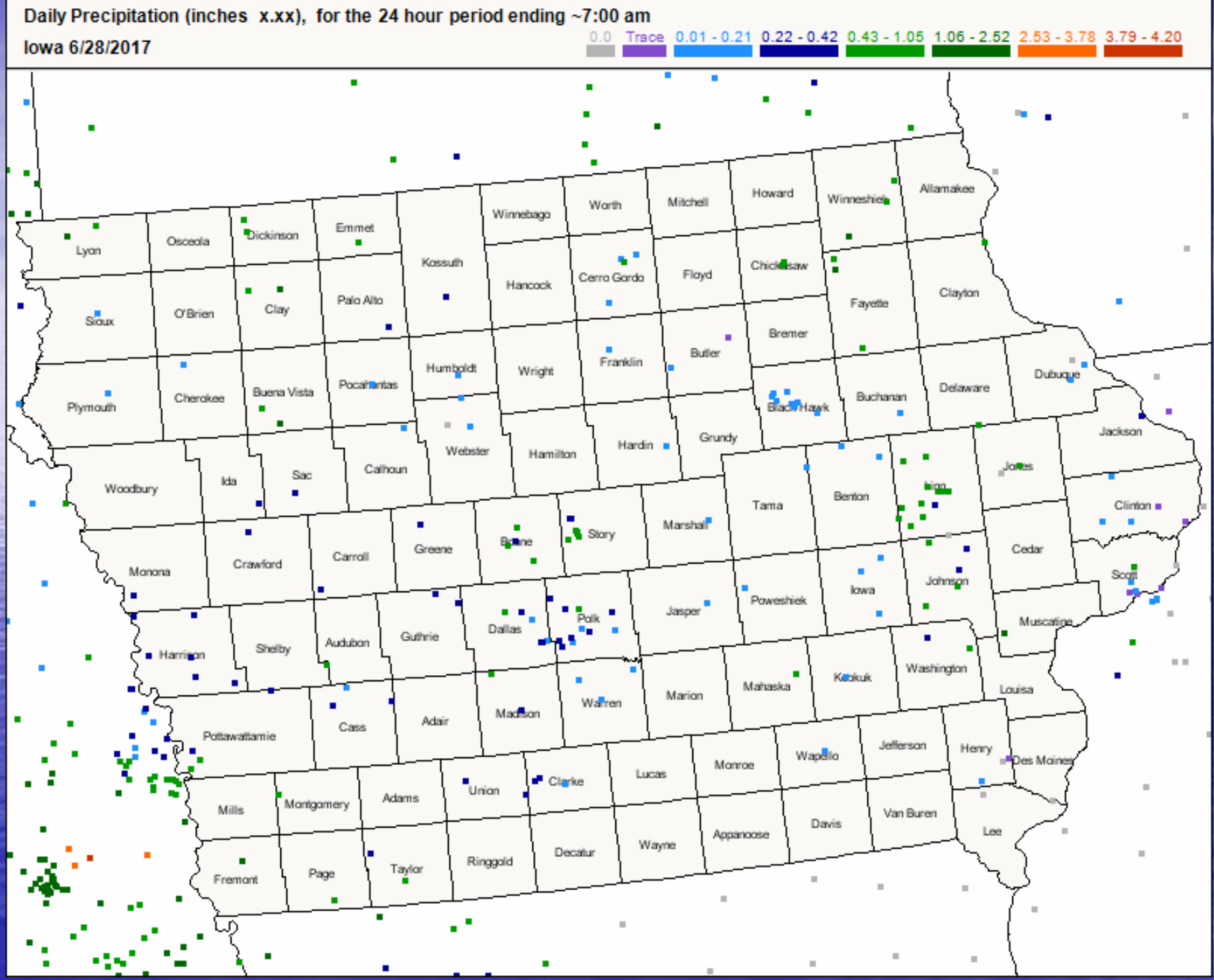


Drought Impact Reporter

- http://droughtreporter.unl.edu/submitreport/

Community Collaborative Rain, Hail and Snow Network

www.cocorahs.org


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Iowa 6/28/2017
0.0
Trace
0.01 - 0.21
0.22 - 0.42
0.43 - 1.05
1.06 - 2.52
2.53 - 3.78
3.79 - 4.20
Lyon
Osceola
Dickinson
Emmet
Winnebago
Worth
Mitchell
Howard
Winneshiek
Allamakee
Sioux
O'Brien
Clay
Palo Alto
Kossuth
Hancock
Cerro Gordo
Floyd
Chickasaw
Fayette
Clayton
Plymouth
Cherokee
Buena Vista
Pocahontas
Humboldt
Wright
Franklin
Butler
Bremer
Buchanan
Delaware
Dubuque
Woodbury
Ida
Sac
Calhoun
Webster
Hamilton
Hardin
Grundy
Black Hawk
Jackson
Monona
Crawford
Carroll
Greene
Boone
Story
Marshall
Tama
Benton
Linn
Jones
Clinton
Harrison
Shelby
Audubon
Guthrie
Dallas
Polk
Jasper
Poweshiek
Iowa
Johnson
Cedar
Scott
Muscatine
Pottawattamie
Cass
Adair
Madison
Warren
Marion
Mahaska
Keokuk
Washington
Louisa
Mills
Montgomery
Adams
Union
Clarke
Lucas
Monroe
Wapello
Jefferson
Henry
Des Moines
Fremont
Page
Taylor
Ringgold
Decatur
Wayne
Appanoose
Davis
Van Buren
Lee

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