Lower Platte River **Consortium**

The handouts and presentation given at a June 19, 2018 open house of the Lower Platte River Consortium can be viewed on the following pages. Public comments and questions were also encouraged at the open house and are still welcome by clicking the email link below.

Click below to submit comments and questions:

droughtplanstudy@gmail.com

A STATE IN **DROUGHT** 2012 Impacts on Nebraska

100% of **Nebraska** in drought

96% in **EXTREME** drought conditions

AGRICULTURAL IMPACTS

HAY PRODUCTION ↓ **28%**

CORN PRODUCTION ↓ **16%**

SOYBEAN PRODUCTION ↓ **21%**

over **1,100** **IRRIGATORS** shut off from pumping from **Big Blue, Elkhorn, Loup, Niobrara, North Platte** and **Republican Rivers.**

Economic Impact from indemnity payments estimated at **$780M**

Ranchers lost an average of **$200** **per cattle head**

178 reported **water main breaks** in **May, June & July** in Omaha – up from only **56** in **2011**

Nebraska experienced the worst fire season since **1919**
More than **$12M** in damage was reported

400,000 acres **had burned in more than** **1,200** fires

Lower Platte River experienced record low flows with high water temperatures ranging from **92-97°** Fahrenheit

↑ INCREASES IN FISH KILLS

↓ DECREASES IN WATER-BASED RECREATION

Worst outbreak of **epizootic hemorrhagic disease** since **1970s** **killing** more than **1/3** of the **whitetail deer population**

Lower Platte River **Consortium**

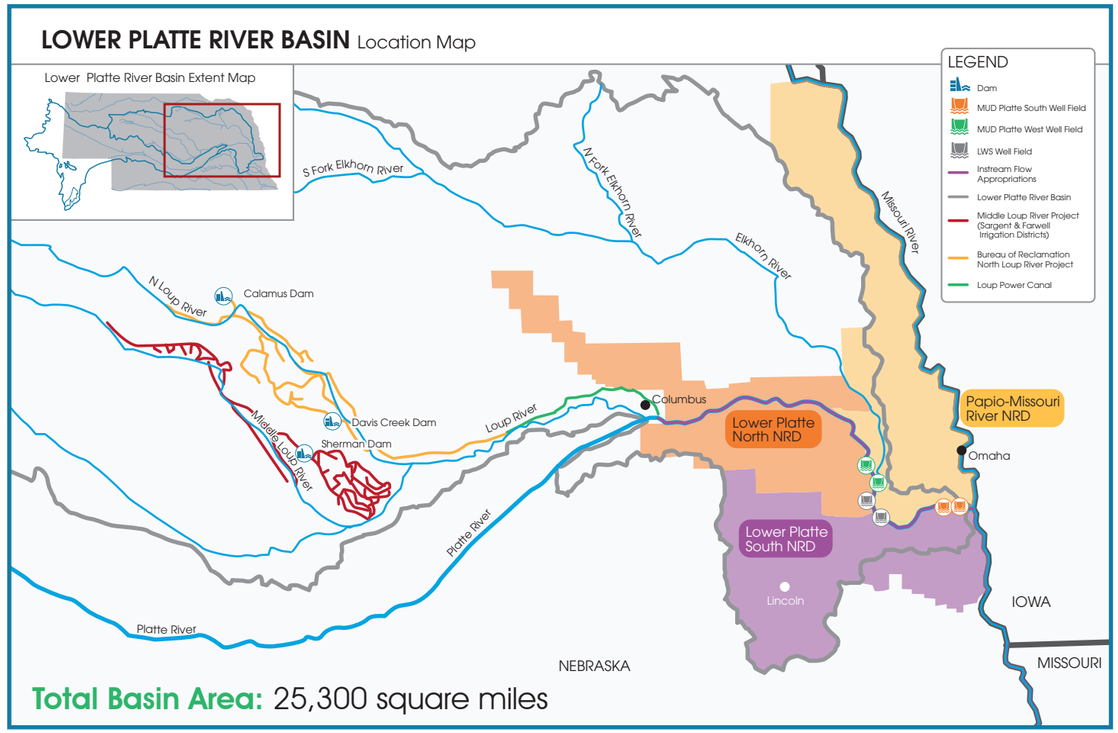
JUNE 2018

The **three Lower Platte River Natural Resources Districts (NRDs), Lincoln Water System,** the **Metropolitan Utilities District of Omaha**, and the **Nebraska Department of Natural Resources (Nebraska DNR)** are embarking on an effort to develop a Drought Contingency Plan for the Lower Platte River Basin in Nebraska. The plan will offer regional solutions to improve water supply reliability and drought resiliency.

Consortium Purpose Statement: To study long-term water supplies available to the lower subbasin for enhancing streamflows or aquifer storage to support sustainable public water systems.

What is the Lower Platte River Basin?

The Lower Platte River Basin is defined as all surface areas that drain into the Lower Platte River, including those areas that drain into the Loup River and the Elkhorn River, and all aquifers that impact surface water flows of the basin.



Total Basin Area: 25,300 square miles

Consortium Partners

PAPIO-MISSOURI RIVER NATURAL RESOURCES DISTRICT
Finding Solutions Today for a Secure Tomorrow.

LOWER PLATTE NORTH Natural Resources District

LOWER PLATTE SOUTH natural resources district

NEBRASKA DEPT. OF NATURAL RESOURCES

METROPOLITAN UTILITIES DISTRICT

CITY OF LINCOLN NEBRASKA

Funding Partners

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION
WaterSMART

NATURAL RESOURCES COMMISSION
Nebraska Water Sustainability Fund

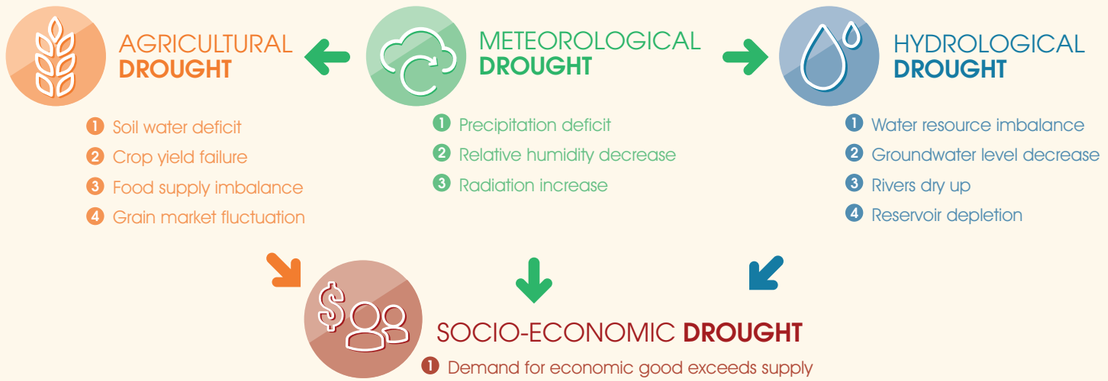
What is the Drought Contingency Plan?

Consortium partners are collaborating to develop a Drought Contingency Plan which is in part funded by the U.S. Bureau of Reclamation and the Nebraska Water Sustainability Fund. The plan will offer drought mitigation and response planning from a regional, integrated perspective, while considering Consortium partners' existing water resources and assets and exploring alternative and/or new operational tactics to improve reliability and resiliency during droughts.

What is drought?

Drought is a deficiency in precipitation over an extended period. Drought is a natural hazard, has a slow onset, and may evolve over the course of months or even years. The impacts of drought can be reduced through **preparedness** and **mitigation**. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. The duration of droughts varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind. In other cases drought may span many years.

Human factors, such as water demand and water management can exacerbate the impact that drought has on a region. Because of the interplay between a natural drought event and various human factors, drought means different things to different people. Drought is defined in a number of ways.



Planning ahead is more efficient and effective than waiting to take measures in a crisis. Drought contingency planning supports preparedness to:

- Identify vulnerabilities and mitigation actions to reduce risks
- Improve coordination and cooperation among key entities, and development of procedures for monitoring, assessing, and responding to drought
- Reduce impacts of drought, and conflicts between water users

Drought Contingency Plans include six primary phases:

1. Establish Diverse Task Force and Objectives

- ☑ The Task Force is made up of member NRDs and their elected boards, Metropolitan Utilities District, Nebraska DNR, and Lincoln Water System. The Task Force actively participates in developing the drought contingency plan.
- ☑ The Task Force represents multiple interests in the planning area including:
  - Agricultural, domestic and commercial sectors
  - Fish and wildlife habitat
  - Forestry and range management
  - Park facilities
  - Soil conservation
  - Public water supplies
  - Surface rights including:
    - Storage, irrigation, hydropower, manufacturing, diversions, instream flows and other beneficial uses
- ☑ Bureau of Reclamation reviews the Task Force membership and provides feedback as necessary to support and encourage a diverse and inclusive Task Force.

2. Develop Monitoring Plan

- ☑ Establish a process for monitoring near- and long-term water availability, and a framework for predicting the probability of future droughts or confirming an existing drought.
- ☑ Establish a process for collection, analysis, and dissemination of water availability and other drought-related data (e.g., precipitation, temperature).
- ☑ Explain how data will be used to predict or confirm droughts, including identifying metrics and triggers that will be used to define stages of drought and to trigger response actions.

3. Conduct Vulnerability Assessment

- ☑ Assess the risks to critical resources within the planning area and the factors contributing to those risks.
- ☑ Will drive the development of potential mitigation and response actions.
- ☑ Consider a range of future conditions, including uncertainties related to changing hydrologic conditions.

4. Identify Mitigation and Response Actions

- ☑ Identify, evaluate, and prioritize response and mitigation actions and activities that can build long-term resiliency and can be implemented during a drought that will mitigate the impacts.
- ☑ Mitigation actions are actions, programs, and strategies implemented before drought to address potential risks and impacts while response actions are actions that are implemented during specific stages of drought to manage the limited supply and decrease the severity of immediate impacts.

5. Develop Administrative Framework

- ☑ Identify who is responsible for undertaking the actions necessary to implement each element of the drought contingency plan, including communicating with the public about those actions.
- ☑ Identify roles, responsibilities, and procedures necessary to: conduct drought monitoring; initiate response actions; initiate mitigation actions; and update the plan.

6. Identify Plan Update Process

- ☑ Describe the process that was undertaken to develop the plan, including how stakeholders were engaged and how input was considered.
- ☑ Include a process and schedule for monitoring, evaluating, and updating the drought contingency plan.

Lower Platte River
Drought Contingency Plan

Public Open House
June 19, 2018

Purpose: To study long-term water supplies available to the lower Platte subbasin for enhancing streamflows or aquifer storage to support sustainable public water systems.

Consortium Members

LOWER PLATTE SOUTH
natural resources district

Lower Platte North
Natural Resources District

PAPIO-MISSOURI RIVER
NATURAL
RESOURCES
DISTRICT
OMAHA, NE

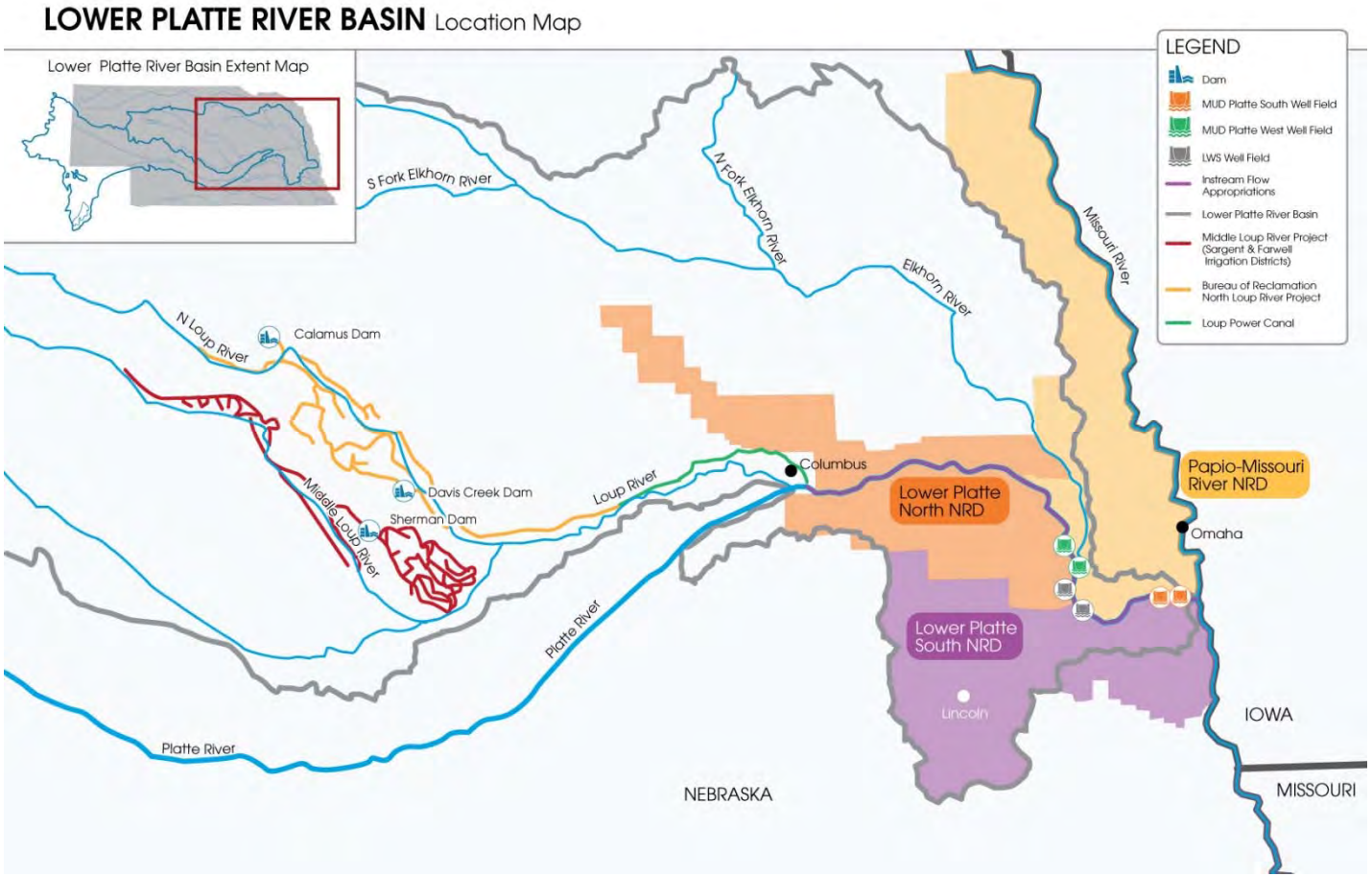
CITY OF
LINCOLN
NEBRASKA

NEBRASKA
DEPT. OF NATURAL RESOURCES

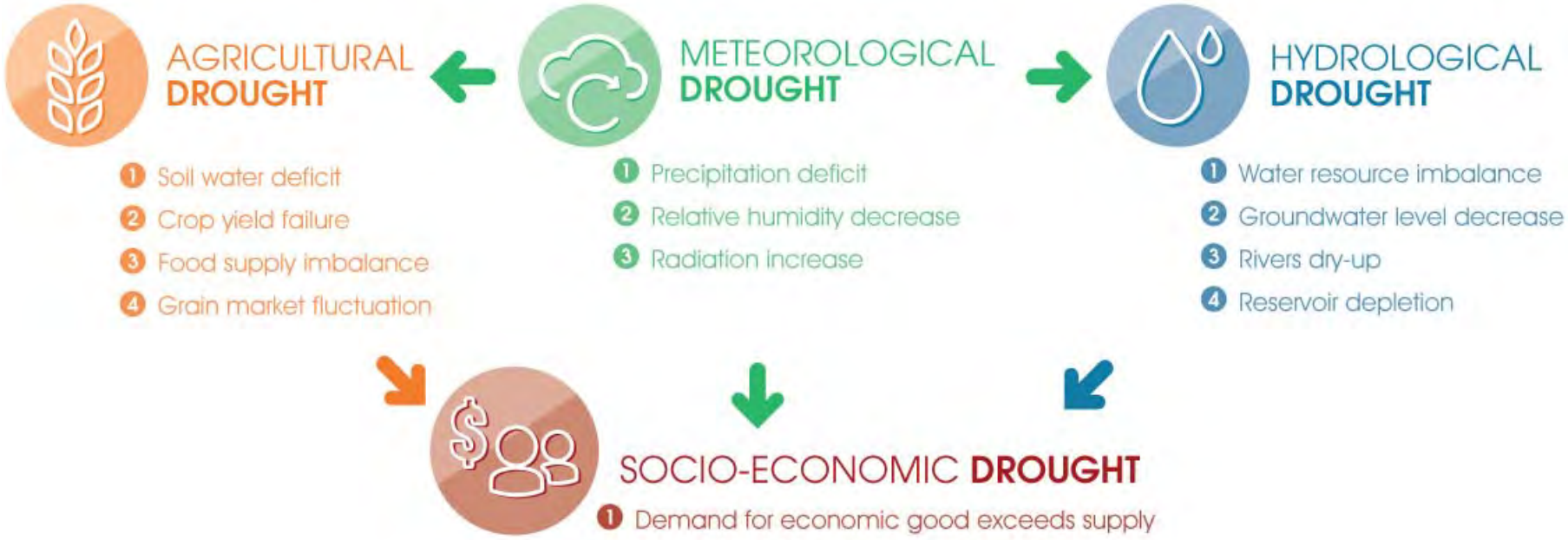
METROPOLITAN
UTILITIES DISTRICT
Live Green. *Think Blue.*

Lower Platte River **Drought Contingency Plan**

Lower Platte River Basin



Anatomy of Drought



Drought Contingency Planning Process

Basin Hydrology

- Upper Platte fed by snowmelt in Rocky Mountains
- Lake McConaughy - mainstem North Platte River
- Platte River above Duncan becomes disconnected during low flows

Vulnerability Assessment

The degree to which a population is vulnerable to a drought hinges on the ability to anticipate, to deal with, resist, and recover from the drought.

Major Sectors Impacted by Drought

- Agricultural
- Municipal & Industrial
- Recreational & Environmental

Agricultural Sector

- NRD controls
  - Groundwater allocations
  - Reduction of irrigated acres
  - Limits on expansion of irrigated aces
- Surface Water Administration (prior appropriation doctrine)

Municipal & Industrial Sector

- Population growth
- System production, pumping, and delivery capacities
- Water use restrictions (lawn watering, car washing, water shortage rates, etc.)
- Water quality impacted/higher treatment costs
- Infrastructure failure/water main breaks
- Single source/lack of redundancy

Recreational & Environmental Sector

- Loss or degradation of habitat (wetlands, endangered species,
- Fish kills
- Reduced tourism (boating, camping, fishing, etc.)

Climate Change and Drought

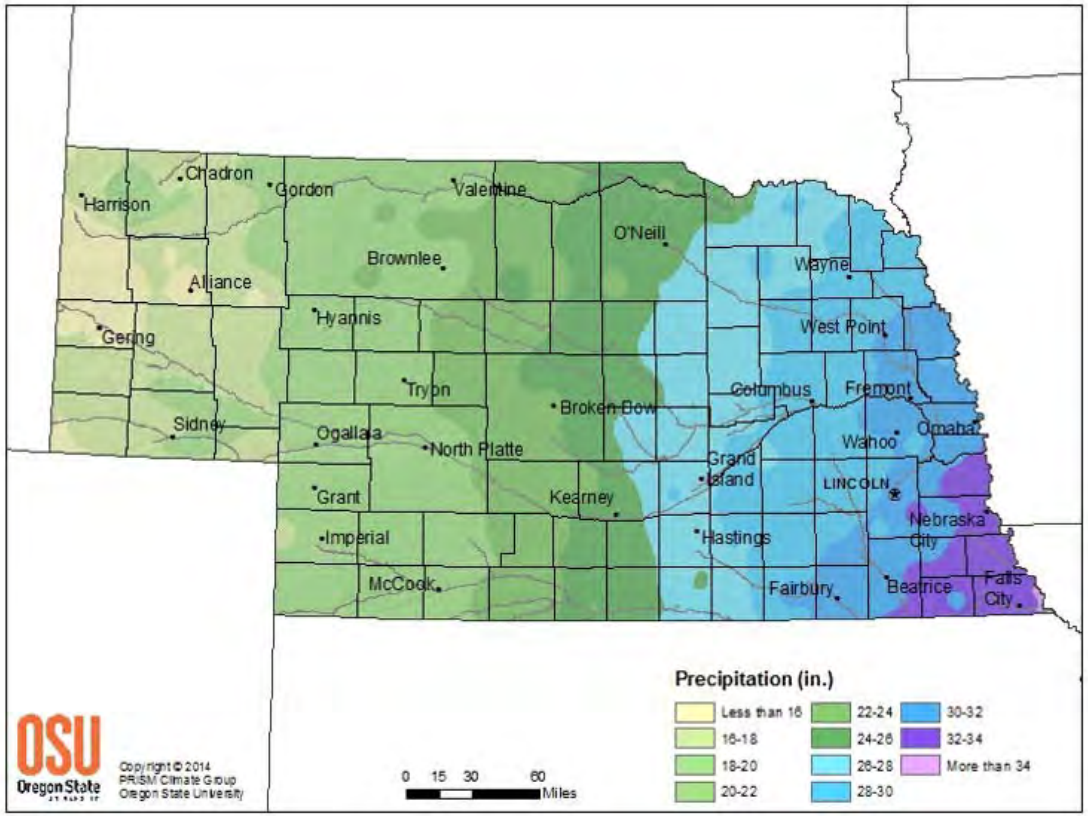
Tyler Williams
Extension Educator

Lower Platte River **Drought Contingency Plan**

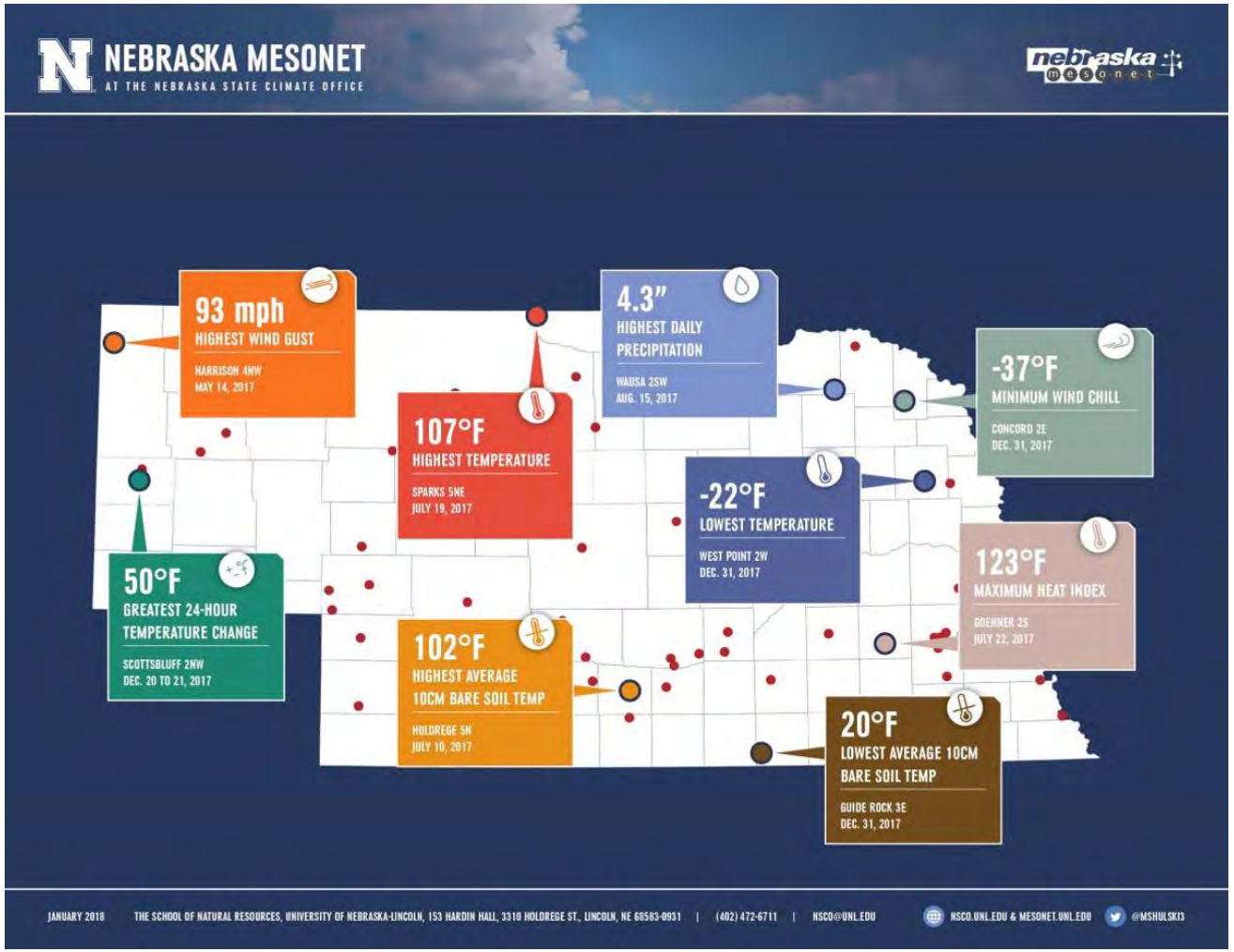
What is drought?

- Drought is a deficiency in precipitation over an extended period.
  - Deficiency?
  - Precipitation?
  - Extended period?

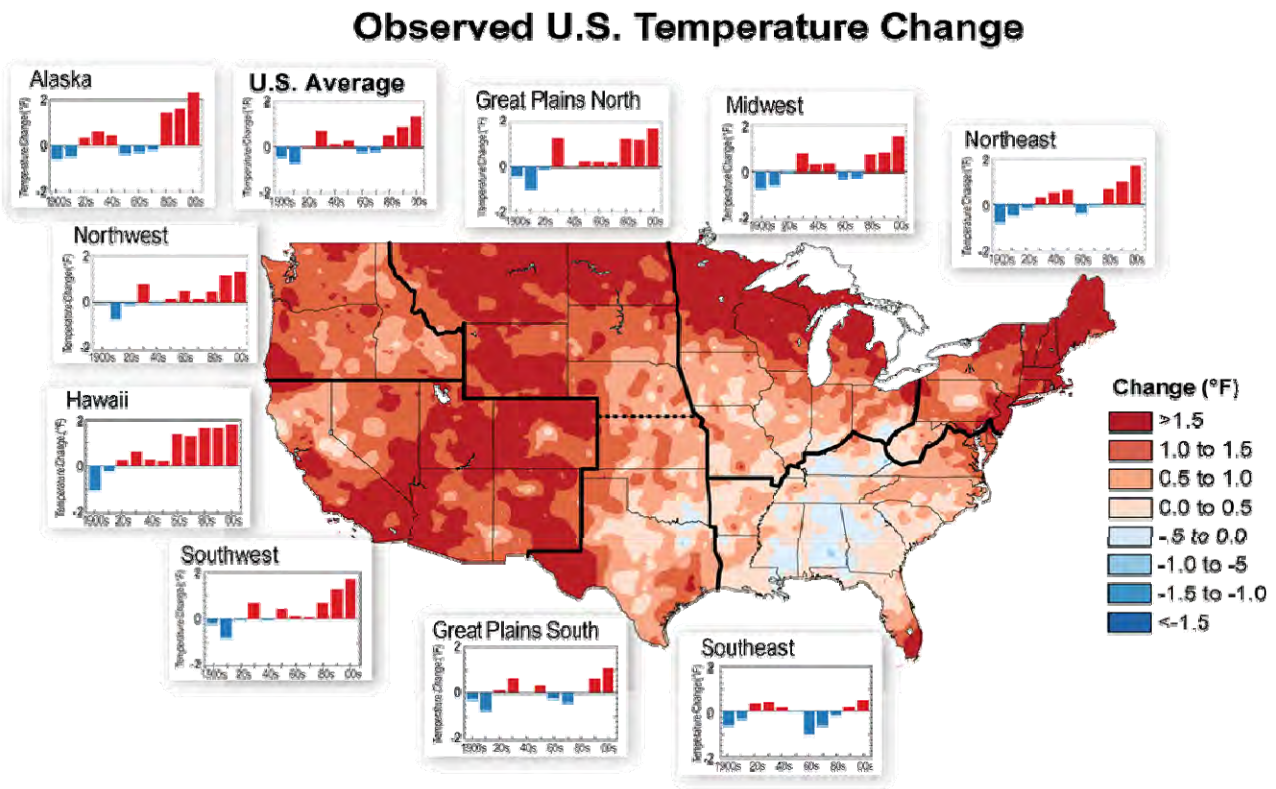
Average Annual Precipitation (1981-2010) Nebraska



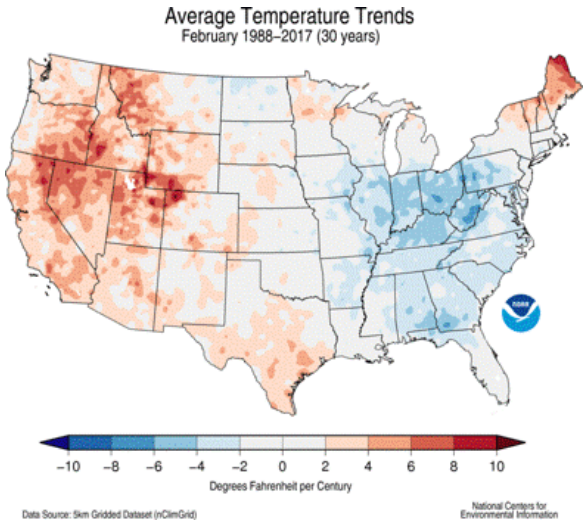
2017 State Weather Extremes

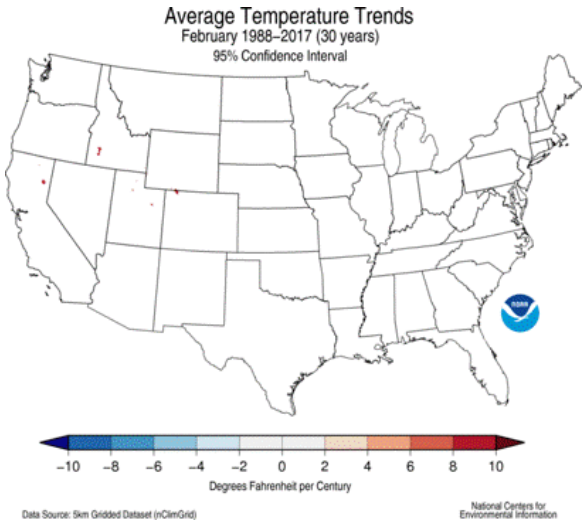


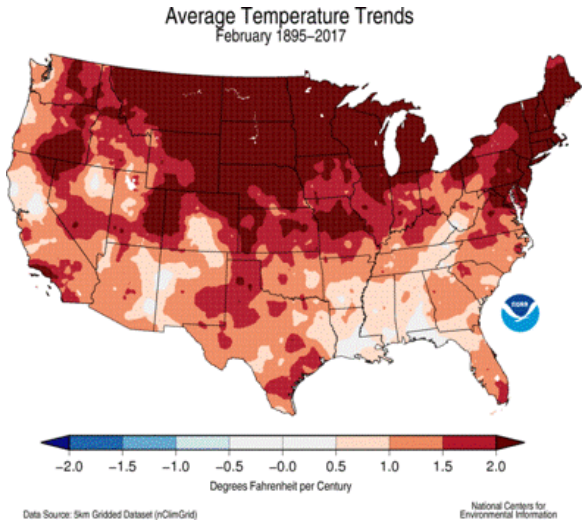
Annual Temperature Trend (1991-2012)

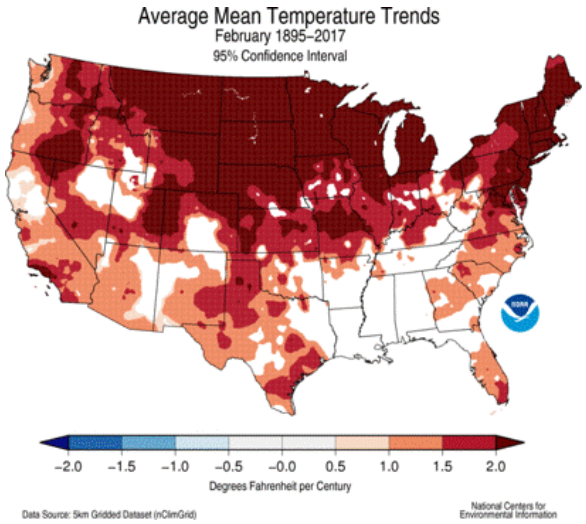


February Temp Trends

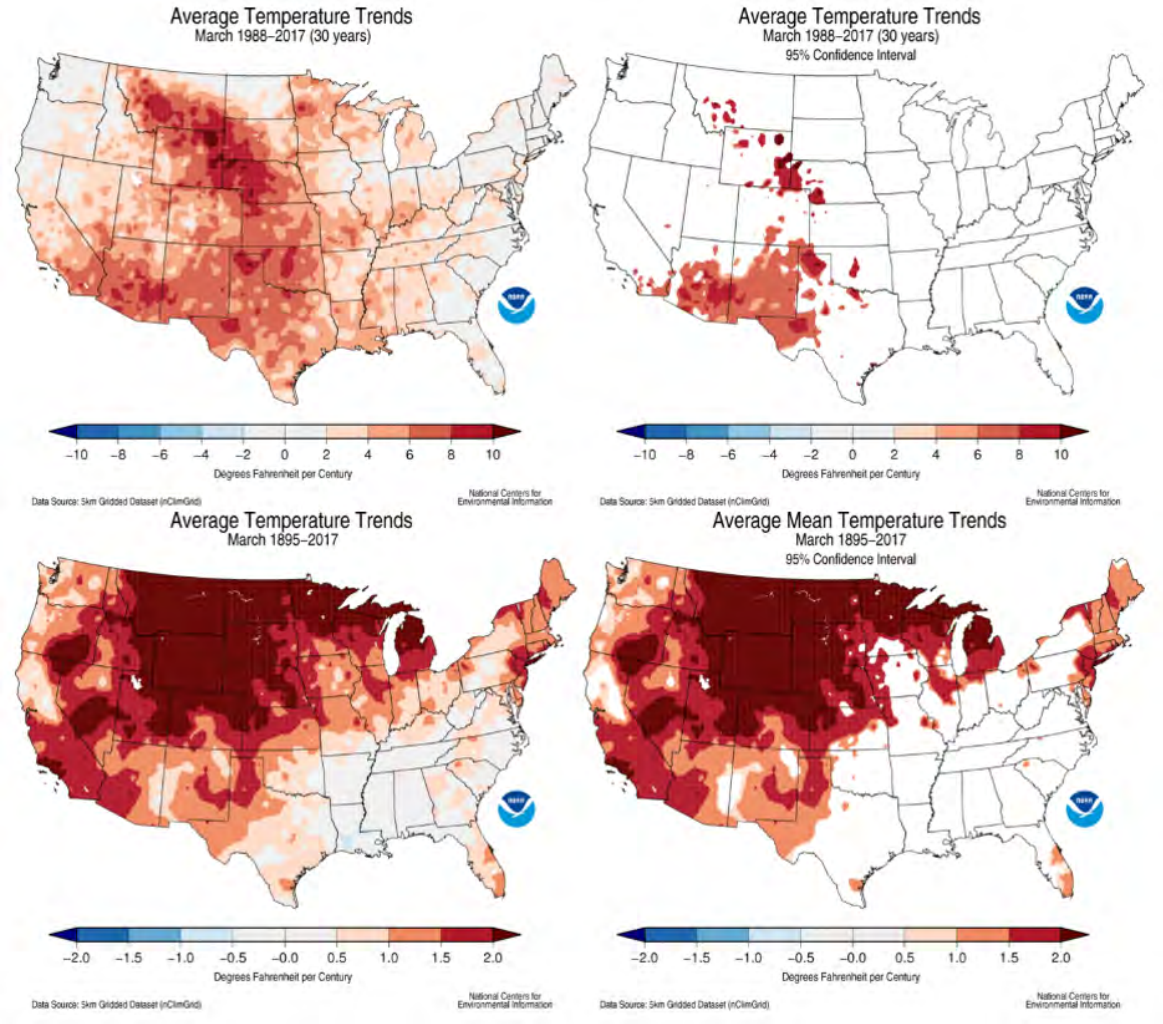




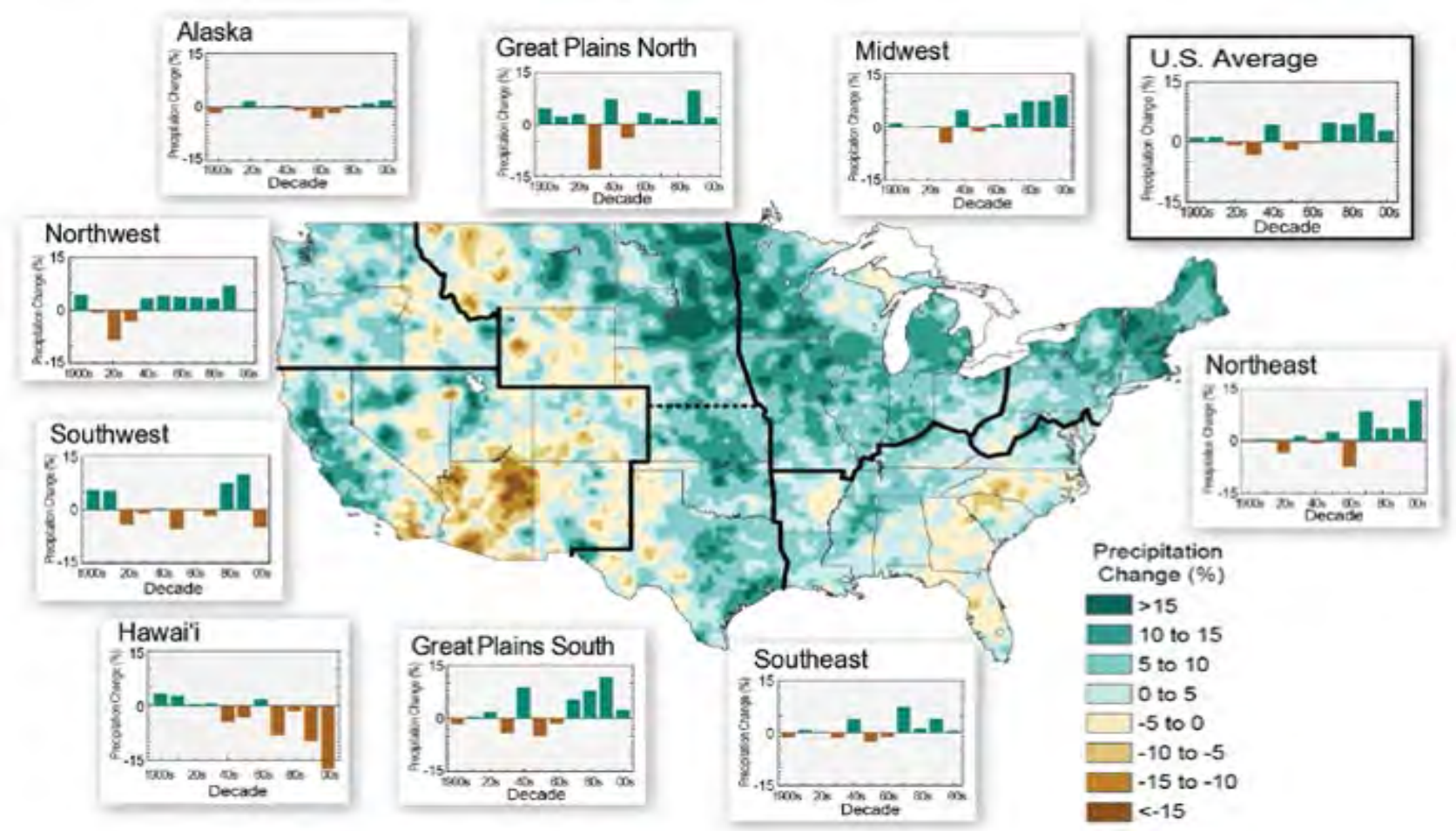




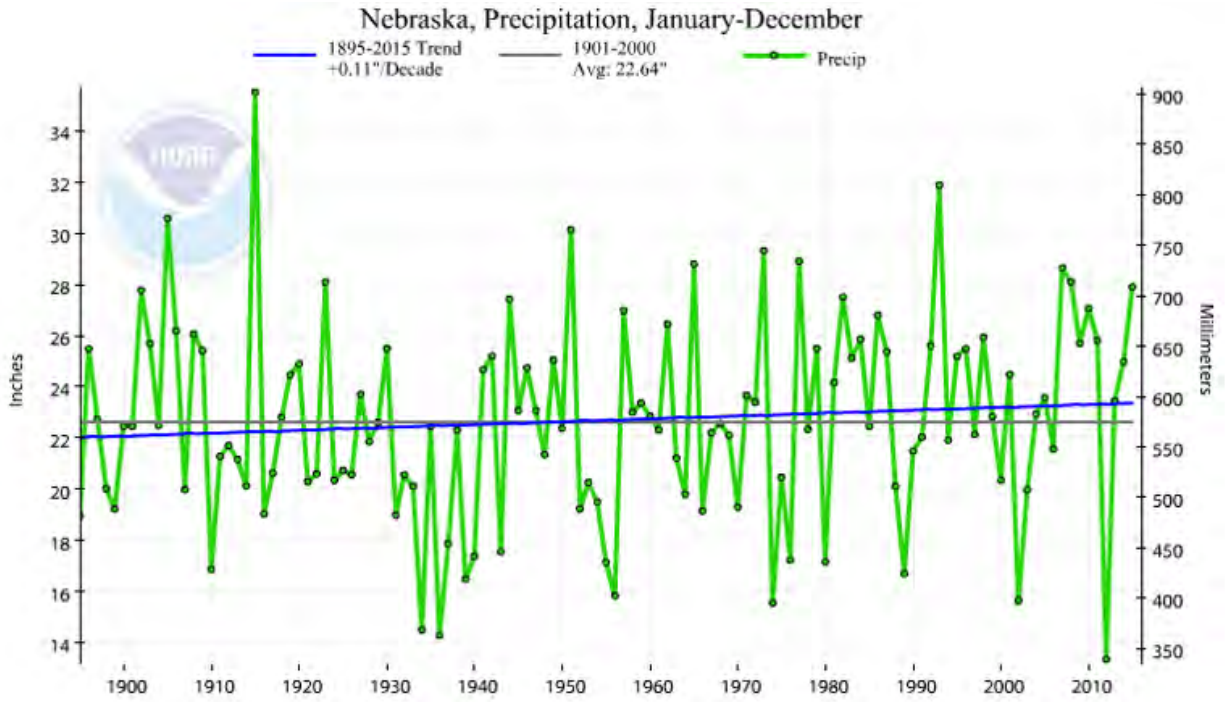
March Temp Trends



Recent Changes in Precipitation



State-wide Precipitation

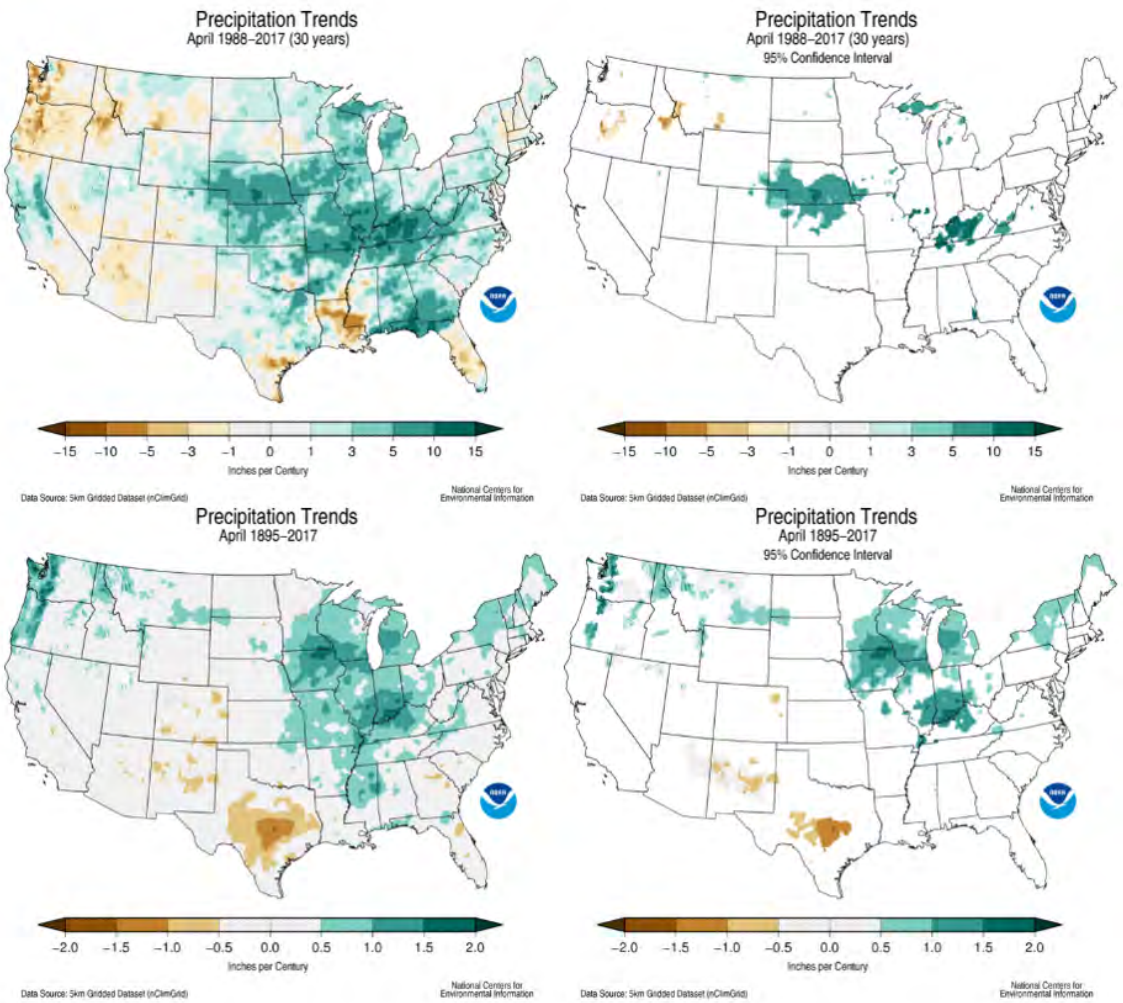


State-wide aggregate change in total precipitation by season (1895-2012)

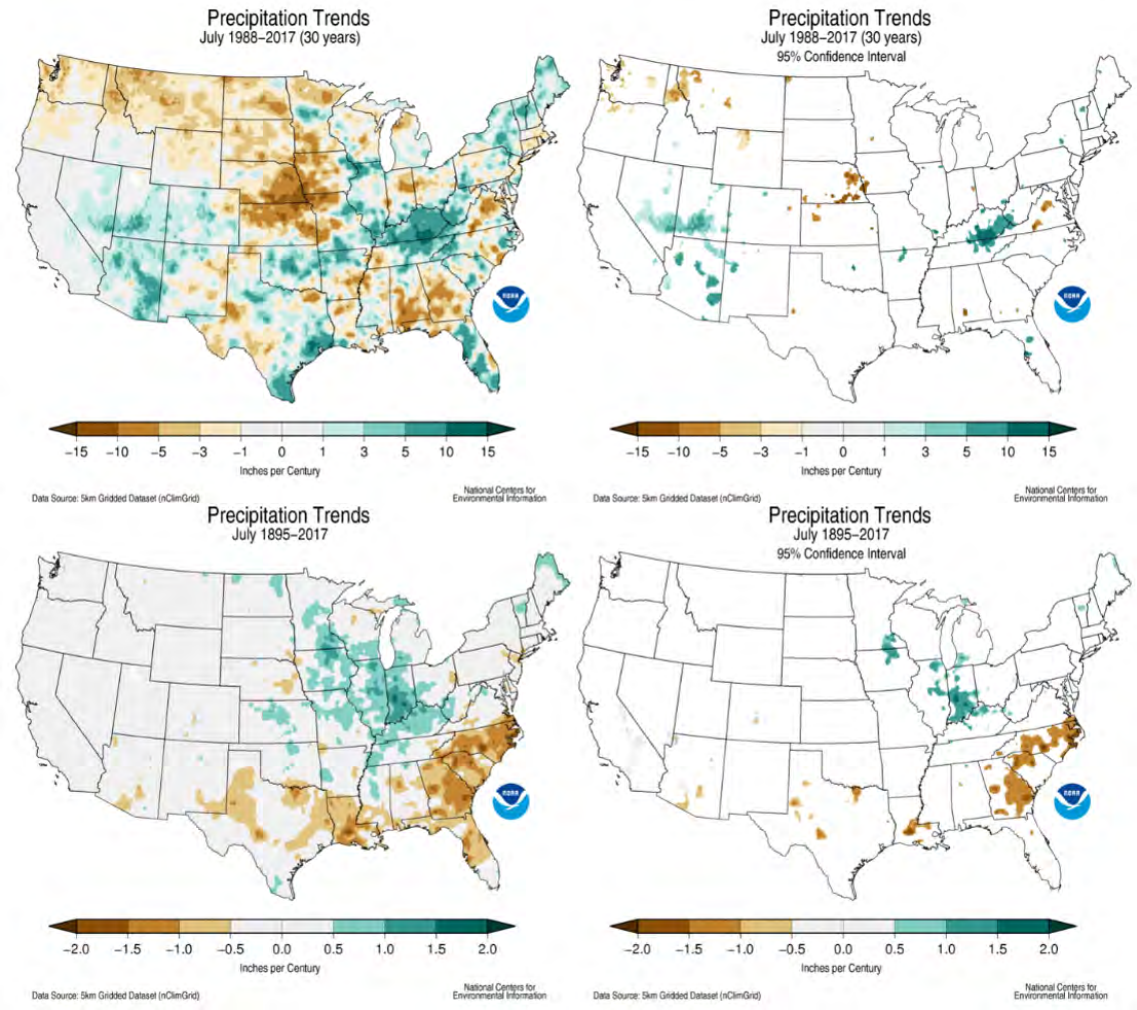
- Winter: -0.20 in
- Spring: +1.11 in
- Summer: -0.45 in
- Fall: +0.04 in

Source: Shulski et al., 2015

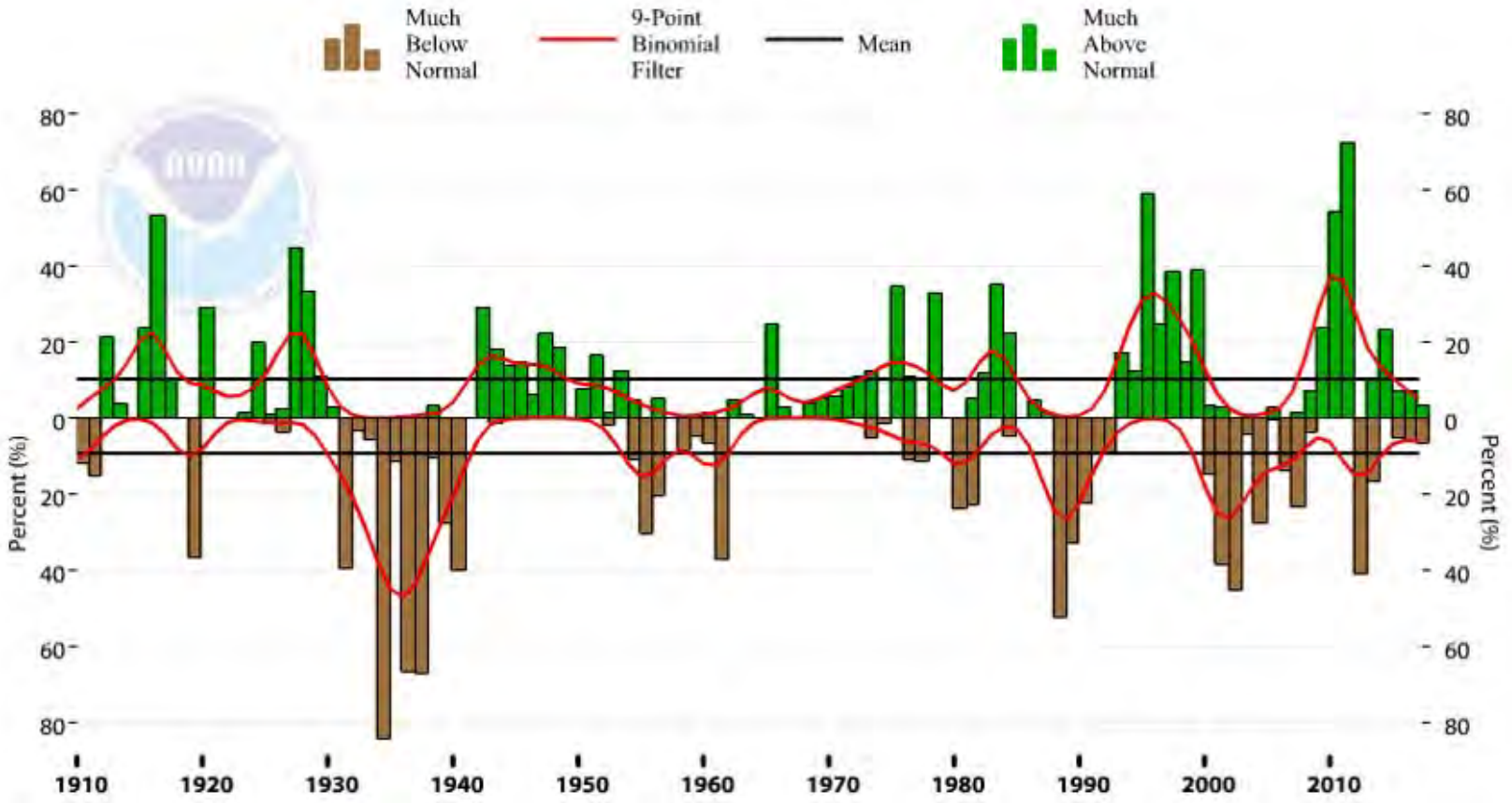
April Precip Trends



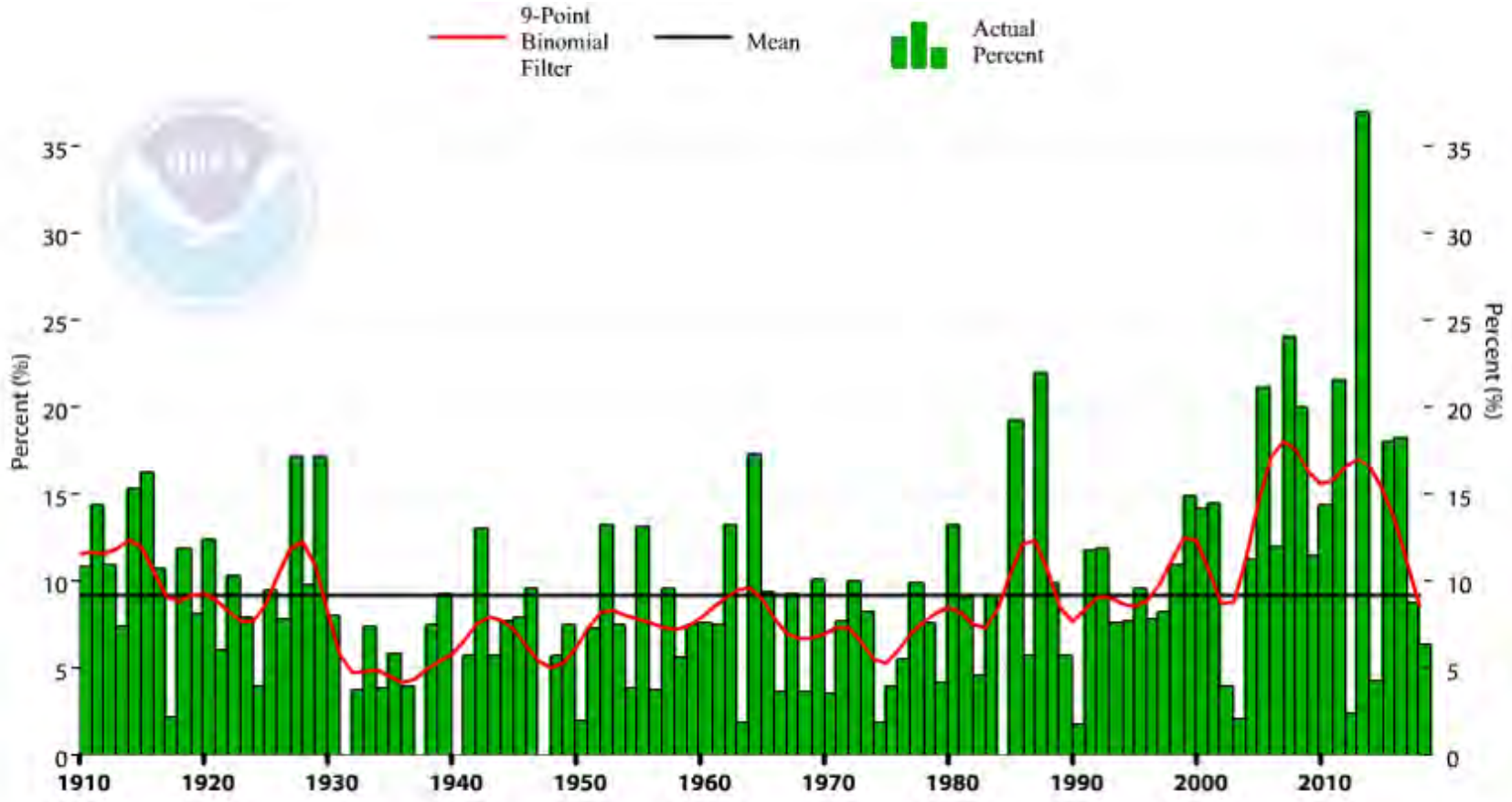
July Precip Trends



Northern Rockies and Plains Extremes in PDSI (Step 3)
Warm Season (April-September 1910-2017)

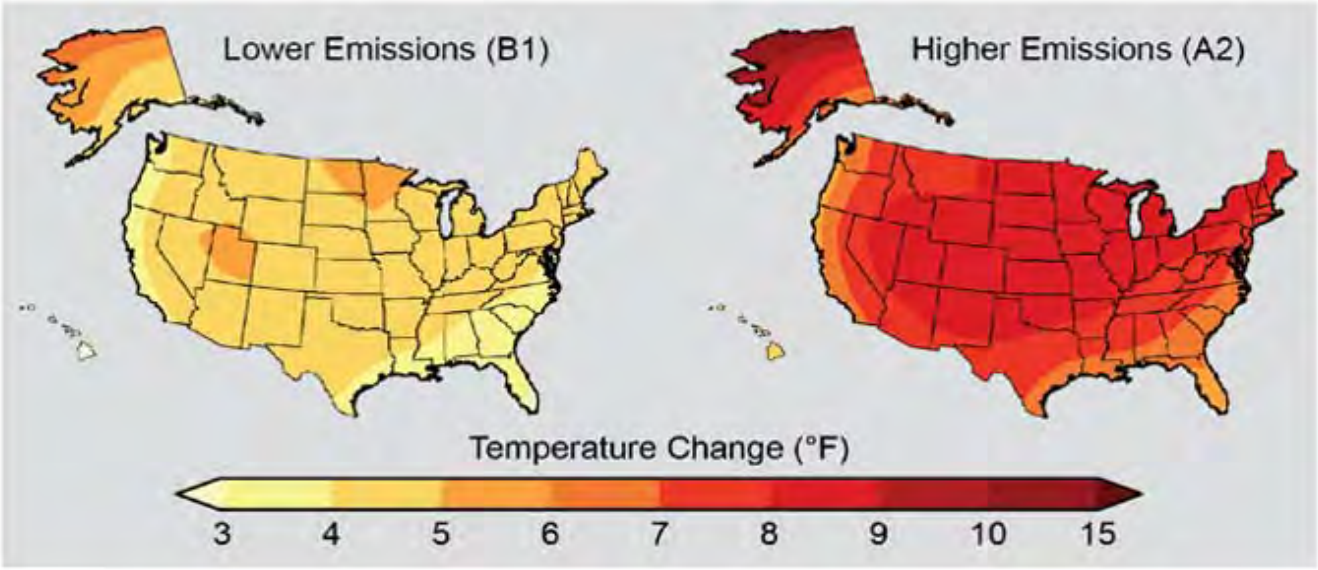


Northern Rockies and Plains Extremes in 1-Day Precipitation (Step 4*)
Spring (March-May) 1910-2018



Projected Changes in Nebraska's Climate

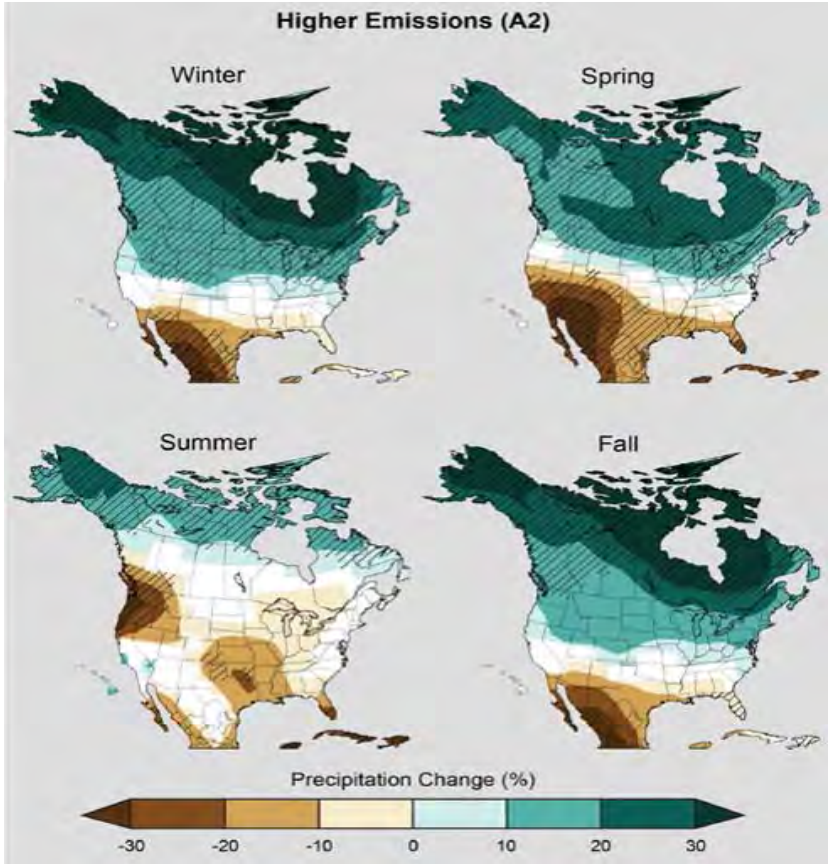
- Projections for Temperatures from 2070-2099 – heavily influenced by emissions
- 100°F days (10-20/yr), Night temps above 60°F (20-40 nights/yr), frost-free days (14 days by 2100)



Projected Changes in Nebraska's Climate Projection for Precipiation

- Projection for Precipitation
  - Small increase in winter/early spring precipitation in NE.
  - Drying trend in the central Plains in summer.
  - Increase in heavy precipitation events expected to continue

In general, dry areas will get drier, wet areas will get wetter



Impact Recap

- More precipitation in April, May and June, less in March and July
- Rain falling in less-frequent, but heavier events
- Increase in growing season length (esp. in west)
- Severe and extreme events increasing
- Warmer temperatures in the winter and fall and warmer nights in the summer – more rain, less snow
- Freeze risk? – temps increasing, but freeze distribution is tricky
- Night time temps increase – respiration increases and livestock cool-down-time decreases
- More GDDs but outside of typical "growing season"
- "Flash" droughts (2012)

What does this mean...

- Precipitation
  - Altered timing of typical rainfall pattern
  - Timing is important to coincide with use by agriculture, recreation, habitat, and communities.
- Rivers and streams
  - Increase peak flow due to heavy rainfall events and saturated soil in spring
  - Altered by snowmelt timing
  - Enhanced flood risk
- Soil moisture
  - Decrease due to increased atmospheric demand and early/late season warming
  - Reduce groundwater recharge and crop/plant available moisture
- Irrigation
  - Likely to increase with extended growing season and longer dry spells
- Groundwater
  - Water quantity and water quality challenges
  - ~80% of NE's public water and ~100% of private water comes from groundwater
- How can we better capture the liquid that falls, flows, and melts?
  - Storage, surface characteristics, technology

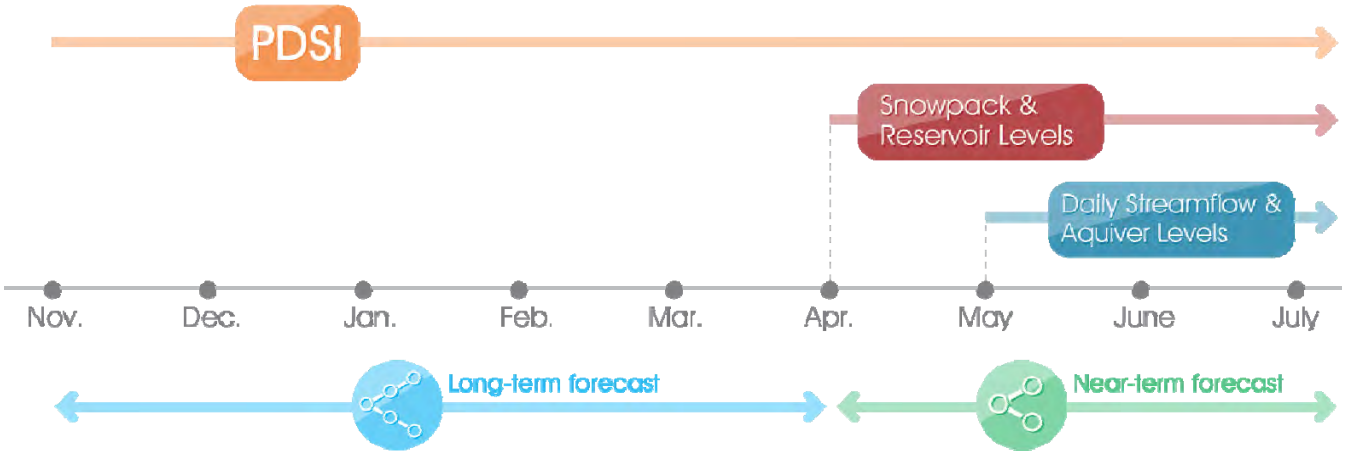
Challenges I see…

- Seasonal variability
- Projections are vague – especially for Plains
- What about technology?
- What will we do for emissions?
- How will the earth respond?
  - Short term extremes vs. long-term consistency
    - The Melting Arctic and Midlatitude Weather Patterns: Are they connected?
      - https://journals.ametsoc.org/doi/full/10.1175/JCLI-D-14-00822.1

Drought Monitoring

Lower Platte River **Drought Contingency Plan**

Timeline Showing Progression



Category	PDSI	Platte River Streamflow at Ashland	Aquifer Volumes
Moderate Drought	-2.0 to -2.99	3,000 – 1,500 cfs	Varies
Severe Drought	-3.0 to -3.99	1,500 – 500 cfs	
Extreme Drought	-4.0 and below	Less than 500 cfs	

Drought Management

Mitigation actions are actions, programs, and strategies implemented **before drought** to address potential risks and impacts.

Response actions are actions that are implemented **during specific stages of drought** to manage the limited supply and decrease the severity of immediate impacts.

Response Actions

- Coordinated Public messaging
- Urban water use restrictions
- Urban water rate pricing
- Shifting water operations
- Groundwater pumping management & administration of surface water
- Groundwater augmentation pumping
- Import water from Missouri River
- Reservoir Releases
- Rapid Response Area

Mitigation Actions

- Surface water storage
- Canal recharge
- Alluvial aquifer recharge
- Water leasing/banking/exchanges