United States Department of Agriculture
Southwest Climate Hub

Nevada Climate Conversation:

Climate Informed Agriculture

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Emile Elias, Southwest Climate Hub Director
Joel Brown, Southwest Climate Hub Co-Director, NRCS National Ecological Site Team Leader

Adapted from a Climate Smart Agriculture training developed by Elizabeth Marks, NRCS

Today's Conversation

Climate

- Terminology
- U.S. Climate trends
- Why these changes are occurring
- Local Climate Information

Climate Smart Agriculture

- How to start the conversation
- Available Resources

Discussion/Feedback

What words come to mind when you think of Climate Adaptation/Resiliency?

Click on link in the Chat box

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Terminology

Weather vs. Climate (Source: NOAA)

Weather reflects short-term conditions of the **atmosphere**

Climate is the average daily **weather** for an extended period at a certain location

Weather can change from minute-to-minute, hour-to-hour, day-to-day, and season-to-season. **Climate**, is the average of **weather** over time and space.

Climate is what you expect, weather is what you get.

Photo Credit: Travis

Climate Smart Agriculture

Definition:

Agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and development goals. (Source: Food and Agriculture Organization)

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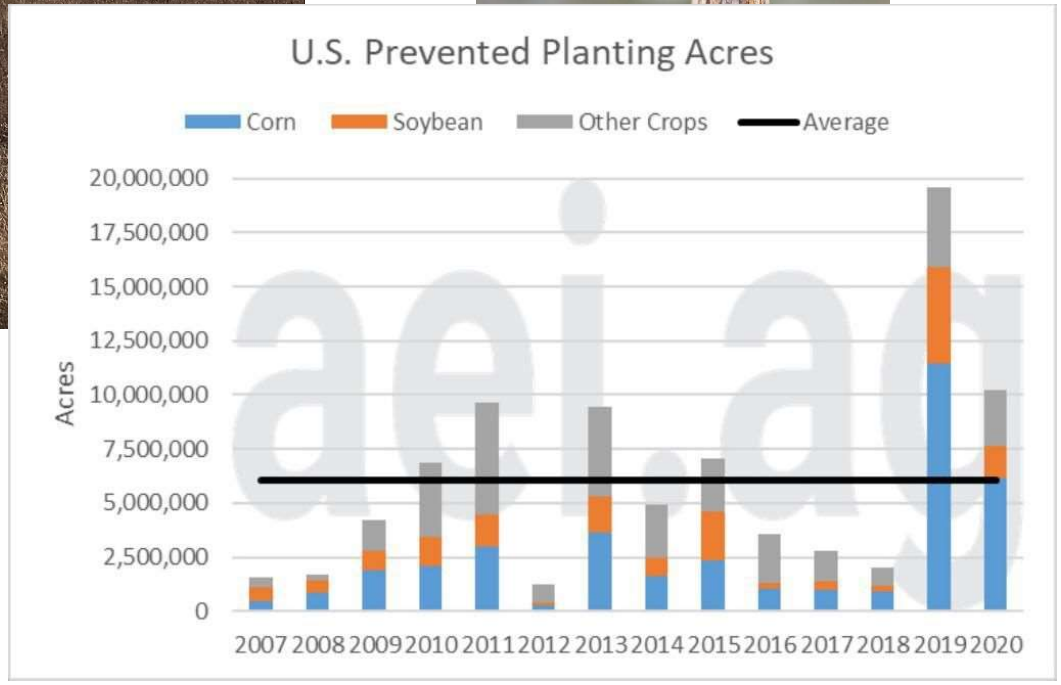
National Climate Observations

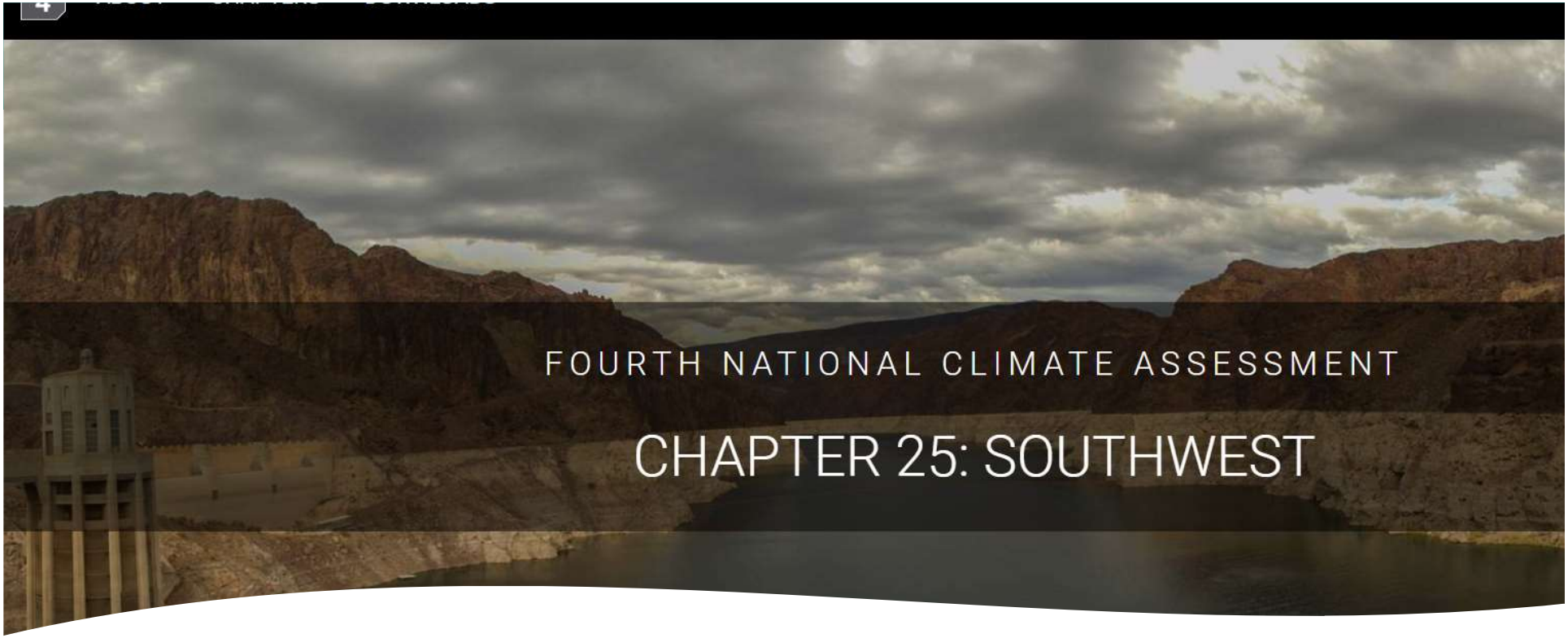
Natural

Natural Resources Conservation Service

nrcs.usda.gov/

What changes in weather have you noticed in your lifetime?

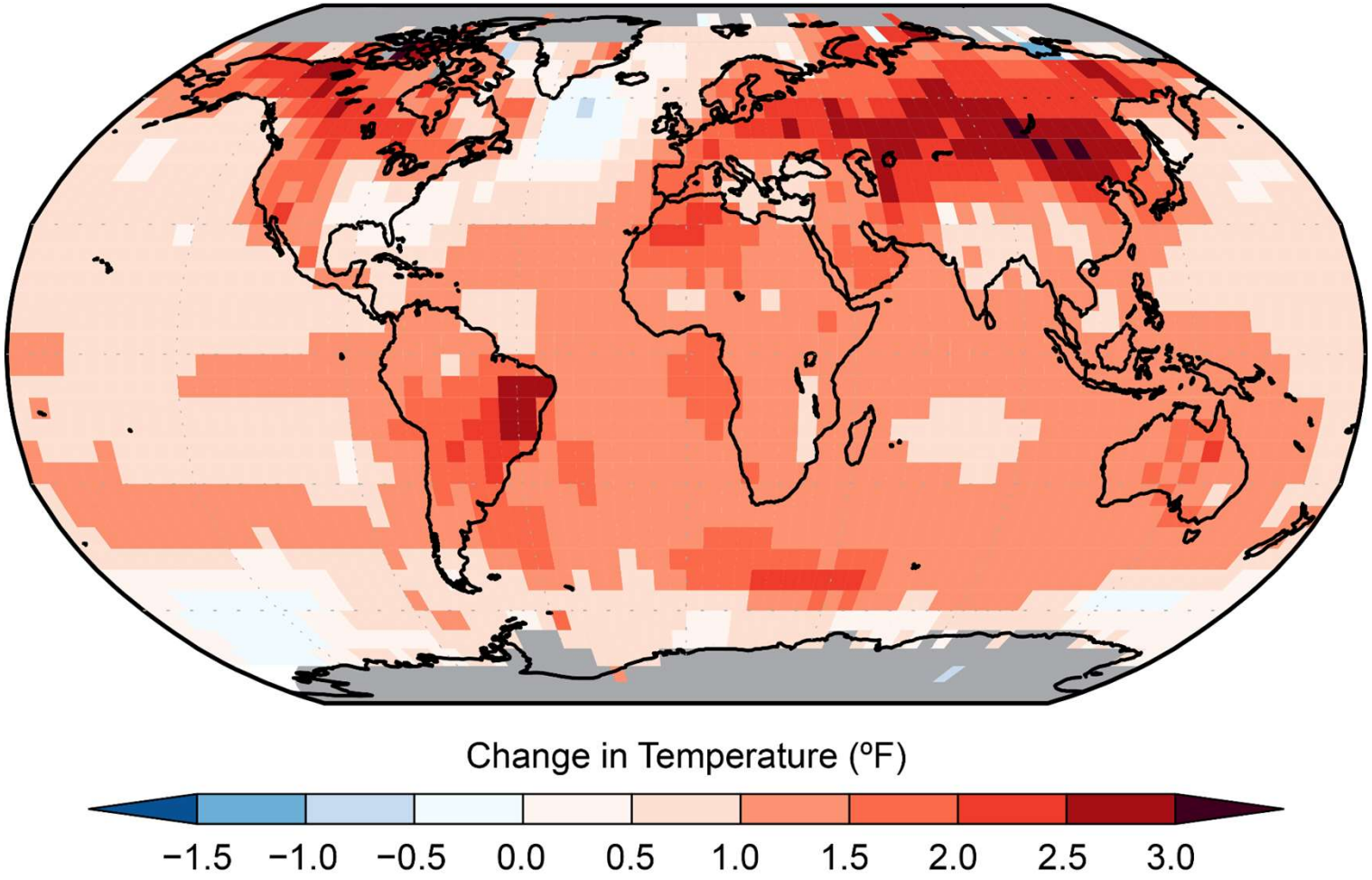




Fourth National Climate Assessment 2018

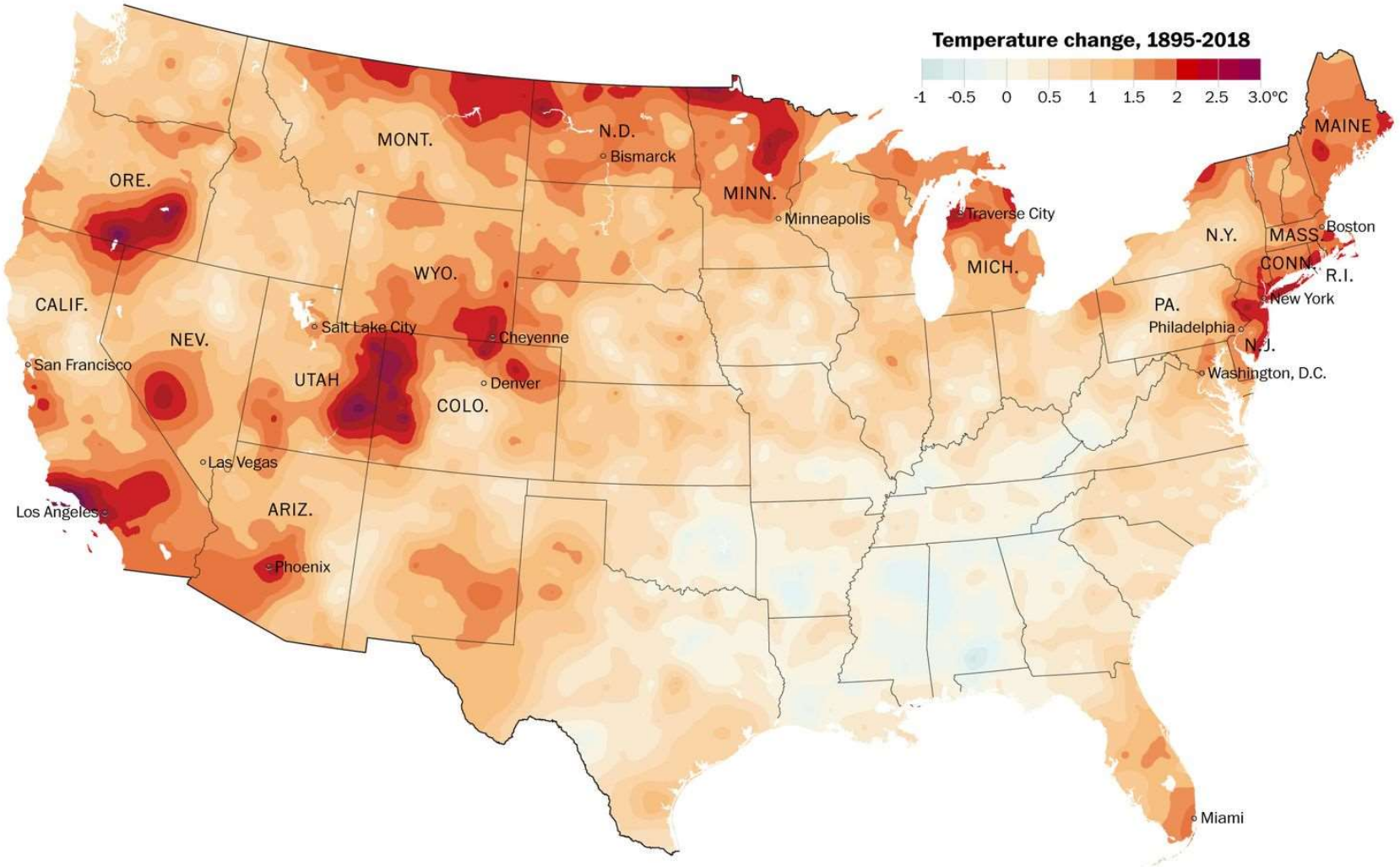
- 1,500 page congressionally mandated report done every four years by the US Global Change Research Program (federally funded).
- Lead agency: National Oceanic and Atmospheric Association (NOAA), many other partner contributors including USDA
- Official data source for USDA climate change information

Observed: Average Global Rise in Temperature of 2°F
(1880 – 2012)



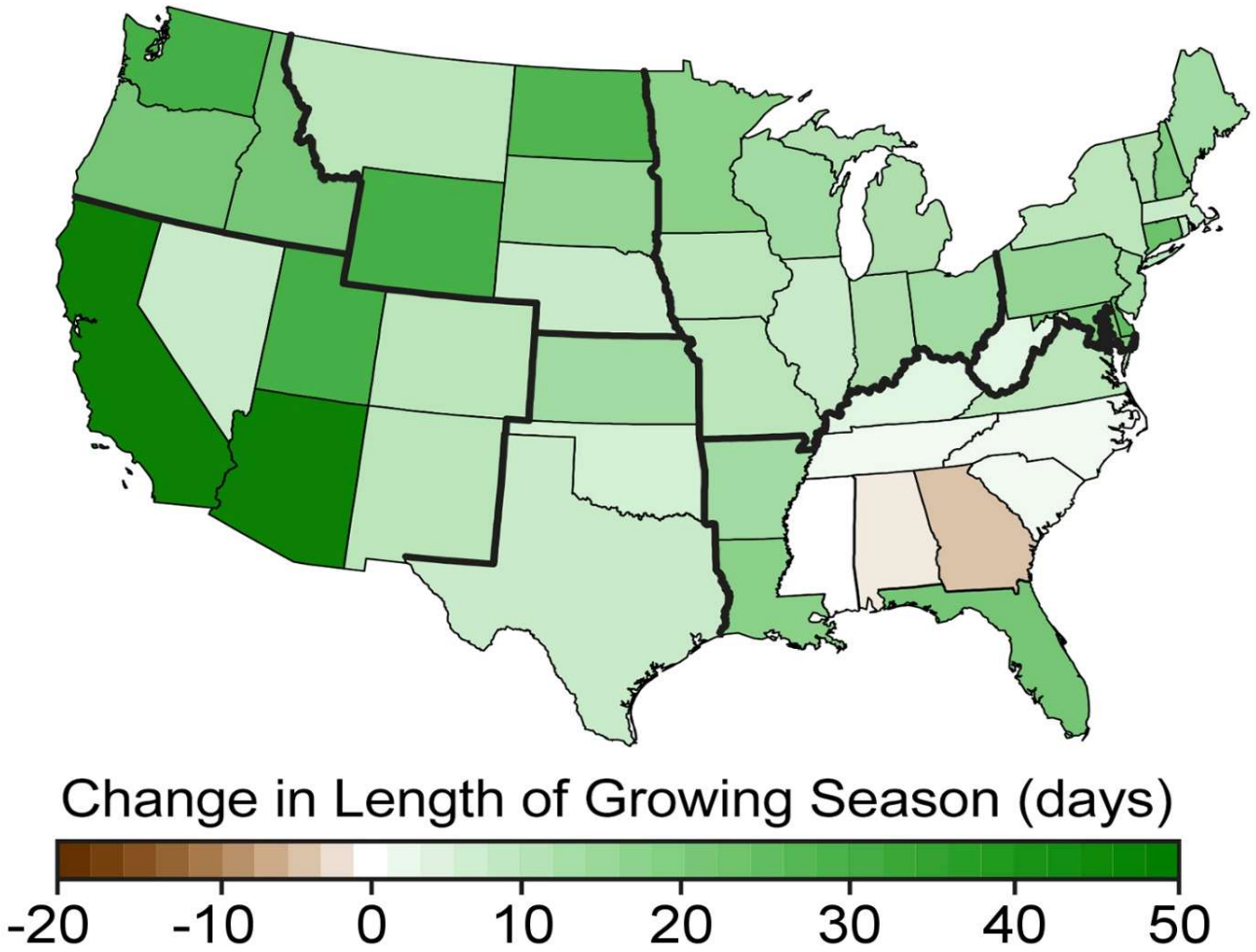
Source: Fourth National Climate Assessment 2018

Observed: U.S. Change in Temperature
(1880 – 2012)



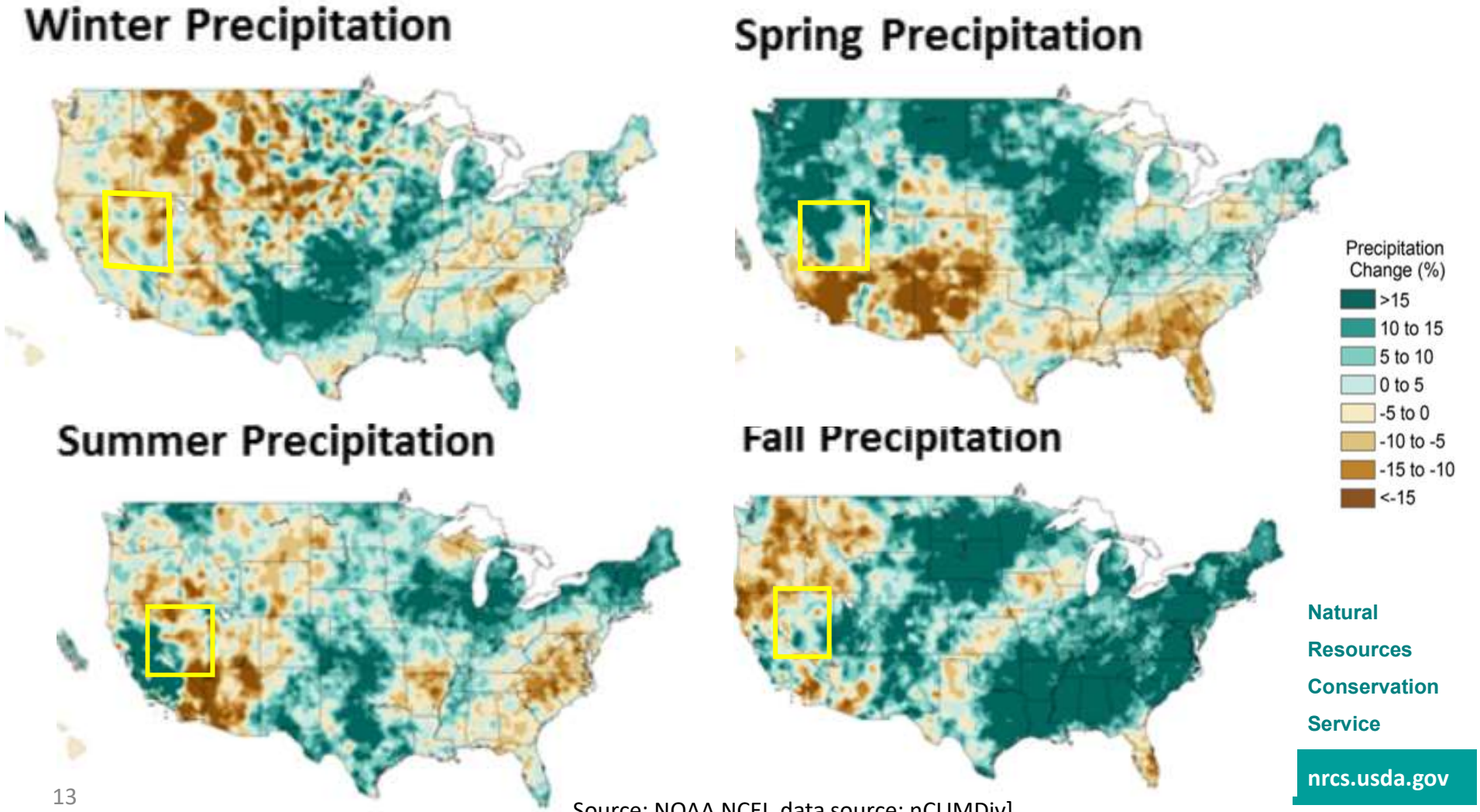
Source: Fourth National Climate Assessment 2018

Observed: Change in Growing Season Length
(1895 – 2012)



Source: Fourth National Climate Assessment 2018

Observed: Precipitation Timing Changes
(1986-2018 to 1901-1960)



Source: NOAA NCEI, data source: nCLIMDiv].

How does this climate information factor into understanding specific Agricultural production systems?

- Alfalfa
- Pasture
- Rangeland
- Livestock
- Potatoes
- Barley
- Winter/Spring Wheat
- Onions
- Hemp
- Teff grass

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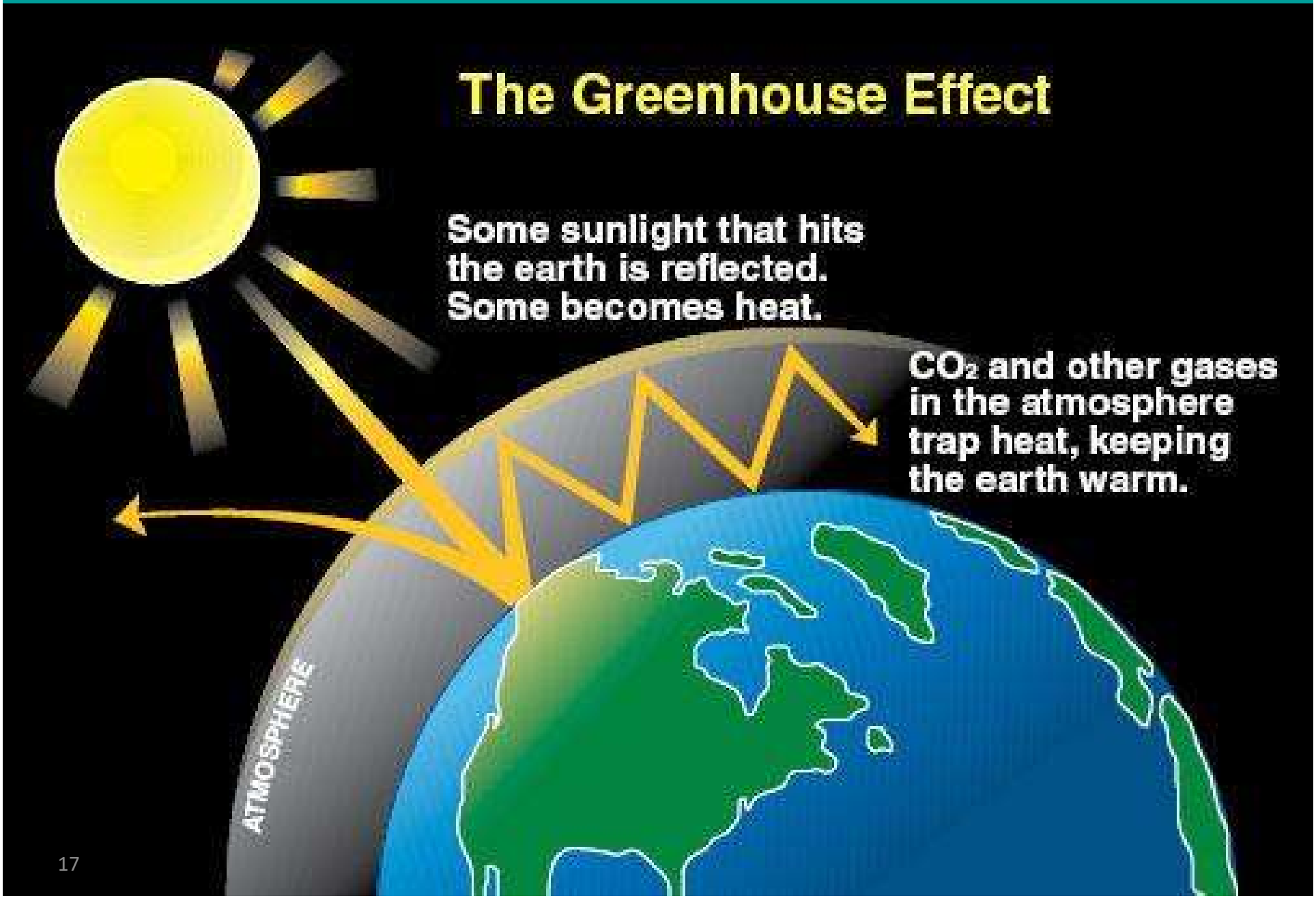
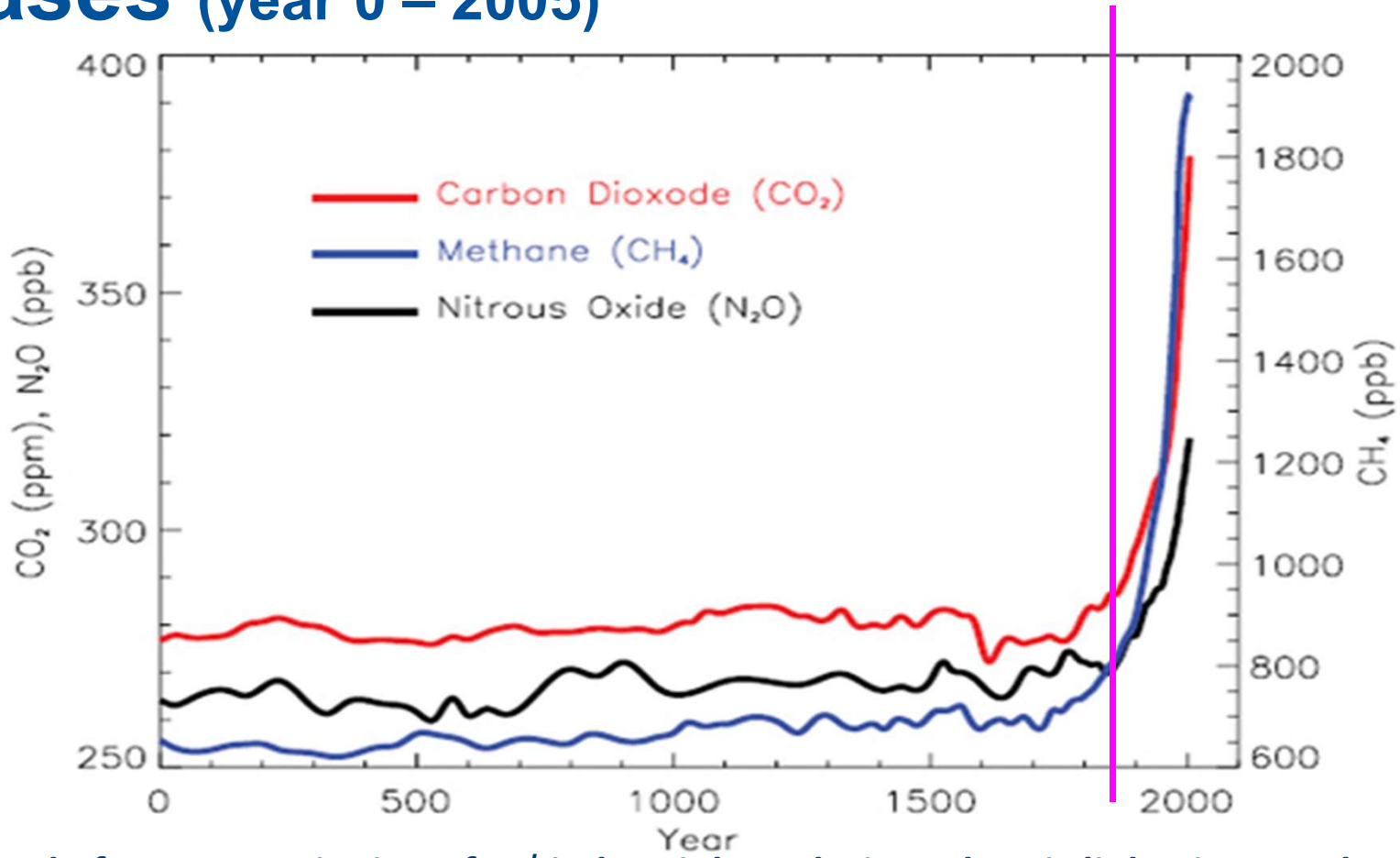
Why Are These Changes Happening?


Photo: Scott Woodall


Photo: Scott Woodall


The Greenhouse Effect
Some sunlight that hits the earth is reflected. Some becomes heat.
CO_2 and other gases in the atmosphere trap heat, keeping the earth warm.
ATMOSPHERE

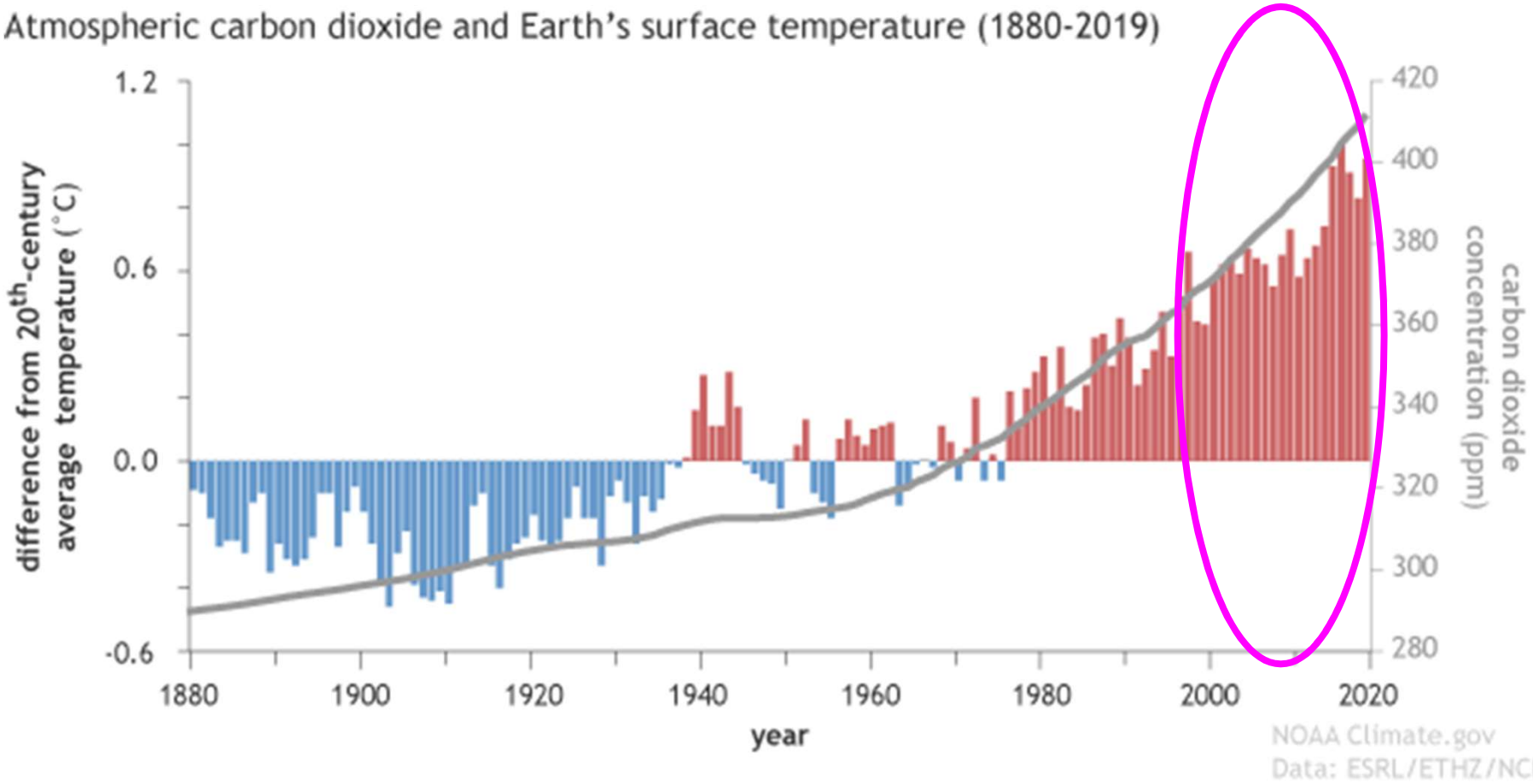
Concentrations of Greenhouse Gases (year 0 – 2005)



End of 1800s: Beginning of 2nd industrial revolution, electric lights invented, and introduction of the automobile.

Source: Intergovernmental Panel on Climate Change Fourth Assessment Report 2007

Temperature Has Risen Along With Levels of Greenhouse Gases



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Local Climate Observations and Trends

Emile Elias, Southwest Climate Hub Director

Natural Resources Conservation Service

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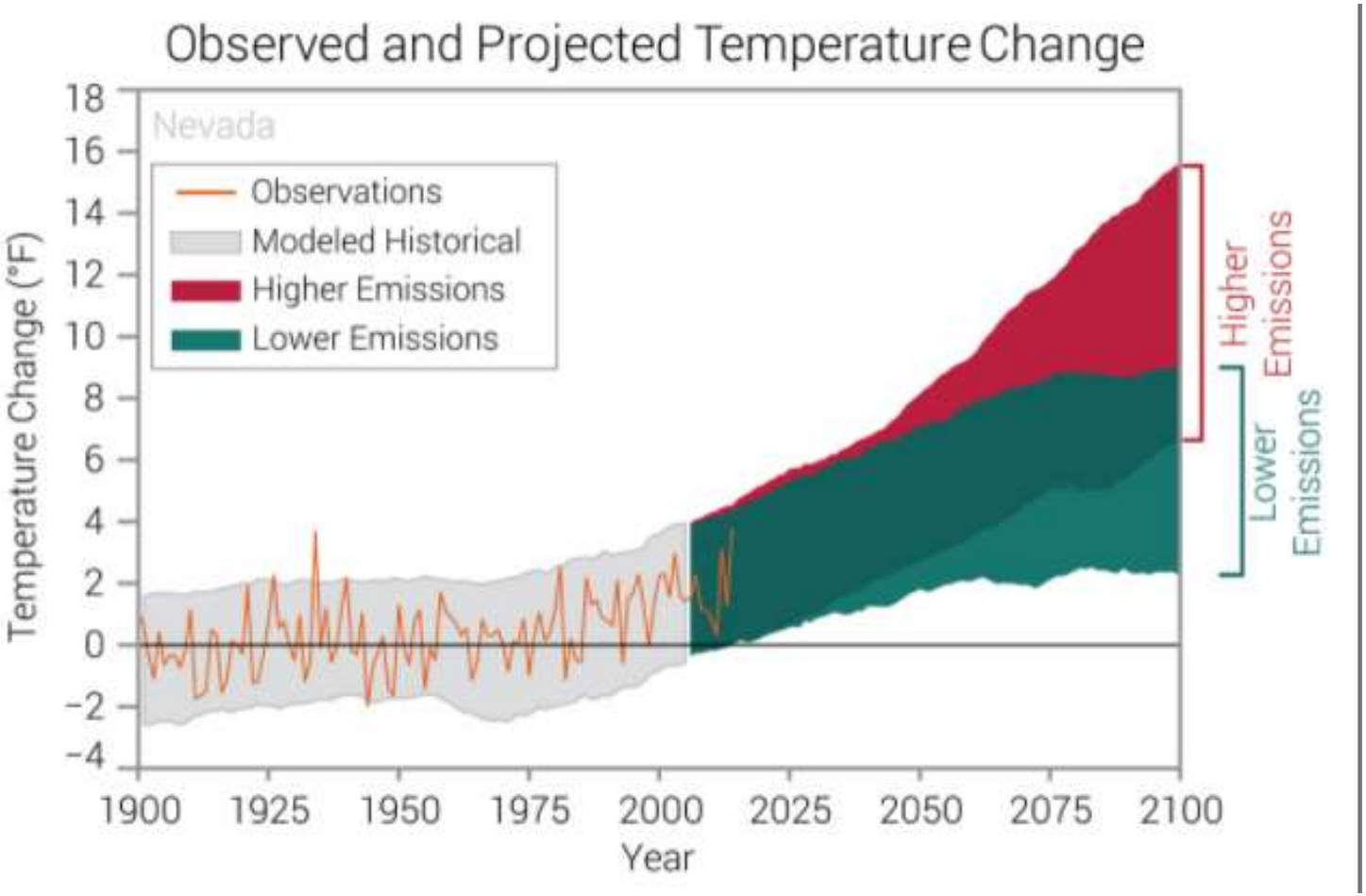
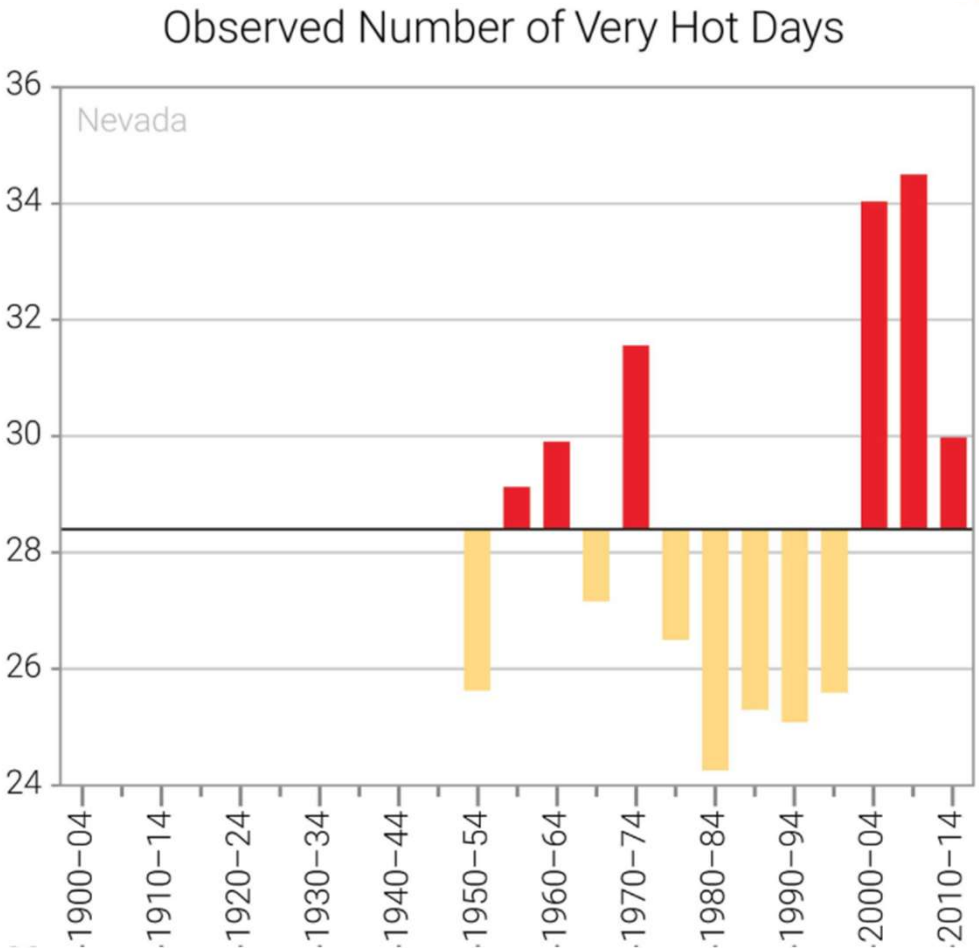
Southwest Things to Think About

- Direct impacts
  - Heat
  - Mega Drought
  - Extreme rainfall events, shifting rainfall patterns?
- Indirect impacts
  - Water quantity and quality, water table compactions
  - Flooding
  - Wildfire and post-fire flooding
  - Woody and herbaceous invasive species
- Historically underserved communities are among the most at risk from climate change – new USDA commitment to "*equity, inclusion and equal opportunity*"

Nevada



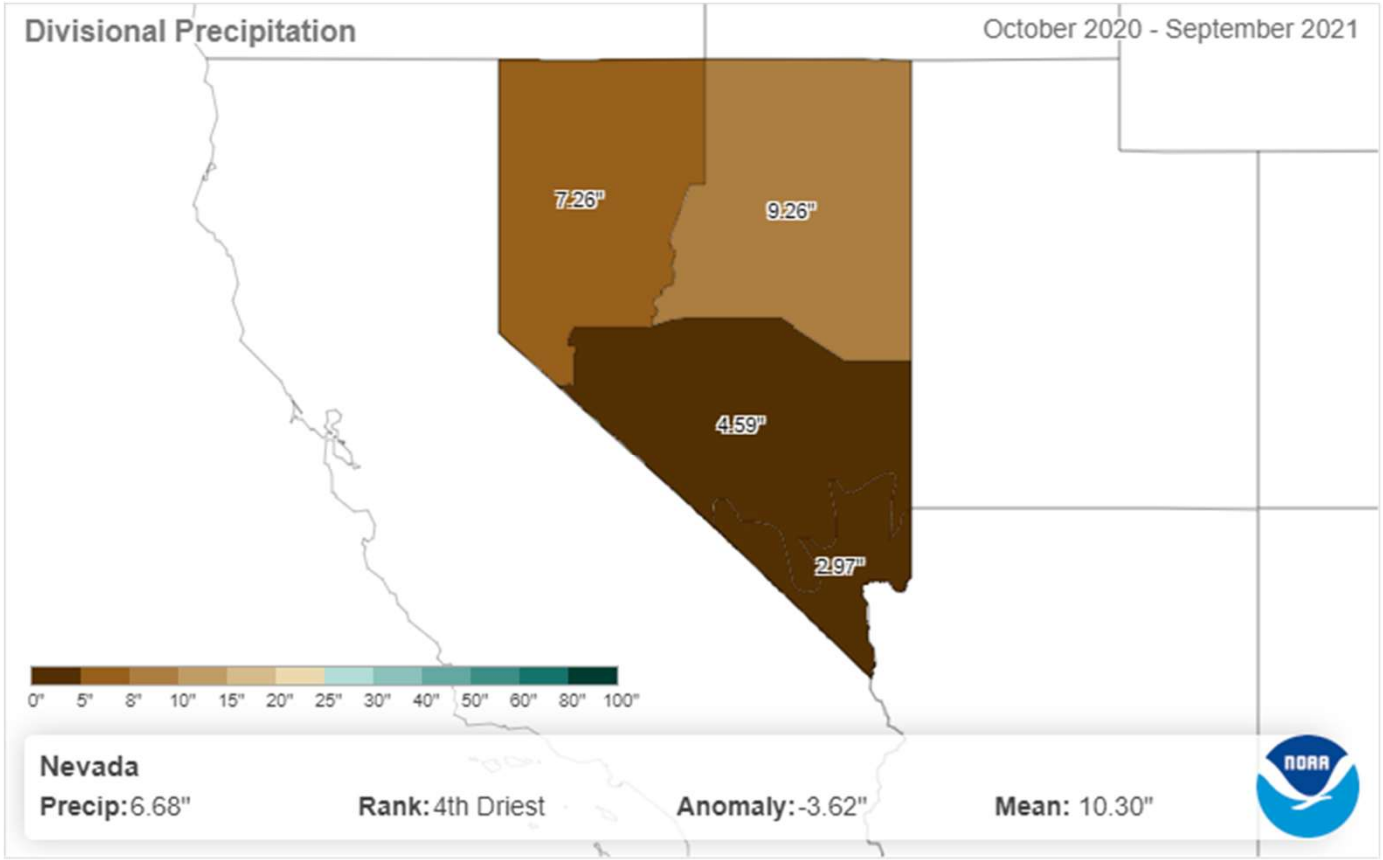
Source: NOAA State Summaries



The observed number of very hot days (annual number of days with maximum temperature above 95°F) for 1950–2014, averaged over 5-year periods; these values are averages from 27 long-term reporting stations.

Source: https://statesummaries.ncics.org/chapter/nv/

Nevada is the driest state in the US, and future projections of precipitation are uncertain…



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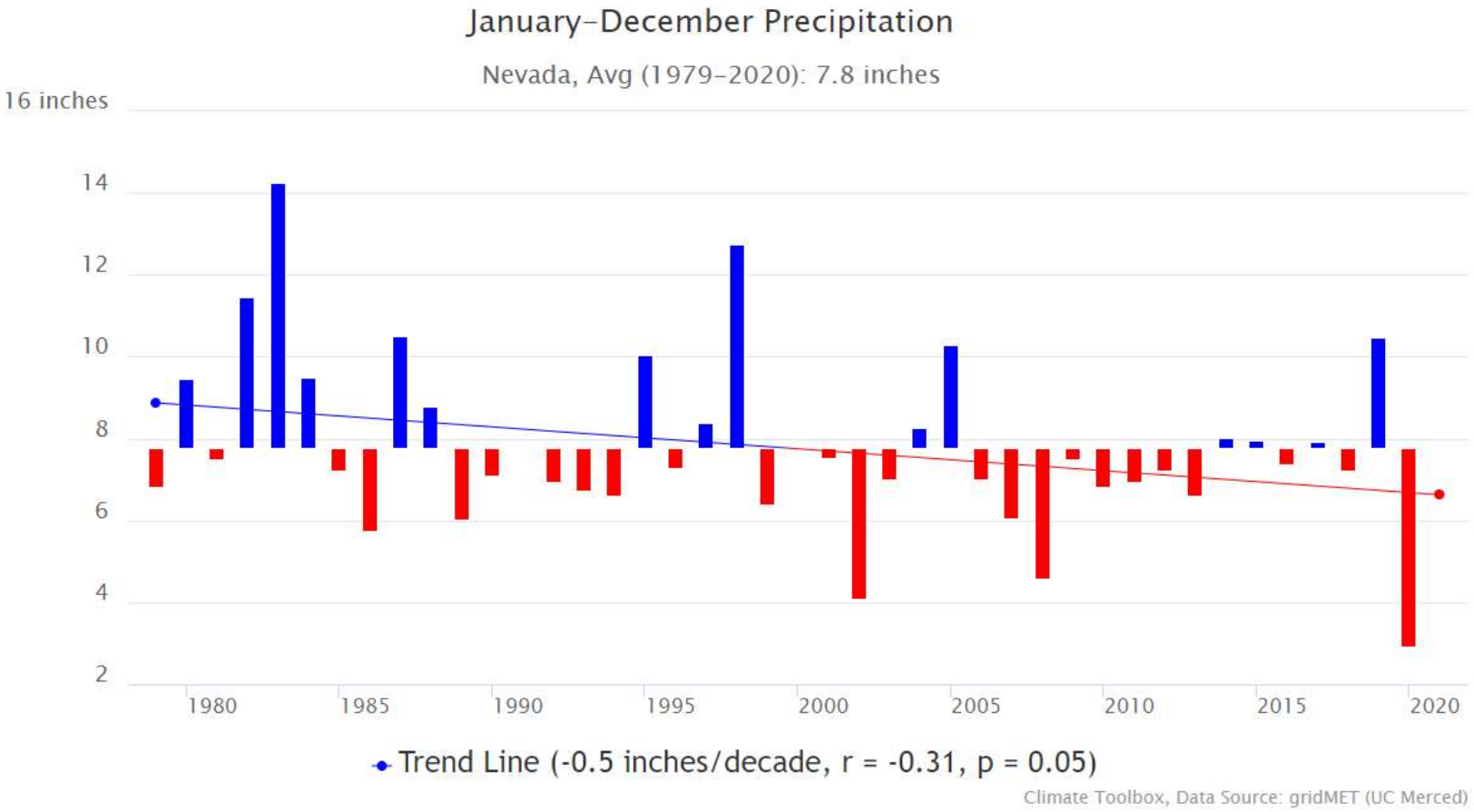
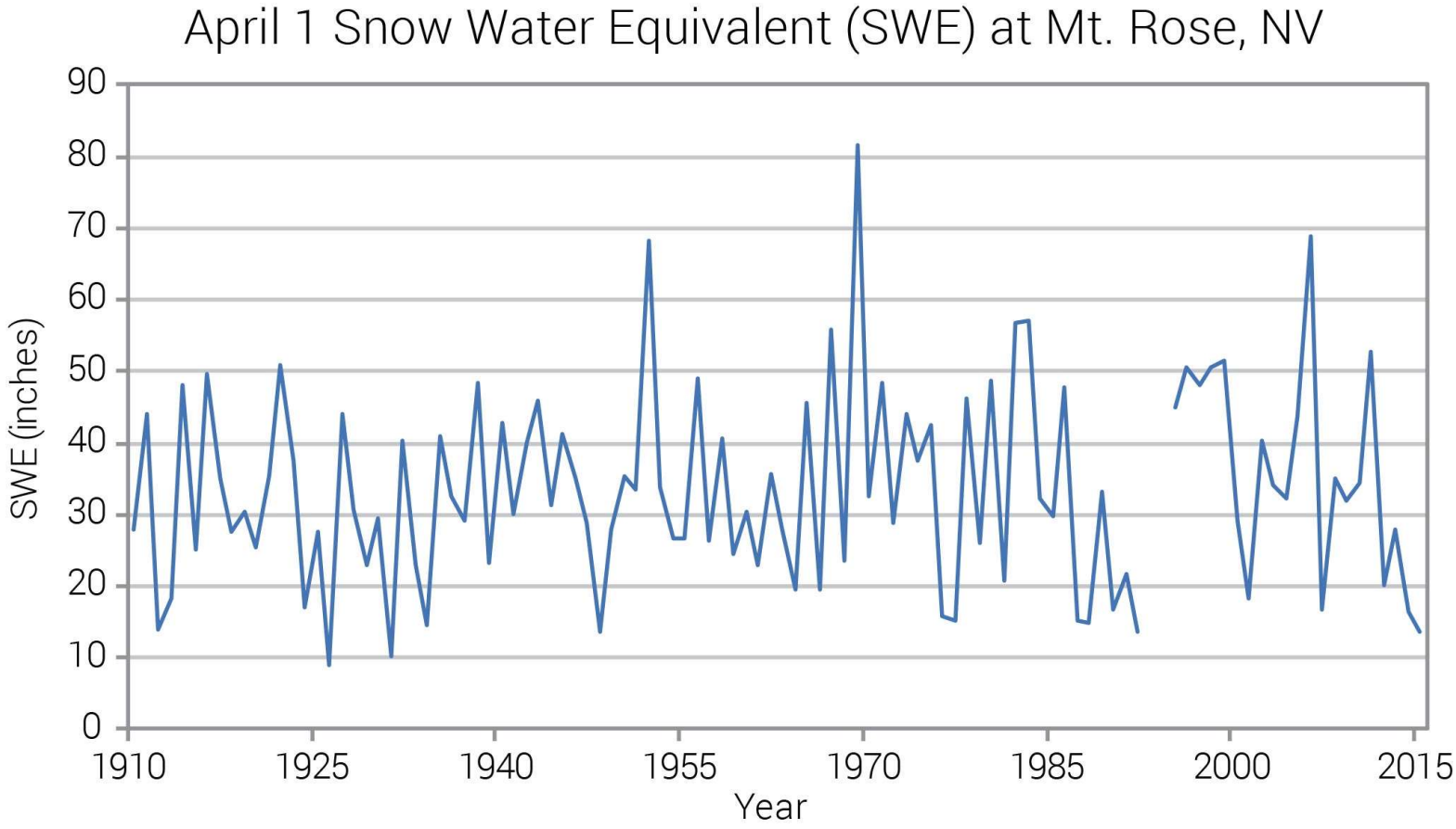
Nevada Observed Precipitation Changes



Increased temperature is projected to reduce snowpack



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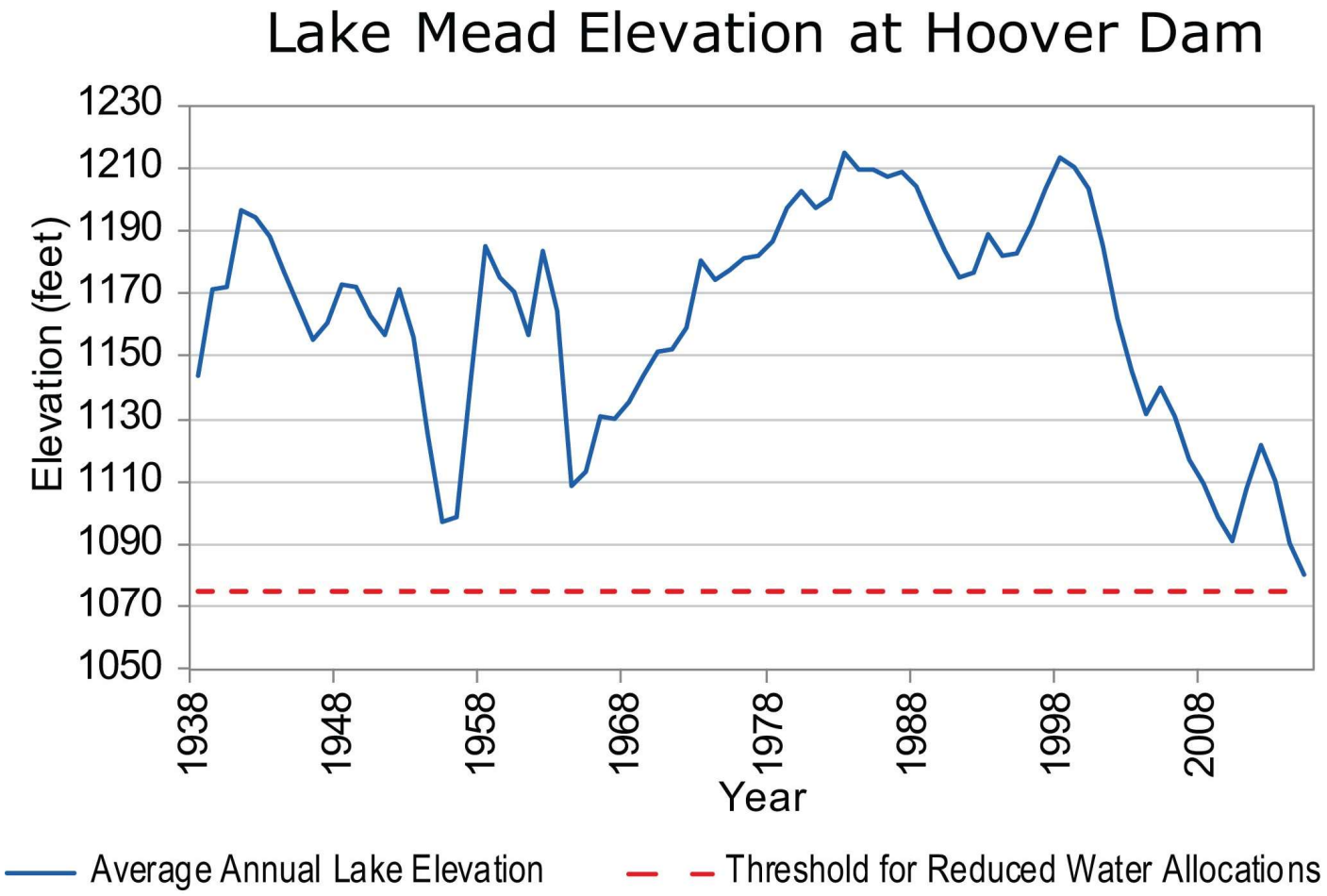
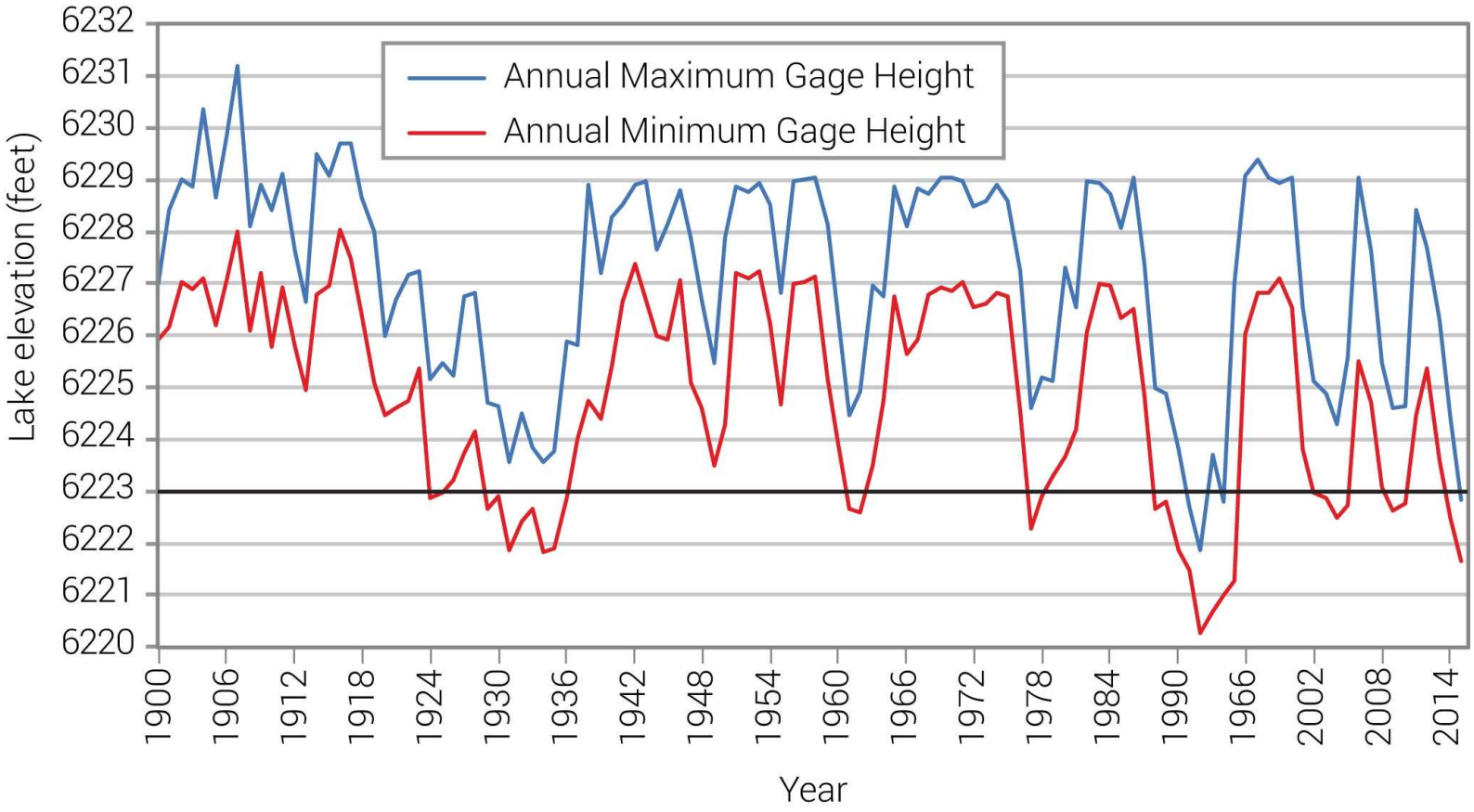
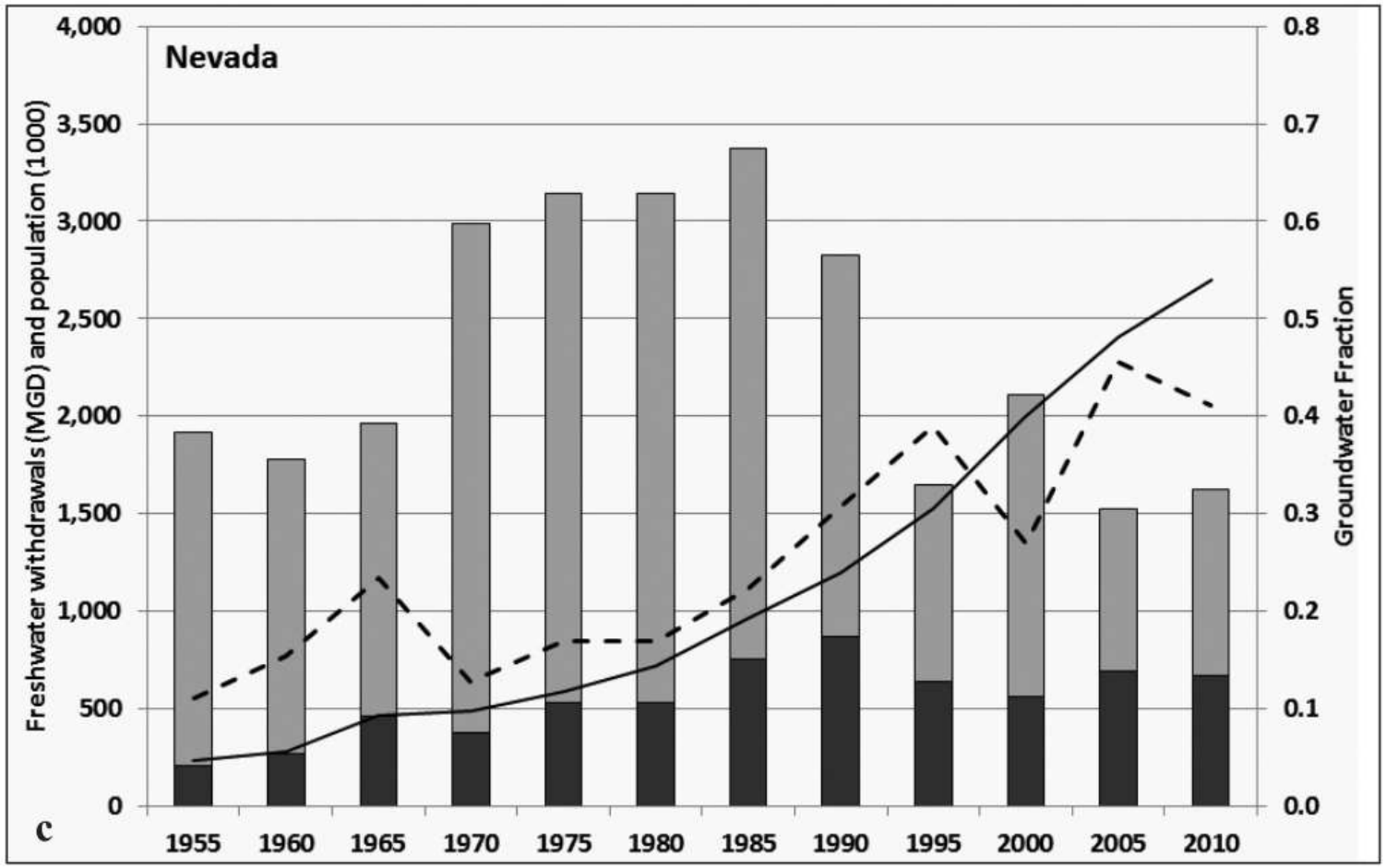
With potential negative impacts to water supplies.



Lake Tahoe Water Levels 1900–2015

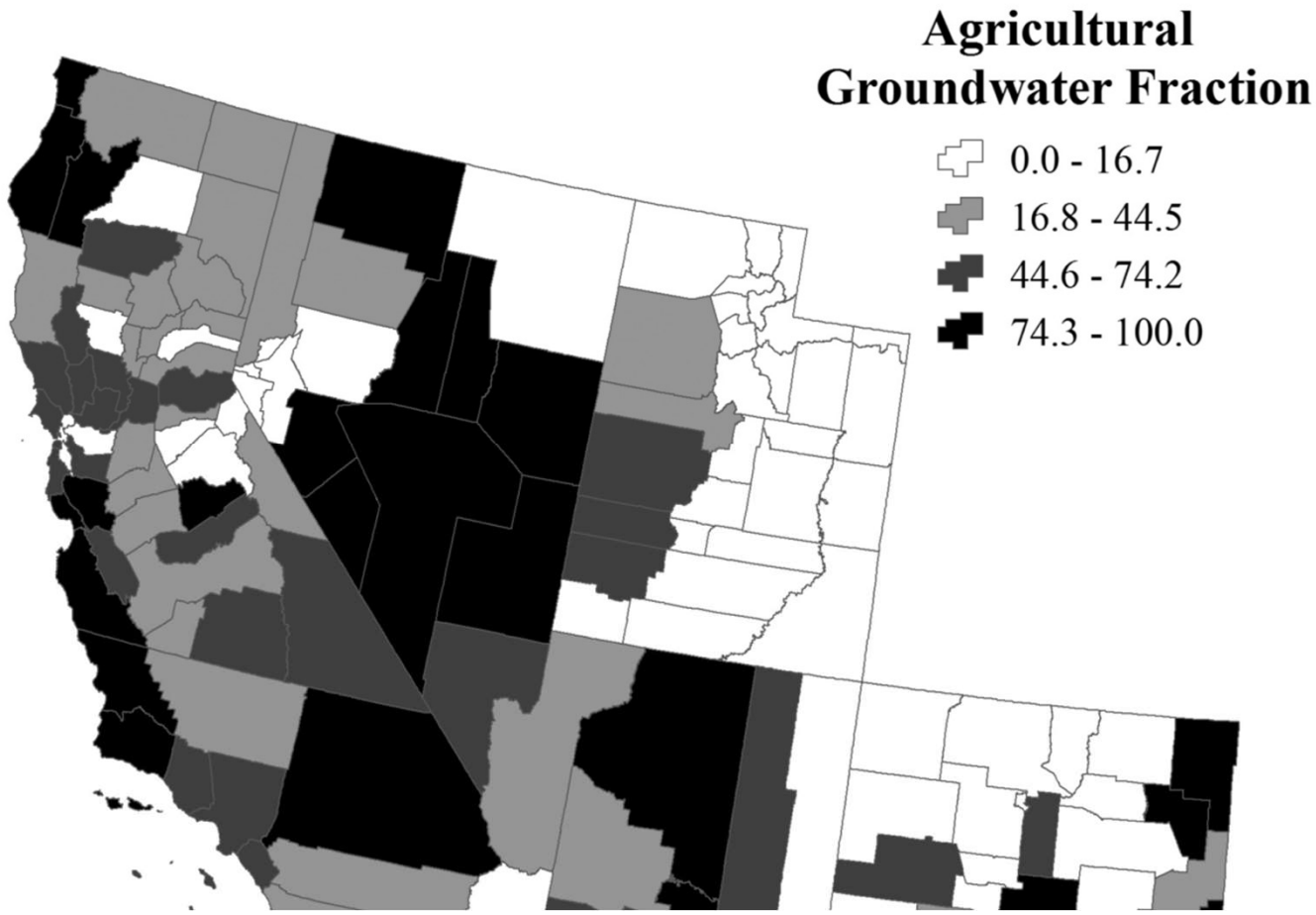


Historic agricultural water use in NV

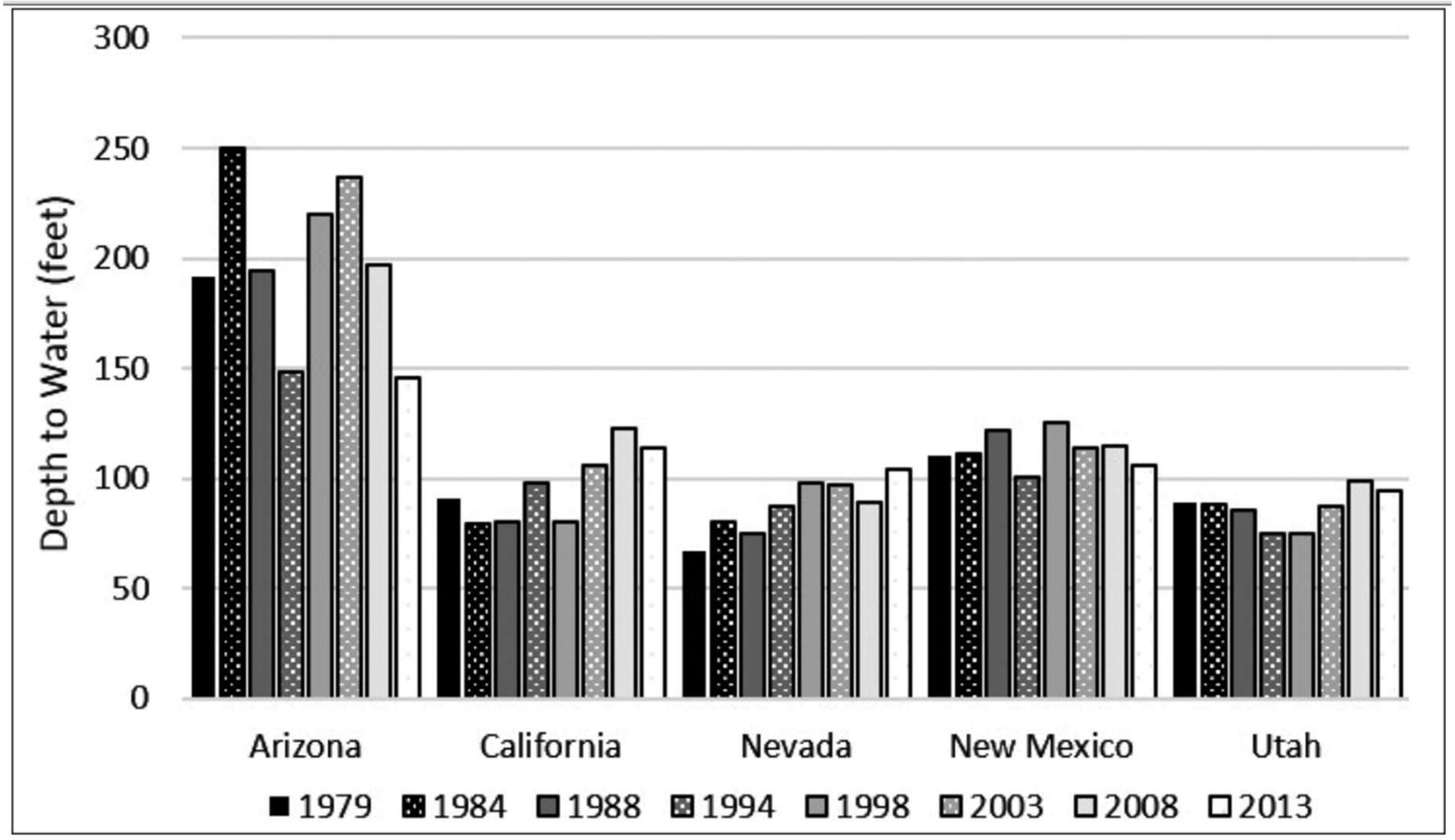


Total agricultural freshwater withdrawals, regional population change, and fraction of agricultural water use supplied by groundwater for Nevada (dark gray = groundwater; light gray = surface water)

Agricultural groundwater fraction



Change in depth to groundwater



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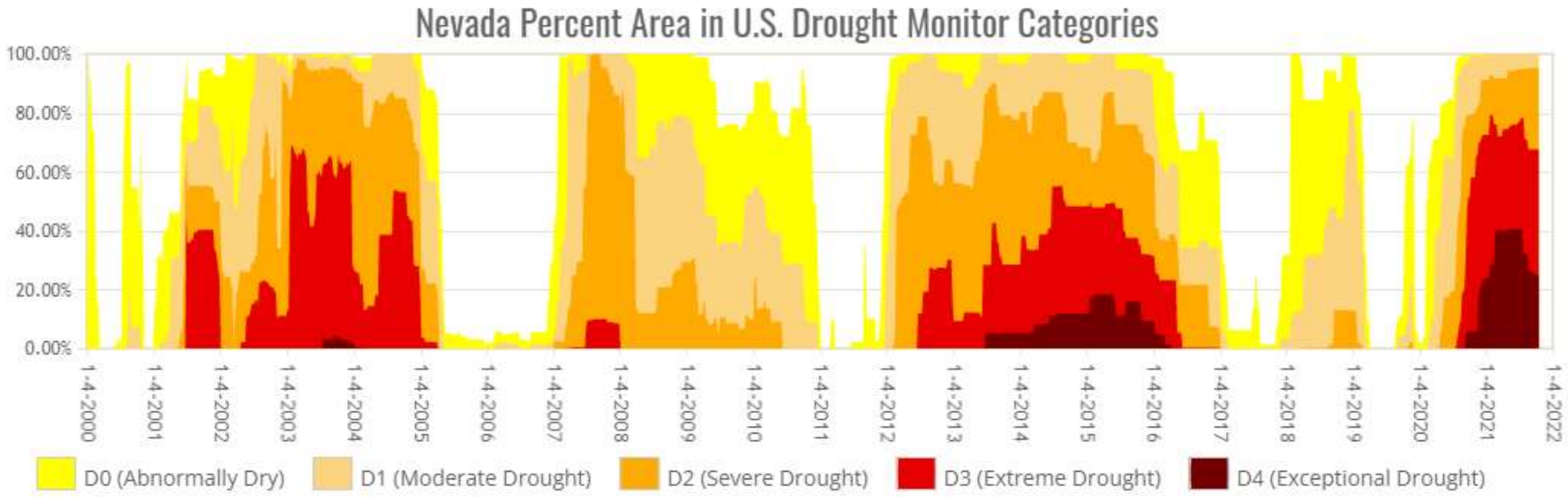
Drought has been frequent and higher temperatures will increase the intensity of future droughts.



https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx

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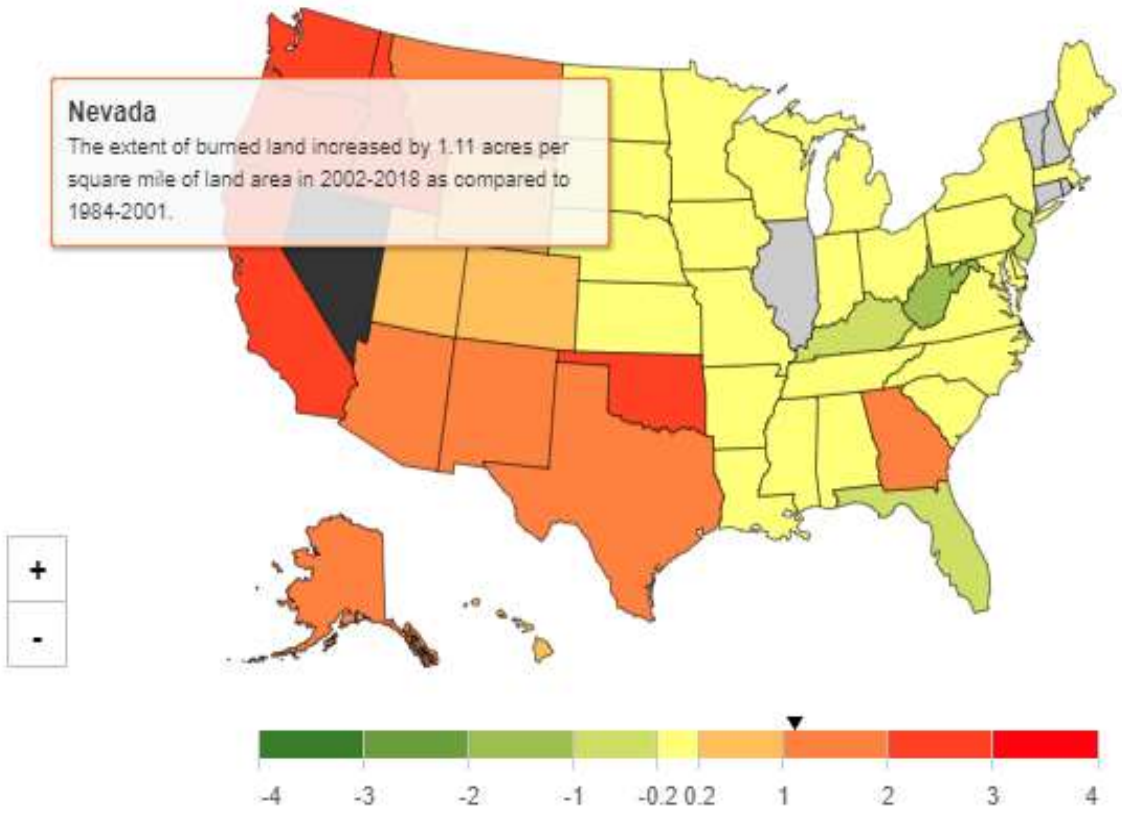
Wildfire in Nevada

Figure 5. Change in Annual Burned Acreage by State Between 1984-2001 and 2002-2018



Increase in annual burned area of ~121,600 acres

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https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires

Adapting can take many forms

Adaptation - a change or the process of change by which an organism or species becomes better suited to its environment.

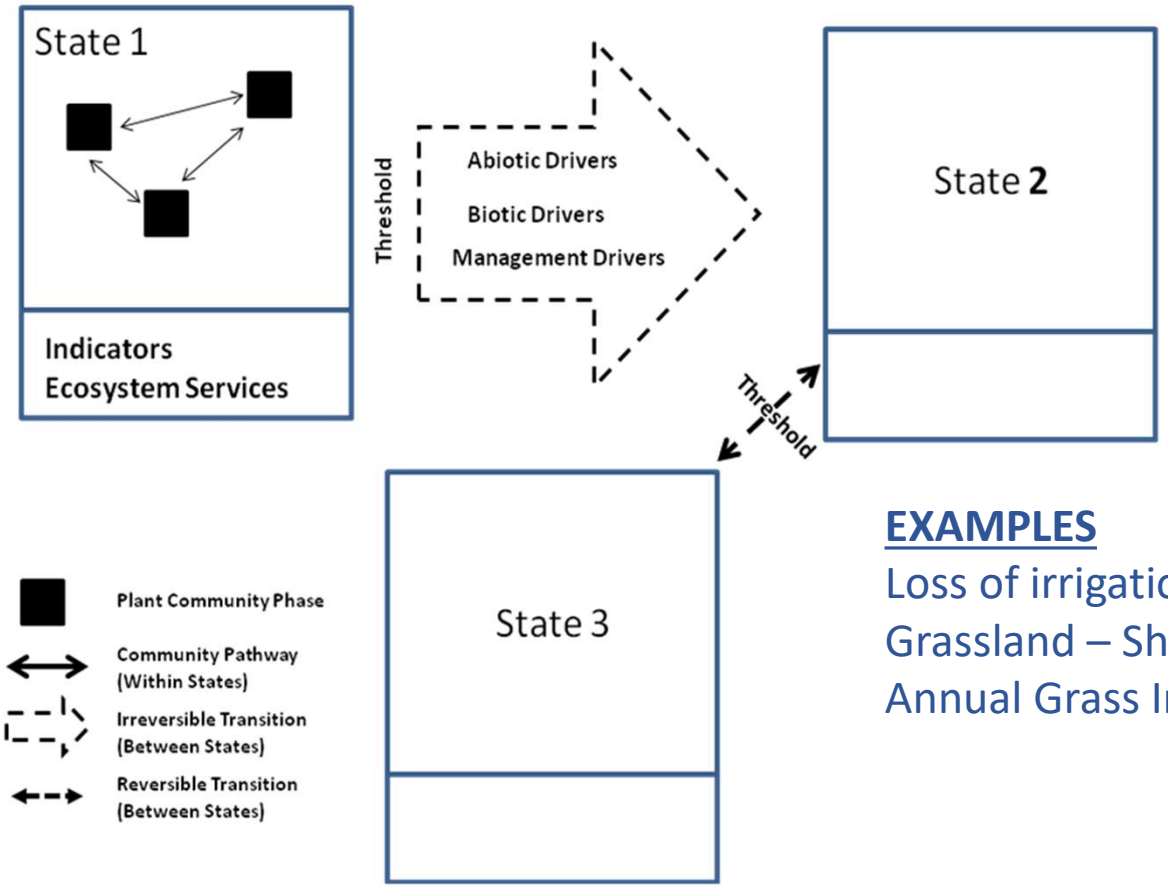
Adaptive Transformation - substantial changes to actions in response to changing circumstances

new-products, services, management systems
changes in scale and intensity
changes in locations

Responsive or anticipatory

Technological or behavioral

Adaptive Transformation – Ecological Site example



EXAMPLES

Loss of irrigation water

Grassland – Shrubland conversion

Annual Grass Invasion

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What **management** changes have you seen producers adopt to deal with weather/climate conditions in Nevada?

enter in chat box

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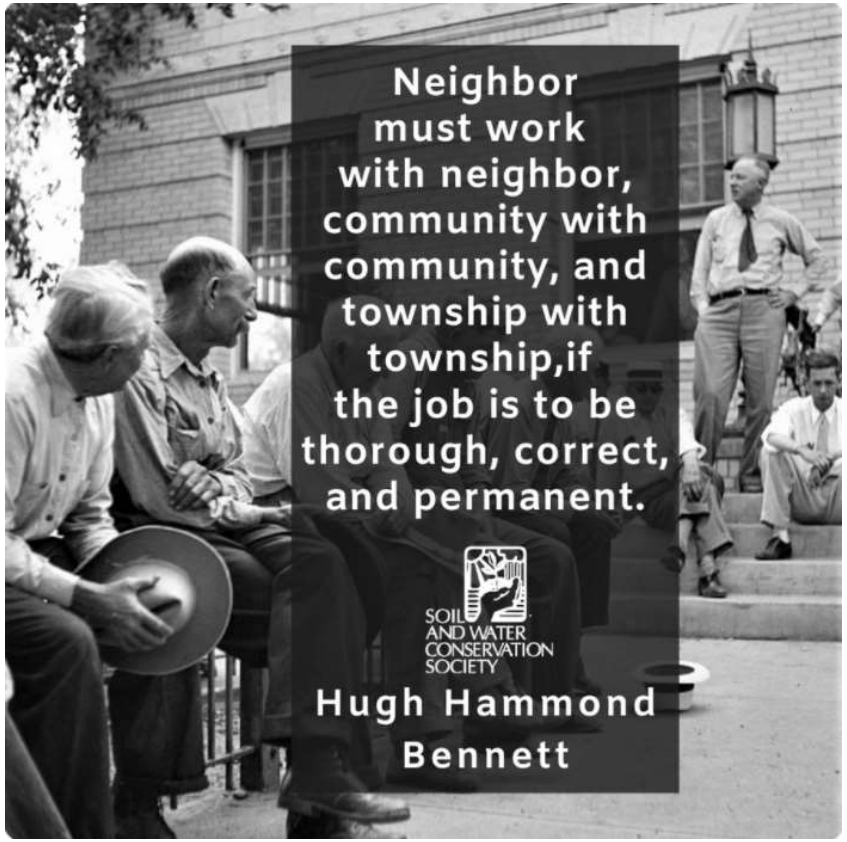
Climate Smart Agriculture and NRCS

Relaying the information



NRCS has been translating science into information and actions that agricultural producers can use since it's inception in 1935

Where to Start the Conversation About Climate Informed Agriculture

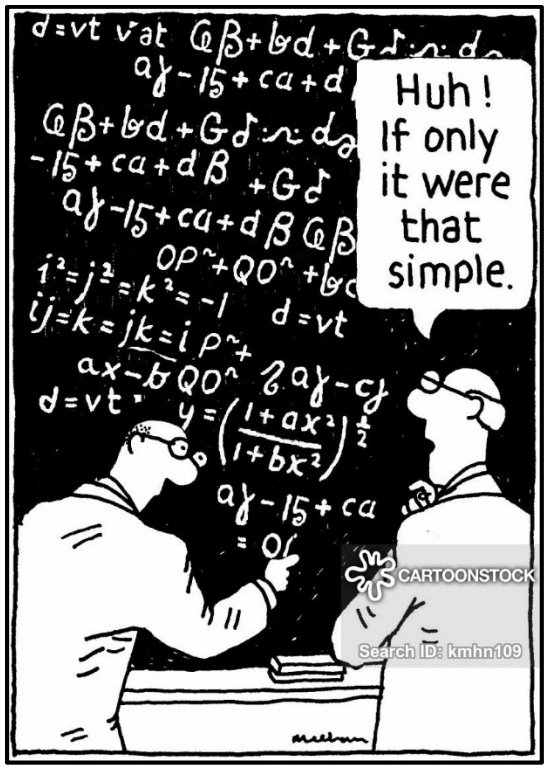
- NRCS professionals know the Landscape and Operations

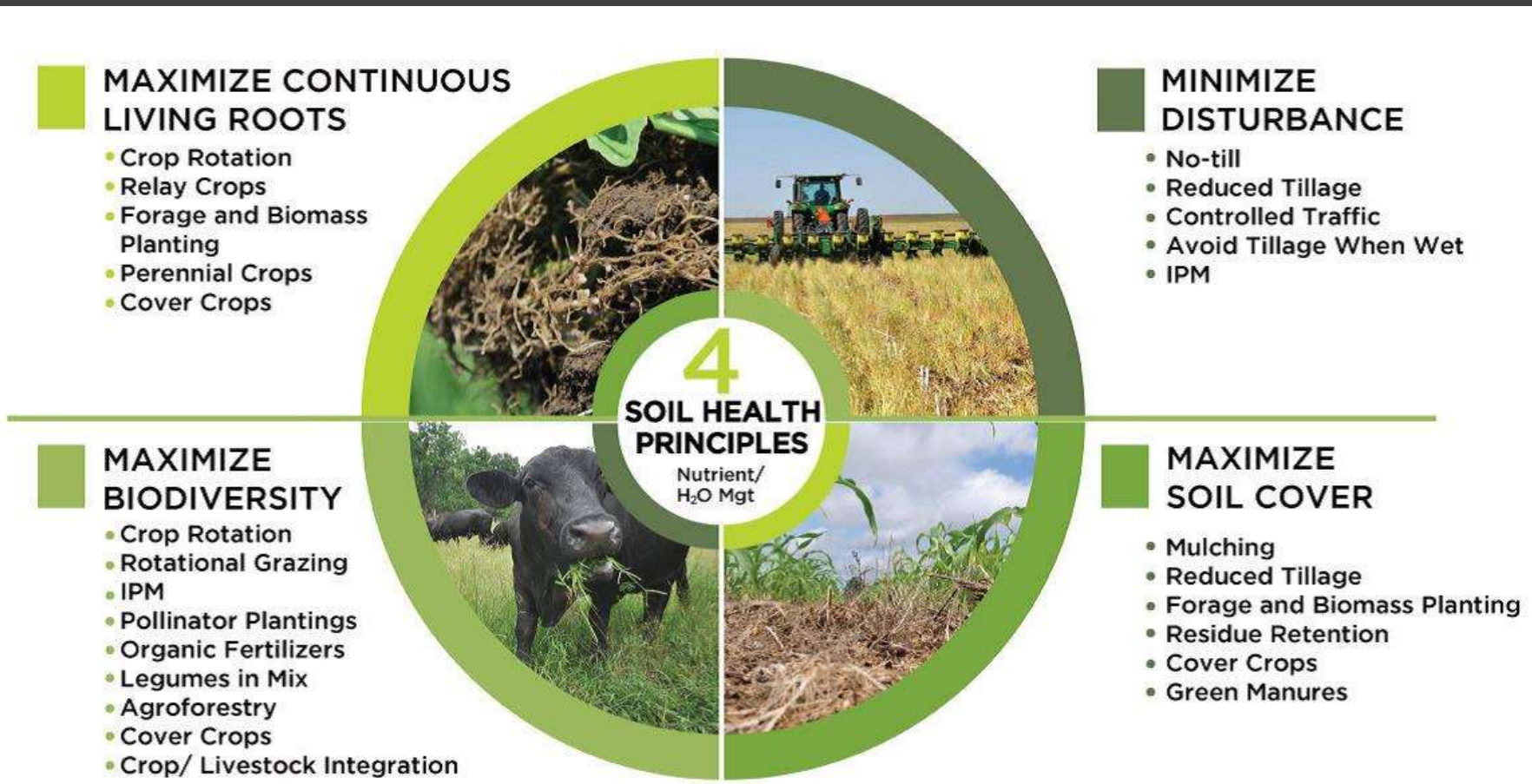
- Will current practices be sufficient to address the extremes and changes in a changing climate?

Where to Start the Conversation About Climate Informed Agriculture

Understand the Climate Information for your area:

- **NOAA State Summaries**
  https://statesummaries.ncics.org/
- **Weather Explorer to see a county level data:**
  https://crt-climate-explorer.nemac.org/
- **US Drought Monitor and other resources:**
  www.drought.gov
- **USDA Climate Hubs:**
  https://www.climatehubs.usda.gov/hubs/southwest





Where to Start the Conversation About Climate Informed Agriculture

- Continue Promoting Keystone NRCS Campaigns
  - Soil Health
  - Contingency plans
    - **Drought**
    - **Flooding**
    - **Extreme heat**
    - **Cold Snaps**
    - **Blizzards**

Local, trusted messengers are the most effective communicators.

Source: McKenzie-Mohr, Doug, (2011). *Fostering sustainable behavior: an introduction to community-based social marketing, 3rd edition.* Gabriola Island, BC: New Society Publishers. https://www.cbsm.com/book/

What can NRCS do to do help Nevada be more resilient to weather variability?

- Ranchers
- Irrigated Farmers
- Rural/Urban water needs
- Agricultural survival strategies

Place thoughts in the chat box

WaterSMART

Available Resources

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USDA Climate Hubs

Natural Resources Conservation Service

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Southwest USDA Climate Hub

- Headquartered at the USDA-ARS Jornada Experimental Range on the New Mexico State University campus in Las Cruces, NM

- Provide information and technology to guide climate-informed decision making by farmers, ranchers, forest landowners, Native American tribes, natural resource managers and technology transfer specialists

- Science driven, stakeholder centered, efficient, cooperative partnerships with federal, state and local organizations

Southwest USDA Climate Hub

Climate Hubs Supporting NRCS

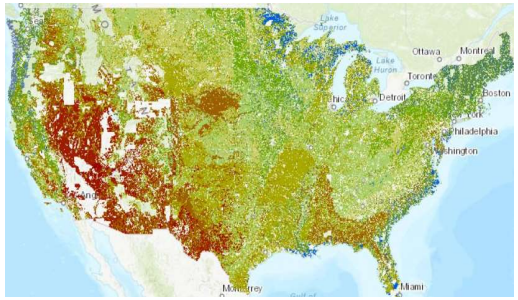
Increase partnership reach and science connections

- Drought Learning Network (focus on how not what)
- Peer-to-peer knowledge transfer
- Tribal Engagement
- SW Beef Project
- ARID Project

Provide Tools to inform Decision-making

- Grass-Cast
- AgRisk Viewer
- CocoRahs
- Beef Decision Toolshed

USDA Resources



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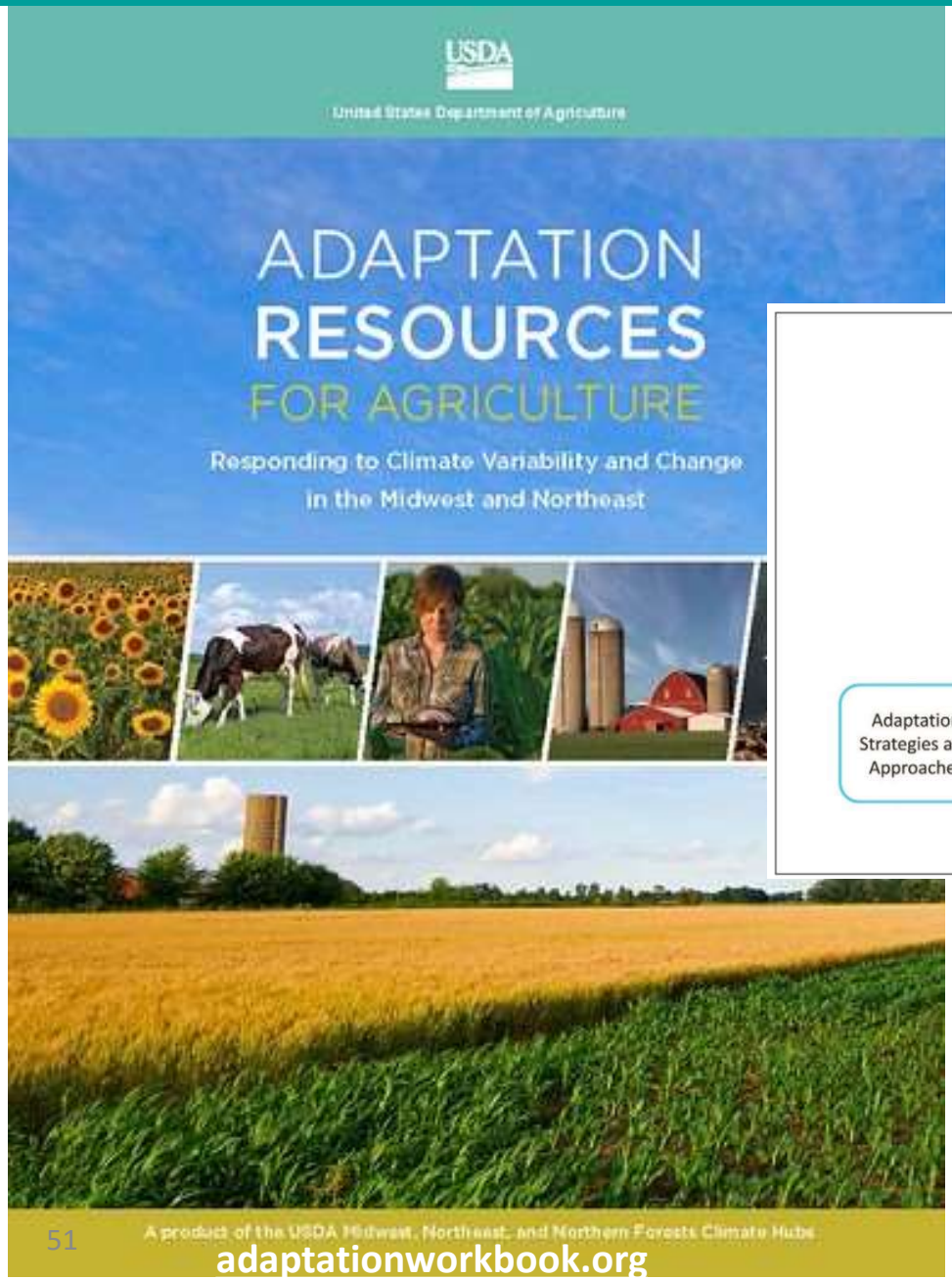
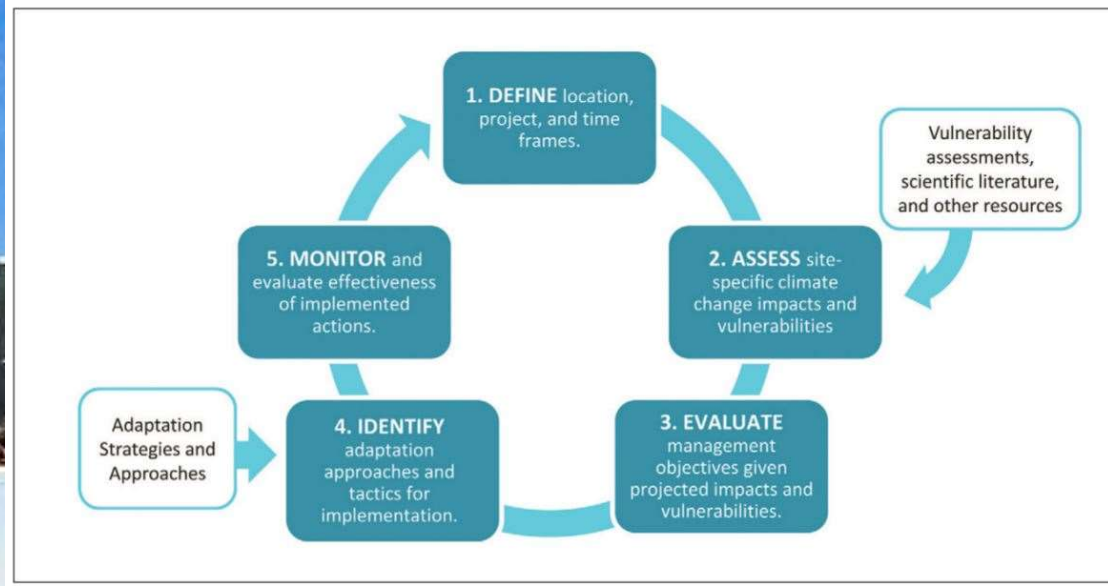
What other partners/resources are available in Nevada?





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adaptationworkbook.org

Available Resources:

General Climate Information:

Southwest Climate Hub: https://www.climatehubs.usda.gov/hubs/southwest

Specific Climate Information

Drought.gov - https://www.drought.gov/

Drought Monitor - https://droughtmonitor.unl.edu/

AgRisk Viewer - https://www.climatehubs.usda.gov/hubs/southwest/tools/agrisk-viewer

Climate Smart Restoration Tool - https://climaterestorationtool.org/csrt/

Climate Historic and Projection information:

LOCA - https://scenarios.globalchange.gov/loca-viewer/

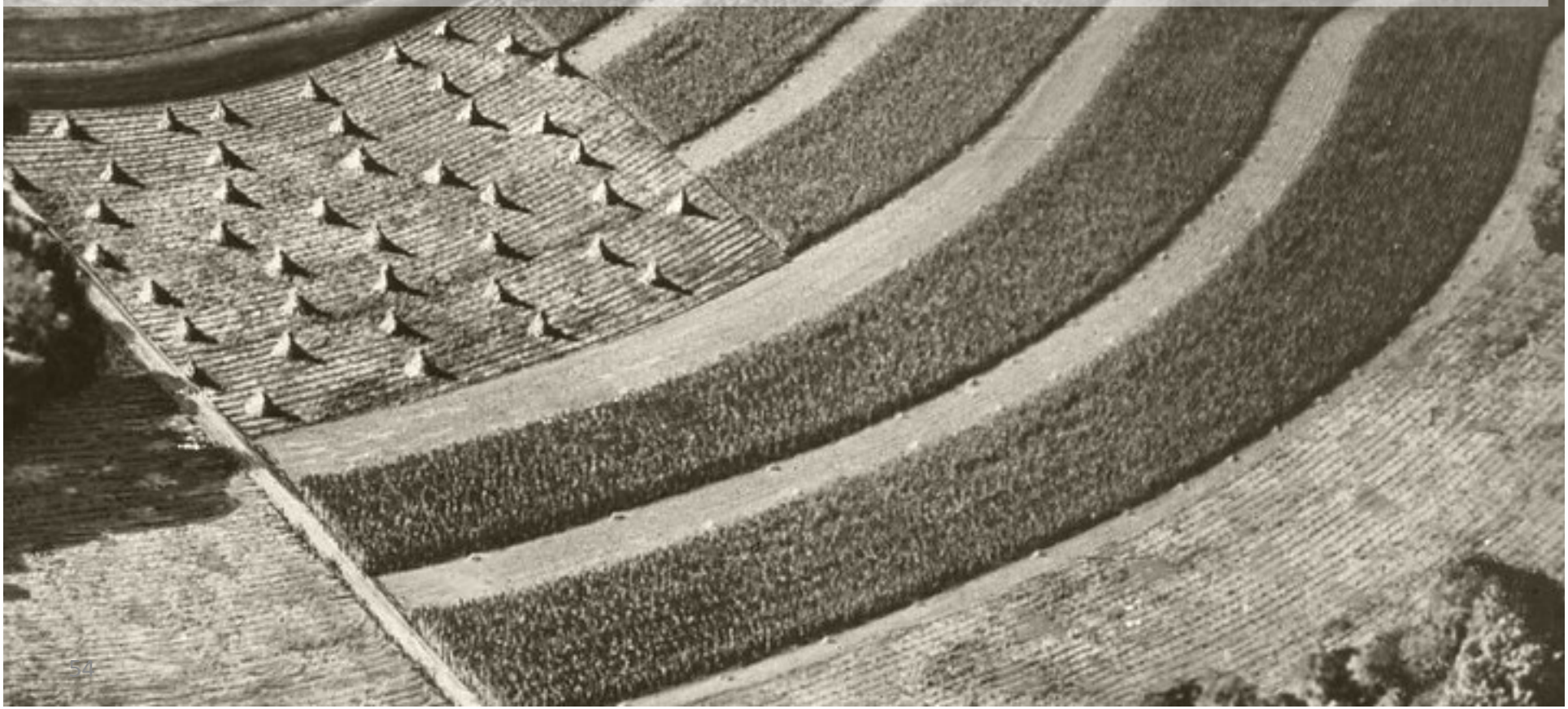
Fourth National Climate Assessment - https://nca2018.globalchange.gov/chapter/1/

Climate toolbox - https://climatetoolbox.org/tool/future-climate-dashboard

We need your feedback!

Please complete 2-minute survey by following the link in the chat box.

NRCS Vision: *A world of clean and abundant water, healthy soils, resilient landscapes, and thriving agricultural communities through voluntary conservation.*



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