The National Integrated Drought Information System (NIDIS) of the National Oceanic and Atmospheric Administration

Photo Credit: Arizona State Climate Office

Elizabeth Weight
Drought Early Warning Systems Coordinator
NIDIS/NOAA, Boulder, Colorado, USA

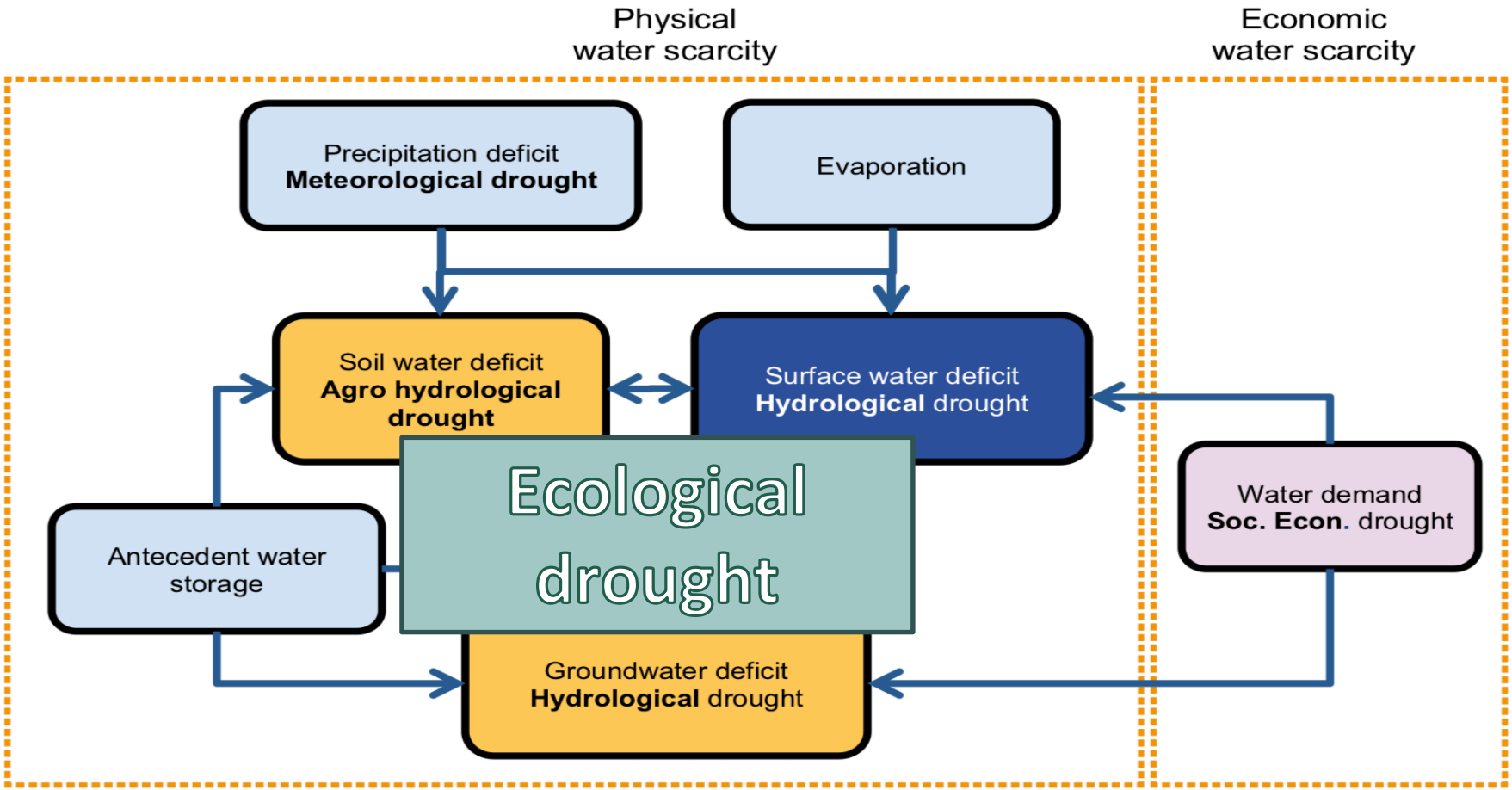
Advancing Sustainability of U.S. – Mexico Drylands: A Binational Workshop
2-4 May 2018

Presentation Overview

1. Drought: A challenge for science and management
2. National Integrated Drought Information System (NIDIS) and Drought Early Warning Systems
3. Selected Transboundary Drought Early Warning Products

Drought: A Wicked Problem

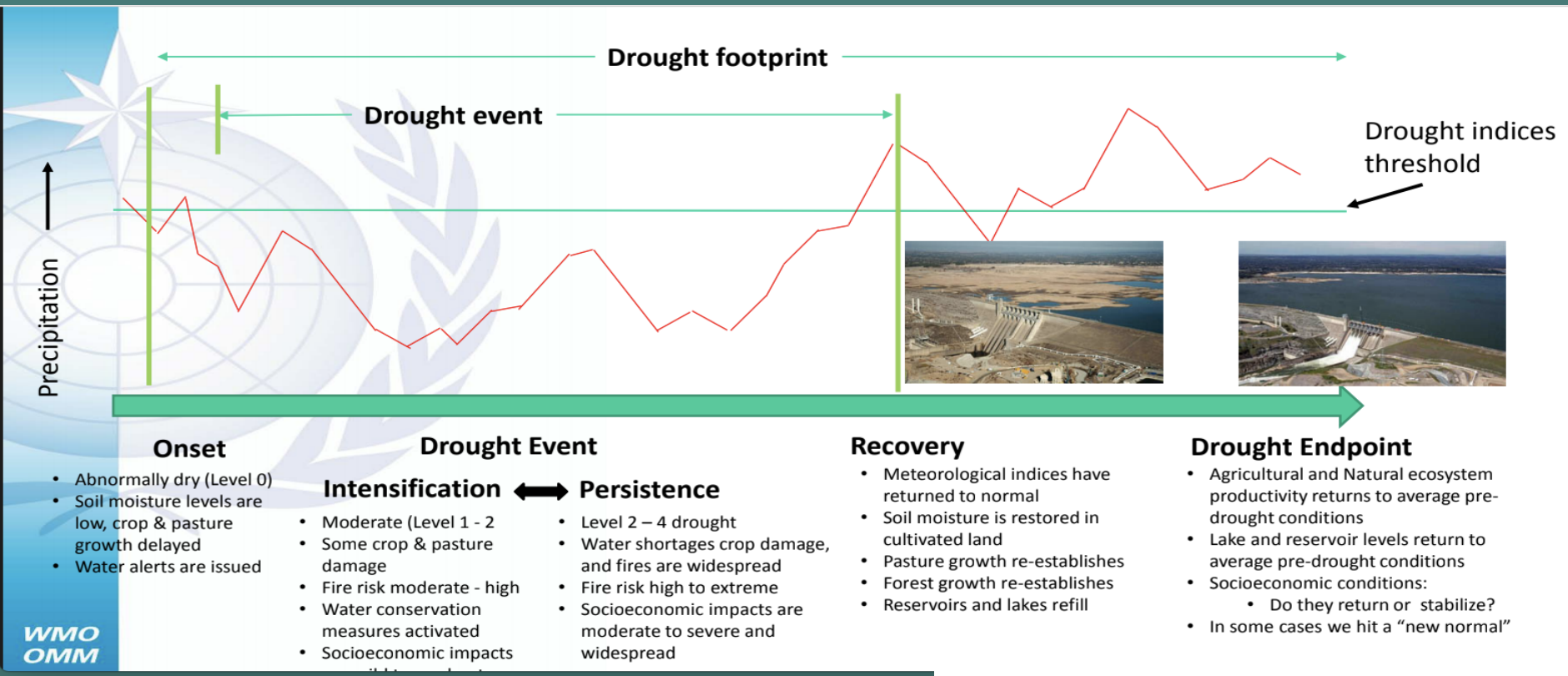
Multiple definitions



Moors, IHE Delft Institute for Water Education

Drought: A Wicked Problem

Multiple definitions + When does it start? When does it end?



WMO CAgM Drought Expert Team, 2018

Drought: A Wicked Problem

Multiple definitions

+

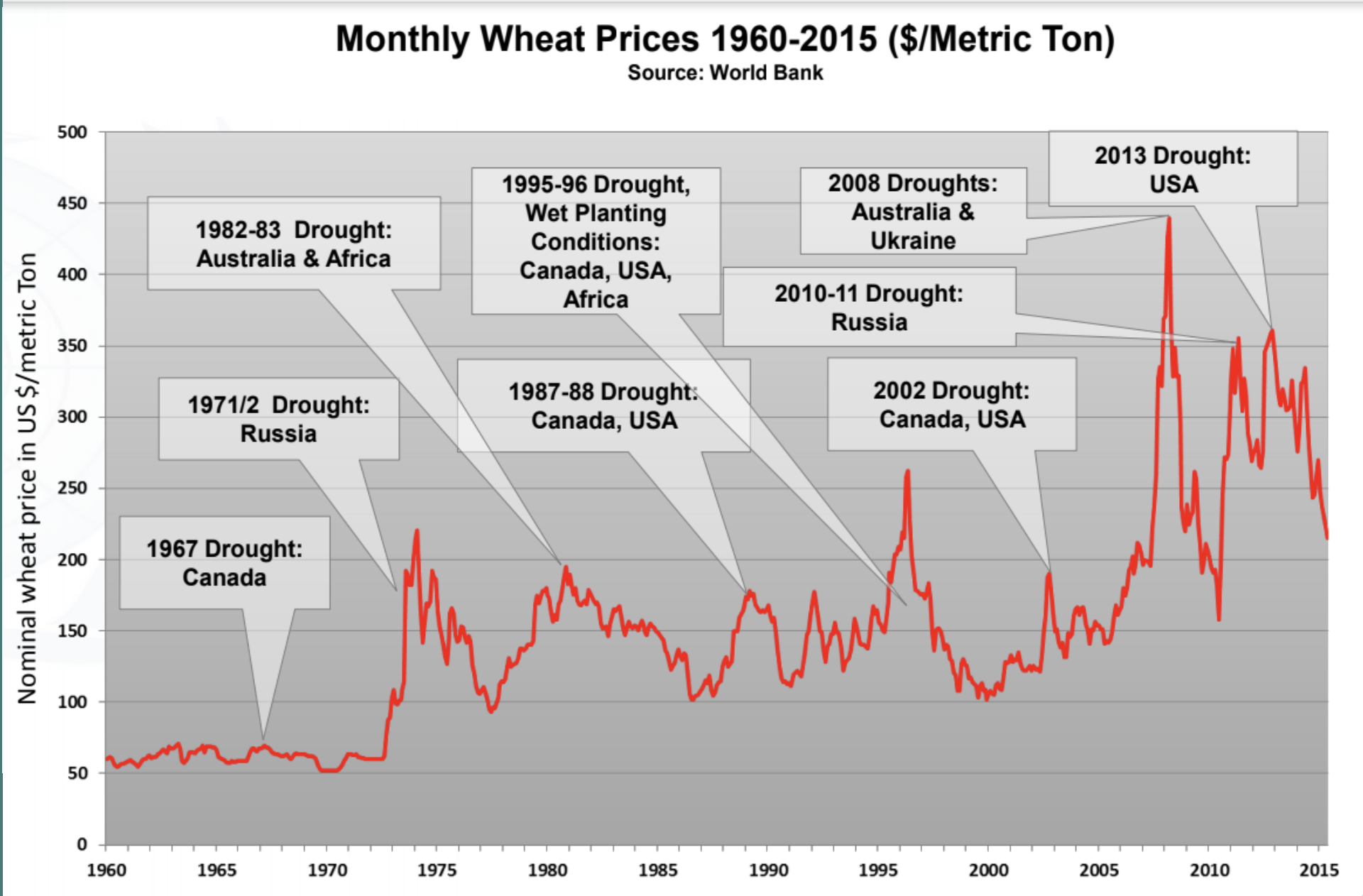
When does it start?
When does it end?

+

Interconnected impacts on different sectors

USDA Livestock Forage Program drought payments 2011-2017: USD $ 6.6 billion

Drought: A Wicked Problem



Drought: A Wicked Problem

Multiple definitions

+

When does it start?
When does it end?

+

Interconnected impacts on different sectors

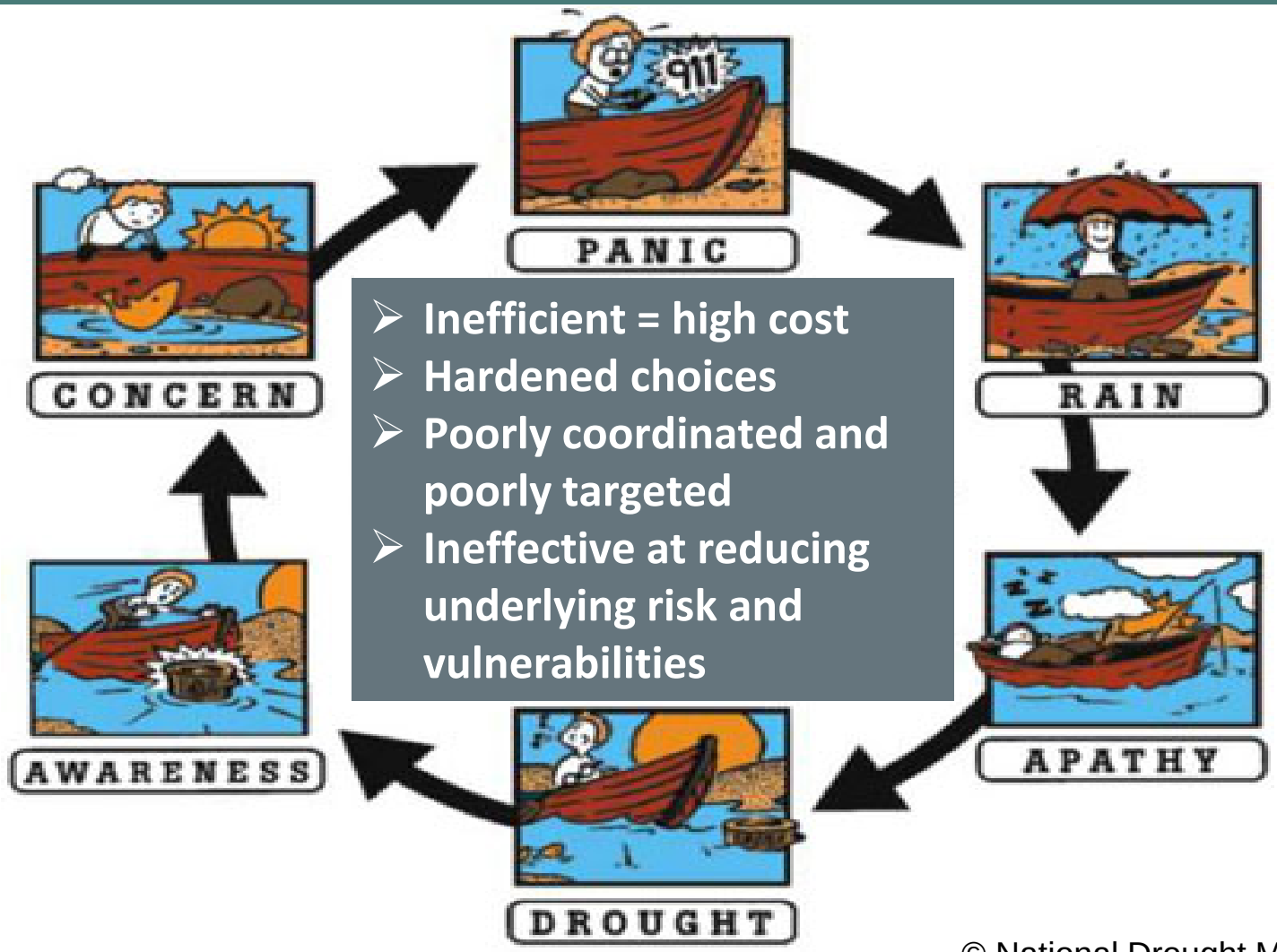
+

Large scale

↓

Challenging to manage

Drought Management: Business As Usual



National Integrated Drought Information System (NIDIS)

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM ACT OF 2006 (PUBLIC LAW 109-430). REAUTHORIZED IN 2014 (PUBLIC LAW 113-86).

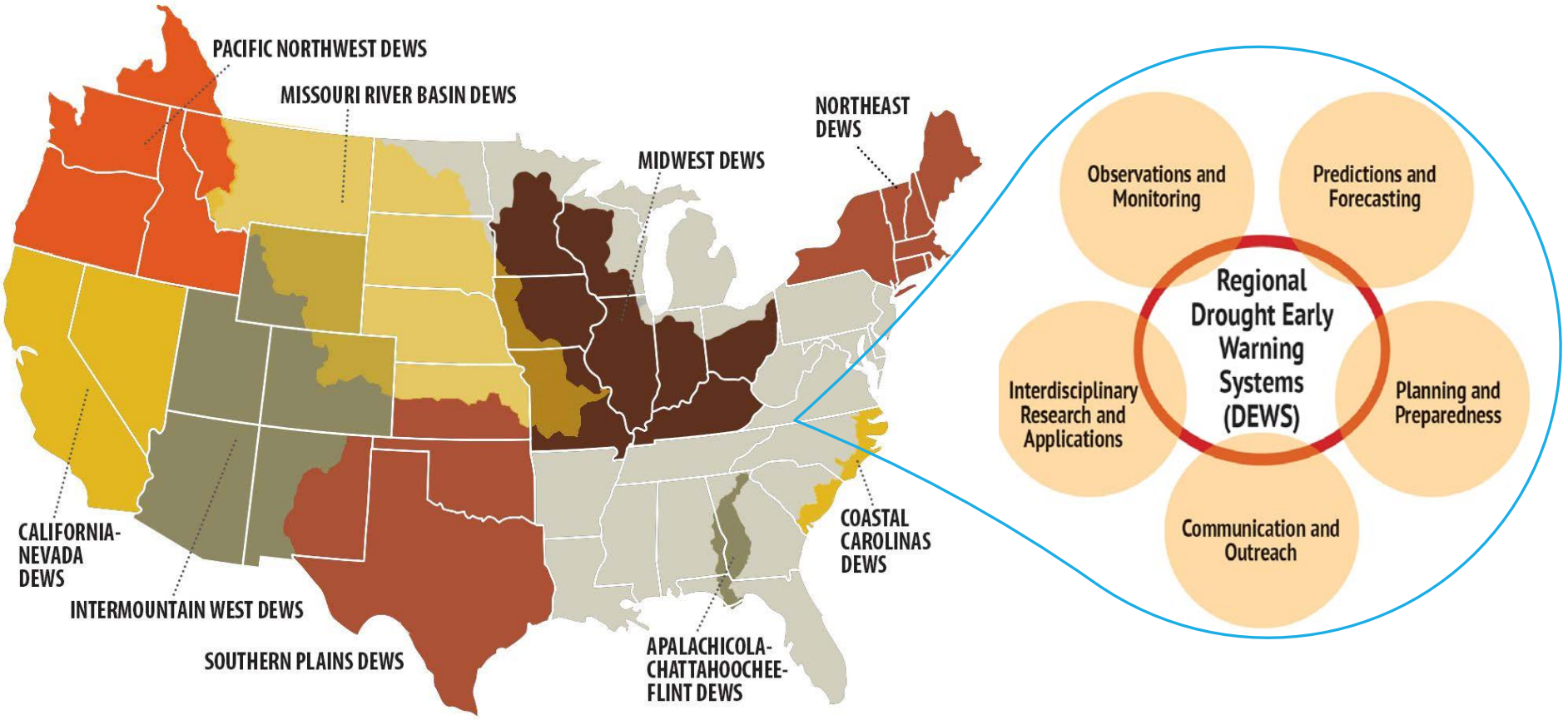
NIDIS Mandate

To “develop and provide a national drought early warning system”

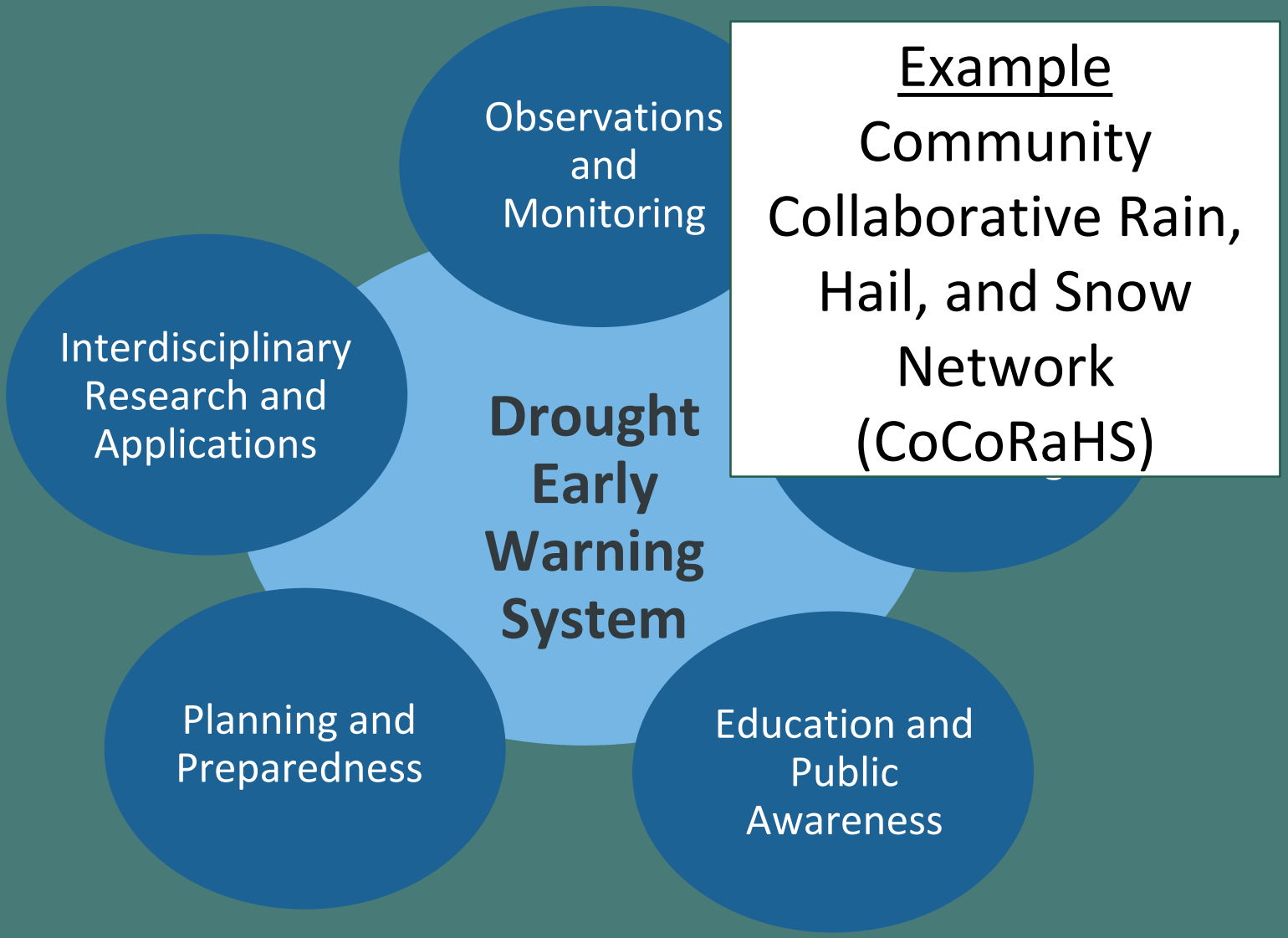
in order to:

“better inform and provide for more timely decision-making to reduce drought-related impacts and costs”

NIDIS: 9 Regional Drought Early Warning Systems (DEWS)



Components of a Drought Early Warning System (DEWS)



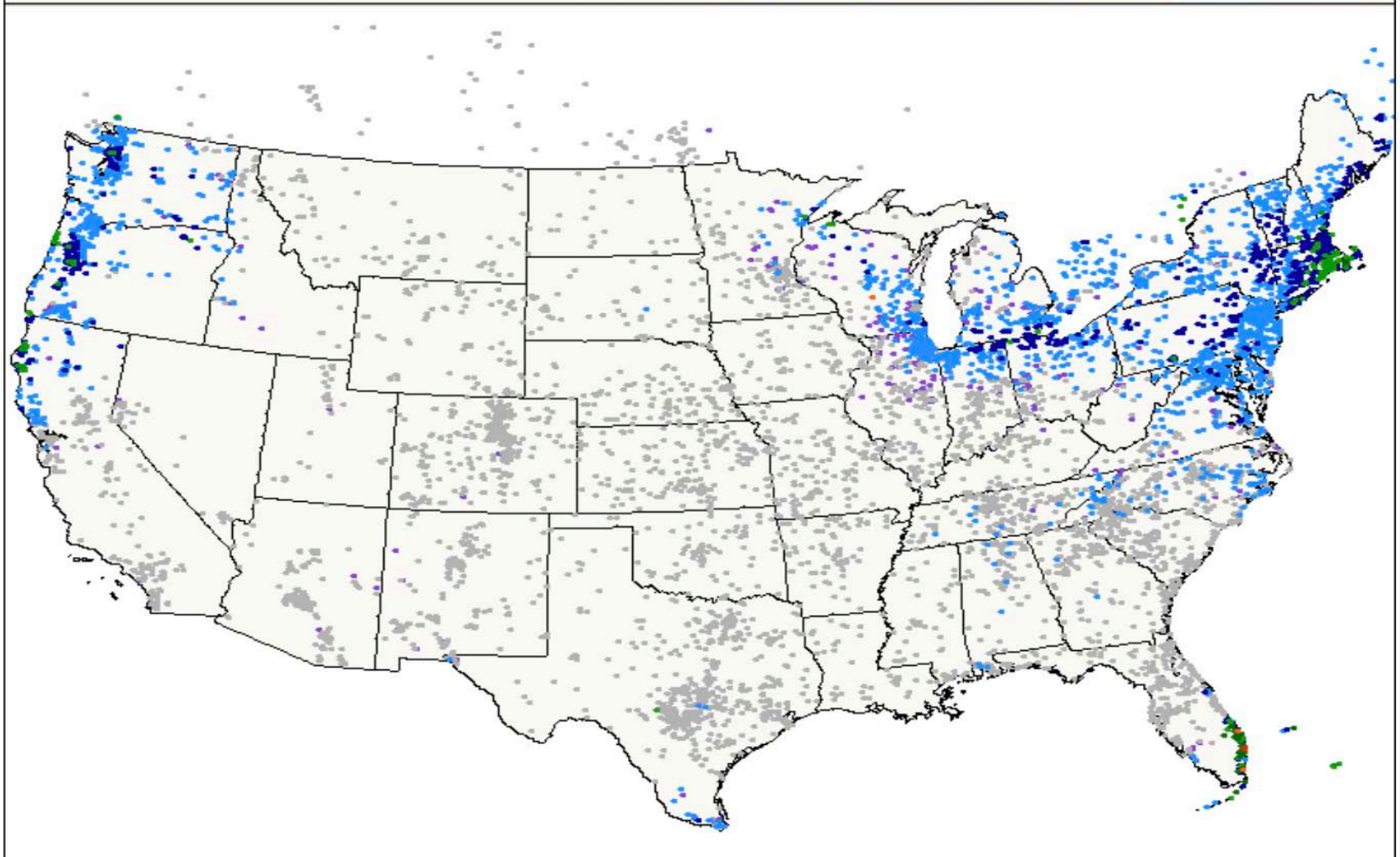
Example
Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS)

Maps : Daily Precipitation

Map Type	Map Location		Date	Colors	
Precipitation	National	No State Selected	4/28/2018	Standard	Get Map

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
USA 4/28/2018

0.0 Trace 0.01 - 0.25 0.26 - 0.50 0.51 - 1.26 1.27 - 3.02 3.03 - 4.53 4.54 - 5.04



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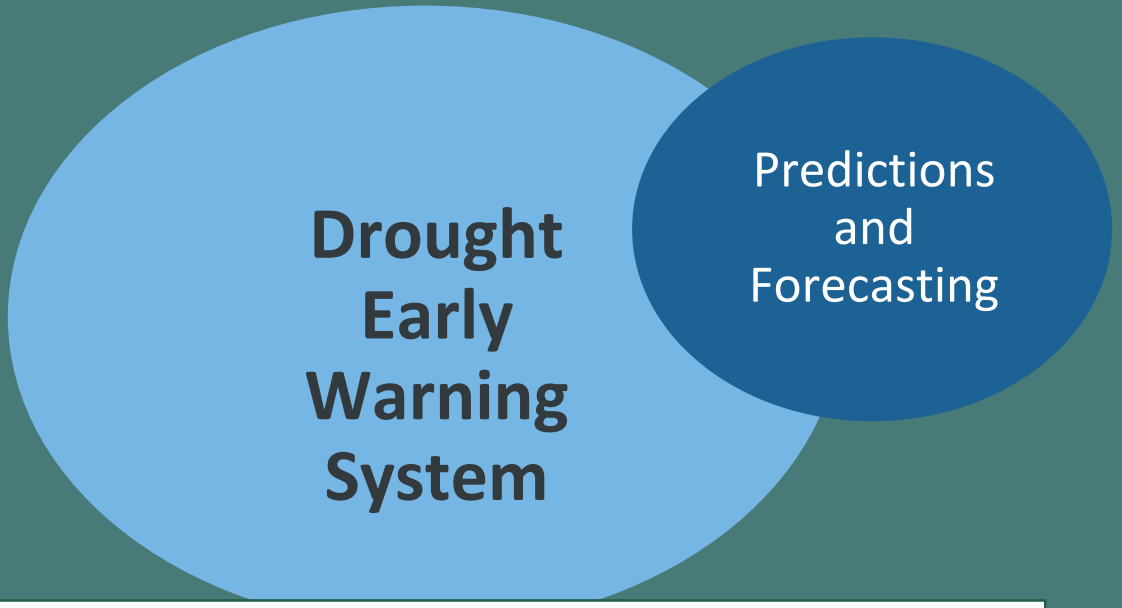

Example

The Rio Grande – Rio Bravo Climate Impacts and Outlook

Forecast - April | May | June

Temperature

The one-month NOAA temperature outlook (April; Figure 5) favors chances for above-average temperatures for most of New Mexico and Texas through April. Chances for above-average temperatures increase further into the spring and summer, according to the three-month NOAA temperature outlook (May-June; figure not shown).

Figure 5 (right): NOAA one-month temperature outlook (April). Forecast made on march 15, 2018 by **CPC**.

The forecast from CONAGUA´s Servicio Meteorológico Nacional (SMN) for April, above-average anomalies in Tamaulipas, Nuevo León, Coahuila, Sonora, Baja Ca and southern Chihuahua, and below-average anomalies are expected in Northeas above-average temperature anomalies in Tamaulipas, Nuevo León, Coahuila, Chi and Baja California (Figure 6).

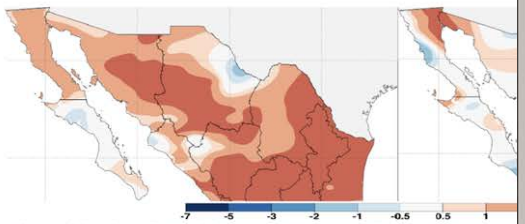

Figure 6 (above): Predicted minimum temperature anomalies for northern of Mex (right). Forecast made on March 1, 2018 by

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For April, the SMN precipitation outlook predicts above-average conditions in nort conditions in Tamaulipas, Nuevo León, Coahuila, Chihuahua and Sonora. The pre average conditions in Northeast Nuevo León and Tamaulipas and below-average Coahuila, Chihuahua, Sonora and Baja California Peninsula (Figure 8).

Figure 8 (abo

Contributors

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sary21@email.arizona.edu

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Victor Murphy
NOAA-National Weather Service - Southern Region

Isaac Palomo
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Reynaldo Pascual|Minerva López
Mexico National Meteorological Services (SMN) - Drought

Julio Martínez
Mexico National Meteorological Services (SMN) - Diagnostic Observations

Darío Rodríguez Rangel
Mexico National Meteorological Services (SMN) - Fire

Juan Saldaña Colín
Mexico National Meteorological Services (SMN) - Climate Services

CLIMAS
Climate Assessment for the Southwest
A NOAA RISA TEAM

Rio Grande-Bravo Outlook March 2018
Regional Climate Overview - December 2017 - February 2018
Forecast - April | May | June
Announcements & News

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Darío Rodríguez Rangel

Summary

Forecasts favor above-average temperatures and below-average precipitation for the Rio Grande/Bravo Basin through June.

PUBLISHED: Thursday, March 29, 2018

AT A GLANCE

1. Rio Grande/Bravo Region
   Dry, pre-greenup fuels coupled with windy and dry spring conditions will increase the potential for ignitions and rapid fire spread rates.
2. Tamaulipas and Chihuahua
   Abnormally dry conditions continued in parts of Chihuahua and moderate to severe drought conditions developed in southern Tamaulipas.
3. New Mexico and North Texas
   Precipitation was 0-70% of average from December-February for New Mexico and Northwest Texas
4. North New Mexico and Texas
   Extreme drought conditions have developed in northern New Mexico and persisted in northern Texas.

Los pronósticos favorecen temperaturas superiores a la media y las precipitaciones inferiores a la media para la cuenca Río Grande/Bravo hasta junio.

AT A GLANCE

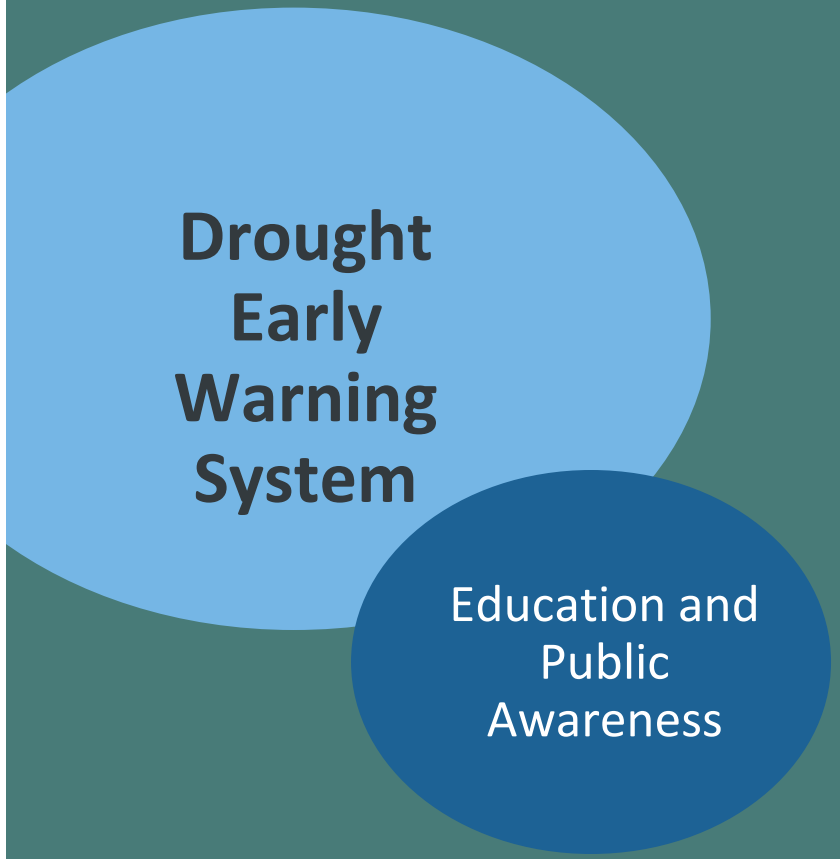
1. Región de Río Grande / Bravo
   Los combustibles secos, junto con las condiciones secas y de vientos de la primavera aumentarán las probalidades de incendios forestales así como su propagación.
2. Tamaulipas y Chihuahua
   Las condiciones anormalmente secas continuaron en partes de Chihuahua y las condiciones de sequía moderada a severa se desarrollaron en el sur de Tamaulipas.
3. Nuevo México y el norte de Texas
   La precipitación fue del 0-70 % del promedio de diciembre a febrero para Nuevo México y el noroeste de Texas.
4. Norte de Nuevo México y Texas
   Las condiciones extremas de sequía se han desarrollado en el norte de Nuevo México y persistieron en el norte de Texas.

NOAA NIDIS CONAGUA COMISIÓN NACIONAL DEL AGUA SERVICIO METEOROLÓGICO NACIONAL CLIMAS SCIPP A NOAA RISA TEAM

Components of a Drought Early Warning System (DEWS)

Examples

- Capacity development to support drought planning with the Native American *Wind River Reservation*
- Drought Portal
- Timely drought information products



Components of a Drought Early Warning System (DEWS)

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

NIDIS Drought.gov
U.S. Drought Portal

Home | Data, Maps & Tools | Regions | Research | Resources | What is NIDIS? | News | Calendar | Contact Us

Where is drought this week?

U.S. Drought Monitor | U.S. Seasonal Drought Outlook | Drought Impacts Report | Wildfire Risks | NIDIS in Your Region

26.4%
of the US and 31.0% of the lower 48 states.

59.7 million
people in the U.S. and 59.6 in the lower 48 states.

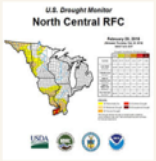
As of March 7-13:

Generally moderate precipitation (up to 3 inches) fell on most of the Southeast, portions of the California and Oregon Coasts, and the higher elevations of northern California. Lesser amounts (0.6 to 1.0 inch) dampened the northern Intermountain West and southern Rockies, and most other sections of California outside the interior valleys and arid southeastern areas. Meanwhile, little or no precipitation fell on a large swath encompassing most of the Plains, and negligible amounts were also recorded in parts of the Ohio and Mississippi Valleys north of the confluence, the central Rockies, the Great Basin, and the desert Southwest. This includes some of the nation's most intensely impacted drought areas from the Four Corners states eastward into the south-central Great Plains.

NOAA Office of Weather and Air Quality

Funding opportunity for snow pack and soil moisture remote sensing projects
The NOAA Office of Weather and Air Quality (OWAQ) is soliciting proposals to support research and development that has a strong potential for advancing the use of snowpack (snow water equivalent)...
Read the article

Dress rehearsal for drought: South Carolinians simulate hazard response
When's the best time to plan for drought? When there isn't one. And that's just what South Carolina did in September.
Read the article



NDMC & NIDIS Introduce new US Drought Monitor maps for NWS Regions
Through a partnership with NIDIS, the National Drought Mitigation Center (NDMC) has introduced two new ways to view the U.S. Drought Monitor map. Users can now view maps...
Read the article

www.drought.gov

Components of a Drought Early Warning System (DEWS)

SOUTHERN PLAINS DROUGHT UPDATE

APRIL 23, 2018

National Integrated Drought Information System
Drought.gov

Below is a summary of the April 23 webinar on current Southern Plains drought conditions, impacts, and outlook and wildfires. The information was provided by Brian Fuchs, Climatologist with the National Drought Mitigation Center, and Todd Lindley, National Weather Service Forecast Office in Norman, Oklahoma.

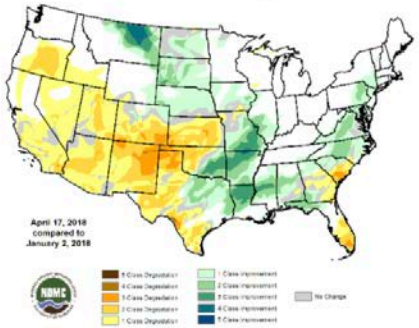
▲ **Fig 1.** U.S. Drought Monitor for April 24. Source: droughtmonitor.unl.edu

Drought Status

The April 24 U.S. Drought Monitor (USDM) depicts the country's most intense drought in the Southern Plains and Four Corners regions, with substantial areas of Kansas, Oklahoma, Texas, New Mexico, Utah, Colorado and Arizona in "Extreme" and "Exceptional" drought.

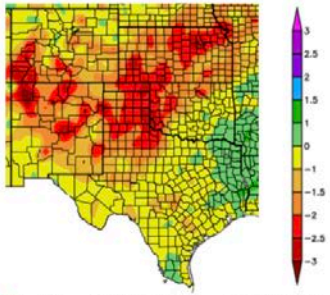
Meteorological Conditions and Indicators

The Southern Plains received significant moisture in September and October 2017, but "the spigot shut off" in early October, leading to a 3-4 class USDM drought degradation between January and April. Above-normal temperatures through the winter, particularly in Colorado and New Mexico, exacerbated drought conditions.



▲ **Fig. 2.** U.S. Drought Monitor Class Change for CONUS. April 17, 2018 compared to January 2, 2018. Source: droughtmonitor.unl.edu

The Standardized Precipitation Index (SPI) shows the intensification of drought over the past 6 months and shows that a large area is "primed for drought development in the near future."

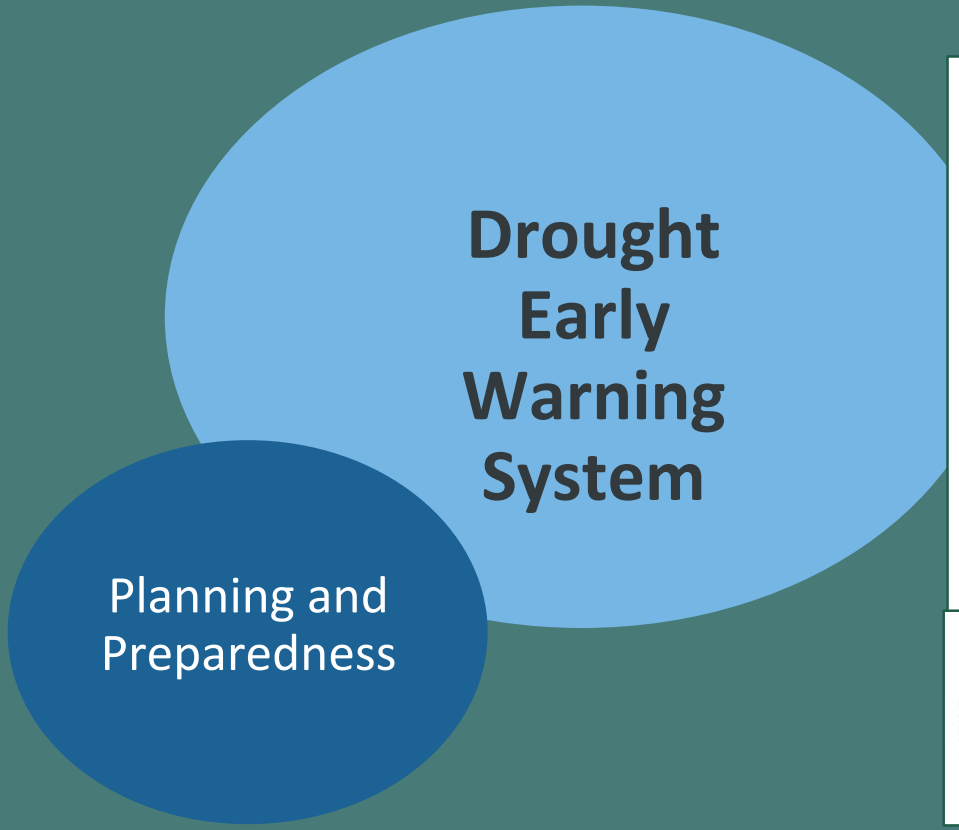


▲ **Fig. 3.** Six month SPI for the Southern Plains 10/22/2017-4/21/2018.

La Nina is a contributing factor to the drought, but not the major driver.

For more information about NIDIS, please visit www.drought.gov

Components of a Drought Early Warning System (DEWS)

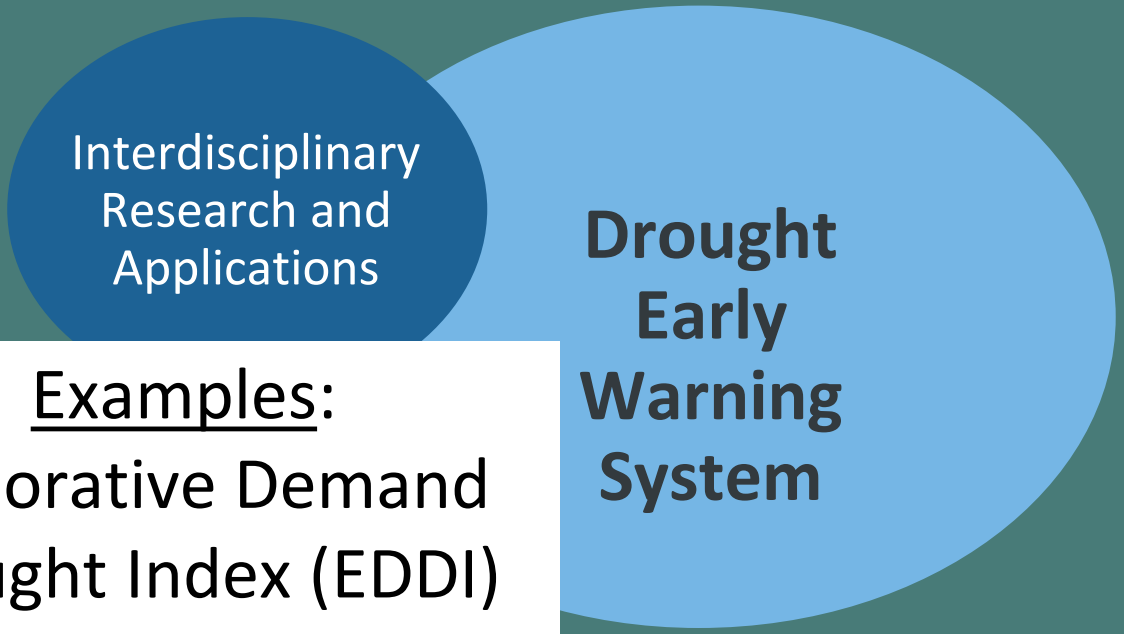


Example

Support to Utah and Colorado to develop / improve state drought plans

WESTERN WATER ASSESSMENT
A NOAA RISA TEAM

Components of a Drought Early Warning System (DEWS)



Examples:

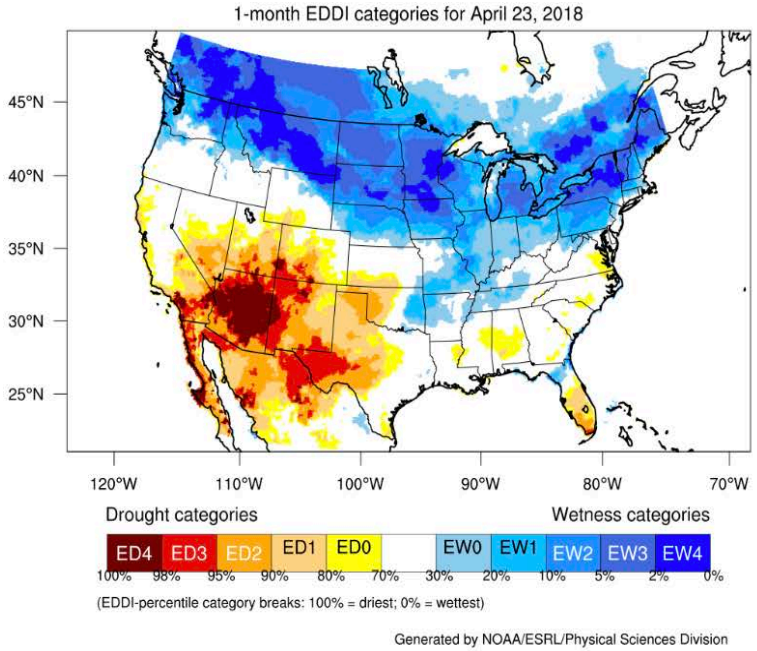
- Evaporative Demand Drought Index (EDDI)
- Drought assessments
- Climate Engine

About

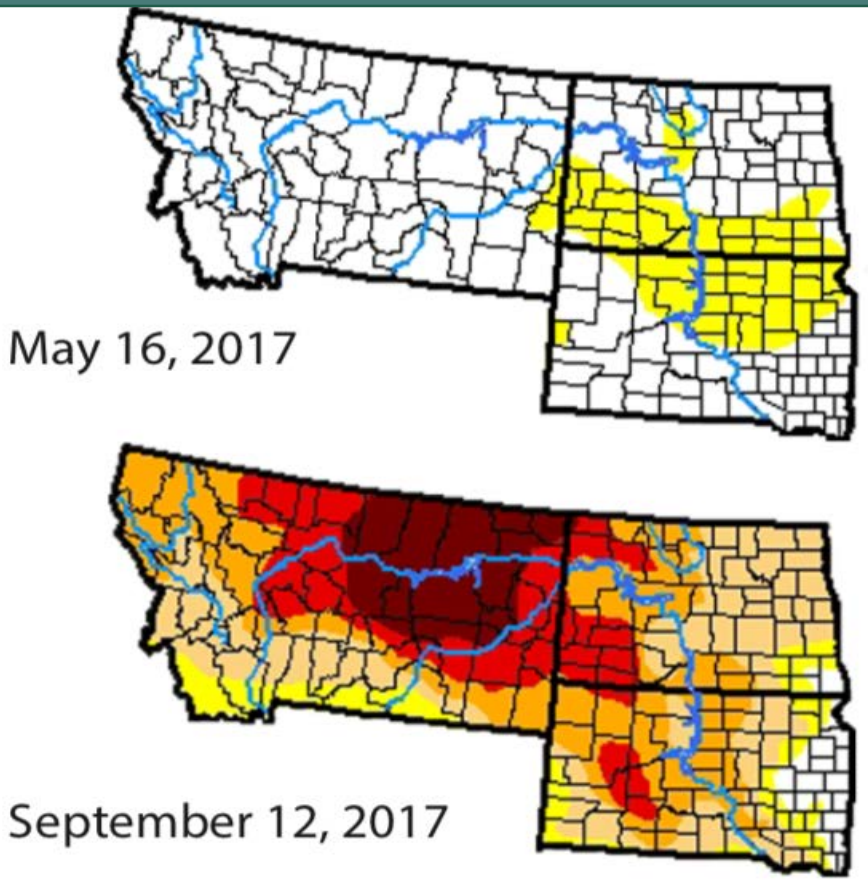
What is EDDI?

The Evaporative Demand Drought Index (EDDI) is an experimental drought monitoring and early warning guidance tool. It examines how anomalous the atmospheric evaporative demand (E_0; also known as "the thirst of the atmosphere") is for a given location and across a time period of interest. EDDI is multi-scalar, meaning that this period—or "timescale"—can vary to capture drying dynamics that themselves operate at different timescales; we generate EDDI at 1-week through 12-month timescales.

This webpage offers a frequently updated assessment of current conditions across CONUS, southern parts of Canada, and northern parts of Mexico; a tool to generate historical time series of EDDI for a user-selected region; introductions to the EDDI team; and a list of resources for users to explore EDDI and its applications further.



Assessment of the 2017 Northern Plains (S Dakota, N Dakota, Montana) Drought

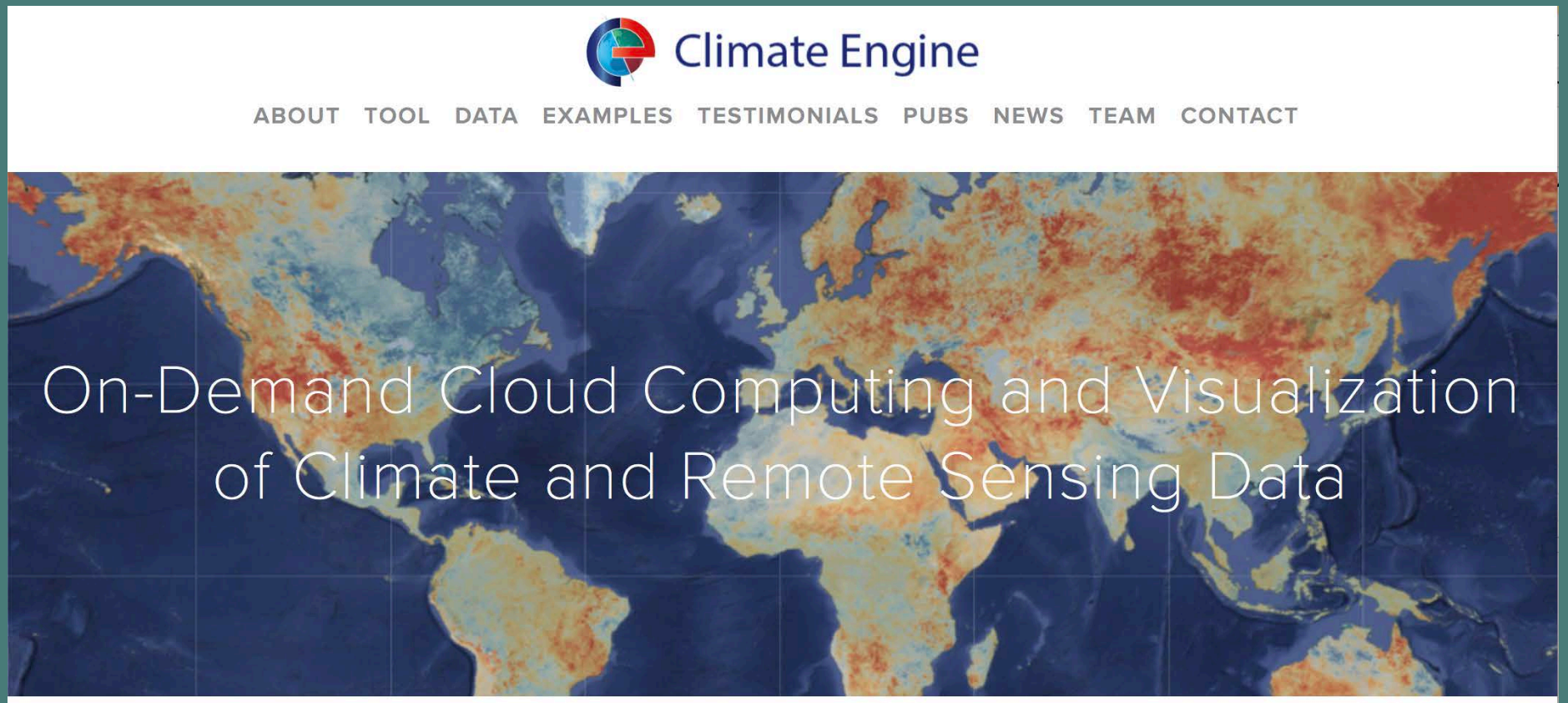


Assessment Goals

1. Understand flash droughts
2. Attribution: Causes, predictability, physical drivers, comparison to historical droughts
3. Contribution of drought to wildfire
4. Lessons learned: strengthen DEWS

Partnership: Canadian and U.S. Federal, state, local and tribal

Climate Engine (climateengine.org)



Analyze and interact with climate and earth observations for decision support related to drought, water use, agricultural, wildfire, and ecology

University of Idaho, Desert Research Institute, Google

Drought Early Warning Systems (DEWS) as a Decision Frame

A DEWS creates a framework to:

- Coordinate research + planning + education, etc. towards goal of drought resilience
- Nest multiple spatial and jurisdictional scales
- Understand interdependencies and costs/benefits of decision trade-offs
- Adapt through evaluation and transfer of best practices

North American Drought Monitor

March 31, 2018

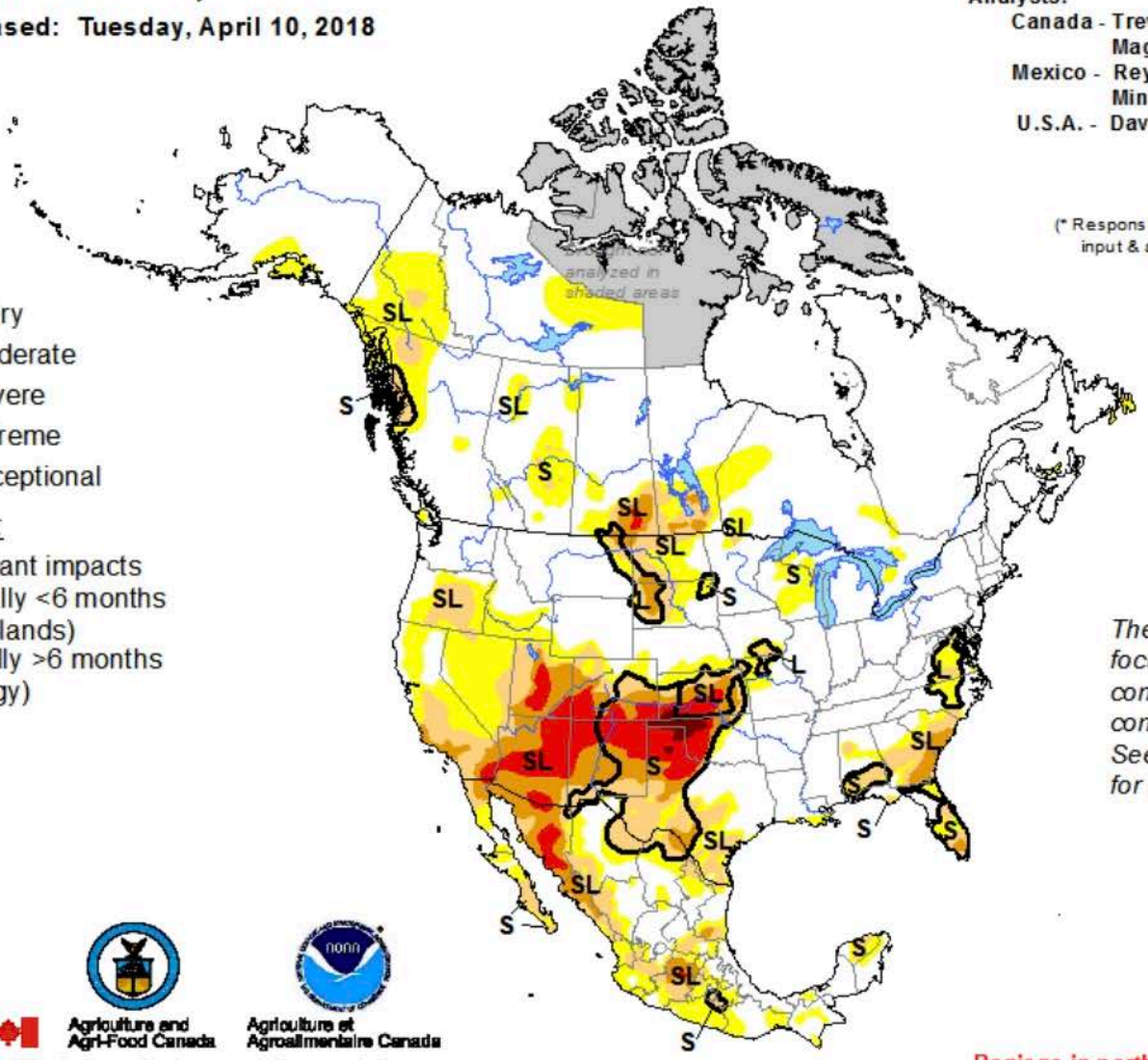
Released: Tuesday, April 10, 2018

https://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/

Analysts:

Canada - Trevor Hadwen
Maginda Magendrathajan
Mexico - Reynaldo Pascual Ramirez
Minerva Lopez*
U.S.A. - David Miskus

(* Responsible for collecting analysts' input & assembling the NA-DM map)

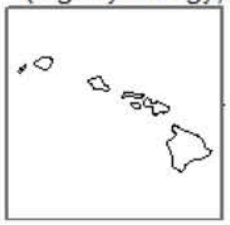


Intensity:

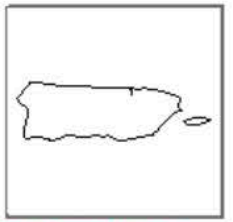
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

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 for a general summary.



Regions in northern Canada may not be as accurate as other regions due to limited information.

USDA NDMC CONAGUA COMISIÓN NACIONAL DEL AGUA

Agriculture and Agri-Food Canada
Environment and Climate Change Canada

Agriculture et Agroalimentaire Canada
Environnement et Changement climatique Canada

Selected Transboundary Drought Early Warning Products

North American Wildfire Outlook

North American Seasonal Fire Assessment and Outlook

National Interagency Fire Center ● Natural Resources Canada ● Servicio Meteorológico Nacional
United States **Canada** **Mexico**

Outlook Period April, May, and June 2018
Issued 13 April 2018

Executive Summary

Strong winter storms continued to cross North America. Storms developed along the western Canada-United States coast, strengthened across the central Rockies, then barreled through the eastern seaboard. Systems brought very cold temperatures and heavy snow or rain to many areas. Above normal precipitation fell across the southern Prairie provinces in Canada. In the U.S., heavy rain or snow fell over much of California, the northern Rockies, the northern Plains, the Midwest, the Mississippi Valley, southeastern Texas, the southern Appalachians, and parts of the New England coast. Parts of southeastern and central Alaska also had normal to above normal precipitation. Below normal precipitation occurred over parts of Ontario and the northwestern provinces, the U.S. Southwest and central Plains, and northern Mexico and the Yucatán.

Selected Transboundary Drought Early Warning Products

CLIMAS
Climate Assessment for the Southwest
A NOAA RISA TEAM

ABOUT SW CLIMATE EDUCATION LIBRARY RESEARCH SERV

Rio Grande-Bravo Outlook March 2018
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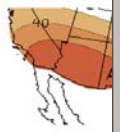

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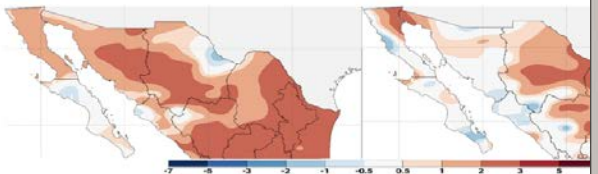

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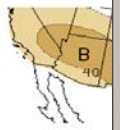

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For April, the SMN precipitation outlook predicts above-average conditions in northern Baja California a
conditions in Tamaulipas, Nuevo León, Coahuila, Chihuahua and Sonora. The precipitation forecast for
average conditions in Northeast Nuevo León and Tamaulipas and below-average conditions in the rest
Coahuila, Chihuahua, Sonora and Baja California Peninsula (Figure 8).

Figure 8 (above): Pr

CLIMAS
Climate Assessment for the Southwest
A NOAA RISA TEAM

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Rio Grande-Bravo Outlook March 2018
Regional Climate Overview - December 2017 - February 2018
Forecast - April | May | June
Announcements & News

Contributors

Sarah LeRoy
RGBO Editor
Climate Assessment for the Southwest (CLIMAS)
sary21@email.arizona.edu

Gregg Garfin
Climate Assessment for the Southwest (CLIMAS)

Mark Shafer
Southern Climate Impacts Planning Program (SCIPP)

Meredith Muth
NOAA - Climate Program Office

Victor Murphy
NOAA-National Weather Service - Southern Region

Isaac Palomo
Climate Assessment for the Southwest (CLIMAS)

Martín Ibarra|Idalia Ledesma|Alberto Chablé
Mexico National Meteorological Services (SMN) - Seasonal Forecasts

Reynaldo Pascual|Minerva López
Mexico National Meteorological Services (SMN) - Drought

Julio Martínez
Mexico National Meteorological Services (SMN) - Diagnostic Observations

Darío Rodríguez Rangel

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Summary

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Forecasts favor above-average temperatures and below-average precipitation for the Rio Grande/Bravo Basin through June.

AT A GLANCE

1. Rio Grande/Bravo Region
   Dry, pre-greenup fuels coupled with windy and dry spring conditions will increase the potential for ignitions and rapid fire spread rates.
2. Tamaulipas and Chihuahua
   Abnormally dry conditions continued in parts of Chihuahua and moderate to severe drought conditions developed in southern Tamaulipas.
3. New Mexico and North Texas
   Precipitation was 0-70% of average from December-February for New Mexico and Northwest Texas
4. North New Mexico and Texas
   Extreme drought conditions have developed in northern New Mexico and persisted in northern Texas.

Los pronósticos favorecen temperaturas superiores a la media y las precipitaciones inferiores a la media para la cuenca Río Grande/Bravo hasta junio.

AT A GLANCE

1. Región de Río Grande / Bravo
   Los combustibles secos, junto con las condiciones secas y de vientos de la primavera aumentarán las probalidades de incendios forestales así como su propagación.
2. Tamaulipas y Chihuahua
   Las condiciones anormalmente secas continuaron en partes de Chihuahua y las condiciones de sequía moderada a severa se desarrollaron en el sur de Tamaulipas.
3. Nuevo México y el norte de Texas
   La precipitación fue del 0-70 % del promedio de diciembre a febrero para Nuevo México y el noroeste de Texas.
4. Norte de Nuevo México y Texas
   Las condiciones extremas de sequía se han desarrollado en el norte de Nuevo México y persistieron en el norte de Texas.

NOAA NIDIS CONAGUA COMISIÓN NACIONAL DEL AGUA SERVICIO METEOROLÓGICO NACIONAL CLIMAS SCIPP A NOAA RISA TEAM

Selected Transboundary Drought Early Warning Products

National Integrated Heat Health Information System

NIHHIS Partners host heat-health workshop in Hermosillo, Mexico

19 May 2017 Number of views: 832

The Commission for Environmental Cooperation (CEC) and the Centers for Disease Control and Prevention (CDC) held a workshop on May 17-18, 2017 in Hermosillo, Sonora, México, on the use of syndromic surveillance for extreme heat in North America. The Climate Program Office's Juli Trtanj delivered an update on the National Integrated Heat Health Information System (NIHHIS)'s national and trans-boundary NIHHIS activities, inclusive of the Rio Grande/Bravo NIHHIS Pilot, the recent Mexico Climate Outlook Forum, and the health-focused North American Climate Services Partnership meeting held in November of 2016 in Mexico City.

NIHHIS
NATIONAL INTEGRATED HEAT HEALTH INFORMATION SYSTEM

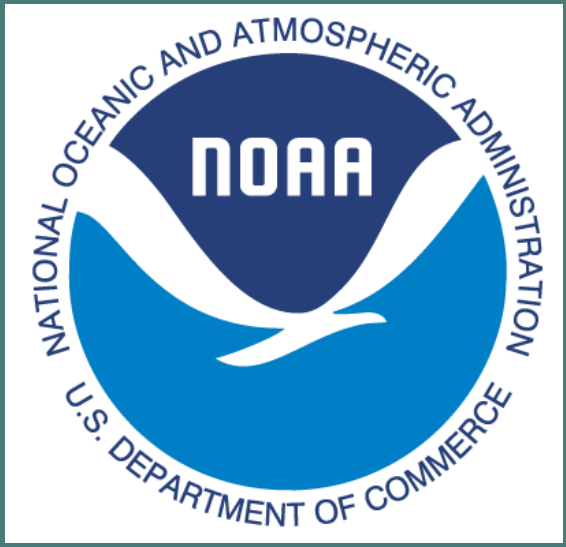
The workshop showcased the results of the CEC project, Helping North American Communities Adapt to Climate Change: A Pilot Syndromic Surveillance System for Extreme Heat. These results include lessons learned from the pilot projects in the communities collaborating on the project: Ottawa, Canada; Detroit, US; and Hermosillo, México. The workshop also included a guide for the design and implementation of syndromic surveillance systems for heat-related health outcomes in North America, developed under the project.

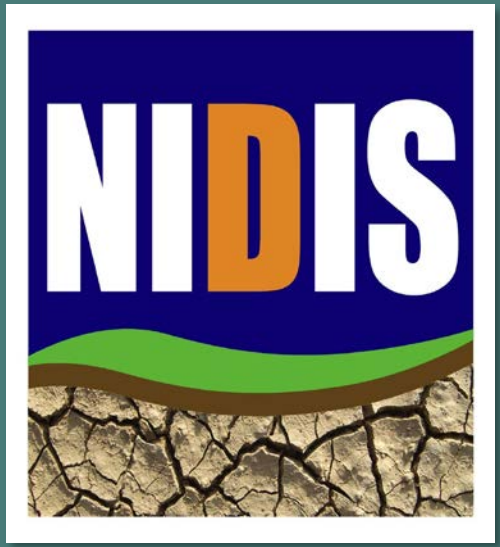
The event convened public health professionals, emergency management officials, public health decision makers, researchers, and epidemiologists from North America. These participants exchanged information about the need for and use of health data to support and assess the efficiency of actions aimed at adapting to extreme heat in the context of climate change.

NIHHIS and the CEC, with strong leadership by NOAA, CDC, EPA, and other federal agencies in the United States, Canada, and Mexico, are working to reduce the risk of heat-related health issues along the border and across North America.

Thank you!

Elizabeth Weight
NOAA/NIDIS
Elizabeth.Weight@NOAA.gov





Build on Products to Create Transboundary Drought Early Warning System?

Needs are vast but resources are limited: Use a systematic approach to define priority actions and achieve scale

1. Focus on alignment of science and activities towards goal of drought resiliency
2. Define key vulnerabilities and opportunities
3. What are key windows of opportunities, critical moments in time and space?
4. Assess gaps against framework
5. Determine research domains: what and how much information is needed for decision-making at crucial moments in time?