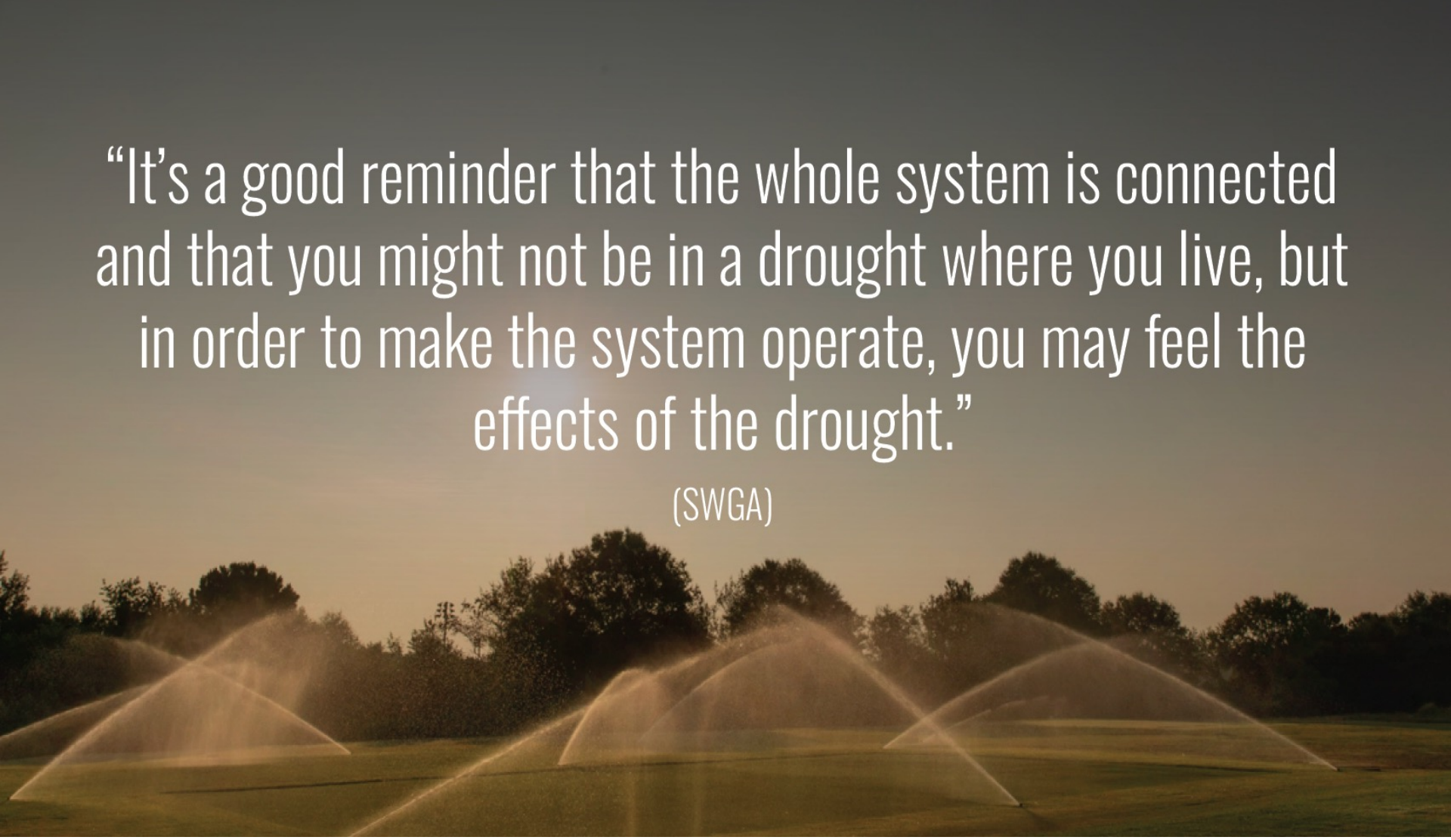
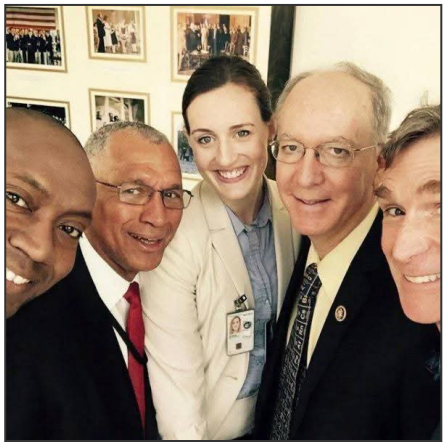

“It’s a good reminder that the whole system is connected and that you might not be in a drought where you live, but in order to make the system operate, you may feel the effects of the drought.”
(SWGA)

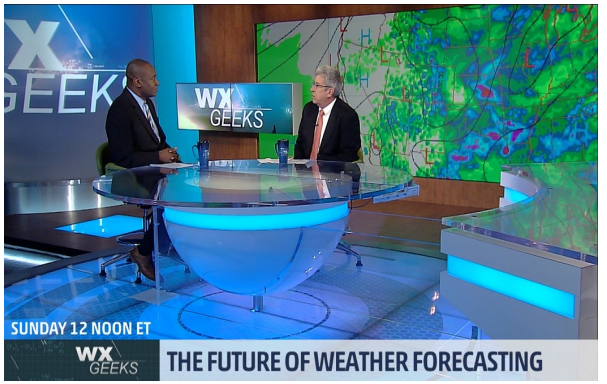
GEORGIA

Who Is This Guy?

- Georgia Athletic Association Distinguished Professor
- Director, UGA's Atmospheric Sciences Program
- Host, Weather Channel's Weather Geeks
- Senior Contributor, Forbes Magazine
- Member of 3 National Academies
- Son of Georgia – Native of Canton, Georgia
- 3-Time Florida State University Alumni
- Husband and Father of 2 college-age kids
- I have eaten my share of boiled peanuts



> I believe too many scientists are comfortable in the ivory tower, journal space, and conferences. However, a gale of misinformation rushes in to replace the void if scientists are not communicating to the public, stakeholders, and students.
>
> **Dr. Marshall Shepherd**



Communicating Science To Non-Scientists: A Drought Perspective

J.MARSHALL**SHEPHERD, PhD**
Regents and Georgia Athletic Association Distinguished Professor
Director, UGA Atmospheric Sciences Program
2013 President, American Meteorological Society
Host, Weather Channel's Weather Geeks
Forbes Senior Contributor

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- Context

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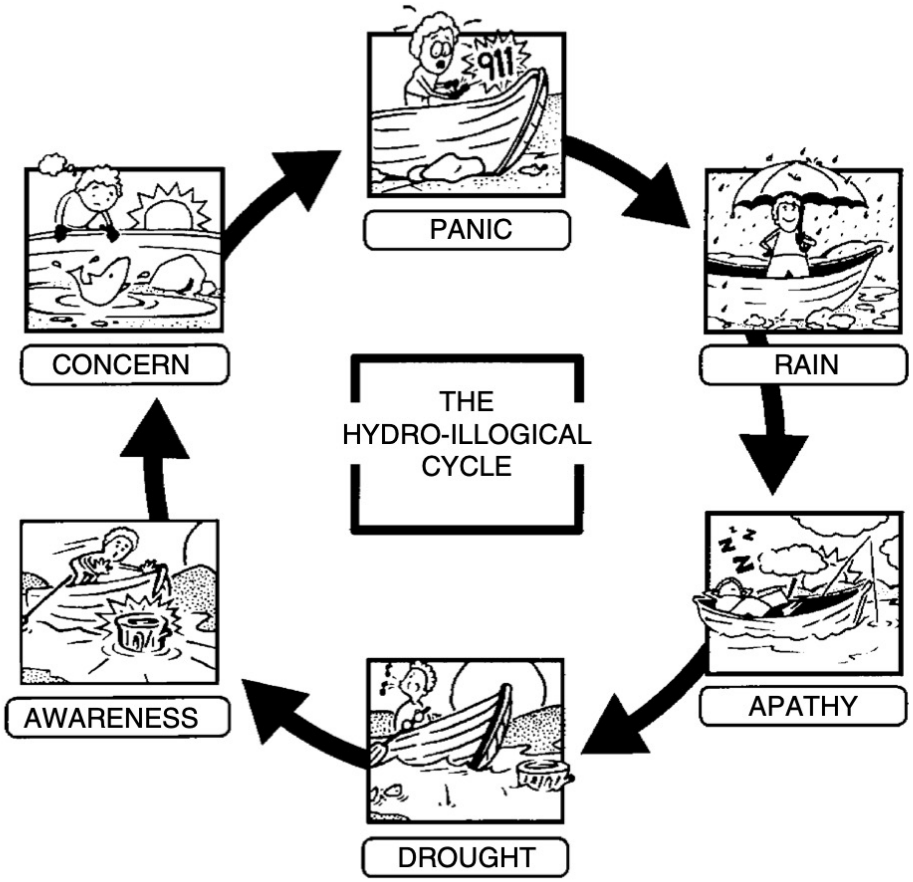
The Hydro-Illogical Cycle, from I.R. Tannehill's *Drought: Its Causes and Effects in 1947*



"We welcome the first clear day after a rainy spell. Rainless days continue for a time and we are pleased to have a long spell of such fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to the drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again."

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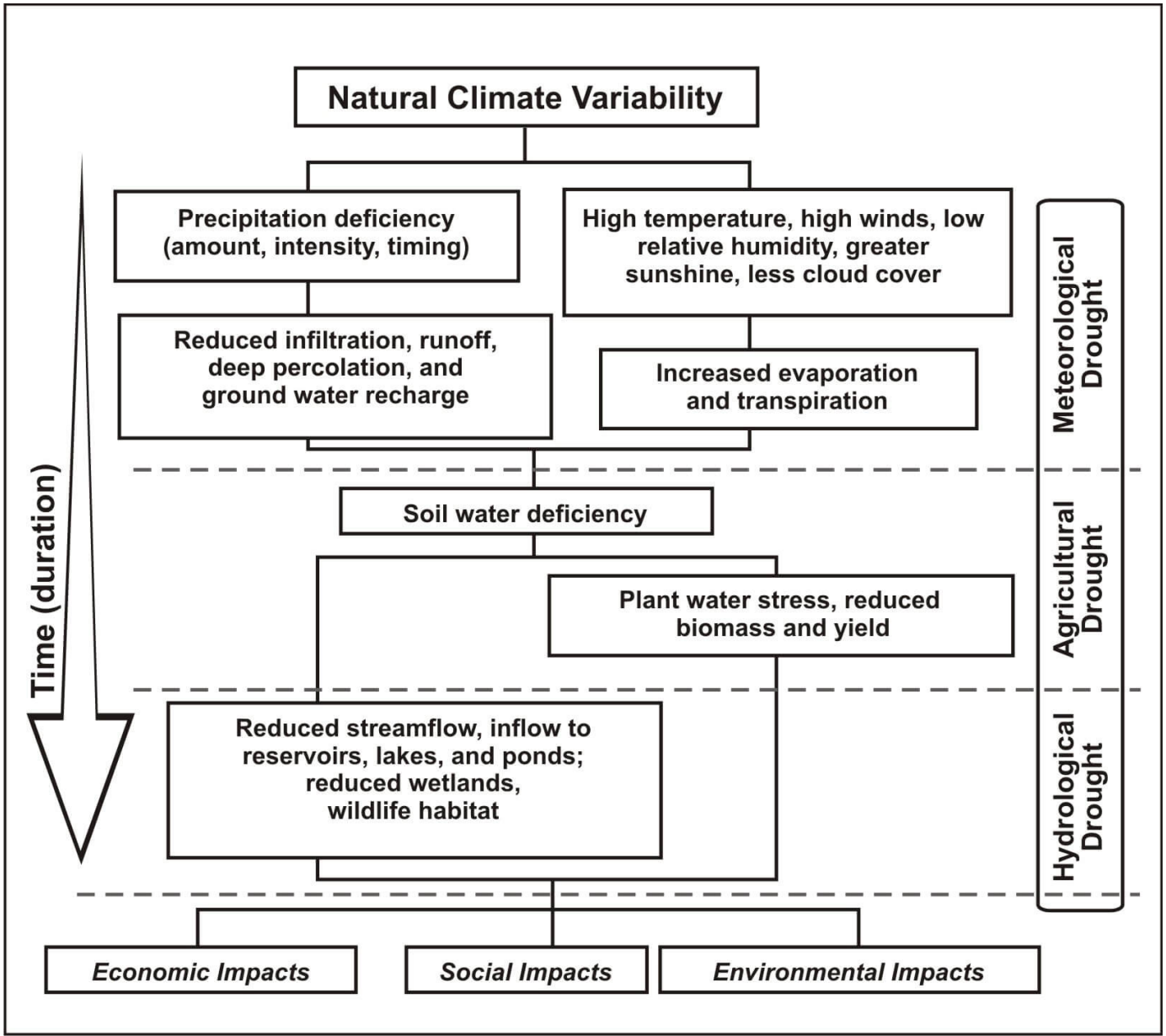
Drought: Types of Drought



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- Current Drought Conditions

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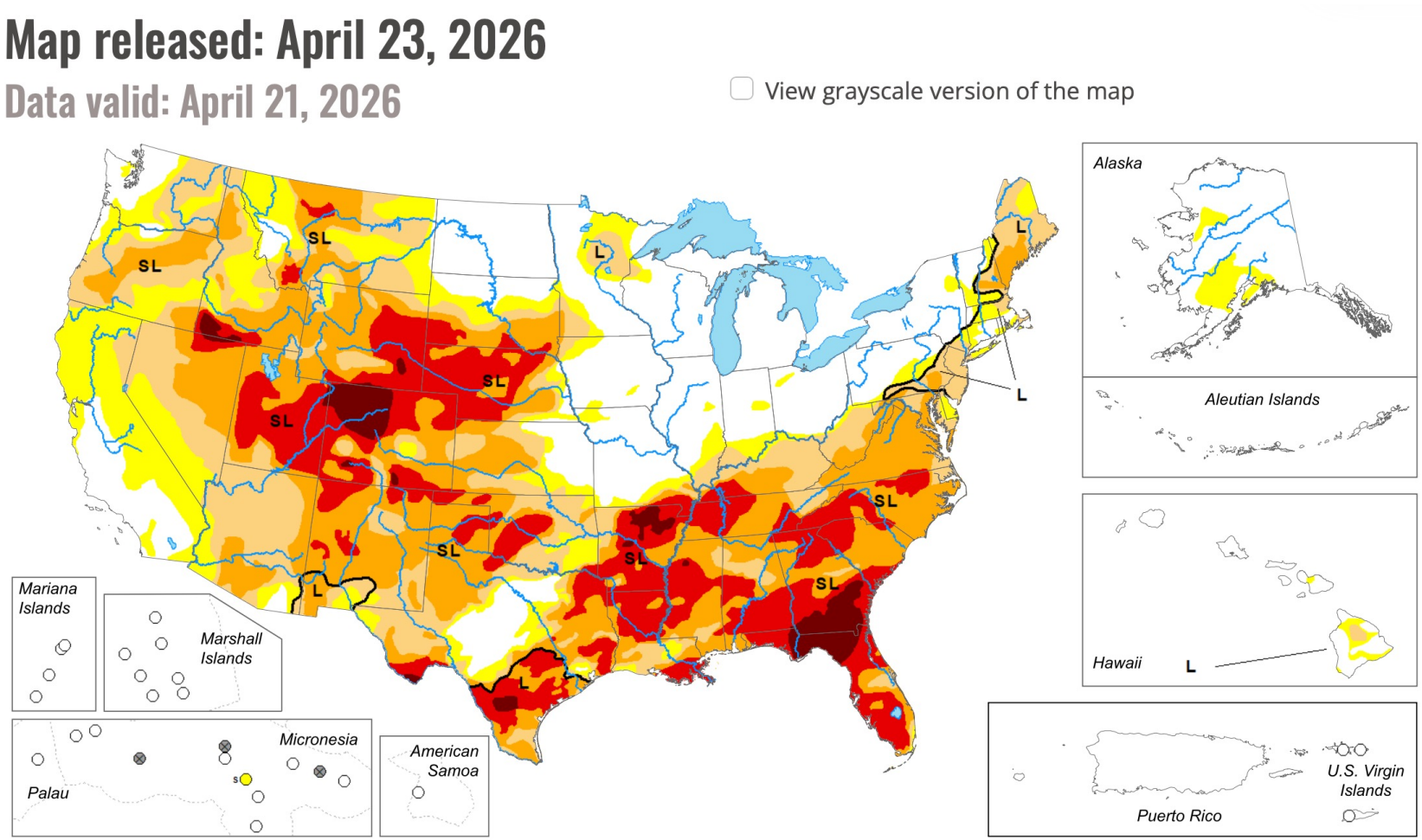
Drought Bottom Line – Up Front



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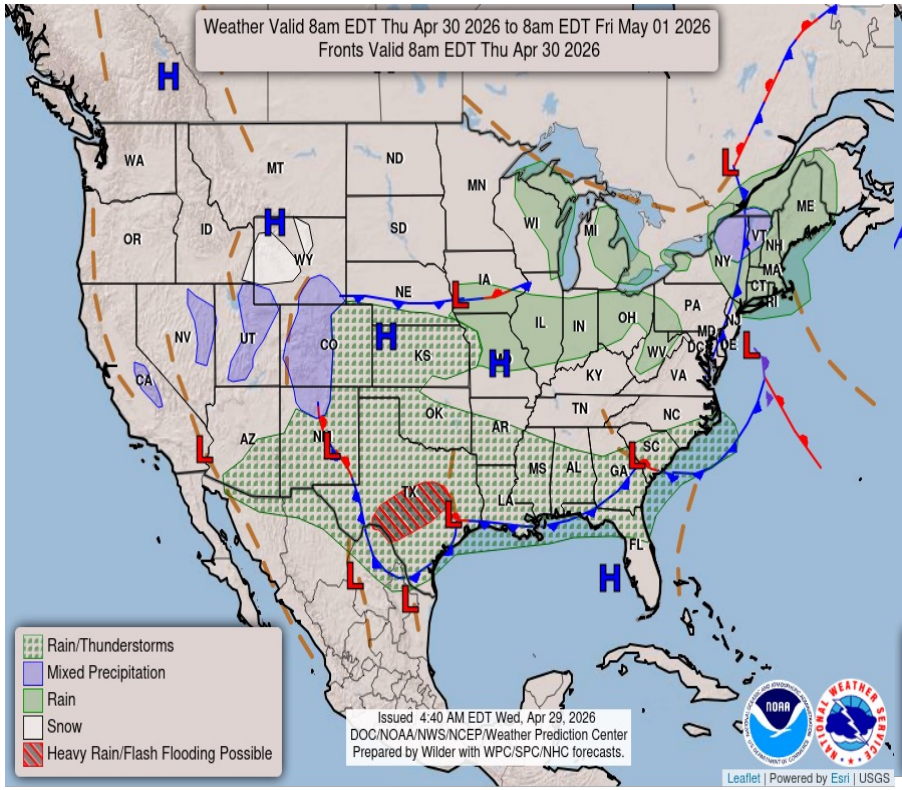
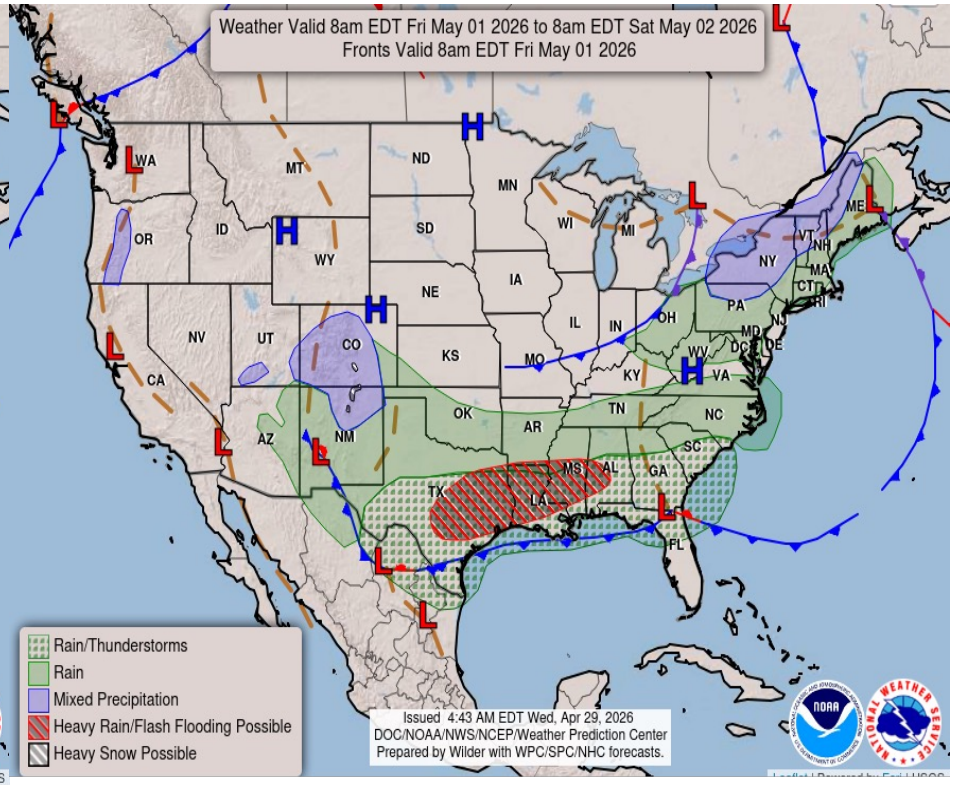
The Next Few Days

Today



Friday



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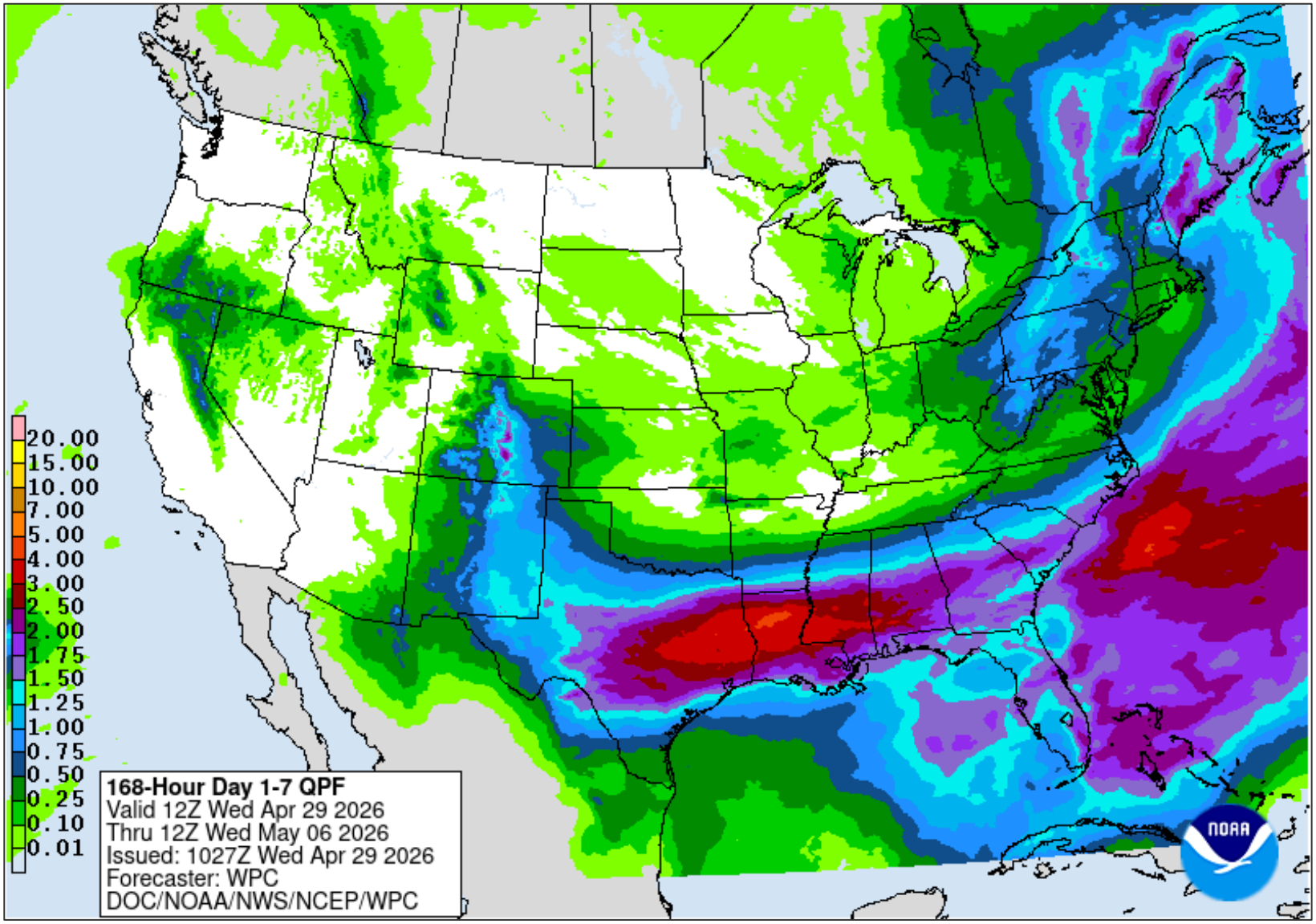
Expected Rainfall Through May 6



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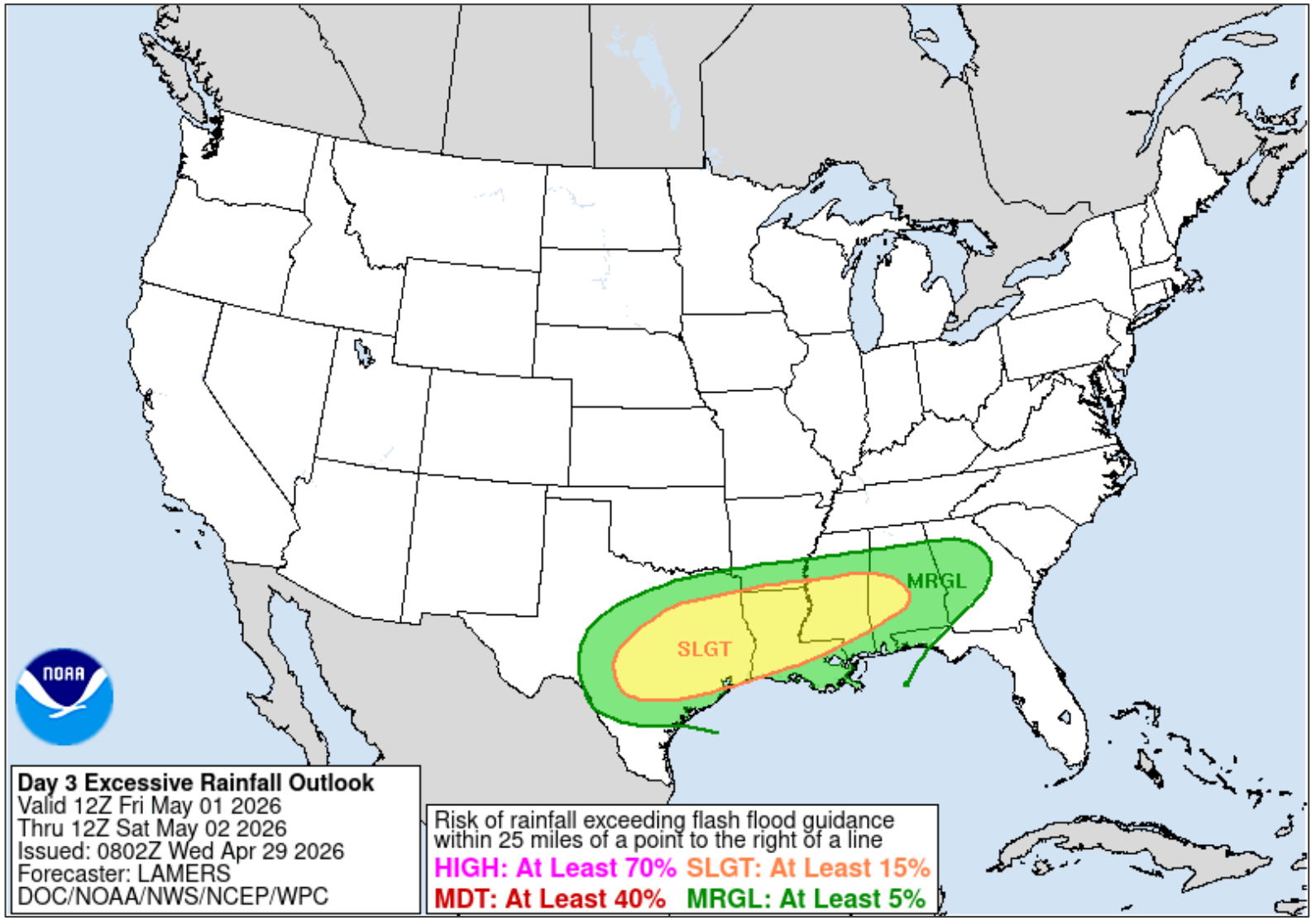
Expected Rainfall Through May 6



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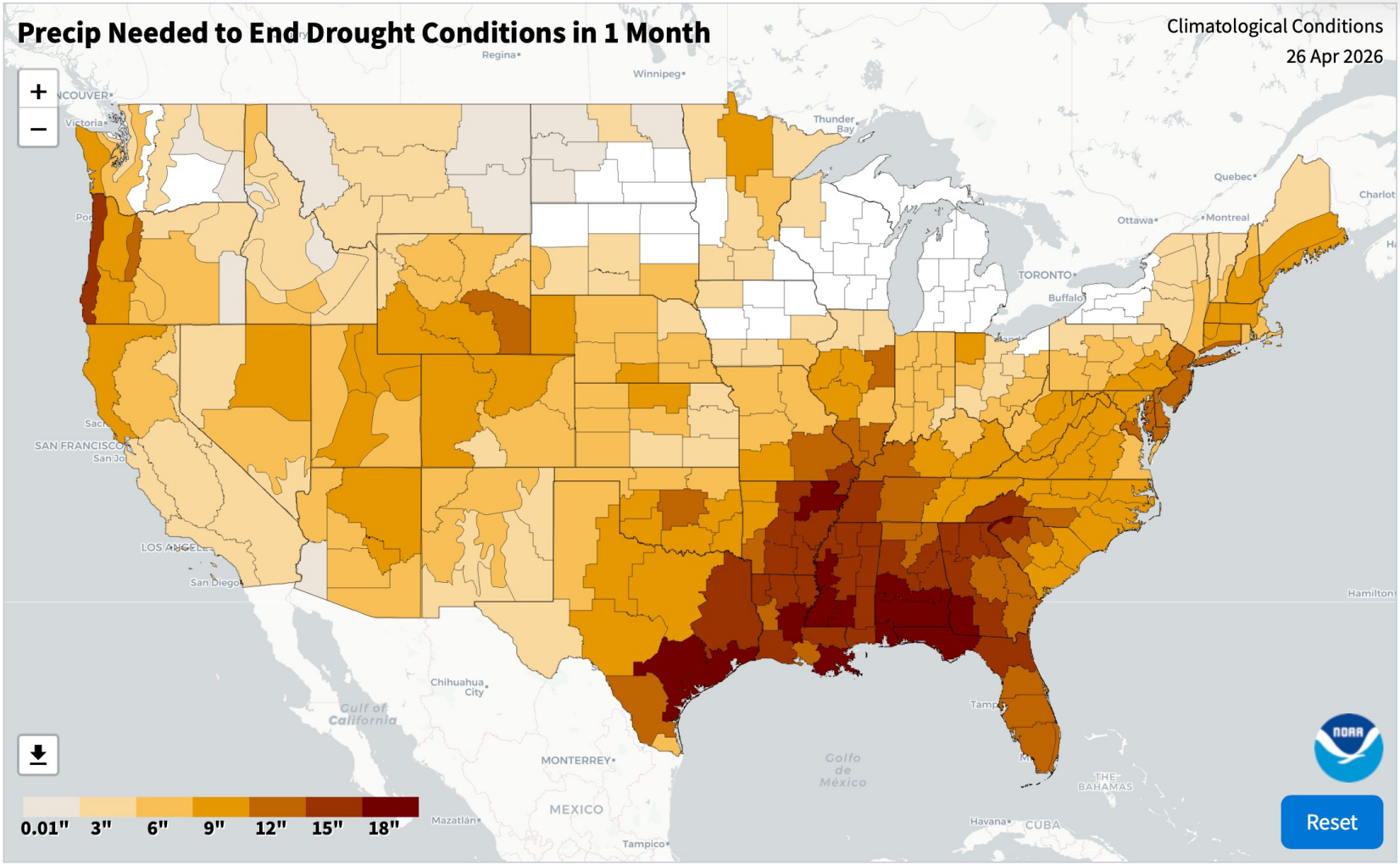
Will We Put A Dent In The Drought?



Based on the PHDI. PHDI is a primary measure of long-term drought but may not apply to all areas, including those with heavily managed surface water. No additional precipitation is needed for white areas.

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Barriers To Communication

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Cupcakes will have to save us

Source: Brad Panovich

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The “Big” Challenges

Dunning-Kruger Effect

Cognitive Dissonance

Confirmation Bias

Internet and Social Media

Science Literacy

Everything Is Local

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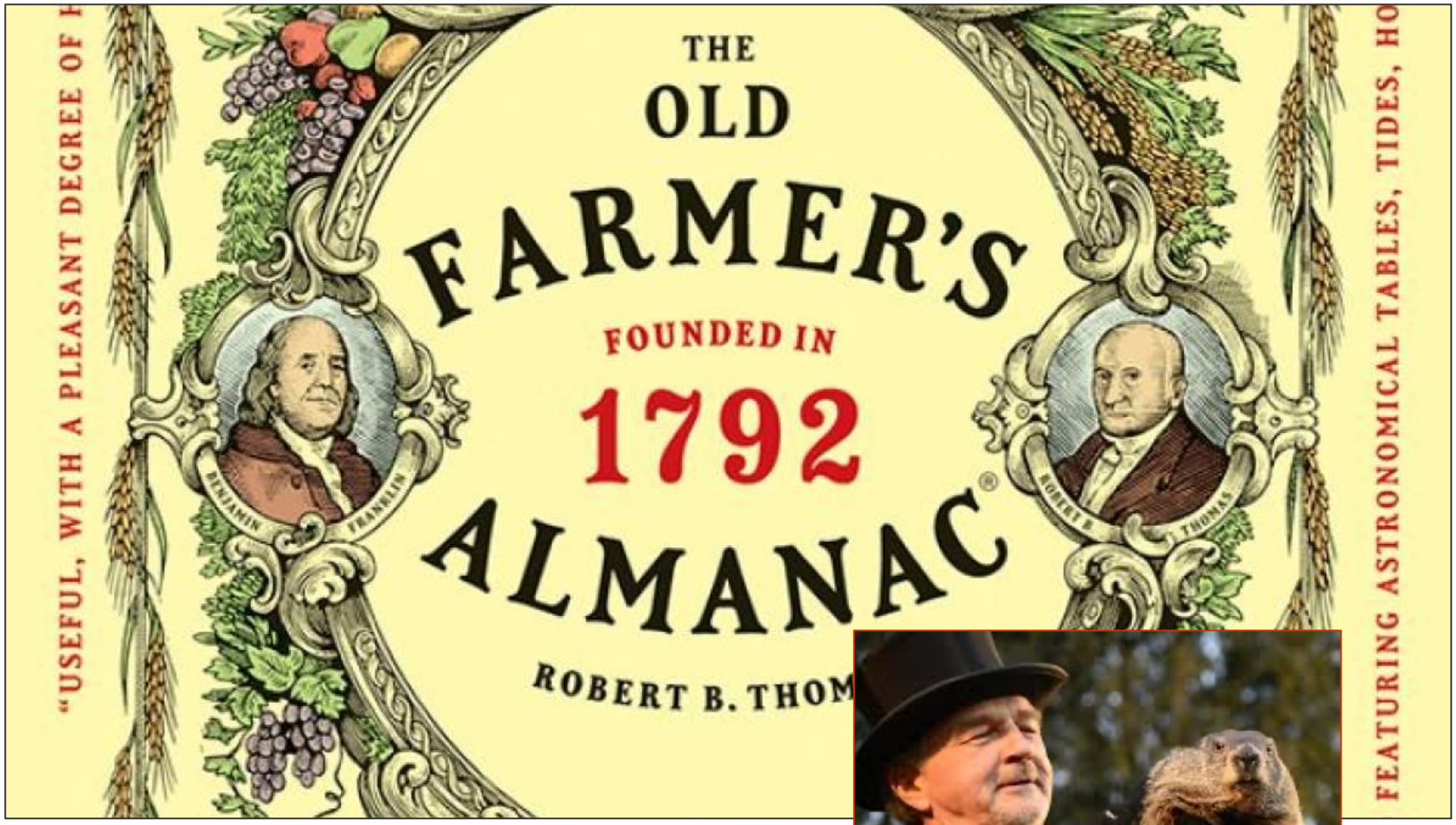
Confirmation Bias and Perception



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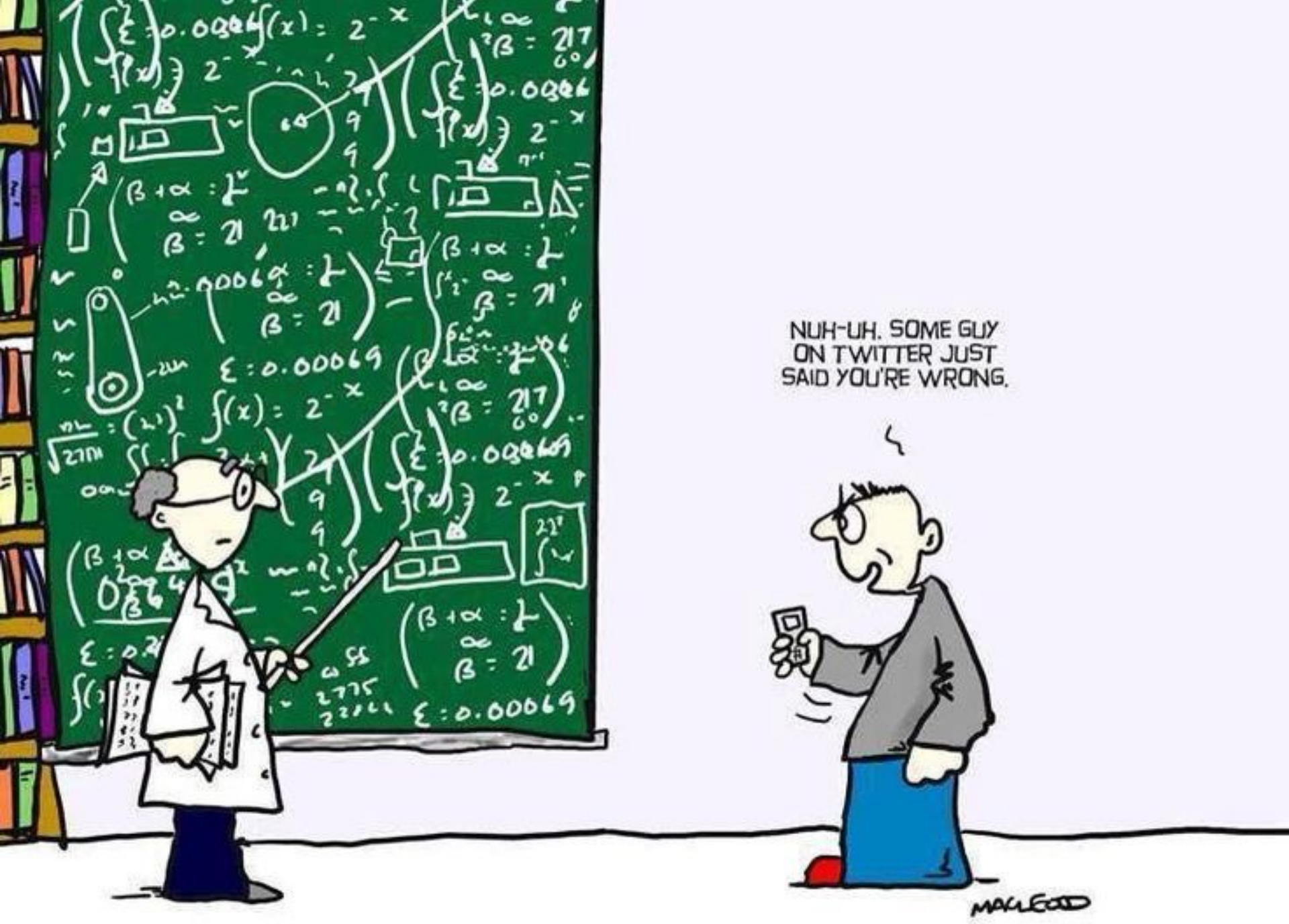
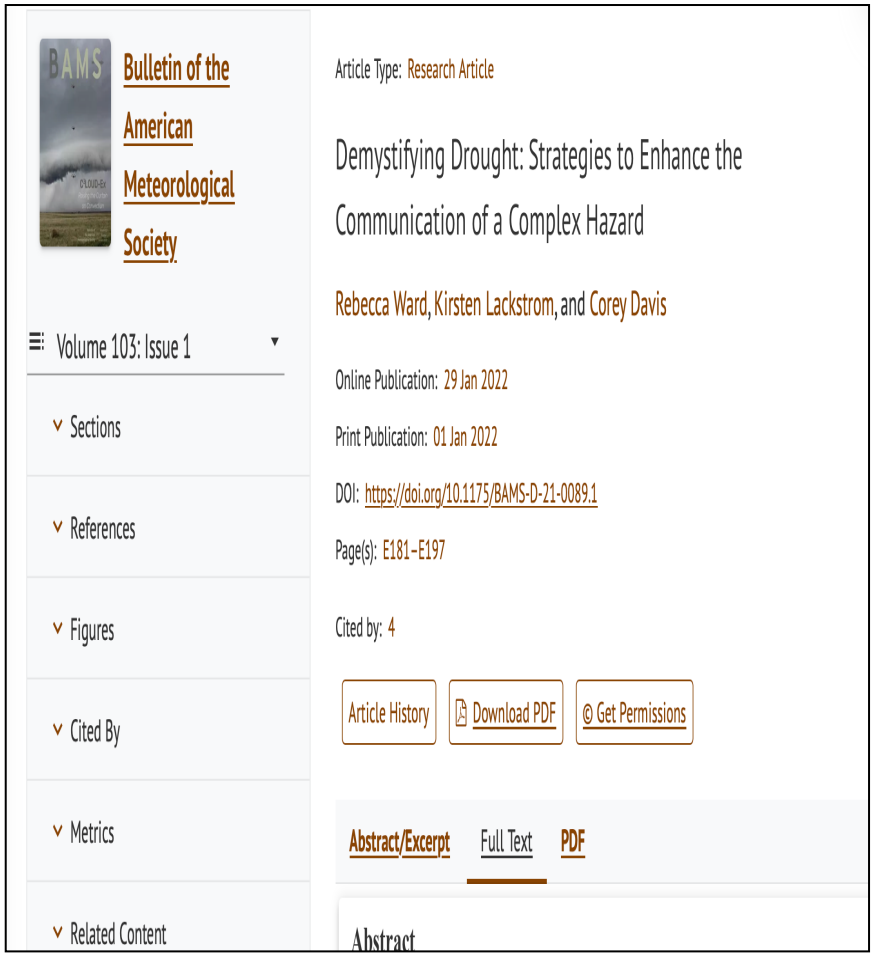

NUH-UH. SOME GUY ON TWITTER JUST SAID YOU'RE WRONG.
MACLEOD

Drought Communication Tips and Strategies



Bulletin of the American Meteorological Society

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Demystifying Drought: Strategies to Enhance the Communication of a Complex Hazard

Rebecca Ward, Kirsten Lackstrom, and Corey Davis

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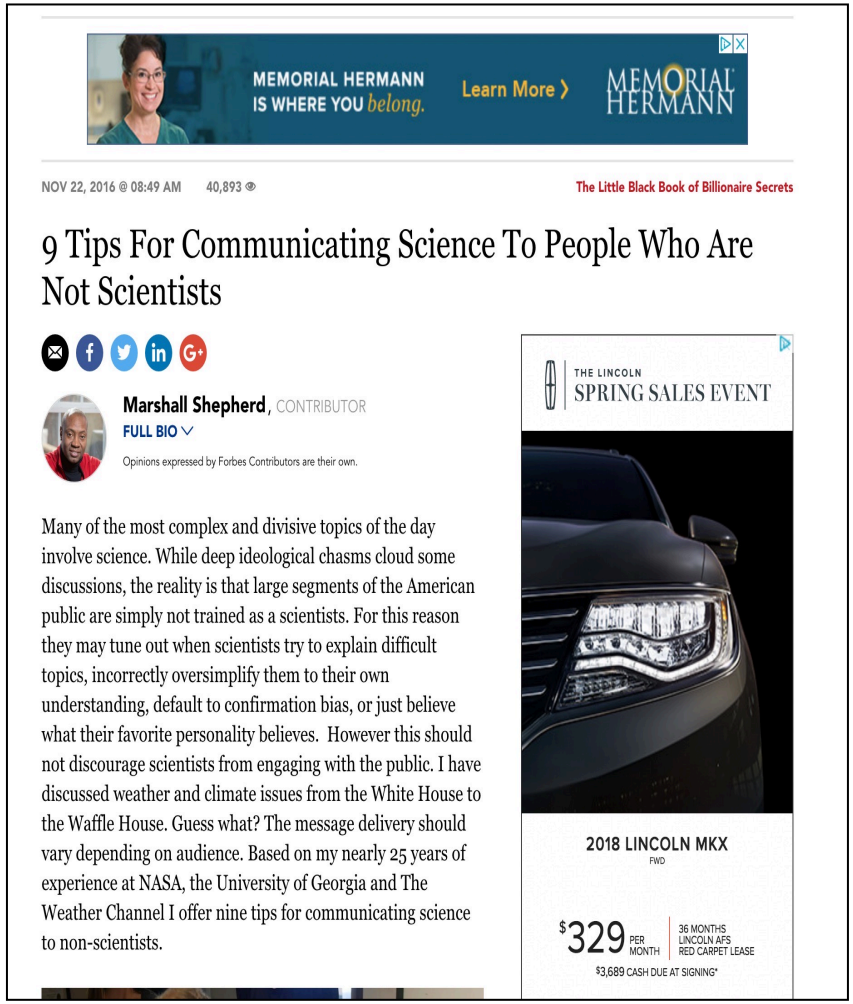
Abstract



NOV 22, 2016 @ 08:49 AM 40,893

The Little Black Book of Billionaire Secrets

9 Tips For Communicating Science To People Who Are Not Scientists

Marshall Shepherd, CONTRIBUTOR

FULL BIO

Opinions expressed by Forbes Contributors are their own.

Many of the most complex and divisive topics of the day involve science. While deep ideological chasms cloud some discussions, the reality is that large segments of the American public are simply not trained as a scientists. For this reason they may tune out when scientists try to explain difficult topics, incorrectly oversimplify them to their own understanding, default to confirmation bias, or just believe what their favorite personality believes. However this should not discourage scientists from engaging with the public. I have discussed weather and climate issues from the White House to the Waffle House. Guess what? The message delivery should vary depending on audience. Based on my nearly 25 years of experience at NASA, the University of Georgia and The Weather Channel I offer nine tips for communicating science to non-scientists.

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- Drought Communication

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1. Know your audience

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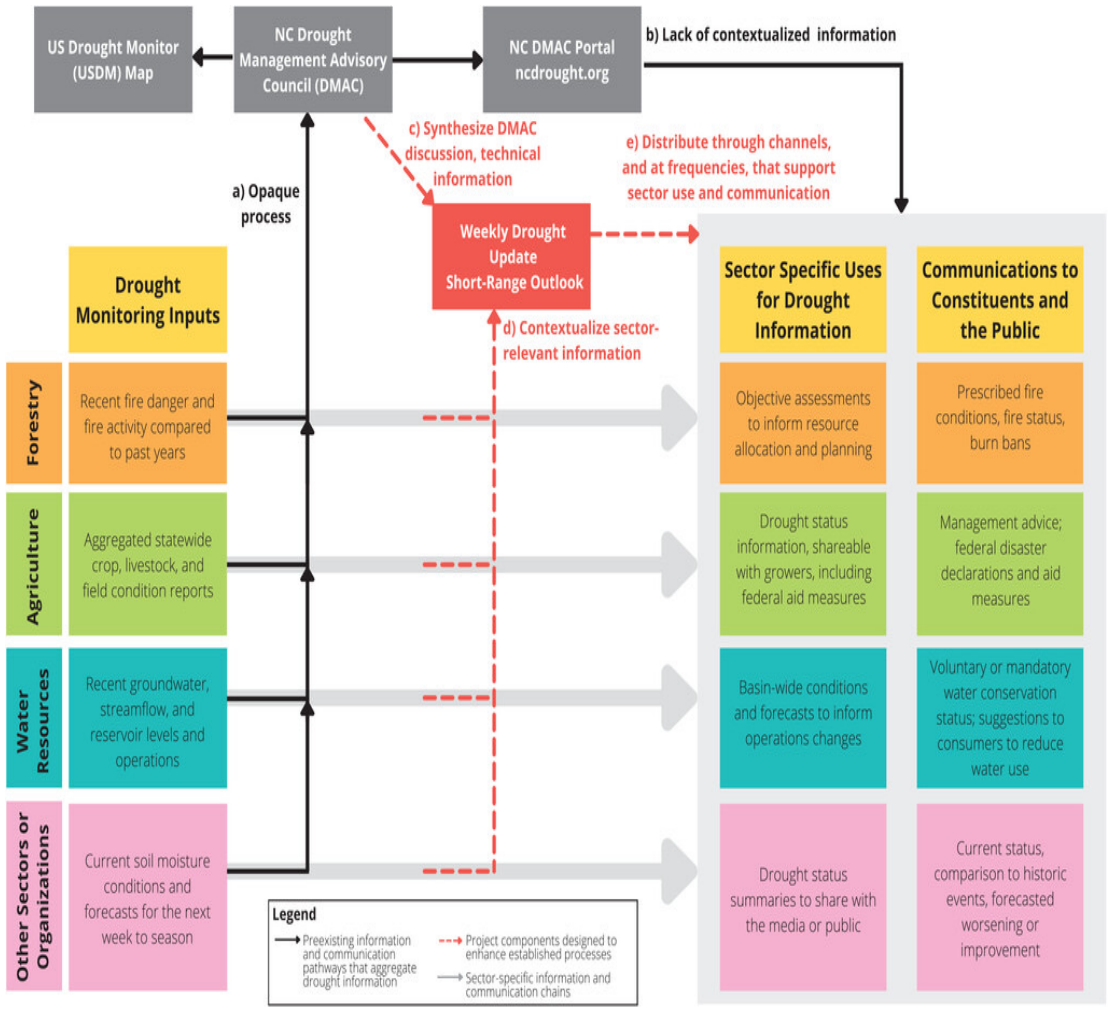
Know your audience



The network of drought communication chains in North Carolina.

The solid gray and black arrows illustrate the pathways through which drought information is provided, aggregated, used, and communicated by the project's target sectors.

Shortcomings : (a) how the DMAC determines drought status, and which specific inputs are considered, is unclear to external audiences. (b) As stand-alone products, the NC DMAC portal and weekly drought map lack sufficient context to help users understand and apply the information.

Bulletin of the American Meteorological Society 103, 1; 10.1175/BAMS-D-21-0089.1

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2. Keep Messaging Simple

North Carolina Drought Update

For the assessment period ending July 21, 2020

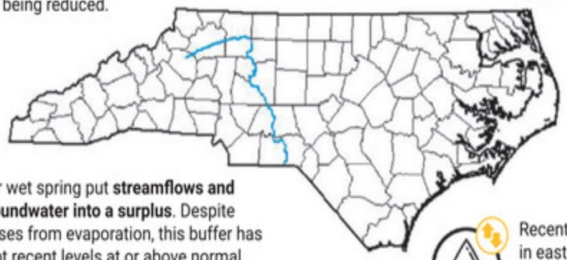
*Note: updates will be issued monthly when the state is **not** experiencing dry or drought conditions.*

This Week's Drought Monitor of North Carolina Map

From the US Drought Monitor, authored by Richard Heim (*NOAA/NESDIS/NCEI*) with input from the North Carolina Drought Management Advisory Council (ncdrought.org)

Reservoirs in the Piedmont are **maintaining target levels**, although inflows have declined and some downstream releases are being reduced.

Topsoil moisture remains mostly adequate, but in parts of the northern and central Coastal Plain, **soybean planting is delayed** while **corn and tobacco crops are wilting or fringing**.



Our wet spring put **streamflows and groundwater into a surplus**. Despite losses from evaporation, this buffer has kept recent levels at or above normal.

Recent rains have been spotty, especially in eastern NC. **Roanoke Rapids** is having its driest July on record, while **New Bern** is on pace for its 18th-wettest.

Last Week's Drought Map

A Product of Project Nighthawk

https://climate.ncsu.edu/nighthawk

Project Nighthawk · North Carolina Climate Office · CISA

Statewide Condition Summary

After another hot week with only scattered precipitation, conditions are drying out, but the state drought map remains blank. **So when does a summer weather pattern become abnormal dryness, or even drought?** Here are some signs:

Summer Weather	Abnormal Dryness
Warrants routine irrigation of crops, lawns, and gardens	Needing to irrigate more often, or plants showing extra stress
Brown grass and low creek levels after a few hot, dry days	Impacts lasting for a week or more, even after receiving rain
A mix of wet and dry conditions from ag, fire, & hydro indicators	Multiple indicators converging on similar levels of dryness

Want to share impact reports to help monitor emerging dryness? Consider contributing them to the **CoCoRaHS Condition Monitoring** program at www.cocorahs.org.

January through June Statistics

Location	Precip. Departure from Normal	Mean Temp. Dep. from Normal
All of NC	+7.99 inches	+2.4°F
Mountains	+11.68 inches	+1.9°F
Piedmont	+8.06 inches	+2.3°F
Coastal Plain	+6.10 inches	+2.8°F

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Three Points and Three M's

What can 3 points describe?

- 3 focuses of your research
- 3 reasons your work is important
- 3 research questions you pursued
- 3 results you found
- 3 potential applications

Get ready to write yours in a few minutes!

AAAS

Thought Bubble designed by Herbert Spencer from the thenounproject.com

Keep them Miniature, Meaningful, and Memorable: 3M's

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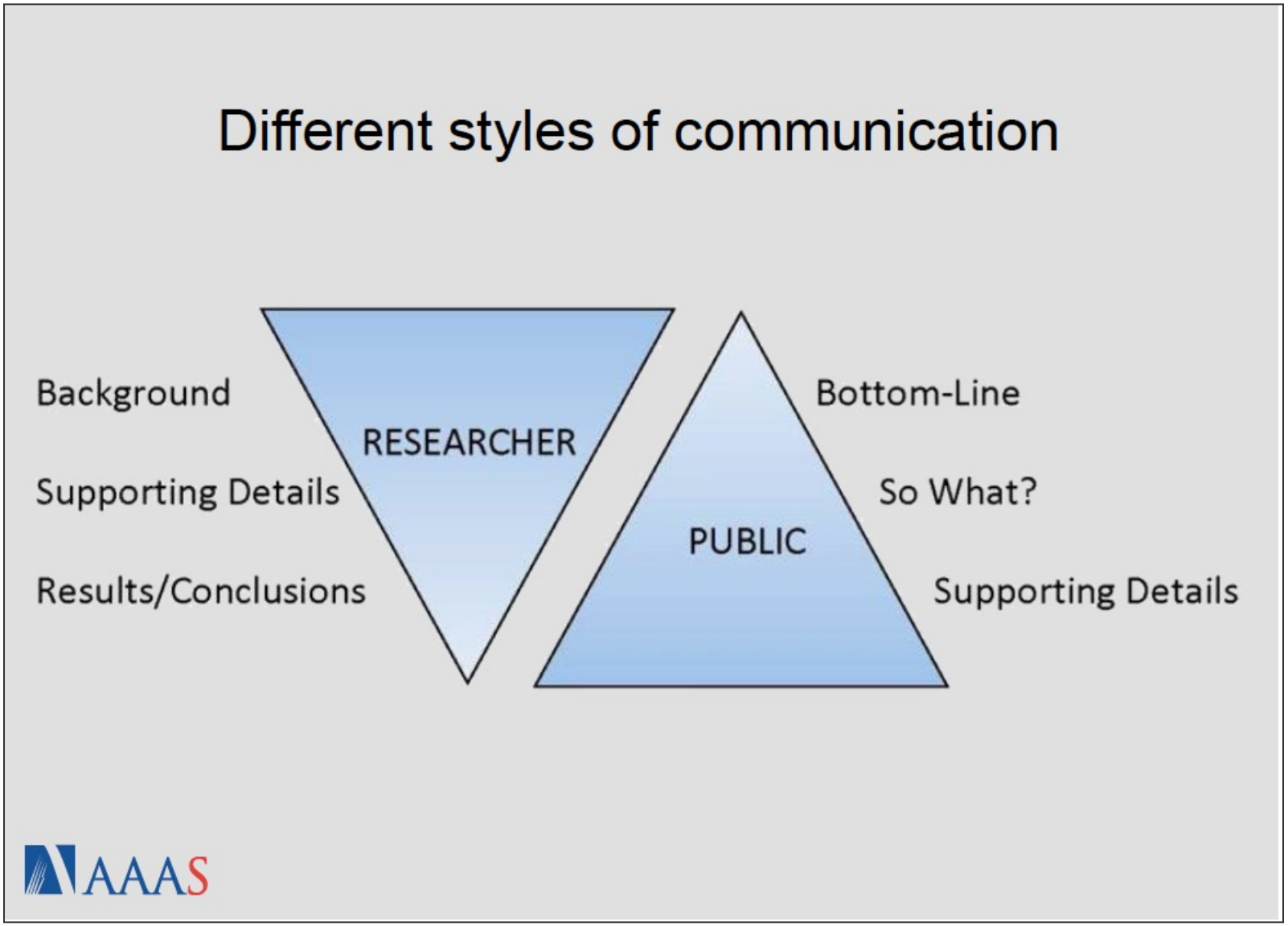
Get to the Point



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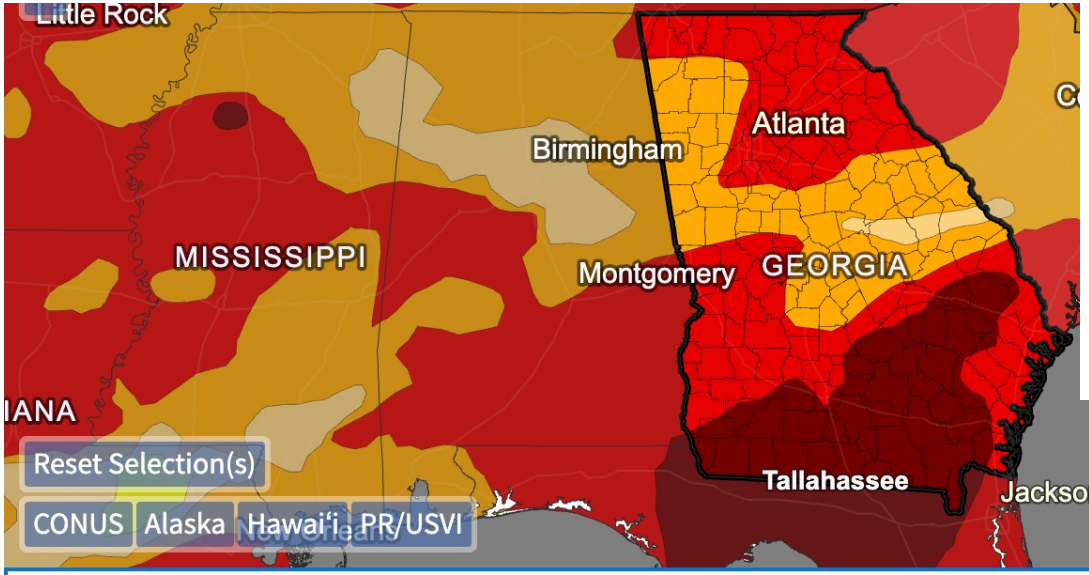
Avoid Jargon

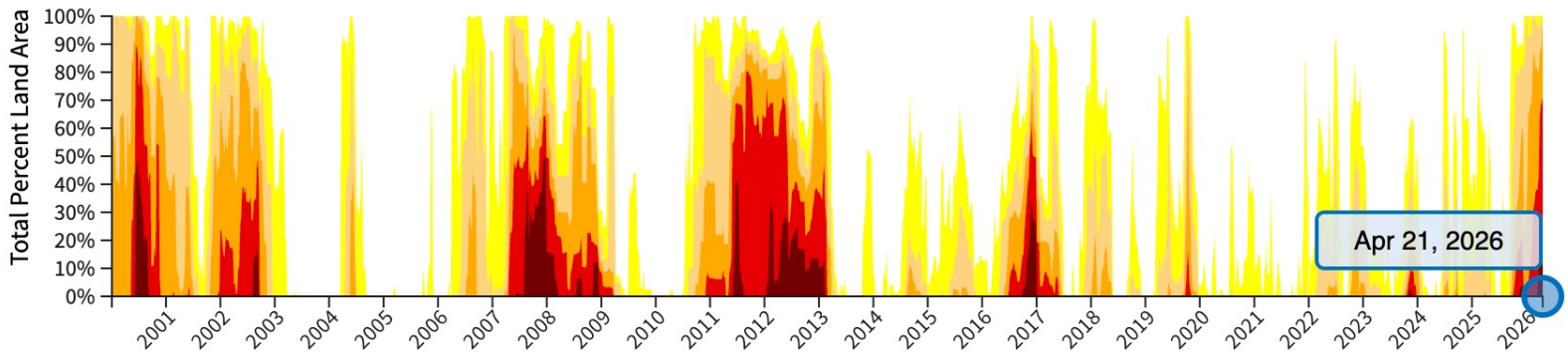
Terms that have different meanings for scientists and the public		
Scientific term	**Public meaning**	**Better choice**
enhance	improve	intensify, increase
aerosol	spray can	tiny atmospheric particle
positive trend	good trend	upward trend
positive feedback	good response, praise	vicious cycle, self-reinforcing cycle
theory	hunch, speculation	scientific understanding
uncertainty	ignorance	range
error	mistake, wrong, incorrect	difference from exact true number
bias	distortion, political motive	offset from an observation
sign	indication, astrological sign	plus or minus sign
values	ethics, monetary value	numbers, quantity
manipulation	illicit tampering	scientific data processing
scheme	devious plot	systematic plan
anomaly	abnormal occurrence	change from long-term average

3. Provide Climate Context



Map Legend

U.S. Drought Monitor Category	% of GA
D0 - Abnormally Dry	0.0%
D1 - Moderate Drought	1.9%
D2 - Severe Drought	27.0%
D3 - Extreme Drought	43.7%
D4 - Exceptional Drought	27.31%
Total Area in Drought (D1–D4)	99.91%



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An El Nino Watch is in effect. ENSO-neutral conditions are present and are favored through April-June 2026 (80% chance). *In May-July 2026, El Niño is likely to emerge (61% chance) and persist through at least the end of 2026.*

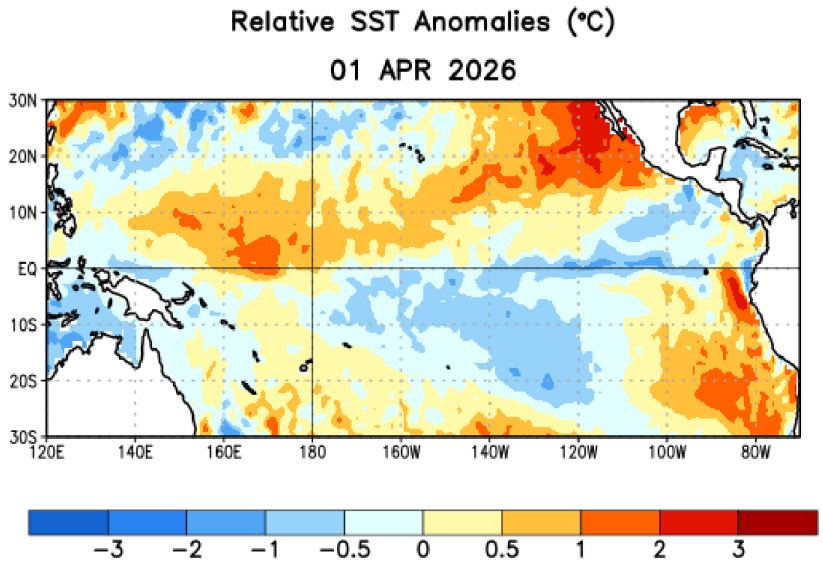

Figure 1. Average relative sea surface temperature (SST) anomalies (°C) for the week centered on 1 April 2026. Anomalies are computed with respect to the 1991-2020 base period weekly means.

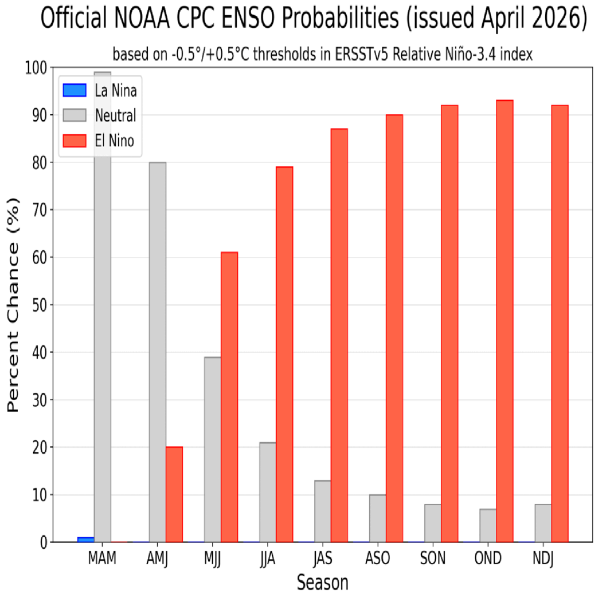

Figure 7. Official ENSO probabilities for the Niño 3.4 relative sea surface temperature index (5°N-5°S, 170°W -120°W) minus tropical mean (20°N-20°S). The relative index is re-scaled to match the variance of the traditional index. Figure updated 9 April 2026. Higher resolution image/table: https://cpc.ncep.noaa.gov/products/analysis_monitoring/enso/roni/probabilities.php

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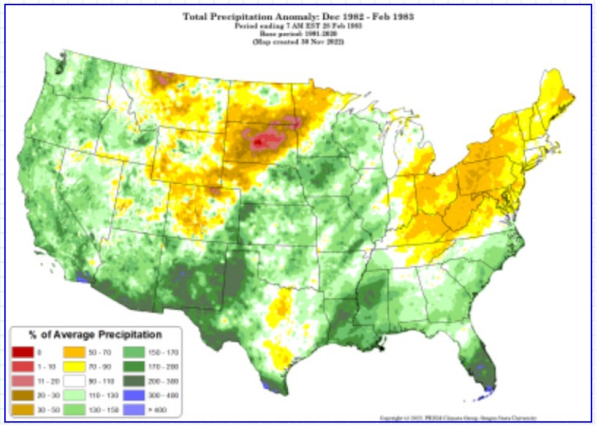
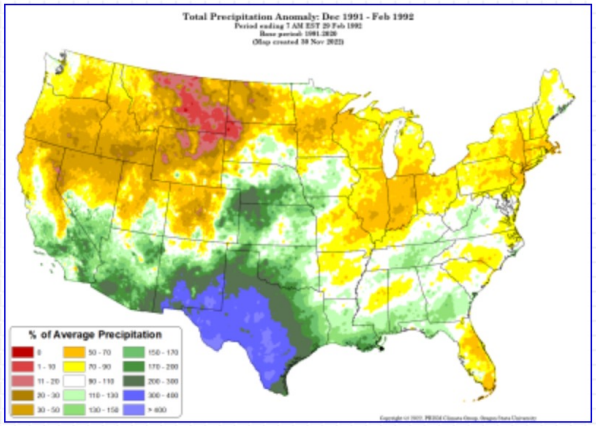
Recent Very Strong El Nino Patterns

Very Strong El Niño (RONI ≥ 2.0 °C)

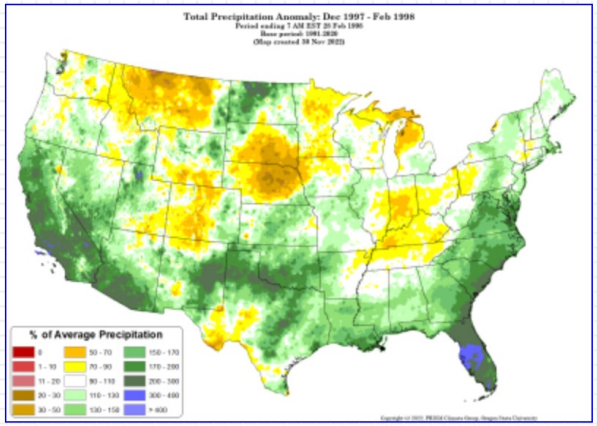
1982-1983



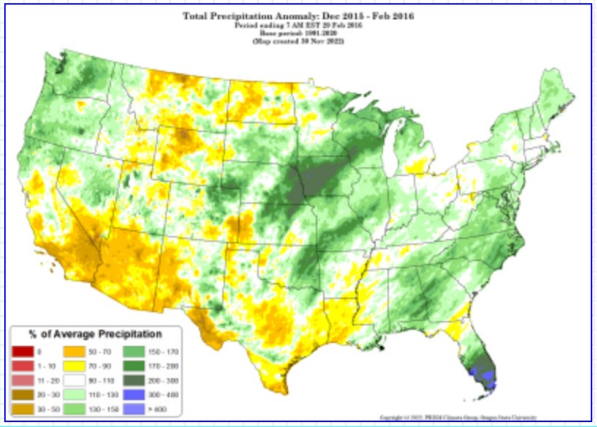
1991-1992



1997-1998



2015-2016



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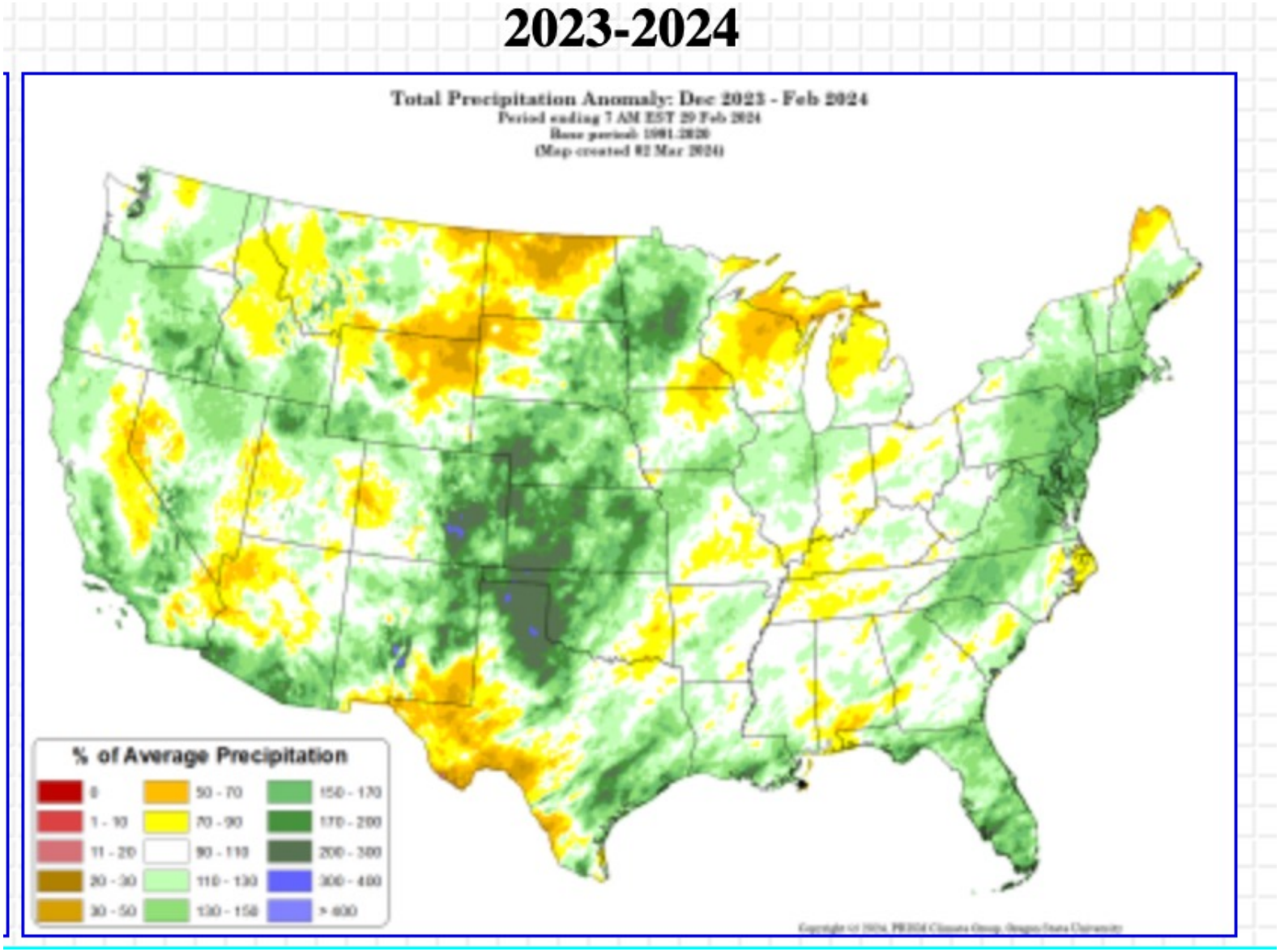
Recent Moderate El Nino



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4. Employ Existing Networks, Web-based Strategies, and ”Push”

- New resources should consider not only how users and sectors fit into the drought monitoring process, but also how and when they access information and share it with colleagues and constituents.
- Centralized clearing houses or web portals are often the default method of drought information dissemination, but these can have limited utility when created under the assumption of homogenous user needs and expertise and with little user feedback
- Combinations of web-based information, “pushed” information, and infographics are effective

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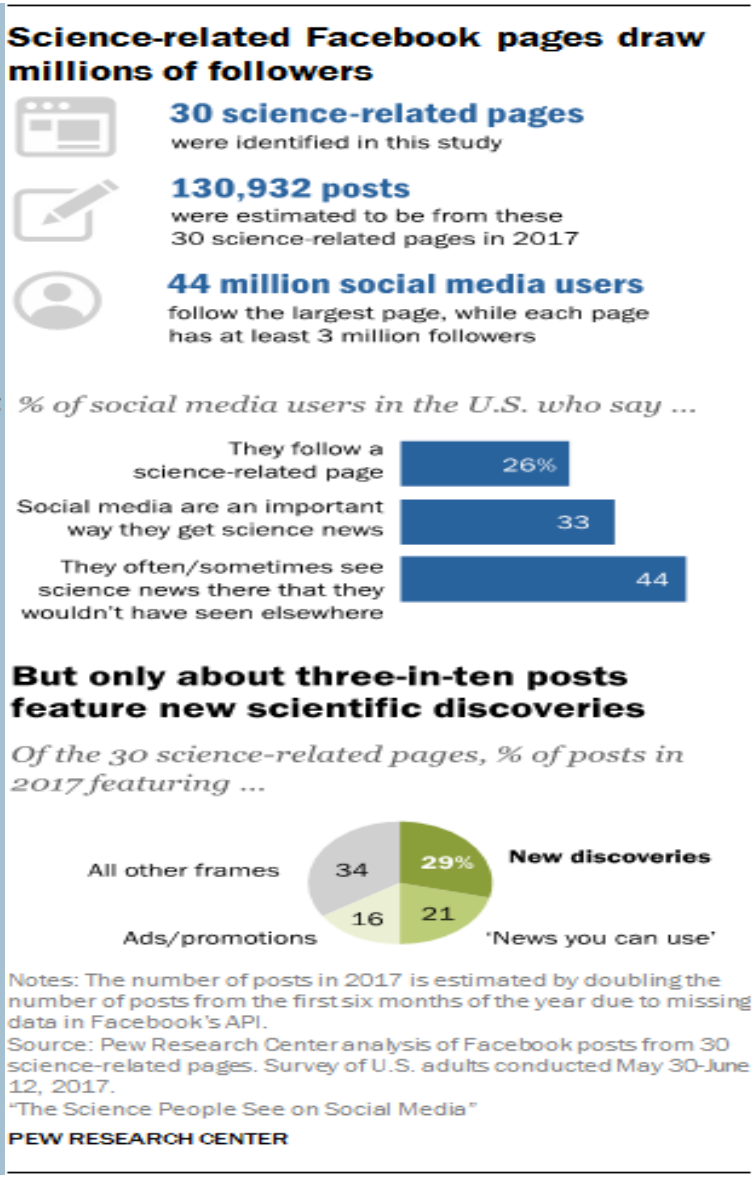
Use Social media



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- Other Strategies and Thoughts On Resiliency

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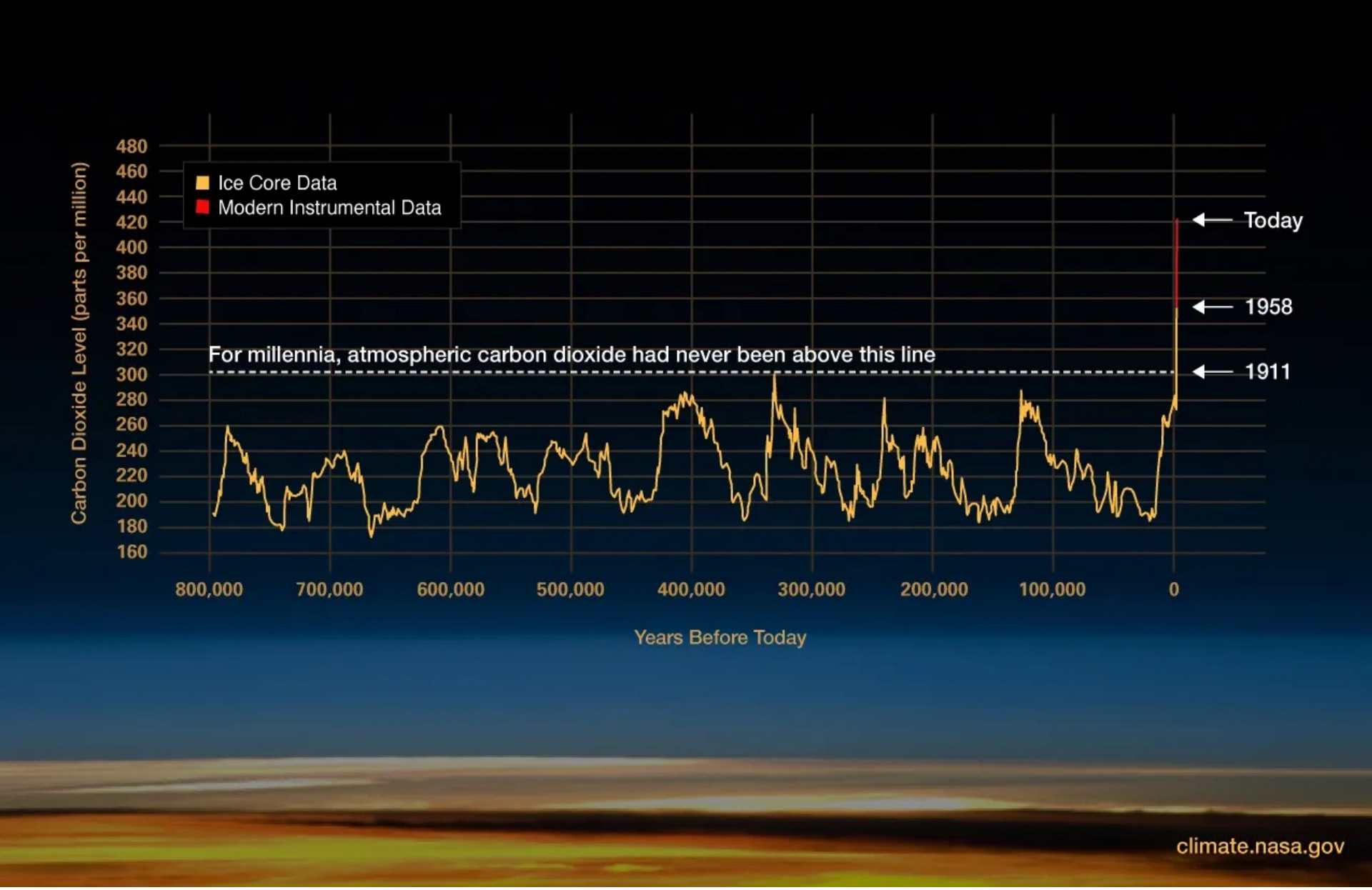
Carbon Dioxide Level (parts per million)
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
Ice Core Data
Modern Instrumental Data
For millennia, atmospheric carbon dioxide had never been above this line
Today
1958
1911
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Years Before Today
climate.nasa.gov

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Relate

- E Establish Contact
- L Listen
- F Find Common Ground
- L Lessen Mistrust
- A Assess Needs
- N Nurture
- D Deliver

Farmers skeptical about validity of climate change

May 9, 2014 by Mick Kulikowski

The recently released **National Climate Assessment**, reported by a team of 300 experts, including a panel from the National Academy of Sciences, asserts that climate change is already impacting the United States, and that the warming of the past 50 years is "primarily due to human-induced

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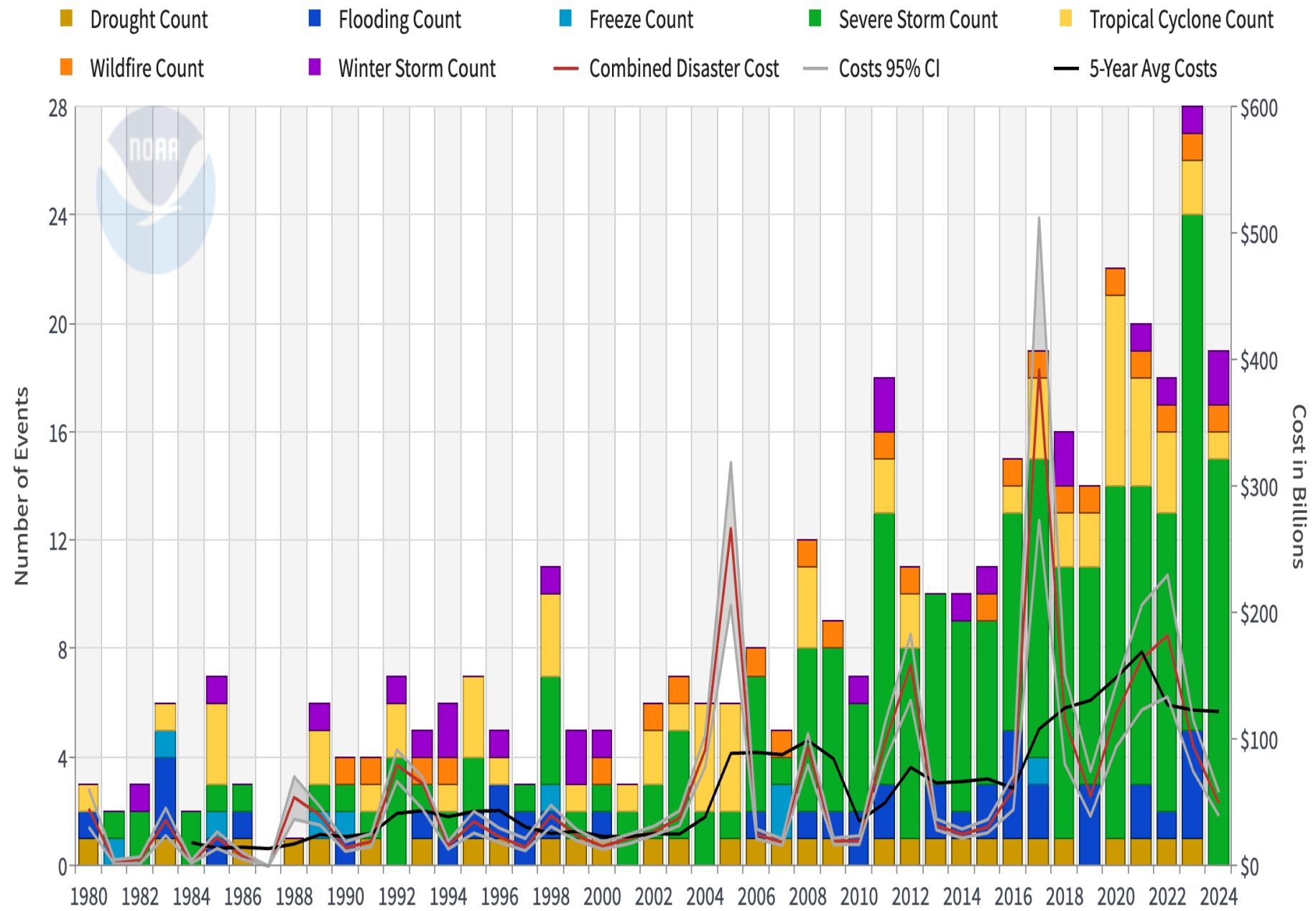
United States Billion-Dollar Disaster Events 1980-2024 (CPI-Adjusted)



Updated: August 8, 2024

Powered by **ZingChart**

The 5 R's

- **Risk:** Compounding, extreme disasters introduce new, interconnected, and complex risk scenarios
- **Response:** Increased compounding disaster risk requires planning and preparation for the co-occurrence of multiple and varied disruptive events that interact with societal exposure and vulnerabilities to amplify overall disaster impact.
- **Resilience:** When capacity to absorb the effects of hazards increases it minimizes recovery needs and disaster effects are less likely to compound.
- **Remembering**: Perception and understanding of risk are commonly grounded in past experience, leading to complacency in observation capacity, planning, and preparation
- **Recovery**: Effective disaster recovery requires an "epoch" rather than "event" view that more fully captures the prolonged effects of compounding disasters and reflects the experienced reality of the community.

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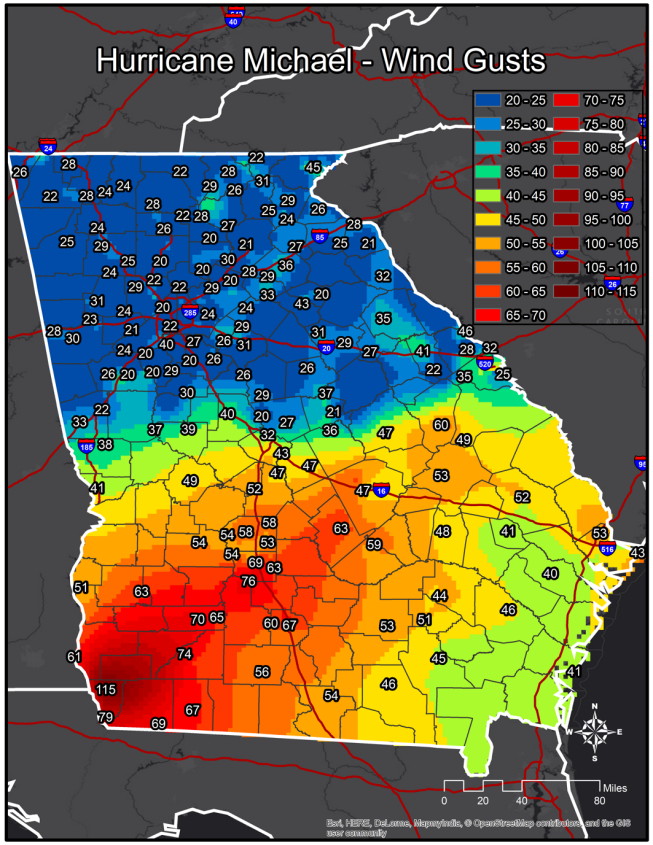
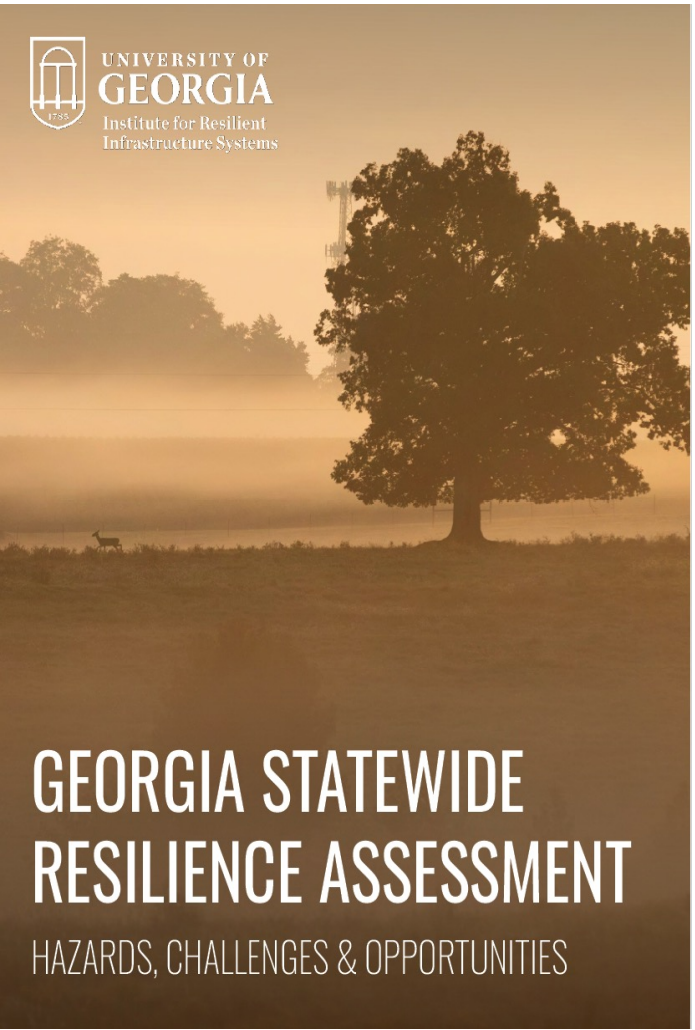


"Being proactive with resilience has shown even a 10 to 1 return on reducing losses from catastrophic events."--

Ian Giammanaco

5P's: Planning and Resiliency



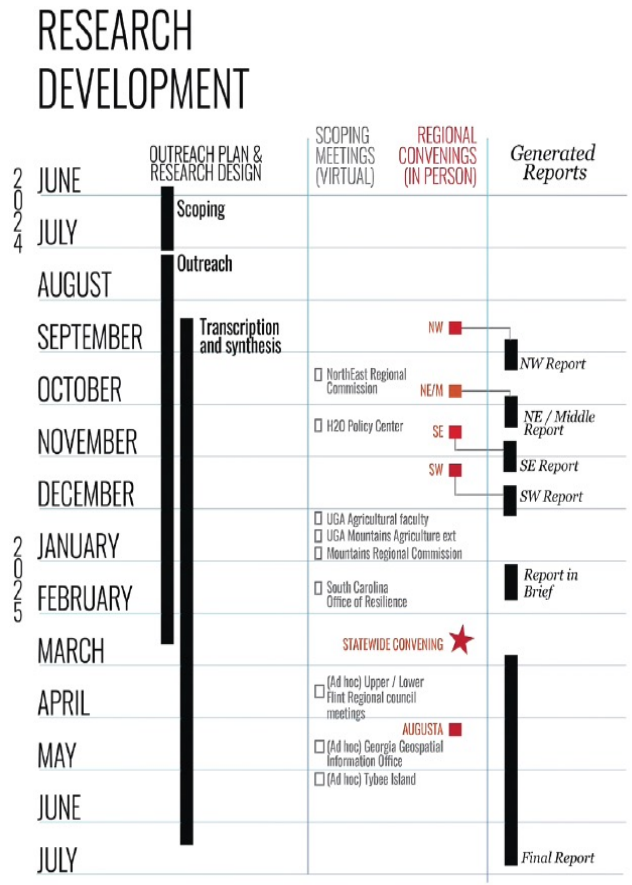
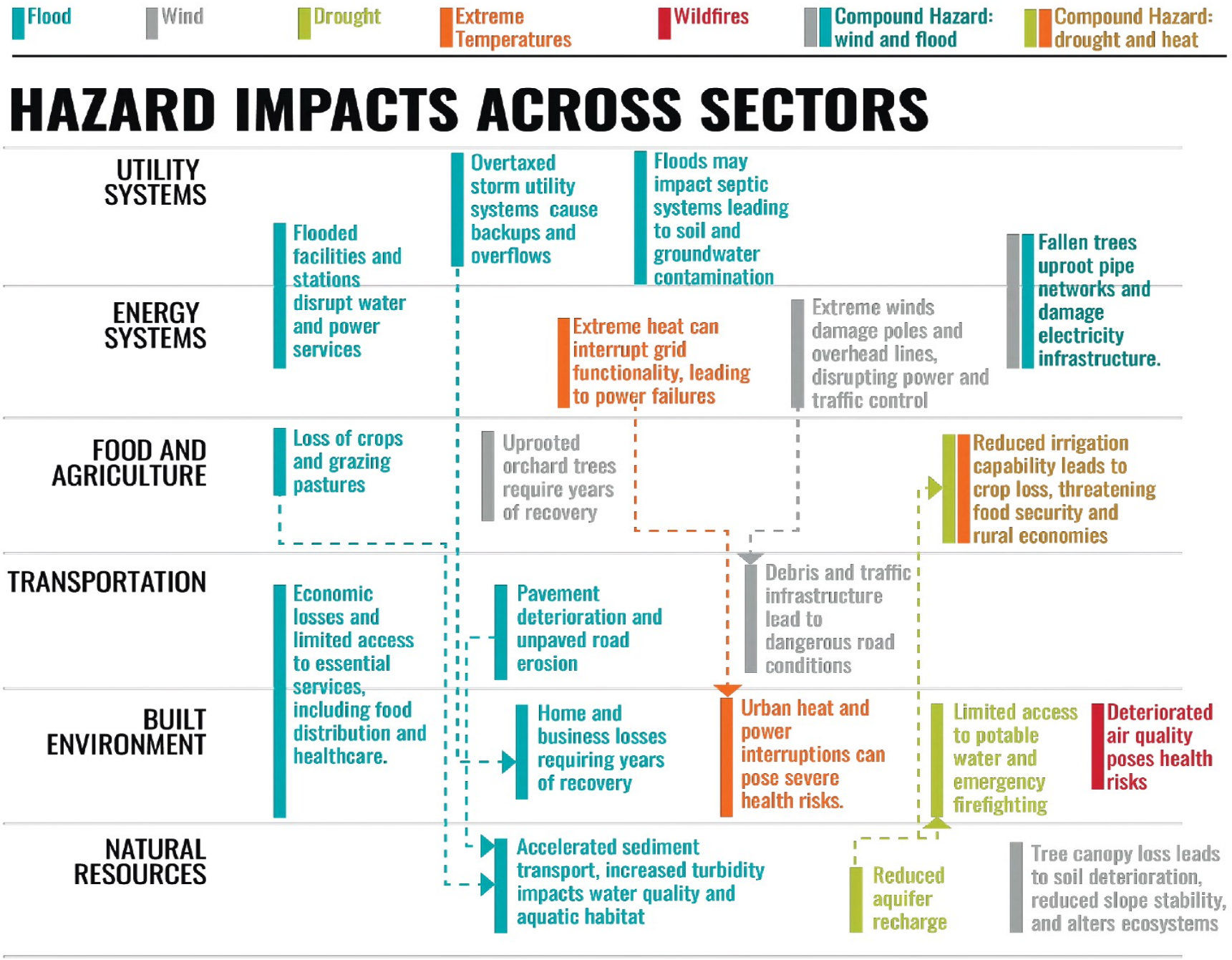
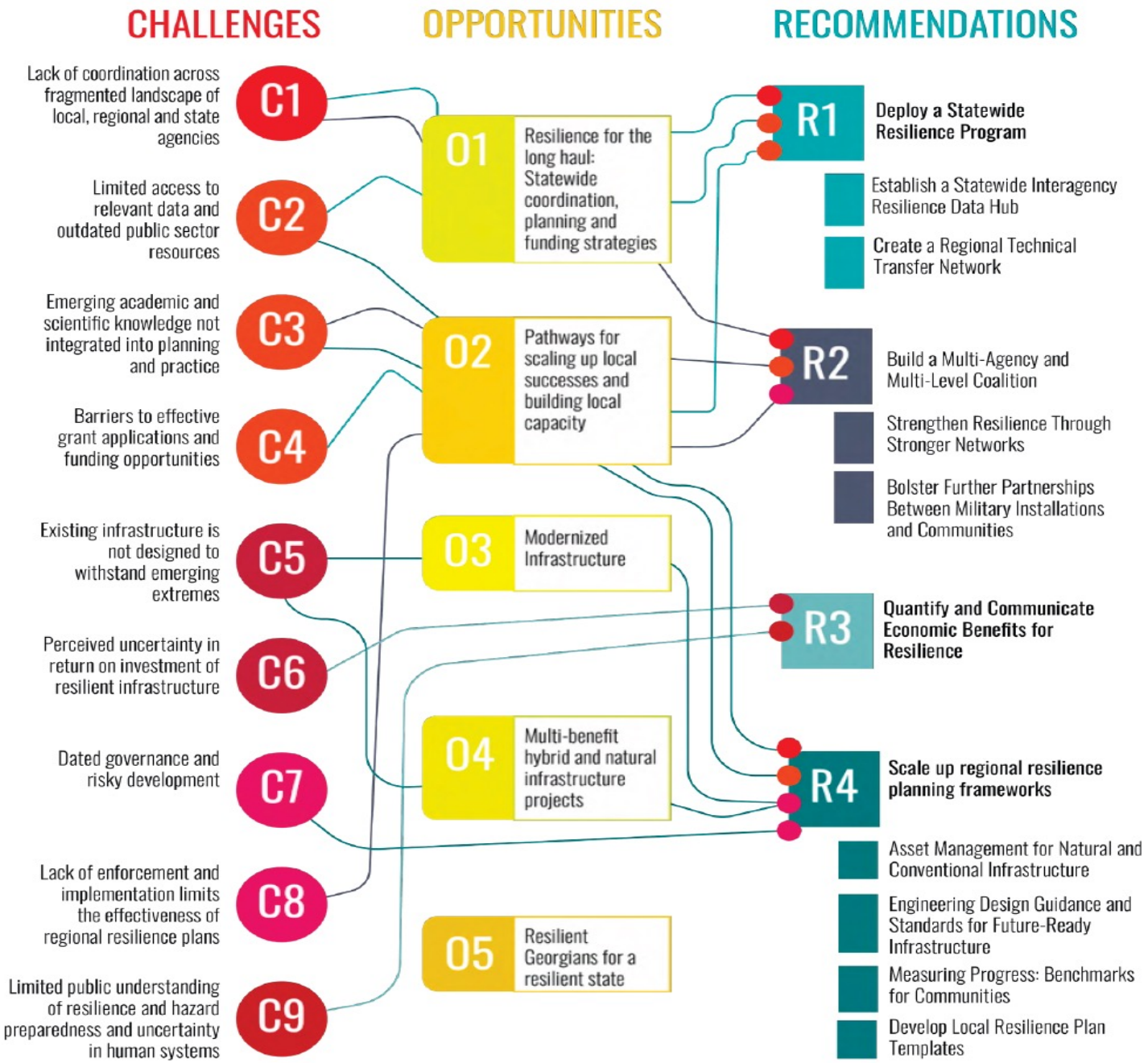


Figure 1. *Research development process including convenings and meetings held to represent regions across the state, and the timeline.*


Flood
Wind
Drought
Extreme Temperatures
Wildfires
Compound Hazard: wind and flood
Compound Hazard: drought and heat
HAZARD IMPACTS ACROSS SECTORS
UTILITY SYSTEMS
ENERGY SYSTEMS
FOOD AND AGRICULTURE
TRANSPORTATION
BUILT ENVIRONMENT
NATURAL RESOURCES
Overtaxed storm utility systems cause backups and overflows
Floods may impact septic systems leading to soil and groundwater contamination
Flooded facilities and stations disrupt water and power services
Fallen trees uproot pipe networks and damage electricity infrastructure.
Extreme heat can interrupt grid functionality, leading to power failures
Extreme winds damage poles and overhead lines, disrupting power and traffic control
Loss of crops and grazing pastures
Uprooted orchard trees require years of recovery
Reduced irrigation capability leads to crop loss, threatening food security and rural economies
Debris and traffic infrastructure lead to dangerous road conditions
Economic losses and limited access to essential services, including food distribution and healthcare.
Pavement deterioration and unpaved road erosion
Home and business losses requiring years of recovery
Urban heat and power interruptions can pose severe health risks.
Limited access to potable water and emergency firefighting
Deteriorated air quality poses health risks
Accelerated sediment transport, increased turbidity impacts water quality and aquatic habitat
Reduced aquifer recharge
Tree canopy loss leads to soil deterioration, reduced slope stability, and alters ecosystems

HOW CHALLENGES INFORM RECOMMENDATIONS



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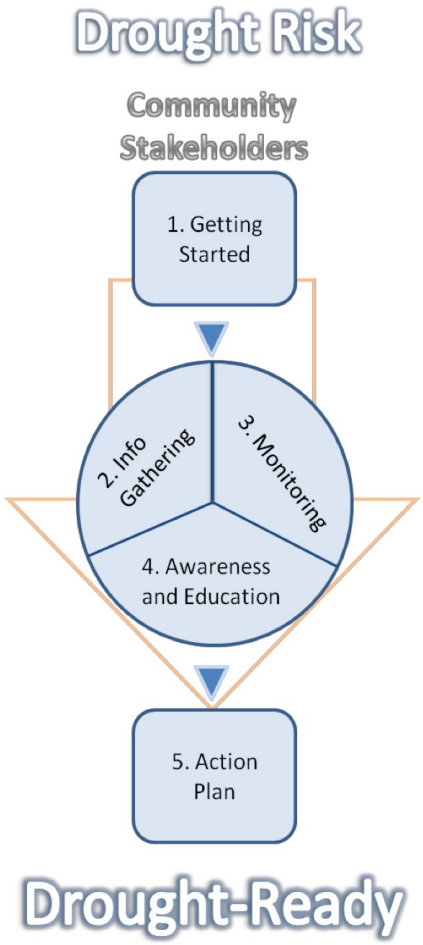
Planning Matters

Step 1	Appoint a drought task force
Step 2	State the purpose and objectives of the drought preparedness plan
Step 3	Seek stakeholder participation and resolve conflict
Step 4	Inventory resources and identify groups at risk
Step 5	Prepare/write the drought preparedness plan
Step 6	Identify research needs and fill institutional gaps
Step 7	Integrate science and policy
Step 8	Publicize the drought preparedness plan and build public awareness
Step 9	Develop education programs
Step 10	Evaluate and revise drought preparedness plan



Outcomes:

- Understand past droughts and impacts on community
- Implement system to monitor drought and impacts
- Establish regular communication about drought conditions and impacts
- Know what actions to take before and during a drought

Benefits:

- Increased community awareness of water, climate, and drought
- Reduce dollar losses during next drought
- Reduce stress during next drought
- Protect animals and plants from drought impacts
- Increase community resilience

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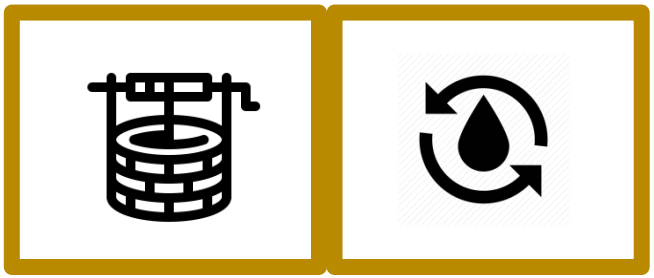
Drought Mitigation Efforts

Water harvesting Technology | Fog Harvesting Technology | Drought Tolerant Crops | Sustainable Land Management | Land Restoration | Solar-water pumping

Desalination Technology | Sand Dams | Irrigation Systems | Crops insurance | Livestock insurance | Microcredit



Groundwater management/ conservation | Water recycling