Identifying Vulnerabilities & Taking Action toward Climate Resilience

Presenters:

S. Beck, American Public Gardens Association

N. Gardiner, NOAA's Climate Program Office and the U.S. Climate Resilience Toolkit

T. Magellan, Montgomery Botanical Center

Climate & Sustainability Alliance

AMERICAN PUBLIC GARDENS ASSOCIATION

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- Communicating Climate & Conservation
- Opportunities to Learn
- Education Curricula
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- Climate Research at Gardens

Climate & Sustainability Toolbox

KEYWORD

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CATEGORIES

- [x] -NOAA CLIMATE RESOURCES
- [ ] -SUSTAINABILITY INDEX
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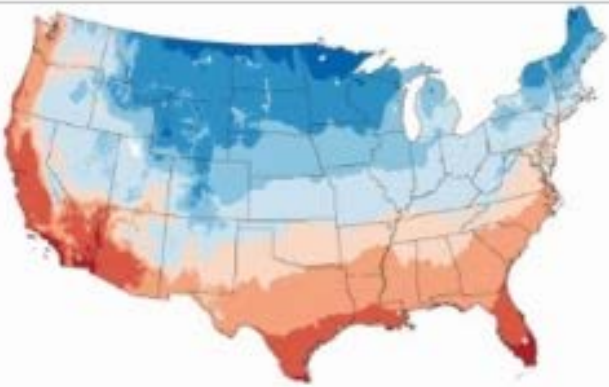
Apply

US Drought Monitor 11/1/15

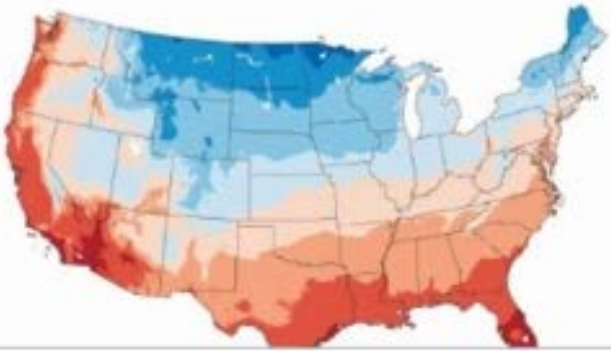
Current drought conditions, as well as forecasts, mapped out for the United States and Puerto Rico. Soil moisture, streamflow and precipitation conditions and outlooks are included.

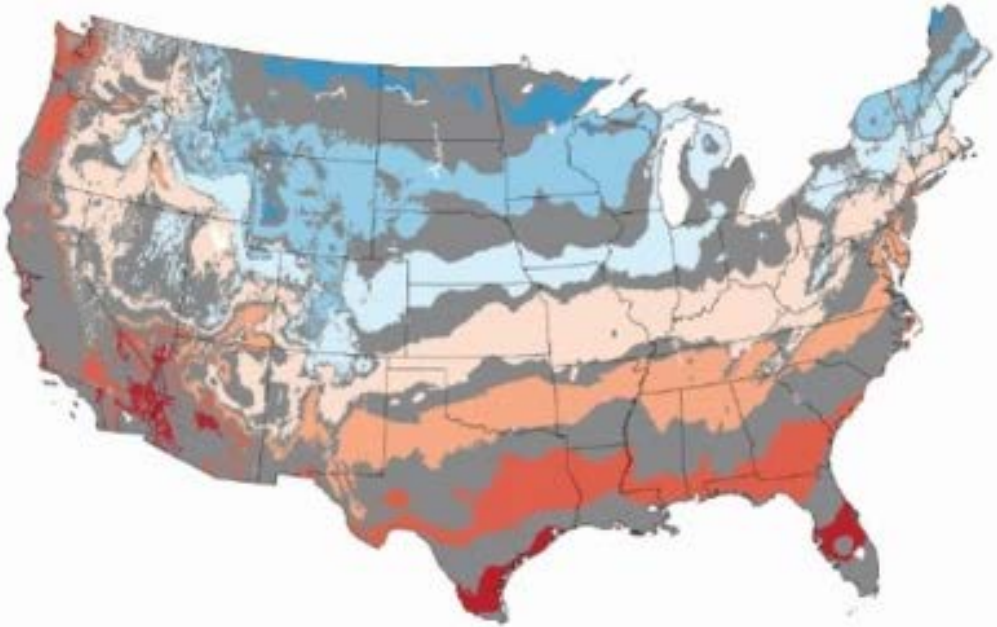
North America Drought Monitor 11/1/15

A collaboration between Canada, Mexico and the US, the North America Drought Monitor produces a monthly drought conditions map. Downloadable drought data are provided free to the public.



CLIMATE-RELATED PLANTING ZONES 2011–2040
Based on 1971-2010 trends.

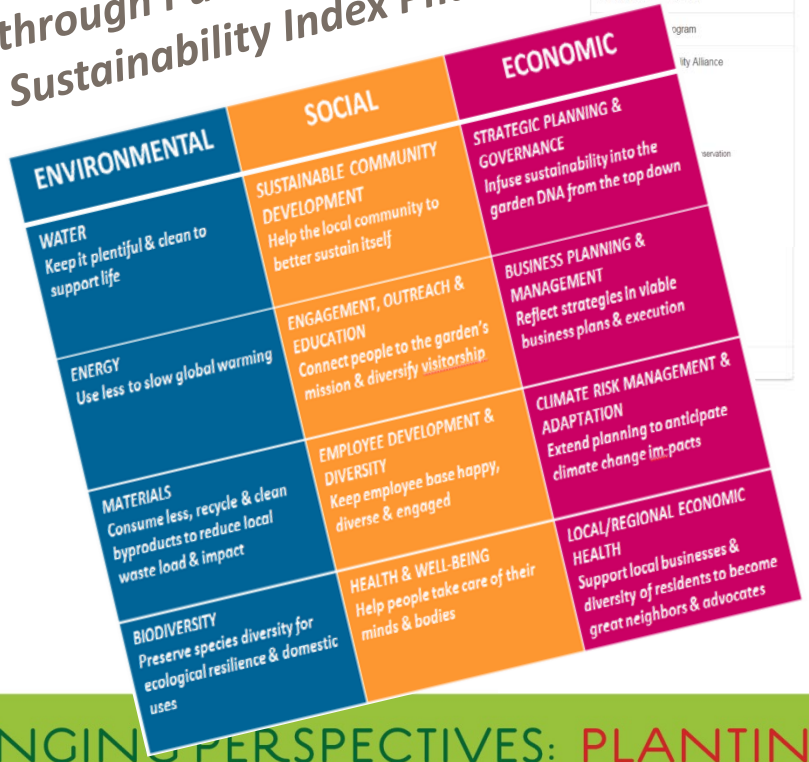




Average Annual Minimum Temperature by Climate-Related Planting Zone

- No Change in Zone
- Zone 4 (-29 to -20 F)
- Zone 5 (-19 to -10 F)
- Zone 6 (-9 to 0 F)
- Zone 7 (1 to 10 F)
- Zone 8 (11 to 20 F)
- Zone 9 (21 to 30 F)
- Zone 10 (31 to 40 F)

NOAA tools will be accessible through Public Gardens Sustainability Index Phase 2:



Environmental Sustainability

maintains Earth's capacity to support all life

Chicago Region Trees Initiative

The Chicago Region Trees Initiative was established in 2013 as a collaboration of Chicago region partners working together to develop and implement a strategy that builds a healthier and more diverse urban forest by 2040.

The strategy was developed based on findings from the Regional Tree Census produced in cooperation with the USDA Forest Service and The Morton Arboretum.

The Morton Arboretum | THE CHAMPION of TREES

Autumn Gold Ginkgo

American Linden

CHICAGO BOTANIC GARDEN

Trees for 2050

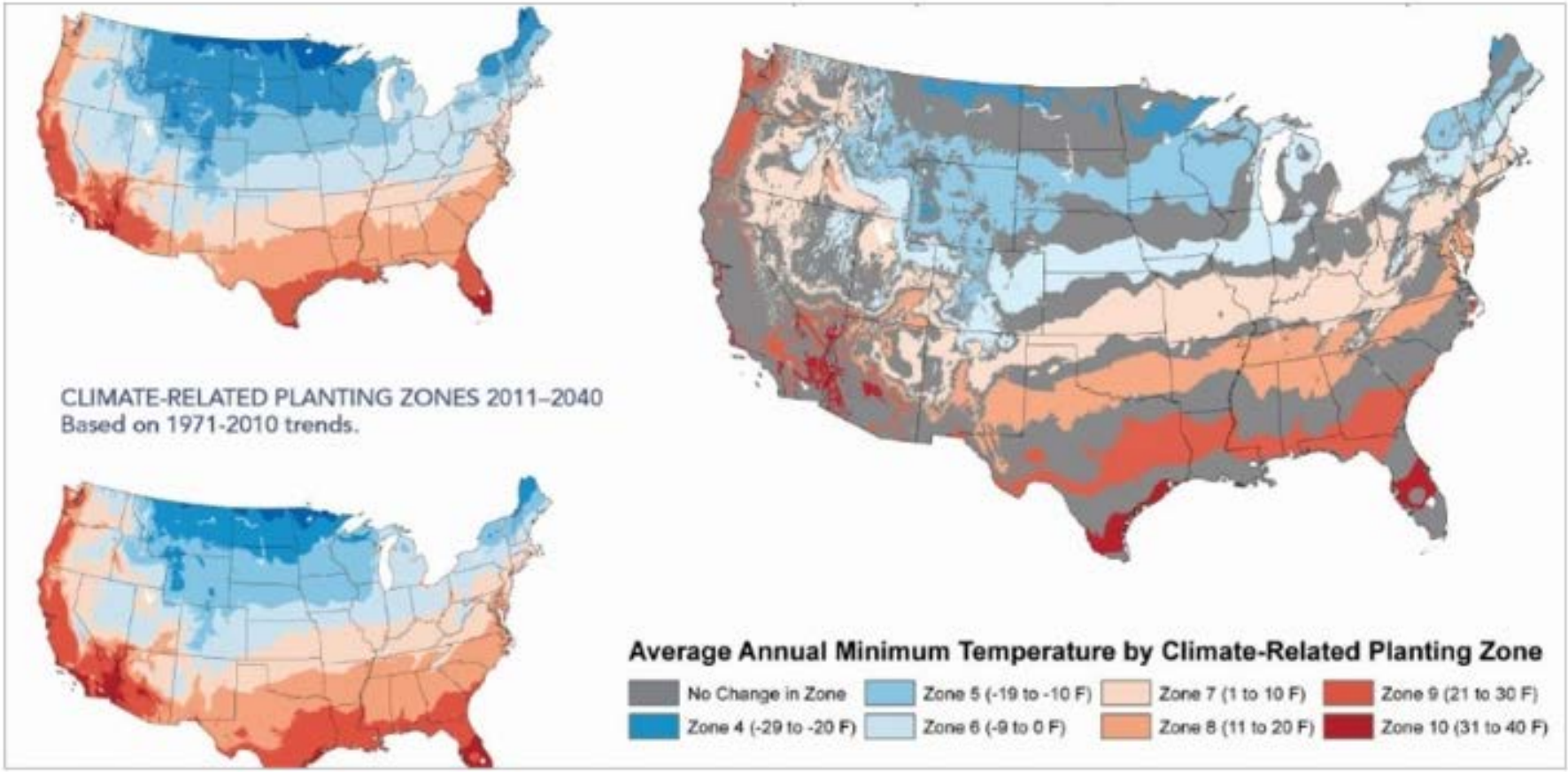
Many of the trees common to Chicago's urban forests will adapt to a steadily warming climate through 2050, according to a recent study led by Dr. Andrew Bell, curator of woody plants.

His team analyzed 50 trees in the garden collection and found that 40 would continue to thrive under worst-case warming scenarios through mid-century.

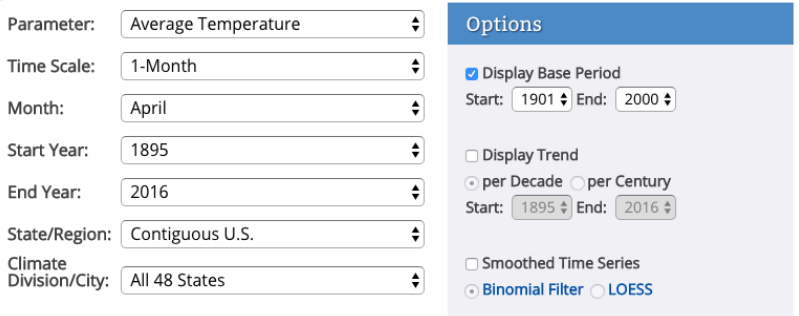
The trees were evaluated for their performance in three types of urban uses, sidewalk plantings, parks and residential settings, and public gardens and other "legacy" sites. Planting recommendations are presented in an interactive database.

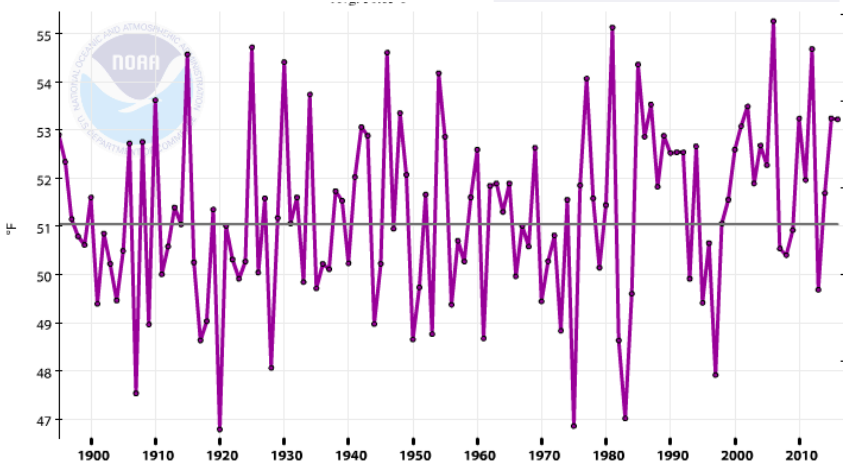
Amur Maackia	N/R +35 yrs	
Autumn Blaze® Maple	Park/Residential, Legacy	
Autumn Brilliance Serviceberry	Park/Residential	
Autumn Gold Ginkgo	Street, Park/Residential, Legacy	
Baldcypress	Street, Park/Residential	

NOAA Climate Resources



Maps, Data, and Tools





Exercise 1: Climate at a Glance

Have climate conditions affected you where you live?

Here is a method to find a tool that helps you visualize **at a glance** how **climate** conditions are changing in **your city/county/state**:

1. Go to the Climate Resilience Toolkit (toolkit.climate.gov) **Tools** section and, using the filter functions (top right), select the following:

   Category » View Past/Current Conditions

   Category » Analyze/Download Data

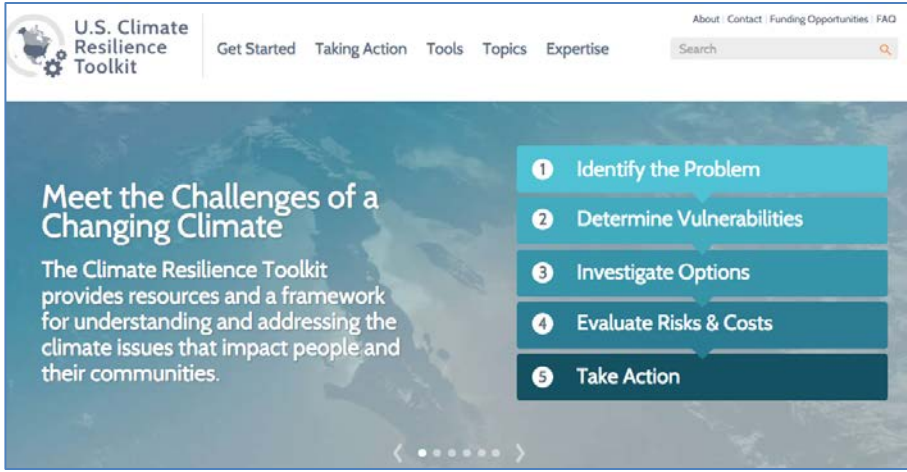
2. How many tools are left? Which one(s) best match your search criteria?
3. Select "Climate At A Glance." Click to visit that website and explore its functionality.

South Carolina Botanical Garden

"We learned from what happened in 2013 and applied what we learned – and it worked. It really showed what happens when you do things right."

-- Patrick McMillan,
Botanical Garden Director

Interagency Activities

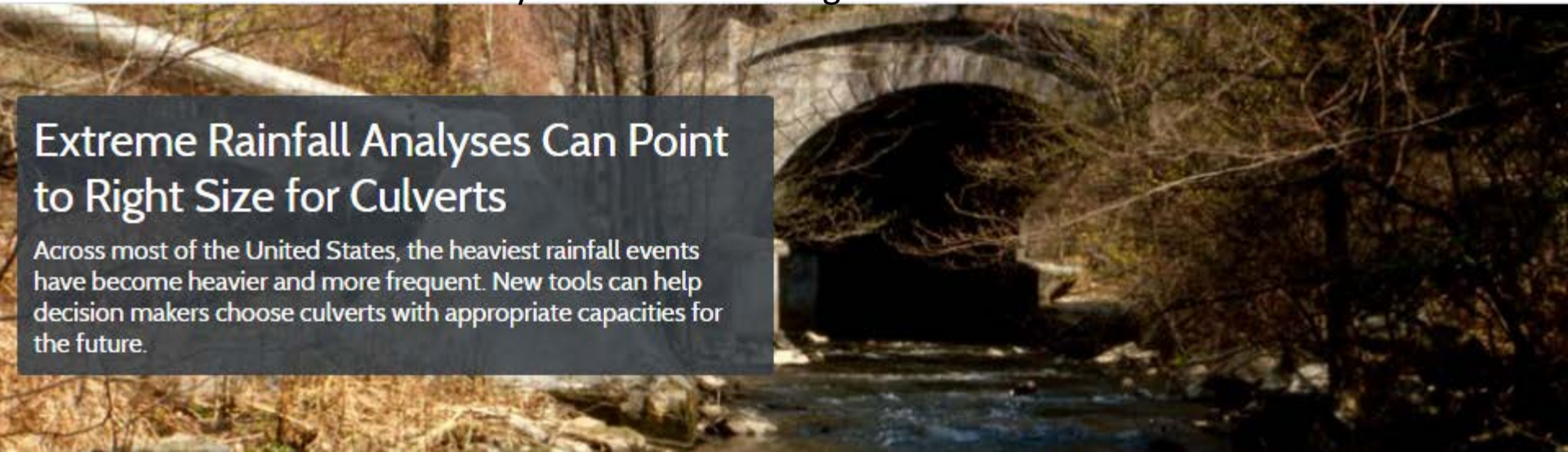


Exercise 2: Extreme Precipitation

Access the Taking Action case studies. Use search filters to find

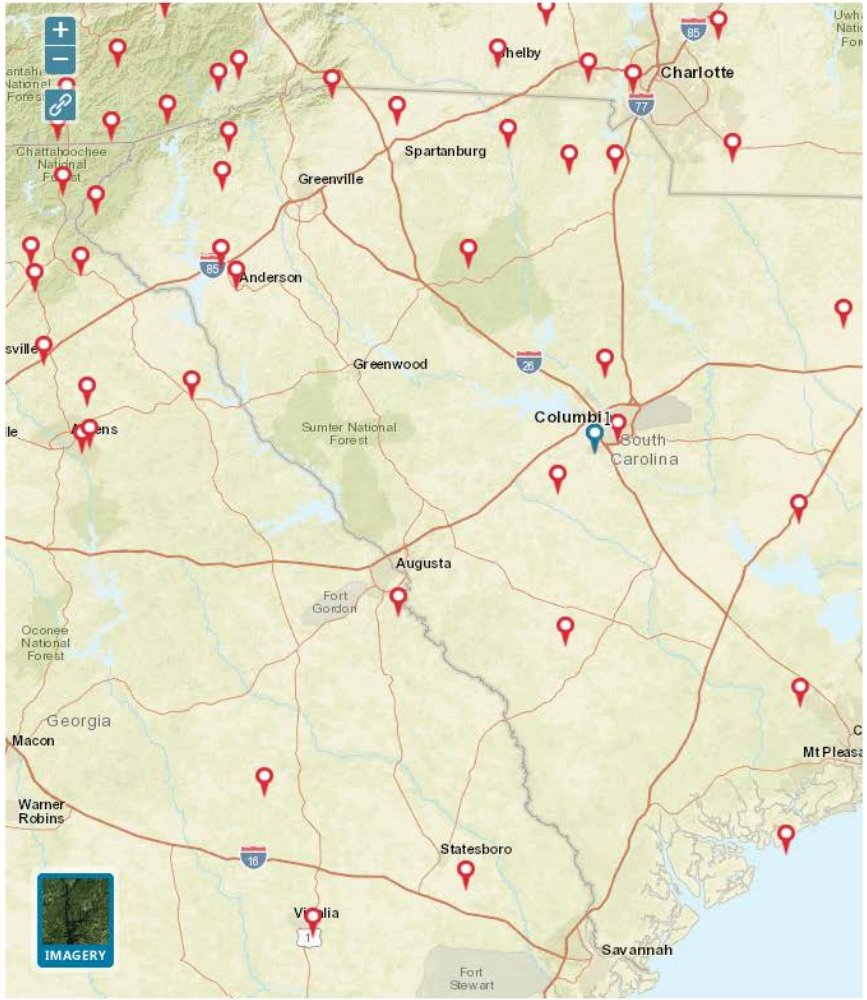
- How many of studies address extreme precipitation?
- How many get all the way to “Step 4: Evaluate Risks & Costs”?
- How many of those are situated in the Northeast U.S.?

Select and read the case study focused on culvert sizing in Columbia County, NY and entitled “Extreme Rainfall Analyses Can Point to Right Size for Culverts.”



CLIMATE EXPLORER

LAYERS | HISTORICAL DATA

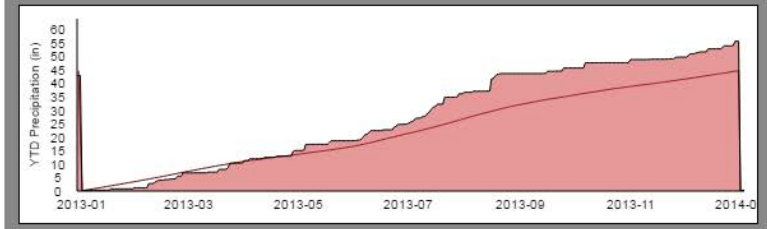


STATION DETAIL:

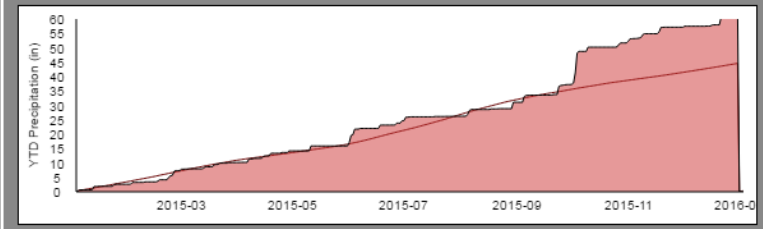
TEMPERATURE | PRECIPITATION

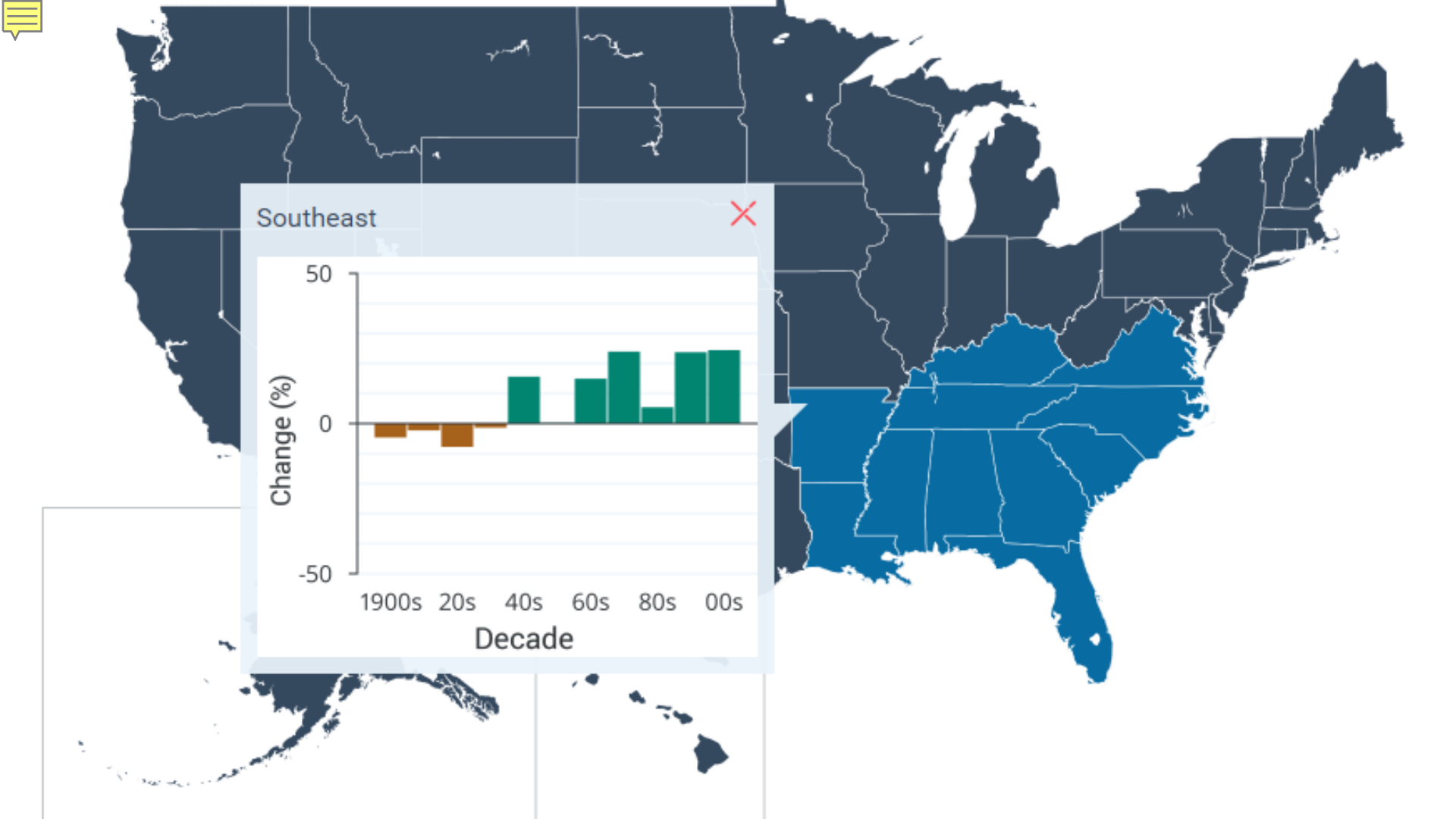
(1) COLUMBIA SC

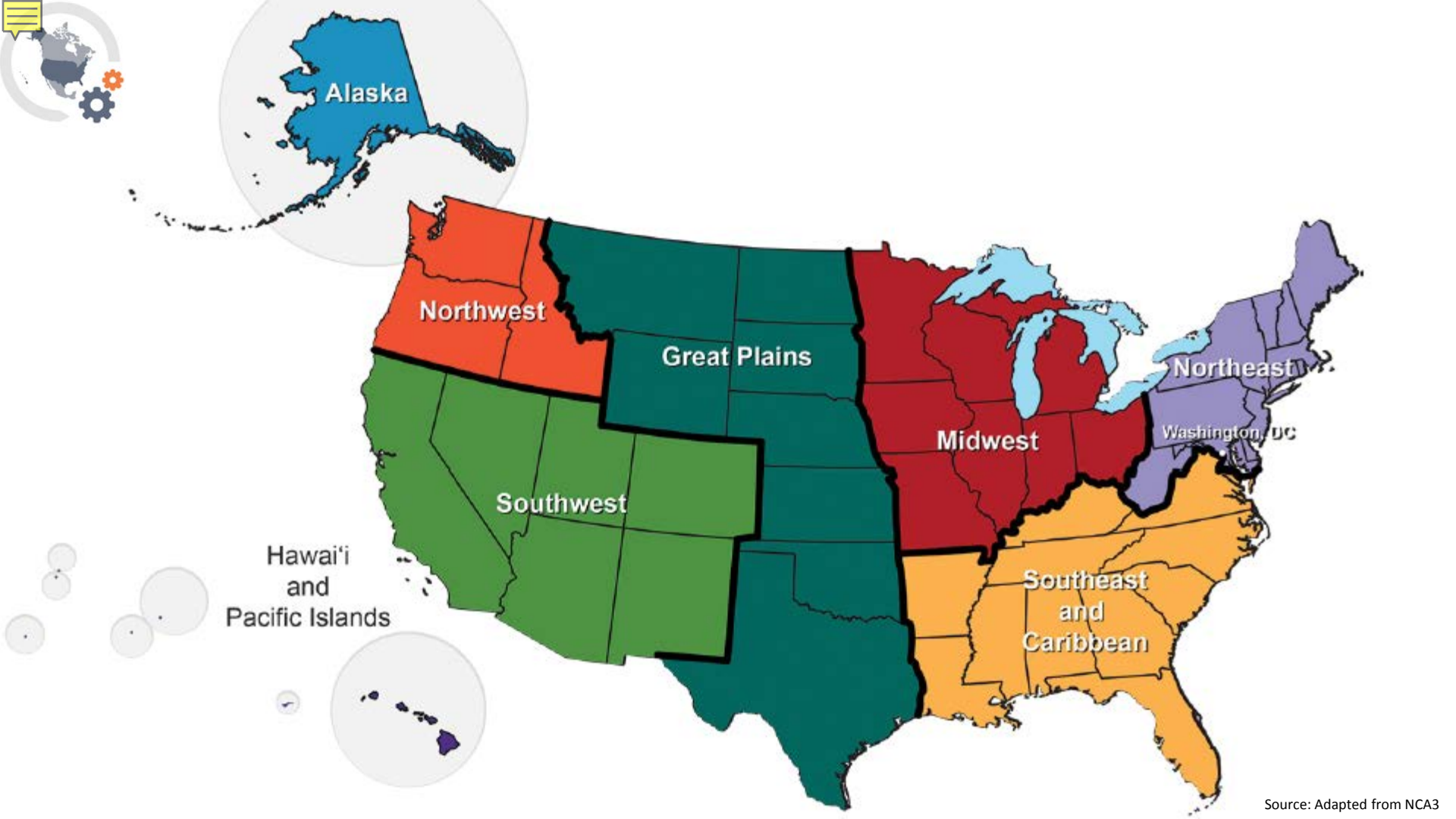
PRECIPITATION



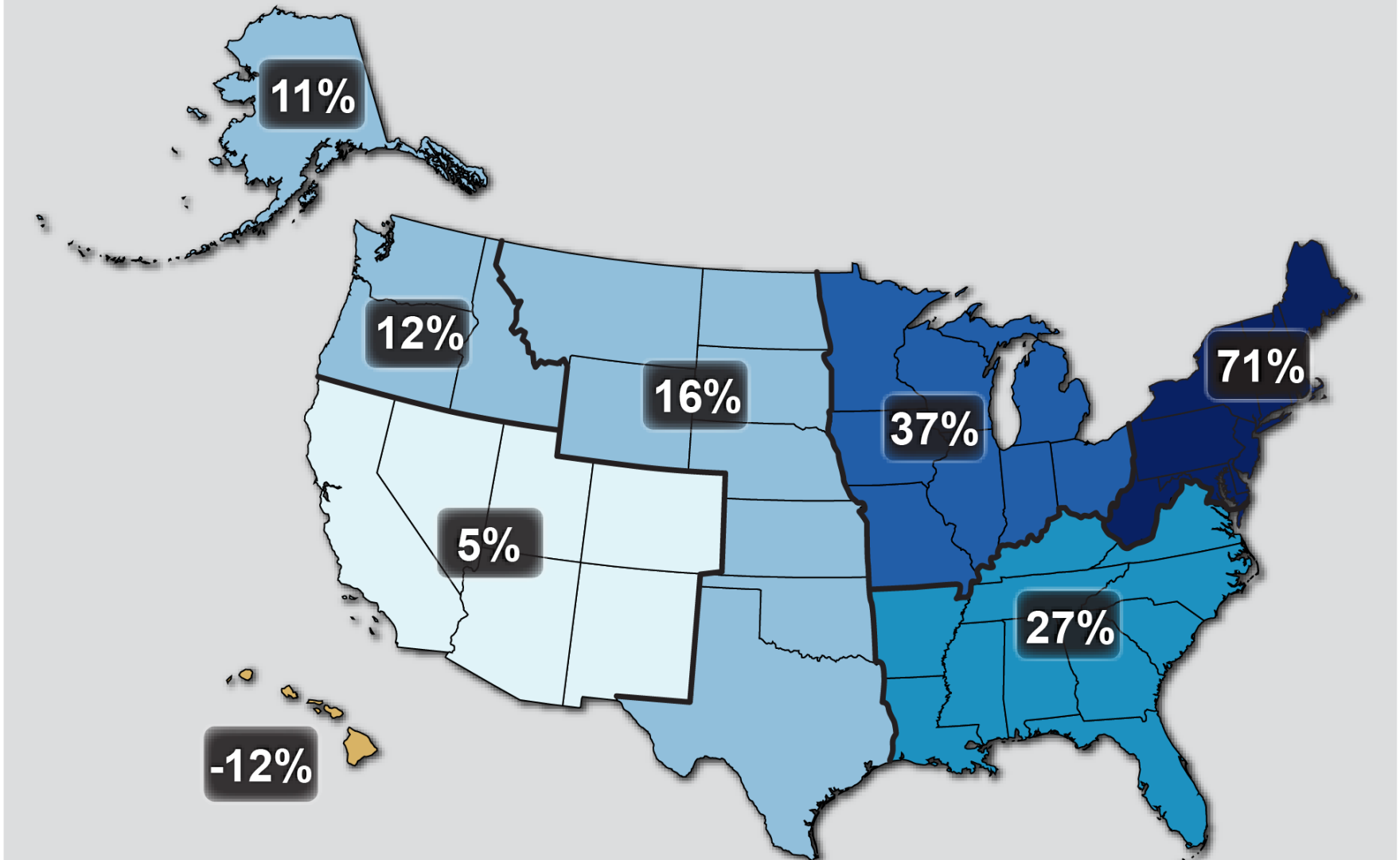
PRECIPITATION

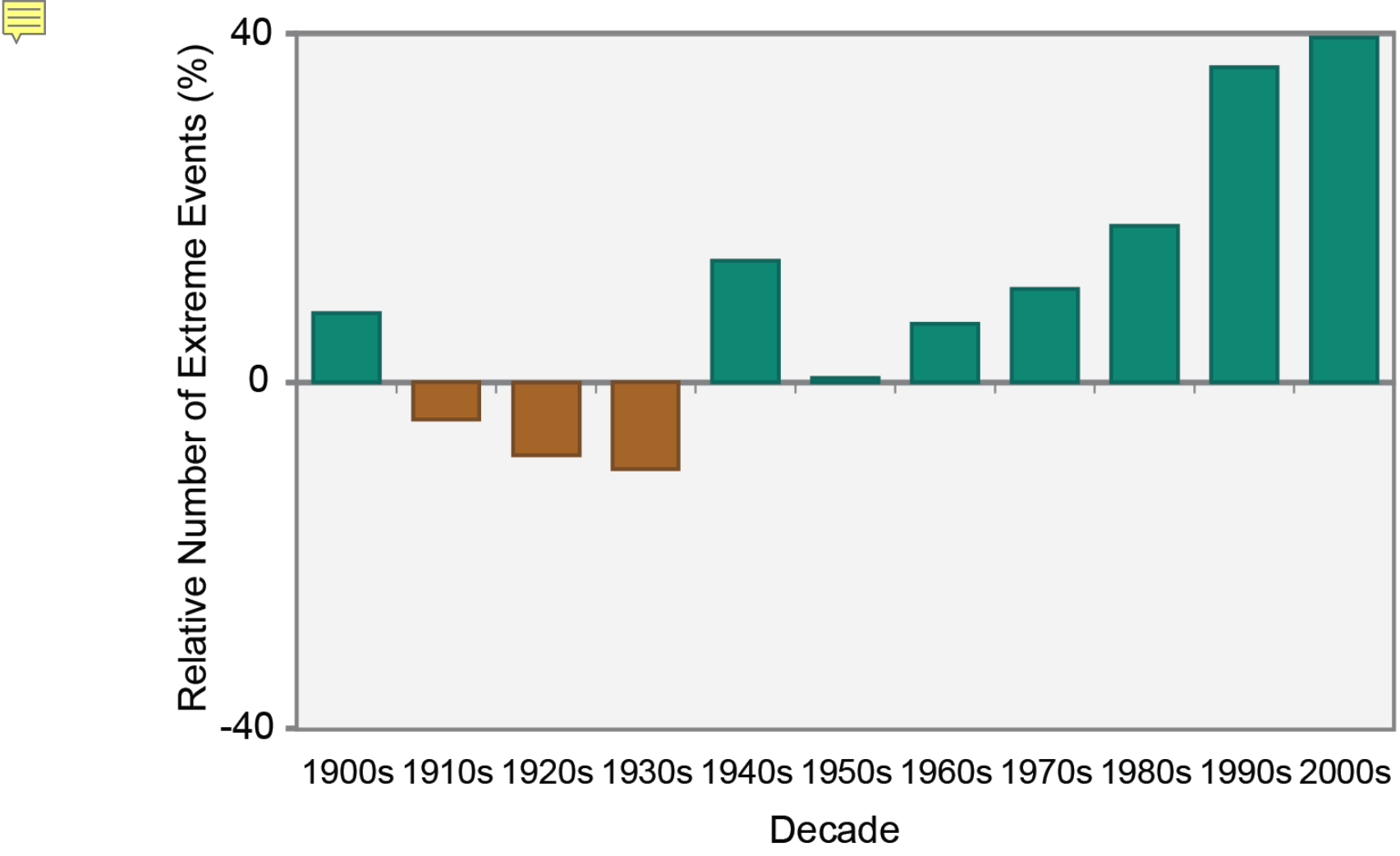



Southeast
50
0
-50
Change (%)
1900s
20s
40s
60s
80s
00s
Decade



Source: Adapted from NCA3


11%
12%
16%
37%
71%
5%
27%
-12%


Relative Number of Extreme Events (%)
40
0
-40
1900s
1910s
1920s
1930s
1940s
1950s
1960s
1970s
1980s
1990s
2000s
Decade

Topics

Select a topic of interest below to learn about climate-rela

Water Resources

- Municipal Water Supply
- Flooding
- Drought
- Ecosystems
- Water Resources Dashboard

Arctic

- Arctic Oceans, Sea Ice, and Coasts
- Melting Glaciers, Snow, and Ice
- Arctic Weather and Extreme Events
- Permafrost and Arctic Landscapes
- Arctic Development and Transport
- Arctic Peoples and Ecosystems

Coast

- Sea Level R
- Coastal Erc
- Storm Surg
- Tsunami
- Inland Floc
- Shallow Coastal Flooding (Nuisance Flooding)
- Building Resilience in Coastal Communities

lnerability

vation

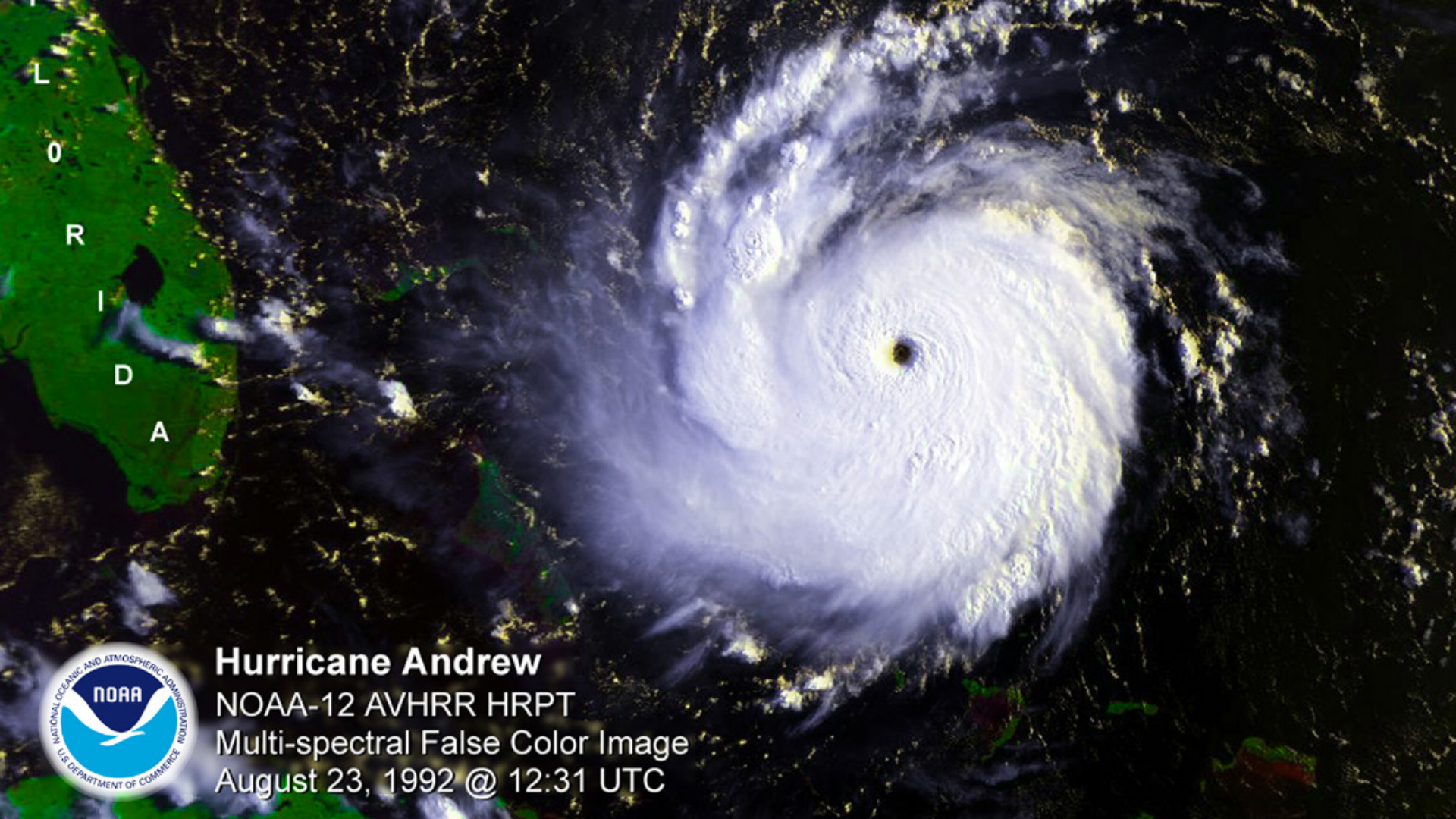
- Protecting and Enhancing the Resilience of Ecosystems

Energy Supply and Use

- Energy Consumption
- Energy Production
- Energy Facilities
- Building Resilience in Energy Supply and Use

Economic Sustainability

prosperity through efficient management of natural and human resources.

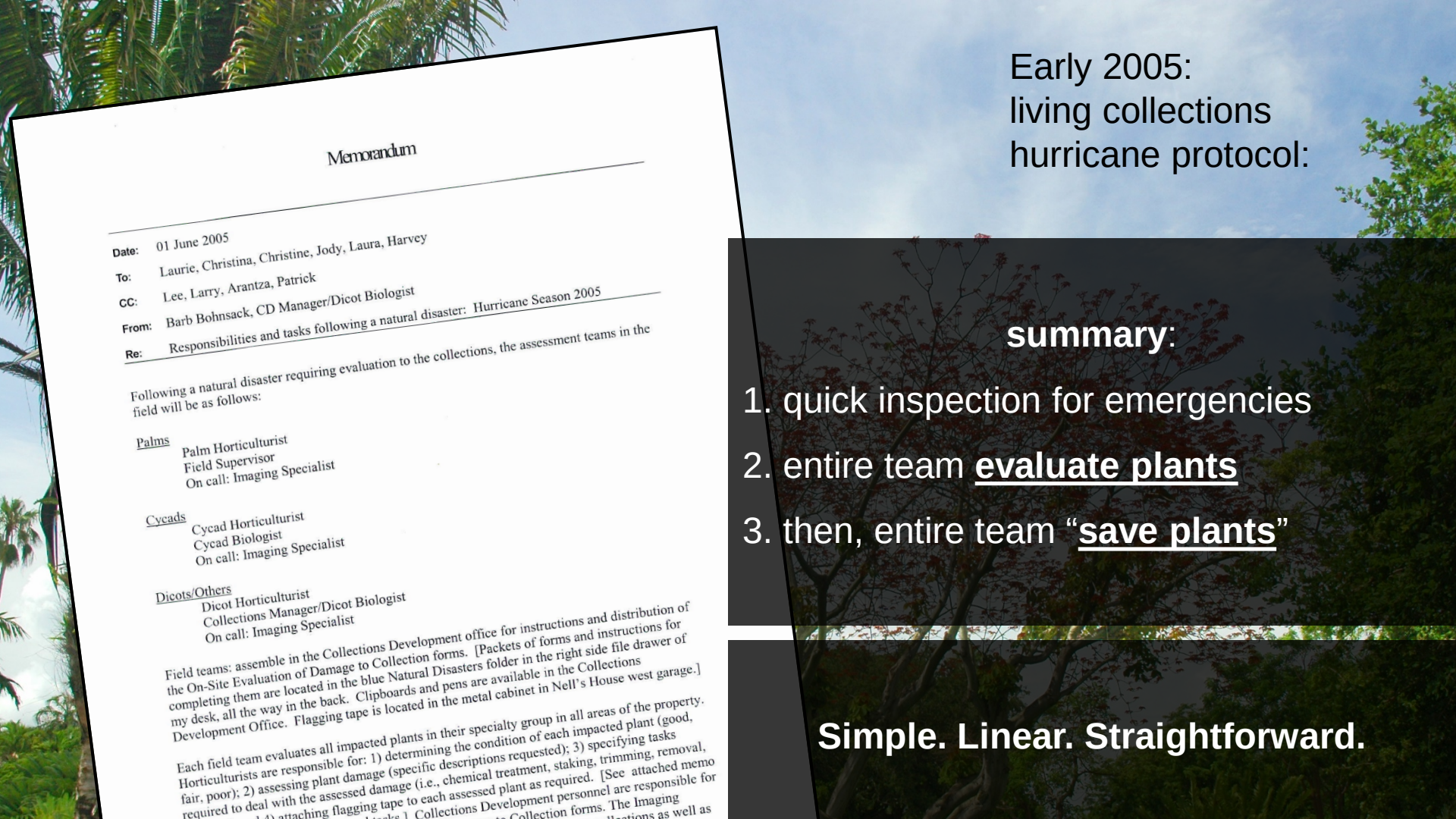

L
O
R
I
D
A
Hurricane Andrew
NOAA-12 AVHRR HRPT
Multi-spectral False Color Image
August 23, 1992 @ 12:31 UTC

Biggest disaster at MBC

Hurricane Andrew, 1992

Hurricane Andrew, 1992

Hurricane Andrew, 1992



Memorandum

Date: 01 June 2005

To: Laurie, Christina, Christine, Jody, Laura, Harvey

CC: Lee, Larry, Arantza, Patrick

From: Barb Bohnsack, CD Manager/Dicot Biologist

Re: Responsibilities and tasks following a natural disaster: Hurricane Season 2005

Following a natural disaster requiring evaluation to the collections, the assessment teams in the field will be as follows:

Palms
Palm Horticulturist
Field Supervisor
On call: Imaging Specialist

Cycads
Cycad Horticulturist
Cycad Biologist
On call: Imaging Specialist

Dicots/Others
Dicot Horticulturist
Collections Manager/Dicot Biologist
On call: Imaging Specialist

Field teams: assemble in the Collections Development office for instructions and distribution of the On-Site Evaluation of Damage to Collection forms. [Packets of forms and instructions for completing them are located in the blue Natural Disasters folder in the right side file drawer of my desk, all the way in the back. Clipboards and pens are available in the Collections Development Office. Flagging tape is located in the metal cabinet in Nell's House west garage.]

Each field team evaluates all impacted plants in their specialty group in all areas of the property. Horticulturists are responsible for: 1) determining the condition of each impacted plant (good, fair, poor); 2) assessing plant damage (specific descriptions requested); 3) specifying tasks required to deal with the assessed damage (i.e., chemical treatment, staking, trimming, removal, [illegible] attaching flagging tape to each assessed plant as required. [See attached memo [illegible]] Collections Development personnel are responsible for [illegible] to Collection forms. The Imaging [illegible] as well as

Early 2005:
living collections
hurricane protocol:

summary:

1. quick inspection for emergencies
2. entire team **<u>evaluate plants</u>**
3. then, entire team "**<u>save plants</u>**"

Simple. Linear. Straightforward.

Hurricane Katrina, late August 2005


Hurricane Katrina, 2005

Hurricane Katrina, 2005


Damage assessment, next morning

damage assessment:

systematic, organized, *thorough*.

10,859 plants

Three days of assessment work

Table 1. Collections damage assessment summary

	Destroyed	Damaged	Toppled
Cycads	0	22	63
Palms	48	899	207
Dicots	85	296	124
Total	133	1,217	394


Hurricane Wilma, October 2005
two months after Hurricane Katrina

Hurricane Wilma, 2005


Hurricane Wilma, 2005

Hurricane Wilma, 2005

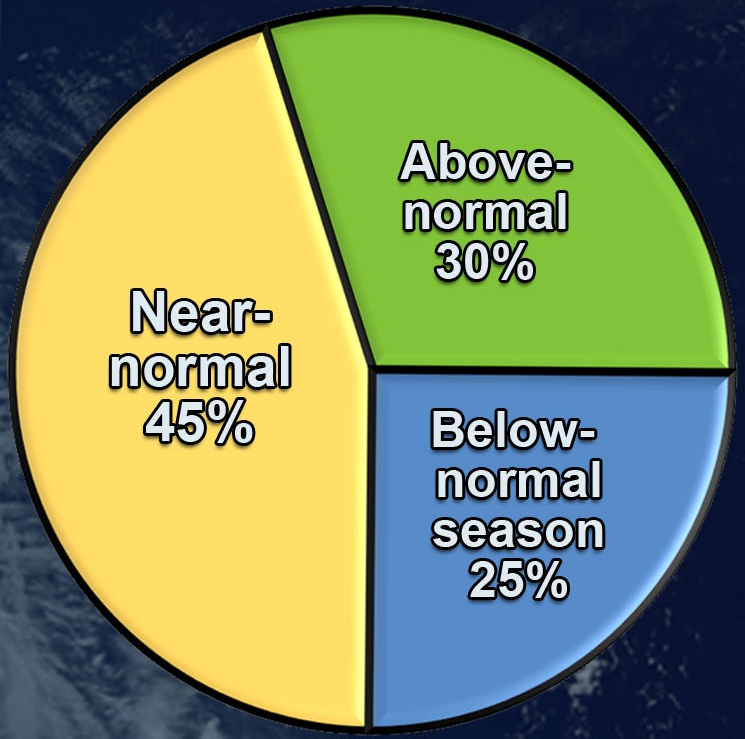

containers easily become airborne
Hurricane Katrina, 2005


containers easily become airborne
tips:
group containers like this
label container and tag
add extra tag below medium
Hurricane Wilma, 2005

threats

2016 Atlantic Hurricane Season Outlook

Named storms:	10 - 16
Hurricanes:	4 - 8
Major hurricanes:	1 - 4



Outlook probability

Be prepared: Visit hurricanes.gov
and follow @NWS and @NHC_Atlantic on Twitter

NOAA

assets

Historical Hurricane Tracks

Search Hurricanes By

Location | Name/Year | Ocean Basin

2005

Refine Search

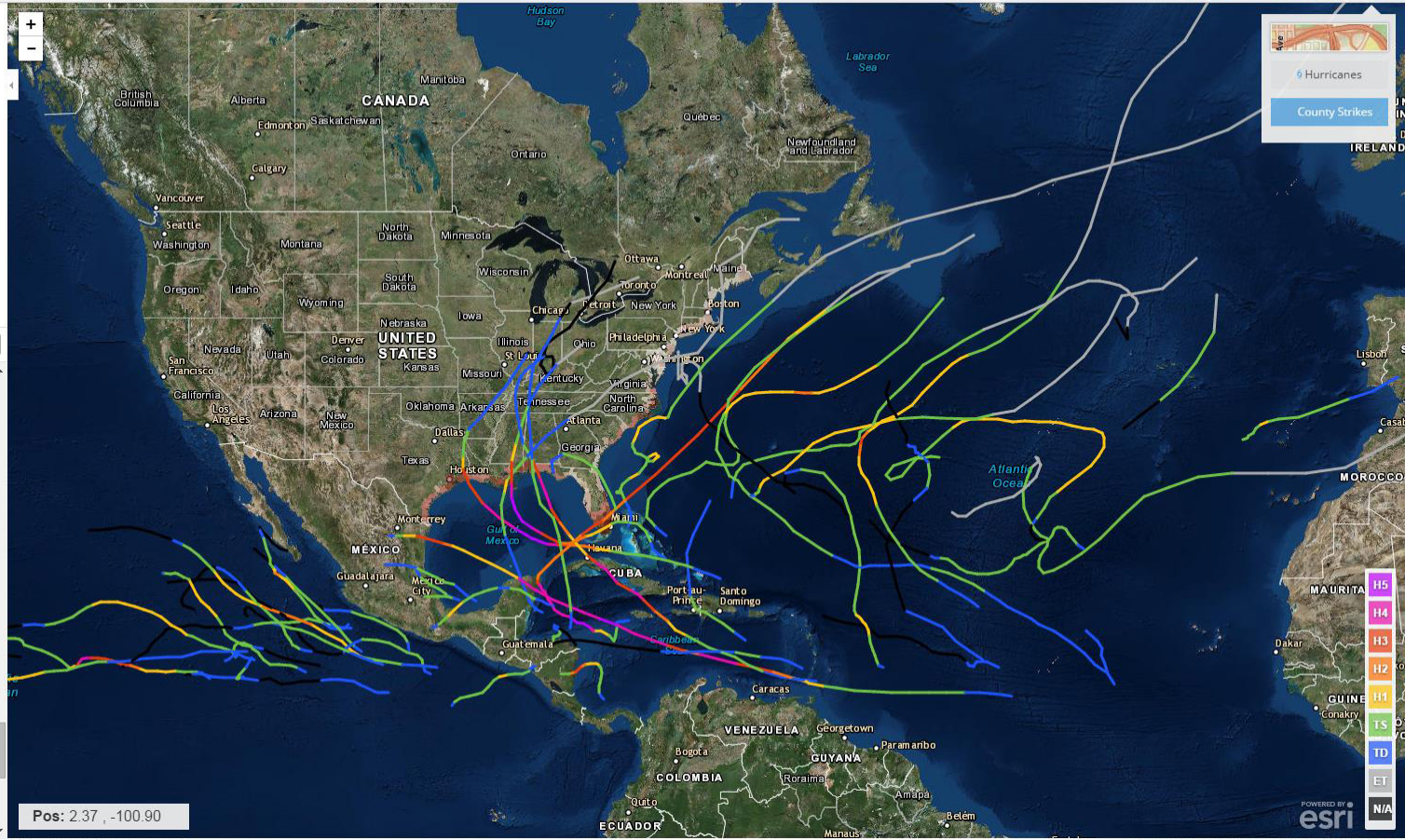
Search through the storms below

Advanced Filters

Results (116) | Selected | My Storms (0)

Clear Sort By Year (Asc.)

TWENTY-TWO 2005	Oct 08, 2005 to Oct 14, 2005
VINCE 2005	Oct 08, 2005 to Oct 11, 2005
KIROGI 2005	Oct 09, 2005 to Oct 19, 2005
NOT NAMED 2005	Oct 13, 2005 to Oct 17, 2005
SIXTEEN 2005	Oct 15, 2005 to Oct 21, 2005
WILMA 2005	Oct 15, 2005 to Oct 26, 2005
ALPHA 2005	Oct 22, 2005 to Oct 24, 2005
NOT NAMED 2005	Oct 25, 2005 to Oct 29, 2005
BETA 2005	Oct 26, 2005 to Oct 31, 2005
KAI-TAK 2005	Oct 27, 2005 to Nov 02, 2005
NOT NAMED 2005	Nov 04, 2005 to Nov 08, 2005
TEMBIN 2005	Nov 06, 2005 to Nov 12, 2005
BOLAVEN 2005	Nov 12, 2005 to Nov 20, 2005
GAMMA 2005	Nov 14, 2005 to Nov 22, 2005



Hurricane Hazel: 60th Anniversary

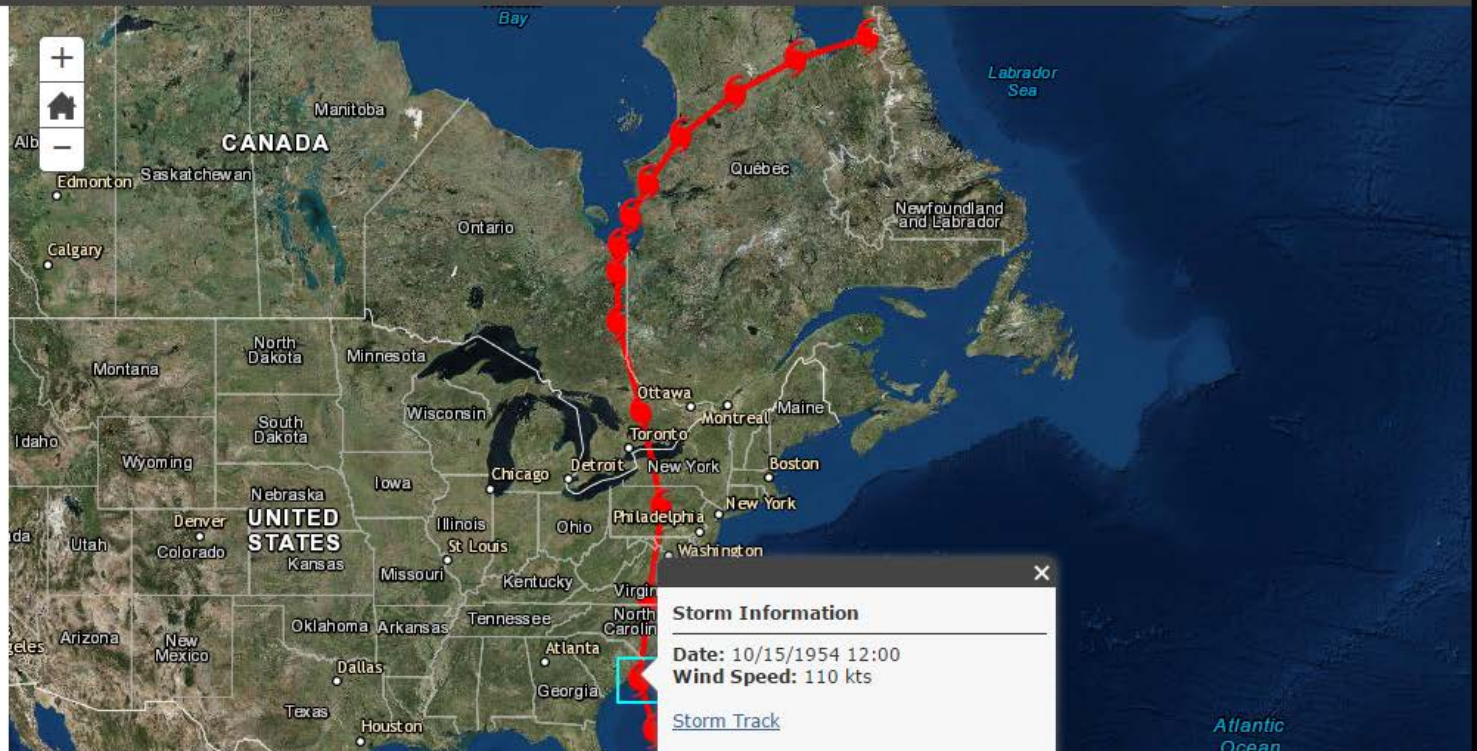
Path | Impacts | In the Carolinas | Storm Surge

Hazel's Path

Hurricane Hazel first developed on October 5, 1954, and moved westward through the Caribbean without striking land. Instead of continuing its predicted track towards Jamaica, Hazel made a sharp turn north, striking Haiti. Forecasters believed that the storm would lose power over the cooler waters north of Florida and drift eastward into the Atlantic. Again, contrary to predictions, Hazel turned northward to make landfall in the Carolinas as a Category 4 hurricane and then traveled up the East Coast into Canada. Hazel finally moved offshore on October 18.

Click the hurricane icons to get information on the storm track.

More Historical Hurricane Tracks



Hurricane Hazel: 60th Anniversary

What would the extent of Hazel's storm surge be today?

The damage inflicted by Hazel was made worse by the timing of the hurricane strike. Landfall coincided with the full moon of October, the highest lunar tide of the year, resulting in intensified storm surges. Surges of over 12 feet inundated a large area of coastline and reached as high as 18 feet at Calabash, North Carolina, producing severe coastal damage.

The map shows the effects of Hazel's storm surge on today's landscape. The Sea, Lake, and Overland Surges from Hurricanes, or *SLOSH*, model used current topography with the known parameters of the 1954 storm.

Darker blues indicate greater inundation depth while lighter blues indicate less inundation.

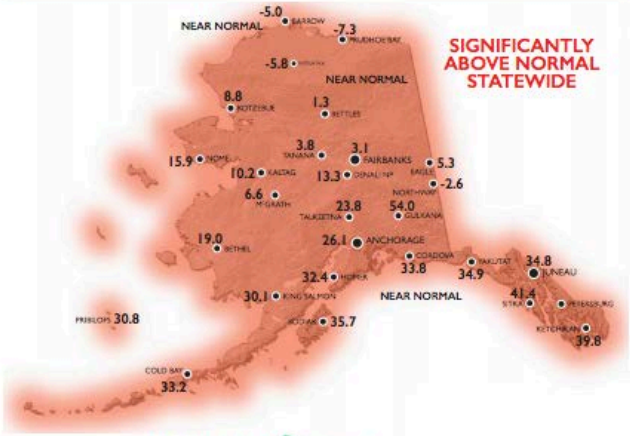
More information on the SLOSH model

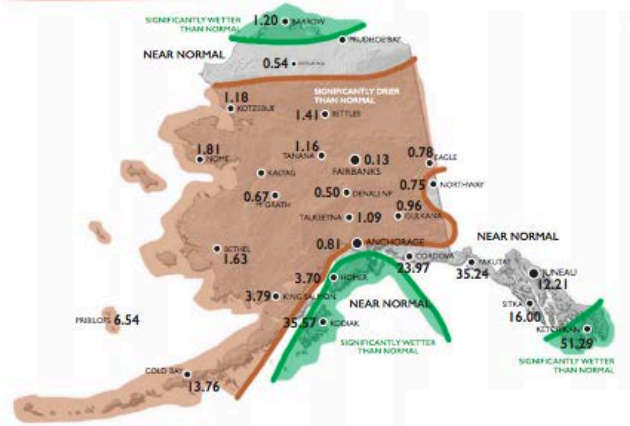
Emory Griffin-Noyes, a biologist working with the New England Wildflower Society collects spicebush seeds

Over two years, the New England Wild Flower Society and its partners, North Carolina Botanic Garden and Mid-Atlantic Regional Seed Bank (part of New York City Department of Parks and Recreation), are undertaking the first large-scale, coordinated seed banking effort in the eastern United States.

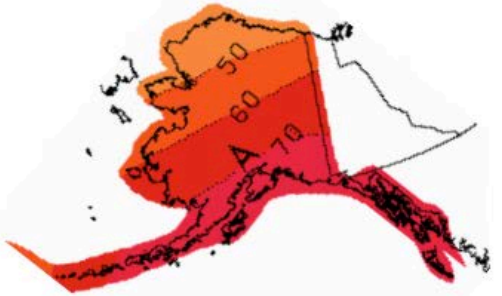
Regional Tools

TEMPERATURE & PRECIPITATION ANOMALIES

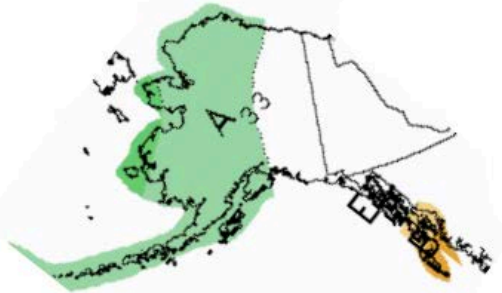




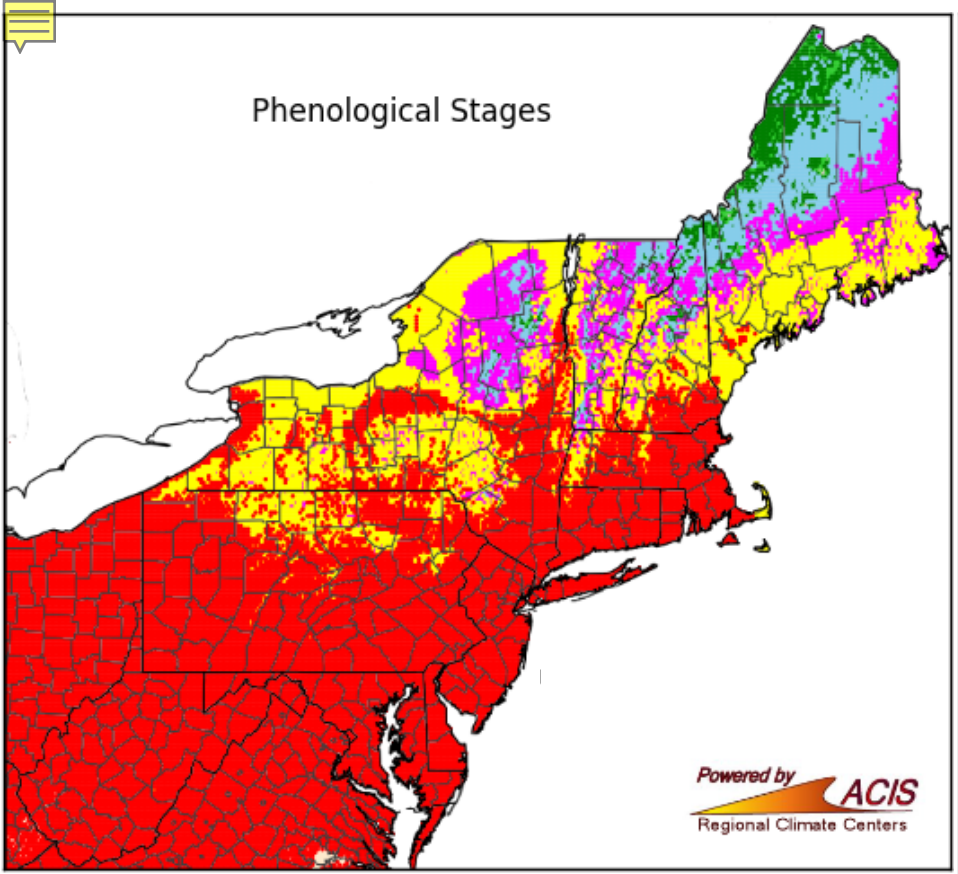
OUTLOOKS: APRIL–JUNE 2016

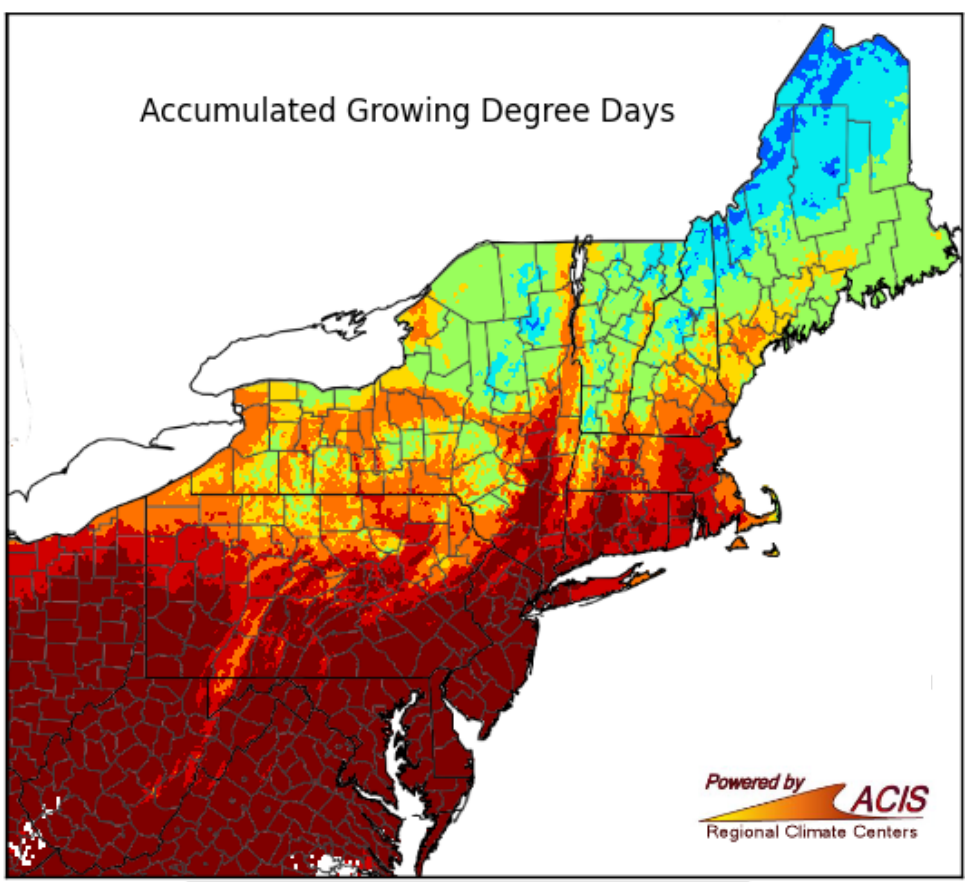


TEMPERATURE The April–June outlook from the Climate Prediction Center shows dramatically increased chances for significantly above-normal temperatures over most of Alaska, as the lingering effect of El Niño, above-normal sea surface temperatures and unusually low sea ice conspire to boost the chances of warmer than normal temperatures.



PRECIPITATION The same factors influence the precipitation outlook. With showers becoming the typical kind of precipitation over most of the state during May and June, there is much less confidence with precipitation outlooks.





Dormant	Silver Tip	Green Tip	1/2" Green	Tight Cluster	Pink Bud	Bloom	Petal Fall

25 125 225 325 475 525 625 725

Social Sustainability

social cohesion, equity, justice and wellbeing

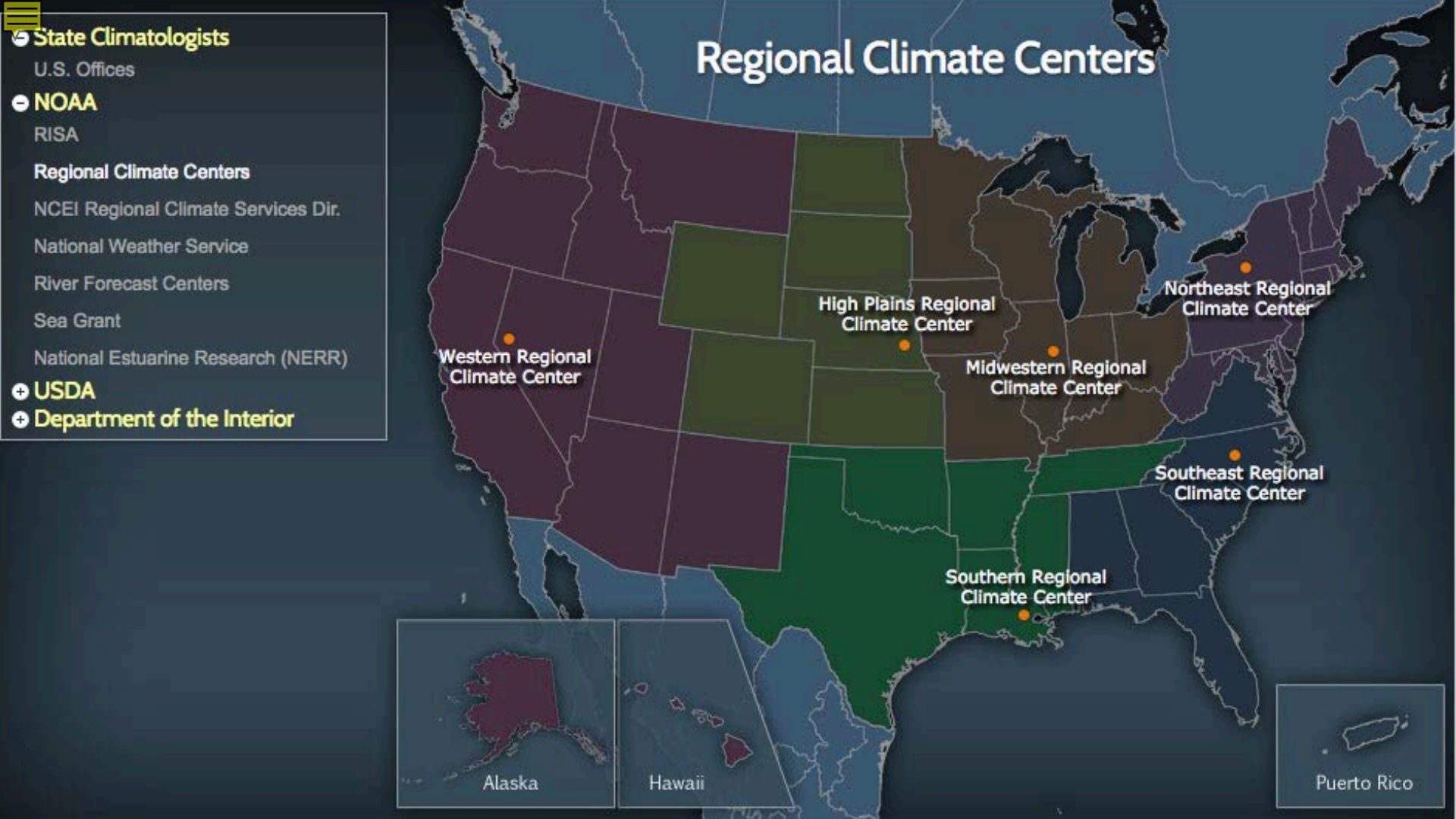
How can the humanities help address sea level rise?

The National Endowment for the Humanities (NEH) has chosen FIU's History Department as recipient of a Humanities in the Public Square grant.

A total of seven events will feature literary and religious studies experts, historians, philosophers, geographers and other scholars sharing their perspectives on risk, fear, hope and resilience, among other themes related to sea level rise and climate change.

The Kampong is working with FIU to host events for the Ecohumanities for Cities in Crisis program.

The Kampong also includes staff from FIU's climate change and sea level research teams in our annual high school teacher enrichment programs.


State Climatologists
U.S. Offices
NOAA
RISA
Regional Climate Centers
NCEI Regional Climate Services Dir.
National Weather Service
River Forecast Centers
Sea Grant
National Estuarine Research (NERR)
USDA
Department of the Interior
Regional Climate Centers
Western Regional Climate Center
High Plains Regional Climate Center
Midwestern Regional Climate Center
Northeast Regional Climate Center
Southeast Regional Climate Center
Southern Regional Climate Center
Alaska
Hawaii
Puerto Rico


Climate.gov
Lisa Auermiller
Jacques Cousteau National
Estuarine Research Reserve

Resilience is at the Heart of NOAA's Mission

Science: Understand and predict changes in climate, weather, oceans, and coasts

Service: Share that knowledge and information with others

Stewardship: Conserve and manage coastal and marine ecosystems and resources

NOAA and Federal Climate Resources

- Data and Tools to understand our Environment
- Services to support our Economy
- Experts nearby to support Society