

Update on the NADM Website Development

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NCEI / NIDIS Drought.gov

NATIONAL
INTEGRATED
DROUGHT
INFORMATION
SYSTEM



Drought.gov



Agriculture and
Agri-Food Canada
Environment and
Climate Change Canada



Agriculture et
Agroalimentaire Canada
Environnement et
Changement climatique Canada

Current NADM Website

NADM web presence on Drought.gov (<https://www.drought.gov/nadm/>)

- A home on drought.gov for NADM efforts and documentation.
- Uses a Content Management System, for easy content updates.
- Highlights efforts from multiple contributors, including NOAA and NDMC.



The screenshot shows the North American Drought Portal website. The header includes the NIDIS logo, the title "North American Drought Portal", the URL "www.drought.gov", and a search bar. A navigation menu contains links for OVERVIEW, INDICATORS, NADM MAPS & TOOLS, FORECASTS, ACTIVITIES, and PARTICIPANTS. The main content area features a "Welcome!" message and a description of the NADM as a cooperative effort between drought experts in Canada, Mexico, and the United States. To the right, there is a "North American Drought Monitor" section for "March 31, 2018", which includes a map of North America showing drought severity levels. The map uses a color scale from yellow (D1) to red (D4) to indicate increasing drought severity. A legend on the left of the map explains the color coding and provides information about the data source and update frequency.

Updated NADM Website

- Efforts on U.S. Drought Portal are the basis for new work on NADM and Global Drought.gov website.
- Including:
 - usability-based design, incorporating usability tests during development
 - mobile/tablet responsive sites that meet accessibility requirements
 - new integrated high-performance interactive mapping capabilities
(complementing traditional ArcGIS approach)
- Requirements for site content are the generally the same, but the look and feel and organization of the site will be different.



Home

Data, Maps & Tools

Regions

Research

Resources

What is NIDIS?

News

Calendar

Contact Us

Drought resilience resources for the nation

How is Drought Affecting your Neighborhood?

[Get Conditions](#)

Where is drought this week?

January 10-16



8.1%

of the US and 8.5% of the lower 48 states are affected by drought.



16.0 million

people in the U.S. and 15.8 in the lower 48 states are affected by drought.

A significant weather system impacted the lower Mississippi Valley and pushed northeast into the Ohio River Valley and the Northeast. The active pattern over the Pacific Northwest and northern Rocky Mountains continued, bringing much-needed rain and snow to these regions. Cooler than normal temperatures dominated the Plains region and the South, with areas of the northern Plains 15-20 degrees below normal. Warmer than normal conditions dominated the West, with areas of the Great Basin 10-15 degrees warmer than normal.



View Upcoming Events & Webinars >

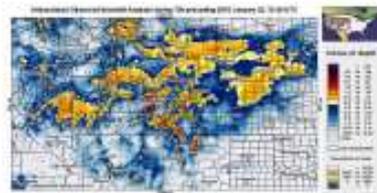
Tweets by @DroughtGov

NIDIS Retweeted



ColoradoClimateCenter
@ColoradoClimate

Here's how our weekend storm stacked up for the @DroughtGov Intermountain West. #WYwx #COwx #UTwx #AZwx #NMwx



19h

NIDIS Retweeted



ColoradoClimateCenter
@ColoradoClimate

Here's how our weekend storm stacked up for the @DroughtGov Intermountain West. #WYwx #COwx #UTwx #AZwx #NMwx

The Climate Prediction Center's (CPC) Seasonal Drought Outlook is issued monthly on the third Thursday of each month. The Outlook predicts whether drought will emerge, stay the same or get better in the next three months.

[Learn more about the Seasonal Drought Outlook](#)

Drought persists

Drought present on the Current U.S. Drought Monitor map is expected to continue for the next three months

30%
of map area

Drought remains but improves

Drought present on the Current U.S. Drought Monitor map is expected to continue, but for the next three months

10%
of map area

Drought removal likely

Drought present on the Current U.S. Drought Monitor map is expected to be removed from the map in the next three months

5%
of map area

Drought development likely

Drought present on the Current U.S. Drought Monitor map is expected to be added to the map in the next three months

0%
of map area



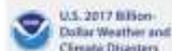
Puerto Rico

Hawaii

Alaska

Contiguous US

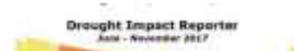
News & Updates



U.S. 2017 Billion-Dollar Weather and Climate Disasters

2017's Billion-Dollar Disasters
The National Centers for Environmental Information

Featured Drought Data, Maps & Tools



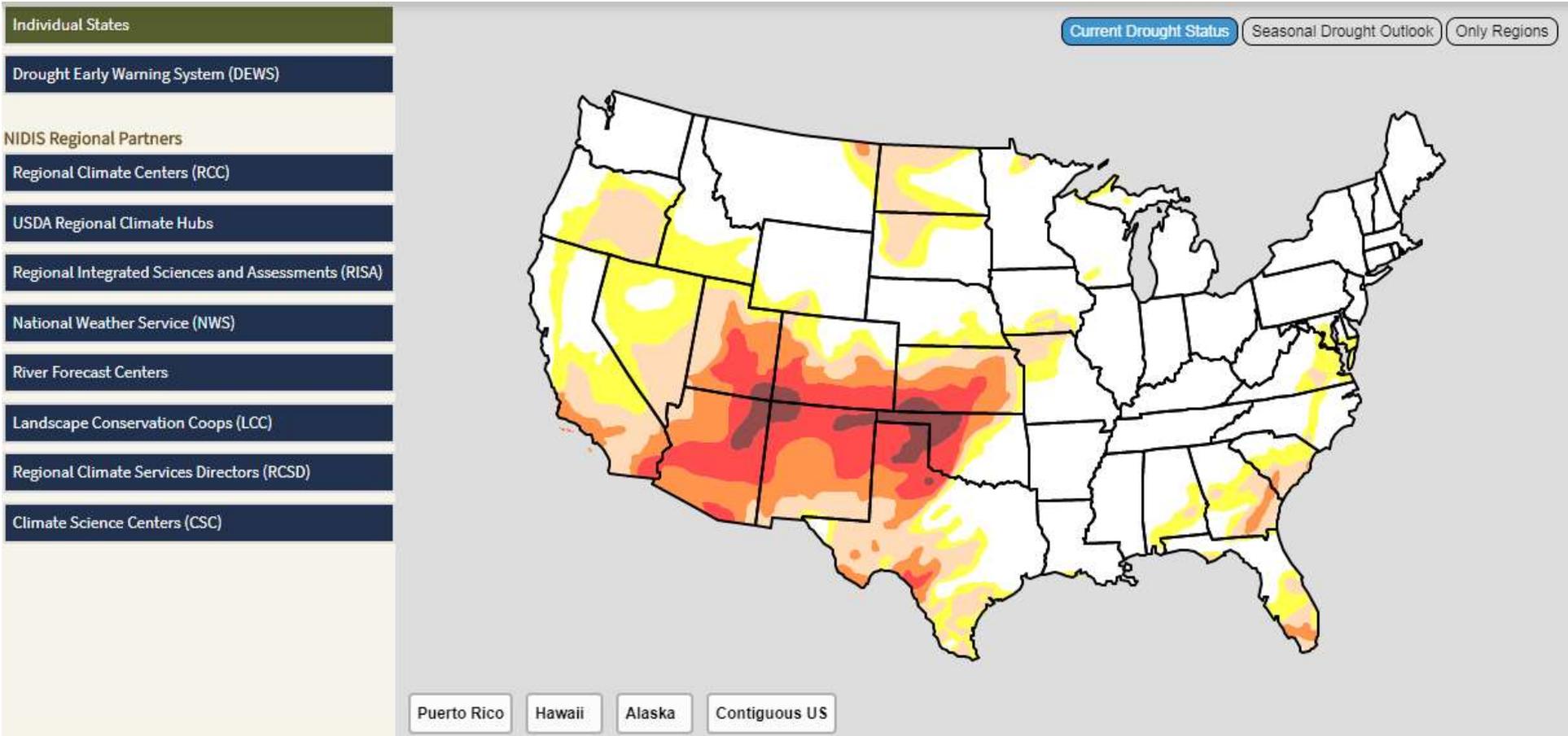
New Mapping Capabilities - *Leaflet*

*Leaflet - open source JavaScript library used to build web mapping applications
-- suitable with most mobile and desktop platforms.*

Currently, we are utilizing Leaflet on US (drought.gov) Regions page

Future work - we are in the process of updating all the state pages...

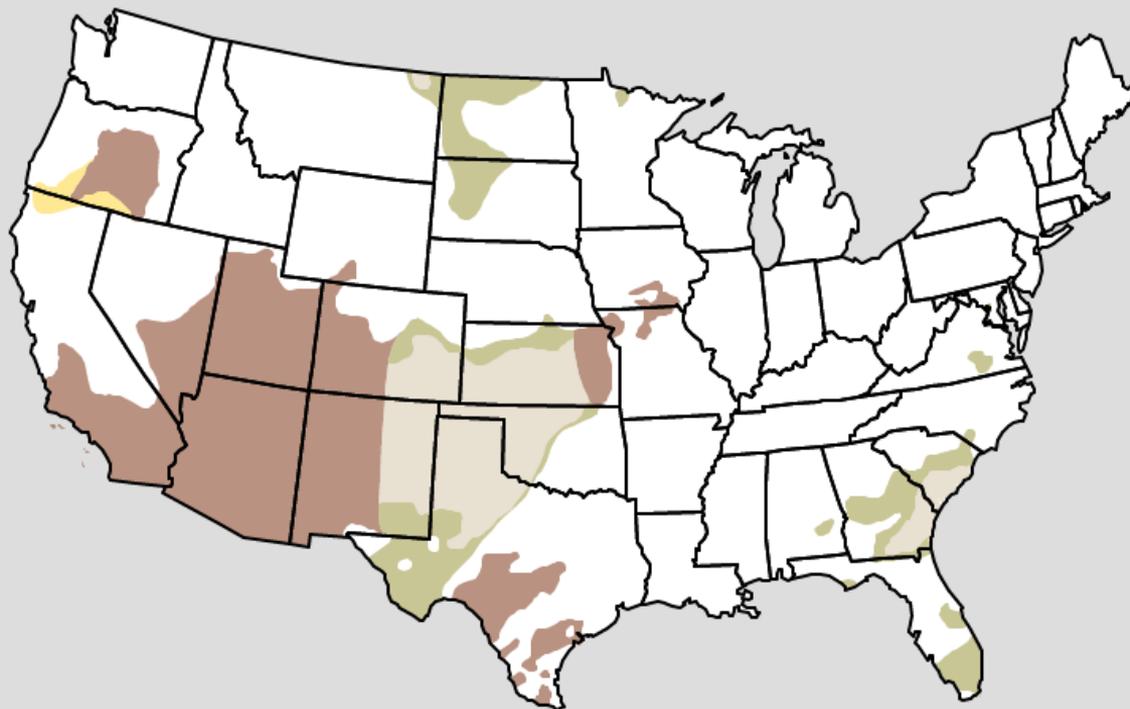
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New Mapping Capabilities - *Leaflet*

- Individual States
- Drought Early Warning System (DEWS)
- NIDIS Regional Partners
- Regional Climate Centers (RCC)
- USDA Regional Climate Hubs
- Regional Integrated Sciences and Assessments (RISA)
- National Weather Service (NWS)
- River Forecast Centers
- Landscape Conservation Coops (LCC)
- Regional Climate Services Directors (RCSD)
- Climate Science Centers (CSC)

Current Drought Status **Seasonal Drought Outlook** Only Regions



Puerto Rico Hawaii Alaska Contiguous US

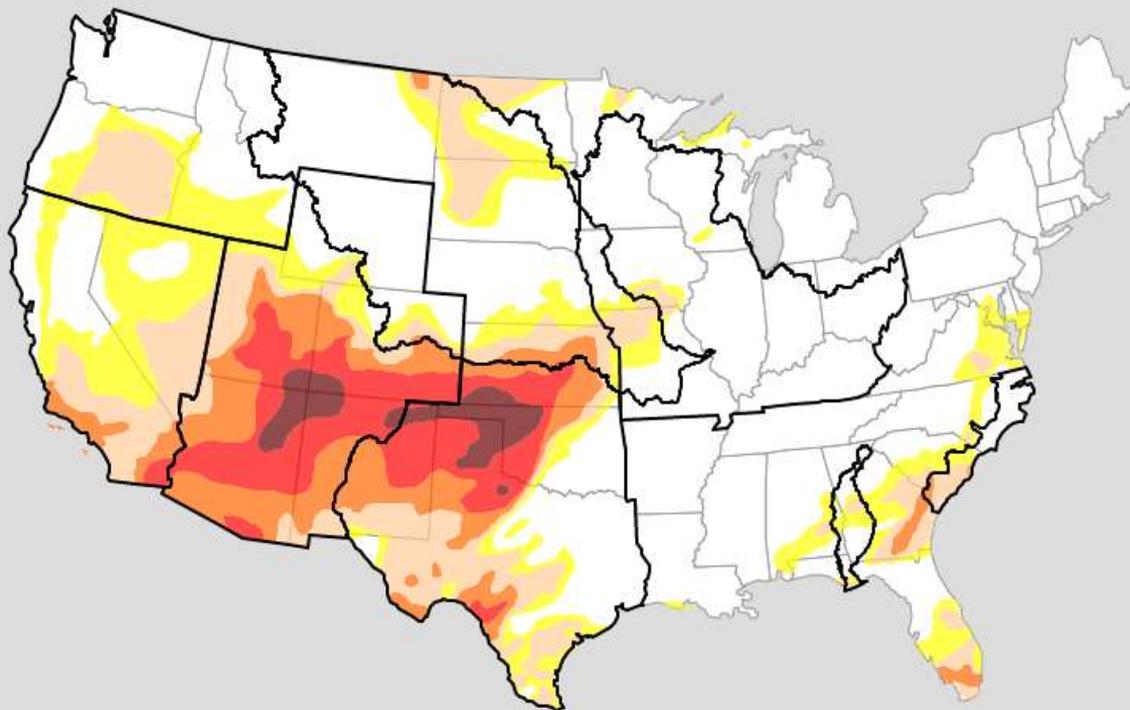
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Current Drought Status

Seasonal Drought Outlook

Only Regions



Puerto Rico

Hawaii

Alaska

Contiguous US

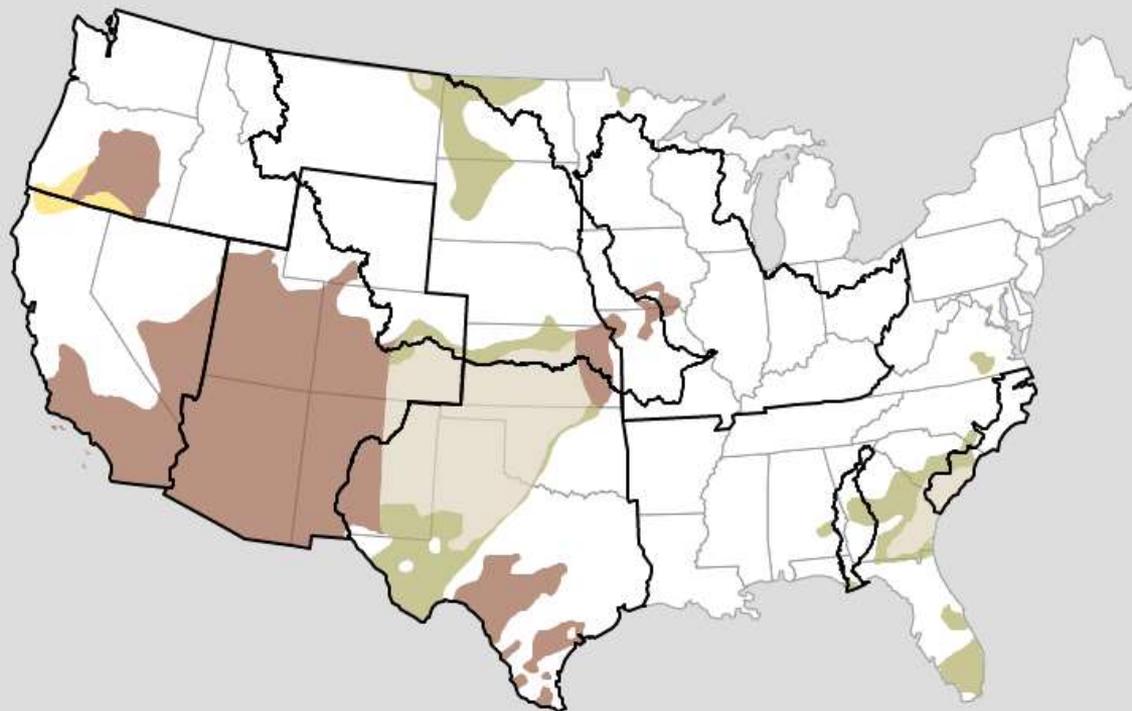
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Current Drought Status

Seasonal Drought Outlook

Only Regions



Puerto Rico

Hawaii

Alaska

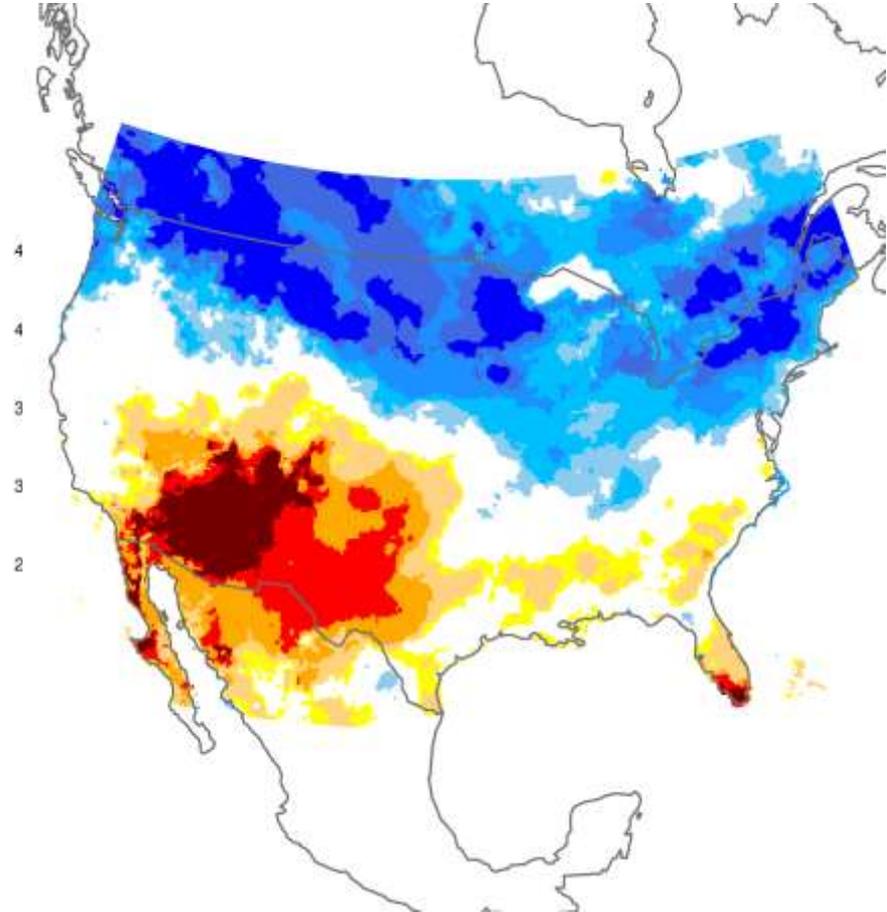
Contiguous US

GeoJSON

Utilization of ArcGIS, GDAL, and other tools to process and convert files (vector & raster) to GeoJSON



Example: From ArcGIS file Demand Drought Index (DDI) from the Earth System Research Laboratory - file size = 499KB
...classifying,
...dissolving.



NADM Mapping Example

What does Leaflet and GeoJSON mean for NADM?

- high-performance, zoomable, mobile-ready mapping, using projections

Will complement web services available for same data through ArcGIS Server

The U.S. Drought Monitor (USDM) is a map that is updated each Thursday to show the location and intensity of drought across the country.

[Learn more about the U.S. Drought Monitor](#)

D0 - Abnormally Dry

- Short-term dryness slowing planting, growth of crops
- Some lingering water deficits
- Pastures or crops not fully recovered

40%
of map area

D1 - Moderate Drought

- Some damage to crops, pastures
- Some water shortages developing
- Voluntary water-use restrictions requested

30%
of map area

D2 - Severe Drought

- Crop or pasture loss likely
- Water shortages common
- Water restrictions imposed

10%
of map area

D3 - Extreme Drought

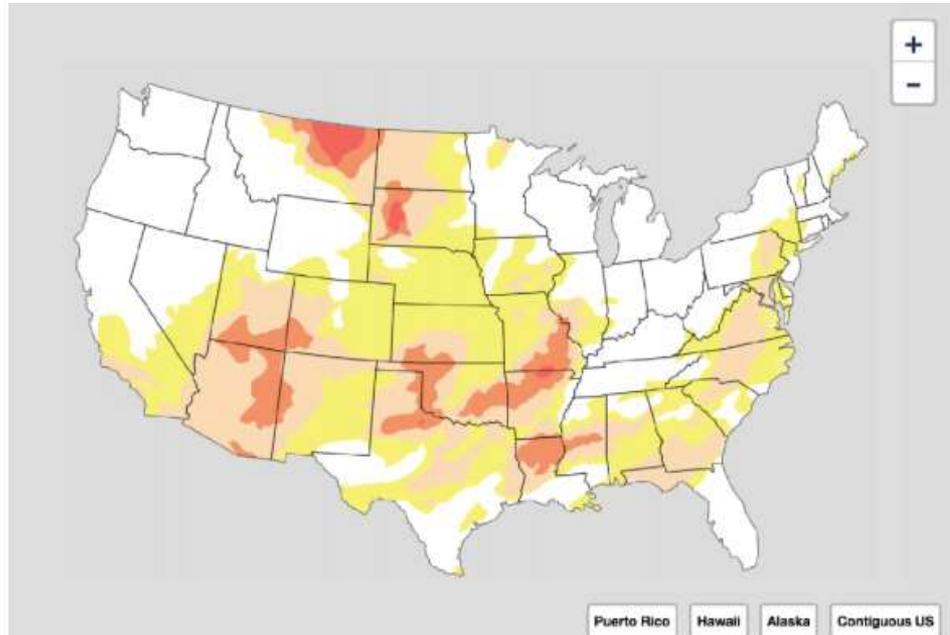
- Major crop/pasture losses
- Widespread water shortages or restrictions

5%
of map area

D4 - Exceptional Drought

- Exceptional and widespread crop/pasture losses
- Shortages of water creating water emergencies

0%
of map area



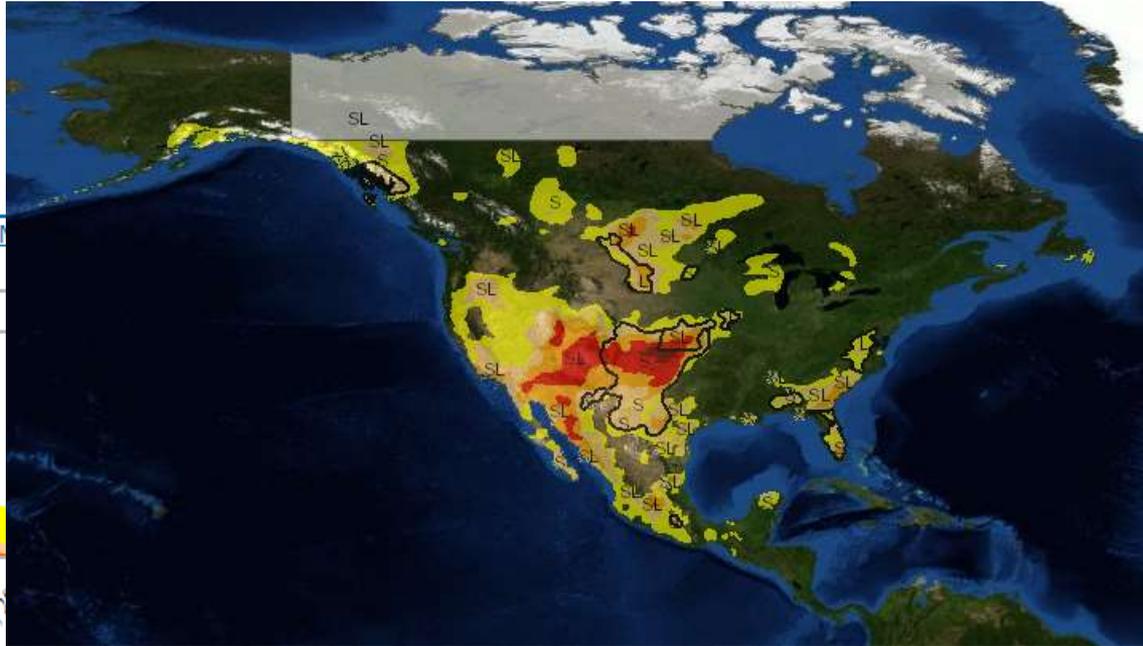
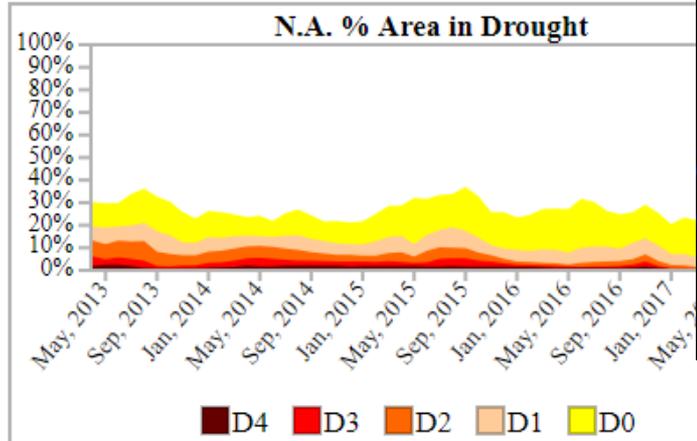
Monthly NADM processing

Python processing - 2 steps:

- Preprocess
 - cleans, clips, merges files
- Post-process
 - cleans, statistics, database, FTP

Area Drought

[Download Image](#), [Download as JSON](#), [Download as XML](#)



Additions to NADM

Shapefiles and Statistics

- River Basins:
 - Columbia
 - Great Lakes
 - Rio Grande & Bravo
- Ecoregions:
 -
 -
 -
 -
 -
 -
 -

NADM_GreatLakes201803								
FID	Shape	DroughtCat	Population	Pop_Pct	Year_Month	Area_SqMi	Area_Pct	
0	Polygon	d0	1172020	4.90651	201803	36537.1	12.2626	

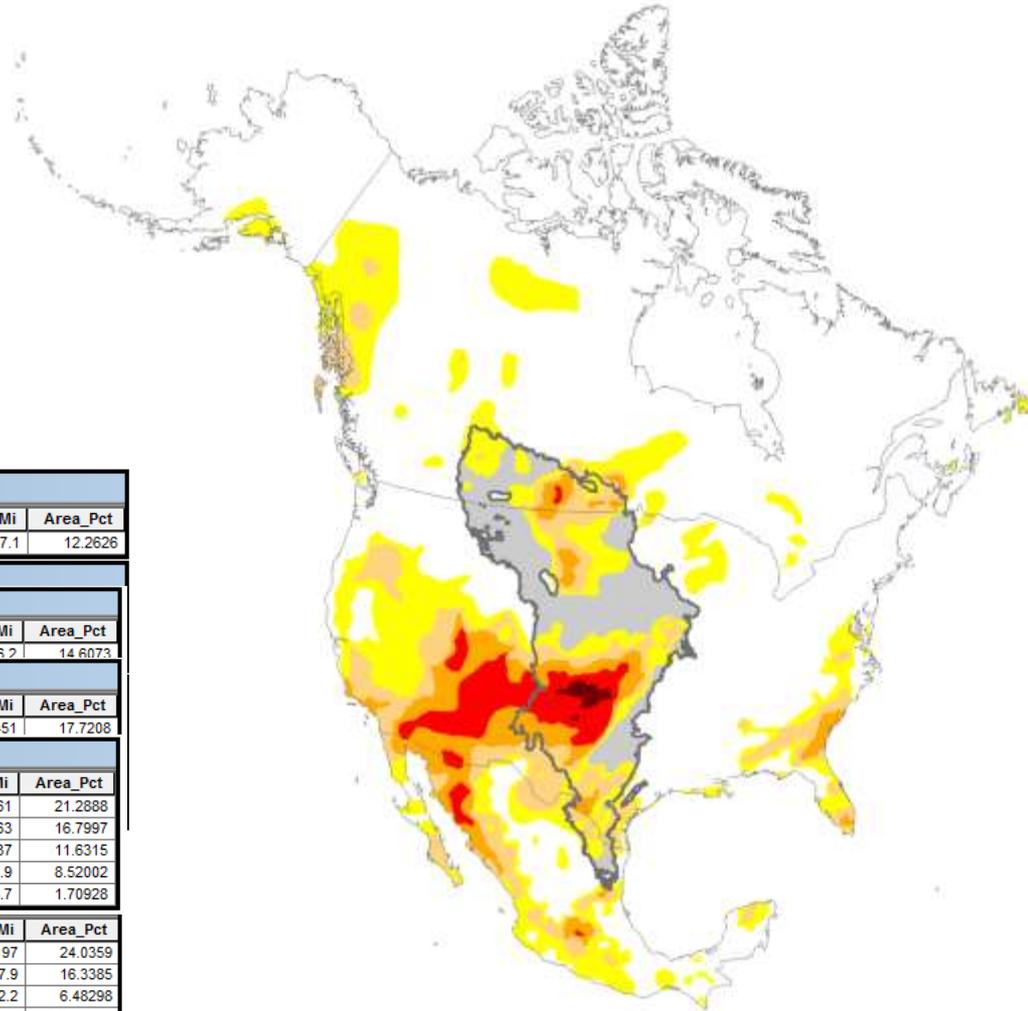
NADM_Columbia201803								
FID	Shape	DroughtCat	Population	Pop_Pct	Year_Month	Area_SqMi	Area_Pct	
0	Polygon	d0	4654390	28.9699	201803	56208.2	14.6073	

NADM_SouthCentral201803								
FID	Shape	DroughtCat	Population	Pop_Pct	Year_Month	Area_SqMi	Area_Pct	
0	Polygon	d0	4947810	28.4727	201803	124451	17.7208	

NADM_SemiAridPrairies201803								
FID	Shape	DroughtCat	Population	Pop_Pct	Year_Month	Area_SqMi	Area_Pct	
0	Polygon	d0	10826900	34.0505	201803	223361	21.2888	
1	Polygon	d1	4121770	12.963	201803	176263	16.7997	
2	Polygon	d2	2022430	6.36054	201803	122037	11.6315	
3	Polygon	d3	1100890	3.46228	201803	89391.9	8.52002	
4	Polygon	d4	104193	0.327688	201803	17933.7	1.70928	

NADM_GreatPlains201803								
FID	Shape	DroughtCat	Population	Pop_Pct	Year_Month	Area_SqMi	Area_Pct	
0	Polygon	d0	2886220	26.4737	201803	146197	24.0359	
1	Polygon	d1	1438180	13.1917	201803	99377.9	16.3385	
2	Polygon	d2	424274	3.89163	201803	39432.2	6.48298	
3	Polygon	d3	11211.1	0.102833	201803	2602.66	0.427897	

Merge of all the above Ecoregions



Future of NADM Monthly Process

Additions?

- Layers - regions, areas, statistics, etc.

Automation?

- Definitely an option

Population Grid?

- CIESIN (Global gridded population of the world)

<http://sedac.ciesin.columbia.edu/data/collection/gpw-v4>

Drought.gov science efforts

- Python-based reusable climate/drought indices (James Adams):

Palmer Drought Indices (PDSI, self-calibrated PDSI, Z-Index, PHDI)

Standard Precipitation Index (SPI)

Standard Precipitation-Evapotranspiration Index (SPEI)

Potential Evapotranspiration (PET)

Percentage of Normal Precipitation (PNP)

The GitHub logo, consisting of the word "GitHub" in a bold, black, sans-serif font.

- Supports monthly and daily datasets
- Open access to code – [on Drought.gov](https://on.drought.gov) (present) and NOAA and/or NIDIS GitHub (future).
- Well documented with reproducible test cases.
- High performance, works for stations, divisions, grids. Easy to run on NLDAS, Prism, nClimGrid, CHIRPS, GPCP, GPCC, and more. NDMC is experimenting with use on streamflow data.
- Enable reuse of code within drought/climate community and across NIDIS funded projects.
- Application of these tools to datasets at NOAA/NCEI.
- Build a community of contributors!

Application of the Python Indices: CMORPH

CMORPH (NOAA/Climate Prediction Center P. Xie):

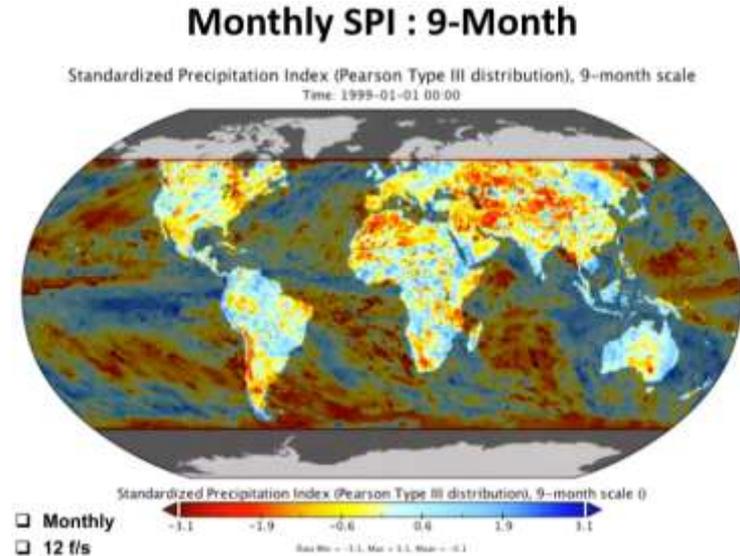
“CMORPH (CPC MORPHing technique) produces global precipitation analyses at very high spatial and temporal resolution. This technique uses precipitation estimates that have been derived from low orbiter satellite microwave observations *exclusively*, and whose features are transported via spatial propagation information that is obtained entirely from geostationary satellite IR data. At present we incorporate precipitation estimates derived from the passive microwaves aboard the DMSP 13, 14 & 15 (SSM/I), the NOAA-15, 16, 17 & 18 (AMSU-B), and AMSR-E and TMI aboard NASA's Aqua and TRMM spacecraft, respectively. ”

Transition to Operational ‘Gold Standard’ archive and documentation at NOAA/NCEI in FY2018, with CPC continuing real-time production.

1998-Present (Daily and 3-hourly)

0.25 x 0.25 degree (60N-60S, 0-360)

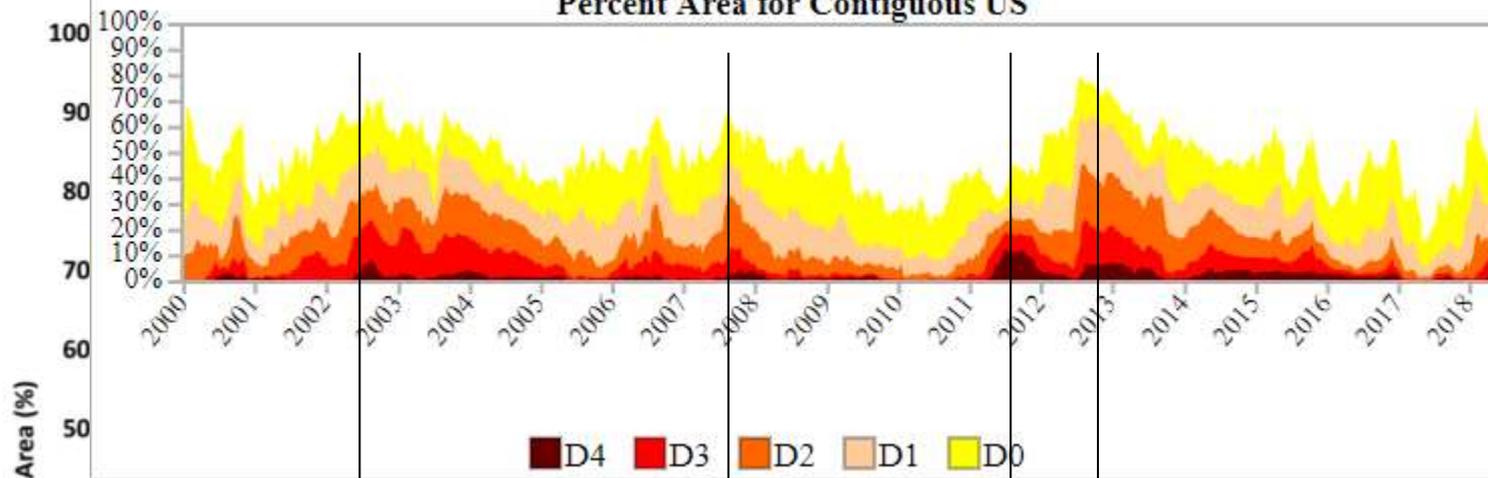
Preliminary data updates within 18 hours!



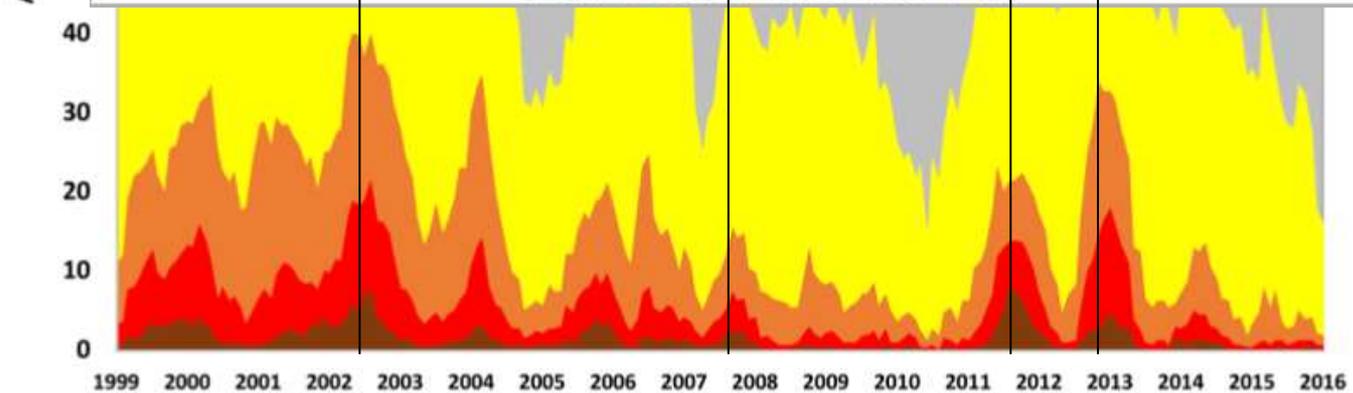
Application of the Python Indices: CMORPH

- Why?
 - Fast updates support global drought monitoring
 - Monthly and Daily precipitation totals
 - Product based on 'Gold-Standard' operational dataset at NOAA NCEI and CPC.
 - Application of Python Climate Indices to a large, gridded, global dataset.

Percent Area for Contiguous US



USDM



CMORPH

SPI < -2
SPI < -1.5
SPI < -1
SPI < 0

1998-2004 Western US Drought
2006-2008 Southeastern Drought
2010-2012 TX-MX Drought
2012-2017 CA Drought
2012-2013 Midwestern Drought

NADM and CMORPH

North American Drought Monitor

September 30, 2011

Released: Wednesday, October 12, 2011

<http://www.ncdc.noaa.gov/nadm.html>

Analysts:

Canada - Trevor Hadwen
Richard Rieger
Dwayne Chobanik
Mexico - Reynaldo Pascual
Adelina Albanil
U.S.A. - Rich Tinker
Richard Heim*
Liz Love-Brotak

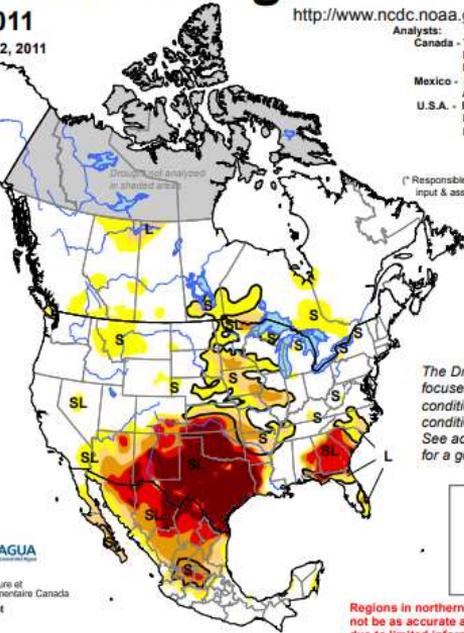
(* Responsible for collecting analysts' input & assembling the NA-DM map)

Intensity:

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

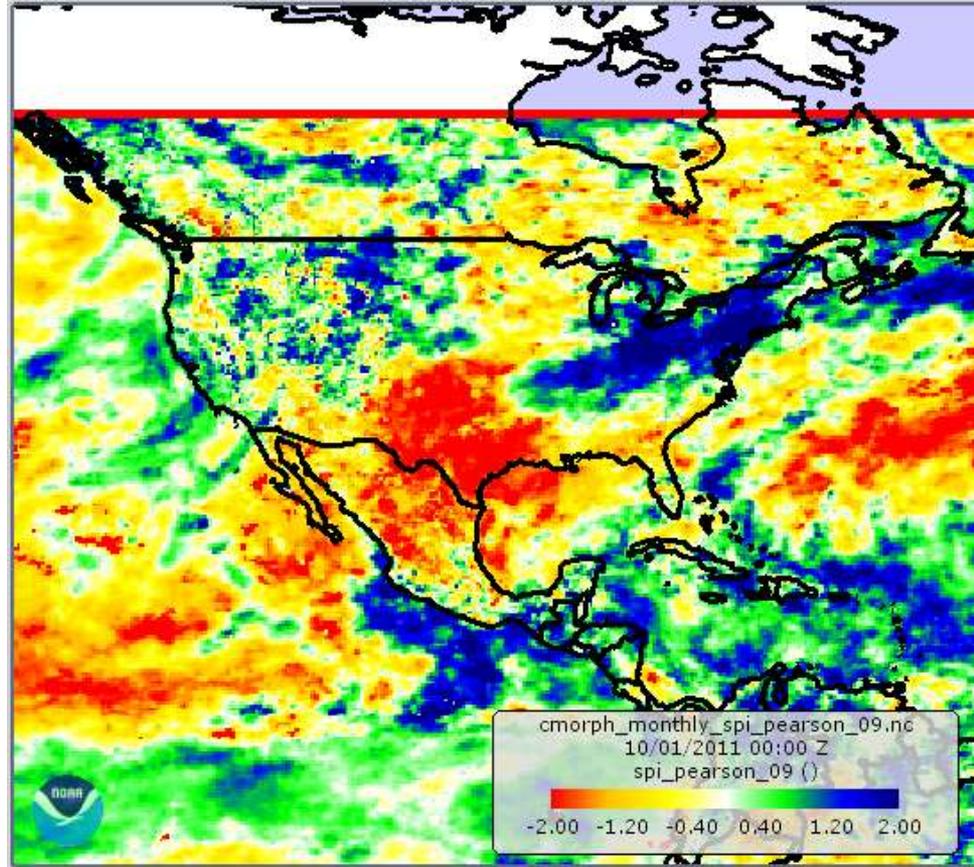
Drought Impact Types:

- ~ 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.



cmorph_monthly_spi_pearson_09.nc
10/01/2011 00:00 Z
spi_pearson_09 ()

-2.00 -1.20 -0.40 0.40 1.20 2.00

StoryMaps

- GIS efforts are compatible with StoryMaps.
- Drought.gov/NCEI can prepare or host data that is used in StoryMaps.
- Drought.gov can embed StoryMaps in Drought.gov

<https://www.drought.gov/drought/dry-texas-autumn-exceptional-drought-and-back>

- StoryMaps for NADM?

Conclusion

- Drought.gov will use lessons-learned on the new U.S. Drought Portal to guide new NADM website efforts.
- A focus on optimized data management, using a mixture of open source and ESRI/ArcGIS technologies.
- Preliminary efforts on CMORPH are promising, as an indicator that may add value in North American and Global drought monitoring.
- Drought.gov is committed to open access to data, web services, code and applications
- Drought.gov wants to support the amazing work done across the community.

Thank you!

Steve.Ansari@noaa.gov, Rocky.Bilotta@noaa.gov
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