Operational Success Through Tools, Training, and Transparency

Ryan Sandler &
Spencer Higginson
NOAA's NWS
541-773-1067
Medford, OR

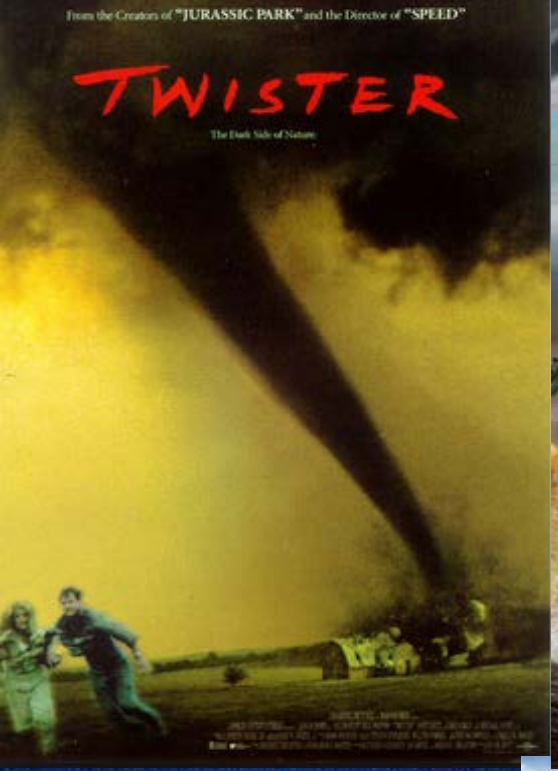
August 14 – 16, 2018

Seven Feathers Casino Resort

Canyonville, Oregon

Topics

- Who We Are and What We Do
- Cool Technology We Use
- Communication is the Name of the Game
- How We Can Help You
- What the Heck is a 100 Year Rainfall
- Drought, El Nino, and the Seasonal Outlook
- Past Climate Trends and Potential Future Climate Trends

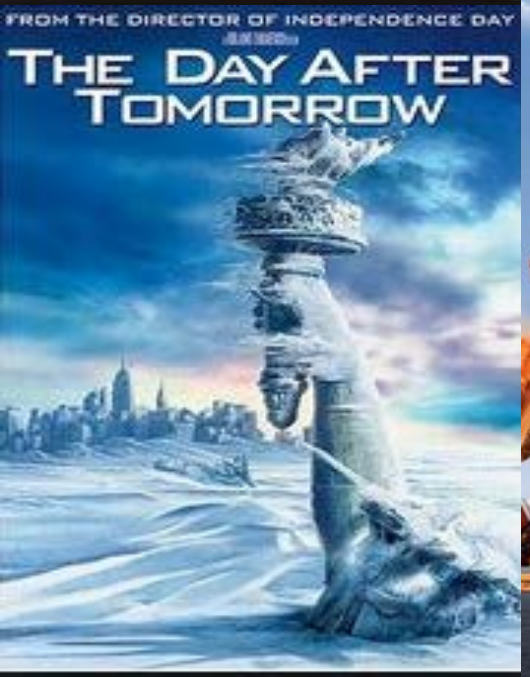

From the Creators of "JURASSIC PARK" and the Director of "SPEED"
TWISTER
The Dark Side of Nature

TARA REID
IAN ZIERING
AND JOHN HEARD
SHARKNADO
ENOUGH SAID!

IAN ZIERING
TARA REID
SHARKNADO 2
THE SECOND ONE
SHARK HAPPENS!
Syfy

PREPARE TO GO
INTO THE STORM

SOME THINGS WERE NEVER MEANT TO BE CONTROLLED
GEOSTORM
OCTOBER 20


FROM THE DIRECTOR OF INDEPENDENCE DAY
THE DAY AFTER TOMORROW

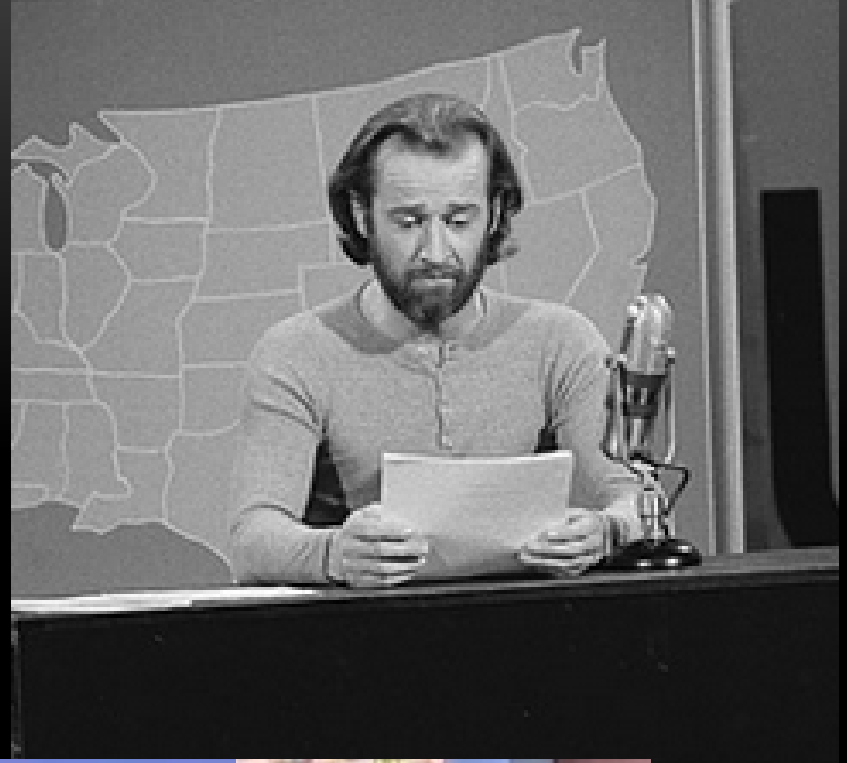
PREPARE TO GET SERVED
CLOUDY with a chance of MEATBALLS
THIS SEPTEMBER
IN 3D AND real 3D IN SELECT THEATERS

LOU DIAMOND PHILLIPS
NICOLE DEBOER
GREG EVIGAN
METAL TORNADO
NOTHING CAN PREPARE YOU FOR THIS

CASPER VAN DIEN
MICHAEL BEACH
500 MPH STORM

WE WERE WARNED
2012
NOVEMBER

Sir



The Weather Man

43
46
45
46
8
CLE
30.1
NE
31%

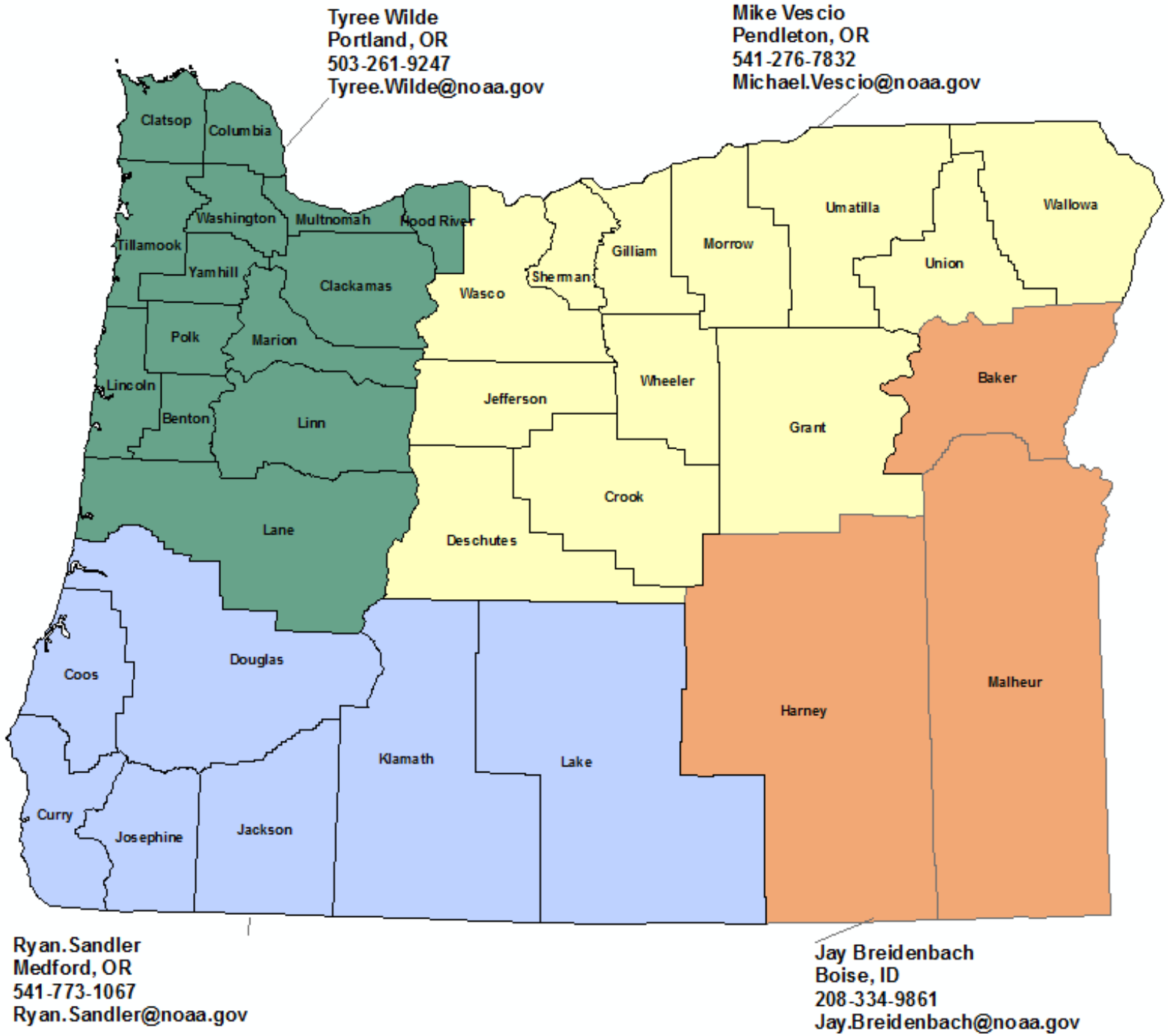
46,608 employees

- Census Bureau
- Economic Analysis Bureau
- Economic Development Administration
- Economics and Statistics Administration
- Export Administration Bureau
- Foreign-Trade Zones Board
- Industry and Security Bureau
- International Trade Administration
- Minority Business Development Agency
- National Institute of Standards and Technology
- **National Oceanic and Atmospheric Administration**
- National Shipping Authority
- National Technical Information Service
- National Telecommunications and Information Administration
- Patent and Trademark Office
- Technology Administration
- Travel and Tourism Administration

12,000 employees

- Marine and Aviation Operations
- Marine Fisheries Service
- National Ocean Service
- Office of Oceanic and Atmospheric Research
- National Environmental Satellite, Data, and Information Service
- **National Weather Service**

4,400 employees


Tyree Wilde
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503-261-9247
Tyree.Wilde@noaa.gov
Mike Vescio
Pendleton, OR
541-276-7832
Michael.Vescio@noaa.gov
Clatsop
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Washington
Multnomah
Hood River
Tillamook
Yamhill
Clackamas
Polk
Marion
Lincoln
Benton
Linn
Lane
Wasco
Sherman
Gilliam
Morrow
Umatilla
Union
Wallowa
Jefferson
Wheeler
Grant
Baker
Deschutes
Crook
Coos
Douglas
Klamath
Lake
Harney
Malheur
Curry
Josephine
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Ryan.Sandler@noaa.gov
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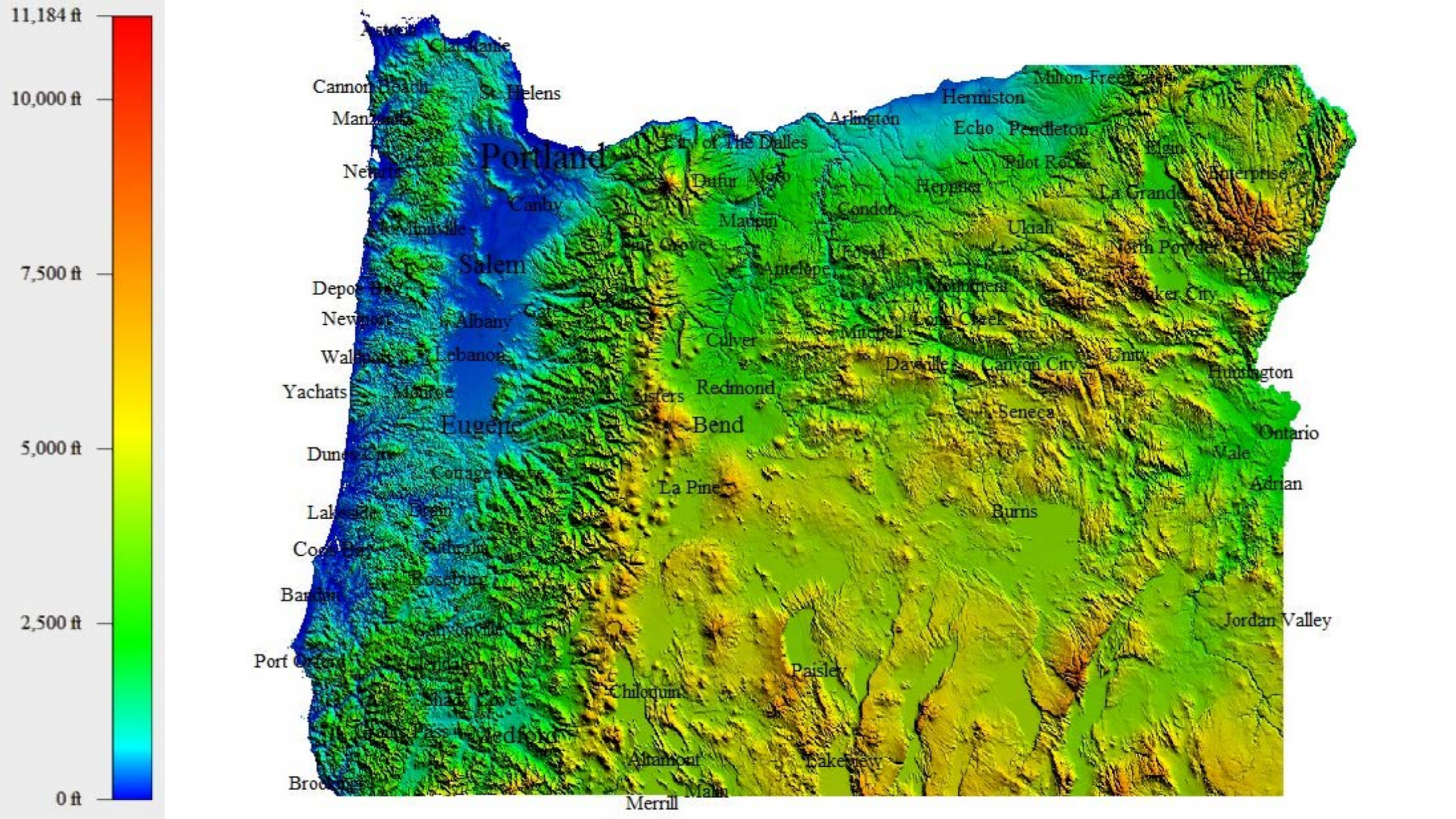
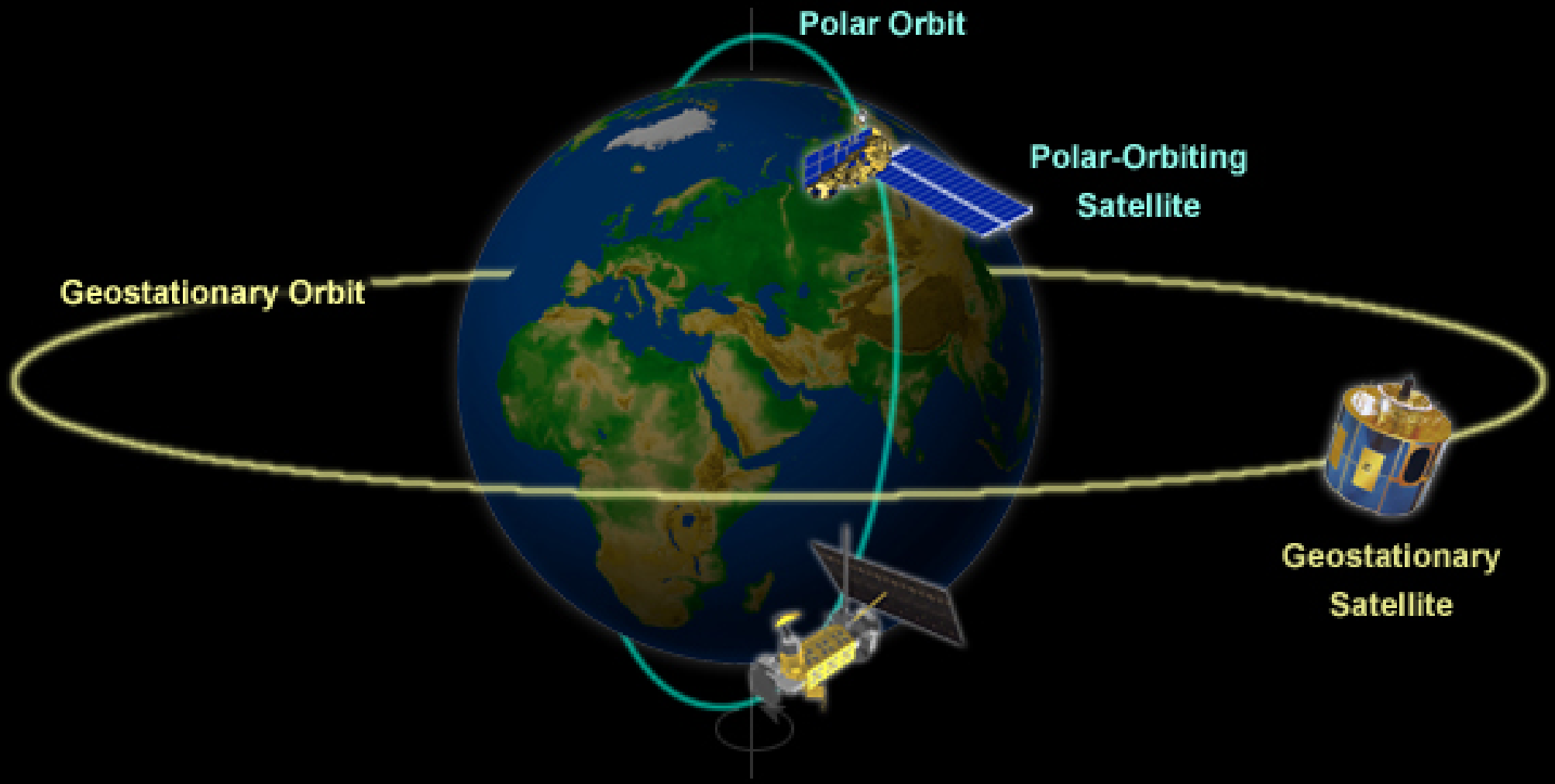
208-334-9861
Jay.Breidenbach@noaa.gov


11,184 ft
10,000 ft
7,500 ft
5,000 ft
2,500 ft
0 ft
Portland
Salem
Eugene
Bend
Medford
Cannon Beach
St. Helens
Canby
Albany
Lebanon
Yachats
Monroe
Sisters
Redmond
La Pine
Culver
Antelope
Maupin
Dufur
Arlington
Hermiston
Echo
Pendleton
Pilot Rock
Heppner
Condon
Ukiah
Elgin
Enterprise
La Grande
North Powder
Baker City
Long Creek
Mitchell
Dayville
Canyon City
Unity
Huntington
Seneca
Ontario
Vale
Adrian
Burns
Jordan Valley
Paisley
Chiloquin
Altamont
Lakeview
Merrill
Malin

Polar-Orbiting and Geostationary Satellites



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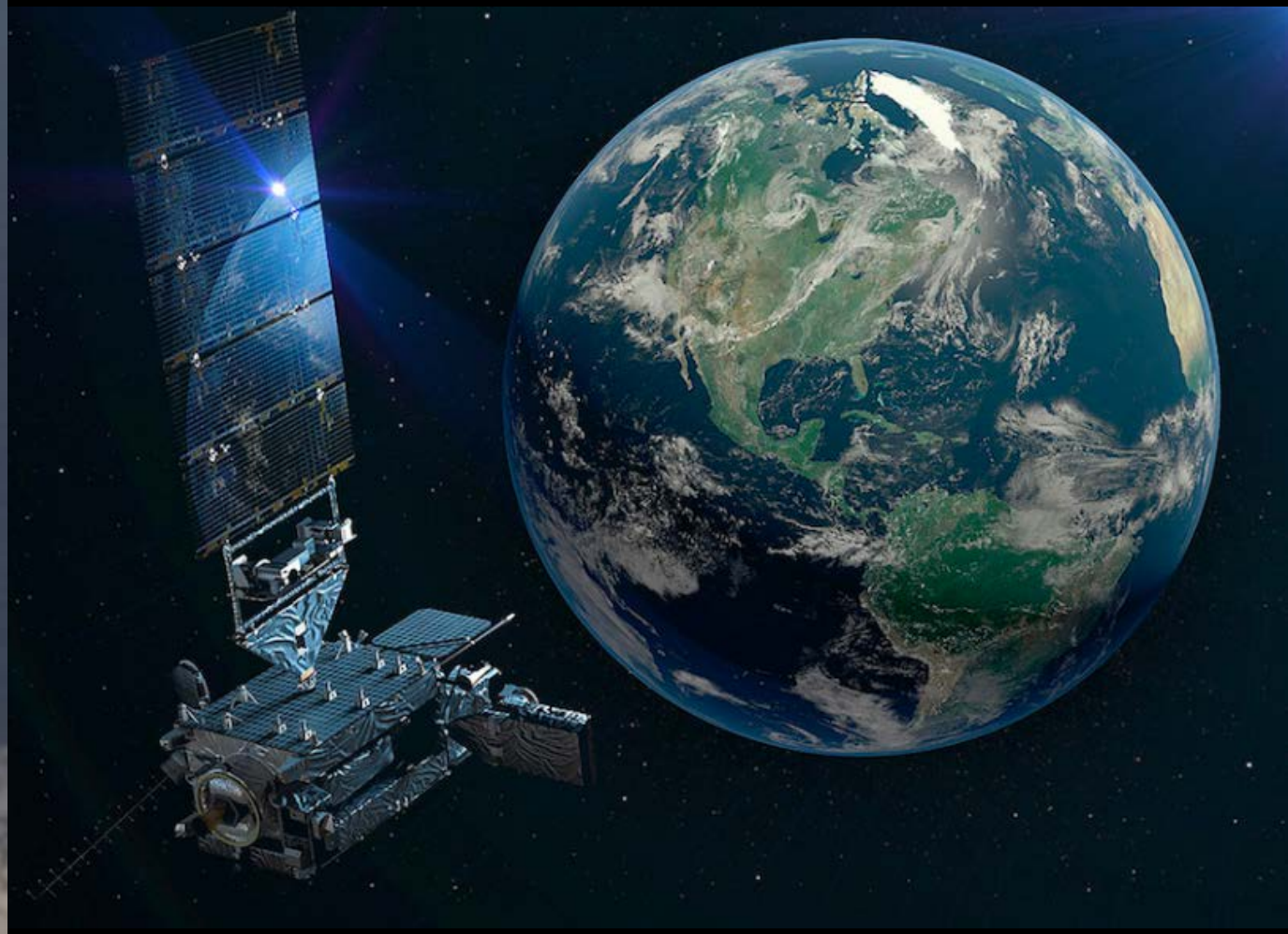
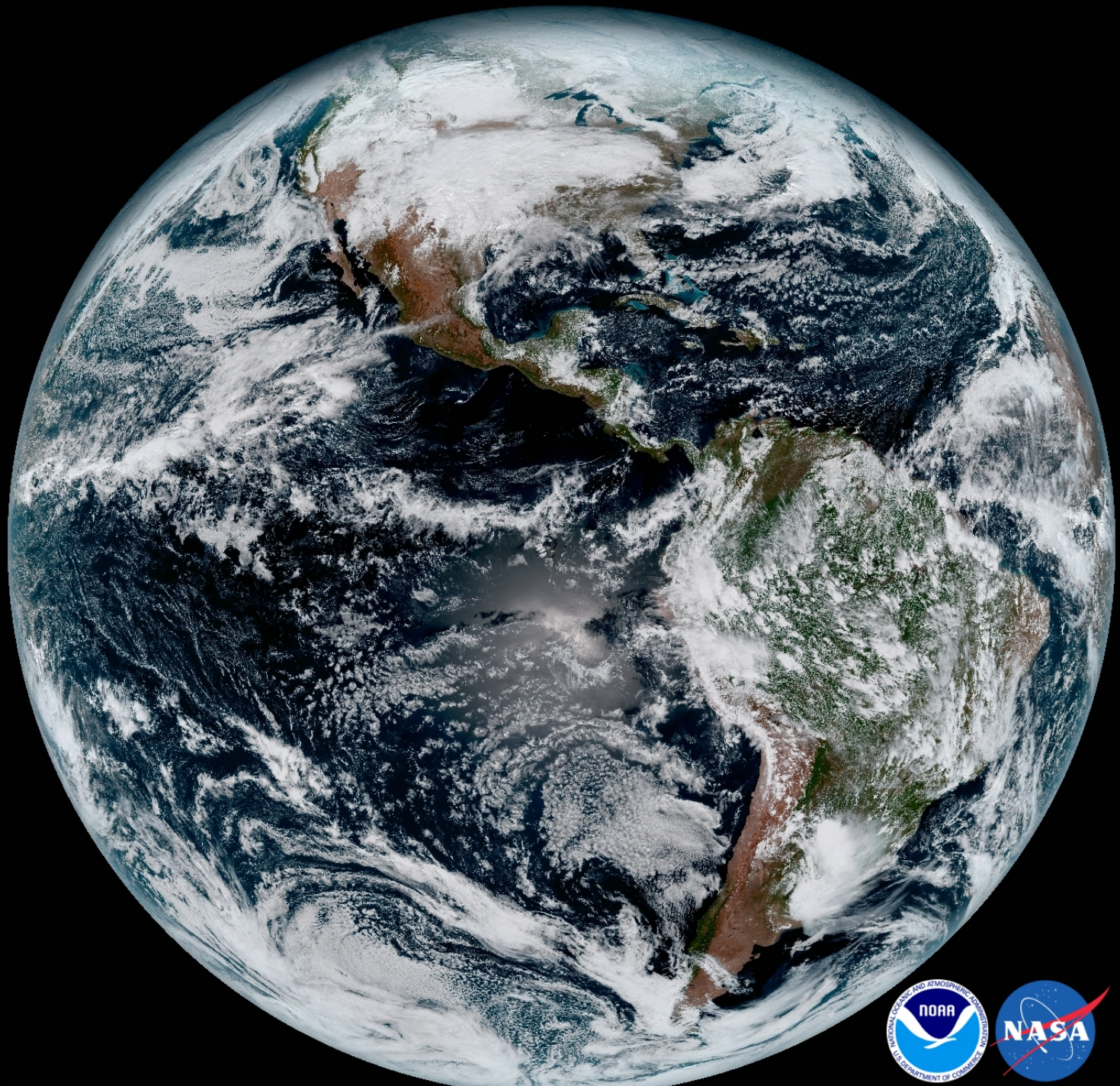
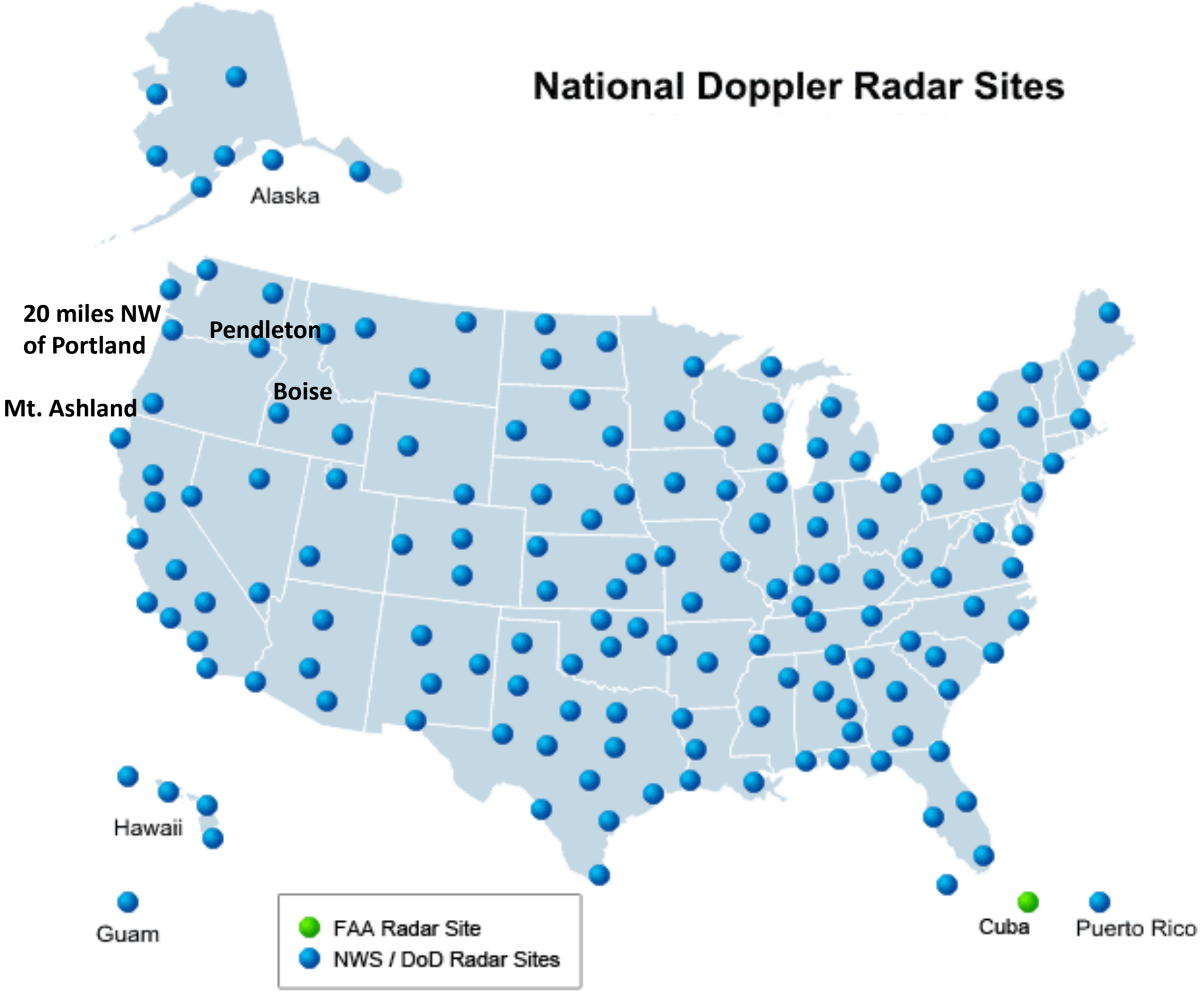
GOES 16
Launched Nov. 2016

GOES 17 Weather Satellite – Launched March 2018

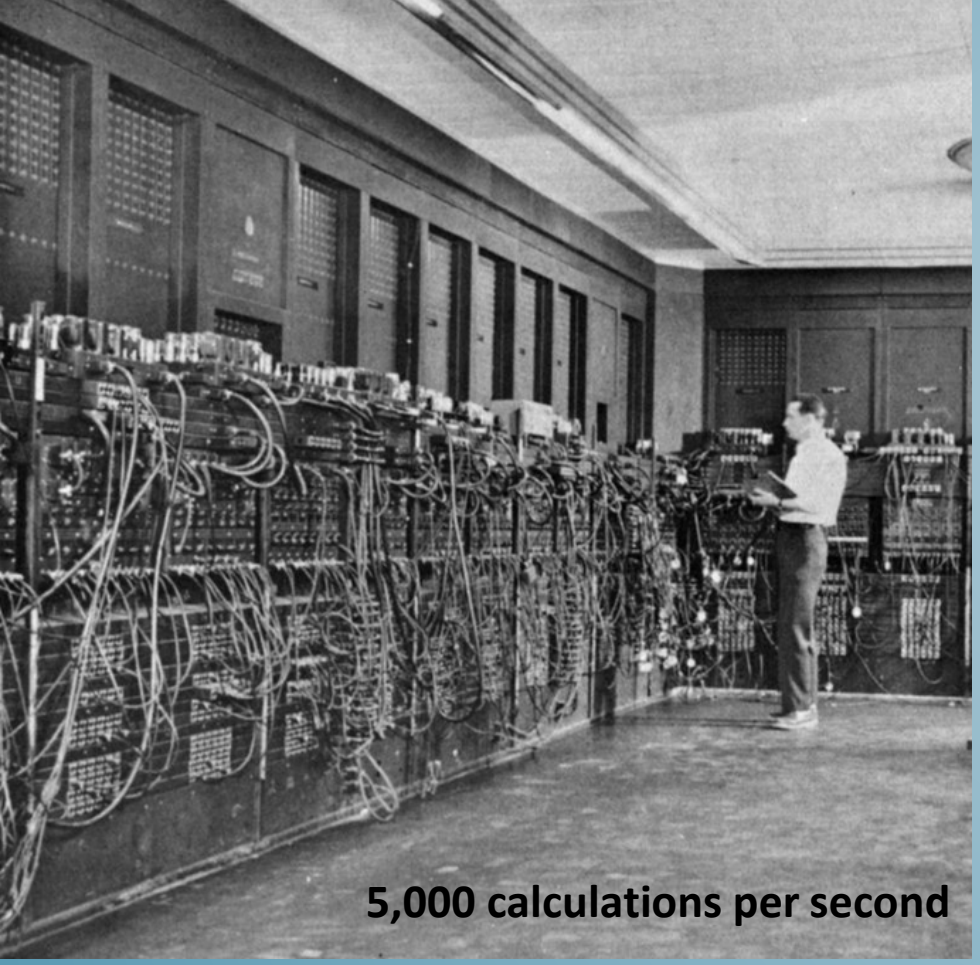



NOAA
NASA


National Doppler Radar Sites
Alaska
20 miles NW of Portland
Pendleton
Boise
Mt. Ashland
Hawaii
Guam
Cuba
Puerto Rico
FAA Radar Site
NWS / DoD Radar Sites

Doppler Radar

SUPERCOMPUTERS



ENIAC - 1950

Luna and Surge

Richard Hendrickson

85 years of volunteer observing since 1930.

Age 101, Bridgehampton, NY.

(Died in 2016 at 103 years old)

Weather Balloon Equipment

1970s-80s

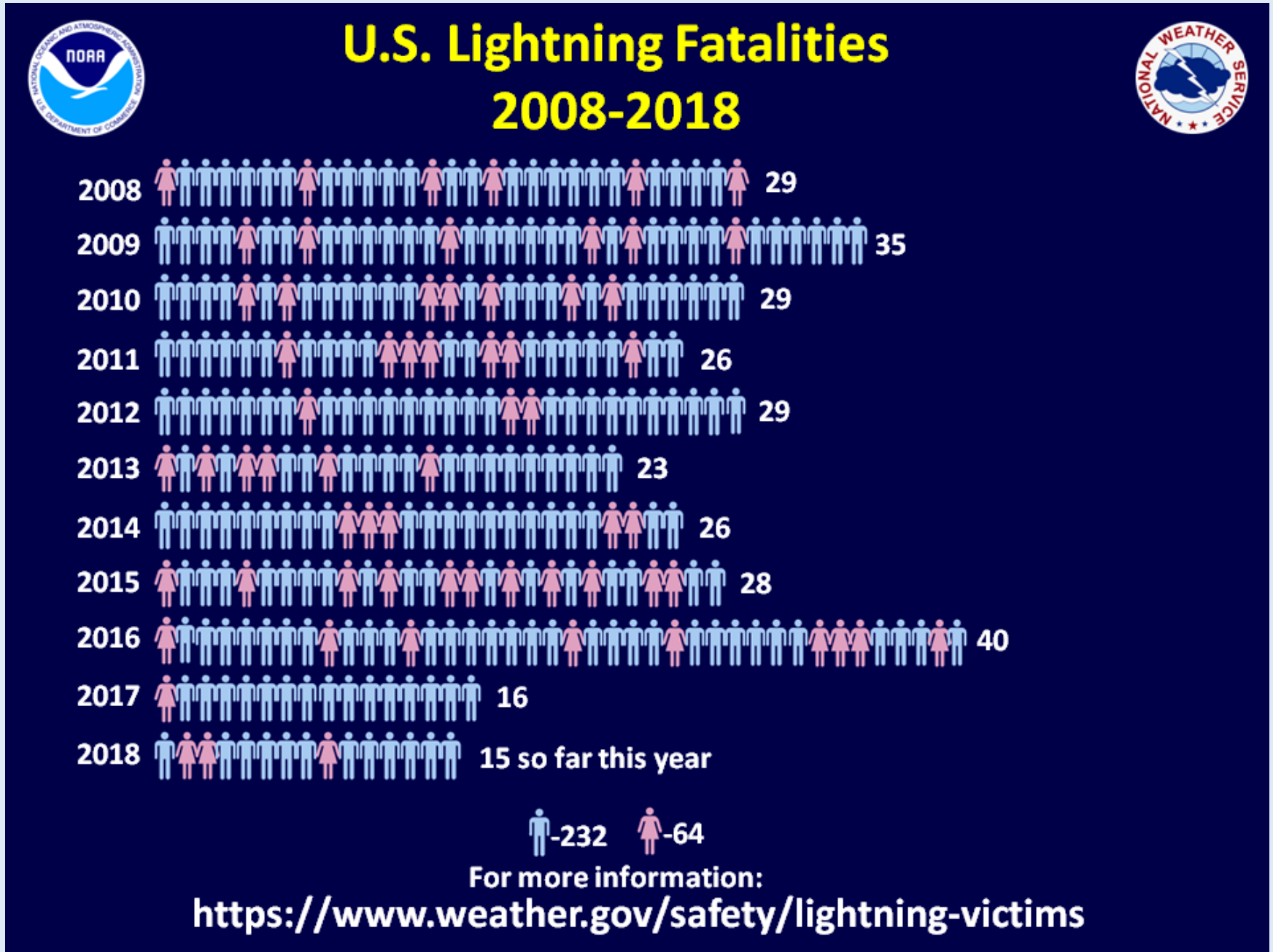
1990s-2009

GPS 2009

GPS 2013

The Weather Balloon

Are more men or women killed by lightning in the United States?



Weather Communication

Showers?

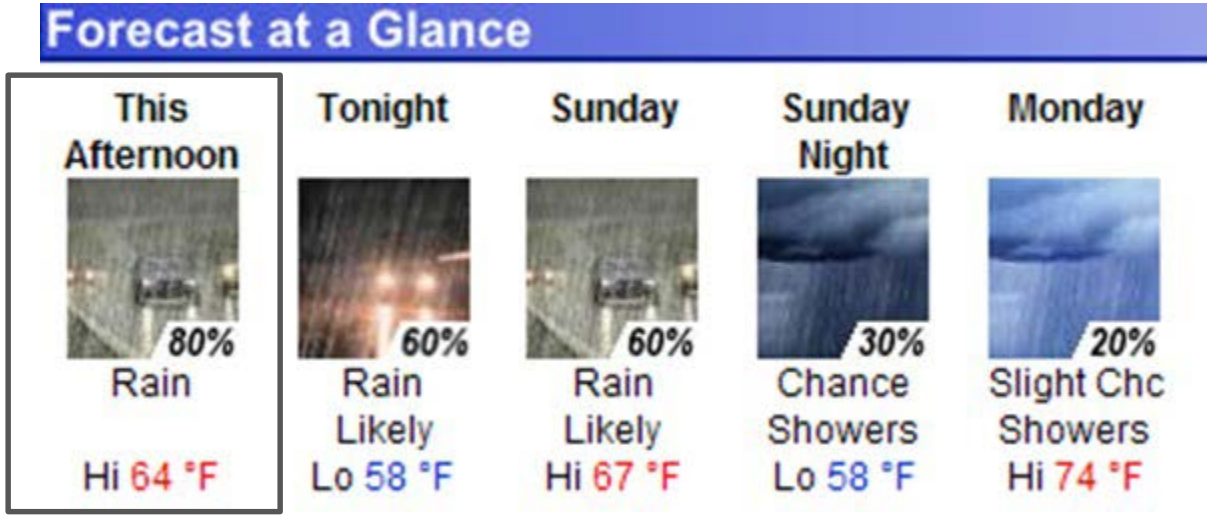
“Glossary of Meteorology” Definition:

Showers are characterized by the suddenness with which they start and stop, by the rapid changes of intensity, and usually by rapid changes in the appearance of the sky.

Google Dictionary Definition:

A brief and usually light fall of rain, hail, sleet, or snow.

Probability of Precipitation



Question: For this afternoon the meteorologist says the chance of rain is 80%. You understand this to mean:

A. Rain will occur 80% of the day.

➡ **B.** At a specific point in the forecast area there is an 80% chance of rain occurring.

C. There is an 80% chance that rain will occur somewhere in the forecast area during the day.

D. 80% of the forecast area will receive rain and 20% will not.

E. Sunny. No Chance of rain.

When Thunder Roars, Go Indoors!

STOP all activities.

Seek shelter in a substantial building or hard-topped vehicle.

Wait 30 minutes after the storm to resume activities.

www.lightningsafety.noaa.gov

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Local forecast by "City, St" or ZIP code
Enter location ... Go
Location Help

News Headlines
- Oregon Smoke Blog
- Latest HRRR Smoke Model Forecast

weather.gov/Medford

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Get Weather
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NWS Forecast Office Medford, OR
Weather.gov > Medford, OR

Medford, OR
Weather Forecast Office

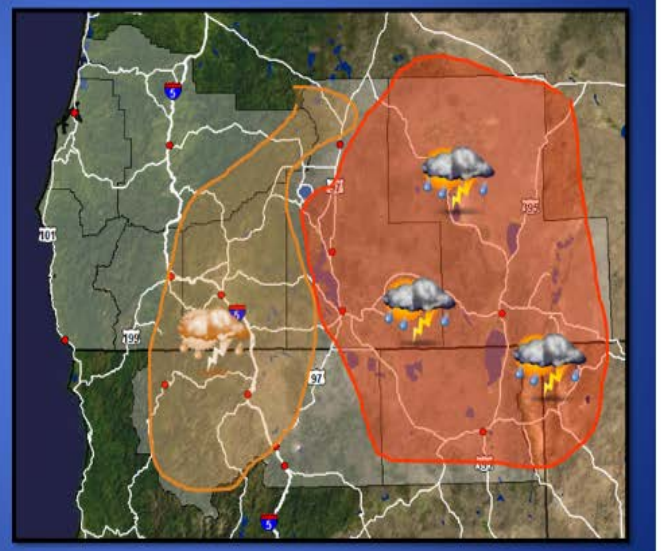
Current Hazards | Current Conditions | Radar | Forecasts | Rivers and Lakes | Climate and Past Weather | Local Programs

IsoTstorms

Incoming Thunderstorm Threat

Threat currently over the east side, expanding westward this evening

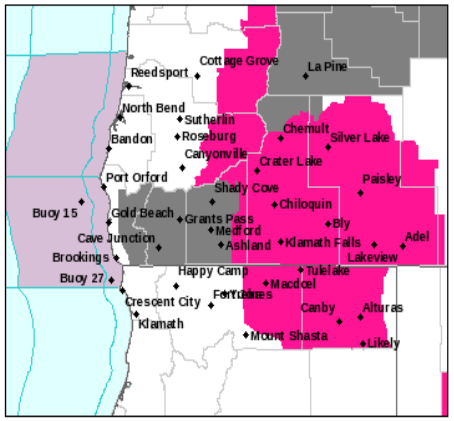
- Thunderstorm chances will expand westward this evening, with slight chance into western Siskiyou and Jackson Counties.
- Red flag warnings are in effect over the Cascades and eastward, and a fire weather watch is in effect west of the Cascades.



Areas in red could see thunderstorms before noon

Show Caption

Click a location below for detailed forecast.



Watches, Warnings & Advisories | Zoom Out

- Red Flag Warning
- Small Craft Advisory
- Gale Watch
- Air Quality Alert

Last Map Update: Wed, Aug. 15, 2018 at 1:01:16 pm PDT

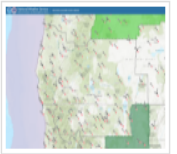
Text Product Selector (Selected product opens in current window)

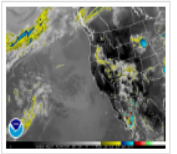
Latest Text Products Issued by MFR

Monthly Climate Summaries

Forecast Discussion

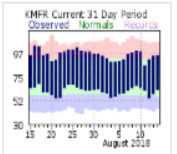
Radar


Observations/Hazards


Satellite Imagery

Weather Map

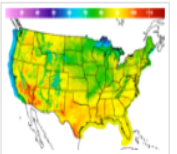
Forecast Weather Tables


Climate Graphs

Fire Weather

Marine

Crater Chronicle


Graphical Forecasts

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USA.gov

US Dept of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
Medford, OR
4003 Cirrus Dr.
Medford, OR 97504-4198
(541) 773-1067

Comments? Questions? Please Contact Us.

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NWS Forecast for: Canyonville OR
Issued by: National Weather Service Medford, OR
Last Update: 2:25 pm PDT Aug 15, 2018

Print

This Afternoon	Tonight	Thursday	Thursday Night	Friday	Friday Night	Saturday	Saturday Night	Sunday
Haze	Haze	Haze	Haze	Haze then Sunny	Clear	Sunny	Clear	Sunny
High: 89 °F	Low: 57 °F	High: 88 °F	Low: 55 °F	High: 87 °F	Low: 53 °F	High: 88 °F	Low: 54 °F	High: 87 °F

This Afternoon: Widespread haze. Sunny, with a high near 89. North northwest wind around 7 mph.

Tonight: Widespread haze. Mostly clear, with a low around 57. North northwest wind 5 to 8 mph becoming calm in the evening.

Thursday: Widespread haze. Mostly sunny, with a high near 88. Calm wind becoming north northwest 5 to 8 mph in the afternoon.

Thursday Night: Widespread haze. Mostly clear, with a low around 55. North northwest wind 5 to 10 mph becoming light northwest in the evening.

Friday: Widespread haze before 11am. Sunny, with a high near 87. Calm wind becoming north northwest 5 to 8 mph in the afternoon.

Friday Night: Clear, with a low around 53.

Saturday: Sunny, with a high near 88.

Saturday Night: Clear, with a low around 54.

Sunday: Sunny, with a high near 87.

Sunday Night: Mostly clear, with a low around 56.

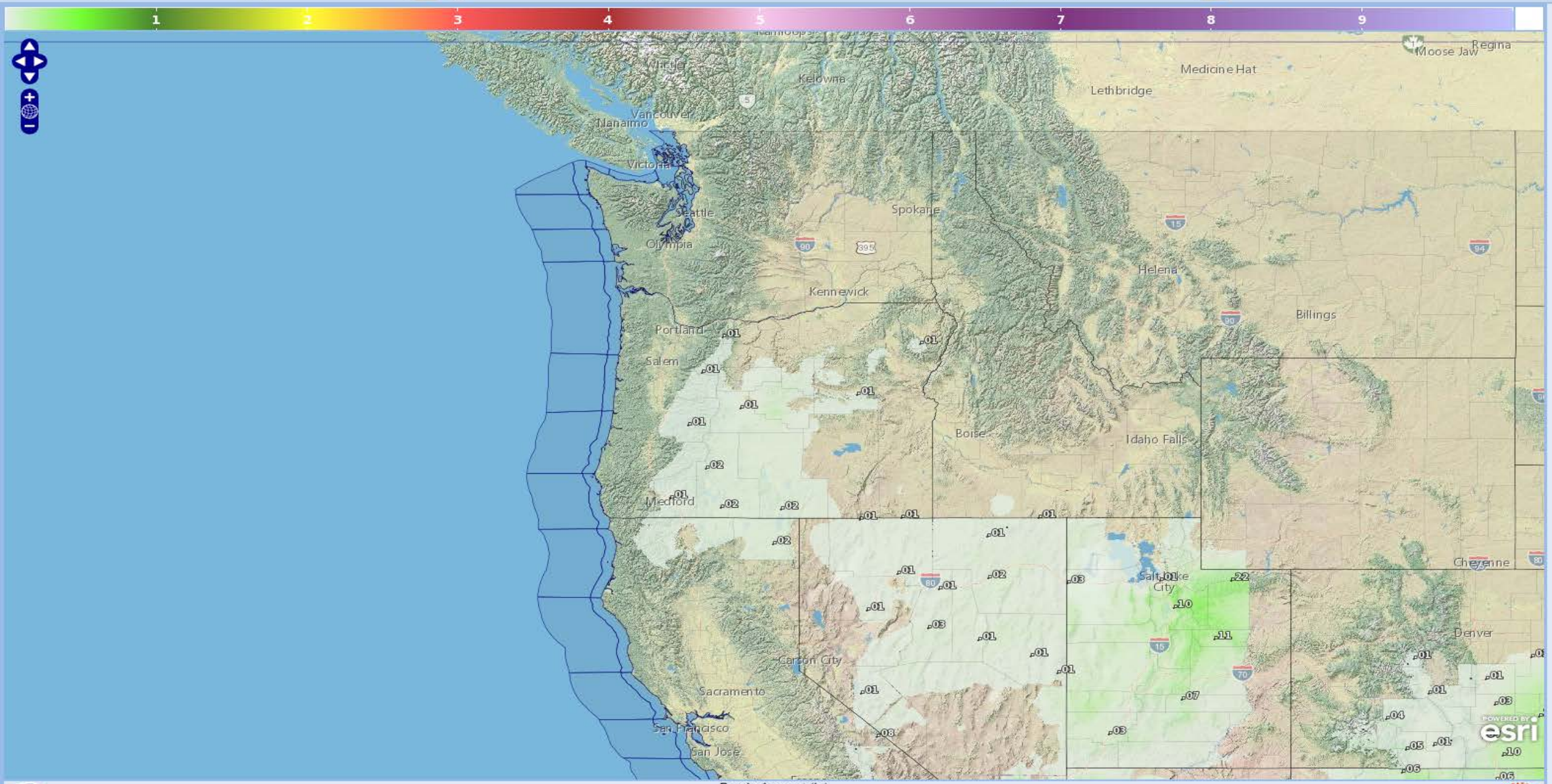
Monday: Mostly sunny, with a high near 89.

Monday Night: Clear, with a low around 58.

Tuesday: Sunny, with a high near 91.

National Digital Forecast Database Display

National (CONUS | Precip Amount (in) | Ending Aug 15, 11 PM PDT | Wed | Thu | Fri



Precip Amount (in)
6 hours ending at: Wed, Aug 15 2018, 11 PM PDT
Issued: Aug 15 at 2 PM PDT

NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Share

Medford, OR
Weather Forecast Office

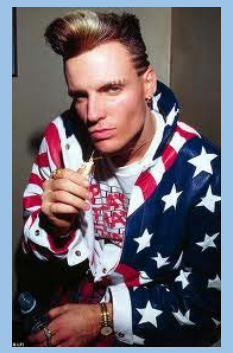
No Warnings or Advisories In Effect for this Point.
For warnings and/or advisories in effect for adjacent areas to this point, see /mfr

Change Table Font Size Increase Decrease

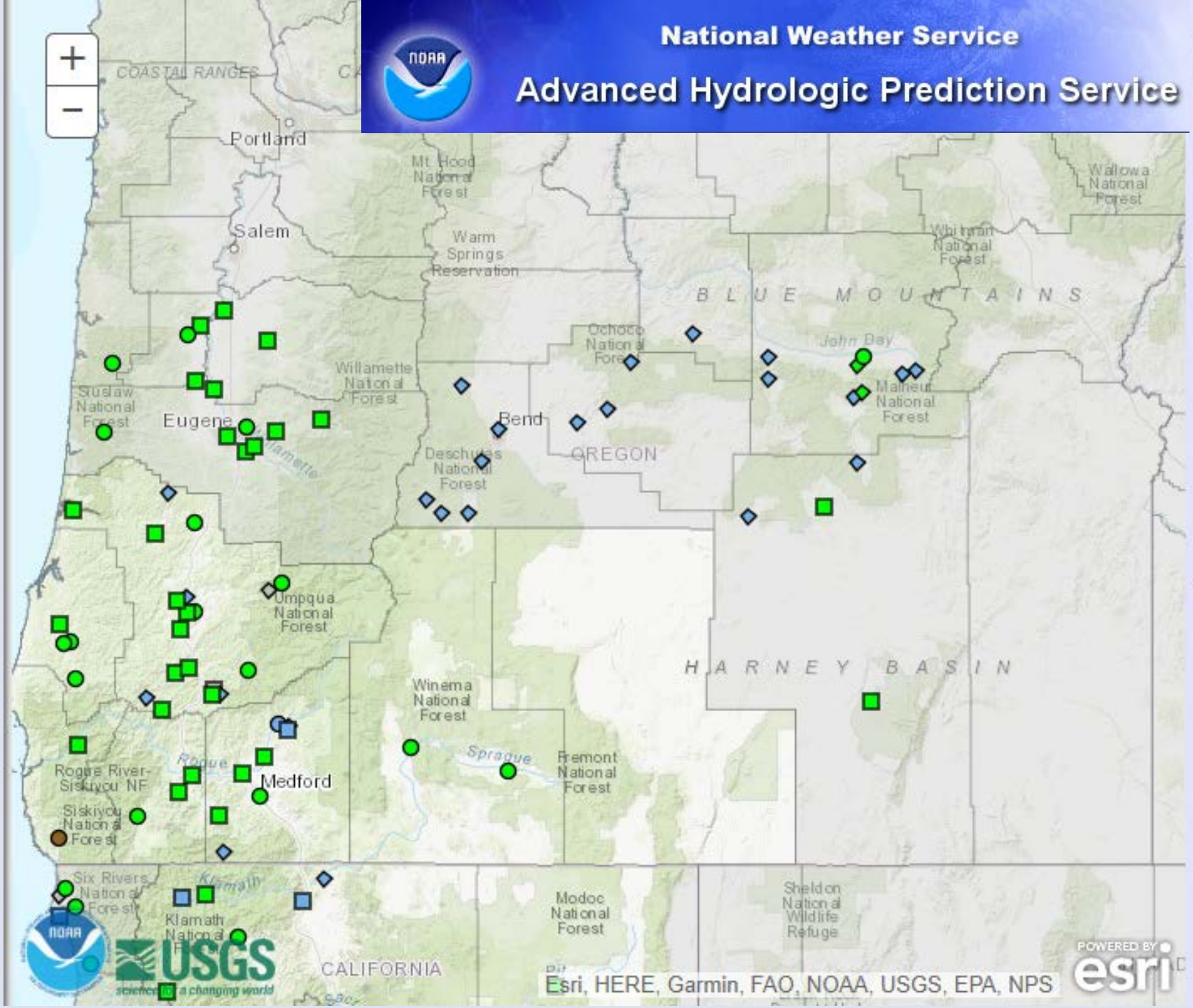
Forecast For Lat/Lon: 42.9310/-123.2900 (Elev. 863 ft)
Canyonville OR
Forecast Created at: 2pm PDT Aug 15, 2018

Custom Weather Forecast Table

	Wed Aug 15				Thu Aug 16				Fri Aug 17				Sat Aug 18				Sun Aug 19				Mon Aug 20			
Weather		Haze																						
Daily-Temp		High 89 Low --			High 88 Low 57				High 87 Low 55				High 88 Low 53				High 87 Low 54				High 89 Low 56			
Chance of Precip	--	0%	5%	5%	5%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Precip		0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"
12-hr Snow Total		--		0"		0"		0"		0"		0"		0"		0"		0"		0"		0"		0"
6-Hour	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm
Temp		72	89	68	58	74	88	66	56	73	87	64	54	73	88	65	55	72	87	66	57	74	89	68
Cloudiness		7%	25%	21%	39%	18%	29%	15%	16%	1%	1%	4%	4%	2%	2%	4%	11%	11%	3%	22%	82%	29%	2%	5%
Dewpoint		56	56	56	54	56	55	53	51	52	46	50	48	51	47	51	50	53	50	53	51	54	53	54
Relative Humdity		53%	34%	66%	87%	53%	33%	64%	84%	47%	25%	59%	81%	46%	25%	60%	84%	50%	29%	61%	82%	50%	30%	61%
Wind		N 3	N 8	NW 2	W 1	N 3	NW 10	NW 3	NW 1	N 8	NW 12	N 5	NE 5	N 6	NW 10	NW 3	N 3	N 5	NW 9	N 3	NE 3	NW 2	NW 7	N 2
Snow Level (ft)		12175	12175	12078	12078	11177	11177	9370	9370	9204	9204	10124	10124	10278	10278	10717	10717	10067	9830	9755	9665	10181	10815	11183

Year				
2011	27,751,585	131,287	81,705	74,551
2018	51,878,288	531,648	750,347	175,657
Percent Increase In Likes	+87%	+305%	+818%	+136%

facebook.com/NWSMedford/



- Forecast available
- Probability and forecasts available
- Observations only available
- Major Flooding
- Moderate Flooding
- Minor Flooding
- Near Flood Stage
- No Flooding
- Observations Are Not Current
- Out of Service
- Flood Category Not Defined
- At or Below Low Water Threshold

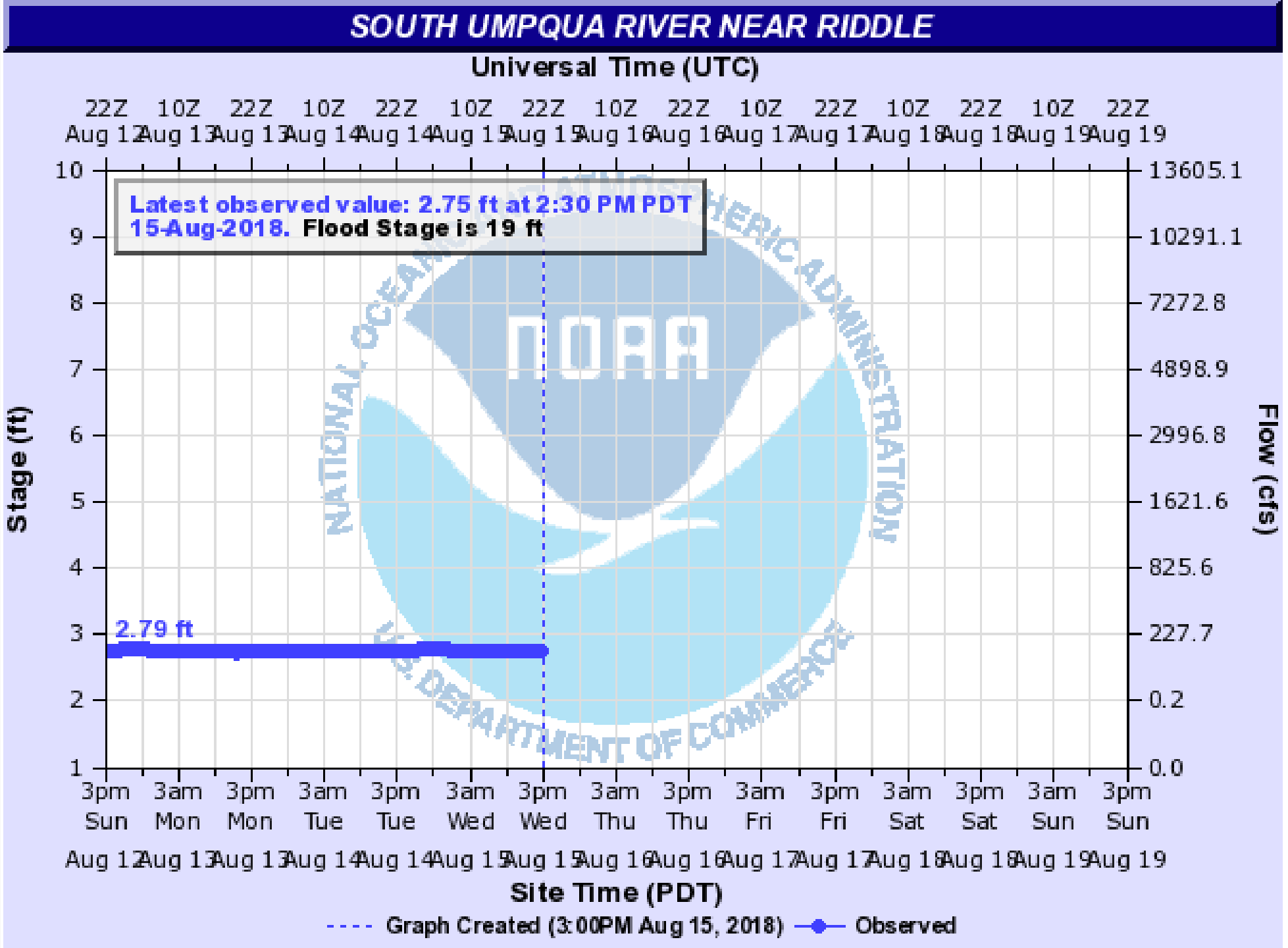
Last map update:
08/15/2018 at 03:02:02 pm PD
08/15/2018 at 22:02:02 UTC

What is UTC time?

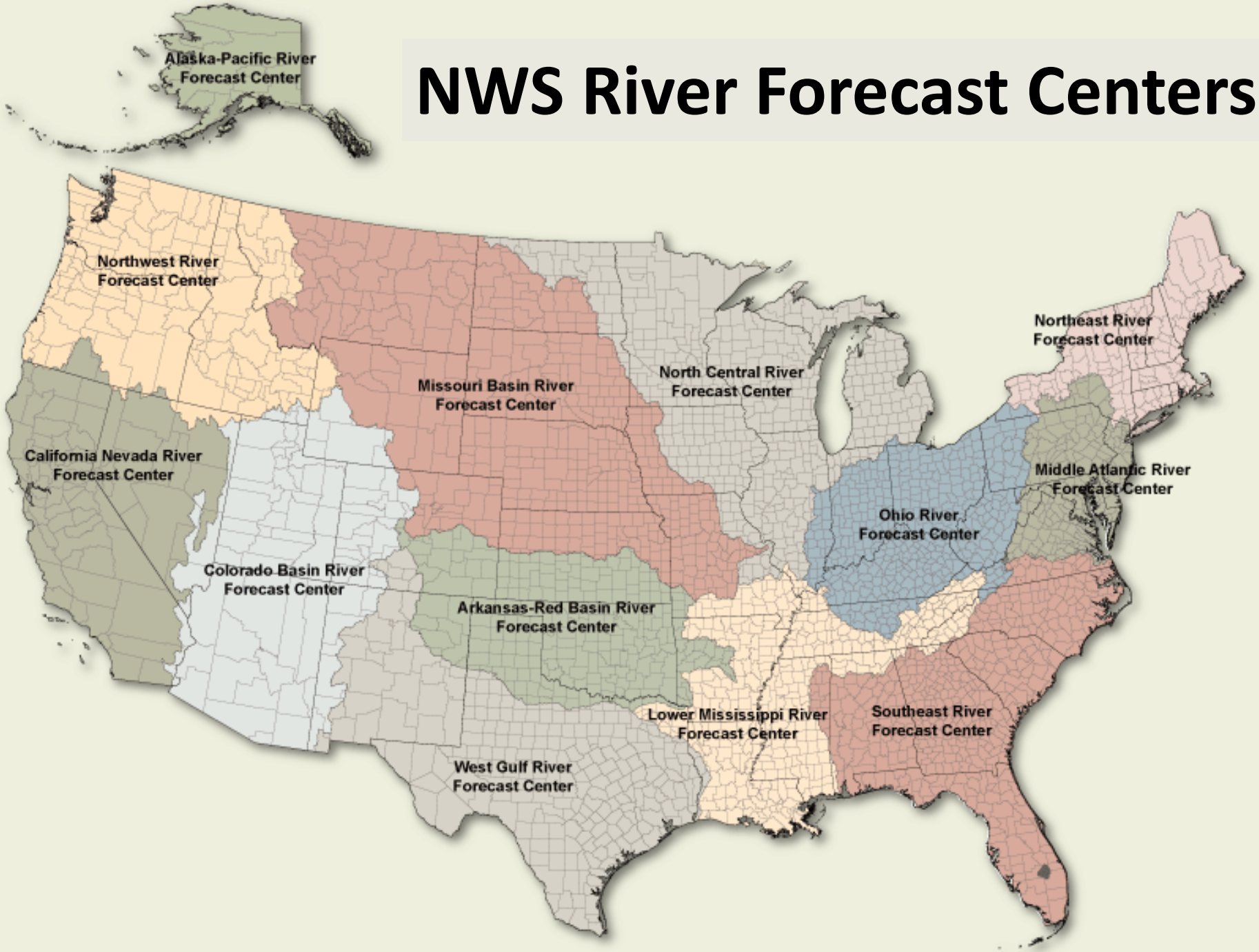
Map Help

Disclaimer

KML


SOUTH UMPQUA RIVER NEAR RIDDLE
Universal Time (UTC)
22Z Aug 12
10Z Aug 13
22Z Aug 13
10Z Aug 14
22Z Aug 14
10Z Aug 15
22Z Aug 15
10Z Aug 16
22Z Aug 16
10Z Aug 17
22Z Aug 17
10Z Aug 18
22Z Aug 18
10Z Aug 19
22Z Aug 19
Latest observed value: 2.75 ft at 2:30 PM PDT 15-Aug-2018. Flood Stage is 19 ft
2.79 ft
Stage (ft)
10
9
8
7
6
5
4
3
2
1
Flow (cfs)
13605.1
10291.1
7272.8
4898.9
2996.8
1621.6
825.6
227.7
0.2
0.0
3pm Sun Aug 12
3am Mon Aug 13
3pm Mon Aug 13
3am Tue Aug 14
3pm Tue Aug 14
3am Wed Aug 15
3pm Wed Aug 15
3am Thu Aug 16
3pm Thu Aug 16
3am Fri Aug 17
3pm Fri Aug 17
3am Sat Aug 18
3pm Sat Aug 18
3am Sun Aug 19
3pm Sun Aug 19
Site Time (PDT)
Graph Created (3:00PM Aug 15, 2018)
Observed

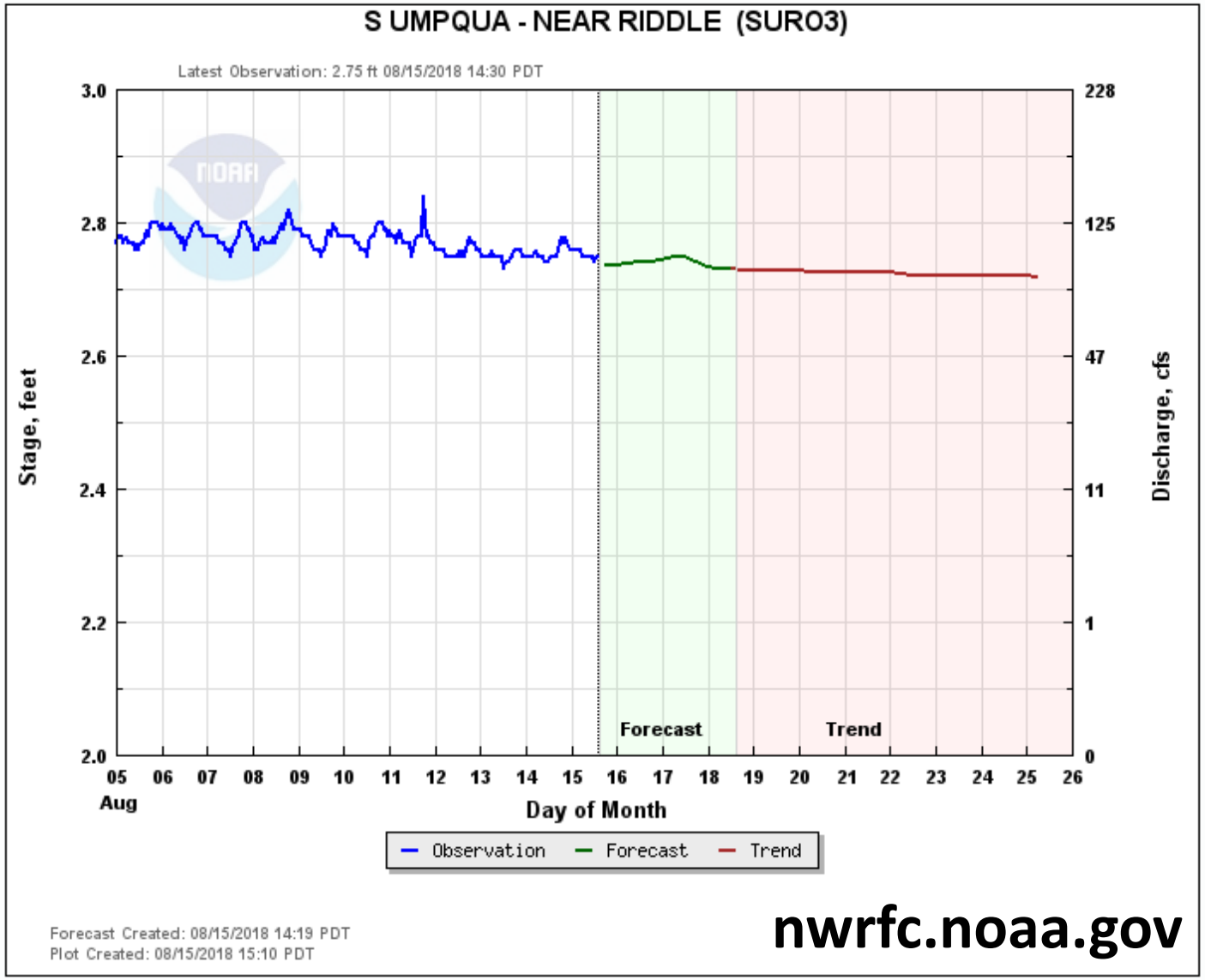
NWS River Forecast Centers



NORTHWEST RIVER FORECAST CENTER

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The 4-10 Day Trend Forecast is based on model guidance only. Daily variation and uncertainty of forecasts during this period is high.



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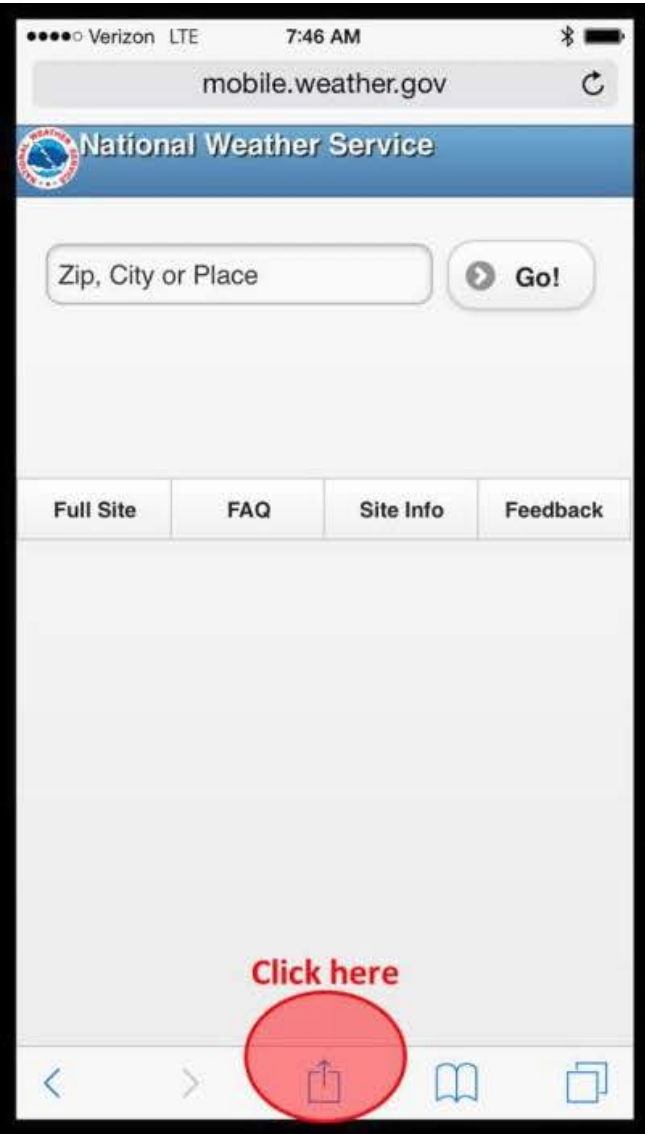

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National Weather Service

Canyonville OR

Current Conditions

Roseburg Regional Airport
Updated: 13 Aug 3:53 pm PDT

Fair

88 °F
Wind N 7 MPH
Dew Point 54 °F
(32% RH)

Forecast
13 Aug 15:53 pm PDT

Tonight	Tuesday	Tuesday Night
Clear Lo 57°F	Sunny Hi 94°F	Clear Lo 59°F

Detailed Forecast

Radar

Satellite

Forecast Discussion

Forecast Graphics

Rivers/Lakes

Tweet a #wxreport

More Info

Tropical Weather

Marine/Tides

Astronomical Data

Tsunami

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The Forecast for Canyonville

Canyonville OR

Tonight
Clear
Low 57
Clear, with a low around 57. North northwest wind 5 to 8 mph becoming calm in the evening.

Tuesday
Sunny
High 94
Sunny, with a high near 94. Calm wind becoming north northwest around 6 mph in the afternoon.

Tuesday Night
Clear
Low 59
Clear, with a low around 59. North northwest wind 5 to 8 mph becoming calm in the evening.

Wednesday
Sunny
High 91
Sunny, with a high near 91. Calm wind becoming northwest around 6 mph in the afternoon.

Wednesday Night
Mostly Clear
Low 57
Mostly clear, with a low around 57. Northwest wind 5 to 8 mph becoming calm in the evening.

Thursday
Sunny
High 89
Sunny, with a high near 89.

Thursday Night
Clear
Low 55
Clear, with a low around 55.

Friday
Sunny
High 87
Sunny, with a high near 87.

Friday Night
Clear
Low 54
Clear, with a low around 54.

Saturday
Sunny
High 88
Sunny, with a high near 88.

Saturday Night
Clear
Low 56
Clear, with a low around 56.

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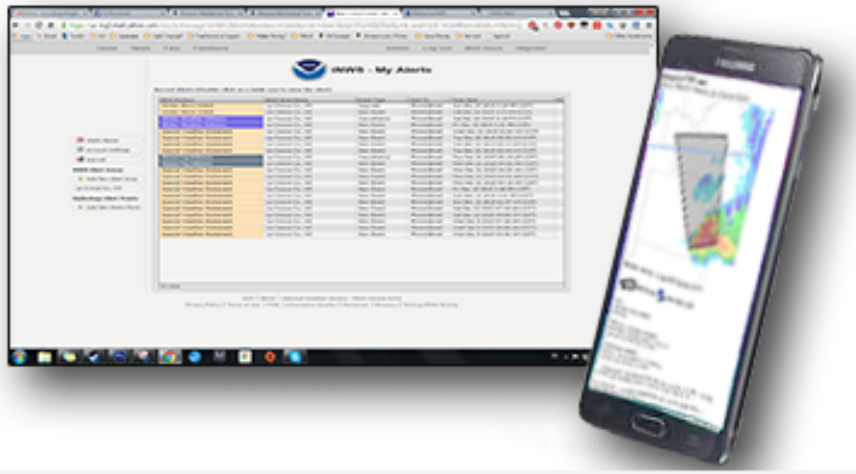
iNWS - Interactive NWS

National Weather Service Mobile Decision Support Services (MDSS)

iNWS MOBILE ALERTING

Receive customized text message and e-mail alerts for National Weather Service products that you care about.



Welcome

InteractiveNWS (iNWS) is the home of new mobile and desktop innovations of the National Weather Service. This application suite allows NWS partners to receive National Weather Service products in new and innovative ways, such as text messaging and mobile-enabled webpages. iNWS strives to fulfill our mission of protecting life and property by using technology to reach out to our customers.

Recent News

Note: If you are receiving alerts, but never signed up for them, they may be coming from a new FEMA public system called the Wireless Emergency Alerts (WEA). More information can be found at http://ctia.org/wea

iNWS is an experimental service intended for NWS core partners: emergency managers, community leaders, other government agencies and the electronic media.

iNWS - Registration

User Information

First Name :

Last Name :

Organization :

Job Title :

City :

State : AL

Account Credentials

Email :

Confirm Email :

Password :

Confirm Password :

NOAA Password Policy:
- passwords must be at least 12 characters long
- must contain at least one upper case letter
- must contain at least one lower case letter
- must contain at least one number
- must contain at least one special character (e.g. $, #, &, etc.)

By clicking 'Submit Registration Request' you are voluntarily providing this information and agreeing to the:

Terms of Use

Privacy Policy

Your registration request will be reviewed, and you will receive an email notifying you of the approval or denial of your registration request within 1-2 business days.

Submit Registration Request

PLEASE NOTE:
iNWS is intended for members of community emergency planning and response management:
- emergency managers
- law enforcement
- fire and emergency responders
- transportation and safety managers
- public officials

Skywarn Net Control operators
Government partners of the NWS
Members of the media
Please do not register if you do not fit one of these descriptions

Please note the following federal policy and executive order issued about texting while driving.

We collect personal information such as your email address and cell phone number in order to validate your account and to provide you with customized alerts.
If you have concerns about how and why we collect this data please read the Privacy Policy.

To view the official NWS product description Click here.

inws.ncep.noaa.gov

iNWS - My Alerts

- Alerts Home
- Account Settings
- Log out

Alert Areas

- Add New Alert Area
- Coos Co., OR
- Curry Co., OR
- Douglas Co., OR
- Jackson Co., OR
- Josephine Co., OR
- Klamath Co., OR
- Lake Co., OR
- Modoc Co., CA
- Siskiyou Co., CA

Hydrology Alert Points

- Add New Hydro Point
- AGNO3: Rogue River at Agness
- GRAO3: Rogue River at Grants Pass
- RSBO3: South Umpqua River at Roseburg

Search for Alerts

Start Date :

End Date :

Alert Area : All

Submit Reset

Alerts (Double-click on a table row to view the alert)

NWS Product	Alert Area Name	Event Type	Sent To	Time Sent
Fire Weather Watch	Modoc Co., CA	Cancellation	Email	Mon Aug 13 2018 2:52 PM (PDT)
Fire Weather Watch	Lake Co., OR	New Event	Email	Mon Aug 13 2018 2:45 PM (PDT)
Fire Weather Watch	Klamath Co., OR	New Event	Email	Mon Aug 13 2018 2:45 PM (PDT)
Fire Weather Watch	Siskiyou Co., CA	New Event	Email	Mon Aug 13 2018 2:45 PM (PDT)
Fire Weather Watch	Modoc Co., CA	New Event	Email	Mon Aug 13 2018 2:45 PM (PDT)
Fire Weather Watch	Modoc Co., CA	New Event	Email	Sun Aug 12 2018 05:21 AM (PDT)
Red Flag Warning	Lake Co., OR	Correction	Email	Fri Aug 10 2018 9:20 PM (PDT)
Red Flag Warning	Klamath Co., OR	Correction	Email	Fri Aug 10 2018 9:20 PM (PDT)
Red Flag Warning	Modoc Co., CA	Correction	Email	Fri Aug 10 2018 9:20 PM (PDT)
Red Flag Warning	Lake Co., OR	New Event	Email	Fri Aug 10 2018 3:09 PM (PDT)
Red Flag Warning	Klamath Co., OR	New Event	Email	Fri Aug 10 2018 3:09 PM (PDT)
Red Flag Warning	Modoc Co., CA	New Event	Email	Fri Aug 10 2018 3:09 PM (PDT)
Red Flag Warning	Lake Co., OR	Continuation	Email	Fri Aug 10 2018 3:09 PM (PDT)
Red Flag Warning	Modoc Co., CA	New Event	Email	Fri Aug 10 2018 09:31 AM (PDT)
Red Flag Warning	Klamath Co., OR	Continuation	Email	Fri Aug 10 2018 03:47 AM (PDT)
Red Flag Warning	Lake Co., OR	Continuation	Email	Fri Aug 10 2018 03:47 AM (PDT)
Red Flag Warning	Modoc Co., CA	Continuation	Email	Fri Aug 10 2018 03:47 AM (PDT)
Fire Weather Watch	Modoc Co., CA	New Event	Email	Fri Aug 10 2018 02:59 AM (PDT)
Red Flag Warning	Lake Co., OR	New Event	Email	Thu Aug 9 2018 9:04 PM (PDT)
Red Flag Warning	Klamath Co., OR	New Event	Email	Thu Aug 9 2018 9:04 PM (PDT)
Fire Weather Watch	Modoc Co., CA	Upgrade	Email	Thu Aug 9 2018 9:04 PM (PDT)

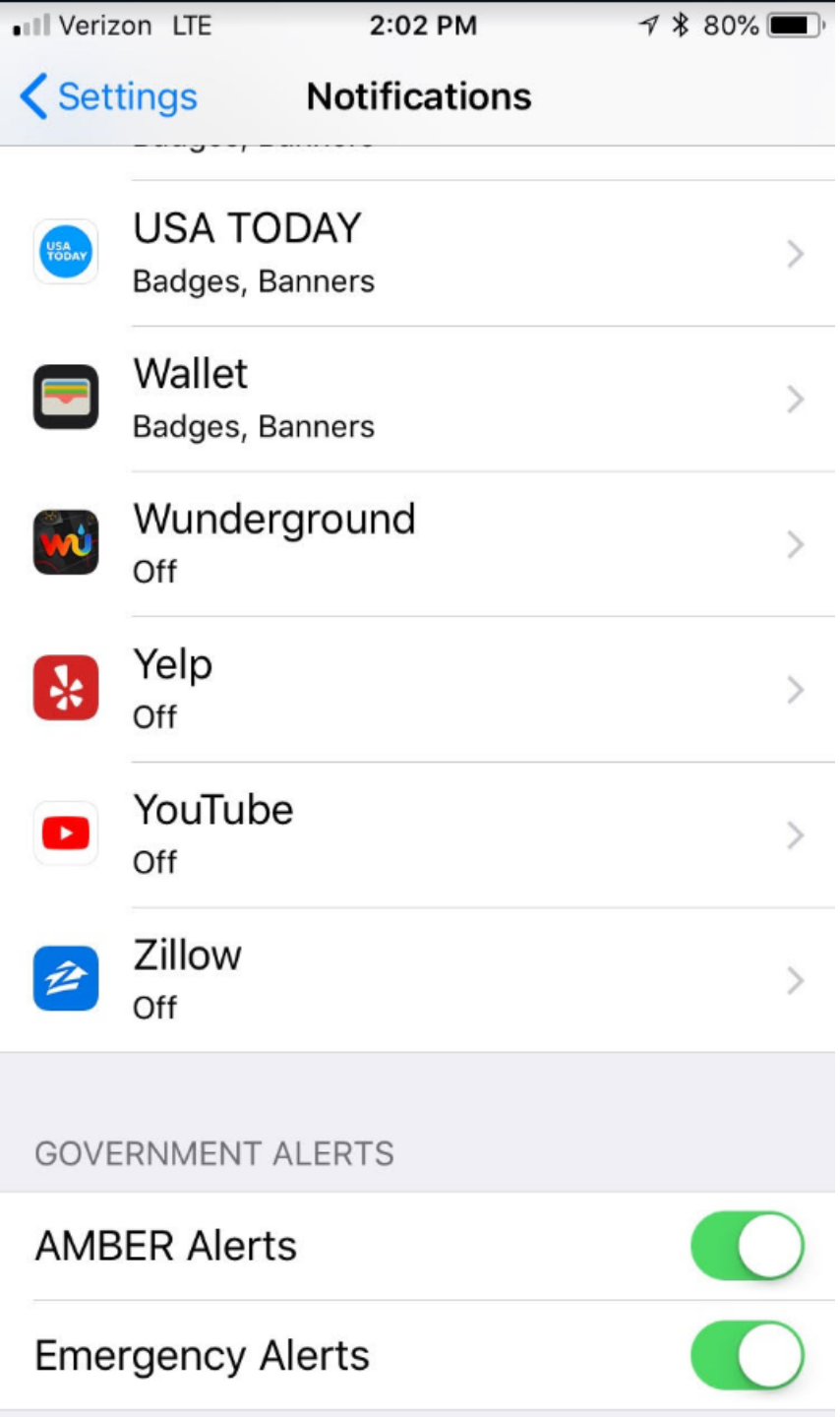
50 rows

WEA Messages Originated by NWS

	Warning Type	WEA Message
Extreme	Tsunami Warning	Tsunami danger on the coast. Go to high ground or move inland. Listen to local news. –NWS
	Tornado Warning	Tornado Warning in this area til hh:mm tzT. Take shelter now. Check local media. –NWS *-- or --* Tornado EMERGENCY til hh:mm tzT. Tornado spotted in this area. Find shelter now! -NWS
	Extreme Wind Warning	Extreme Wind Warning this area til hh:mm tzT ddd. Take shelter. –NWS
	Hurricane Warning	Hurricane Warning this area. Check local media and authorities. -NWS
	Typhoon Warning	Typhoon Warning this area til hh:mm tzT ddd. Check local media and authorities. -NWS
Severe	Storm Surge Warning**	NWS: Life-threatening storm surge danger. Check for possible evacuation orders.
	Flash Flood Warning	Flash Flood Warning this area til hh:mm tzT. Avoid flooded areas. Check local media. -NWS
	Dust Storm Warning	Dust Storm Warning til hh:mm tzT. Remember, Pull Aside, Stay Alive -NWS

Legend
tzT = timezone
ddd= three letter abbreviation for day of the week

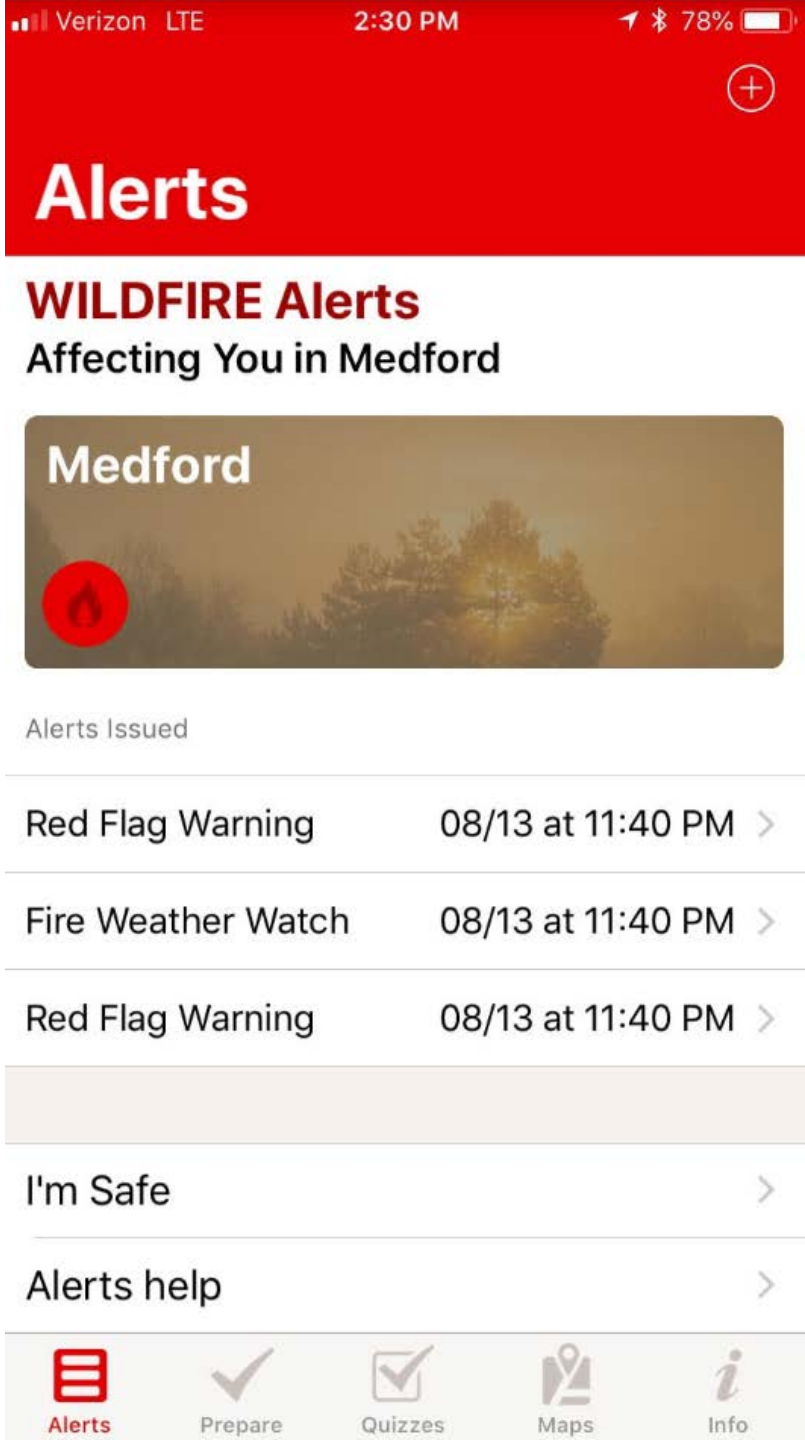
**Availability of Storm Surge Warning varies by wireless carrier


Verizon LTE
2:02 PM
80%
Settings
Notifications
USA TODAY
Badges, Banners
Wallet
Badges, Banners
Wunderground
Off
Yelp
Off
YouTube
Off
Zillow
Off
GOVERNMENT ALERTS
AMBER Alerts
Emergency Alerts

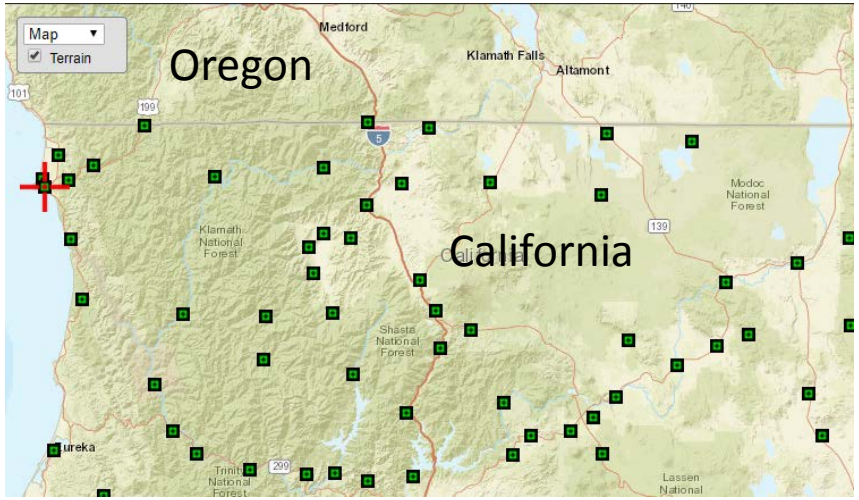
Emergency Alert
Tornado Warning in this area until 6:30 PM. Take Shelter. Check Local Media. -NWS

Saturday, January 13
EMERGENCY ALERTS
now
Emergency Alert
BALLISTIC MISSILE THREAT INBOUND TO HAWAII. SEEK IMMEDIATE SHELTER. THIS IS NOT A DRILL.
Slide for more

Red Cross Emergency App



You can answer questions like “was this a 100 year rainfall In Crescent City?”



hdsc.nws.noaa.gov/hdsc/pfds/

NOAA's National Weather Service

Hydrometeorological Design Studies Center

Precipitation Frequency Data Server (PFDS)

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Probable Maximum Precipitation
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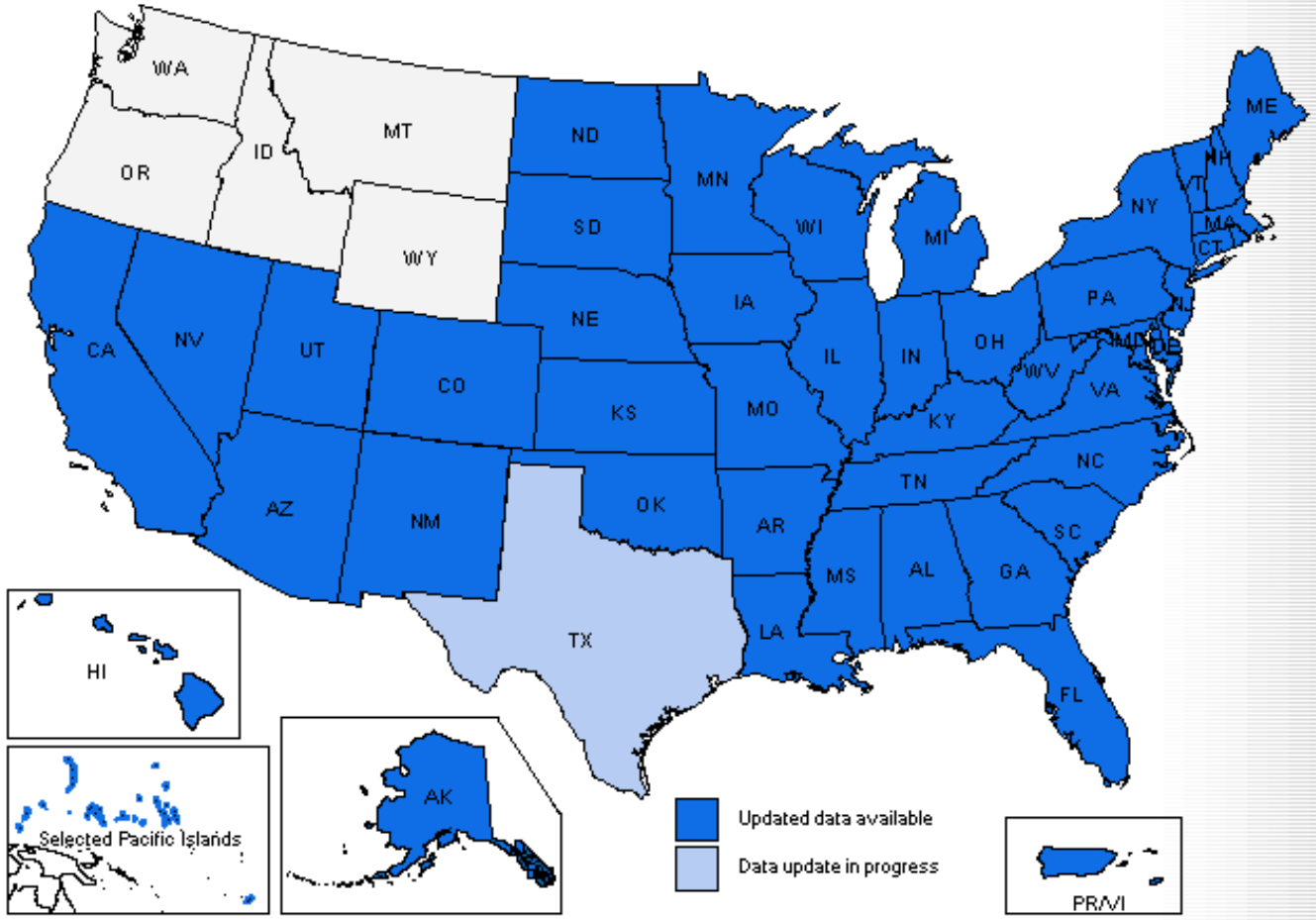
Precipitation Frequency Data Server (PFDS)

State: Choose a state (or click map) ▾ Load



Crescent City, California – Precipitation Frequency Estimates

PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.172** (0.150-0.199)	**0.224** (0.195-0.260)	**0.292** (0.253-0.340)	**0.346** (0.297-0.407)	**0.420** (0.348-0.513)	**0.477** (0.385-0.595)	**0.533** (0.420-0.685)	**0.592** (0.451-0.783)	**0.670** (0.488-0.929)	**0.730** (0.512-1.05)
10-min	**0.246** (0.214-0.286)	**0.321** (0.279-0.373)	**0.418** (0.362-0.487)	**0.496** (0.426-0.584)	**0.602** (0.498-0.735)	**0.683** (0.552-0.854)	**0.765** (0.602-0.982)	**0.848** (0.647-1.12)	**0.960** (0.699-1.33)	**1.05** (0.733-1.51)
15-min	**0.298** (0.259-0.345)	**0.388** (0.337-0.451)	**0.505** (0.438-0.589)	**0.600** (0.516-0.706)	**0.728** (0.603-0.889)	**0.826** (0.668-1.03)	**0.925** (0.727-1.19)	**1.02** (0.782-1.36)	**1.16** (0.845-1.61)	**1.26** (0.887-1.82)
30-min	**0.403** (0.351-0.468)	**0.526** (0.457-0.611)	**0.685** (0.594-0.798)	**0.814** (0.699-0.957)	**0.987** (0.817-1.21)	**1.12** (0.905-1.40)	**1.25** (0.986-1.61)	**1.39** (1.06-1.84)	**1.57** (1.15-2.18)	**1.71** (1.20-2.47)
60-min	**0.569** (0.496-0.660)	**0.742** (0.645-0.862)	**0.966** (0.838-1.13)	**1.15** (0.986-1.35)	**1.39** (1.15-1.70)	**1.58** (1.28-1.97)	**1.77** (1.39-2.27)	**1.96** (1.50-2.60)	**2.22** (1.62-3.08)	**2.42** (1.70-3.48)
2-hr	**0.849** (0.739-0.984)	**1.07** (0.933-1.25)	**1.36** (1.18-1.59)	**1.60** (1.37-1.88)	**1.91** (1.58-2.33)	**2.15** (1.74-2.69)	**2.39** (1.88-3.07)	**2.64** (2.01-3.49)	**2.96** (2.16-4.11)	**3.21** (2.25-4.63)
3-hr	**1.10** (0.961-1.28)	**1.38** (1.20-1.60)	**1.73** (1.50-2.01)	**2.01** (1.73-2.36)	**2.39** (1.98-2.92)	**2.67** (2.16-3.34)	**2.96** (2.33-3.80)	**3.25** (2.48-4.30)	**3.64** (2.65-5.04)	**3.93** (2.76-5.66)
6-hr	**1.75** (1.53-2.03)	**2.15** (1.87-2.50)	**2.67** (2.31-3.11)	**3.07** (2.64-3.61)	**3.61** (2.99-4.41)	**4.02** (3.25-5.02)	**4.42** (3.48-5.68)	**4.83** (3.68-6.39)	**5.36** (3.91-7.44)	**5.77** (4.05-8.31)
12-hr	**2.50** (2.17-2.90)	**3.10** (2.69-3.60)	**3.86** (3.34-4.50)	**4.46** (3.83-5.24)	**5.24** (4.34-6.40)	**5.82** (4.71-7.27)	**6.39** (5.03-8.21)	**6.96** (5.31-9.22)	**7.71** (5.61-10.7)	**8.26** (5.79-11.9)
24-hr	**3.49** (3.12-3.99)	**4.41** (3.93-5.05)	**5.56** (4.94-6.37)	6.45 (5.69-7.45)	**7.60** (6.52-9.03)	**8.44** (7.12-10.2)	**9.26** (7.64-11.4)	**10.1** (8.11-12.8)	**11.1** (8.64-14.6)	**11.9** (8.96-16.1)
2-day	**4.87** (4.35-5.57)	**6.12** (5.46-7.01)	**7.67** (6.82-8.80)	**8.87** (7.83-10.2)	**10.4** (8.93-12.4)	**11.5** (9.71-13.9)	**12.6** (10.4-15.6)	**13.7** (11.0-17.3)	**15.0** (11.7-19.7)	**16.0** (12.1-21.7)
3-day	**5.73** (5.12-6.56)	**7.18** (6.40-8.22)	**8.96** (7.97-10.3)	**10.3** (9.13-11.9)	**12.1** (10.4-14.4)	**13.4** (11.3-16.2)	**14.6** (12.0-18.0)	**15.8** (12.7-20.0)	**17.3** (13.4-22.7)	**18.4** (13.9-24.9)
4-day	**6.50** (5.80-7.43)	**8.14** (7.26-9.32)	**10.2** (9.03-11.6)	**11.7** (10.3-13.5)	**13.6** (11.7-16.2)	**15.1** (12.7-18.2)	**16.4** (13.5-20.3)	**17.7** (14.3-22.4)	**19.4** (15.1-25.4)	**20.6** (15.5-27.9)
7-day	**8.04** (7.17-9.20)	**10.1** (9.02-11.6)	**12.6** (11.2-14.5)	**14.5** (12.8-16.8)	**16.9** (14.5-20.1)	**18.6** (15.7-22.5)	**20.2** (16.6-24.9)	**21.7** (17.5-27.4)	**23.6** (18.3-30.9)	**24.9** (18.8-33.7)
10-day	**9.47** (8.45-10.8)	**11.9** (10.6-13.7)	**14.9** (13.2-17.1)	**17.1** (15.1-19.8)	**19.8** (17.0-23.6)	**21.7** (18.3-26.3)	**23.5** (19.4-29.1)	**25.2** (20.3-31.9)	**27.3** (21.2-35.8)	**28.7** (21.7-38.9)
20-day	**13.2** (11.7-15.0)	**16.5** (14.7-18.9)	**20.4** (18.1-23.4)	**23.2** (20.5-26.8)	**26.7** (22.9-31.7)	**29.0** (24.5-35.2)	**31.2** (25.8-38.6)	**33.2** (26.8-42.1)	**35.7** (27.7-46.9)	**37.4** (28.2-50.6)
30-day	**16.6** (14.8-19.0)	**20.6** (18.4-23.6)	**25.2** (22.4-29.0)	**28.6** (25.2-33.0)	**32.6** (28.0-38.7)	**35.3** (29.8-42.7)	**37.8** (31.2-46.7)	**40.1** (32.3-50.7)	**42.8** (33.2-56.2)	**44.6** (33.7-60.4)
45-day	**21.7** (19.4-24.9)	**26.5** (23.6-30.4)	**32.0** (28.5-36.7)	**35.9** (31.7-41.5)	**40.6** (34.8-48.2)	**43.7** (36.8-52.9)	**46.5** (38.4-57.5)	**49.1** (39.5-62.2)	**52.1** (40.5-68.4)	**54.2** (40.8-73.3)
60-day	**26.3** (23.5-30.1)	**31.7** (28.2-36.3)	**37.7** (33.6-43.3)	**42.0** (37.1-48.6)	**47.1** (40.4-56.0)	**50.5** (42.6-61.1)	**53.5** (44.2-66.2)	**56.3** (45.4-71.3)	**59.5** (46.3-78.2)	**61.7** (46.5-83.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Maximum 1-Day Total Precipitation for CRESCENT CITY MCNAMARA AP, CA

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date
1	6.01	2016-12-14
2	5.19	2016-10-13
3	5.05	1954-12-30
4	4.94	1950-10-28
5	4.36	2006-12-25
6	4.29	1950-10-29
7	4.14	2012-11-29
8	3.86	2008-12-28
9	3.71	2003-12-13
10	3.56	2006-02-27
Period of record: 1949-10-15 to 2018-08-07		

#1 was a 5 to 10 year storm?

*Max 1 day ≠ Max 24 hour

Yreka, California – Precipitation Frequency Estimates

PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.111** (0.096-0.130)	**0.151** (0.130-0.178)	**0.209** (0.179-0.246)	**0.260** (0.221-0.310)	**0.337** (0.276-0.417)	**0.402** (0.321-0.509)	**0.473** (0.367-0.616)	**0.553** (0.416-0.743)	**0.691** (0.495-0.973)	**0.795** (0.548-1.16)
10-min	**0.160** (0.137-0.187)	**0.217** (0.187-0.255)	**0.300** (0.257-0.353)	**0.373** (0.317-0.444)	**0.483** (0.395-0.597)	**0.576** (0.460-0.729)	**0.678** (0.526-0.883)	**0.792** (0.596-1.07)	**0.990** (0.710-1.40)	**1.14** (0.786-1.67)
15-min	**0.193** (0.166-0.226)	**0.262** (0.226-0.308)	**0.363** (0.311-0.427)	**0.452** (0.384-0.537)	**0.584** (0.478-0.722)	**0.697** (0.556-0.882)	**0.820** (0.637-1.07)	**0.958** (0.720-1.29)	**1.20** (0.859-1.69)	**1.38** (0.950-2.02)
30-min	**0.259** (0.224-0.304)	**0.353** (0.304-0.414)	**0.487** (0.418-0.574)	**0.607** (0.516-0.722)	**0.786** (0.642-0.971)	**0.937** (0.748-1.19)	**1.10** (0.856-1.44)	**1.29** (0.968-1.73)	**1.61** (1.15-2.27)	**1.85** (1.28-2.71)
60-min	**0.351** (0.302-0.411)	**0.477** (0.411-0.560)	**0.659** (0.566-0.776)	**0.821** (0.698-0.976)	**1.06** (0.869-1.31)	**1.27** (1.01-1.60)	**1.49** (1.16-1.94)	**1.74** (1.31-2.34)	**2.18** (1.56-3.07)	**2.51** (1.73-3.67)
2-hr	**0.506** (0.436-0.593)	**0.628** (0.541-0.737)	**0.804** (0.690-0.947)	**0.961** (0.817-1.14)	**1.20** (0.978-1.48)	**1.40** (1.11-1.77)	**1.62** (1.25-2.10)	**1.86** (1.40-2.50)	**2.23** (1.60-3.14)	**2.54** (1.75-3.72)
3-hr	**0.622** (0.536-0.729)	**0.745** (0.641-0.875)	**0.923** (0.792-1.09)	**1.08** (0.920-1.29)	**1.32** (1.08-1.63)	**1.52** (1.22-1.93)	**1.74** (1.35-2.27)	**1.99** (1.50-2.68)	**2.37** (1.70-3.33)	**2.68** (1.85-3.93)
6-hr	**0.881** (0.759-1.03)	**1.01** (0.874-1.19)	**1.21** (1.04-1.42)	**1.38** (1.17-1.64)	**1.64** (1.34-2.02)	**1.85** (1.48-2.34)	**2.09** (1.62-2.72)	**2.35** (1.77-3.16)	**2.75** (1.97-3.87)	**3.08** (2.12-4.51)
12-hr	**1.21** (1.05-1.42)	**1.44** (1.24-1.69)	**1.74** (1.49-2.05)	**1.99** (1.69-2.36)	**2.34** (1.91-2.89)	**2.62** (2.09-3.31)	**2.90** (2.25-3.78)	**3.21** (2.41-4.31)	**3.63** (2.60-5.11)	**3.97** (2.73-5.81)
24-hr	**1.70** (1.52-1.95)	**2.15** (1.91-2.46)	**2.71** (2.41-3.12)	**3.16** (2.78-3.65)	**3.74** (3.20-4.46)	**4.17** (3.50-5.07)	**4.60** (3.77-5.71)	**5.02** (4.02-6.40)	**5.58** (4.30-7.38)	**5.99** (4.47-8.19)
2-day	**2.13** (1.90-2.44)	**2.76** (2.46-3.17)	**3.55** (3.15-4.08)	**4.17** (3.67-4.83)	**4.97** (4.25-5.93)	**5.56** (4.66-6.76)	**6.13** (5.03-7.62)	**6.70** (5.36-8.55)	**7.44** (5.74-9.85)	**7.99** (5.97-10.9)
3-day	**2.44** (2.17-2.80)	**3.19** (2.84-3.66)	**4.13** (3.67-4.75)	**4.87** (4.29-5.64)	**5.82** (4.98-6.95)	**6.53** (5.48-7.94)	**7.22** (5.92-8.97)	**7.90** (6.32-10.1)	**8.78** (6.77-11.6)	**9.44** (7.05-12.9)
4-day	**2.72** (2.42-3.12)	**3.56** (3.17-4.09)	**4.62** (4.10-5.31)	**5.45** (4.80-6.31)	**6.52** (5.57-7.78)	**7.31** (6.13-8.89)	**8.08** (6.63-10.0)	**8.84** (7.08-11.3)	**9.84** (7.58-13.0)	**10.6** (7.90-14.4)
7-day	**3.21** (2.86-3.67)	**4.15** (3.70-4.76)	**5.34** (4.74-6.14)	**6.27** (5.52-7.26)	**7.47** (6.39-8.91)	**8.35** (7.01-10.2)	**9.21** (7.56-11.4)	**10.1** (8.05-12.8)	**11.2** (8.60-14.8)	**12.0** (8.95-16.4)
10-day	**3.53** (3.15-4.05)	**4.55** (4.05-5.22)	**5.82** (5.17-6.69)	**6.81** (6.00-7.88)	**8.09** (6.92-9.65)	**9.02** (7.57-11.0)	**9.93** (8.15-12.3)	**10.8** (8.67-13.8)	**12.0** (9.24-15.9)	**12.9** (9.60-17.6)
20-day	**4.41** (3.93-5.05)	**5.69** (5.06-6.52)	**7.27** (6.45-8.35)	**8.48** (7.47-9.82)	**10.0** (8.57-12.0)	**11.1** (9.35-13.5)	**12.2** (10.0-15.2)	**13.3** (10.6-16.9)	**14.6** (11.2-19.3)	**15.6** (11.6-21.3)
30-day	**5.19** (4.63-5.95)	**6.72** (5.98-7.71)	**8.58** (7.61-9.86)	**9.99** (8.80-11.6)	**11.8** (10.1-14.0)	**13.0** (10.9-15.8)	**14.2** (11.7-17.7)	**15.4** (12.3-19.6)	**16.9** (13.0-22.3)	**17.9** (13.4-24.5)
45-day	**6.42** (5.72-7.35)	**8.30** (7.39-9.52)	**10.6** (9.38-12.1)	**12.3** (10.8-14.2)	**14.4** (12.3-17.1)	**15.8** (13.3-19.3)	**17.2** (14.1-21.4)	**18.6** (14.9-23.7)	**20.2** (15.6-26.8)	**21.4** (16.0-29.2)
60-day	**7.48** (6.66-8.57)	**9.64** (8.58-11.1)	**12.2** (10.8-14.0)	**14.1** (12.4-16.3)	**16.5** (14.1-19.6)	**18.1** (15.2-22.0)	**19.6** (16.1-24.4)	**21.0** (16.8-26.8)	**22.8** (17.6-30.2)	**24.0** (17.9-32.8)

Maximum 1-Day Total Precipitation for YREKA, CA

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date
1	4.57	1964-12-23
2	4.29	1894-01-14
3	3.75	1955-12-22
4	3.48	1906-01-18
5	3.28	2005-12-31
6	3.03	1974-01-16
7	2.82	1906-01-15
8	2.80	2009-05-03
-	2.80	1929-12-09
10	2.75	1981-12-20
Period of record: 1893-02-01 to 2018-08-08		

#1 was a 100 year storm?

*Max 1 day ≠ Max 24 hour

Western Regional Climate Center

PROVIDING CLIMATE SERVICES SINCE 1986

About Us | Historical Data | Monitoring | Projects & Research | Specialty Climate | Weather | Station Metadata | Terms & Acronyms

Western U.S. Precipitation Frequency Maps

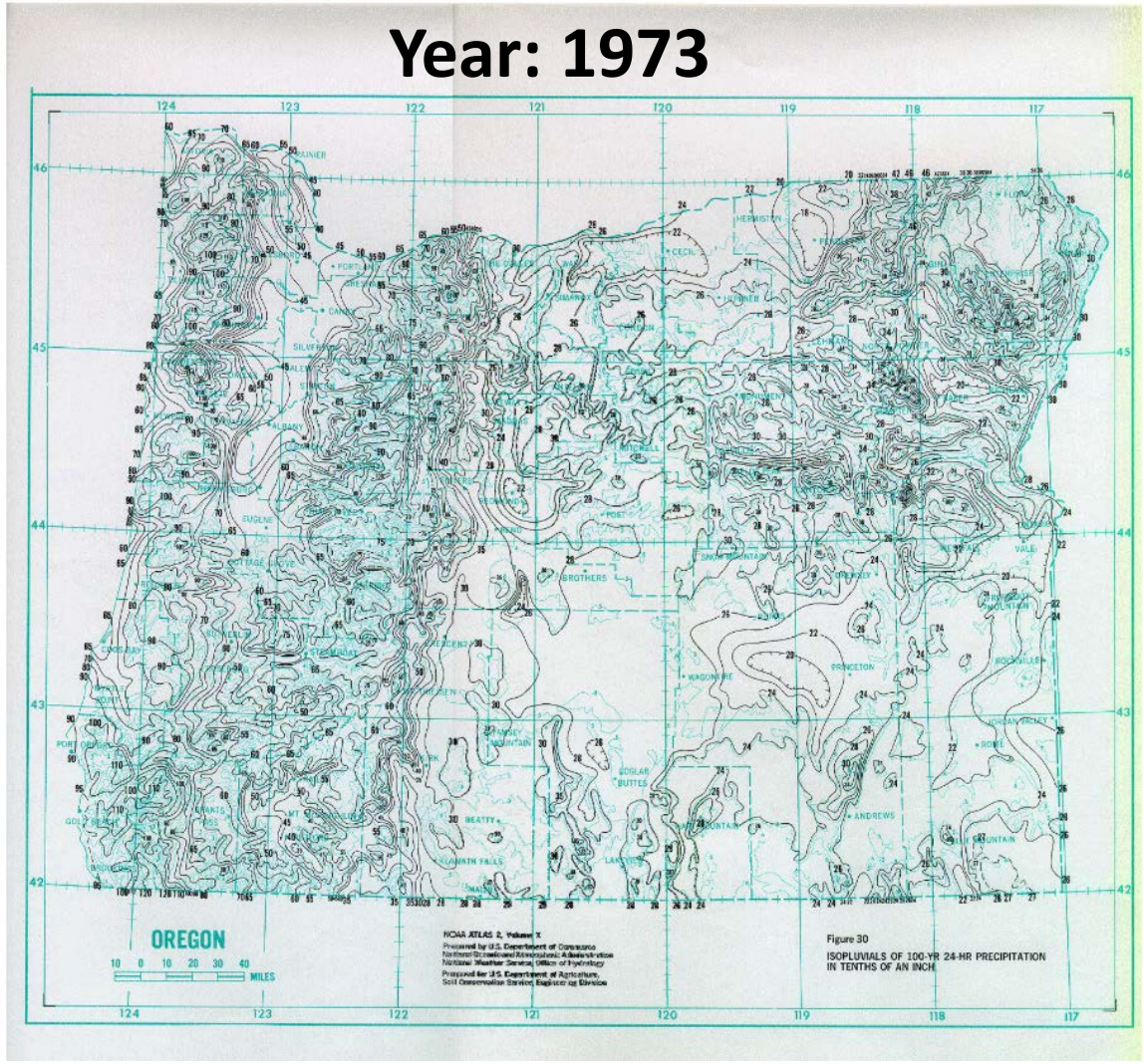
Source: NOAA Atlas 2 published in 1973 (HDSC/NWS Office of Hydrology)

NOTE: To maintain image integrity and detail each image is almost 1 MB in size.
To obtain more information or the text material that accompanies these maps, contact the Western Regional Climate Center.

	2-Year, 6-Hour	5-Year, 6-Hour	10-Year, 6-Hour	25-Year, 6-Hour	50-Year, 6-Hour	100-Year, 6-Hour	2-Year, 24-Hour	5-Year, 24-Hour	10-Year, 24-Hour	25-Year, 24-Hour	50-Year, 24-Hour	100-Year, 24-Hour
Arizona	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northern California	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Southern California	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Colorado	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Idaho	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Montana	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nevada	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
New Mexico	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oregon	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Utah	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Washington	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wyoming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Western U.S. Precipitation Frequency Maps

Year: 1973

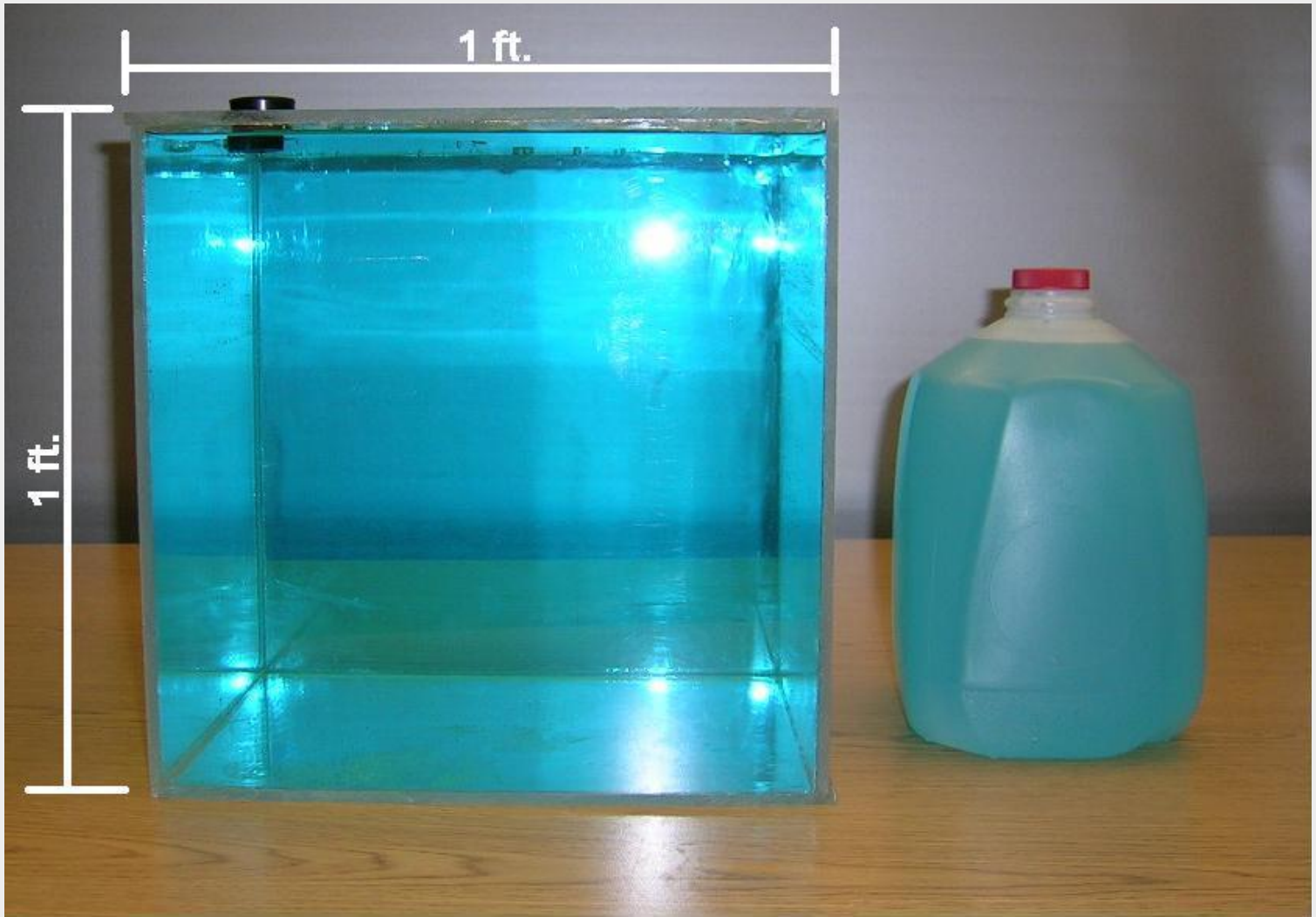


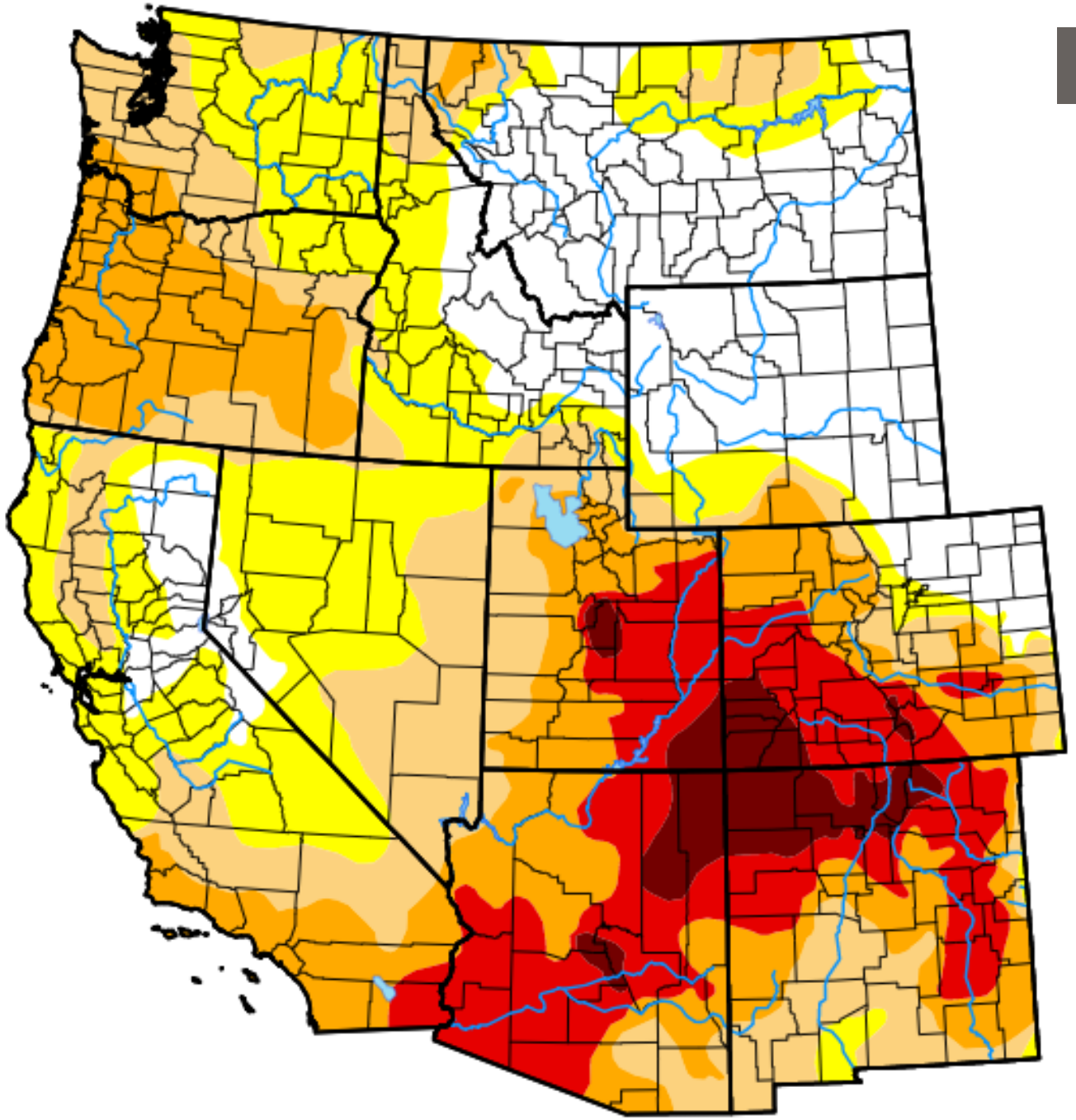
wrcc.dri.edu/Climate/precip_freq_maps.php

Isopluvial lines

Quiz:

Does everyone know the weight of 1 cu. ft of water?





United States Drought Monitor

Map released: Thurs. August 9, 2018

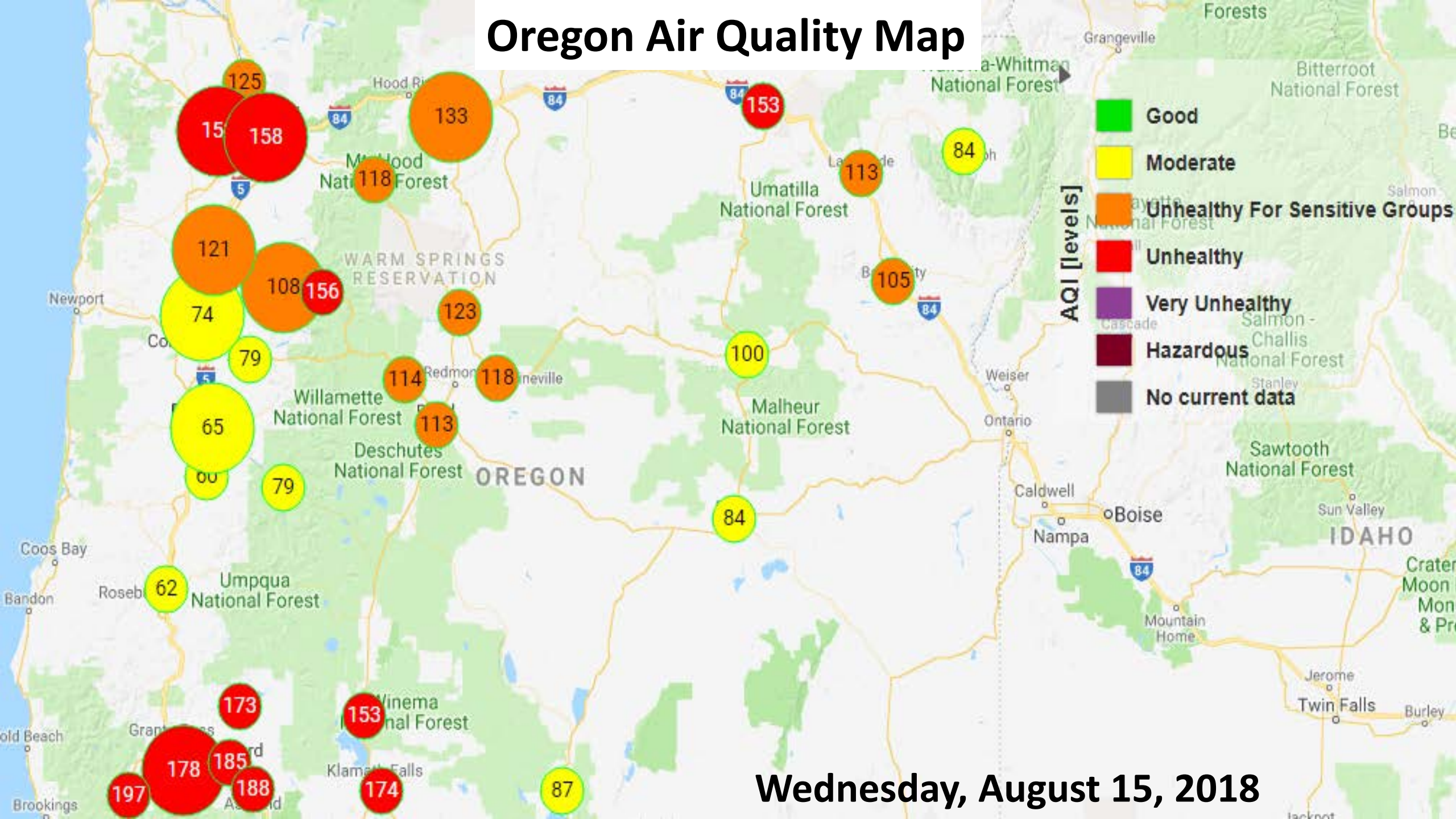
Data valid: August 7, 2018 at 8 a.m. EDT

Intensity:

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

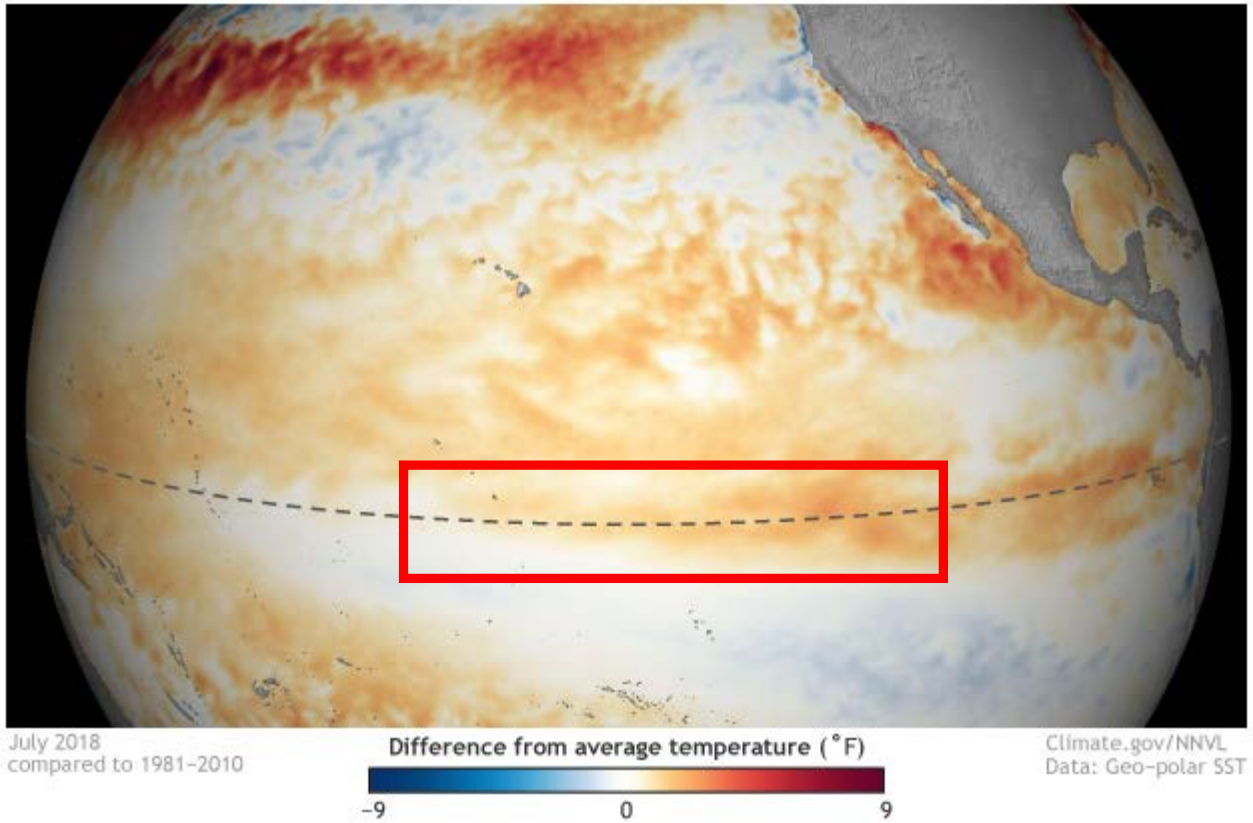
http://droughtmonitor.unl.edu/

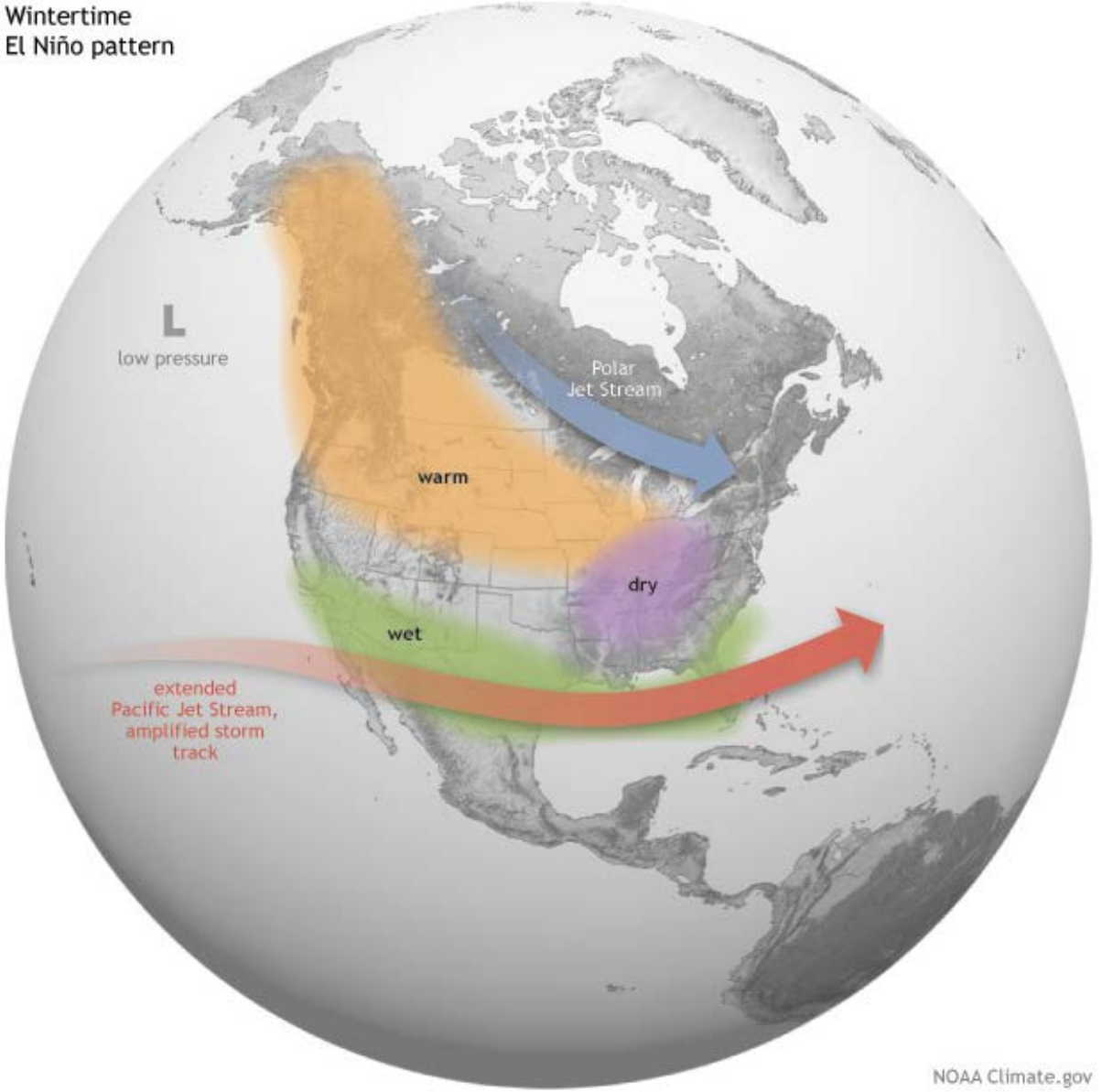
Oregon Air Quality Map



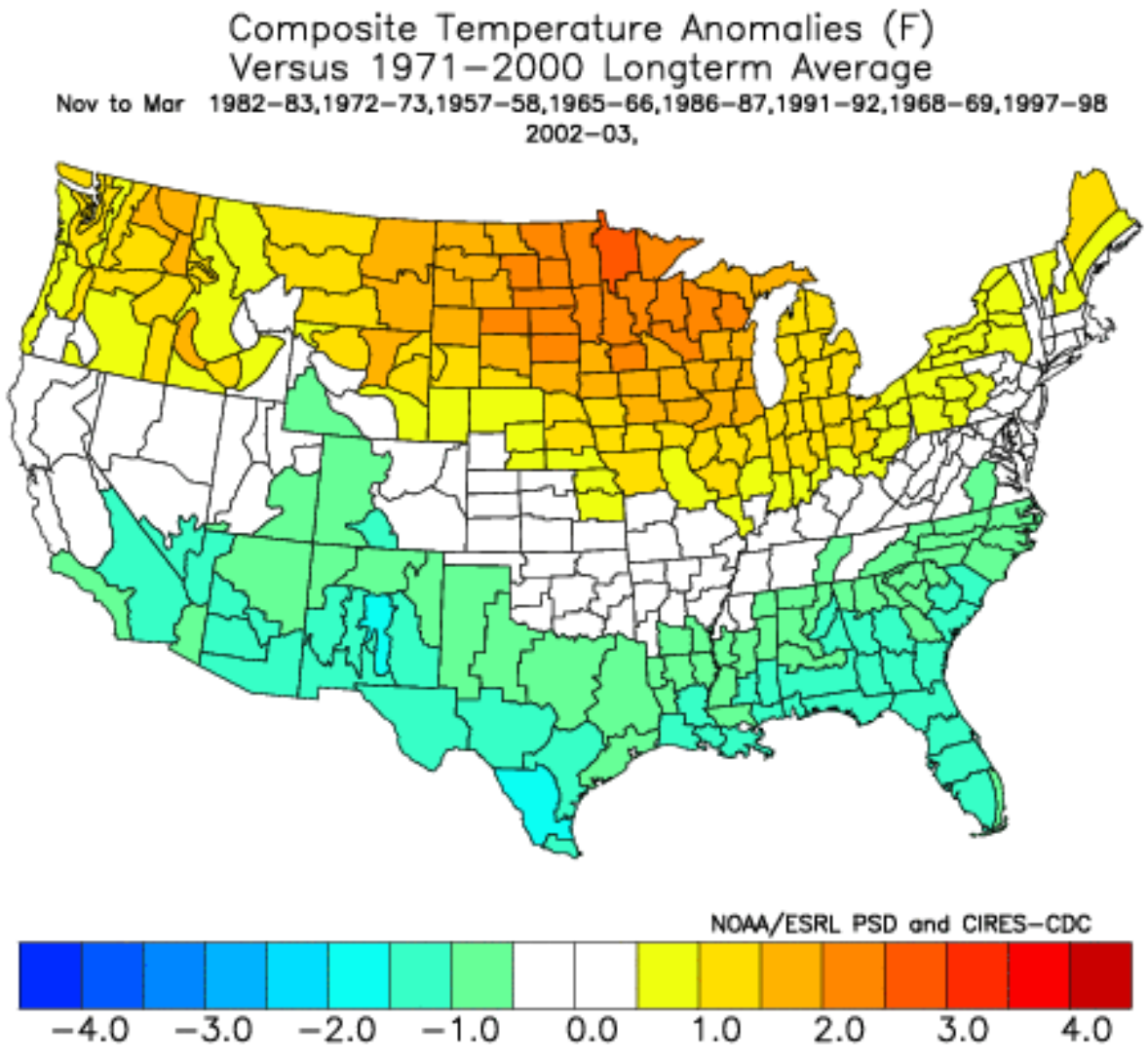
ENSO Alert System Status: El Niño Watch

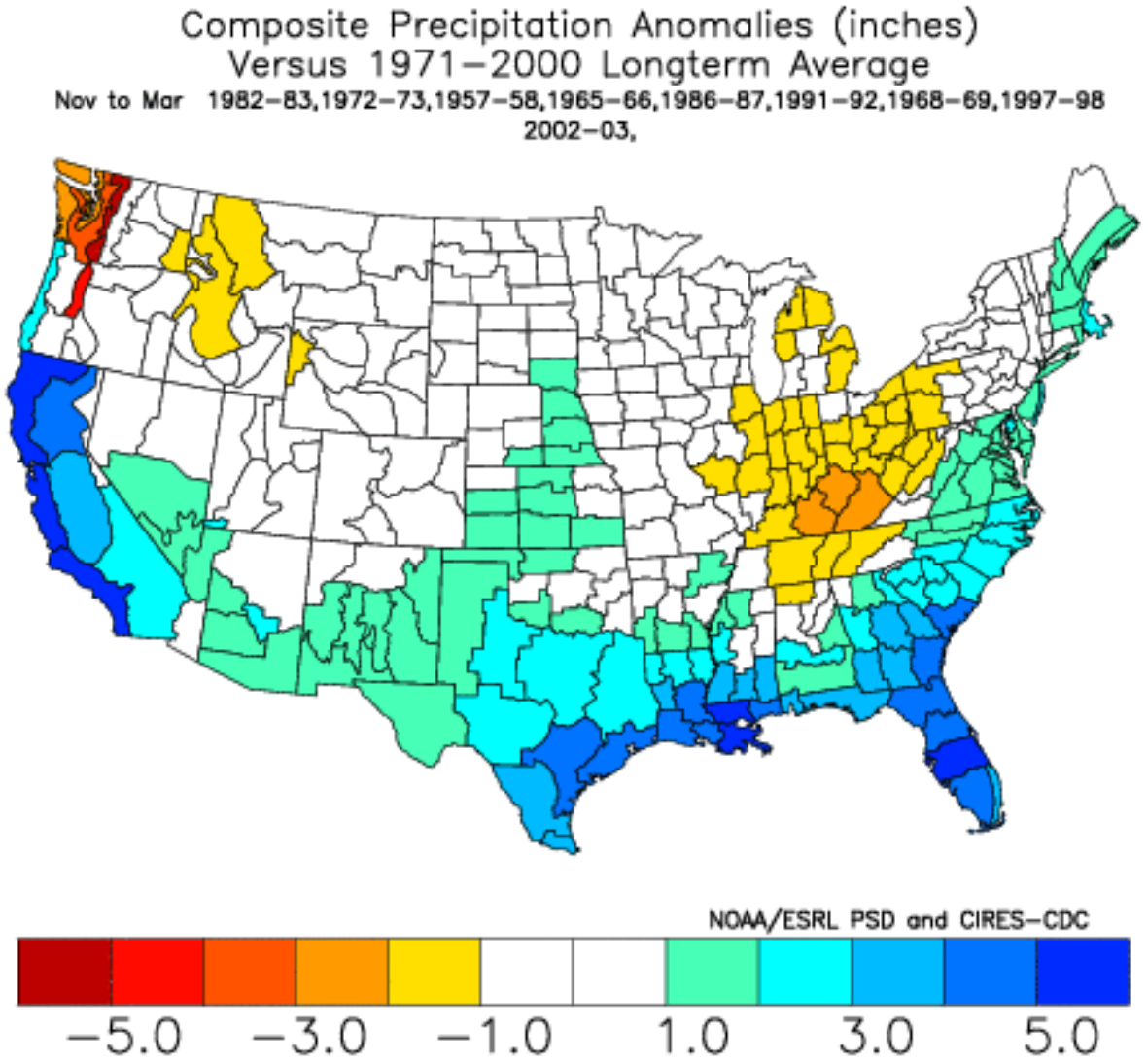
There is ~60% chance of El Niño in the Northern Hemisphere fall 2018 (September-November), increasing to ~70% during winter 2018-19

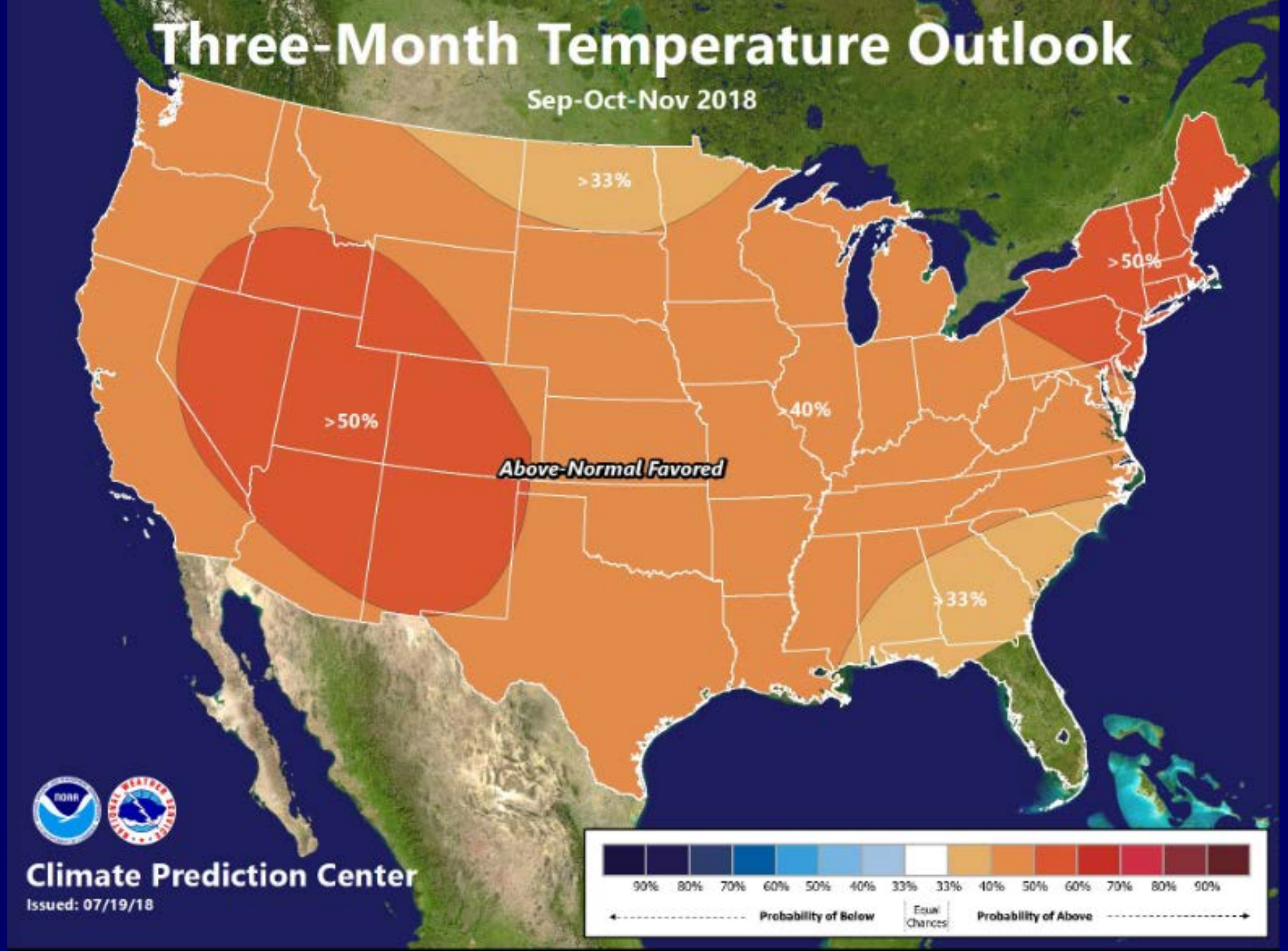


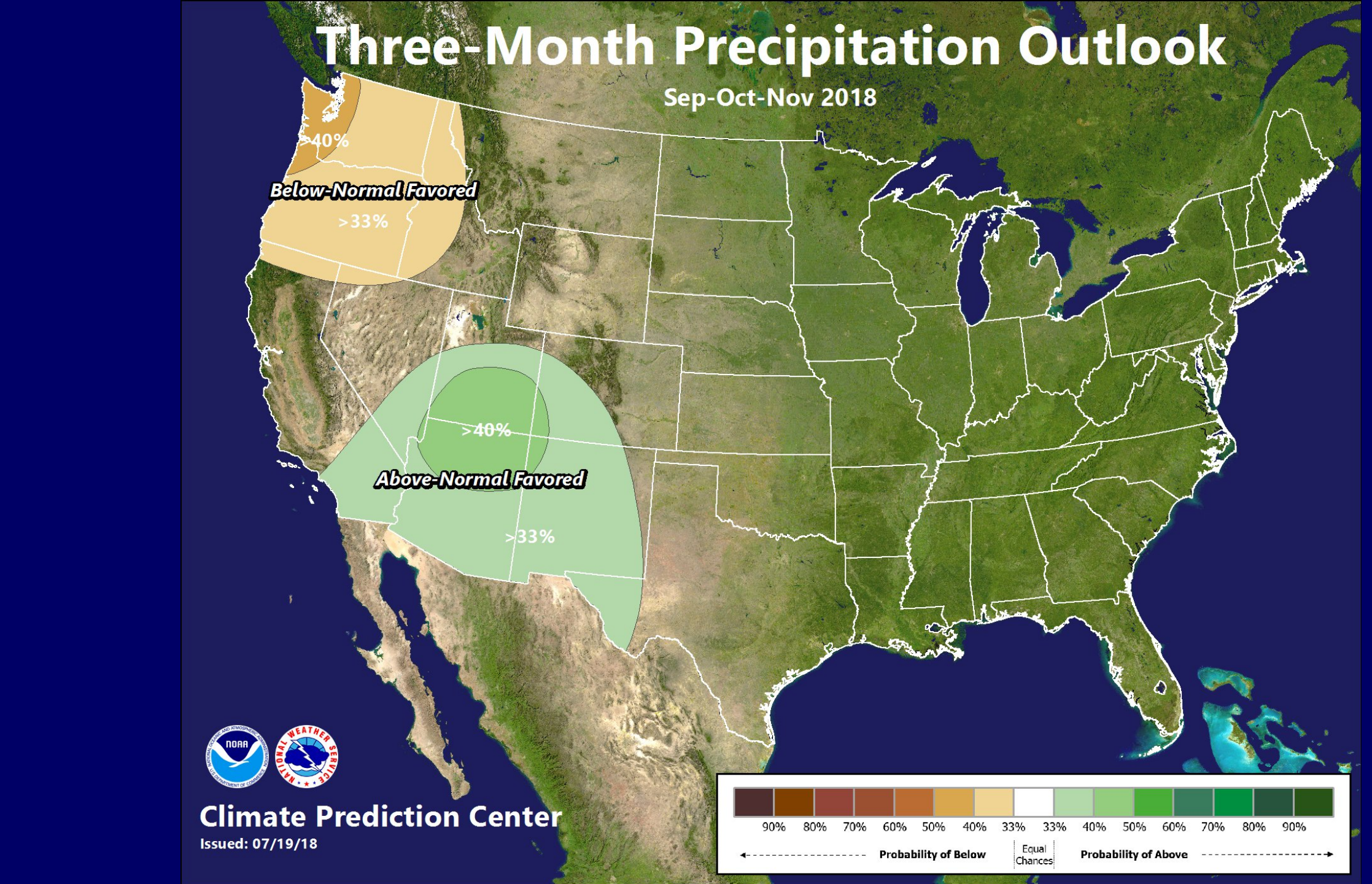


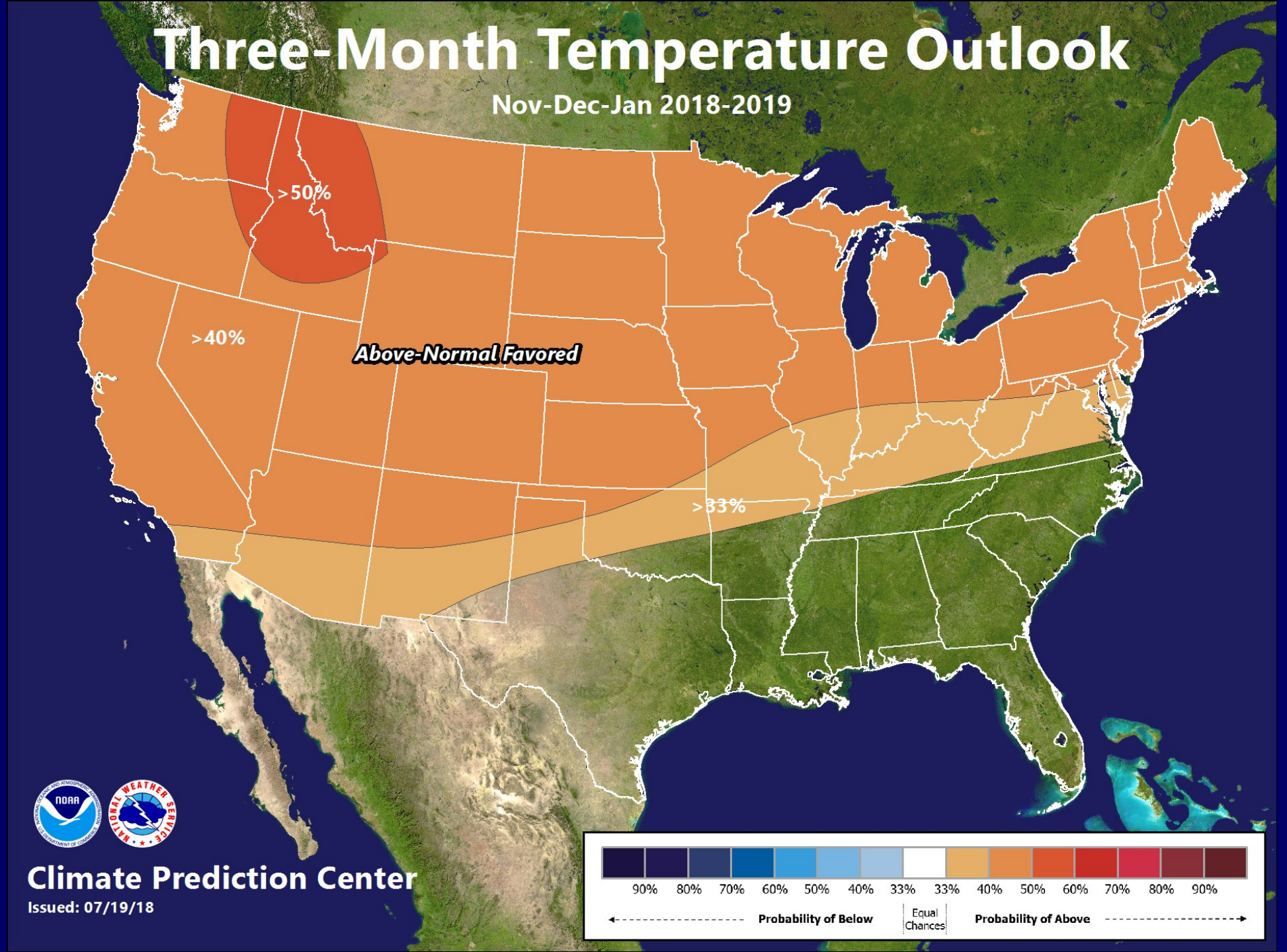
November through March Temperatures and Precipitation with Past El Ninos






Three-Month Temperature Outlook
Sep-Oct-Nov 2018
>33%
>50%
>40%
>50%
Above-Normal Favored
>33%
Climate Prediction Center
Issued: 07/19/18
90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%
Probability of Below
Equal Chances
Probability of Above


Three-Month Precipitation Outlook
Sep-Oct-Nov 2018
>40%
Below-Normal Favored
>33%
>40%
Above-Normal Favored
>33%
Climate Prediction Center
Issued: 07/19/18
90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%
Probability of Below
Equal Chances
Probability of Above


Three-Month Temperature Outlook
Nov-Dec-Jan 2018-2019
>50%
>40%
Above-Normal Favored
>33%
90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%
Probability of Below
Equal Chances
Probability of Above
Climate Prediction Center
Issued: 07/19/18

Three-Month Precipitation Outlook

Nov-Dec-Jan 2018-2019

>40%

>33% Below-Normal Favored

>33%

Above-Normal Favored

>40%

>50%

90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%

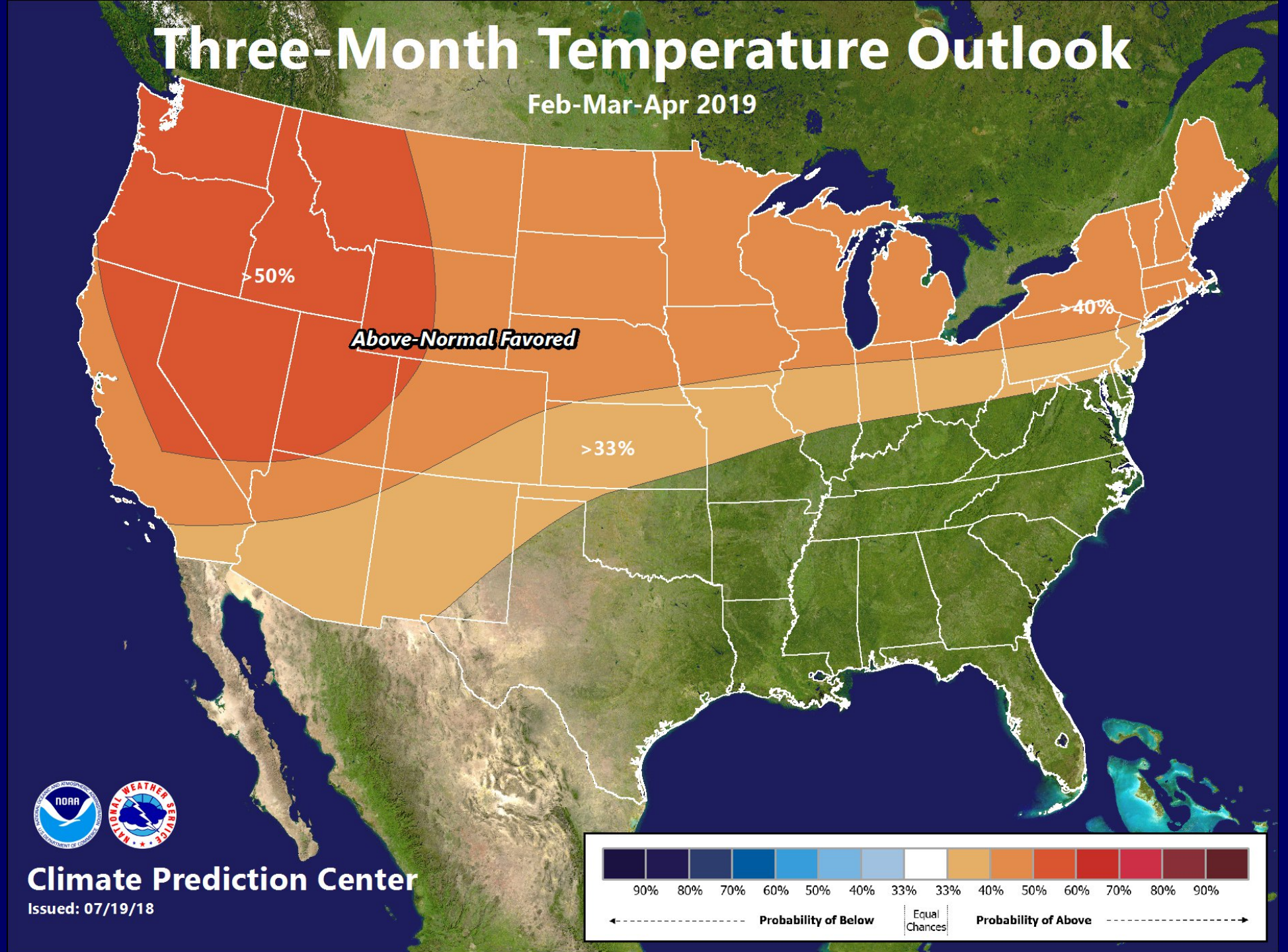
Probability of Below | Equal Chances | Probability of Above

Climate Prediction Center

Issued: 07/19/18

Three-Month Temperature Outlook

Feb-Mar-Apr 2019

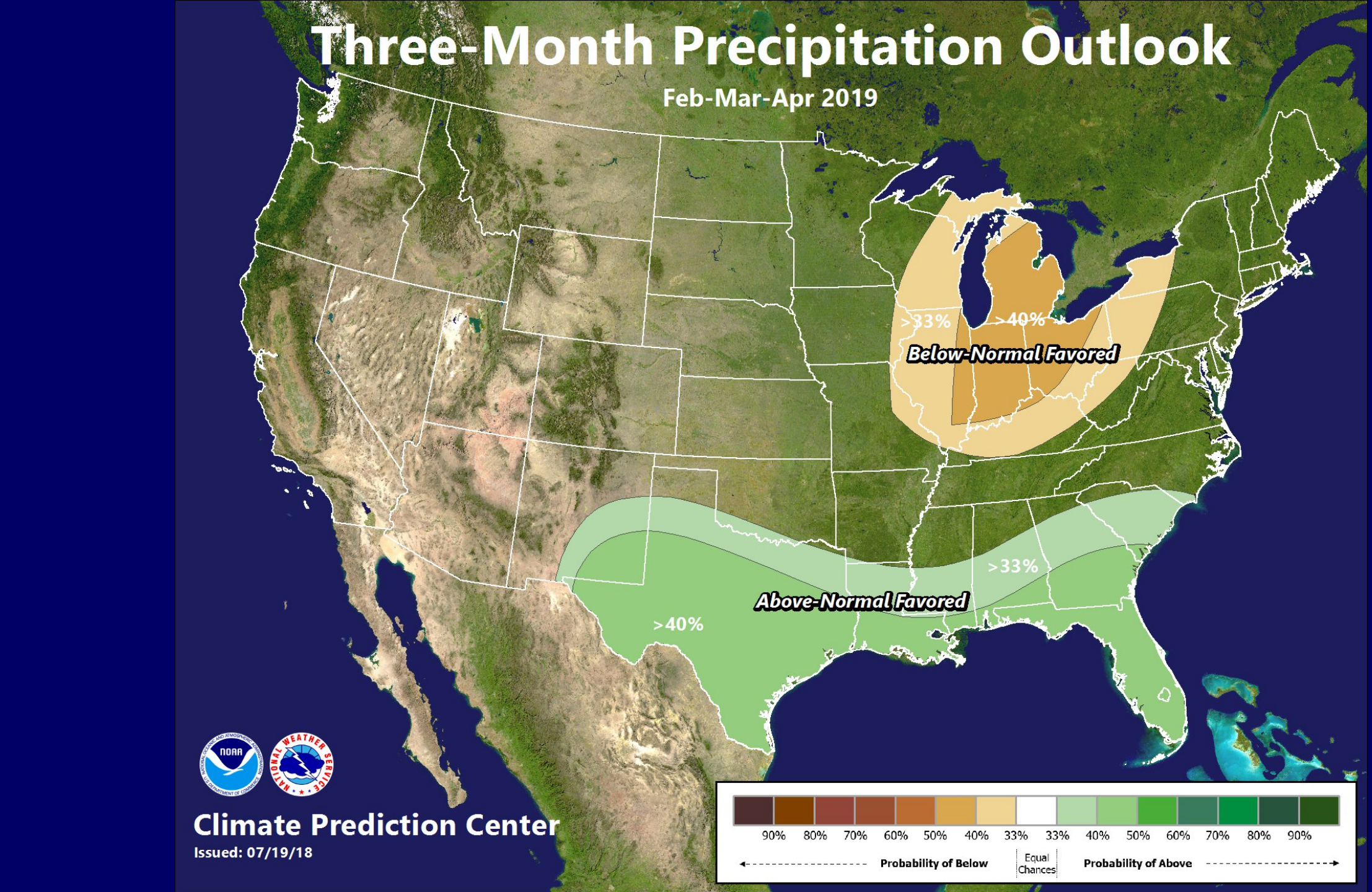


NOAA

NATIONAL WEATHER SERVICE

Climate Prediction Center

Issued: 07/19/18


Three-Month Precipitation Outlook
Feb-Mar-Apr 2019
>33%
>40%
Below-Normal Favored
>33%
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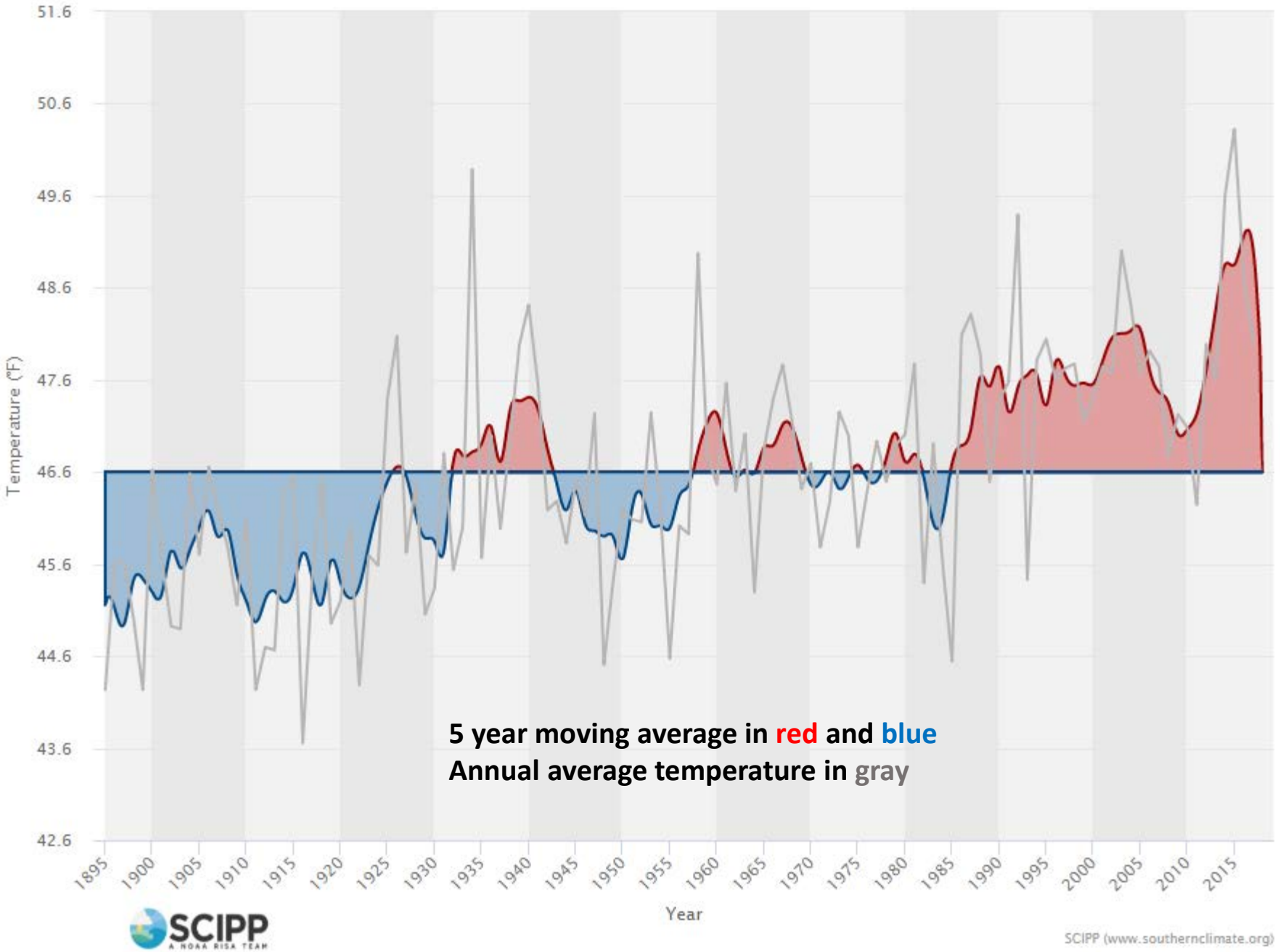
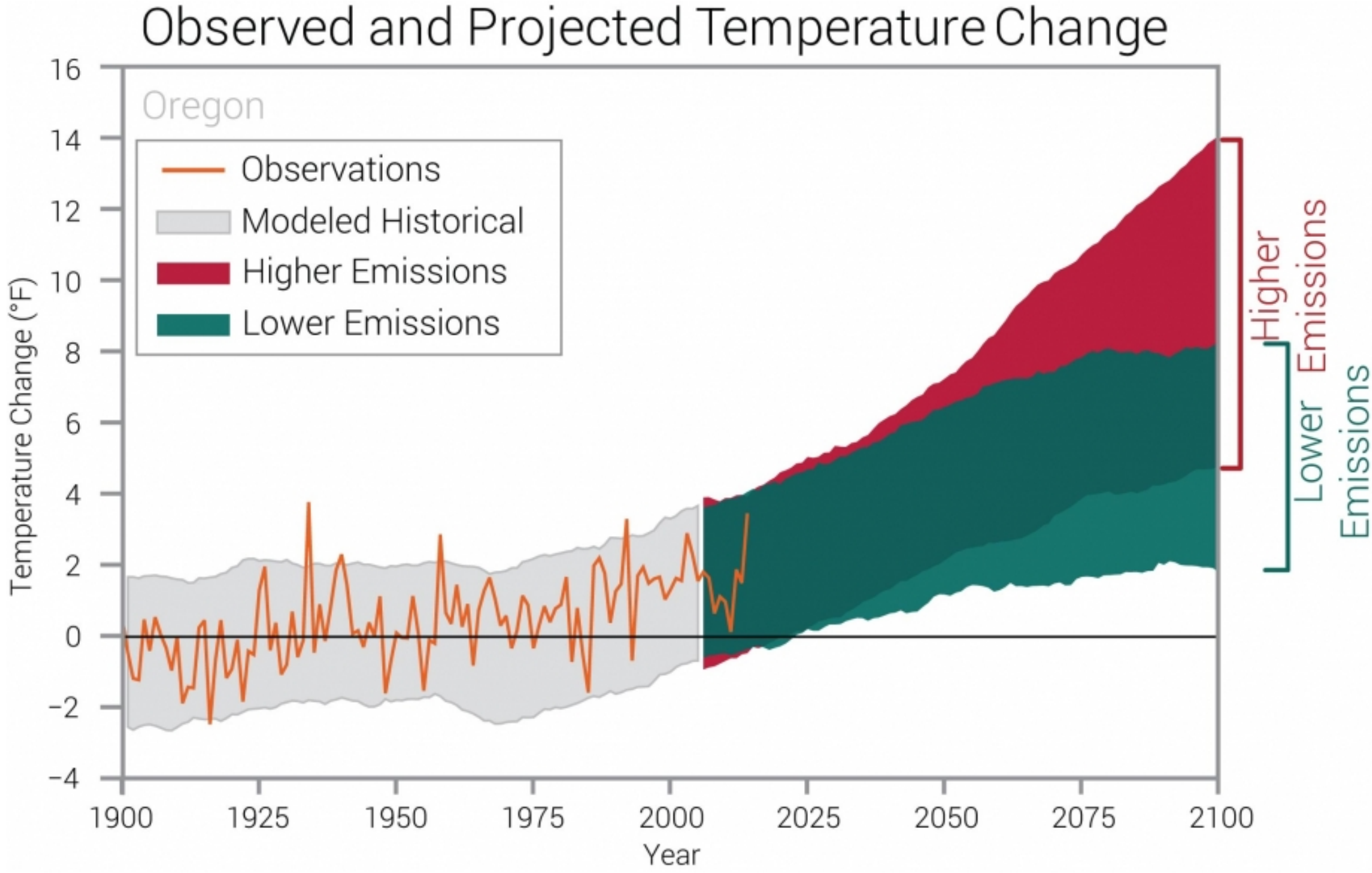
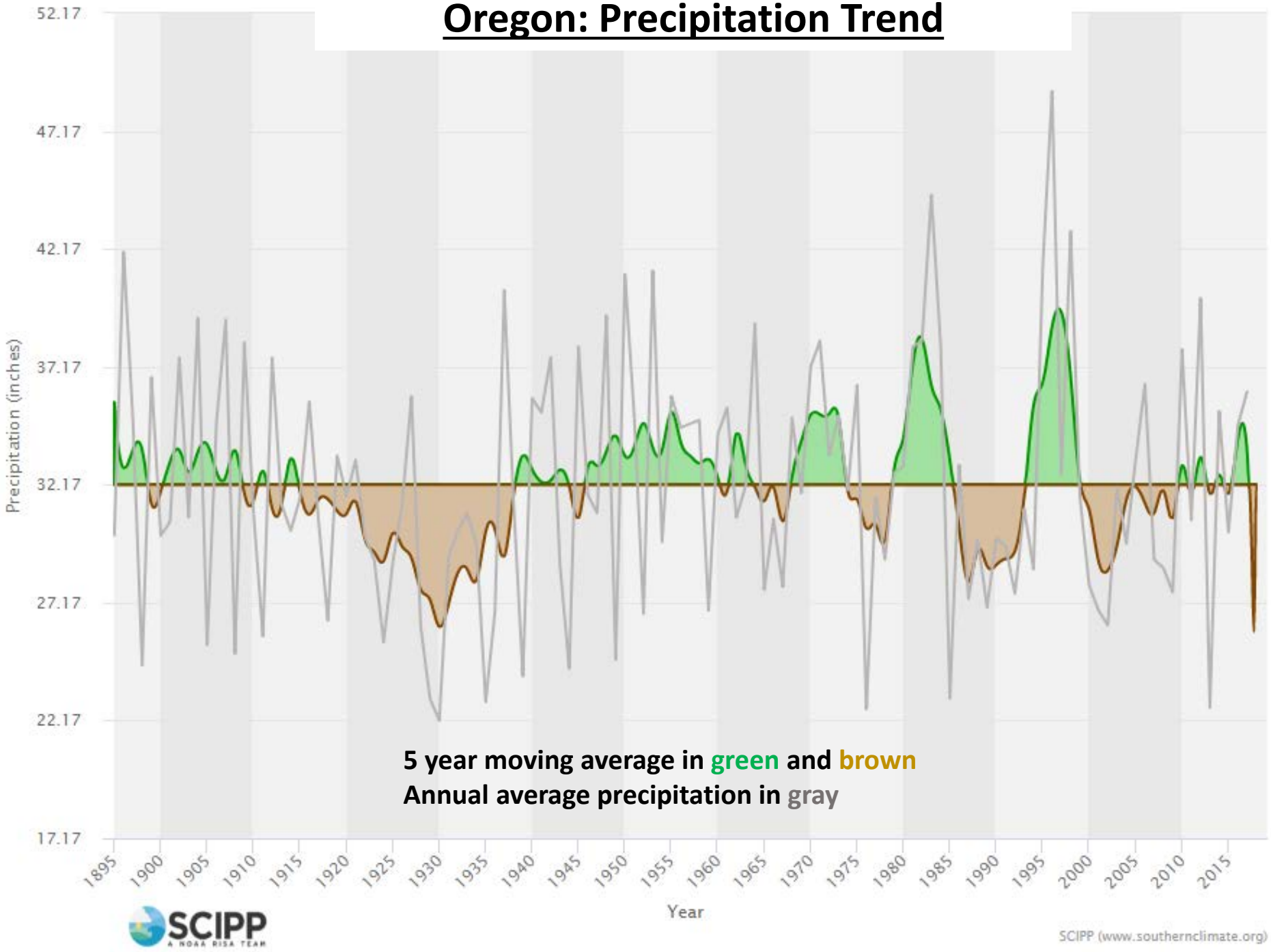
>40%
90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%
Probability of Below
Equal Chances
Probability of Above
Climate Prediction Center
Issued: 07/19/18

Oregon: Temperature Trend

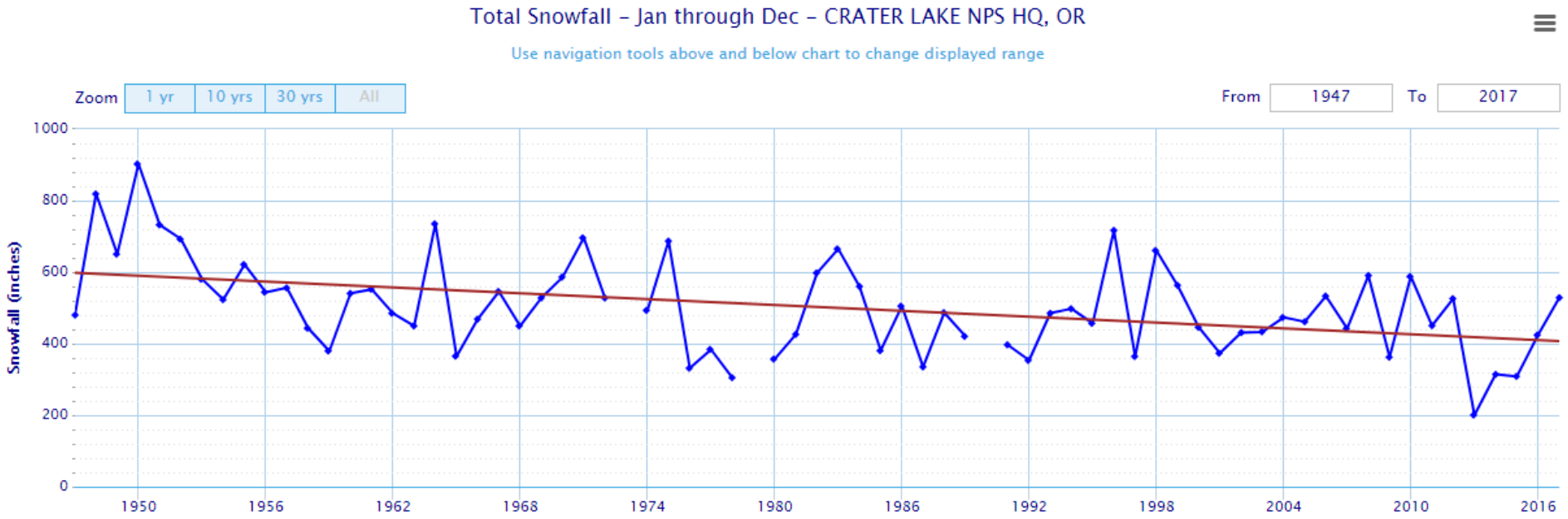



Observed and Projected Temperature Change
Oregon
Observations
Modeled Historical
Higher Emissions
Lower Emissions
Temperature Change (°F)
16
14
12
10
8
6
4
2
0
−2
−4
1900
1925
1950
1975
2000
2025
2050
2075
2100
Year
Higher Emissions
Lower Emissions

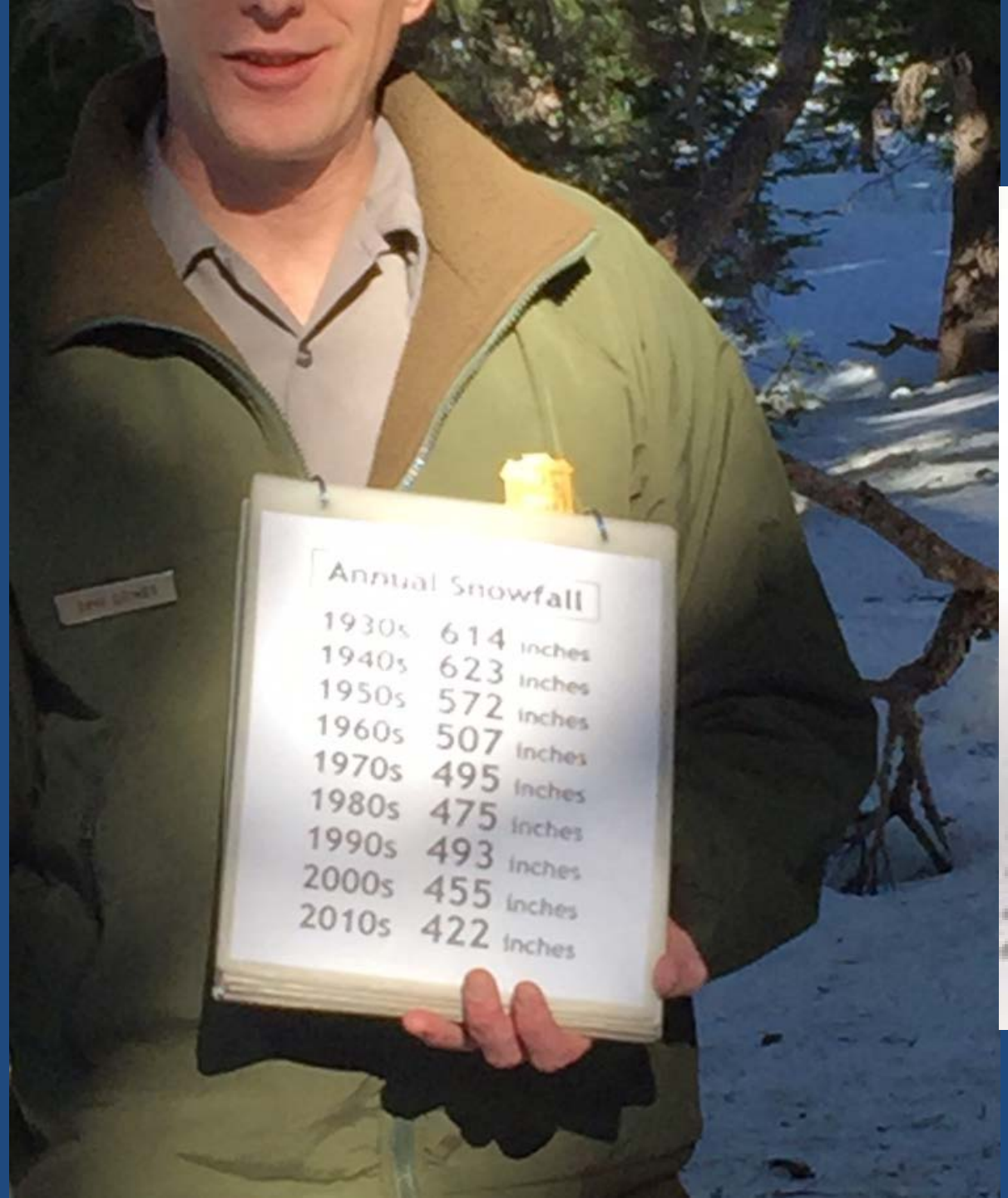
Oregon: Precipitation Trend



Crater Lake National Park at 6475 feet



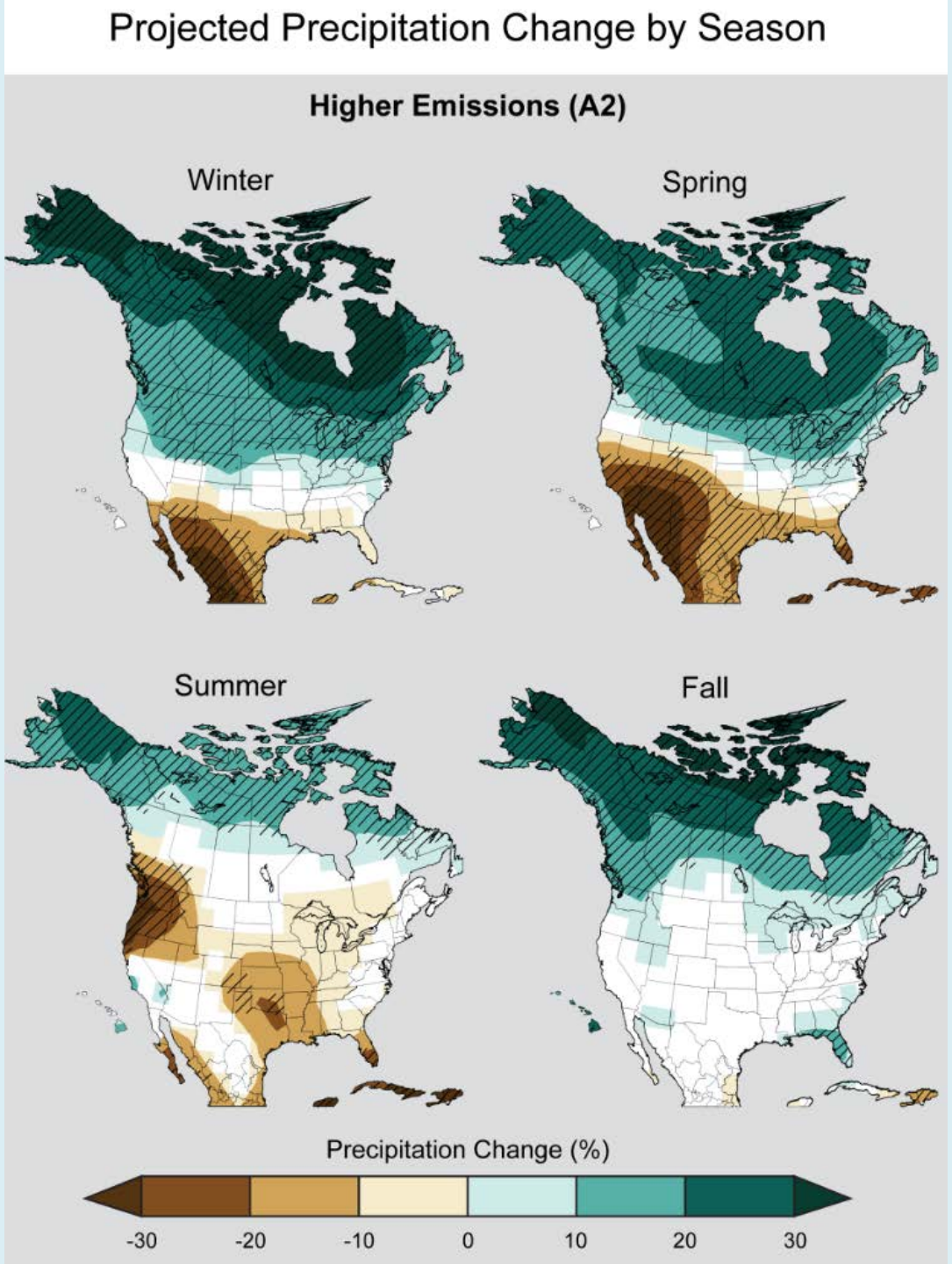
Annual Snowfall lowered from 595” to 410” (31% decrease)



Annual Snowfall

1930s	614	inches
1940s	623	inches
1950s	572	inches
1960s	507	inches
1970s	495	inches
1980s	475	inches
1990s	493	inches
2000s	455	inches
2010s	422	inches

Years 2071-2099 compared to 1970-1999 assuming continued increases in emissions.



Globalchange.gov

weather.gov/wrn/ambassadors

Questions?