

WY Conditions & Outlooks:

Precipitation, Temperatures, Drought, Floods, & Everything In-between

May 19, 2022

The University of Wyoming is an equal opportunity/affirmative action institution.



Presentation Outline

- Current Conditions: Overview
 - Streamflow
 - Reservoir Supply
 - Water Calls and Allocations
- **Outlooks:** Temperature & Precipitation
 - Fuels' Status & Wildland Fire Outlook
- Questions



Current Conditions



US Drought Monitor for May 17, 2022

(Released Thursday, May 19, 2022) Valid 8 a.m. EDT

D4 Exceptional Drought

US Drought Monitor for 17 May 2022



The U.S. Drought Monitor, is a weekly map of drought conditions produced jointly by the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture, and the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln. The U.S. Drought Monitor website is hosted and maintained by the NDMC. http://droughtmonitor.unl.edu

Drought Level	Percentile
None	>30
D0 (Abnormally Dry)	21 to 30
D1 (Moderate Drought)	11 to 20
D2 (Severe Drought)	6 to 10
D3 (Extreme Drought)	3 to 5
D4 (Exceptional Drought)	0 to 2

https://youtu.be/45MQ1GB-uTc

Improvements and degradations in the last month. Recent precipitation is starting to erode some of the areas but longer term dryness is filling in others.



Map Layout Created 19 May 2022 http://www.wrds.uwyo.edu

https://droughtmonitor.unl.edu



14-Day Precipitation Percentile (05 May 2022 to 18 May 2022)

14-Day Precipitation (Percentile) for 05 May 2022 to 18 May 2022



Provisional data, subject to revision

Daily precipitation data from PRISM Climate Group, Copyright ©2021, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map Created 19 May 2022 http://www.wrds.uwyo.edu Daily percentiles created from PRISM daily precipitation grids

Above Median:

- Northwest
- Central
- Northeast
- Platte/Goshen Counties

Below Median (Areas of Concern):

- West
- North Central



90-Day Precipitation Percentile (18 Feb 2022 to 18 May 2022)

90-Day Precipitation (Percentile) for 18 Feb 2022 to 18 May 2022



Provisional data, subject to revision

Daily precipitation data from PRISM Climate Group, Copyright ©2021, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map Created 19 May 2022 http://www.wrds.uwyo.edu Daily percentiles created from PRISM daily precipitation grids

Above Median:

- Bighorn Basin
- Wind River Basin
- Eastern Plains
- Central Sweetwater County
- Northeast

Below Median (Areas of Concern):

- Southern Carbon/Albany Counties
- Southern Lincoln County
- Teton County
- Sublette County







Standardized Precipitation Evapotranspiration Index Created by Montana Climate Office https://drought.climate.umt.edu Map Created 19 May 2022 http://www.wrds.uwvo.edu 60-Day Standardized Precipitation Evapotranspiration Index (19 Mar 2022 to 17 May 2022)



Standardized Precipitation Evapotranspiration Index Created by Montana Climate Office https://drought.climate.umt.edu Map.Created 19 May 2022 http://www.wrds.uwvo.edu

Standardized Precipitation Evapotranspiration Index (SPEI)

Shorter-term wetness, longer-term dryness with areas emerging in the southeast.

1-Year



365-Day Standardized Precipitation Evapotranspiration Index (18 May 2021 to 17 May 2022)

Standardized Precipitation Evapotranspiration Index Created by Montana Climate Office https://drought.climate.umt.edu Map Created 19 May 2022 http://www.wrds.uwyo.edu

https://drought.climate.umt.edu



14-Day Average Minimum Temperature (05 May to 18 May)

Lows below 32F West and Higher Elevs
Warmest Lower North and East

14-Day Average Minimum Temperature (Departure from 1991-2020 Average) for 05 May 2022 to 18 May 2022



Provisional data, subject to revision

Daily Temperature data from PRISM Climate Group, Copyright @2021, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map Created 19 May 2022 http://www.wrds.uwyo.edu Temperature averages created from PRISM day it removature grids 14-Day Average Minimum Temperature for 05 May 2022 to 18 May 2022



Provisional data, subject to revision

Daily Temperature data from PRISM Climate Group, Copyright @2021, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map Created 19 May 2022 http://www.wds.uwyo.edu Temperature averages created from PRISM daily temperature grids

14-Day *Departure from* Normal Average Minimum Temperature

+/- 3F all parts of southeast (3F to 6F above)
Generally west negative departures, positive in east..."generally"



14-Day Average Maximum **Temperature** (05 May to 18 May)

- Average Max above 32F statewide •
- 60s-70s Lower Elevation

14-Day Average Maximum Temperature (Departure from 1991-2020 Average) for 05 May 2022 to 18 May 2022



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Daily Temperature data from PRISM Climate Group, Copyright @2021, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map Created 19 May 2022 http://www.wrds.uwyo.edu Temperature averages created from PRISM daily temperature grids

14-Day Average Maximum Temperature for 05 May 2022 to 18 May 2022



Provisional data, subject to revision

Daily Temperature data from PRISM Climate Group, Copyright @2021, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map Created 19 May 2022 http://www.wrds.uwyo.edu Temperature averages created from PRISM daily temperature grids

14- Day *Departure from* Normal

Average Maximum

- High elev west 3 to 6F Belowemperature Laramie County 3 to 6F Above
- Eastern Plains 0 to 3F Above
- Western lower elev 0 to 3F Below



Soil Moisture Percentile

Two Weeks Ago 05 May 2022

Soil Moisture Percentile for 05 May 2022

18 May 2022

Soil Moisture Percentile for 18 May 2022



Conditions better compared to one month ago except Uinta, Lincoln, southern Teton Counties Deteriorating, though, having reached a peak around 05-06 May.

Same or Worse compared to 05-06 May except Park and Northeast

http://www.wrds.uwyo.edu/Soil/Current_SoilMoisture_Ptile.html



A decrease of 1.55% from last month

Wyoming Area Affected: 100% D0-D4 ; 92.59% D1-D4



http://www.wrds.uwyo.edu/drought/droughttimeline.html





http://www.wrds.uwyo.edu/drought/droughttimeline.html



http://www.wrds.uwyo.edu/wrds/nrcs/snowmap/snowmap.html



Snow Water Equivalent Percent of Median (1991-2020) for 19 May 2022



Basin Snow Water Equivalent Data from Natural Resources Conservation Service Water and Climate Center https://www.nrcs.usda.gov Map created by Wyoming State Climate Office 19 May 2022





Peak Snow Water Equivalent Dates and Totals by Basin With Meltout Dates

This year's "to-date" peak snow water equivalent (SWE) compared to median. Red indicates earlier peak date or lower SWE compared to median Blue indicates later peak date or higher SWE compared to median

Click Column Headers to Sort

Basin Click to View Chart	This Year Peak Date	This Yea SWE (in	r Peak ches)	Ea	Days arly/Late	Peak SWE Dif (inches)	Percent of Median Peak SWE	Median Peak Date	Median Peak SWE (inches)	Current SWE	Median Meltout Date
Belle Fourche	18 Mar 2022		4.2		-16	-2.9	59%	03 Apr IMG	7.1 IMG	0.4	30 Apr IMG
Bighorn	04 May 2022		11.2		9	-0.6	95%	25 Apr IMG	11.8 IMG	7.8	19 Jun IMG
Cheyenne	15 Mar 2022		4.5		-19	-3.1	59%	03 Apr IMG	7.6 IMG	0.6	30 Apr IMG
Laramie	19 Apr 2022		14.5		0	-1.8	89%	19 Apr IMG	16.3 IMG	6.5	13 Jun IMG
Little Snake	18 Apr 2022		17.1		12	-3.4	83%	06 Apr IMG	20.5 IMG	7.3	19 Jun IMG
Lower Green	18 Apr 2022		10.1		10	-3.5	74%	08 Apr IMG	13.6 IMG	4.7	11 Jun IMG
Lower North Platte	25 Apr 2022		10.9		10	-2.1	84%	15 Apr IMG	13.0 IMG	3.8	29 May IMG
Madison	25 Apr 2022		16.8]	11	-7.0	71%	14 Apr IMG	23.8 IMG	14.8	24 Jun IMG
Powder	02 May 2022		9.4		15	-1.6	85%	17 Apr IMG	11.0 IMG	6.1	08 Jun IMG
Shoshone	04 May 2022		15.5		10	-2.6	86%	24 Apr IMG	18.1 IMG	14.4	29 Jun IMG
Snake	30 Apr 2022		18.0		18	-2.9	86%	12 Apr IMG	20.9 IMG	14.5	28 Jun IMG
South Platte	23 Mar 2022		5.4		-6	-1.8	75%	29 Mar IMG	7.2 IMG	0.0	26 Apr IMG
Sweetwater	05 May 2022		14.5		17	-0.7	95%	18 Apr IMG	15.2 IMG	12.9	05 Jun IMG
Tongue	03 May 2022		13.3		1	-0.3	98%	02 May IMG	13.6 IMG	9.6	09 Jun IMG
Upper Bear	18 Apr 2022		13.6		6	-4.2	76%	12 Apr IMG	17.8 IMG	6.4	15 Jun IMG
Upper Green	25 Apr 2022		13.5		12	-2.5	84%	13 Apr IMG	16.0 IMG	9.7	15 Jun IMG
Upper North Platte	26 Apr 2022		20.9		10	-3.7	85%	16 Apr IMG	24.6 IMG	14.6	26 Jun IMG
Wind	05 May 2022		13.2	1	13	-0.9	94%	22 Apr IMG	14.1 IMG	10.1	27 Jun IMG
Yellowstone	04 May 2022		20.3		10	-1.8	92%	24 Apr IMG	22.1 IMG	19.6	02 Jul IMG

Data from Natural Resources Conservation Service SnoTel Network



http://www.wrds.uwyo.edu/Snow/BasinPeakSWE.html







This Year's Peak Snow Water Equivalent as Percent of 1991-2020 Median





Provisional data, subject to revision

Snow Water Equivalent Data from USDA NRCS National Water and Climate Center https://www.nrcs.usda.gov Map created by Wyoming State Climate Office 17 May 2022



Comparing 2022 to 2021 Peak Snow Water Equivalent as Percent of 1991-2020 Median



Basin	2022 Compared to 2021	Basin	2022 Compared to 2021
Belle Fourche	-11%	Snake	-2%
Bighorn	-8%	South Platte	-3%
Cheyenne	-11%	Sweetwater	-24%
aramie	-5%	Tongue	-6%
ittle Snake	-9%	Upper Bear	2%
ower Green	-15%	Upper Green	3%
ower North Platte	-18%	Upper North Platte	1%
Madison	-5%	Wind	5%
Powder	-21%	Yellowstone	2%
Shoshone	0%		



May-July Forecasted Flow



01 May 2022 Streamflow Forecast as Percent of 1991-2020 Median (50% Exceedance Probability) Yellowstone Streamflow Forecast: Tongue River Little Missouri 92% Percent of Median 97% Madison-Gallatin Z Not Forecasted Shoshone River < 10% 93% 10% to 25% **Belle Fourche Bighorn Basin** 25% to 50% 98% Powder River 50% to 75% 88% 75% to 90% 90% to 110% 110% to 125% Snake River 125% to 150% 92% Cheyenne River Basin 150% to 175% 52% 175% to 200% Wind River > 200% 99% Niobrara Upper Green River Lower North Platte W Sweetwater 77% 90% 89% Streamflow Forecasts from USDA/NRCS https://www.wcc.nrcs.usda.gov Great Divide Basin (closed) Upper North Platte pper Bear River 93% 155 80% Laramie River 97% Lower Green River ***** 66% Little Snake River Map Prepared by: South Platte 88% Wyoming State Climate Office http://www.wrds.uwyo.edu Provisional data, subject to revision

Forecasted and Median Streamflow Data from USDA NRCS National Water and Climate Center https://www.nrcs.usda.gov Map created by Wyoming State Climate Office 17 May 2022



WY Streamflow Overview (May 19, 2022)



 Runoff (mountain snowpack) is here!

	E	Explana	tion - Pe	ercentile	classes	5	-
							_
lowest- 10th percentile	5	10-24	25-75	76-90	95	90th percentile -highest	Runof
Much below	Normal	Below normal	Normal	Above normal	Much a	bove normal	- turnon



Current Streamflow Conditions (May 19, 2022)



Streamflow Status

Streamflow: Status Above flood stage All-time high for this 100th percentile (maximum) dav >90th percentile Much above normal 76th – 90th percentile Above normal Normal 25th - 75th percentile 10th - 24th percentile Below normal Much below normal <10th percentile All-time low for this 0th percentile day (minimum) Not flowing Not ranked

- Measurement flag
- Recent measurement unavailable

https://dashboard.waterdata.usgs.gov/



Streamflow Trends (May 19)

Day-of-Year Status

All-time high for this day-of-year	0	0.0%	
Much above normal for this day-of-year	3	3.3%	Streamflow: Status
Above normal for this day-of-year	3	3.3%	Above flood stage All time high fact his south and the
Normal for this day-of-year	55	59.8%	day (maximum)
Below normal for this day-of-year	11	12.0%	Much above normal >90 th percentile
Much below normal for this day-of-year	9	9.8%	Above normal 76 th – 90 th percentile
All-time low for this day-of-year	2	2.2%	Normal $25^{th} - 75^{th}$ percentile
Not ranked - insufficient record	7	7.6%	 Much below normal <10th percentile
Not ranked - no recent measurement	2	2.2%	All-time low for this 0 th percentile
Increasing and Decreasing			day (minimum)
Value increasing	33	35.9%	 Not ranked
Value not changing	20	21.7%	Measurement flag
Value decreasing	36	39.1%	 Recent measurement unavailable
No measurement	3	3.3% 🛛	https://dashboard.waterdata.usgs.gov/



North Fork Shoshone River at Wapiti, WY

Last updated May 19,2022



https://dashboard.waterdata.usgs.gov/

Explanation - Percentile classes							
lowest- Oth percentile	10-24	25-75	76-90	90th percentile -highest	Flow		
Much below normal	Below normal	Normal	Above normal	Much above normal			



Bighorn River at Kane, WY

Last updated May 19, 2022





https://dashboard.waterdata.usgs.gov/

E	xplana	tion - Pe	ercentile	e classes	
lowest- Oth percentile	10-24	25-75	76-90	90th percentile -highest	Flow
Much below normal	Below normal	Normal	Above	Much above normal	



Select WY Streamflows



Power River at Arvada, WY

Last updated May 19, 2022



E	xplana	tion - Pe	ercentile	classes	
lowest- 10th percentile	10-24	25-75	76-90	90th percentile -highest	Flow
Much below normal	Below normal	Normal	Above	Much above normal	

https://dashboard.waterdata.usgs.gov/



North Platte River at WY-NE State Line, WY Last updated May 19, 2022

Select WY Streamflows



https://dashboard.waterdata.usgs.gov/



E	xplana	tion - Pe	ercentile	classes	
lowest- 10th percentile	10-24	25-75	76-90	90th percentile -highest	Flow
Much below normal	Below normal	Normal	Above normal	Much above normal	



Green River below Fontenelle Reservoir, WY

Last updated May 19, 2022

Streamflows Pario Gillette Wind River Reservation Casper North Plat ock Spring Cheyenne

Select WY

https://dashboard.waterdata.usgs.gov/



E	xplana	tion - Pe	ercentile	e classes	
lowest- 10th percentile	10-24	25-75	76-90	90th percentile -highest	Flow
Much below normal	Below normal	Normal	Above normal	Much above normal	

Science for a changing world WY Reservoirs (Update 5/19/22)

May 19, 2022



http://www.wrds.uwyo.edu/surface_water/teacups.html

Compared to April

• Small increase in storage

Apr 28, 2022



RECLAMATION Current Reservoir Conditions: Bighorn System



As of May 17, Bighorn System: 67% of Full, 96% of Average

<u>Reservoir</u>	<u>Content</u>	Capacity	<u>% of Full</u>	<u>% of Avg</u>
Bull Lake	91,400	152,500	59%	112%
Buffalo Bill	357,700	646,600	55%	90%
Boysen	588,000	741,600	79%	111%





RECLAMATION Current Reservoir Conditions: North Platte System



Forecast April – July Runott:								
Forecast Point	Runoff (AF)	<u>% of Avg</u>						
Seminoe	510,000	72						
Sweetwater above Pathfinder	35,000	66						
Alcova to Glendo	110,000	76						

As of May 17, North Platte System: 61% of Full, 87% of Average

<u>Reservoir</u>	<u>Content</u>	Capacity 9	<u>% of Full</u>	<u>% of Avg</u>
Seminoe	376,100	1,017,300	37%	67%
Pathfinder	681,600	1,070,000	64%	108%
Glendo	447,500	492,000	91%	98%
Guernsey	15,200	45,600	33%	52%









South Dakota

Nebraska

Cheyenne

Division 1

Cory Rinehart, 307-532-2248





- May 1, 2022 BOR call on North Platte limits Irrigation Pumpers, between Pathfinder and Guernsey, to 6,600 acre feet every 2 weeks, likely to be on through summer.
- 1. May 6, 2022 call on Jack Creek and tributaries, District 6, to a priority date of Spring 1882.





- 1. May 9, 2022 Call from Montana to fill Tongue River Reservoir lifted.
- 1. May 14, 2022 Call on Big Goose Creek, District 4





- 1. March 30, 2022, call on Gooseberry Creek to a priority date of 1906
- 1. April 8, 2022, call on Owl Creek to a priority date of 1888
- 1. May 6, 2022, call on Grass Creek to a priority date of 1903





- 1. April 29, 2022, call on North Piney Creek, District 10
- May 9, 2022, call onf Central Bear River, District 2
- 1. May 16, 2022, call on Fish Creek, District 10
- 1. May 17, 2022, call on Blacks Fork River, District 15



Contact Information for Calls/Administration

Division 1 Superintendent–Cory Rinehart, 532-2248

Division 2 Superintendent–David Schroeder, 674-7012

Division 3 Superintendent-Joshua Fredrickson, 856-0747

Division 4 Superintendent-Kevin Payne, 279-3441



Forecasts & Outlooks



7-Day Total Precipitation Forecast May 18 - May 24



Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, National Centers for Environmental Prediction,

and Weather Prediction Center - https://www.wpc.ncep.noaa.gov

Map Layout Created 18 May 2022 http://www.wrds.uwyo.edu

- Cold front arrives today (Thu).
- Significant precip possible over southeast WY Thu night to Sat (including wet snow at lower elevations).
- Another strong disturbance possible next Sun night Mon.
- Cold & active weather pattern thru middle of next week.

Note: Forecast includes "Snow Water Equivalent" ≈ Rain + Melted Snow

6-10 Day Temp & Precip Outlook May 24 - May 28



Near climatology

Near climatology

https://bit.ly/CPC6_10Day



8-14 Day Temp & Precip Outlook May 26- June 1



Near climatology

https://bit.ly/CPC8_14Day

Near climatology



3-Month Temp & Precip Outlook

June - August 2022



Likely warmer than normal

https://bit.ly/CPC Seasonal

Lean toward drier than normal



Wyoming Flood Potential May - July 2022



- Chances for river flooding is low through the melt season.
- This graphic depicts the NWS river forecast locations, colored by the highest flood category expected during the next 90 days (greater than 50% chance).
- All Wyoming river forecast points show a less than 50% chance of flooding.

Note: River ice action is not accounted for.



Fuel Moistures and Energy Release Component

Energy Release Component (ERC)

- A number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire.
- It may also be considered a composite fuel moisture value as it reflects the contribution that all live and dead fuels have to potential fire intensity.
- Generally expressed as a Percentile.

1000-Hour Fuel Moisture (1000-hr FM)

- General indicator of drought and correlates with fire danger for a Fire Danger Rating Area
- Represents the modeled moisture content in dead fuels in the 3 to 8 inch diameter class
- The 1000-hr FM value is based on a running 7-day computed average using length of day, daily temperature and relative humidity extremes (maximum and minimum values) and the 24-hour precipitation duration values.

100-Hour Fuel Moisture (100-hr FM)- 1" to 3" Dead Fuels
10-Hour Fuel Moisture (10-hr FM)- 1/4" to 1" Dead Fuels
1-Hour Fuel Moisture (1-hr FM)- 0" to 1/4" Dead Fuels

Live Fuel Moisture- Fuels transition from dormancy to green-up in the spring and early summer, then back to dormancy in the fall.



Current Status as of 05/16/2022



- Values are relative to this date in history.
- Some areas show 50th to 69th percentile.
- Majority of Wyoming is in "greenup". Lower ERCs due to live fuel component.



Current Status: Southwest Wyoming High Desert (valid 5/16/22)





Current Status: Ft. Laramie/Cheyenne (valid 5/16/22)





Current Status: Wind River Mountains (valid 5/16/22)





Seasonal Outlooks







How to get involved ...



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04 Exceptional Drought

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Drought Level Percentile >30 None D0 (Abnormally Dry) 21 to 30 D1 (Moderate Drought) 11 to 20 D2 (Severe Drought) 6 to 10 D3 (Extreme Drought) 3 to 5 D4 (Exceptional Drought) 0 to 2

https://youtu.be/45MQ1GB-uTc

Improvements and degradations in the last month. Recent precipitation is starting to erode some of the areas but longer term dryness is filling in others.



Map Layout Created 19 May 2022 http://www.wrds.uwyo.edu

https://droughtmonitor.unl.edu



Condition Monitoring Observer Reports

Crops

Overview

USDA

Livestock

Fire

40 km

https://bit.ly/CMOReports

- Comparison photos \rightarrow resource conditions
- Regular reporting is helpful (e.g., monthly)
- *Note:* Reports and photos are available to the public.

Northern Plains Climate Hub

U.S. DEPARTMENT OF AGRICULTURE





CoCoRaHS Mapping System

https://www.cocorahs.org







Different networks of stations and their locations for the data used to generate Precipitation Grids for 12 April 2022

Stations used for Precipitation Grids 12 Apr 2022



Provisional data, subject to revision

Stations used by PRISM Climate Group for Precipitation Grids of 12 Apr 2022, Copyright ©2022, PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu Map created 25 Apr 2022















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The Wyoming Conditions Monitoring Team (WCMT) organized and hosted this webinar. The WCMT is a collaborative effort of state, federal, tribal, and university partners that monitor conditions & impacts throughout the state on a weekly basis – and communicate this information to the U.S. Drought Monitor among others. Learn more at:

https://drought.wyo.gov

Thank you! Questions?