

WY Conditions & Outlooks:

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

June 15, 2023

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



Presentation Outline

- Current Conditions: Overview
 - SWE
 - Streamflow
 - Reservoir Supply
- Outlooks: Temperature & Precipitation
 - Fuels' Status & Wildland Fire Outlook
- Highlight of the Month
 - Runoff & Flood Summary
- Questions



Current Conditions



US Drought Monitor for June 13, 2023

(Released Thursday, June 15, 2023) Valid 8 a.m. EDT

US Drought Monitor for 13 Jun 2023



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

Map Layout Created 15 Jun 2023 http://www.wrds.uwyo.edu

Drought LevelPercentileNone>30D0 (Abnormally Dry)21 to 30D1 (Moderate Drought)11 to 20D2 (Severe Drought)6 to 10D3 (Extreme Drought)3 to 5D4 (Exceptional Drought)0 to 2

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

Improvements since the last webinar throughout the east and southwest central parts of the state. Degradation in the northwest where precipitation deficits are beginning to accumulate, impacting soils.



https://droughtmonitor.unl.edu



A decrease of 2.57% from the last Webinar

Wyoming Area Affected: 39.08% D0-D4 ; 15.96% D1-D4



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





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



Above Median:

• Most of the state

Below Median (Areas of Concern):

- Northwest Teton County
- Northeast Niobrara/Southeast Weston Counties

14-Day Precipitation Percentile (01 June 2023 to 14 Jun 2023)

14-Day Precipitation (Percentile) for 01 Jun 2023 to 14 Jun 2023



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 15 Jun 2023 http://www.wrds.uwyo.edu Daily percentiles created from PRISM daily precipitation grids



Above Median:

Much of Wyoming

Below Median (Areas of Concern):

- Western flank of Bighorns
- South Central Wyoming
- Northwest

90-Day Precipitation Percentile (17 Mar 2023 to 14 Jun 2023)

90-Day Precipitation (Percentile) for 17 Mar 2023 to 14 Jun 2023



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 15 Jun 2023 http://www.wrds.uwyo.edu Daily percentiles created from PRISM daily precipitation grids





Standardized Precipitation Index Created by Montana Climate Office https://drought.climate.umt.ed Man Created 15 Jun 2023 http://www.wrde.uwwo.edu

Standardized Precipitation Index Created by Montana Climate Office https://drought.climate.umt.edu Map Created 15 Jun 2023 http://www.wrds.uwvo.edu

Standardized Precipitation Index (SPI)

Short term: Northwest, Southcentral, Bighorn Basin, Southwest, Central, Northcentral Long term: Central, Southwest, Northcentral, Minor areas of the Winds/Tetons, east Central



365-Day Standardized Precipitation Index (14 Jun 2022 to 13 Jun 2023)

> 2.00

1.75 to 2.00

1.50 to 1.75

1.25 to 1.50

1.00 to 1.25

0.50 to 1.00

-0 50 to 0 50

-1.00 to -0.50

-1.25 to -1.0

-1.50 to -1.25

-1.75 to -1.50

andardized Precipitation Inde Montana Climate Office

Montana

Climate

Office

-2.00 to -1.75

<-2.00

Map Prepared by Wyoming State Climate Offic http://www.wrds.uwyo.edi

Standardized Precipitation Index Created by Montana Climate Office https://drought.climate.umt.edu Man Created 15 Jun 2023 http://www.wrds.uwvo.edu

https://drought.climate.umt.edu



14-Day Average Minimum

Temperature (01 Jun to 14 Jun)

- High elevation mins still below freezing
- BH Basin and Northeast, 50s to upper 50s
- 40s elsewhere except high valleys in upper 30s

14-Day Average Minimum Temperature (Departure from 1991-2020 Average) for 31 May 2023 to 13 Jun 2023



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 14 Jun 2023 http://www.wrds.uwyo.edu Temperature averages created from PRISM daily tempWYerature grids

14-Day Average Minimum Temperature for 01 Jun 2023 to 14 Jun 2023



41 - 44

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 15 Jun 2023 http://www.wrds.uwyo.edu Temperature averages created from PBISM daily tempWYerature grids

14-Day *Departure from* Normal

Average Minimum Temperature

- Mostly above normal with a few 0-3F below average in areas in Sweetwater and Carbon Counties
- Bighorn and Powder/Tongue Basins 6-9F above avg
- Much of southern tier up to 3F above avg
- Remainder up to 3-6F above average



14-Day Average Maximum

Temperature (01 Jun to 14 Jun)

- Highs in the 60s except for higher elevations
- Bighorn Basin & NE warmest, upper 70s avg

14-Day Average Maximum Temperature (Departure from 1991-2020 Average) for 01 Jun 2023 to 14 Jun 2023



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 15 Jun 2023 http://www.wrds.uwyo.edu Temperature averages created from PRISM daily tempWYerature grids

14-Day Average Maximum Temperature for 01 Jun 2023 to 14 Jun 2023



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 15 Jun 2023 http://www.wrds.uwyo.edu Temperature averages created from PRISM daily tempWYerature grids

14- Day *Departure from* Normal

Average Maximum

- NE and NW 3-6F above average Surrounded by up to 3F above average
- Greater (-) departure as go south, 3-6F below

avg

As much as 9F below average in far southeast



Soil Moisture Percentile

Two Weeks Ago

14 June 2023



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



Current Streamflow Conditions (June 15, 2023)

Streamflow Status



- Not ranked
- Measurement flag
- Recent measurement unavailable

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



Science for a changing world WY Duration Hydrograph



E	xplana	tion - Pe	ercentile	e classes	
lounet					
10th percentile	10-24	25-75	76-90	 highest 	Bunoff
Much below	Below	Normal	Above	Much above	realion

Spring Streamflow

- Past the peak for snowmelt a little early.
- Spring rains helping to sustain flow.
- Abundant water supply- Normal & above

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

https://waterdata.usgs.gov/



Select WY Streamflows



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

https://waterdata.usgs.gov/

North Fork Shoshone River, WY

Last updated June 1, 2023



	E	xplana	tion - Pe	ercentile	classes	3	
							_
lowest- 10th percentile	5	10-24	25-75	76-90	95	90th percentile -highest	Flow
Much below	Normal	Below normal	Normal	Above normal	Much a	bove normal	1104



Select WY Streamflows



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

https://waterdata.usgs.gov/

Belle Fourche below Moorcroft, WY

Last updated June 15, 2023



	E	xplana	tion - Pe	ercentile	classes	3	
							_
lowest- 10th percentile	5	10-24	25-75	76-90	95	90th percentile -highest	Flow
Much below	Normal	Below normal	Normal	Above normal	Much a	bove normal	1104



North Platte River ab Seminoe Reservoir, WY

Last updated June 15, 2023

USGS 06630000 N PLATTE RIV AB SEMINOE RESERVOIR, NR SINCLAIR, WY (Drainage area: 4175 square miles, length of record: 82 - 83 years) 20000 second 10000 ŧ cubic S 1000 85 disch 쒏 aver 100 Daily OCT NOV DEC JON. FEB MAR APR MAY JUN SEP AUG USGS WaterWatch 2023 Last updated: 2023-06-14

	E	xplana	tion - Pe	ercentile	classes	5	
							_
lowest- 10th percentile	5	10-24	25-75	76-90	95	90th percentile -highest	Flow
Much below	Normal	Below normal	Normal	Above normal	Much a	bove normal	1101

Select WY Streamflows



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

https://waterdata.usgs.gov/



Select WY Streamflows



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

https://waterdata.usgs.gov/

Snake River at Moose, WY

Last updated June 15, 2023



	E	xplana	tion - Pe	ercentile	classes	3	
							_
lowest- 10th percentile	5	10-24	25-75	76-90	95	90th percentile -highest	Flow
Much below	Normal	Below normal	Normal	Above normal	Much a	bove normal	1104



June 15, 2023



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

- Increases in most reservoirs
- Most are more than 75% full

May 25, 2023



RECLAMATION Current Reservoir Conditions: Bighorn System



As of June 14, Bighorn System: 93% of Full, 115% of Average

Reservoir	Content	Capacity	<u>% of Full</u>	% of Avg
Bull Lake	134,900	152,500	89%	118%
Buffalo Bill	599,500	646,600	92%	115%
Boysen	698,500	741,600	94%	114%



Wyoming Area Office Water Order Changes - https://www.usbr.gov/gp/woc/indexwy.html

RECLAMATION Current Reservoir Conditions: North Platte System



Forecast April – July Runoff:

Forecast Point	Runoff (AF)	<u>% of Avg</u>
Seminoe	1,040,000	145
Sweetwater above Pathfinder	90,000	170
Alcova to Glendo	177,000	121

As of June 13, North Platte System: 75% of Full, 102% of Average

<u>Reservoir</u>	Content (AF) Capacity	% of Full	% of Avg
Seminoe	819,088	1,017,300	81%	116%
Pathfinder	594,495	1,070,000	56%	91%
Glendo	480,258	492,000	98%	97%











Forecasts & Outlooks



7-Day Total Precipitation Forecast Through 6/22/23

7-Day Quantitative Precipitation Forecast 15 Jun 2023



Provisional data, subject to revision

The Quantitative Precipitation Forecast shows the liquid amount of forecasted precipitation over the next 7 days The Forecast is created by the National Weather Service Weather Prediction Center 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 15 Jun 2023 http://www.wrds.uwyo.edu

- Wet period continues, Early period conditions favor heavy rainfall.
- Scattered afternoon & evening showers & thunderstorms through Saturday
 - Some locations could miss out on precipitation, despite map showing smoothed
 - appearance

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- Showers more isolated after Sunday
- Wettest in the Wind River basin above and near Boysen Res.

https://bit.ly/7_dayQPForecast



Below-normal temperature signal strengthening (weak to very strong) from east to west

Weak above-normal signal for above-normal precipitation. Strengthening to moderate in east



Weak signal for below-normal temperatures across most of the state, weakening to the northeast

Weak signal for above-normal precipitation across most of the state, weakening to the southwest



No clear signal from the global weather pattern: Near climatology is best forecast

Weak to moderate signal for above-normal precipitation in the north that weakens to no signal in the south



Fuel Moisture and Energy Release Component (ERC) -Definitions and Explanations

- Live Fuel Moisture- Influenced by seasonality, species characteristics and available moisture (soil and air).
- <u>Dead Fuel Moisture</u>- Influenced by precipitation and relative humidity. 4 Size Classes based on "Time Lag", simply explained as the amount of time it takes the fuel to adjust to closely resemble the humidity of its surrounding environment.
 - 1 Hour Fuels
 - Less than 1/4" diameter.
 - Fine flashy fuels that respond quickly to weather changes. Computed from observation time temperature, humidity, and cloudiness.
 - 10 Hour Fuels
 - 1/4 to 1" diameter.
 - Computed from observation time temperature, humidity, and cloudiness. Or can be an observed value, from a standard set of "10-Hr Fuel Sticks" that are weighed as part of the fire weather observation.
 - 100 Hour Fuels
 - 1 to 3" diameter.
 - Computed from 24-hour average boundary condition composed of day length, hours of rain, and daily temperature/humidity ranges.
 - 1000 Hour Fuels
 - 3 to 8 " diameter.
 - Computed from a 7-day average boundary condition composed of day length, hours of rain, and daily temperature/humidity ranges.
- Energy Release Component (ERC)- Related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. The ERC is considered a composite fuel moisture index as it reflects the contribution of all live and dead fuels to potential fire intensity.





































National Fire Danger Outlook



SERVICE



National Fire Danger Outlook







Highlight of the Month ... 2023 Runoff and Flood Summary

Snow Water Equivalent as of 15 April 2023, Percent of 30-Year Median

EATHER





Yellowstone River Basin

SWE peaked 26 April at 109% of 30-year median peak.



No flooding along Yellowstone due to melt (FS=11.0' Corwin Springs)



NWS April-Sept runoff forecast is 74% (1480 kAcFt) of 30-year median



Wind River Basin

SWE peaked 28 April at 111% of 30-year median peak





2023/06/12: Max: 2080 Min: 275 Average: 890 Median: 940 Observed Accumulation: 596 Observed Total: 596 ESP: 1240

No flooding along Wind due to melt runoff (FS=5.0' at Dubois)



NWS April-Sept runoff forecast is 132% (1240 kAcFt) of 30-year median



Bighorn River Basin

7Jun23 12z

10Jun23 12z



SWE peaked 09 April at 102% of 30-year median peak



Oct 2022

Nov 2022 Dec 2022

lan 2023

Tongue River Basin

- Max

- Min Stats. Shading - 2023 (7 sites)

- Median ('91-'20)





Feb 2023 Mar 2023 Apr 2023 May 2023 Jun 2023

Jul 2023

Aug 2023

Sep 2023

No flooding along the Tongue River (NWS Action Stage = 6.0°)



NWS April-Sept runoff forecast is 106% (109 kAcFt) of 30-year median

Powder River Basin



SNOW WATER EOUIVALENT IN

SWE peaked 08 April at 107% of 30-year median peak



USGS 06326500 Powder River near Locate MT



Oct 2022

Nov 2022 Dec 2022

Jan 2023

Feb 2023 Mar 2023

North Platte River Basin



Apr 2023 May 2023 Jun 2023

Aug 2023 Sep 2023

Jul 2023

No flooding due to snowmelt along North Platte (FS= 9.0' at Sinclair)

N Platte Riv AB Seminoe Reservoir, NR Sinclair, WY - 06630000



NWS April-Sept runoff forecast is 168% (1480 kAcFt) of 30-year median



Snake River Basin

SWE peaked 26 April at 123% of 30-year median peak



Salt River Above Reservoir, Near Etna, WY -L3027500 May 15, 2023 - June 14, 2023 Gage height, ft ®

Flooding occurred on a trib to the Snake

Current: — Provisional Action stage … 5 ft Minor flood stage — 5.5 ft Moderate flood stage — 6 ft Maximum operating limit — 6 ft

Courtesy of the USGS

NWS April-Sept runoff forecast is 99% (3060 kAcFt) of 30-year median



Upper Green River Basin







Lower Green River Basin



SWE peaked 08 April at 135% of 30-year median peak

No flooding along the lower Green River (FS=15' at Green River)



NWS April-Sept runoff forecast is 125% (850 kAcFt) of 30-year median



Bear River Basin

SWE peaked 09 April at 151% of 30-year median peak





SNOW WATER EQUIVALENT IN

Little Snake River Basin

SWE peaked 09 April at 157% of 30-year median peak



(560 kAcFt) of 30-year median

SUMMARY OF RUNOFF & FLOODING



. Longmont

Denver

UNITED

S

Boulder

BASIN	PEAK SWE (% OF 30-YEAR	APRIL-SEPTEMBER RUNOFF VOLUME	DID IT FLOOD?
	MEDIAN PEAK SWE)	(% of 30-YR median)	
YELLOWSTONE	109	74	Ν
WIND	111	132	Ν
BIGHORN	102	113	Ν
TONGUE	95	106	Ν
POWDER	107	127	?
NORTH PLATTE	119	168	Ν
SNAKE	123	99	Y
UPPER GREEN	113	121	Ν
LOWER GREEN	135	125	Ν
BEAR	151	204	Y
LITTLE SNAKE	157	204	Y





Site Time (MDT

Websites:

https://www.nrcs.usda.gov/wps/portal/wcc/home/

https://www.cbrfc.noaa.gov/wsup/graph/west/map/esp_map.html

https://waterdata.usgs.gov/wy/nwis/current/?type=flow

https://water.weather.gov/ahps/region.php?state=wy



Flood Risk going forward



https://water.weather.gov/ahps/long_range.php



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Aaron Fiaschetti USGS afiaschetti@usgs.gov	Casey Cheesbrough Bureau of Land Management (BLM) ccheesbrough@blm.gov	Get Involved! Submit a Condition Monitoring Observer Report
George Finnegan Bureau of Reclamation gsfinnegan@usbr.gov	Kevin Low MO Basin River Forecast Center kevin.low@noaa.gov	The WY 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 WY

Thank you!

Learn more at: https://drought.wyo.gov

the U.S. Drought Monitor & others.