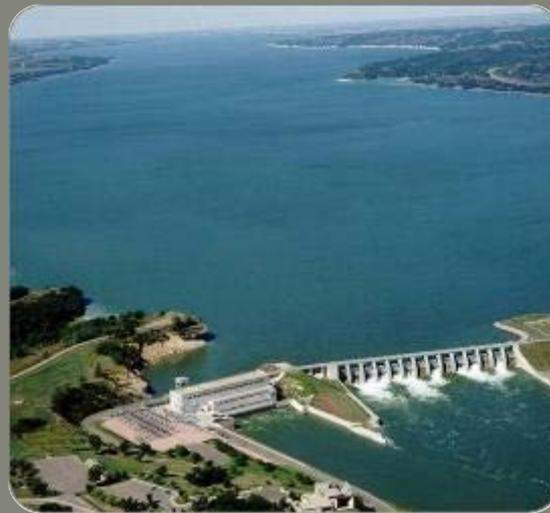


MISSOURI RIVER BASIN WATER MANAGEMENT 2018 MRB NAVIGATORS' MEETING NWS TRAINING CENTER, KANSAS CITY, MO

MAINSTEM OPERATIONS

Kevin Grode, P.E.
Reservoir Regulation Team Lead
NWD, MRBWM
14 February 2018



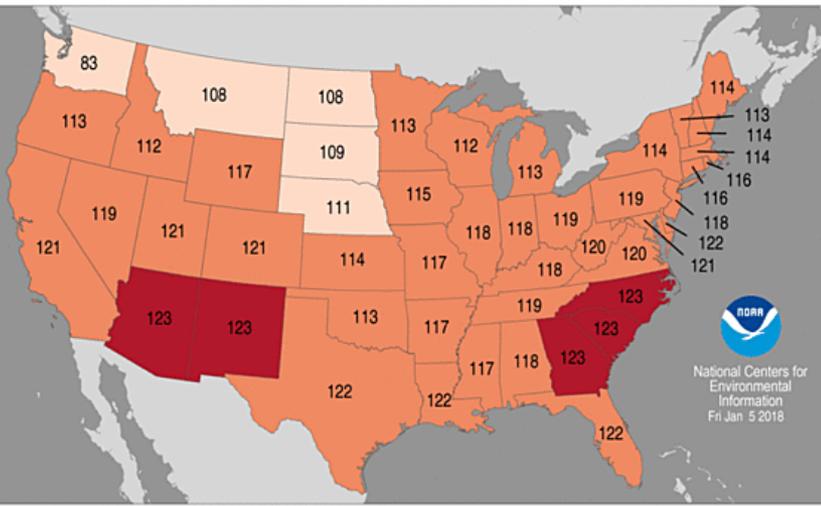
US Army Corps
of Engineers®



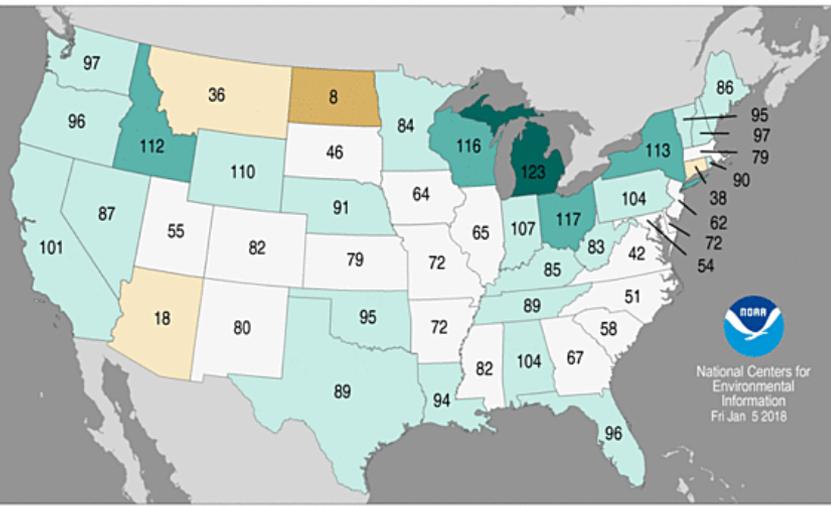
2017 – Climate Summary

Missouri River Basin

Statewide Average Temperature Ranks
January–December 2017
Period: 1895–2017



Statewide Precipitation Ranks
January–December 2017
Period: 1895–2017



Warm

Varied

2017 upper basin* runoff – 29.5 MAF (116% of average)

*above Sioux City, IA

Source: NOAA, National Centers for Environmental Information



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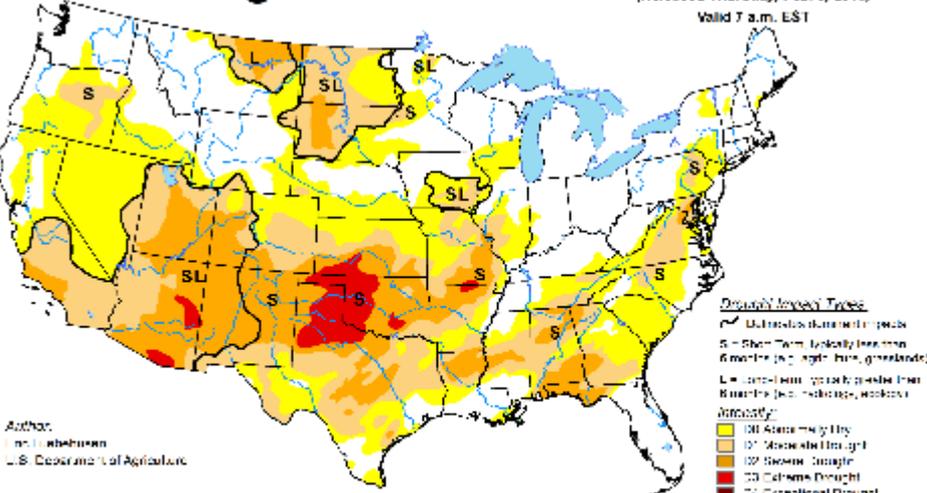
2



Current Drought Conditions Missouri River Basin

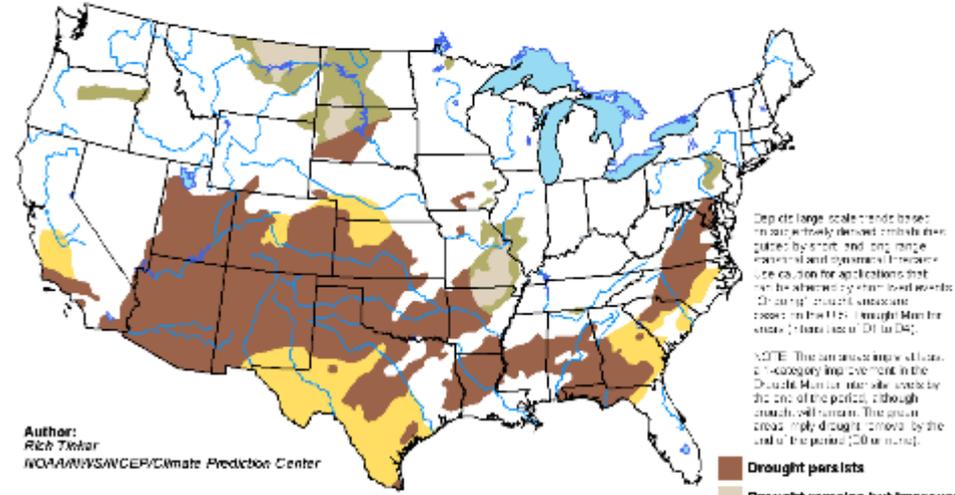
U.S. Drought Monitor

February 6, 2018
(Released Thursday, Feb. 8, 2018)
Valid 7 a.m. EST



U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for January 18 - April 30, 2018
Released January 18, 2018



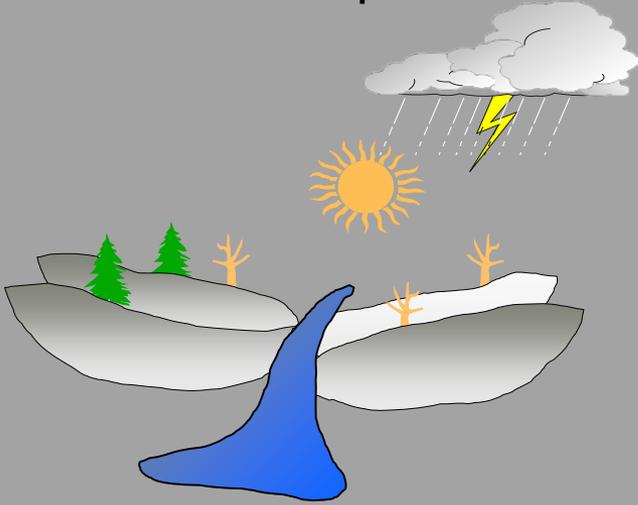
The Drought Monitor is based on satellite data and ground-based observations. For more information, visit <http://droughtmonitor.unl.edu/>

<http://go.usa.gov/3eZ73>

- Drought conditions are affecting most of the Missouri basin.
- The outlook for the upper basin shows that conditions are improving; the outlook for the lower basin indicates development and/or persistence.

Runoff Components

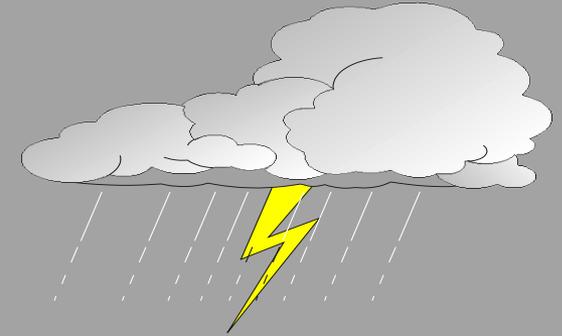
Plains Snowpack



Mountain Snowpack



Rainfall



March and
April

May, June
and July

March through
October

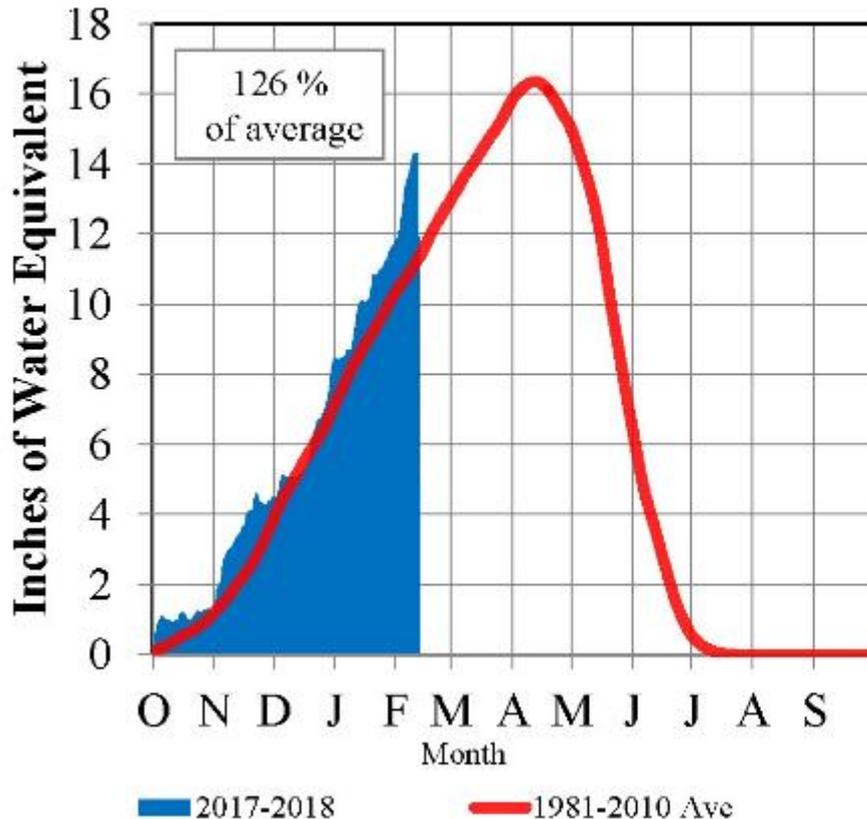
2018 Forecast = 26.4 MAF, 104% of average*

*February 1 forecast; average runoff is 25.3 MAF

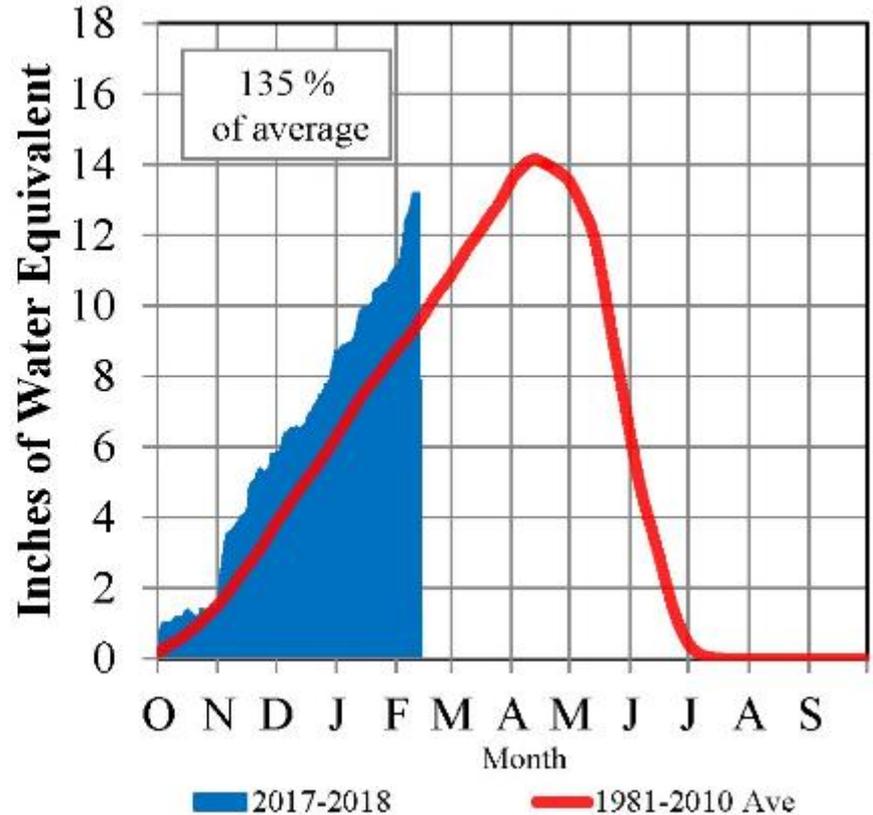
Missouri River Basin 2017-18 Mountain Snowpack

February 12, 2018

Total above Fort Peck



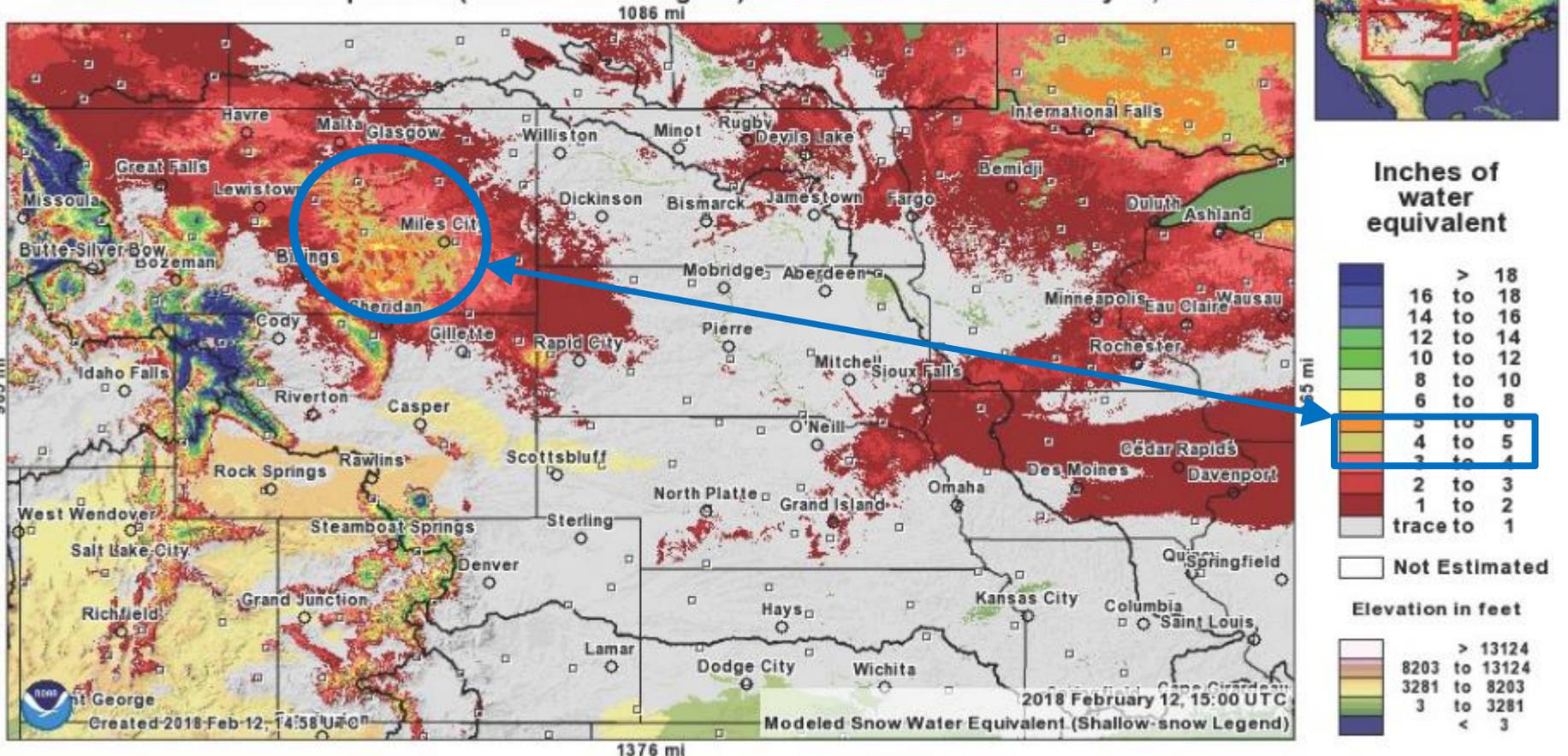
Total Fort Peck to Garrison



70% of peak accumulation normally occurs by February 15.

Plains Snowpack February 12, 2018

Modeled Snow Water Equivalent (Shallow-snow Legend) forecasted for 2018 February 12, 15:00 UTC



Source: NOAA, National Operational Hydrologic Remote Sensing Center

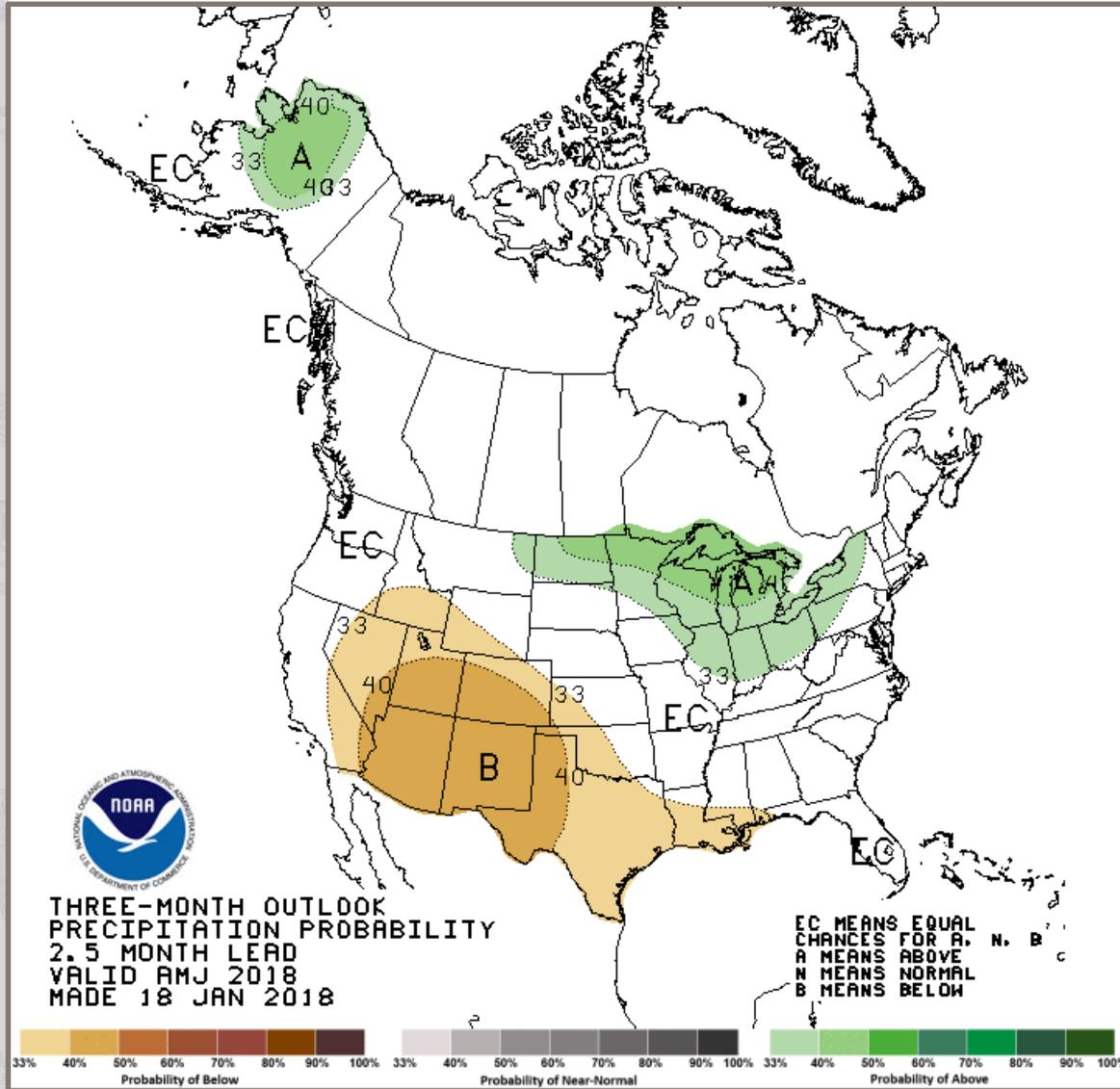


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Precipitation Outlook April – May - June



Most of the basin has Equal Chances of above normal, normal, or below normal precipitation

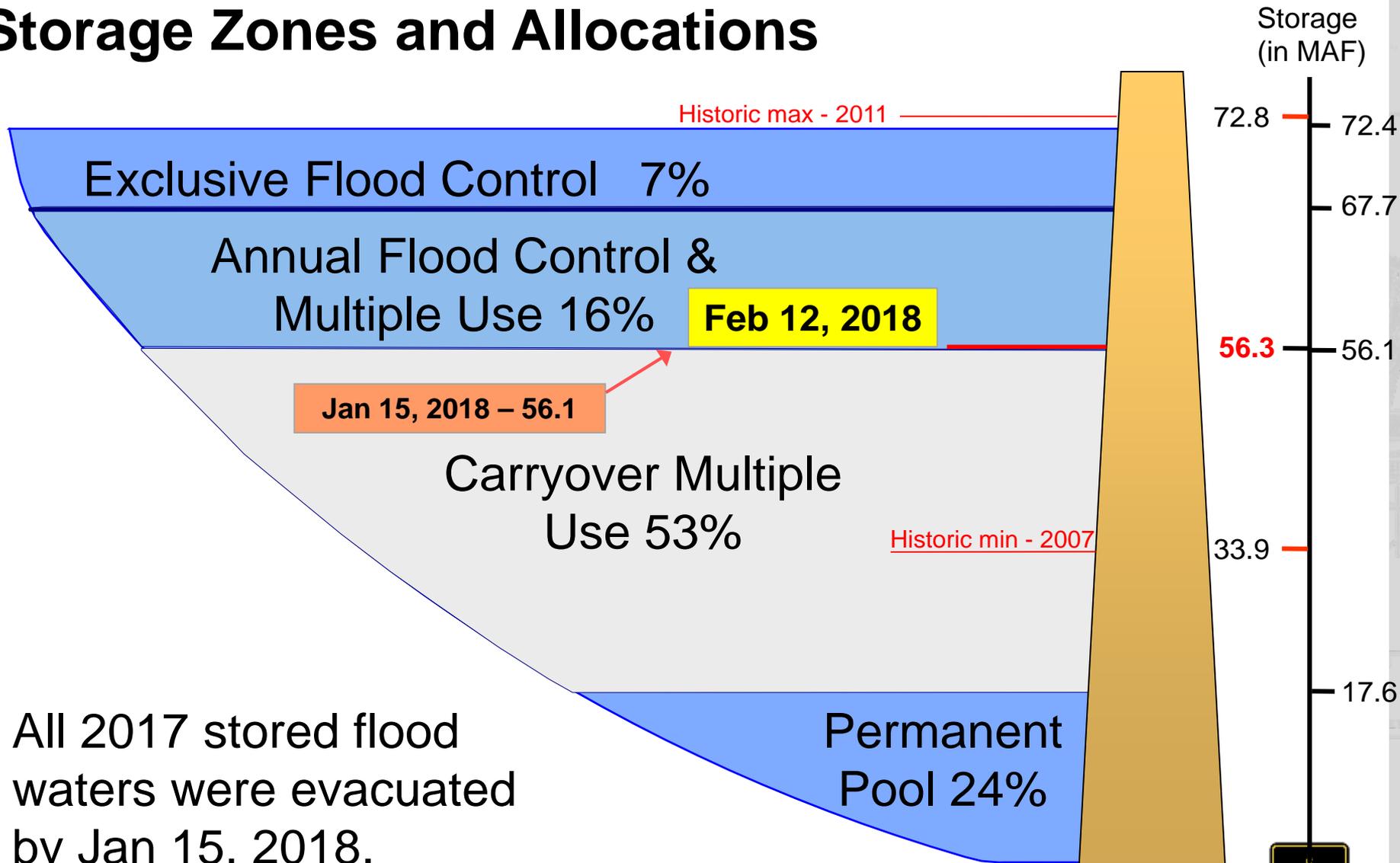


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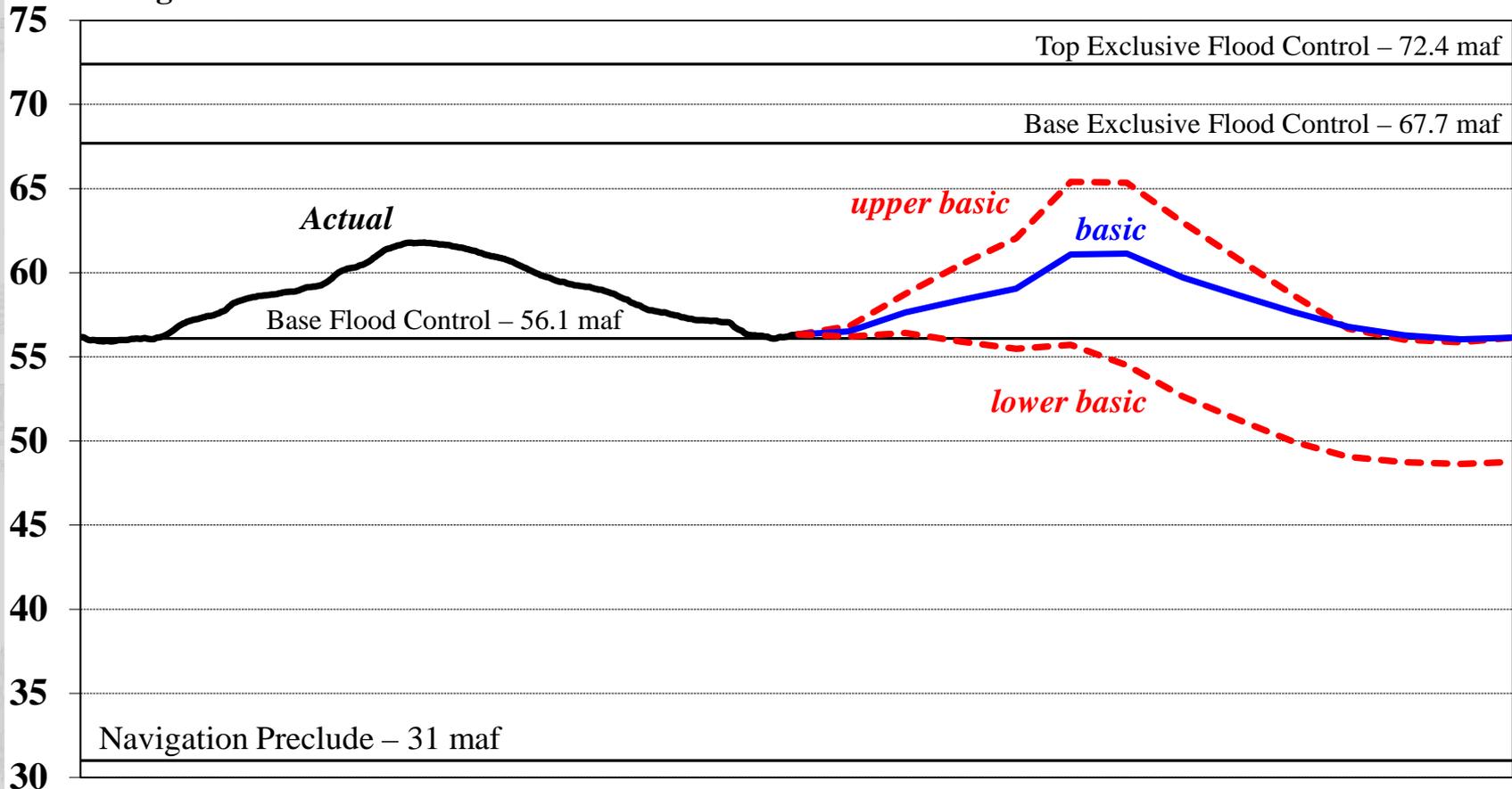
Missouri River Mainstem System Storage Zones and Allocations



Mainstem System Storage – Forecast for 2018

February 1 Monthly Study

Storage in Million Acre-Feet



J F M A M J J A S O N D J F M A M J J A S O N D J F M

2017

2018



US Army Corps of Engineers



Planned Operation for 2018*

- 2018 Runoff Forecast (Feb 1) = 26.4 MAF (104% of ave.)
- All stored 2017 flood waters evacuated (Jan 15, 2018)
- Navigation flow support (first half of season) based on March 15 system storage check
 - Full service flow support
 - ✓ 31,000 cfs at Sioux City and Omaha
 - ✓ 37,000 cfs at Nebraska City
 - ✓ 41,000 cfs at Kansas City
 - Season begins April 1 at mouth
- Navigation flow support and season length (second half of season) based on July 1 system storage check

*based on February 1 monthly studies



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Planned Operation for 2018* (cont'd)

■ Navigation Flow Support

- Basic (most likely) – full service for the entire season
- Lower Basic – full service for the 1st half; 1,200 cfs below full service for 2nd half
- Upper Basic – full service for the 1st half; flood evacuation releases for 2nd half

■ Length of Flow Support

- Basic (most likely) – 10-day extension
- Lower Basic – full 8-month season
- Upper Basic – 10-day extension

■ Opening Dates of Flow Support

- Sioux City, IA – March 23
- Omaha, NE – March 25
- Kansas City, MO – March 28
- Mouth of Missouri – April 1

*based on February 1 monthly studies



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Planned Operation for 2018 (cont'd)

- No Gavins Point bimodal spring pulse in 2018
- Favor Garrison during the forage fish spawn period if inflows are not sufficient to keep all three upper reservoirs steady or rising
- Public meetings scheduled April 17-19, 2018
- Monthly calls with Congressional delegations, Tribes, states, local officials and media
 - Audio file available on our website
 - Next one is scheduled for Tuesday, March 6th
 - Weekly Basin Update – on our website

WEEKLY BASIN UPDATE

www.nwd-mr.usace.army.mil/rcc/

<http://www.nwd-mr.usace.army.mil/rcc/reports/pdfs/weeklyupdate.pdf>

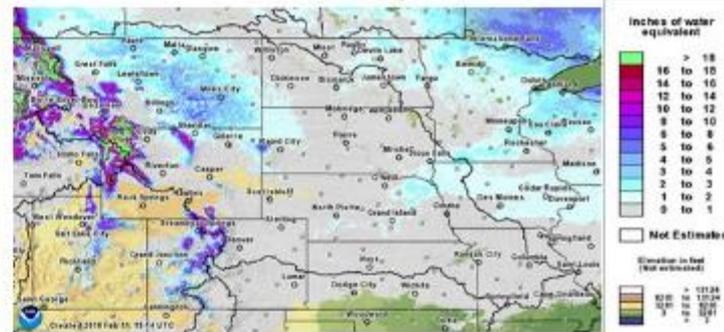
Missouri River Basin – Weekly Update – 12 February 2018

Mainstem Reservoir Status:

- ❖ System storage reached 56.1 million acre-feet (MAF), the base of the Annual Flood Control and Multiple Use Zone, on January 15, 2018.
- ❖ System storage is currently 56.3 MAF, 0.2 MAF above the base of the Annual Flood Control and Multiple Use Zone.
- ❖ Mountain and plains snowpack have increased in the last week.
- ❖ The February 1st runoff forecast for the Missouri River Basin above Sioux City, Iowa is 26.4 million acre-feet (104% of average).
- ❖ The Gavins Point (GAPF) release schedule and Missouri River flows and stages can be found here:

[Click Here](#) for Missouri River releases, flows, & stages

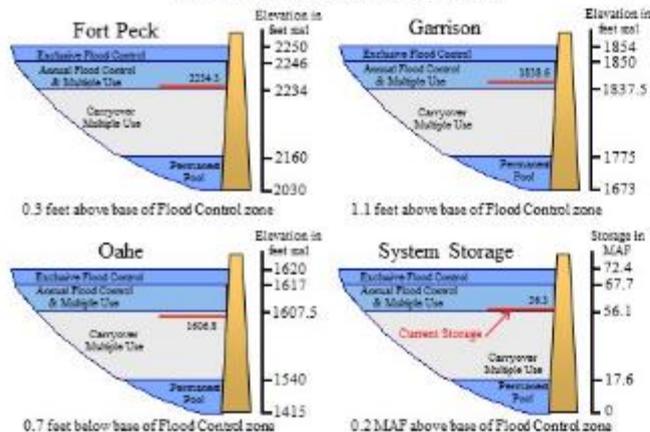
Plains Snowpack



Source: NOAA National Operational Hydrologic Remote Sensing Center (NOHRSC)

[Click Here](#) for 2011 Peak Plains Snowpack

Current Reservoir Levels

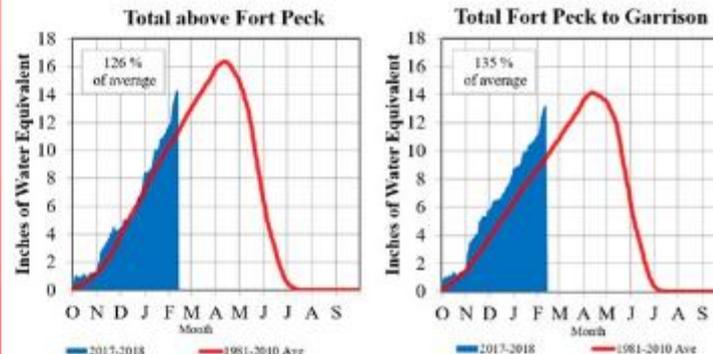


[Click Here](#) for Latest 3-Week Forecast

[Click Here](#) for Comparison Plots

Mountain Snowpack

February 12, 2018



Normally by February 15, 70% of the peak SWE has accumulated.

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LOWER MISSOURI RIVER FORECAST Gavins Release Forecasting Tool (GRFT)

| Missouri River below Gavins Point Dam Forecast | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|
| ** All flows in 1000 cfs ** | | | | | | | | | | |
| date | GALI | ASIA | SUX | DENE | LJIA | OMA | GRNE | WINE | LOE | NCNE |
| as of 2/12/2018 | | | | | | | | | | |
| 2/9 | 18.0 | 1.3 | 20.9 | 20.8 | 1.5 | 21.8 | 1.7 | 2.8 | 12.6 | 30.7 |
| 2/10 | 18.1 | 1.3 | 21.2 | 20.5 | 1.5 | 22.8 | 1.7 | 2.9 | 11.2 | 30.3 |
| 2/11 | 18.0 | 1.3 | 20.8 | 20.8 | 1.5 | 22.8 | 1.7 | 2.8 | 10.9 | 30.1 |
| 2/12 | 18.1 | 1.3 | 21.2 | 20.1 | 1.5 | 22.5 | 1.7 | 2.8 | 10.7 | 29.9 |
| 2/13 | 18.0 | 1.3 | 21.0 | 20.4 | 1.3 | 22.7 | 1.7 | 2.7 | 10.4 | 29.3 |
| 2/14 | 18.0 | 1.3 | 20.9 | 20.5 | 1.3 | 22.9 | 1.7 | 2.7 | 10.2 | 29.4 |
| 2/15 | 18.0 | 1.3 | 20.8 | 20.8 | 1.5 | 23.0 | 1.7 | 2.7 | 10.1 | 29.4 |
| 2/16 | 18.0 | 1.3 | 20.7 | 20.8 | 1.4 | 22.9 | 1.7 | 2.7 | 9.9 | 29.3 |
| 2/17 | 18.0 | 1.3 | 20.8 | 20.4 | 1.4 | 22.9 | 1.7 | 2.7 | 9.8 | 29.2 |
| 2/18 | 18.0 | 1.3 | 20.5 | 20.3 | 1.4 | 22.7 | 1.7 | 2.7 | 9.7 | 29.0 |
| 2/19 | 18.0 | 1.2 | 20.4 | 20.2 | 1.4 | 22.6 | 1.7 | 2.7 | 9.6 | 28.8 |
| 2/20 | 18.0 | 1.2 | 20.3 | 20.1 | 1.4 | 22.5 | 1.7 | 2.6 | 9.5 | 28.6 |
| 2/21 | 18.0 | 1.2 | 20.2 | 20.0 | 1.4 | 22.4 | 1.7 | 2.6 | 9.4 | 28.4 |
| 2/22 | 18.0 | 1.2 | 20.1 | 20.0 | 1.4 | 22.4 | 1.7 | 2.6 | 9.3 | 28.3 |
| 2/23 | 18.0 | 1.2 | 20.1 | 19.9 | 1.4 | 22.3 | 1.7 | 2.6 | 9.2 | 28.1 |
| 2/24 | 18.0 | 1.2 | 20.0 | 19.9 | 1.4 | 22.3 | 1.7 | 2.6 | 9.1 | 28.0 |
| 2/25 | 18.0 | 1.2 | 20.0 | 19.8 | 1.3 | 22.2 | 1.7 | 2.6 | 9.0 | 27.9 |
| 2/26 | 18.0 | 1.2 | 19.9 | 19.8 | 1.3 | 22.2 | 1.7 | 2.6 | 8.9 | 27.7 |

| date | HA A | RUNE | STJ | SSMO | MKC | WVMO | SMNM | BNMO | BAGI | HEMO |
|------|------|------|------|------|------|------|------|------|------|------|
| 2/9 | 1.5 | 26.6 | 31.3 | 0.2 | 34.3 | 37.0 | 0.1 | 37.6 | 2.1 | 40.3 |
| 2/10 | 1.4 | 26.5 | 31.7 | 0.2 | 34.1 | 36.9 | 0.2 | 37.5 | 1.0 | 39.1 |
| 2/11 | 1.4 | 26.7 | 31.5 | 0.3 | 34.0 | 37.1 | 0.2 | 38.0 | 2.2 | 37.4 |
| 2/12 | 1.4 | 26.5 | 31.4 | 0.2 | 34.3 | 36.5 | 0.2 | 37.7 | 0.9 | 38.1 |
| 2/13 | 1.4 | 26.3 | 31.2 | 0.2 | 34.2 | 36.6 | 0.2 | 37.5 | 0.9 | 38.1 |
| 2/14 | 1.4 | 26.3 | 30.9 | 0.2 | 34.0 | 36.6 | 0.2 | 37.7 | 0.9 | 38.0 |
| 2/15 | 1.3 | 26.4 | 30.9 | 0.2 | 33.6 | 36.5 | 0.2 | 37.5 | 0.9 | 37.7 |
| 2/16 | 1.3 | 26.4 | 30.9 | 0.2 | 33.4 | 36.1 | 0.2 | 37.2 | 0.9 | 37.5 |
| 2/17 | 1.3 | 26.2 | 30.5 | 0.1 | 33.0 | 35.9 | 0.2 | 36.9 | 0.9 | 37.2 |
| 2/18 | 1.3 | 26.1 | 30.7 | 0.1 | 32.6 | 35.5 | 0.3 | 36.6 | 0.9 | 36.9 |
| 2/19 | 1.2 | 27.9 | 30.5 | 0.1 | 32.3 | 35.1 | 0.3 | 36.2 | 0.9 | 36.6 |
| 2/20 | 1.2 | 27.7 | 30.3 | 0.1 | 32.1 | 34.6 | 0.3 | 35.6 | 0.9 | 36.2 |
| 2/21 | 1.2 | 27.5 | 30.1 | 0.1 | 31.9 | 34.5 | 0.3 | 35.5 | 0.9 | 36.0 |
| 2/22 | 1.2 | 27.3 | 29.9 | 0.1 | 31.8 | 34.3 | 0.2 | 35.2 | 0.9 | 35.6 |
| 2/23 | 1.1 | 27.1 | 29.7 | 0.1 | 31.6 | 34.1 | 0.2 | 35.0 | 0.9 | 35.3 |
| 2/24 | 1.1 | 27.0 | 29.5 | 0.1 | 31.4 | 33.9 | 0.2 | 34.6 | 0.9 | 35.1 |
| 2/25 | 1.1 | 26.6 | 29.3 | 0.1 | 31.3 | 33.6 | 0.2 | 34.6 | 0.9 | 34.9 |
| 2/26 | 1.1 | 26.7 | 29.1 | 0.1 | 31.1 | 33.6 | 0.2 | 34.4 | 0.9 | 34.8 |

| Date | Results of Release for Date | | | | Service Level Exceeded | | | | Flood Targets | | |
|------|-----------------------------|------|------|------|------------------------|-----|------|-----|-----------------------|------|-----|
| | SUX | OMA | NCNE | MKC | SUX | OMA | NCNE | MKC | OMA | NCNE | MKC |
| 2/12 | 20.9 | 23.0 | 29.3 | 32.0 | NA | NA | NA | NA | OMA | NCNE | MKC |
| 2/13 | 20.8 | 22.9 | 29.2 | 32.3 | NA | NA | NA | NA | NA | NA | NA |
| 2/14 | 20.7 | 22.9 | 29.0 | 32.1 | NA | NA | NA | NA | Minimum Service | | |
| 2/16 | 20.6 | 22.7 | 28.8 | 31.9 | NA | NA | NA | NA | OMA | NCNE | MKC |
| 2/16 | 20.5 | 22.8 | 28.8 | 31.6 | NA | NA | NA | NA | NA | NA | NA |
| 2/17 | 20.4 | 22.5 | 28.4 | 31.6 | NA | NA | NA | NA | Current Service Level | | |
| 2/18 | 20.3 | 22.4 | 28.3 | 31.4 | NA | NA | NA | NA | - cfs | | |
| 2/19 | 20.2 | 22.4 | 28.1 | 31.3 | NA | NA | NA | NA | | | |
| 2/20 | 20.1 | 22.3 | 28.0 | 31.1 | NA | NA | NA | NA | | | |

| Missouri River below Gavins Point Dam Stage Forecast | | | | | | | | | | | |
|---|-----|------|------|------|------|-----|-----|------|------|------|-----------------|
| ** All stages in feet ** | | | | | | | | | | | |
| date | SUX | DENE | OMA | NCNE | RJNE | STJ | MKC | WVMO | BNMO | HEMO | as of 2/12/2018 |
| 2/9 | 9.7 | 17.0 | 11.0 | 7.3 | 8.3 | 5.4 | 7.8 | 9.4 | 5.4 | 5.9 | |
| 2/10 | 9.3 | 17.4 | 11.3 | 7.4 | 8.4 | 5.5 | 7.7 | 9.4 | 5.4 | 5.3 | |
| 2/11 | 9.1 | 17.6 | 11.3 | 7.4 | 8.3 | 5.5 | 7.7 | 9.4 | 5.3 | 5.1 | |
| 2/12 | 9.3 | 17.3 | 11.3 | 7.3 | 8.3 | 5.4 | 7.8 | 9.3 | 5.4 | 5.3 | Observed |
| 2/13 | 9.2 | 17.1 | 11.3 | 7.2 | 8.2 | 5.3 | 7.7 | 9.4 | 5.7 | 5.3 | Forecast |
| 2/14 | 9.2 | 17.0 | 11.4 | 7.3 | 8.2 | 5.2 | 7.7 | 9.4 | 5.4 | 5.3 | |
| 2/15 | 9.1 | 17.5 | 11.4 | 7.2 | 8.2 | 5.2 | 7.6 | 9.3 | 5.4 | 5.2 | |
| 2/16 | 9.1 | 17.5 | 11.1 | 7.2 | 8.2 | 5.2 | 7.6 | 9.3 | 5.3 | 5.2 | |
| 2/17 | 9.1 | 17.4 | 11.4 | 7.1 | 8.2 | 5.2 | 7.6 | 9.2 | 5.2 | 5.1 | |
| 2/18 | 9.0 | 17.4 | 11.3 | 7.1 | 8.2 | 5.2 | 7.4 | 9.1 | 5.2 | 5.0 | |
| 2/19 | 9.0 | 17.3 | 11.3 | 7.0 | 8.1 | 5.1 | 7.3 | 9.0 | 5.1 | 5.0 | |
| 2/20 | 9.0 | 17.3 | 11.3 | 7.0 | 8.1 | 5.1 | 7.3 | 8.9 | 5.0 | 4.9 | |
| 2/21 | 8.9 | 17.3 | 11.2 | 6.9 | 8.1 | 5.0 | 7.2 | 8.8 | 4.9 | 4.8 | |
| 2/22 | 8.9 | 17.2 | 11.2 | 6.9 | 8.0 | 5.0 | 7.2 | 8.8 | 4.9 | 4.8 | |
| 2/23 | 8.8 | 17.2 | 11.2 | 6.9 | 8.0 | 4.9 | 7.1 | 8.8 | 4.8 | 4.7 | |
| 2/24 | 8.9 | 17.2 | 11.2 | 6.8 | 8.0 | 4.9 | 7.1 | 8.8 | 4.8 | 4.7 | |
| 2/25 | 8.9 | 17.2 | 11.1 | 6.8 | 8.0 | 4.8 | 7.0 | 8.7 | 4.7 | 4.6 | |
| 2/26 | 8.8 | 17.2 | 11.1 | 6.8 | 8.0 | 4.8 | 7.0 | 8.7 | 4.7 | 4.6 | |

Head stages at the above stations are shown below

| | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|
| 30.0 | 35.0 | 29.0 | 18.0 | 17.0 | -7.0 | 32.0 | 20.0 | 21.0 | 21.0 |
|------|------|------|------|------|------|------|------|------|------|

<http://www.nwd-mr.usace.army.mil/rcc/>

- * Forecast Information
- ** River (Corps Only)
- *** Missouri River Forecast



US Army Corps of Engineers®



This forecast is prepared by the Corps of Engineers, Missouri River Basin Water Management Division for regulation of reservoir releases and is for internal use and not for general distribution. The National Weather Service prepares and distributes river stage forecasts for the general public.

Visit the MRBWM website:
www.nwd-mr.usace.army.mil/rcc/

THANK YOU!

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402.996.3870



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