SPRING 2019
MISSOURI RIVER BASIN
FLOOD OUTLOOK

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“The views, opinions and findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.”
First – What was the winter forecast?

One of the main driving winter season forecast is El Niño Southern Oscillation (ENSO)
* Based on Sea Surface Temperatures (SST) across the south central Pacific Ocean (specifically Niño 3.4)
TYPICAL EL NIÑO AND LA NIÑA WINTER WEATHER PATTERNS

Wintertime

El Niño Pattern

- Warmer than normal
- Less upper basin snowfall
- Greater lower basin moisture

Strong
2015-2016

Weak
2018-2019
Delayed

La Niña Pattern

- Colder than normal
- Greater upper basin snowfall

Weak
2016-2017

Moderate
2017-2018

Graphics courtesy of NOAA Climate Prediction Center
Current ENSO Conditions
Weak El Niño
Steady then Slowly Weaken

***Forecast***
“Dynamical Models”
ENSO-Neutral
“Statistical Models”
Weak El Niño redevelops this fall

Slightly above normal sea surface temperatures along the equatorial Pacific Ocean

Graphics courtesy of NOAA Climate Prediction Center
SPRING FLOOD – WHAT TO LOOK AT?

Temperature & Precipitation
- Above Ground Conditions (Snowpack or Snow Water Equivalent)
  - Mountain Snowpack
  - Plains Snowpack
- Below Ground Conditions
  - Frost Depth
  - Soil Moisture
- River Conditions
  - Base Flow
  - Ice Thickness
- **Future Conditions - CRITICAL**
TEMPERATURE DEPARTURE FROM NORMAL (OCTOBER 1 – MARCH 10)

- Started out Cold – October/November
- Warm December part of January
- Been generally cold since the 3rd week of January

Graphics courtesy High Plains Regional Climate Center (HPRCC)
PRECIPITATION PERCENT OF NORMAL
(OCTOBER 1 – MARCH 10)

• Many locations > 150% of Normal
• Only small area of Below Normal

Above Normal

Graphics courtesy High Plains Regional Climate Center (HPRCC)
MOUNTAIN SNOWPACK (ESTIMATED) – MARCH 11, 2019

Missouri Headwaters (119% overall)

Yellowstone Basin (118% overall)

North Platte Basin (117% overall)

South Platte Basin (127% overall)

Graphics courtesy of USDA NRCS (Natural Resources Conservation Service)
PLAINS SNOWPACK (COMPARISON)

Modeled Snow Water Equivalent (Shallow-snow Legend) for 2017 March 11, 18:00 UTC

March 11, 2017
- 2”-4” South Central ND
- 1”-2” Northeast MT
PLAINS SNOWPACK (COMPARISON)

Modeled Snow Water Equivalent (Shallow-snow Legend) for 2018 March 11, 18:00 UTC

- 3”-6” Central/Southeast MT
- 1”-3” Northwest SD
- 1”-3” South Central ND

Graphics courtesy of National Weather Service NOHRSC (National Operational Hydrologic Remote Sensing Center)
PLAINS SNOWPACK (COMPARISON)

Modeled Snow Water Equivalent (Shallow-snow Legend) forecasted for 2019 March 11, 18:00 UTC

- 3”-6” Southern ND/SD
- 1”-4” East MT
- 2”-4” East NE, West IA

March 11, 2019

Graphics courtesy of National Weather Service NOHRSC (National Operational Hydrologic Remote Sensing Center)
U.S. SOIL MOISTURE ANOMALY (COMPARISON)

Calculated Soil Moisture Anomaly (mm)
MAR, 2018

Graphics courtesy of NOAA Climate Prediction Center
U.S. SOIL MOISTURE ANOMALY (COMPARISON)

Calculated Soil Moisture Anomaly (mm)
SEP, 2018

Graphics courtesy of NOAA Climate Prediction Center
Above Normal Soil Moisture
- Missouri Headwater
- Upper Yellowstone
- South Dakota
- Nebraska
- Iowa

Below Normal Soil Moisture
- Upper N. Platte/S. Platte River Basin
Current Conditions

Moderate (D1) Drought northeast CO

- Conditions have improved
- Developing/persisting across the southwestern portion of the basin
- Generally Abnormally Dry.
U.S. DROUGHT FORECAST

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

Valid for February 21 - May 31, 2019
Released February 21

Drought conditions (what little there is) expected to improve/removal

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Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short-lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Drought persists
Drought remains but improves
Drought removal likely
Drought development likely

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

Graphics courtesy of National Drought Mitigation Center

Most recent…
STREAM FLOW
(MANY NOT REPORTING DUE TO ICE)

Monday, March 11, 2019 17:30ET
CPC 6-10 DAY OUTLOOK (MARCH 17-21, 2019) (ISSUED MAR 11, 2019)

• Entire Missouri River Basin – Below Normal

Welcome News!

Graphics courtesy of NOAA Climate Prediction Center
CPC 8-14 DAY OUTLOOK (MARCH 19-25, 2019) (ISSUED MAR 11, 2019)

Temperature

Precipitation

Graphics courtesy of NOAA Climate Prediction Center
CPC 3-MONTH TEMPERATURE OUTLOOKS (ISSUED FEB 21, 2019)

April-May-June
“Late Spring”

THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
1.5 MONTH LEAD
VALID AMJ 2019
MADE 21 FEB 2019

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Graphics courtesy of NOAA Climate Prediction Center
CPC 3-MONTH TEMPERATURE OUTLOOKS (ISSUED FEB 21, 2019)

June-July-August
“Summer”

THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
3.5 MONTH LEAD
VALID JJA 2019
MADE 21 FEB 2019

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Graphics courtesy of NOAA Climate Prediction Center
CPC 3-MONTH PRECIPITATION OUTLOOKS (ISSUED FEB 21, 2019)

March-April-May
“Spring”

THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID MAM 2019
MADE 21 FEB 2019

EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Graphics courtesy of NOAA Climate Prediction Center
April-May-June
“Late Spring”

THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
1.5 MONTH LEAD
VALID AMJ 2019
MADE 21 FEB 2019

EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
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Graphics courtesy of NOAA Climate Prediction Center
CPC 3-MONTH PRECIPITATION OUTLOOKS (ISSUED FEB 21, 2019)

May-June-July
“Early Summer”
CPC 3-MONTH PRECIPITATION OUTLOOKS (ISSUED FEB 21, 2019)

June-July-August
“Summer”

Three-month outlook precipitation probability
3.5 month lead
Valid JJA 2019
Made 21 Feb 2019

EC means equal chances for A, N, B
A means above normal
N means normal
B means below normal

Graphics courtesy of NOAA Climate Prediction Center
Minor Flood Stage
Overbank flooding or
Flood damages begin

Moderate Flood Stage
Structures begin flooding or
Many roads overtopped

Major Flood Stage
Many structures flooded
Significant flood damages
MIBRFC MODELED % CHANCE OF MODERATE FLOODING

Percent Chance of Moderate Flooding

- < 5%
- 5% - 20%
- 21% - 40%
- 41% - 60%
- 61% - 80%
- > 80%

Graphics courtesy of NOAA Missouri Basin River Forecast Center
MBRFC MODELED % CHANCE OF MAJOR FLOODING

Graphics courtesy of NOAA Missouri Basin River Forecast Center
QUESTIONS ???