Round Three!

Some Area Weather, Water, and Climate Observations...

And Prospects for the 2020 Spring Flood...

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Bottom Line up Front:

• **Good News...** Flood risk is down *slightly* since earlier outlooks.
  - *No big storms since mid-January*
  - *Snowfall/SWE since January 18th is below normal (~ 0.50 to 0.75 inches low)*
  - *Mild conditions through mid-winter with frost depth shallower than normal*

• **Bad News...** Risk for significant flooding (Mod/Major) still very high.
  - *Fall thru mid winter precipitation was a record (Sept, Oct, Nov, Dec, Jan, Feb)*
  - *Soils are still really, really wet (though frozen)*
  - *Still above normal snowpack/snow-water with high runoff potential*

• **Latest Climate outlooks show no clear signal:** wet, dry, or normal.

• **This Spring:** Risks levels are still in Top 10 to Top 5 flood territory.
MN: Twin Valley, Shelly, High Landing and Crookston are down a risk category.
ND: Lisbon and Neche are both down a risk category from early February.
Accumulated Precipitation (in): Departure from Mean September 1, 2019 to February 25, 2020

(C) Midwestern Regional Climate Center

Mean period is 1981–2010.
By the numbers...

As of Feb 25\textsuperscript{th}, the Fargo area has dropped to 5\textsuperscript{th} wettest on record for Fall-Early Winter precipitation (9/1/19 through 2/25/20)

\begin{table}[h]
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\begin{tabular}{|c|c|c|}
\hline
Rank & Ending Date & Total Precipitation Sep 1 to Feb 25 \tabularnewline \hline
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\textit{Only 0.18” since Jan 20th} (~0.61 inches below average since Jan 20)

While the Grand Forks area is soundly in 1\textsuperscript{st} place!

\textit{Only 0.12” since Jan 20th} (~0.65 inches below average since Jan 20)

Data from NOAA/NCEI, via the XMACIS2 system, with long term records back through the 1890s.
All of this contributed to historic 2019 Fall crest on the Red River at Grand Forks

- Record fall season crest: Oct. 16, 2019 at 40.95* ft
- This was 10 ft higher and over 40% greater volume flow than the previous record fall season crest of 30.76 ft from Nov. 2, 2010
- Note: Fall 2019 set new fall records for all the Red River forecast points north of Fargo (Halstad, Grand Forks, Oslo, Drayton, and Pembina)

*Preliminary via USGS

December 2019 - we froze-up at new record high winter level
Not quite the highest fall crest at Fargo-Moorhead

- Second place fall season crest: October 16, 2019 at 23.40* ft
- This was about **2 ft lower** and over **17% lower** volume flow than the fall season crest of 25.49 ft from Oct. 17, 2008

*Preliminary via USGS

December 2019 – we froze-up **near record high winter level**
In general, flow at freeze-up was nearing record high levels for the time of year for much of the Northern Plains/Midwest...
So what’s next?

The first 2 of 7 key flood ingredients are well met [both at or near record]

The 2009, 2010, and 2011 “historic” spring flood years also had our previous “historic” fall season flood crests (falls of 2008, 2009, and 2010)

Spring Flooding ??

1. Fall Moisture
2. Base Streamflow
3. Frost Depth
4. Winter Snow Pack
5. Snow Water Content
6. Spring Thaw Cycle
7. Heavy Spring Rains

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The first 2 of 7 key flood ingredients are *well* met [both at or near record]

The 2009, 2010, and 2011 “historic” spring flood years *also* had our previous “historic” fall season flood crests (falls of 2008, 2009, and 2010)

3. Frost Depths are running *Below Normal*... less deep than last year (8 to 30 inches)
4. Winter Snowpack is *Above Normal*... except for the far northern basin
5. Snow Water Equivalent (SWE) is *High*... near typical winter season values already

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[Intro image: Factors affecting flooding in the Red River Valley, 1997]
Frost Depth Analysis as of February 24, 2020
(no significant change since January 23rd outlook)

Mainly 12 to 32 inches deep

“Shallow Frost”

Data courtesy of NDAWN, NRCS SCAN, and other government sites
Snow Depth Analysis as of February 27, 2020
(continuing to compress since January 23rd outlook, only slight additions)
Snow Water Equivalent Analysis as of February 27, 2020
(no significant change since January 23rd outlook)
For comparison...late Feb 2011 had an additional 2-4” SWE in the south/central RRV, and higher runoff potential overall than we currently see in 2020.

Note 1: Late Feb 1997 had higher SWE and 2009 was just starting to accrue a higher SWE in the southern RRV than now.

Note 2: Across the Red River Basin, 2011 ended up as the highest volume of runoff year, with 2009 in second place and 1997 in third place. Though runoff came out over a longer period in 2011 than in 1997 or 2009.
For comparison…late Feb 2009 had an additional 1-3” SWE in the south/central RRV, at or higher runoff potential overall than we currently see in 2020.

Note 1: Late Feb 1997 had higher SWE and 2009 was just starting to accrue a higher SWE in the southern RRV than now.

Note 2: Across the Red River Basin, 2011 ended up as the highest volume of runoff year, with 2009 in second place and 1997 in third place. Though runoff came out over a longer period in 2011 than in 1997 or 2009.
SWE Ranking by Sub-Basin:

- Highest across central RRV.

- Lowest along CanAm border.

- Similar to this date in 2019.
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6. To be determined!
7. To be determined!

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Week 1 forecast precipitation: Generally less than 0.10”

(Today through next Wednesday)
Week 2: Near Normal Temps and Precipitation

Week 2 (8-14 day) Outlook - issued February 26th
March – Lamb to Lion??

March Outlook – issued February 20th
No *Clear* Climate Signal as we head into Spring

March, April, May Outlook - issued February 20th
MN: Twin Valley, Shelly, High Landing and Crookston are down a risk category.
ND: Lisbon and Neche are both down a risk category from early February.
Red River at Wahpeton-Breckenridge: Moderate
(floodwalls installed? some bridges closed)
**New!** Probabilistic Flood Outlook Summary (PFOS)

An *Experimental* Product

Now for all Red River mainstem and tributary locations

At a glance, relates current risk to:

- flood stages
- recent years
- floods of record

Let us know what you think!

https://www.weather.gov/fgf/PFOS
Wild Rice River near Abercrombie: **mid-high Major**

(CR3 bridge and bridge near gage flooded)
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https://www.weather.gov/fgf/PFOS

*This outlook graphic shows the most likely river stage range based on the latest forecast.
There is a 5% chance of values higher than depicted here.
**Figure created on 02-27-2020
Red River at Fargo-Moorhead: mid-hi Major
(floodwalls installed, some bridges closed)
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https://www.weather.gov/fgf/PFOS
Sheyenne River at Valley City: **Major**
(flood wall closures, emergency levees?)

*Chance of Exceeding River Stage at Sheyenne River at Valley City (VCRN8)*
Forecast for the period 03/02/2020 - 05/31/2020
This is a conditional simulation based on the conditions as of 02/24/2020
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https://www.weather.gov/fgf/PFOS
Sheyenne River at Harwood: **Major**
(Against Railroad Bridge, against I-29 Bridge)
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https://www.weather.gov/fgf/PFOS
Red River at Grand Forks-East Grand Forks: **Major**
(flood wall closures, rail bridge?)
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https://www.weather.gov/fgf/PFOS
Red River at Oslo: **Major**
(lots of breakouts, town access closed)
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https://www.weather.gov/fgf/PFOS
Park River at Grafton: **Minor-Moderate**
(some rural breakouts, otherwise new city bypass operational)
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• flood stages

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https://www.weather.gov/fgf/PFOS
Red River at Pembina: Major
(dike patrols, south airport road closes)
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- floods of record

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https://www.weather.gov/fgf/PFOS
Devils Lake: 2-3 ft rise expected
(rise back to levels last seen 2015-2016)

Probability of Rising to High Lake Levels on the Devils Lake at Devils Lake 5SW-Creel Bay (DCBN8)
Forecast for the period 02/24/2020 - 09/30/2020
This is a conditional simulation based on the conditions as of 02/24/2020

1450.9 to 1451.8 ft.

Current level: ~1448.9
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Flood Risk by Category at River Forecast Points

Summary:

Widespread Runoff
Road Closures
Floodwalls Closed
Worse than Spring 2019?
Possible Top 5 Flood?

Less winter, lots of early spring to play out!
Future 2020 Probabilistic Outlooks:

- Thursday, February 27th
- Thursday, March 12th

Contact the NWS Grand Forks office 24/7:
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