

LAKE WINNEBAGO WINTER DRAWDOWN MEETING

USACE Detroit District
13 January 2020

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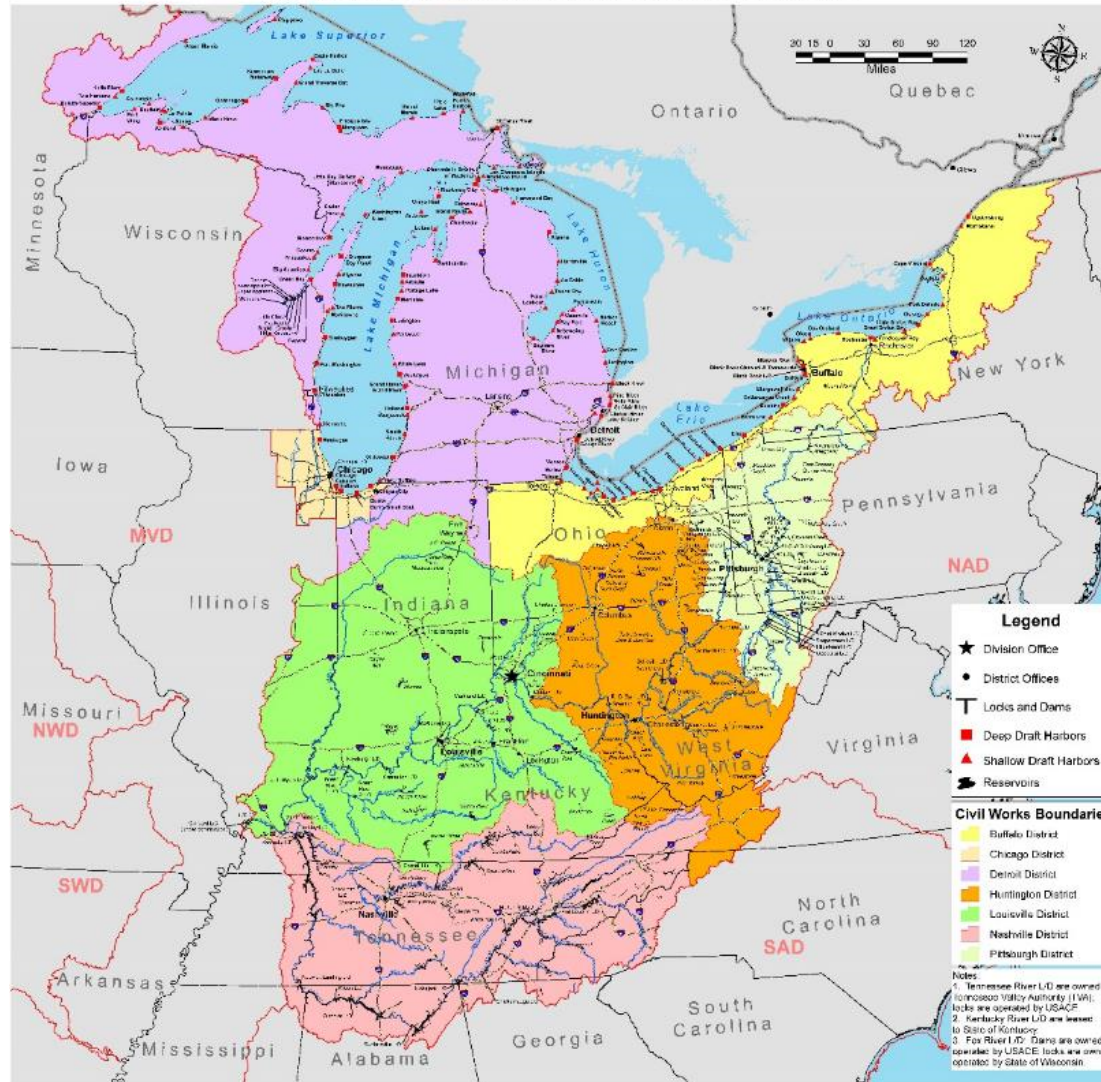
AGENDA



- **Regulation Team Introduction**
- **Wisconsin Operations Transition**
- **Basin Conditions Since October**
- **Operations Overview**
- **Current Conditions and Forecasts**
- **Proposed 2020 Drawdown**
- **Open Discussion/Questions**



Great Lakes and Ohio River Division



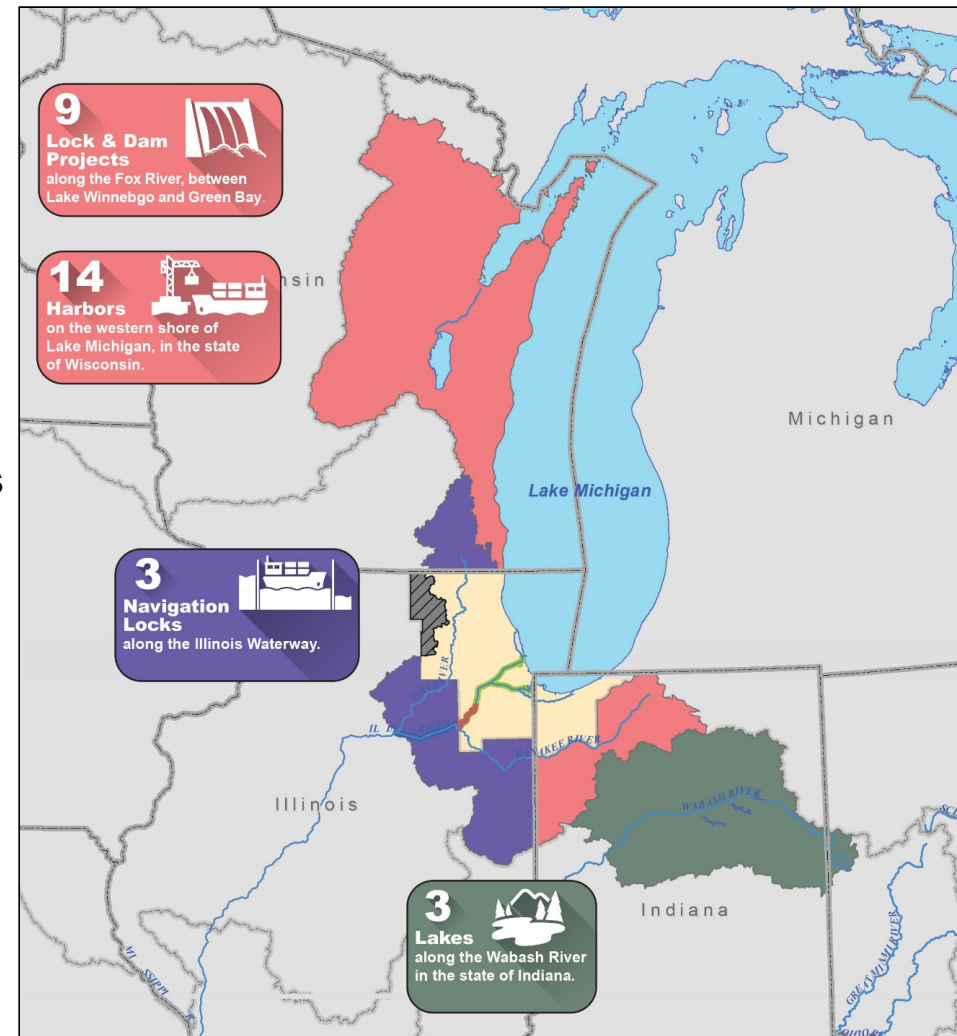


Recommendation

In Dec 2019 Chief of Engineers approved moving the following geographic areas and workload to Chicago District, effective 31 March 2020:

- ✓ The Wisconsin portion of the Lake Michigan watershed
- ✓ Fox River watershed in SE Wisconsin/Northern Illinois
- ✓ T.J. O'Brien Lock and Dam (already in Chicago's footprint)
- ✓ Lockport Lock and Dam (already in Chicago's footprint)
- ✓ Brandon Road Lock and Dam after the completion of GLMRIS – Brandon Rd project (already in Chicago's footprint)
- ✓ The Kankakee River watershed in Indiana and Illinois
- ✓ The Upper Wabash River watershed in Indiana

Detroit District will continue to provide Winnebago Regulation support until Chicago District develops capability.





RECENT BASIN CONDITIONS



FALL BASIN CONDITIONS

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- Fall of 2019 continued what has been a record setting wet pattern.
- The wettest fall on record for the state of Wisconsin despite a relatively normal November.
- December continued a wet trend, ranking as the 7th wettest in WI (125 years of record)
- Snow and rain, with reports of up to 2 inches falling during a storm between Christmas and New Years caused inflows to rise.

Wisconsin

Precipitation Rankings, November 2019

Download: [XML](#)

View Period (Months): [All](#) 1 2 3 4 5 6 7 8 9 10 11 12 18 24 36 48 60

Record Driest	Bottom 1/10	Bottom 1/3	Normal	Top 1/3	Top 1/10	Record Wettest
PERIOD	VALUE	1901-2000 MEAN	ANOMALY	RANK (1895-2019)	WETTEST/DRIEST SINCE	RECORD
November 2019 1-Month	1.97" (50.04mm)	2.00" (50.80mm)	-0.03" (-0.76mm)	74th Driest	Driest since: 2018	1904, 1976
				52nd Wettest	Wettest since: 2015	1991
Ties: 1935, 1995						
Oct-Nov 2019 2-Month	6.77" (171.96mm)	4.38" (111.25mm)	2.39" (60.71mm)	113th Driest	Driest since: 2017	1976
				13th Wettest	Wettest since: 2018	1991
Sep-Nov 2019 3-Month	13.80" (350.52mm)	8.12" (206.25mm)	5.68" (144.27mm)	125th Driest	Driest since: 2018	1976
				1st Wettest	Wettest to Date	2019

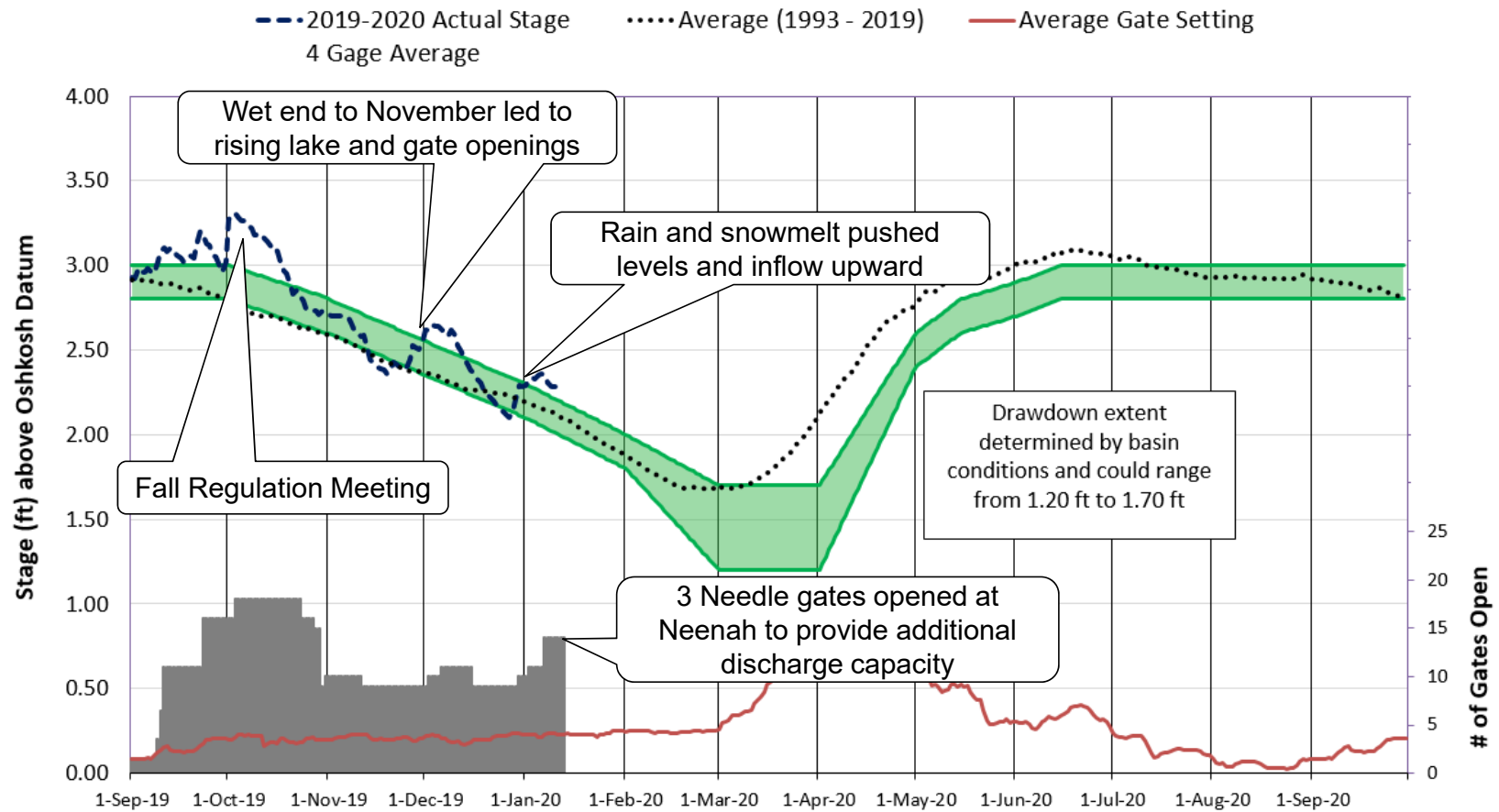


FALL BASIN CONDITIONS



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2019 - 2020 Lake Winnebago Stage with # of Open Gates





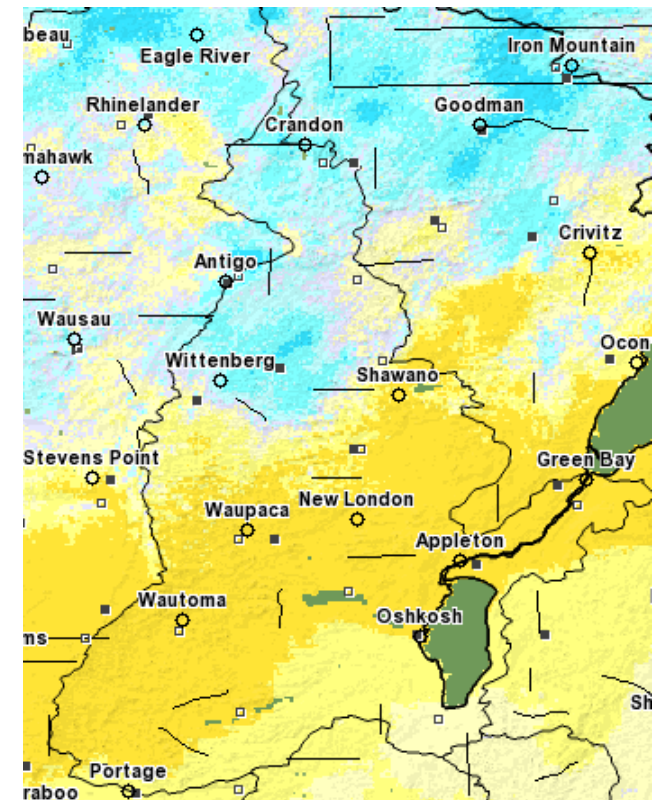
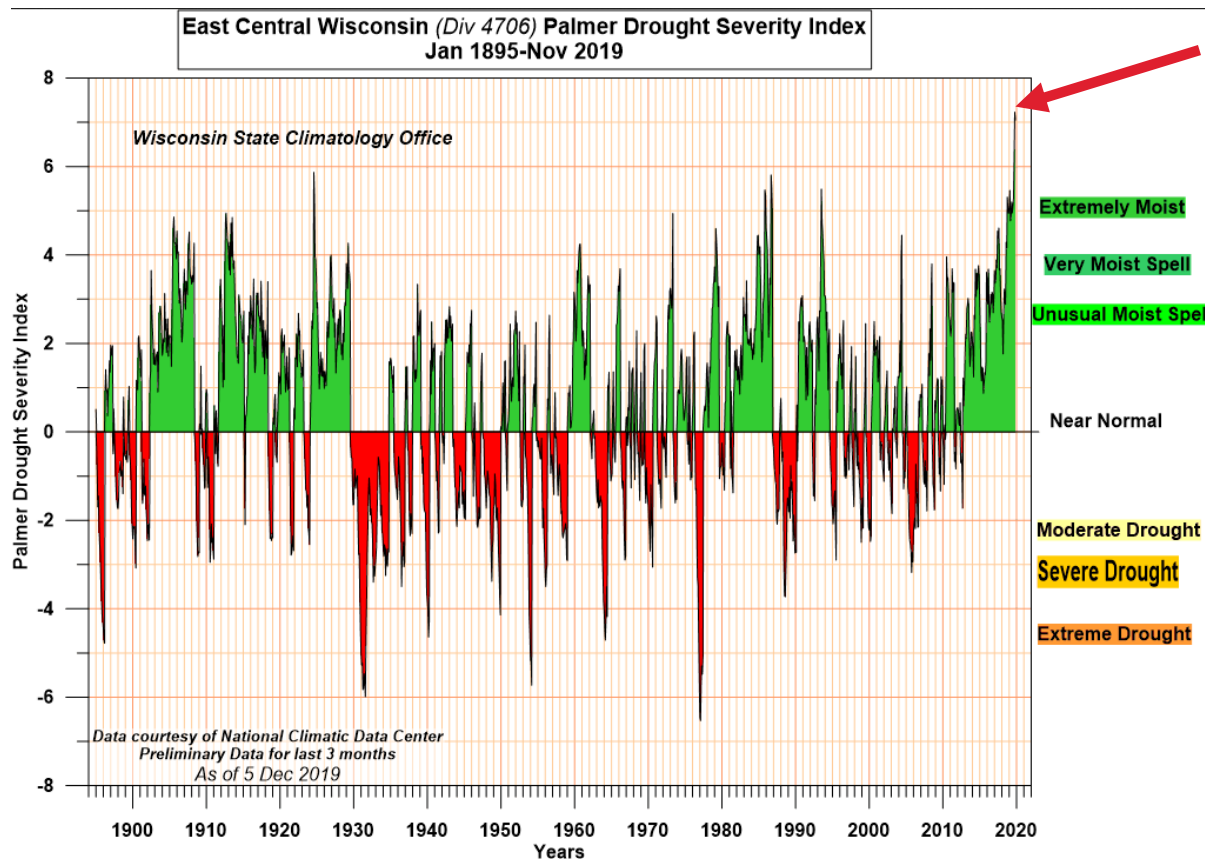
CURRENT BASIN CONDITIONS – WATERSHED

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Soil Moisture is well above normal and expected to climb

Snow depth is below normal
for most of the basin
(blue is above normal, yellow is below)



13 January 2020



RIVER CONDITIONS

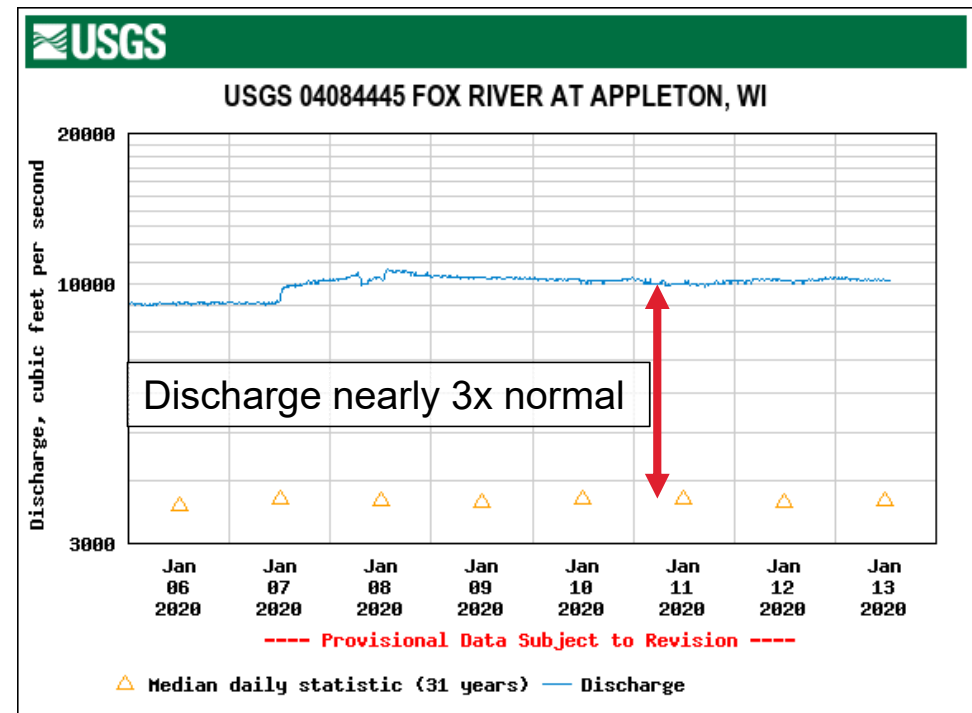


CURRENT BASIN CONDITIONS – RIVERS

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- The Wolf, Embarrass, and Upper Fox River are flowing well above average
- Lower Fox River has had hydroelectric and private property impacts
- Outflows from Lake Winnebago are nearly 3 times normal





FRAZIL ICE FORMATION

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Frazil ice is created when cold air super-cools the water.

The frazil ice adheres to the trash racks of the hydroelectric plants blocking the water intake.

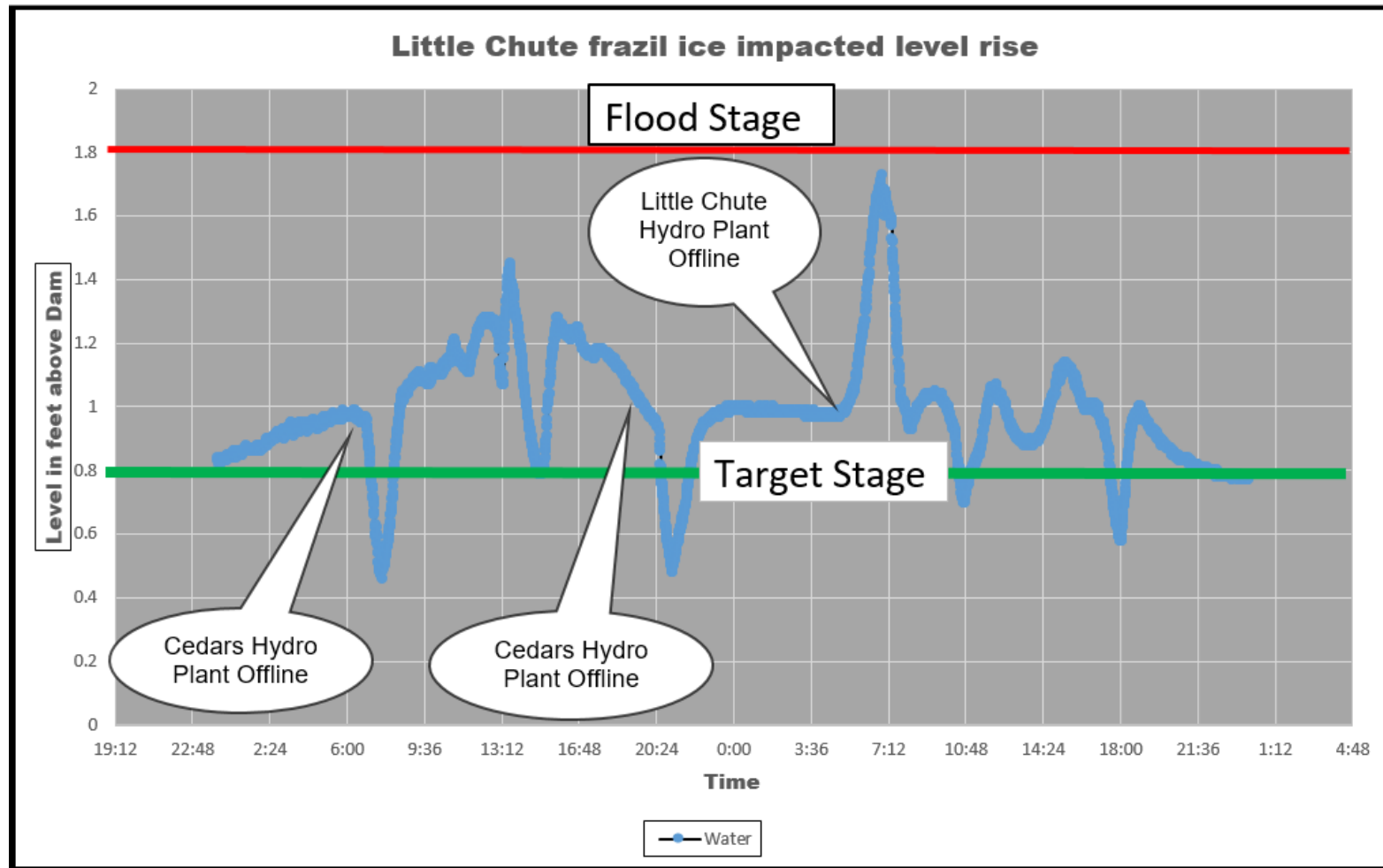
With the hydro plants inability to take the water, the dam needs to be opened more to pass the flow.

Flows above 4,000 cfs on the Fox River greatly increase the risk of frazil ice formation.



IMPACTS OF FRAZIL ICE TO LOWER FOX POOLS

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ICE SHELF BUILT UPSTREAM

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Once the ice shelf is built upstream of the hydro intakes, frazil ice risk is reduced.



ICE REMOVAL





CURRENT CONDITIONS AND FORECAST



CURRENT WEATHER AND BASIN CONDITIONS

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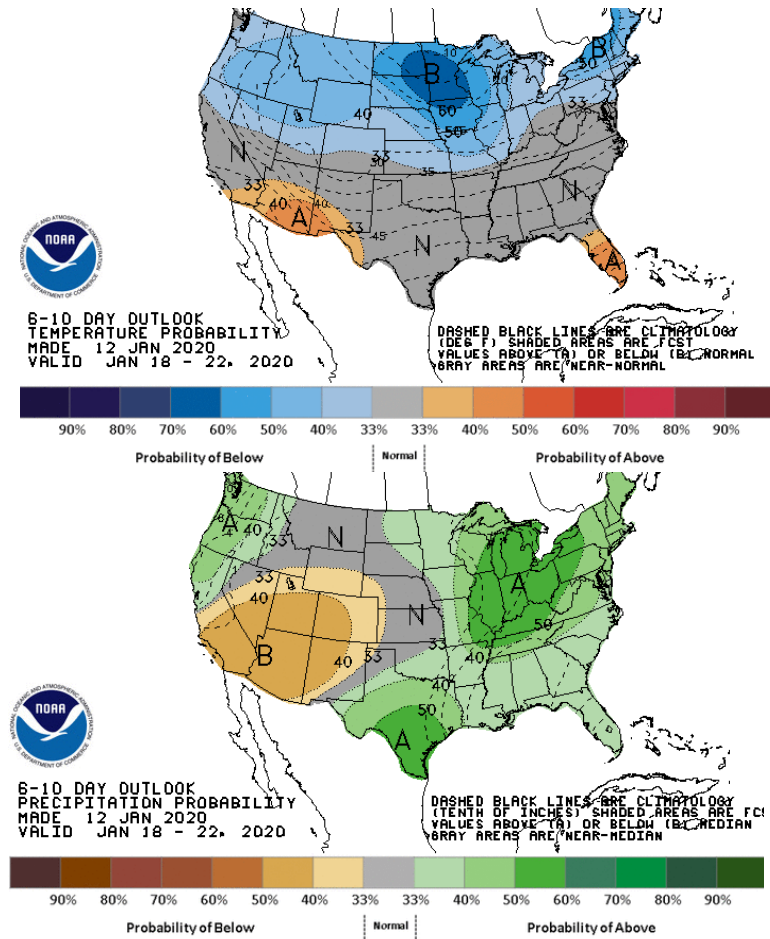
Current Lake Level	2.28 feet above Oshkosh Datum
Inflows at Oshkosh	6,750 cfs, 5 day average, wind influenced
Outflows at Appleton	10,200 cfs
5 Day Precipitation Forecast	1.0 to 1.25 inches of water equivalent
Short Term Temperatures	Warmer tomorrow, colder later this week
Recent Gate Changes	Opened 3 needle gates at Neenah last week
Forecasted Water Level Trend	Slow decline for a few days, followed by rapid declines as inflows drop off.



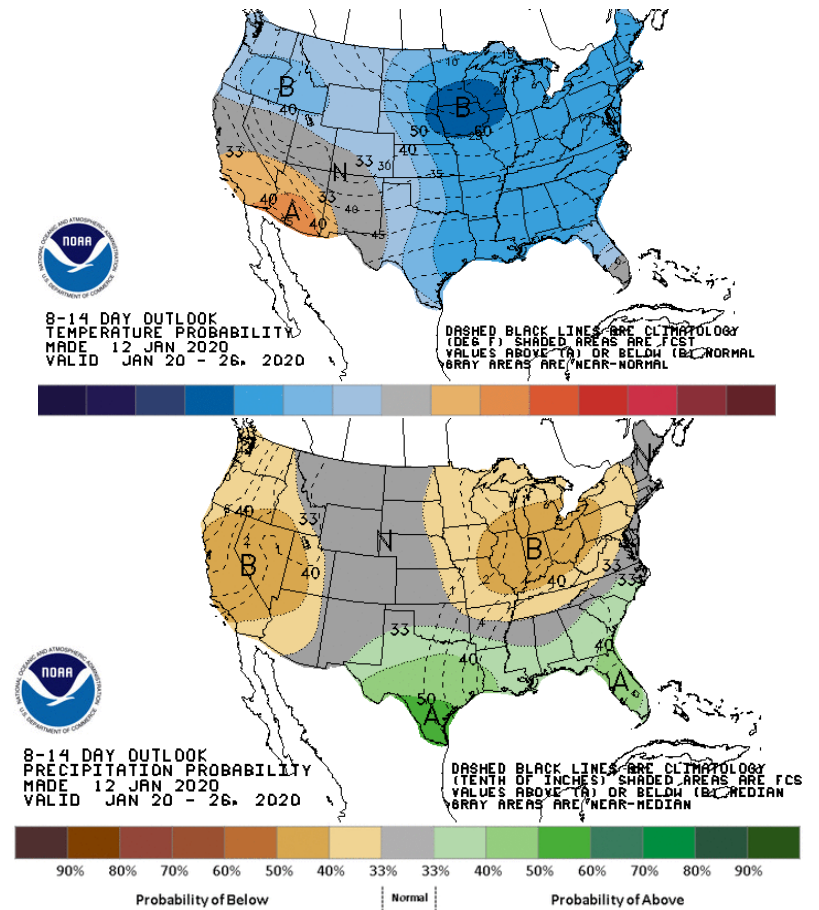
CLIMATIC OUTLOOK



6 to 10 Day Outlook



8 to 14 Day Outlook



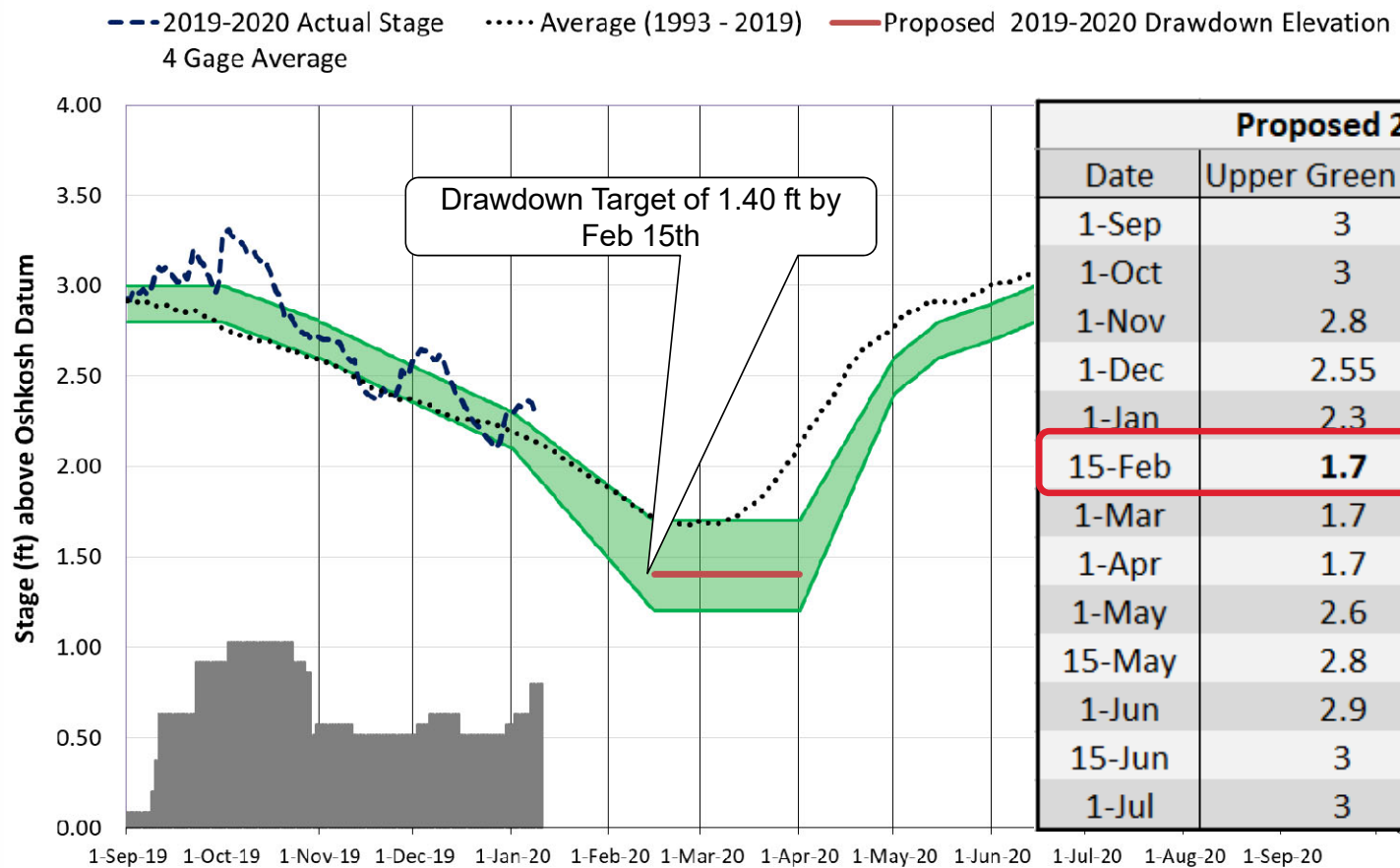


PROPOSED 2019-2020 WATER LEVEL STRATEGY

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2019 - 2020 Lake Winnebago Stage with # of Open Gates



Proposed 2019-2020 Target Levels

Date	Upper Green Band	Center	Lower Green Band
1-Sep	3	2.9	2.8
1-Oct	3	2.9	2.8
1-Nov	2.8	2.7	2.6
1-Dec	2.55	2.45	2.35
1-Jan	2.3	2.2	2.1
15-Feb	1.7	1.4	1.2
1-Mar	1.7	1.45	1.2
1-Apr	1.7	1.45	1.2
1-May	2.6	2.5	2.4
15-May	2.8	2.7	2.6
1-Jun	2.9	2.8	2.7
15-Jun	3	2.9	2.8
1-Jul	3	2.9	2.8



PATH FORWARD - CONDITION DRIVEN

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- Recent high flows are due to the wet fall and warm winter
- Today's Level – 2.28 on 13 Jan 2020
- Inflow Forecast – strong decline later this week
 - Currently modeled by the River Forecasting Center to decline by 2,500 cfs by next Monday.
- Current outflow differential has been 100 cfs over the last several days

Date	Average Flow Differential	Required Average Decline	Resulting Level Ft. Oshkosh Datum
Feb 15 th	1,000 cfs	0.015 ft/day	1.8
Feb 15 th	1,400 cfs	0.021 ft/day	1.6
Feb 15 th	1,800 cfs	0.027 ft/day	1.4
Feb 15 th	2,200 cfs	0.033 ft/day	1.2



WATER LEVEL STRATEGY CONSIDERATIONS

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Hydrologic Driving Considerations

- Current snow in the watershed
- Soil moisture
- Short and Long range weather forecasts
- Timing of annual melt
- Current level of Lake Winnebago
- Current balance of inflow and outflow
- National Weather Service Long Range flood outlooks

Impacts from Water Level and River Flow

- Flood Risk on Lake Winnebago and surrounding communities
- Ice conditions
- Property Owners on Lower Fox River
- Hydroelectric plants
- USACE Staff safety
- Ecological considerations
- Water intake in Menasha Channel (1.2 ft lower limit)

What other considerations or impacts need to be added?