AGENDA

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

- 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.
FALL BASIN CONDITIONS

2019 - 2020 Lake Winnebago Stage with # of Open Gates

- 2019-2020 Actual Stage
- Average (1993 - 2019)
- Average Gate Setting

4 Gage Average

Wet end to November led to rising lake and gate openings

Rain and snowmelt pushed levels and inflow upward

Fall Regulation Meeting

3 Needle gates opened at Neenah to provide additional discharge capacity

Drawdown extent determined by basin conditions and could range from 1.20 ft to 1.70 ft
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
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 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

Little Chute frazil ice impacted level rise

- **Flood Stage**
- **Target Stage**
  - Cedars Hydro Plant Offline
  - Little Chute Hydro Plant Offline
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

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

6 to 10 Day Outlook

8 to 14 Day Outlook
PROPOSED 2019-2020 WATER LEVEL STRATEGY

2019 - 2020 Lake Winnebago Stage with # of Open Gates

- 2019-2020 Actual Stage
- Average (1993 - 2019)
- Proposed 2019-2020 Drawdown Elevation

4 Gage Average

Drawdown Target of 1.40 ft by Feb 15th

Proposed 2019-2020 Target Levels

<table>
<thead>
<tr>
<th>Date</th>
<th>Upper Green Band</th>
<th>Center</th>
<th>Lower Green Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Sep</td>
<td>3</td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>1-Oct</td>
<td>3</td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>1-Nov</td>
<td>2.8</td>
<td>2.7</td>
<td>2.6</td>
</tr>
<tr>
<td>1-Dec</td>
<td>2.55</td>
<td>2.45</td>
<td>2.35</td>
</tr>
<tr>
<td>1-Jan</td>
<td>2.3</td>
<td>2.2</td>
<td>2.1</td>
</tr>
<tr>
<td>15-Feb</td>
<td><strong>1.7</strong></td>
<td><strong>1.4</strong></td>
<td><strong>1.2</strong></td>
</tr>
<tr>
<td>1-Mar</td>
<td>1.7</td>
<td>1.45</td>
<td>1.2</td>
</tr>
<tr>
<td>1-Apr</td>
<td>1.7</td>
<td>1.45</td>
<td>1.2</td>
</tr>
<tr>
<td>1-May</td>
<td>2.6</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>15-May</td>
<td>2.8</td>
<td>2.7</td>
<td>2.6</td>
</tr>
<tr>
<td>1-Jun</td>
<td>2.9</td>
<td>2.8</td>
<td>2.7</td>
</tr>
<tr>
<td>15-Jun</td>
<td>3</td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>1-Jul</td>
<td>3</td>
<td>2.9</td>
<td>2.8</td>
</tr>
</tbody>
</table>
- 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

<table>
<thead>
<tr>
<th>Date</th>
<th>Average Flow Differential</th>
<th>Required Average Decline</th>
<th>Resulting Level Ft. Oshkosh Datum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 15th</td>
<td>1,000 cfs</td>
<td>0.015 ft/day</td>
<td>1.8</td>
</tr>
<tr>
<td>Feb 15th</td>
<td>1,400 cfs</td>
<td>0.021 ft/day</td>
<td>1.6</td>
</tr>
<tr>
<td>Feb 15th</td>
<td>1,800 cfs</td>
<td>0.027 ft/day</td>
<td>1.4</td>
</tr>
<tr>
<td>Feb 15th</td>
<td>2,200 cfs</td>
<td>0.033 ft/day</td>
<td>1.2</td>
</tr>
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WATER LEVEL STRATEGY CONSIDERATIONS

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?