

# COLUMBIA BASIN WATER MANAGEMENT

14 March 2024

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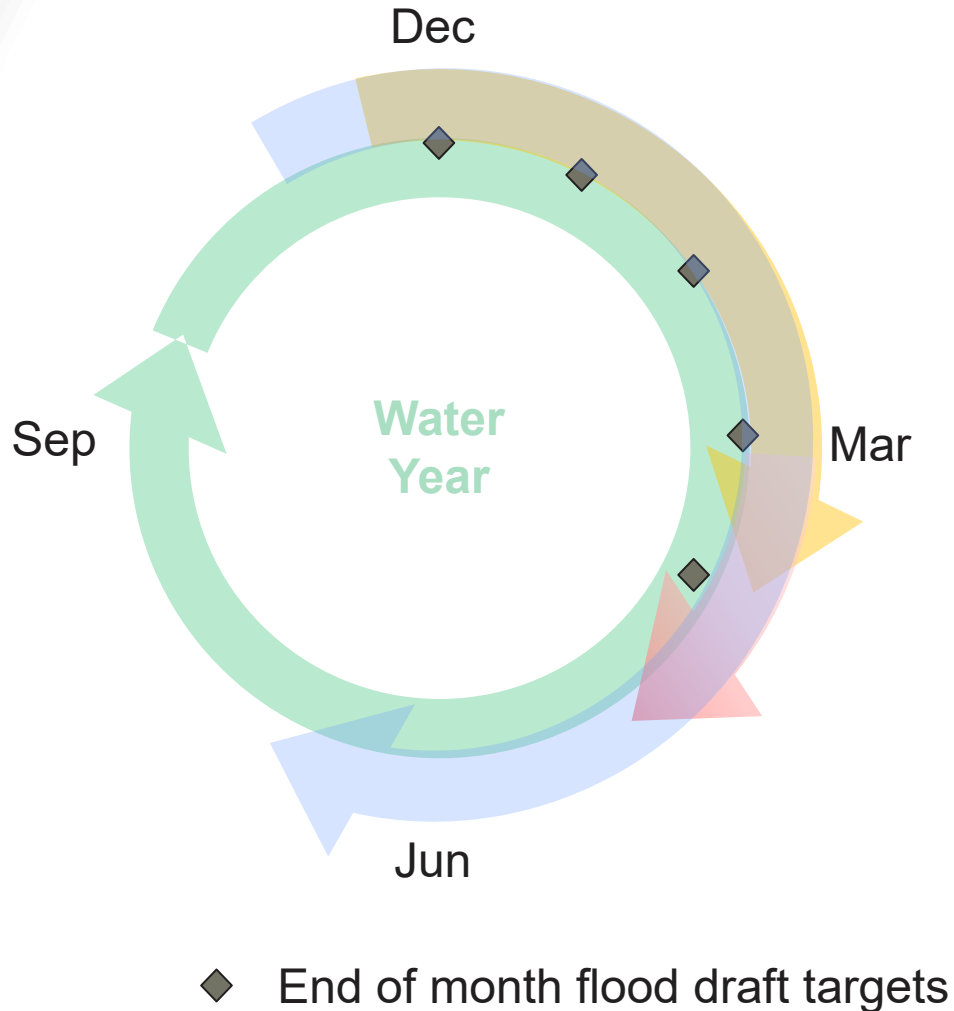
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# SEASONAL FRM OPERATIONS



- December through April end of month flood draft targets based on monthly **water supply volume forecasts** at key locations
- These are long-range forecasts of how much water will run off during the freshet
- Storage projects meet both local and system requirements
- Storage Reservation Diagrams are used at each reservoir to ensure flood control space is available before the flood event



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# TWO TYPES OF HIGH WATER EVENTS



**Spring Freshet** – Snow Melt; Function of temperature and precipitation

**Rain Events** – Generally sustained rain (atmospheric river)

In high water events, frequent multi-agency coordination occurs -- around the clock, if needed





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# LOCAL AND SYSTEM FRM



## Local FRM

Example: Columbia Falls flood stage is 13 ft when Flathead Lake elevation is at or above elevation 2892 ft, and 14 ft if less than 2892 ft

## System FRM

Generally prescribed via end of month upper elevation targets, except during high water events where closer coordination may be required



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# COLUMBIA RIVER BASIN



The Columbia River Basin drains parts of seven western states and southeast British Columbia

- 259,000 square miles
- Approximately the size of France

The river headwaters originate in British Columbia and ultimately empty to the Pacific Ocean near Astoria, Oregon – over 1,200 miles

About 15% of the basin is in Canada, and 35% of the average annual flow comes from Canada

Basin contains federal, private and Canadian dams and operations are coordinated



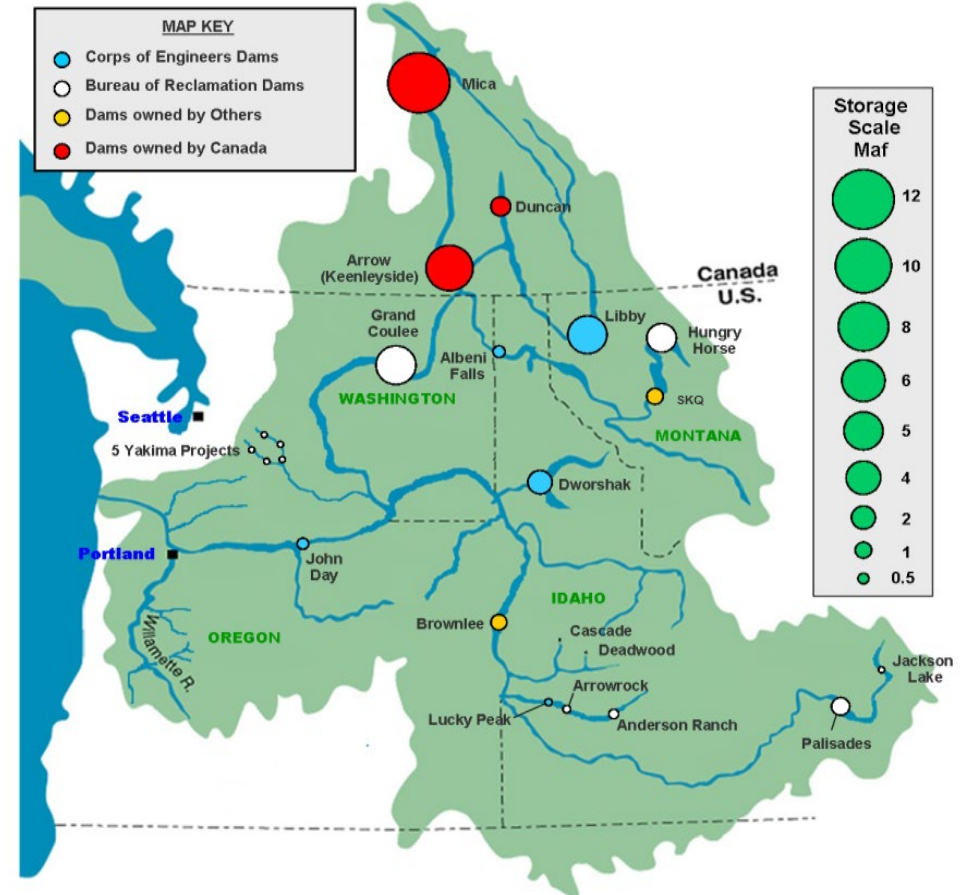
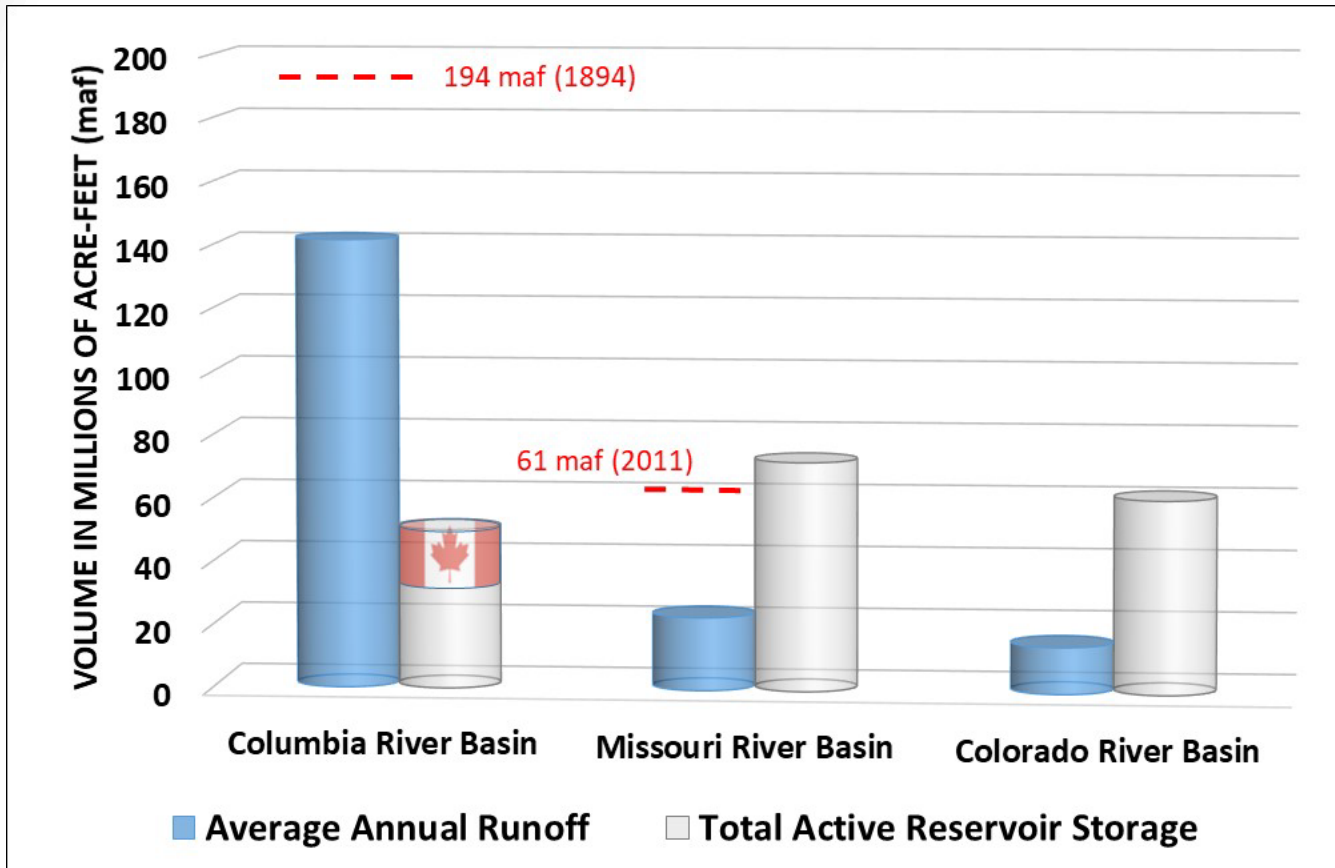
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# MULTI-PURPOSE SYSTEM – FLOOD RISK MANAGEMENT



These reservoirs manage flows that would otherwise endanger human health & safety  
The total space available for flood risk management is limited

- Usable reservoir storage is about one-third of the average annual runoff
- Montana reservoirs can provide 4.98 Maf at Libby, 2.98 Maf at Hungry Horse, and ~1.2 Maf at SKQ



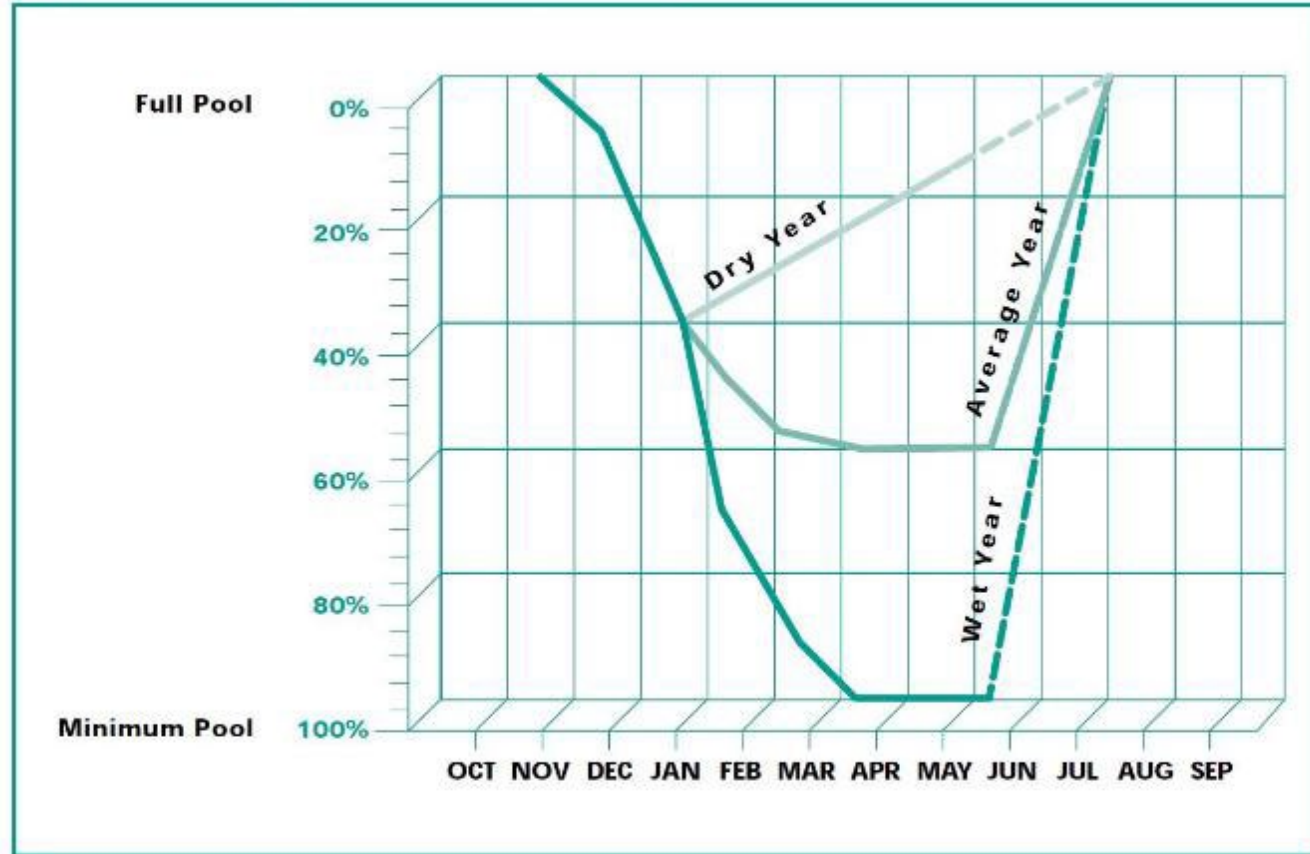


# OPERATION OF STORAGE RESERVOIRS



Many storage reservoirs have space requirements driven by a Storage Reservation Diagram (SRD)

## Typical Storage Reservation Diagram



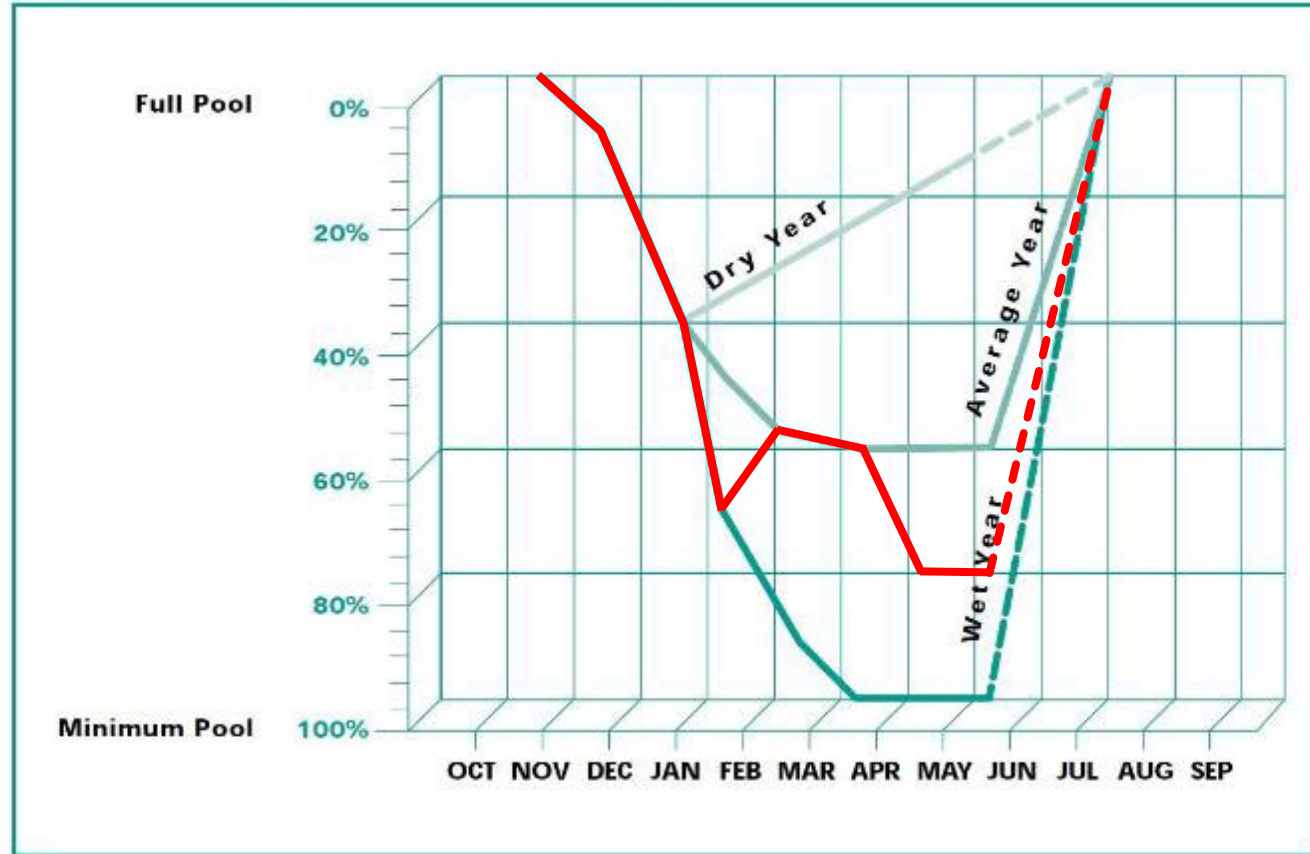
Each storage reservoir has its own storage reservation diagram, which shows the pool levels that need to be maintained given various runoff predictions.



# OPERATION OF STORAGE RESERVOIRS

As water supply forecasts change, storage requirements are updated accordingly.

## Typical Storage Reservation Diagram



Each storage reservoir has its own storage reservation diagram, which shows the pool levels that need to be maintained given various runoff predictions.





# FLOOD RISK MANAGEMENT OUTPUT

**Table 1. Flood Risk Management Requirements**

<b>Project</b>	<b>31 Jan</b>	<b>29 Feb</b>	<b>31 Mar</b>	<b>15 Apr</b>	<b>30 Apr<sup>3</sup></b>	<b>31 May<sup>3</sup></b>	<b>30 Jun<sup>3</sup></b>	<b>31 Jul<sup>3</sup></b>
MCDB (kaf) <sup>2</sup>	915	1241	2886	2886	2886	1674	289	0
ARDB (ft)	1435.9	1434.7	1423.3	1423.3	1423.3	1434.8	1443.8	1444.0
DCDB (ft) <sup>5</sup>	1844.4	1826.2	1817.2	1817.2	1817.2	1849.4	1882.7	1892.0
LIB (ft) <sup>4</sup>	2417.6	2423.0	2416.4	2416.0	2415.7	n/a	n/a	2459.0
LIB (kcfs)	n/a	n/a	n/a	n/a	n/a	TBD	TBD	n/a
HGH (ft)	3550.9	3553.2	3553.7	3554.4	3555.2	n/a	n/a	3560.0
HGH (kcfs)	n/a	n/a	n/a	n/a	n/a	TBD	TBD	n/a
SKQ (ft)	n/a	n/a	n/a	2883.0	n/a	2890.0	2893.0	2893.0
ALF (ft) <sup>1</sup>	2060.0	2060.0	2056.0	n/a	2056.0	2062.5	2062.5	2062.5
GCL (ft)	1290.0	1290.0	1283.3	1283.3	1282.6	1286.4	1289.9	1290.0
BRN (ft)	2077.0	2055.7	2051.6	2059.5	2067.5	2075.5	2077.0	2077.0
DWR (ft)	1557.2	1567.6	1574.0	1578.7	1578.7	1592.3	1600.0	1600.0

[https://www.nwd-wc.usace.army.mil/report/flood\\_risk/](https://www.nwd-wc.usace.army.mil/report/flood_risk/)

# QUESTIONS?

Next, NWS will cover water year conditions



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