

TOTAL DISSOLVED GAS AND FLEXIBLE SPILL OPERATIONS

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US Army Corps
of Engineers®



SUMMARY

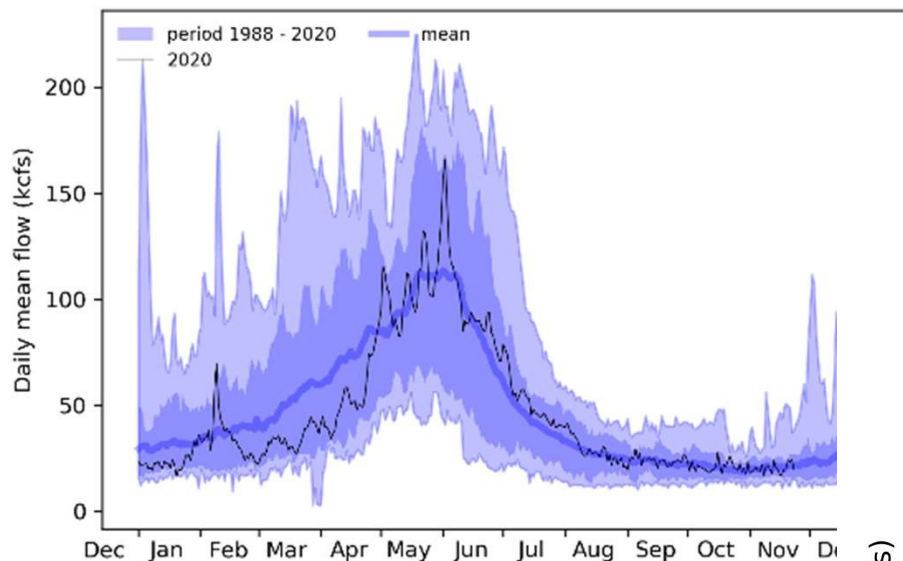
- Average water supply
- Successfully implemented the flex spill agreement
- COVID did not impact TDG monitoring
- Spill caps > agreement estimates
- Managed to the 125% TDG 12-hour metric (2-hour metric not a factor)
- Lack of load spill in late June
- TMT coordinated operations at LGS, JDA and LMN.





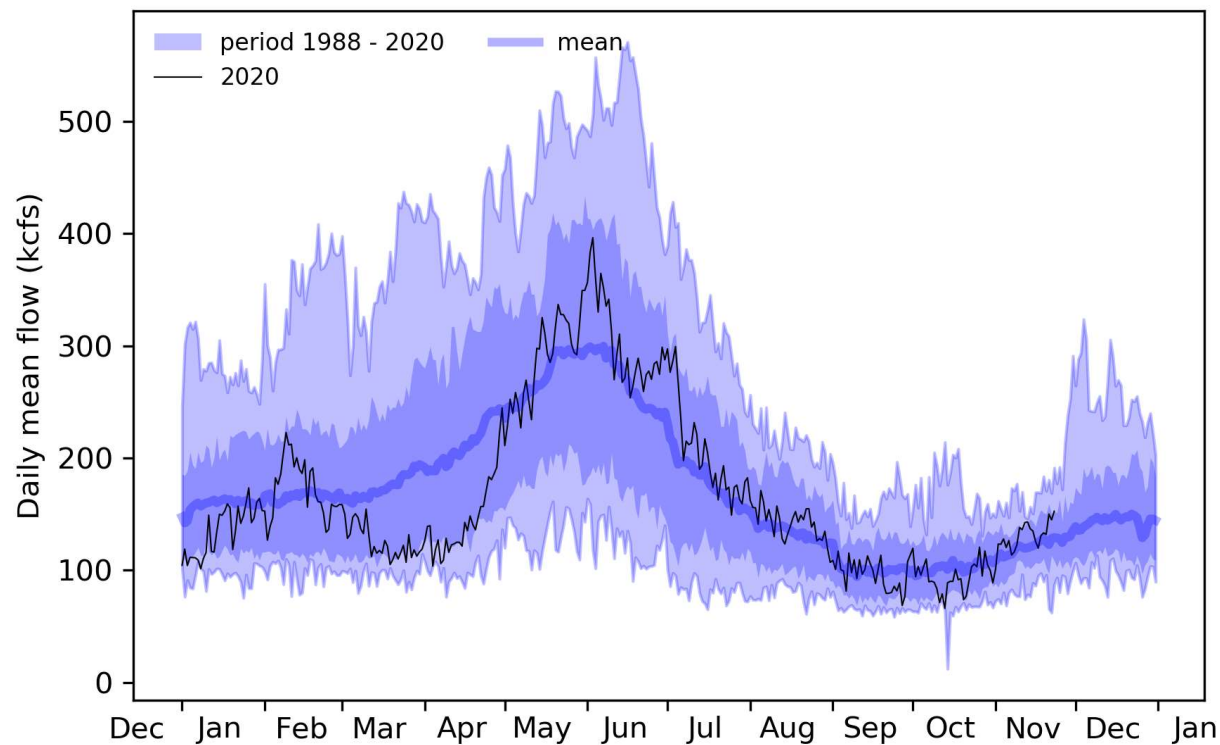
RECAP OF 2020 SPILL SEASON CONDITIONS

Lower Granite Dam flow out



April-August runoff volume:
The Dalles: 91.8 Maf or 105% of average
Lower Granite: 99% of average

The Dalles Dam flow out





FLEX SPILL SPRING OPERATIONS FOR JUVENILE FISH PASSAGE



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| Project | Spring Spill for Juvenile Fish Passage | | | |
|------------------|--|-----------------------|---|--|
| | 2017 (2008 BiOp) | 2018 (Court Order) | 2019 (Flex Spill Agreement) | 2020 (Flex Spill Agreement) |
| Lower Granite | 20 kcfs | 120/115% TDG Cap | 120% TDG Cap 16 hours 20 kcfs 8 hours | 125% TDG Cap 16 hours 20 kcfs 8 hours |
| Little Goose | 30% | 120/115% TDG Cap | 120% TDG Cap 16 hours 30% 8 hours | 125% TDG Cap 16 hours 30% 8 hours |
| Lower Monumental | 120/115% TDG Cap | 120/115% TDG Cap | 120% TDG Cap 16 hours 30 kcfs 8 hours | 125% TDG Cap 16 hours 30 kcfs 8 hours |
| Ice Harbor | 45 kcfs daytime 120/115% TDG Cap nighttime | 120/115% TDG Cap | 120% TDG Cap 16 hours 30% 8 hours | 125% TDG Cap 16 hours 30% 8 hours |
| McNary | 40% | 120/115% TDG Cap | 120% TDG Cap 16 hours 48% 8 hours | 125% TDG Cap 16 hours 48% 8 hours |
| John Day | 30% vs. 40% | 120/115% TDG Cap | 120% TDG Cap 16 hours 32% 8 hours | 120% TDG Cap 16 hours 32% 8 hours |
| The Dalles | 40% | 120/115% TDG Cap | 120% TDG Cap 16 hours 40% 8 hours | 40% |
| Bonneville | 100 kcfs | 120% TDG Cap | 120% TDG Cap 16 hours 100 kcfs 8 hours | 125% TDG Cap or 150 kcfs 16 hours 100 kcfs 8 hours |



SUMMARY STATISTICS, DURING SPILL CAP SPILL, SPRING 2020

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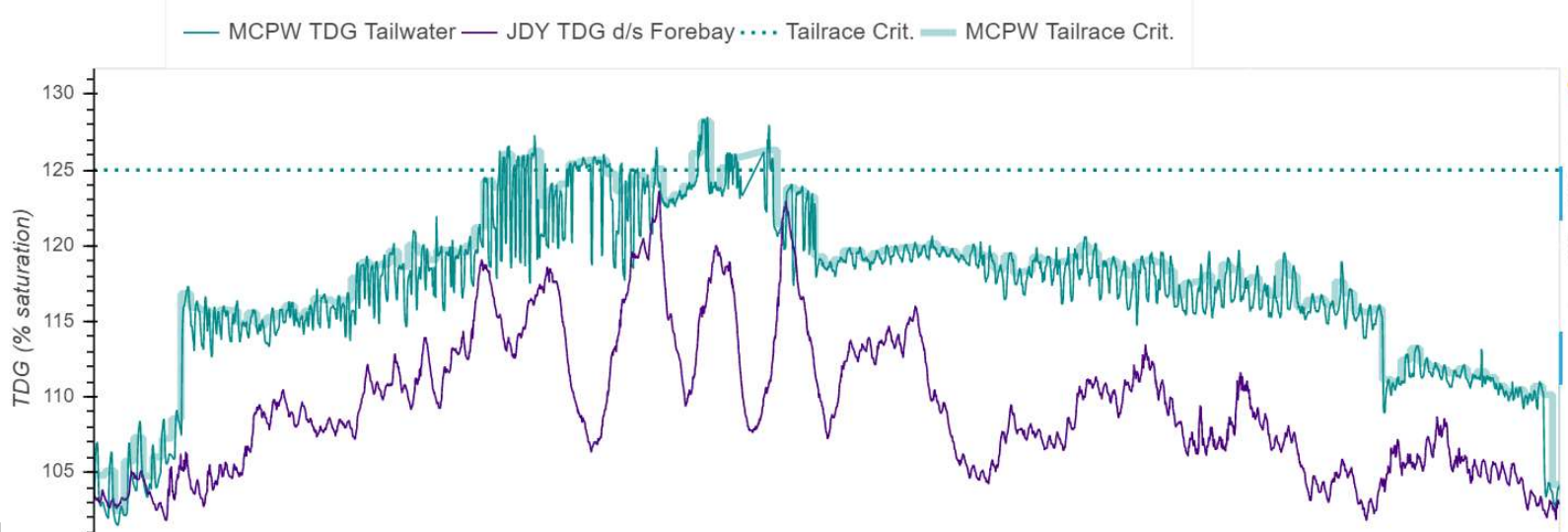
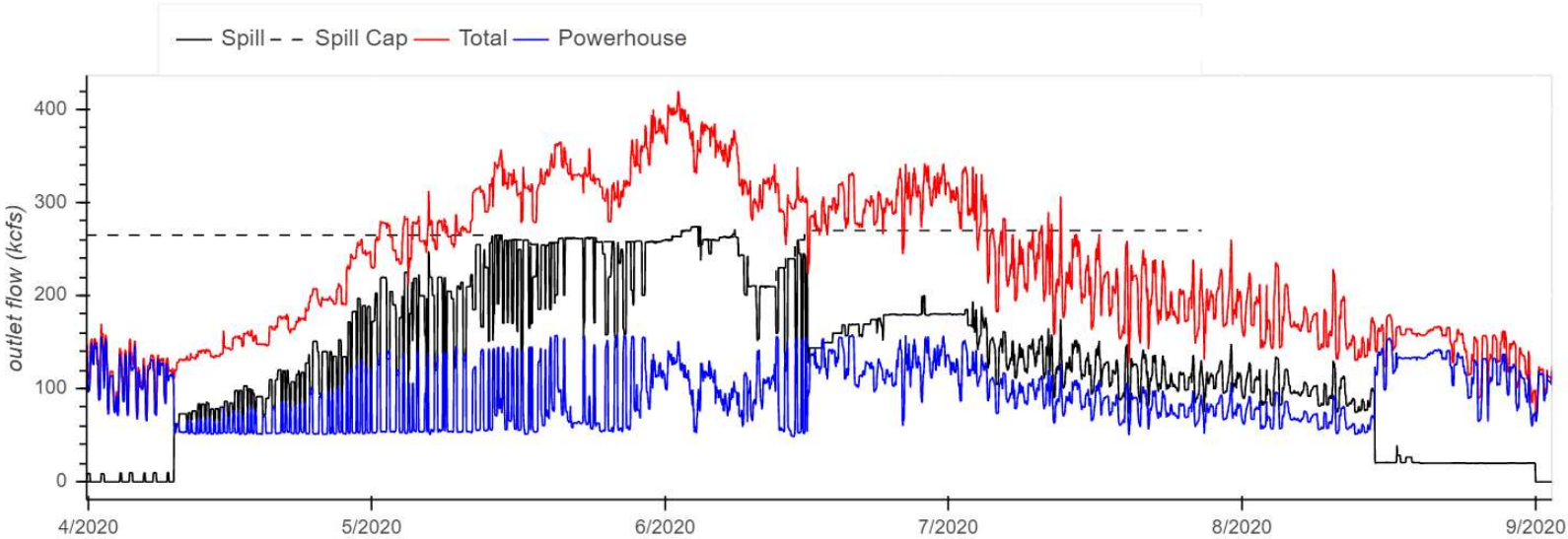


| Project | Spill caps (kcfs) | | | Flex Cap Est | Actual spill compared to spill cap (number of days) | | | % TDG (ave. of the 12 max values per day) | | | Spill (% of total flow) Ave |
|---------------------|-------------------|-----|-----|--------------------|--|--------------|-----------------------|--|-----|-----|---------------------------------------|
| | Min | Ave | Max | | Min. spill | Gen. rest | Spill At Spill Cap | > Spill Cap | Min | Ave | Max |
| Lower Granite | 72 | 79 | 88 | 72 | 31 | 48 | 0 | 114 | 122 | 127 | 61% |
| Little Goose | 73 | 81 | 87 | 79 | 39 | 40 | 0 | 114 | 122 | 126 | 61% |
| Lower Monumental | 98 | 106 | 116 | 98 | 62 | 17 | 0 | 117 | 122 | 126 | 69% |
| Ice Harbor | 110 | 114 | 119 | 119 | 58 | 21 | 0 | 113 | 119 | 126 | 71% |
| McNary | 210 | 260 | 274 | 265 | 34 | 33 | 0 | 115 | 121 | 128 | 67% |
| John Day | 156 | 168 | 187 | 146 | 17 | 38 | 12 | 113 | 119 | 125 | 51% |
| The Dalles | | 40% | | 40% | 0 | 57 | 10 | 112 | 120 | 125 | 41% |
| Bonneville | | 150 | | 150 | 14 | 48 | 5 | 116 | 121 | 125 | 52% |



EXAMPLE: MCNARY

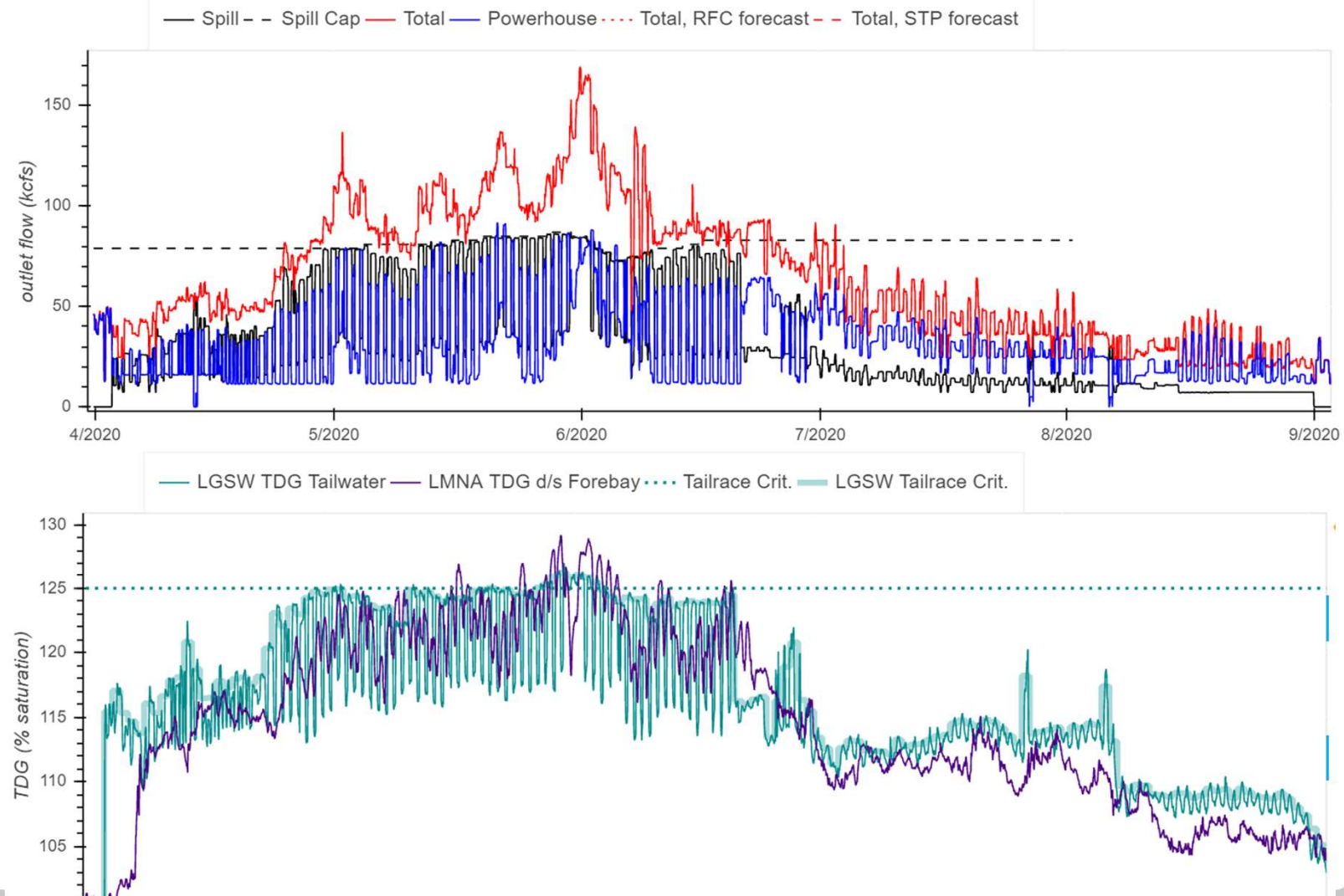
McNary





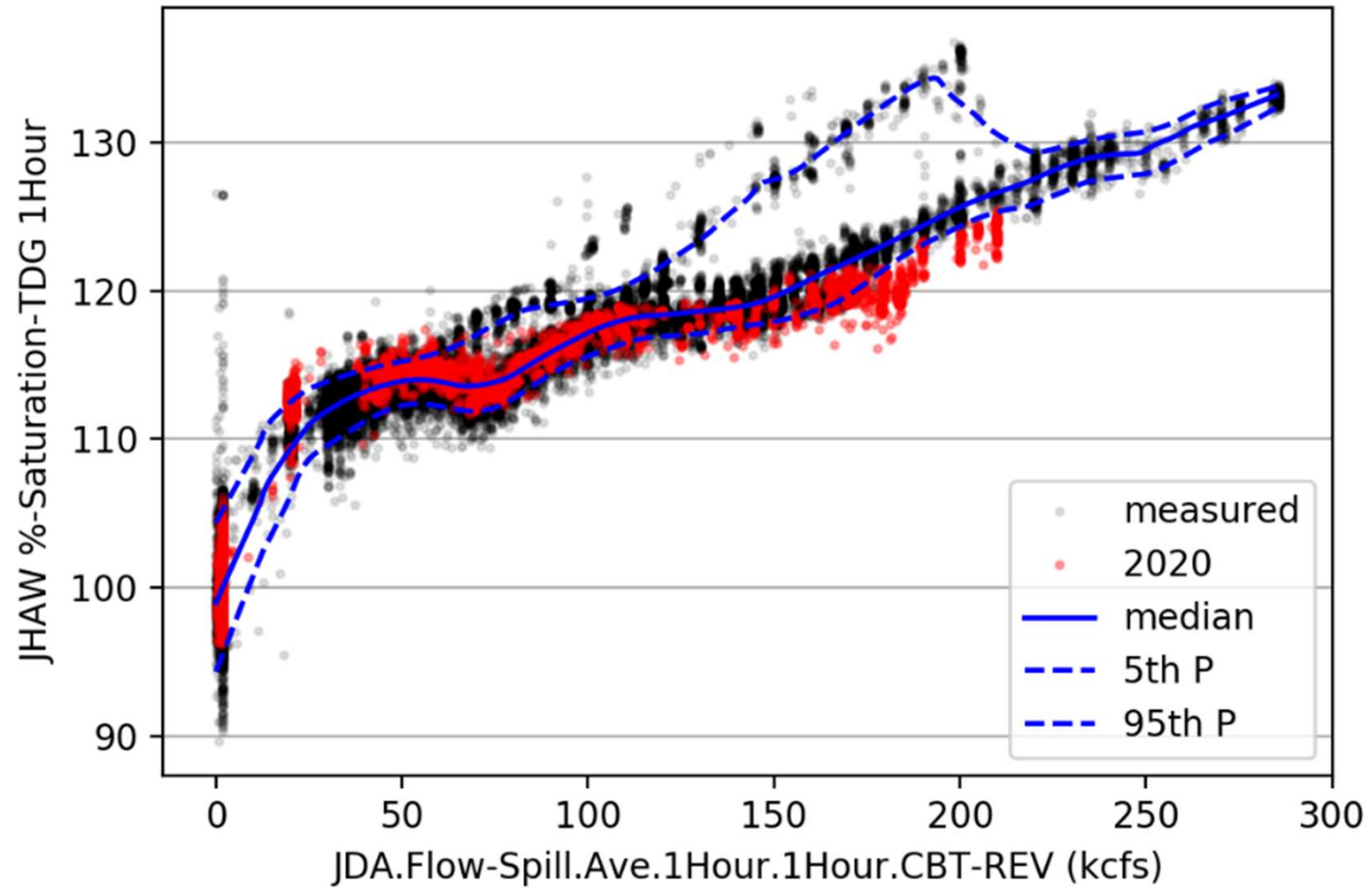
EXAMPLE: LOWER MONU- MENTAL

Little Goose



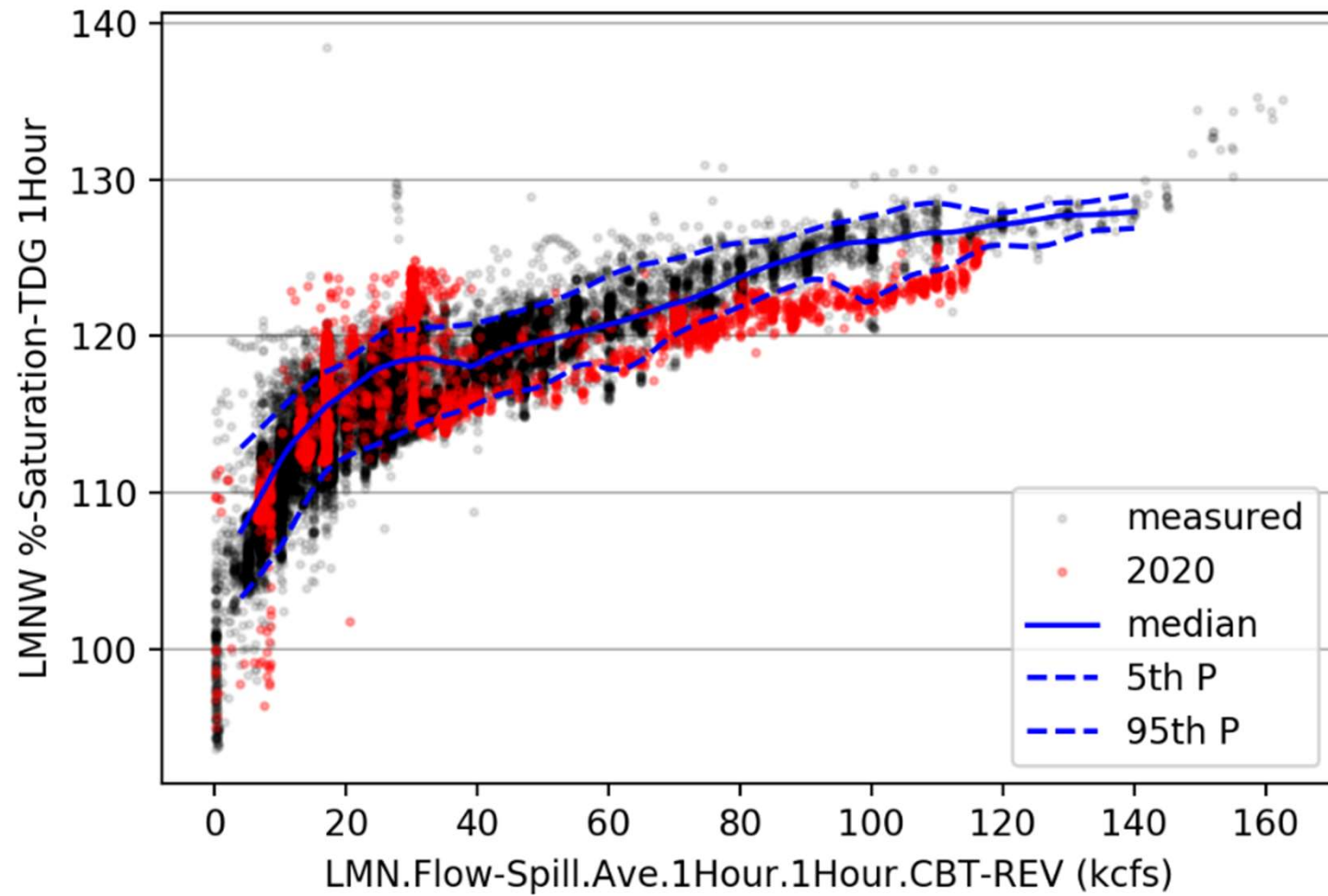


JDA, 2011 to 2019





LMN, 2011 to 2019



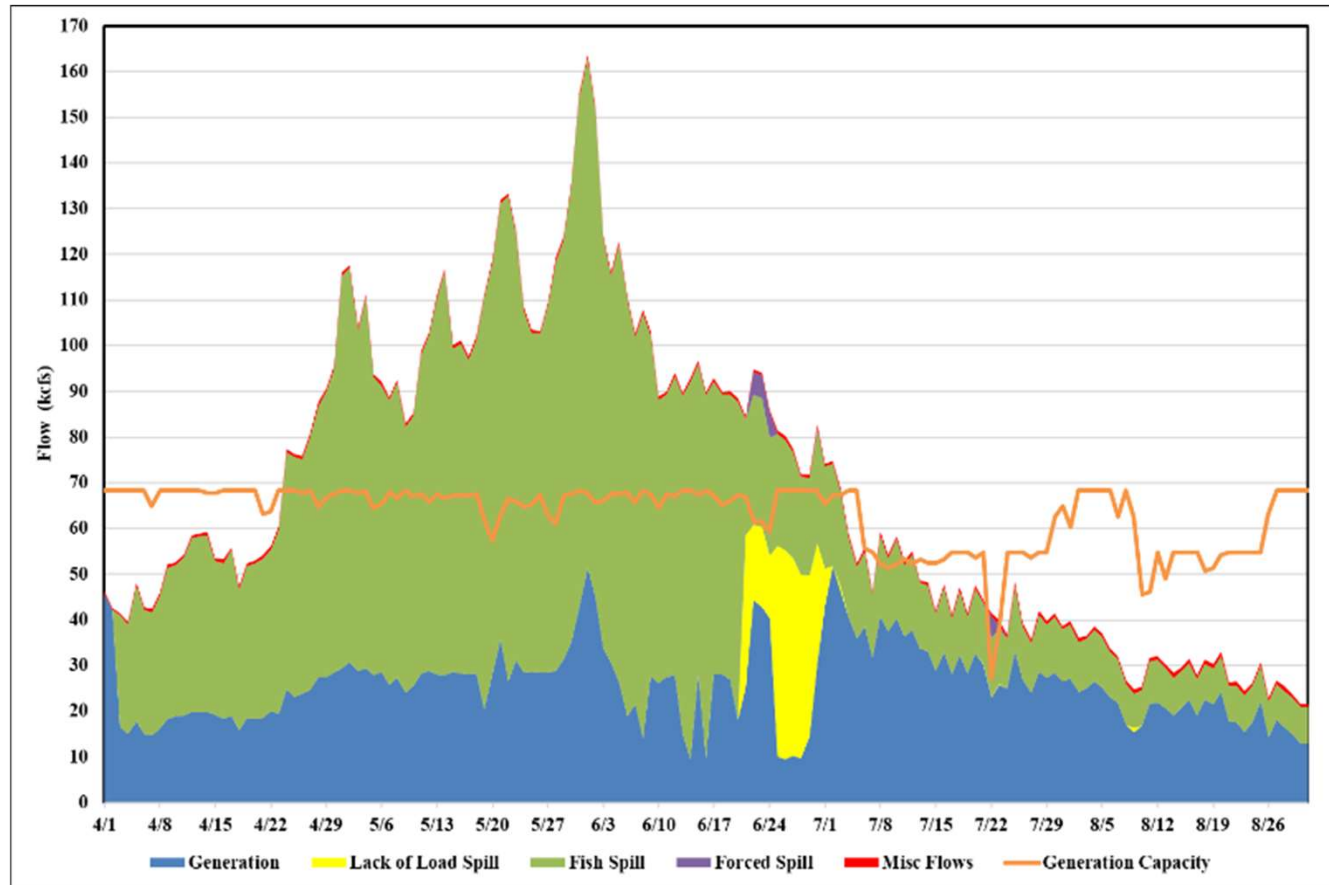


LACK OF LOAD SPILL

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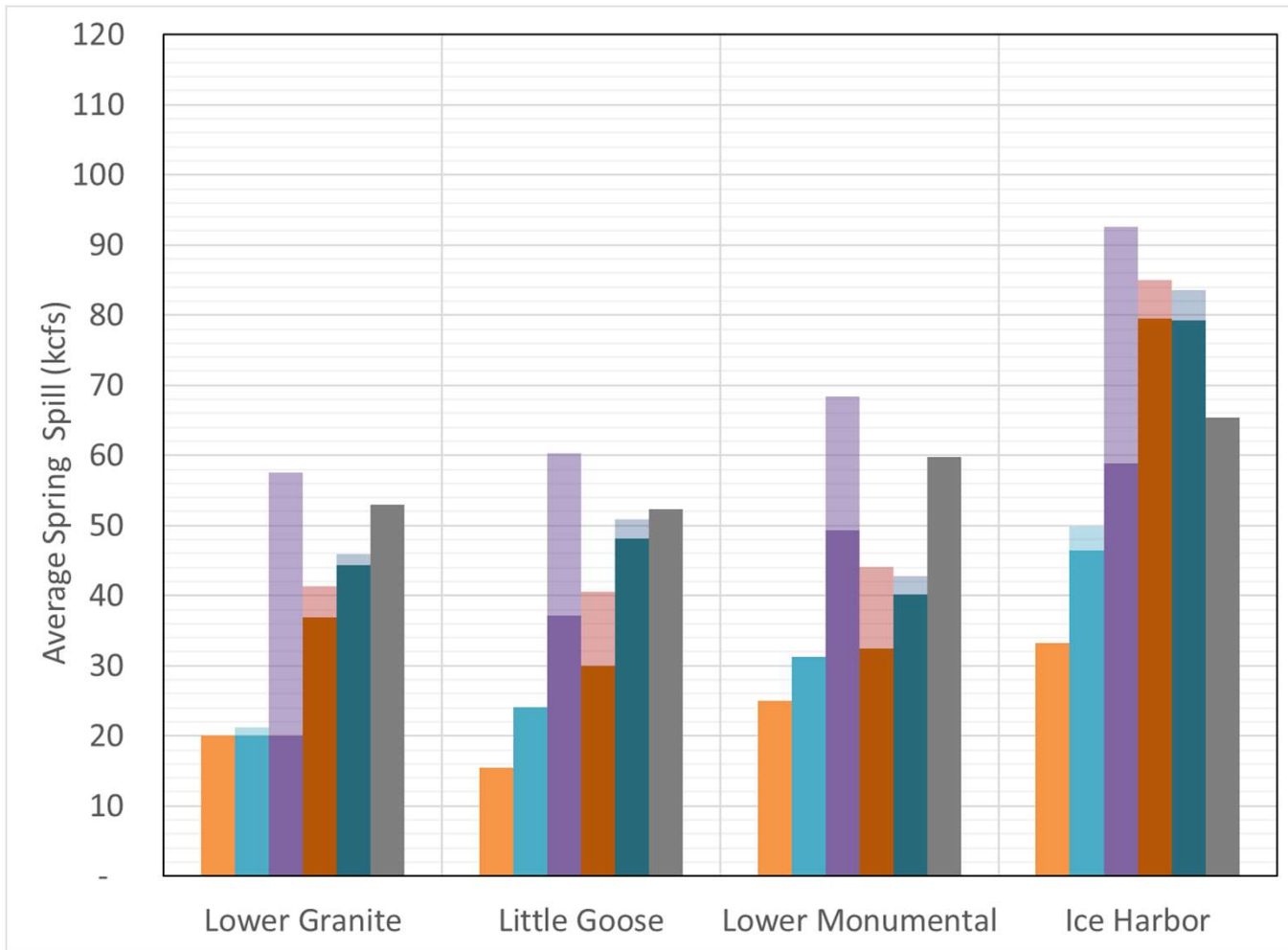
Ice Harbor Dam





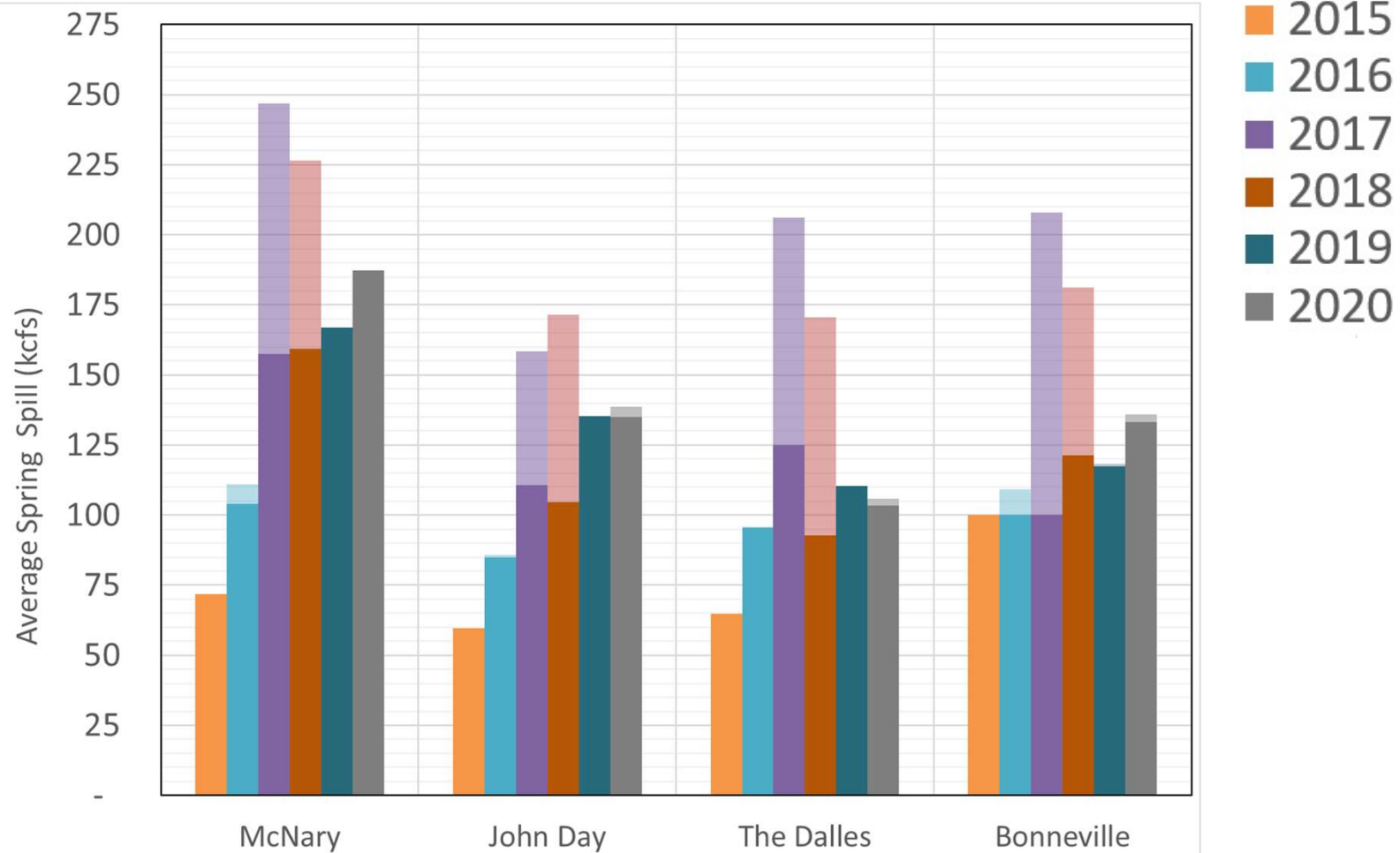
2020 SPRING SPILL

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2020 SPRING SPILL





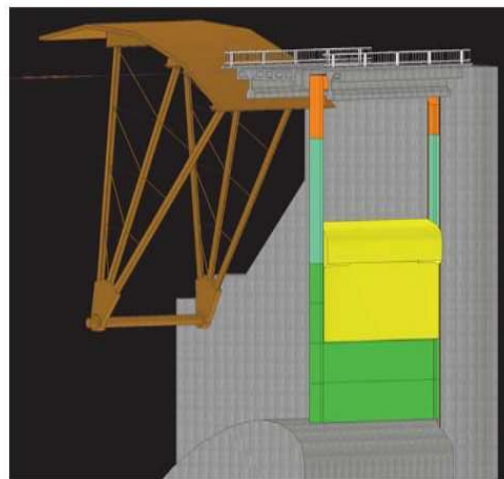
2020 - SPILL SEASON: SUMMARY OF TMT COORDINATED OPERATIONS



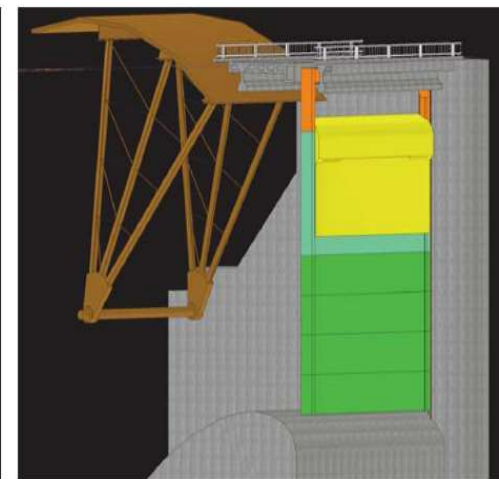
TMT COORDINATED IN-SEASON OPERATIONS

1. **John Day Dam** - Decremental (DEC) Reserves. April 10, TMT Meeting. John Day Dam's generation was above minimum generation outside of the flex hours due to the project carrying DEC reserves. This was elevated to the Flex Spill Work Group (FSWG) and BPA developed guidance based on input from the FSWG.
2. **Little Goose Dam** - Hours of Flex Spill and Spill Pattern Change. May 29, TMT Meeting. Allowed for the 8 hours of performance standard spill to occur after 1200 hours. Appeared to improve the passage of adult Chinook. Impacts on the change in spill pattern on adult Chinook passage may warrant further analysis.

Little Goose Dam – Modified Spill Pattern



Low Crest



High Crest



TMT COORDINATED OPERATIONS

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3. **Lower Monumental Dam** - Hours of Flex Spill and Spill Pattern Change. May 29, TMT Meeting. Change in performance standard spill to 8 consecutive hours from 0400 to 1200 hours appeared to improve the passage of adult spring Chinook. Impacts on the change in spill pattern on adult Chinook passage may warrant further analysis.
4. **Little Goose Dam**** - Coordinated via FPOM not TMT. April 16, FPOM Meeting. Unit 1 Operation. Beginning April 16 through June 20, the operation to manually restrict Little Goose Dam turbine unit 1 to the upper 1% operating range (approximately 16–18 kcfs) was modified to no longer apply during hours of spill to the 125% TDG cap. Impacts on the change in unit 1 on adult Chinook passage may warrant further investigation. This operational change occurred prior to May 29 operation(s) that appeared to improve adult Chinook passage.

