

# Hydrology and Hydro Project Operations

Cowlitz Annual Program Review  
and Science Conference

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# Overview

- Physical setting
- Review 2021, 5-year context
  - Inflows: Rain and runoff
  - Reservoir elevations
  - Instream flow at Mayfield
- Looking to 2022



# Stewardship of the Cowlitz River

***Our top priority is public safety.***

Factors we must balance:

- Environment - fish and wildlife
- Grid reliability
- Recreation
- Power production
- Flood control



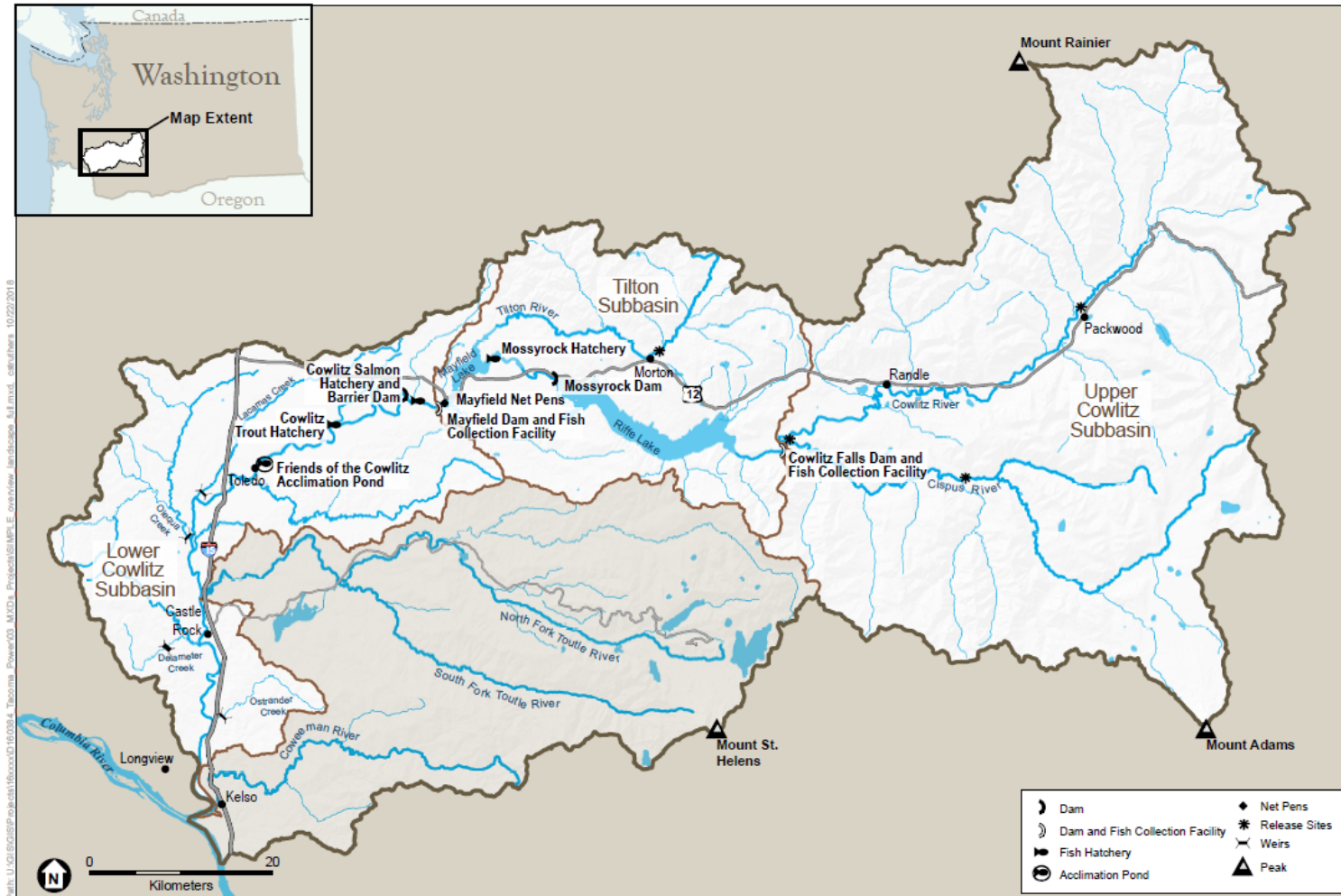


# Stewardship of the Cowlitz River



Modified operations at Riffe Lake

# Watershed and Subbasins



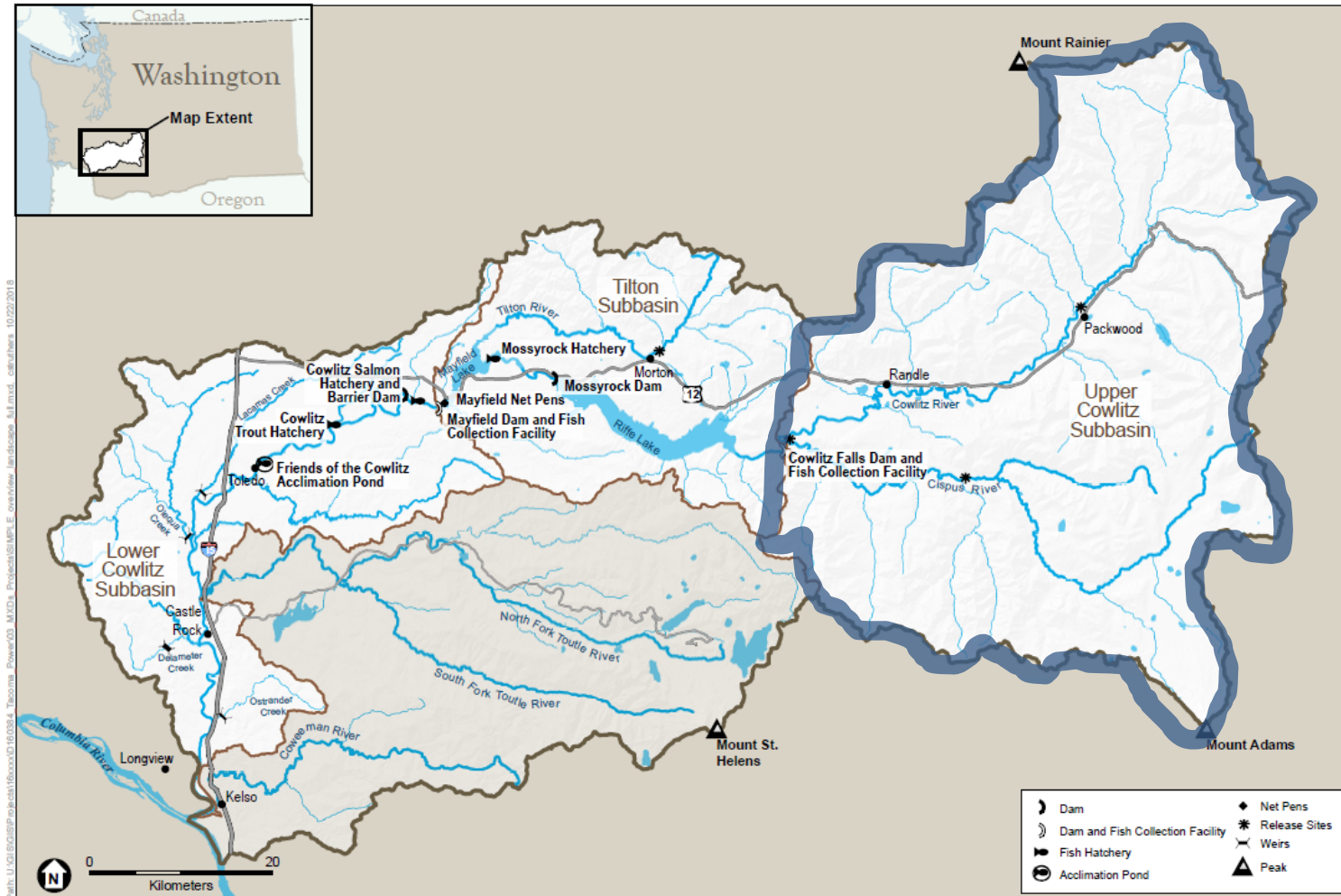
SOURCE: SWIFD, 2014; WDNr, 2017

Tacoma Power

**Figure 1**

Cowlitz River Subbasins

# Watershed and Subbasins



SOURCE: SWIFD, 2014; WDNr, 2017

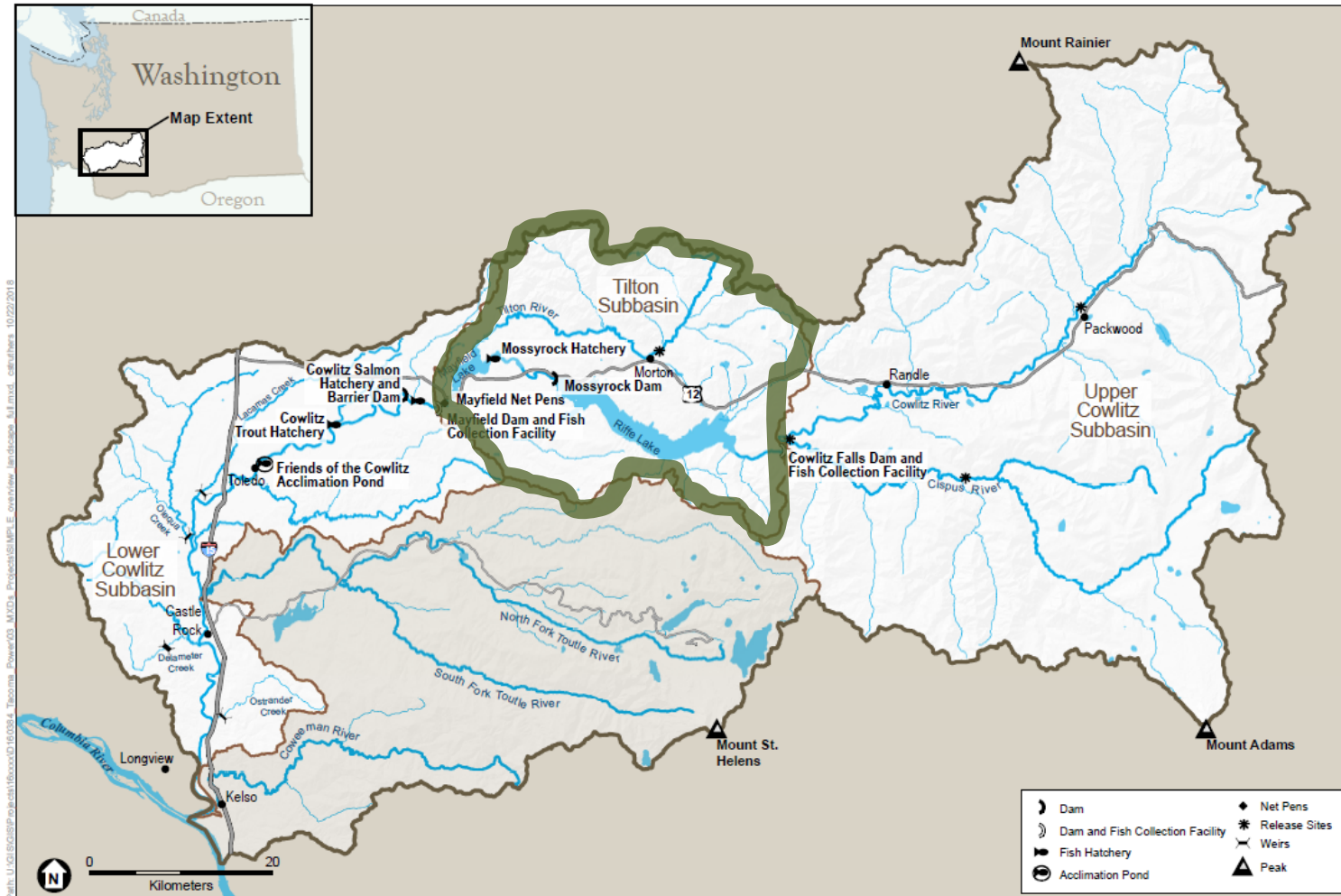
Tacoma Power

**Figure 1**

Cowlitz River Subbasins



# Watershed and Subbasins

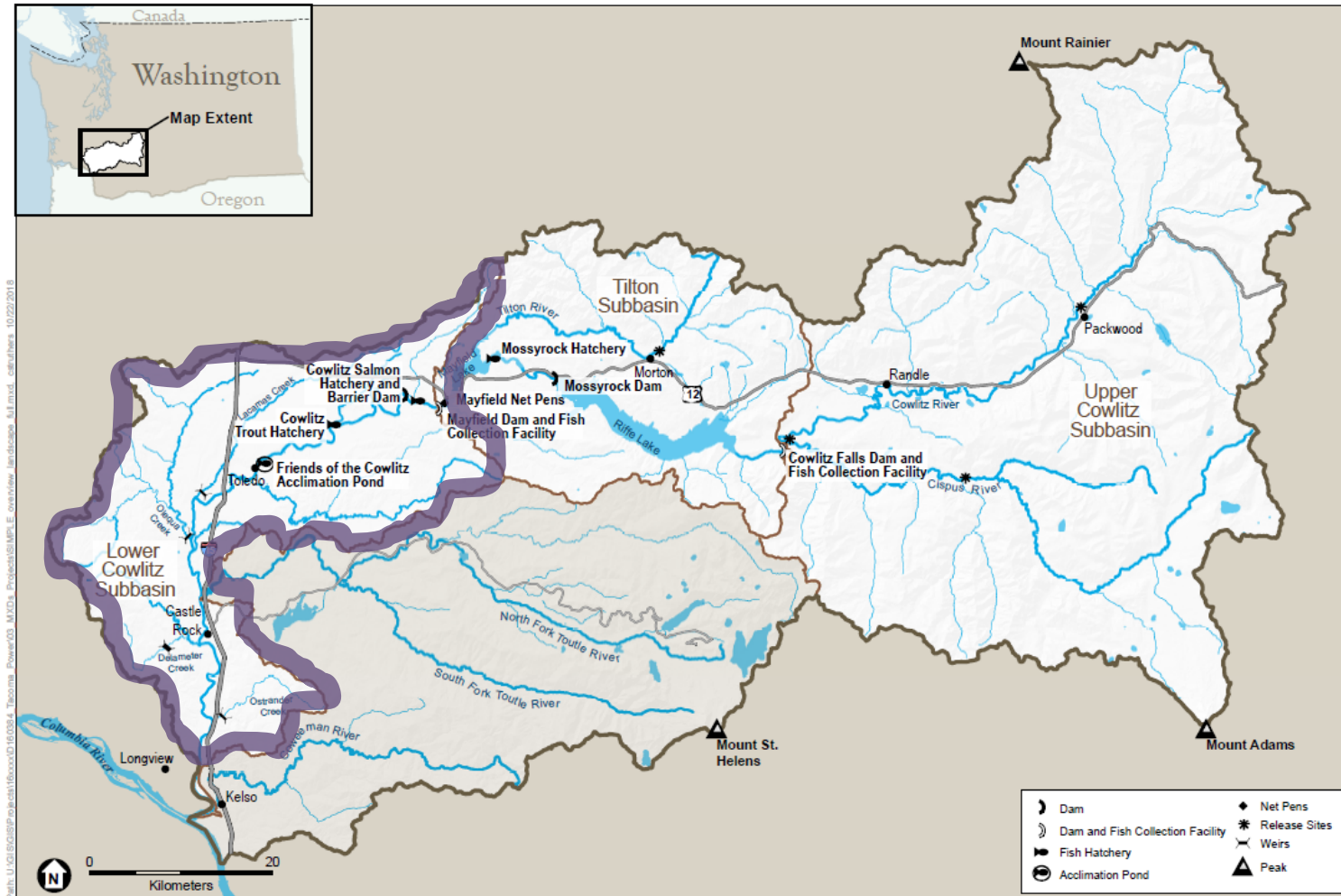


Tacoma Power

**Figure 1**

Cowlitz River Subbasins

# Watershed and Subbasins



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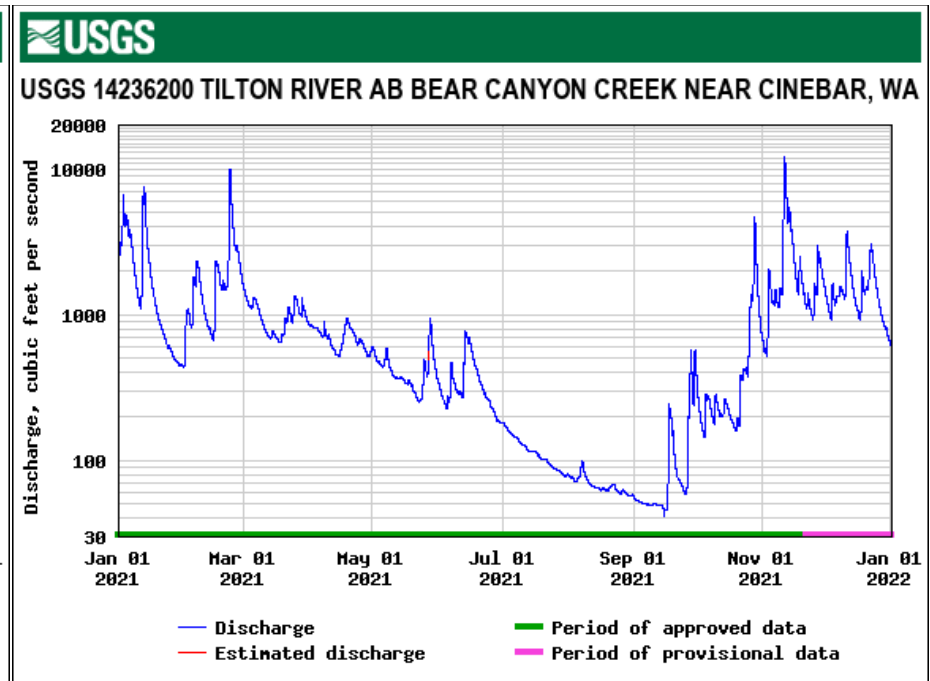
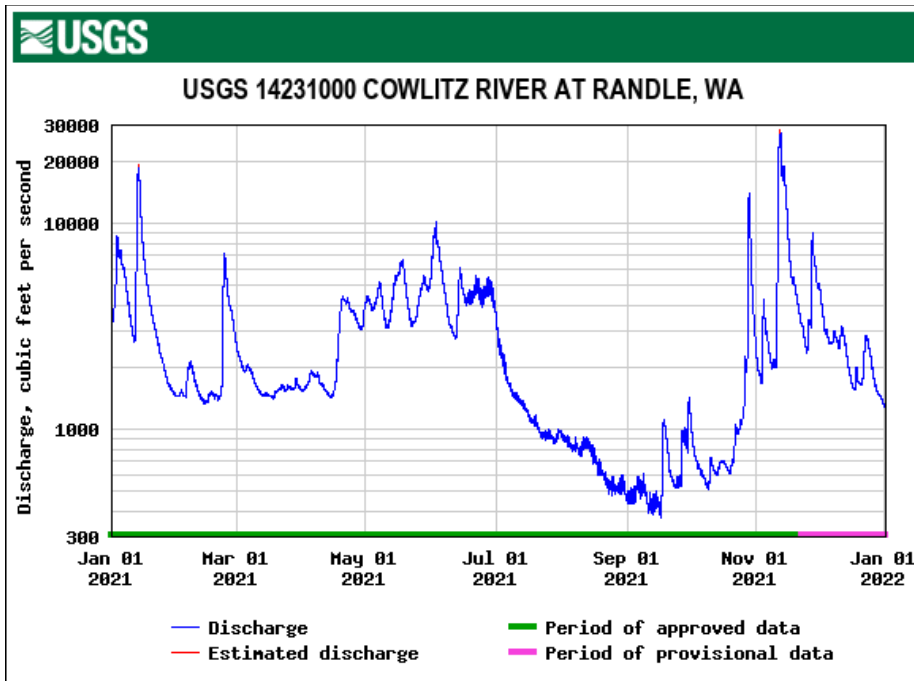
Tacoma Power

**Figure 1**

Cowlitz River Subbasins

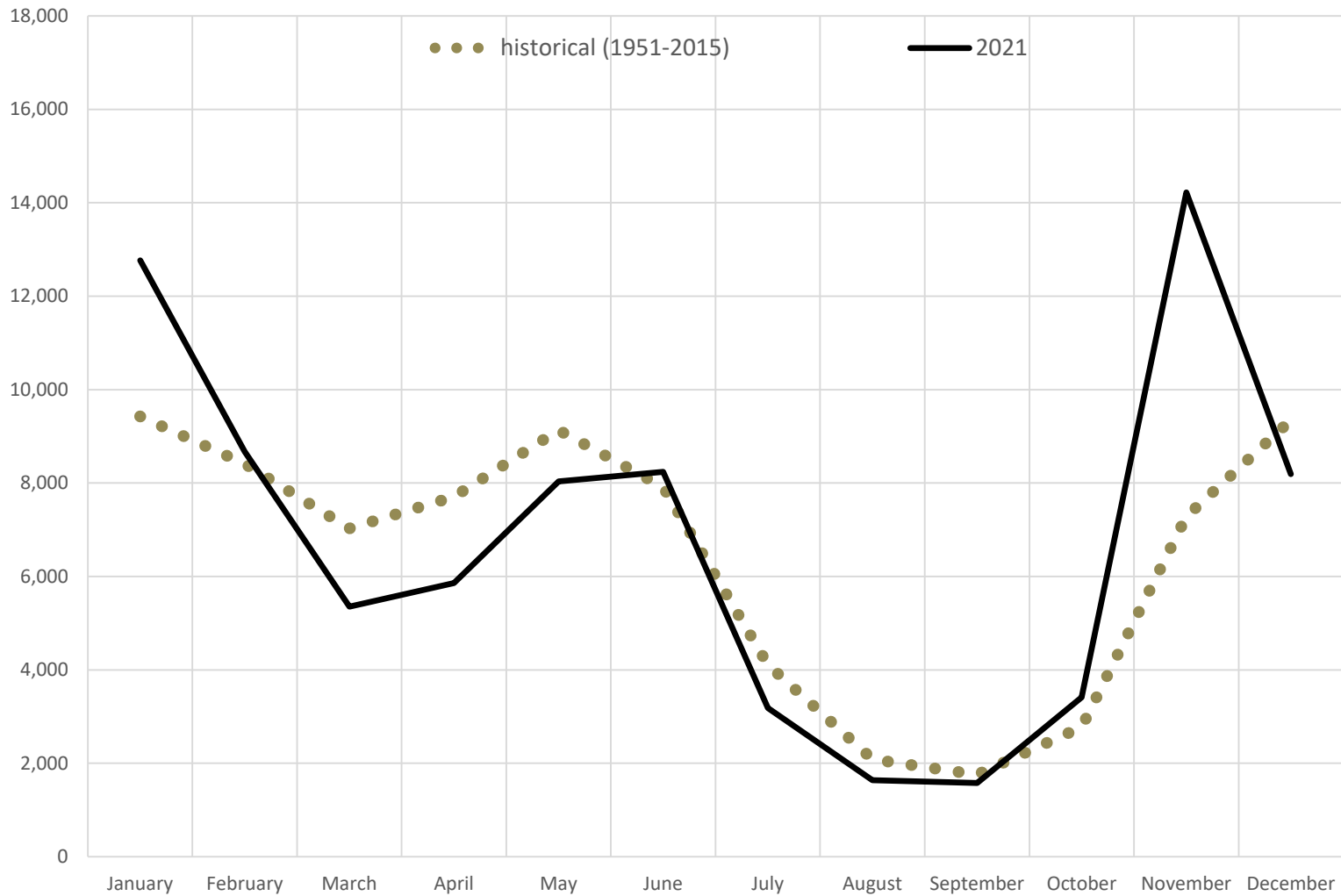


# Inflows: 2021 Rain and Runoff



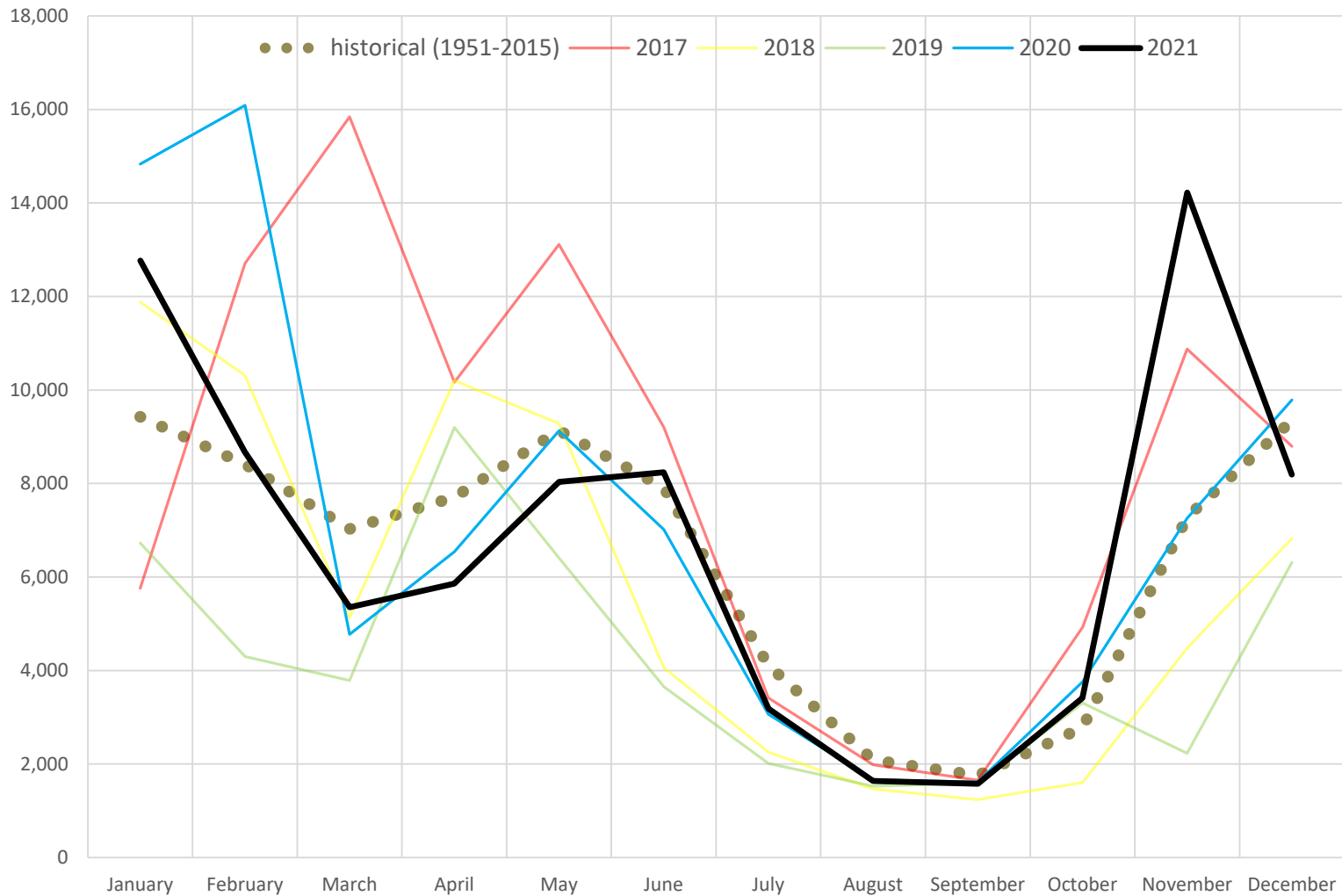
# Inflows: 2021

Natural Inflows to Cowlitz Project (Tacoma Power): Daily Average by Month (cfs)



# Inflows: 5-year context

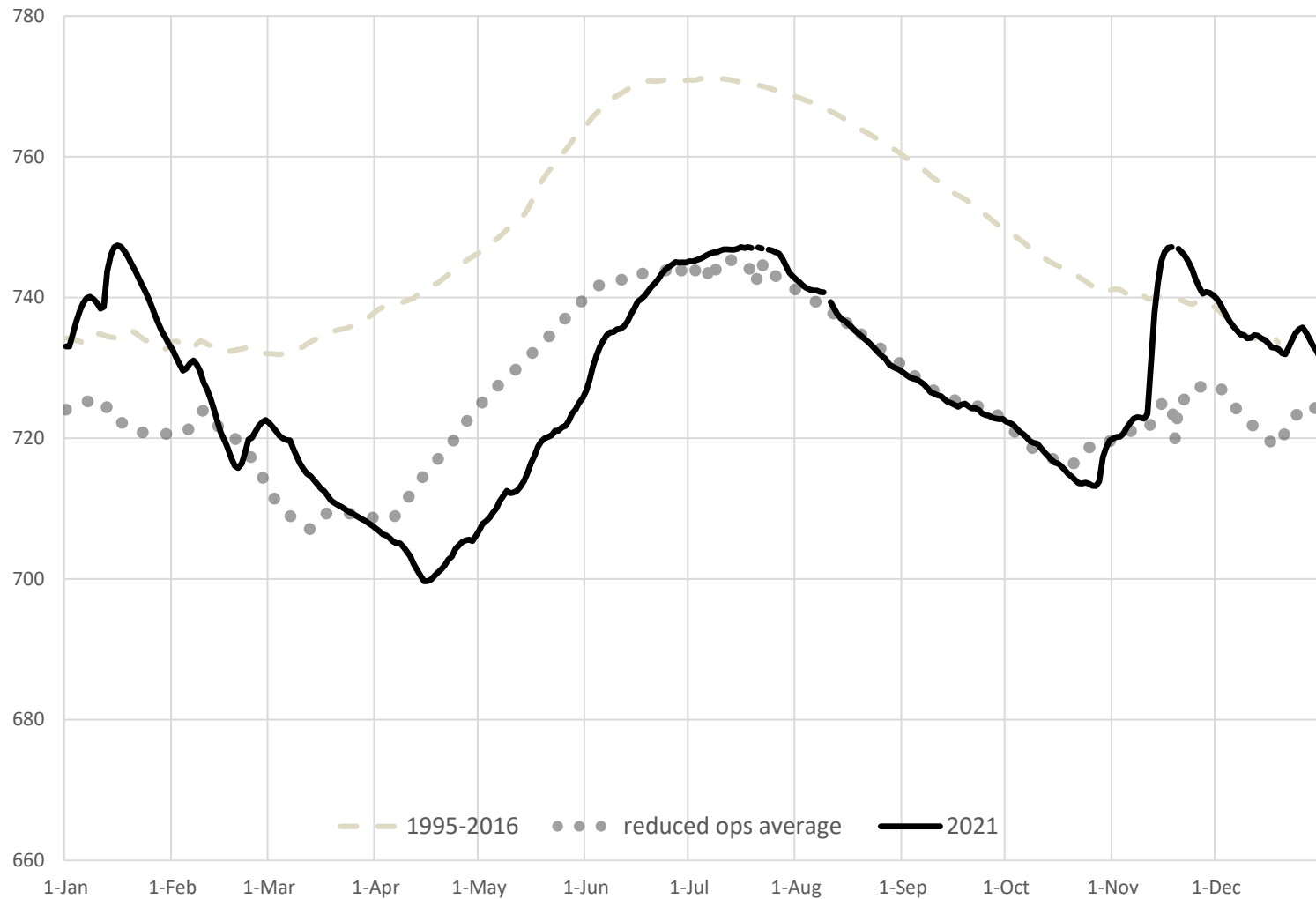
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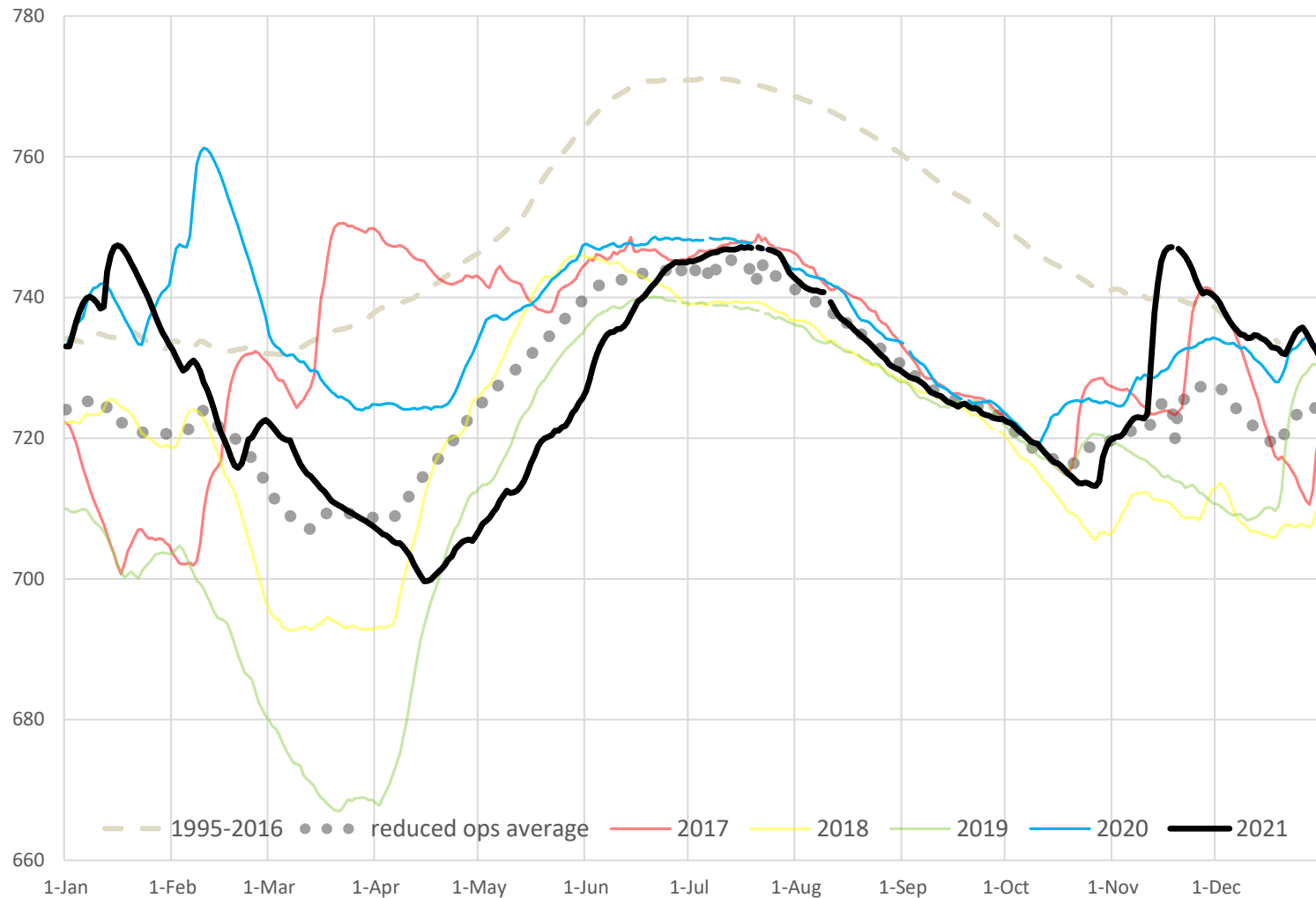
# Reservoir Elevations: 2021

Riffe Lake Elevations (Tacoma Power): Daily (ft)

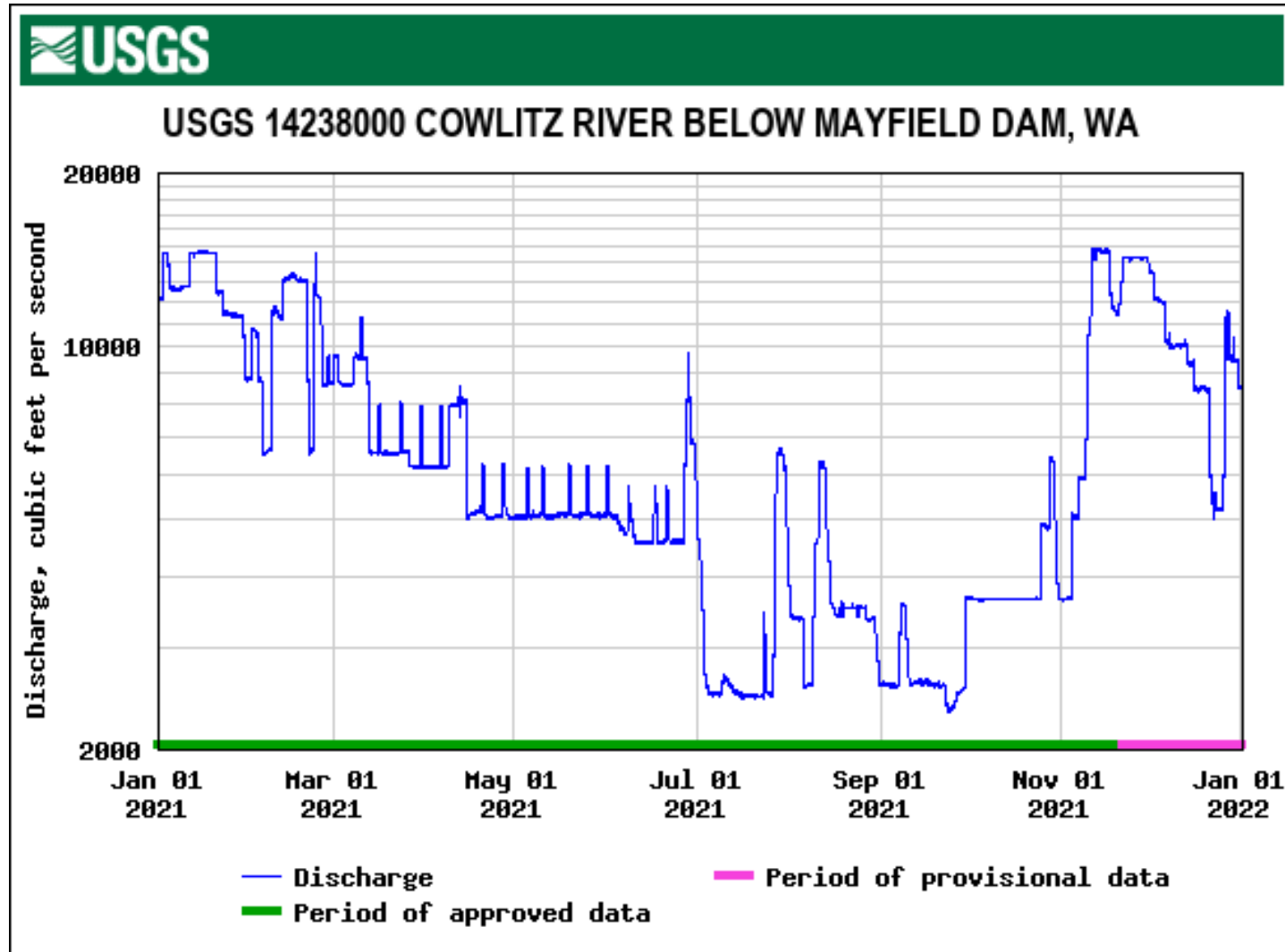


# Reservoir Elevations: 5-year context

Riffe Lake Elevations (Tacoma Power): Daily (ft)

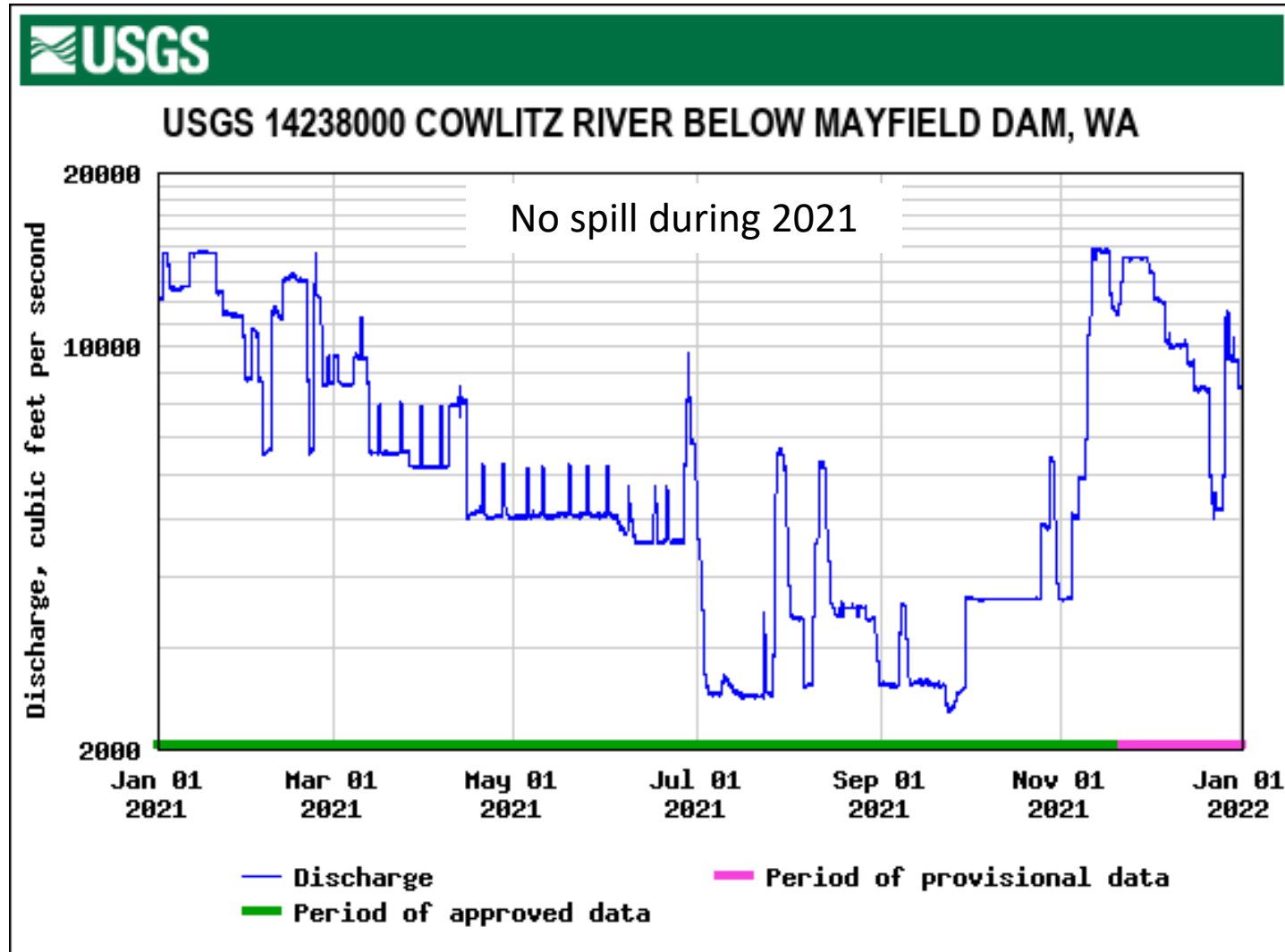


# Instream Flow at Mayfield: 2021

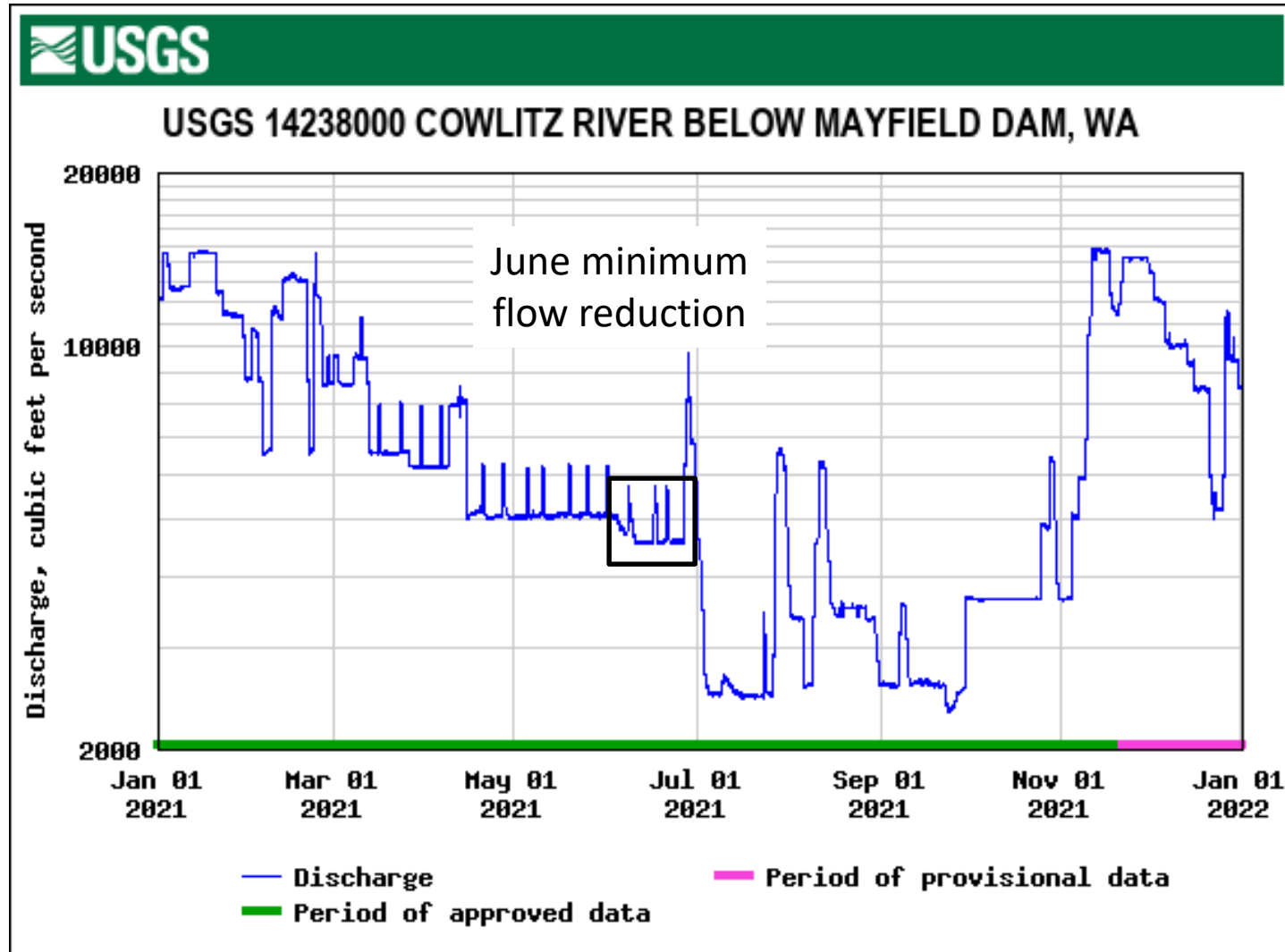




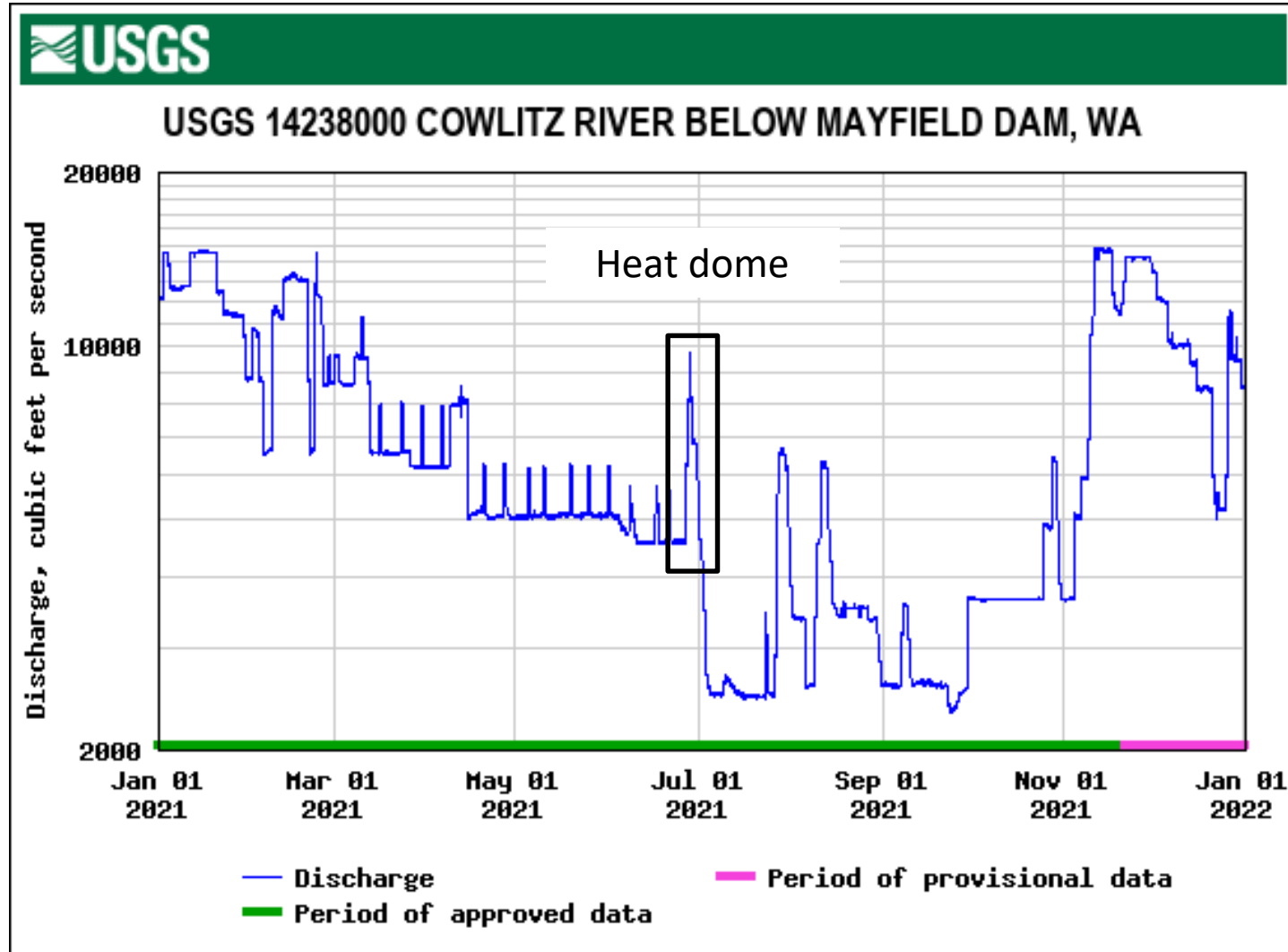
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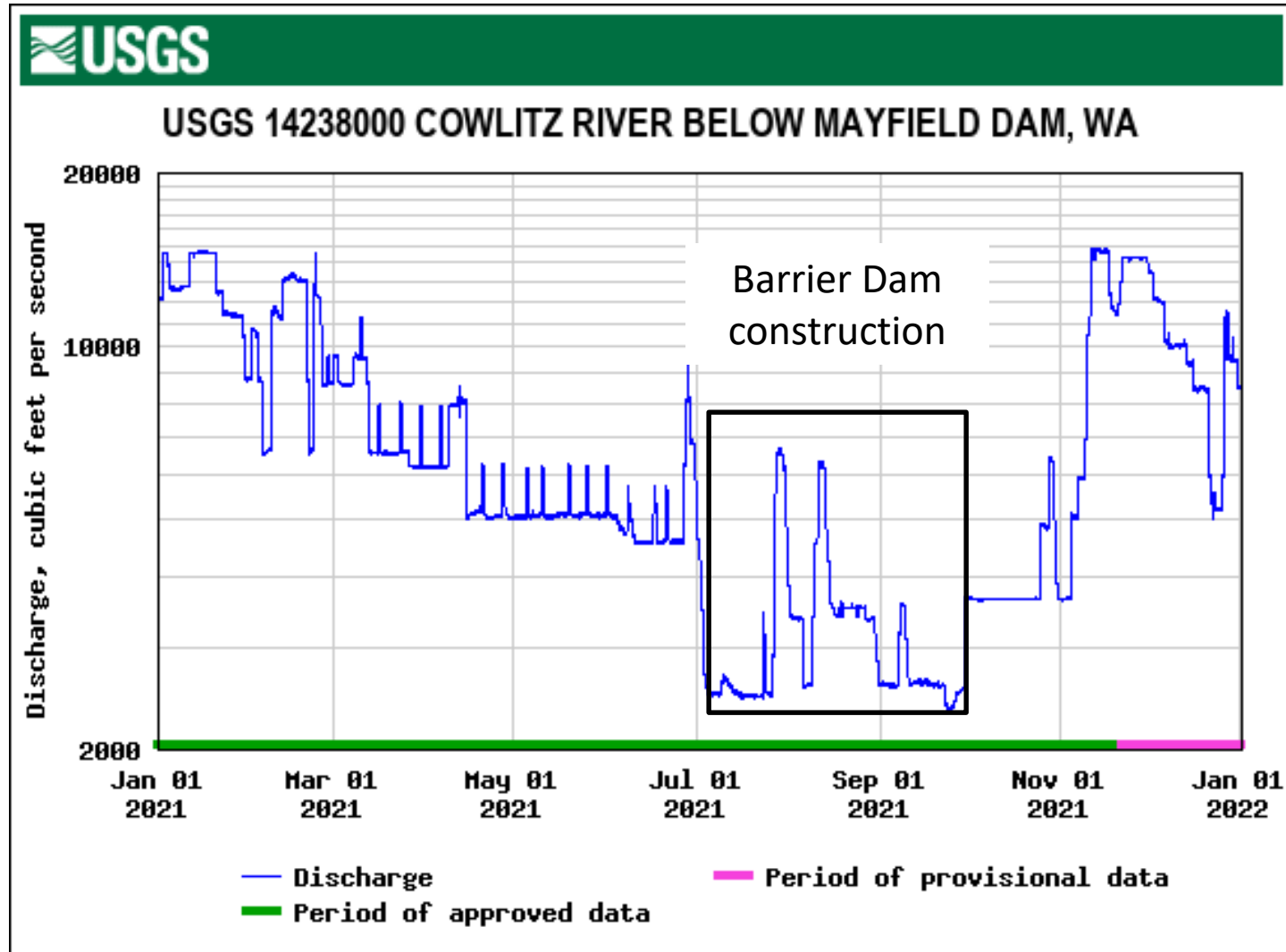


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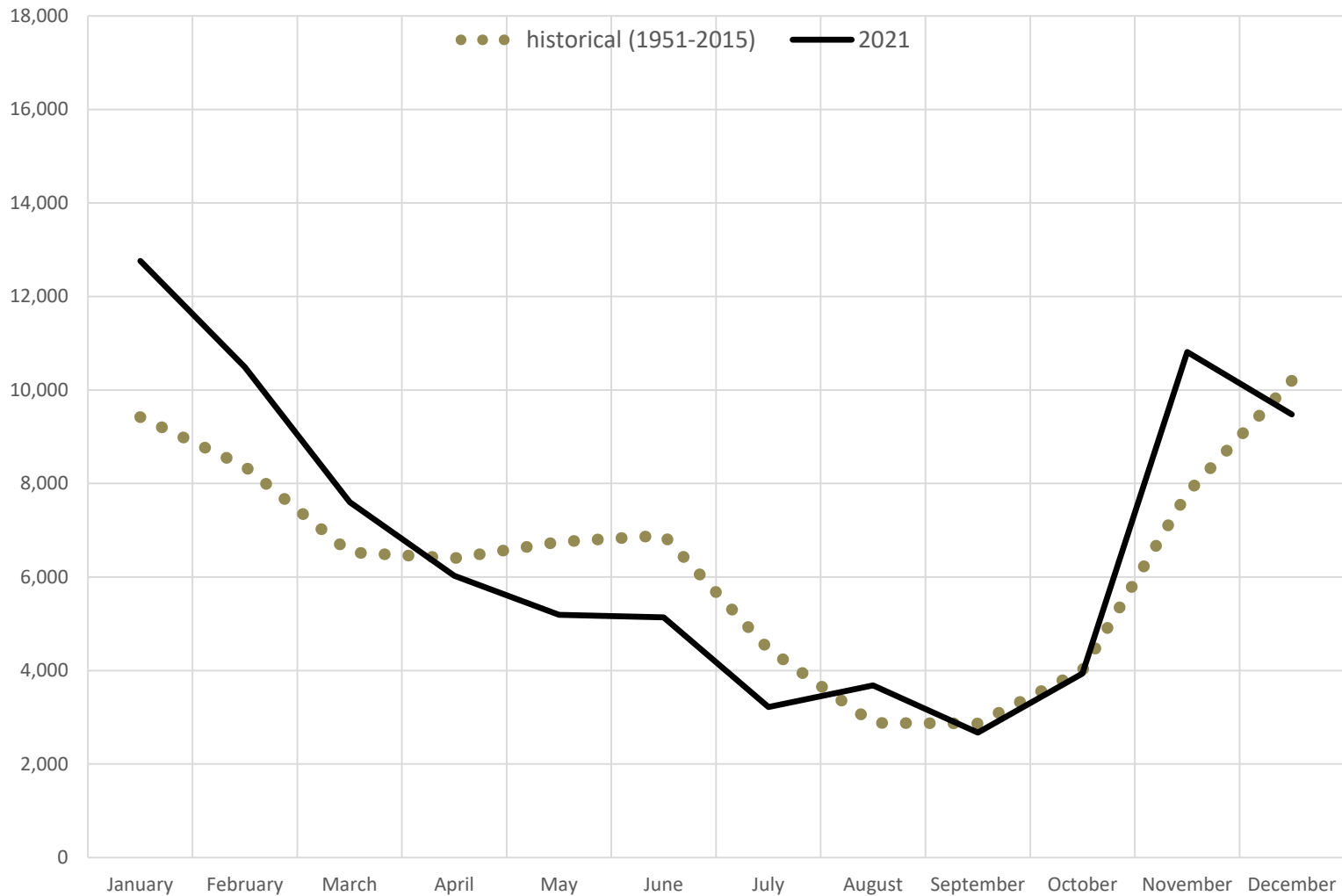


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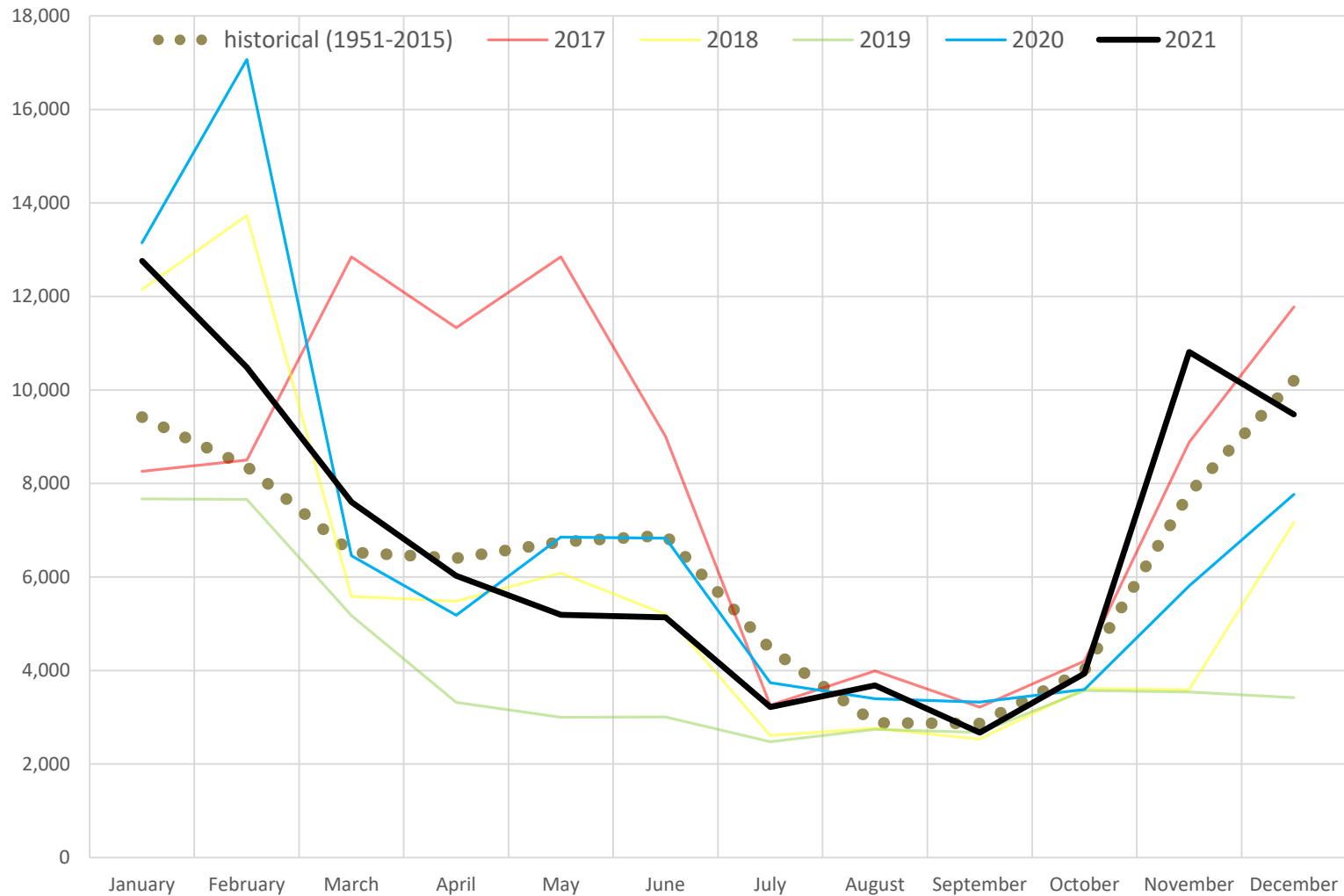
# Instream Flow: 2021

Outflows from Cowlitz Project: Daily Average by Month (cfs)



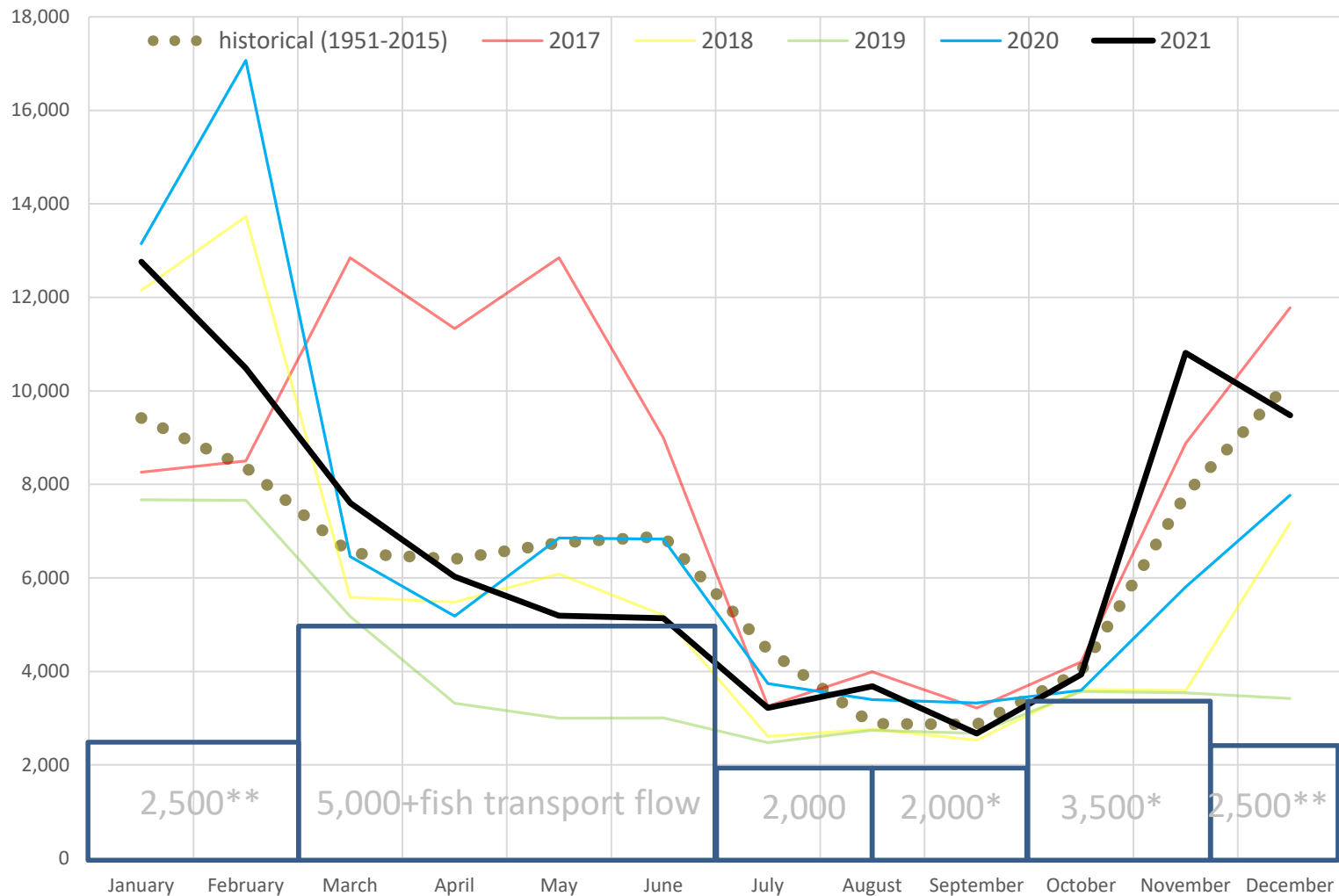
# Instream Flow: 5-year context

Outflows from Cowlitz Project: Daily Average by Month (cfs)



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Outflows from Cowlitz Project: Daily Average by Month (cfs)



\*Minimum can adjust up to 5,000 cfs based on consecutive 5-day averages

\*\* Absolute minimum if no 5-day consecutive average >3,500 cfs



# Key Points

- 2021 hydrologic highlights
  - January and November high inflows, but no spill
  - High snowpack, then exceptionally dry spring
  - June minimum flow reduction (minor)
  - Heat dome
  - Barrier Dam constraints
- 5-year context
  - Ongoing constraints related to reservoir capacity
  - 2021 notable for spring prolonged low inflows and reservoir levels, and high November inflows
  - Generally, 2019 had the lowest inflow and discharge

# 2022 Preview

- Hydrology
  - Variable inflows to date
  - Snowpack has improved toward average
  - Climate outlook: cooler, potentially drier spring
- Operations
  - Higher reservoir than this time in 2021, favorable for refill
  - Planned major projects additionally constrain reservoir and instream flow

# Any Questions?

