

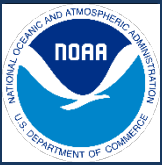
Northwest River Forecast Center



Introduction to NWRFC Services

Columbia Basin Leadership Training
MSU, Portland – August 24, 2022

Henry Pai
Hydrologist
NOAA/NWS/Northwest River Forecast Center
Portland, OR



Northwest River Forecast Center



Overview of NWRFC Services

Lower Columbia Forecast Services

2022 Columbia Minimum Stage *Outlook*

2021 Columbia Minimum Stage *Verification*



NOAA/NWS/RFC Missions



NOAA Mission: To understand and predict changes in the Earth's environment ... to meet our Nation's economic, social, and environmental needs



NWS Mission: The NWS provides weather, hydrologic, and climate forecasts and warnings ... for the protection of life and property and the enhancement of the national economy

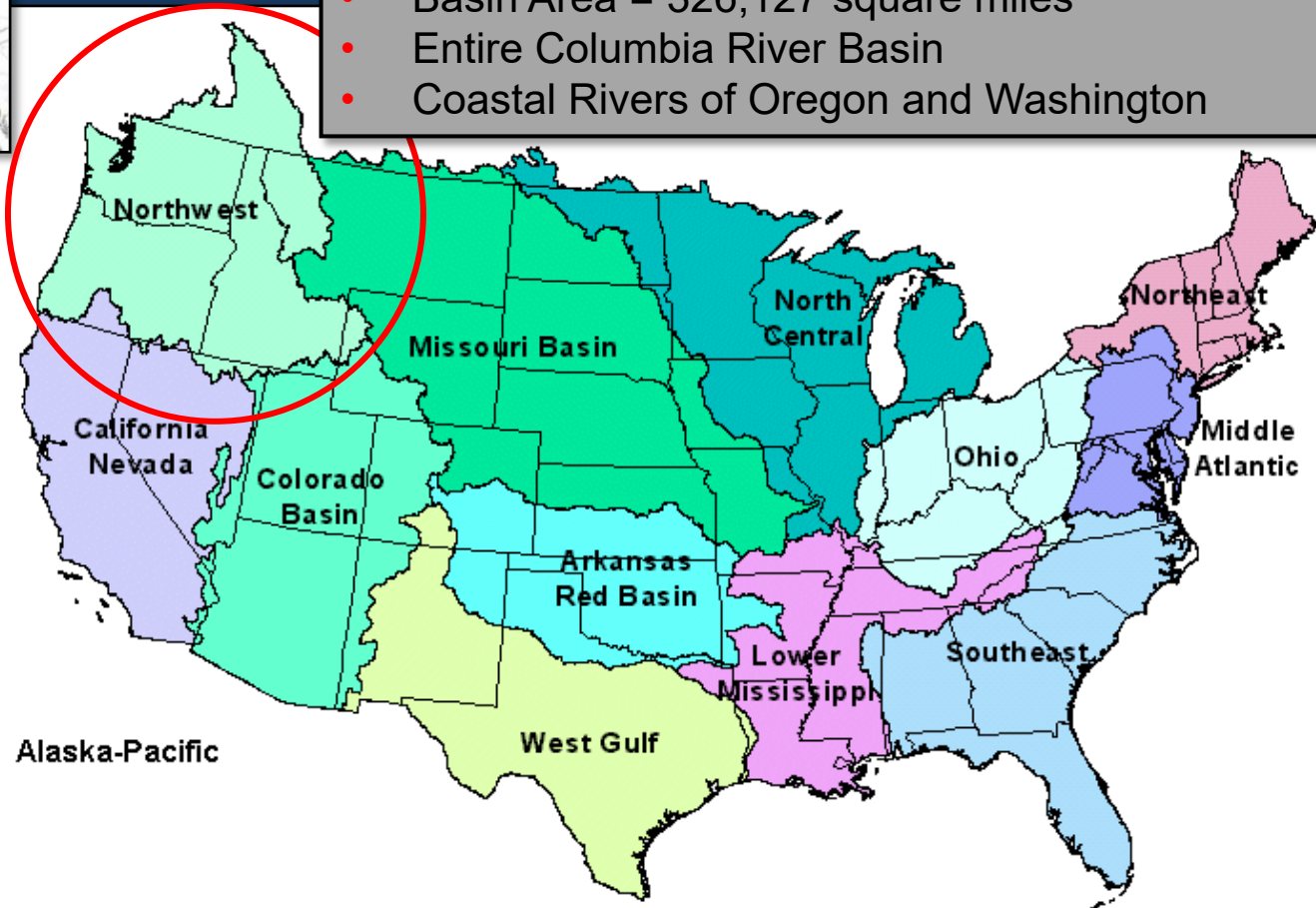


RFC Role: The River Forecast Centers carries out the NOAA and NWS missions by providing streamflow forecasts and information datasets for the well being of the public

13 NWS River Forecast Centers

Northwest RFC:

- Includes portions of 8 States and British Columbia
- Basin Area = 326,127 square miles
- Entire Columbia River Basin
- Coastal Rivers of Oregon and Washington

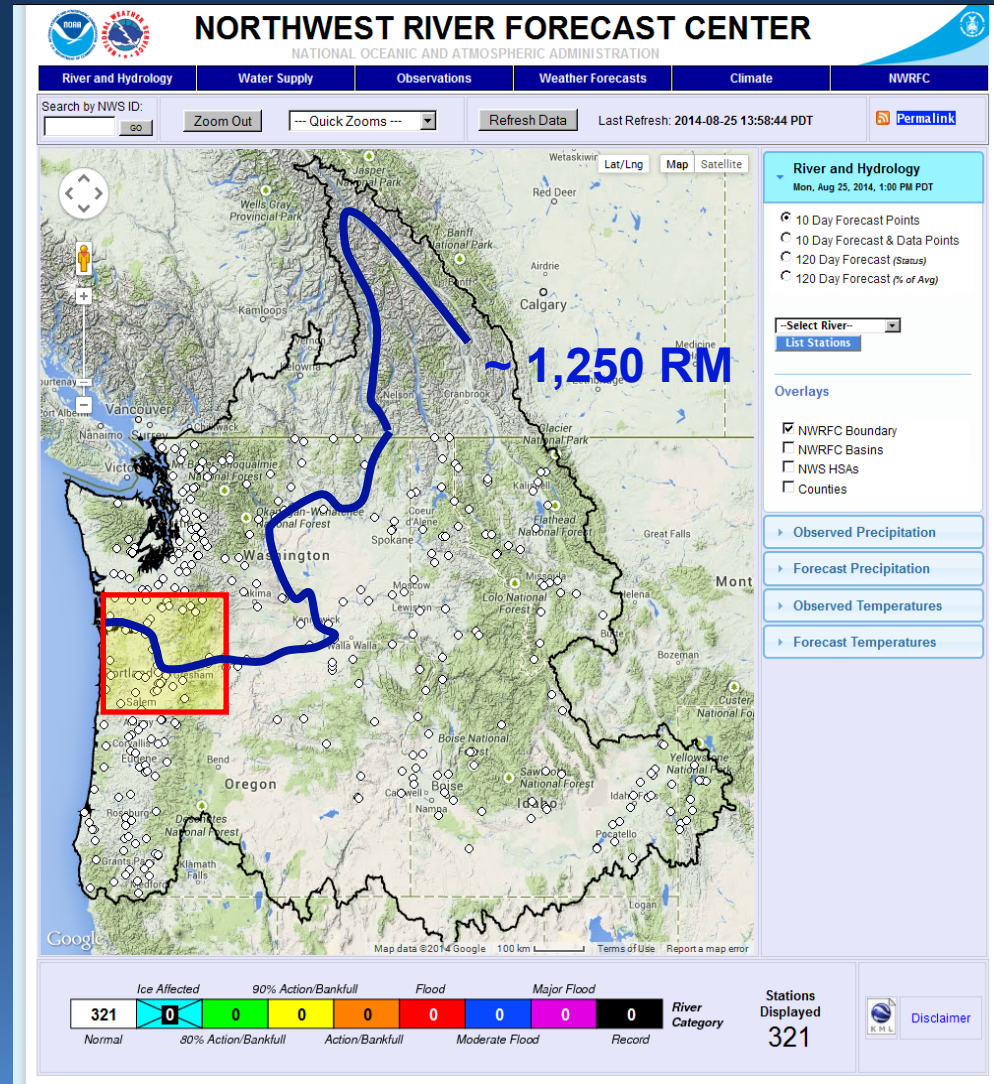




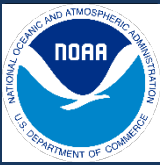
NWRFC Domain and Forecast Services



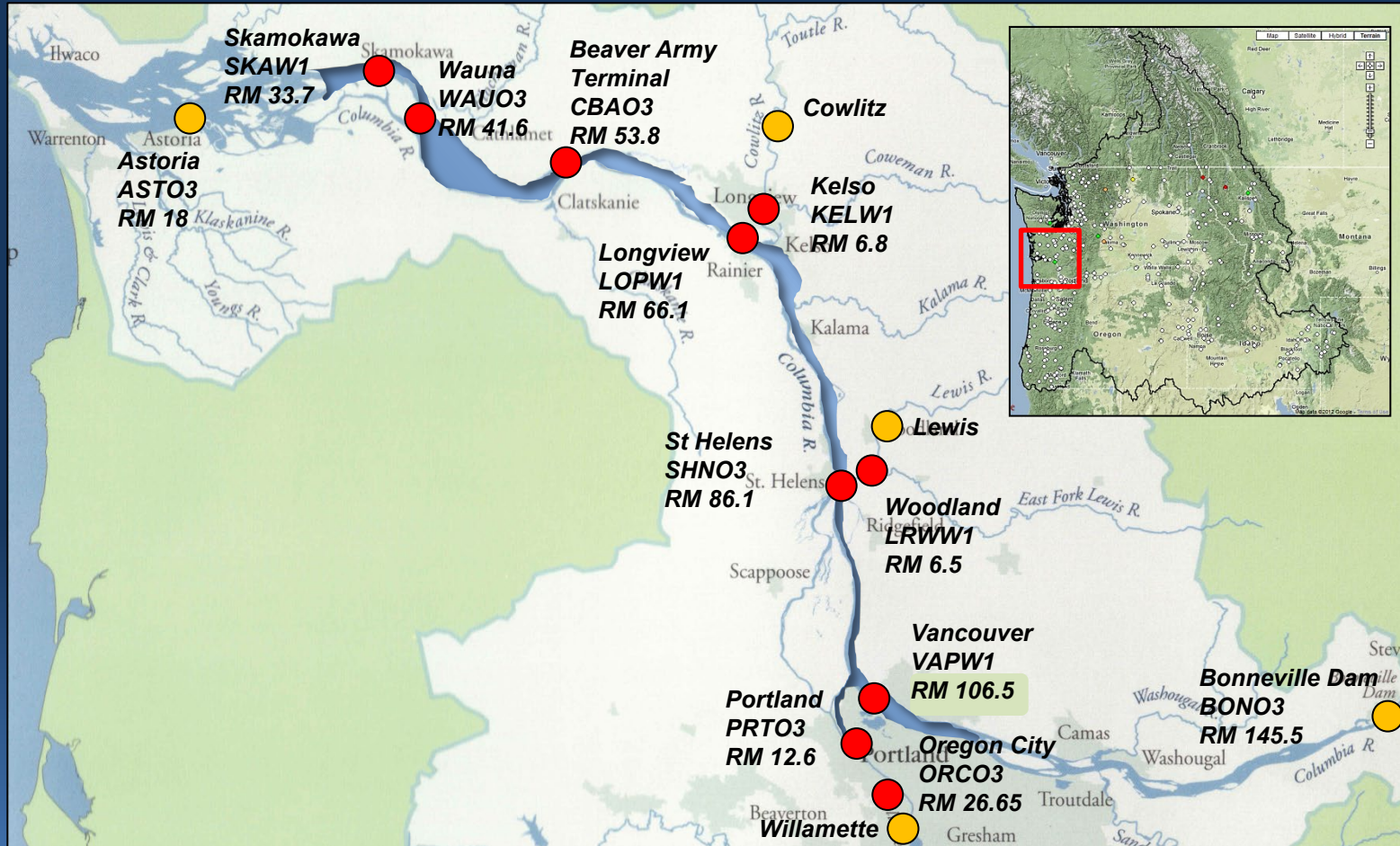
- 10-day deterministic forecasts
 - Issued twice daily
 - Updated as needed
- Seasonal probabilistic forecasts
- ~350 locations
- Use conceptual hydrologic modeling
- Coordinate with USACE, USBR, BPA, and others on streamflow regulation



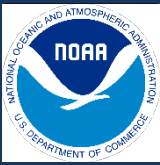
www.nwrfc.noaa.gov



Lower Columbia Forecast Services



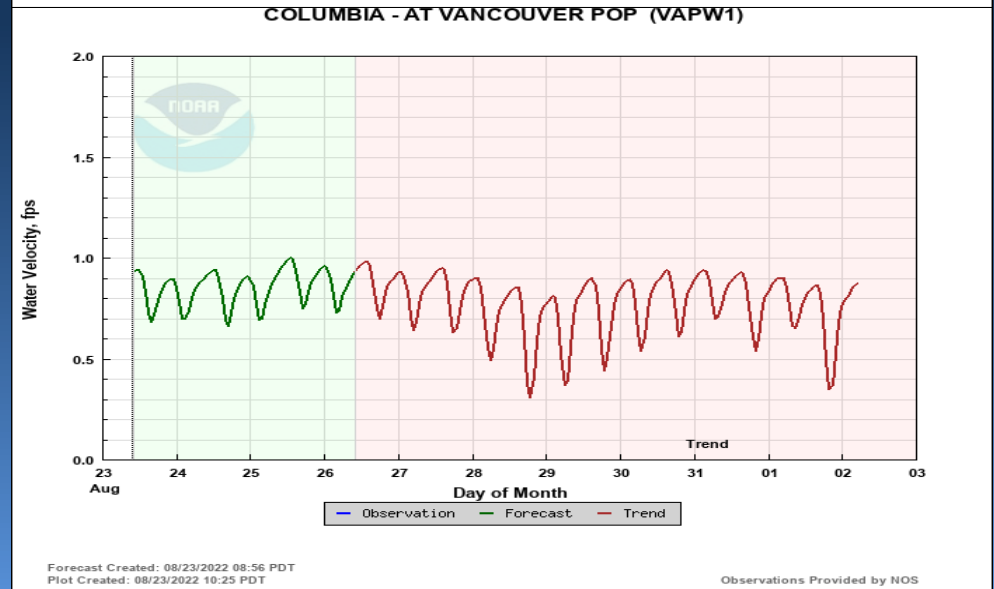
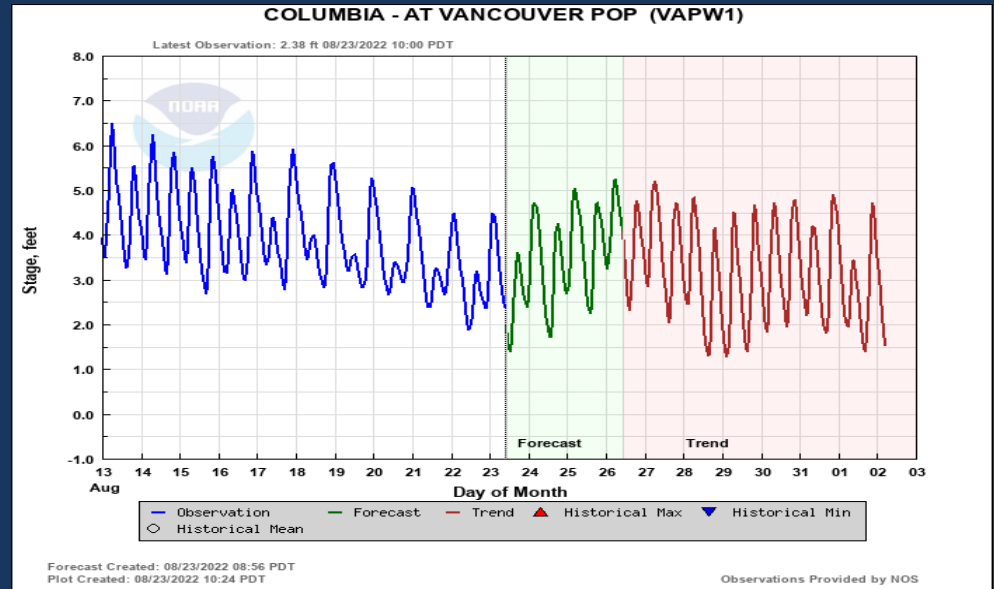
- 10 Forecast Locations for Stage & Velocity
- 5 Boundary Conditions



Lower Columbia Forecast Services



- Stage and velocity forecasts
- 10-day forecast, hourly time step
- Issued twice daily, updated as needed
- Available on NWRFC Web
- Input to LOADMAX program
- Annual minimum stage outlook



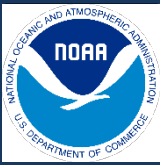


2022 Minimum Stage Outlook

Columbia River at Vancouver



- Long-term stage outlook issued in **June (typically after snowmelt and/or late season pulses)**
- Identification of potential low stages at the Vancouver gage (VAPW1)
- Potential dates of occurrence
- Refer to 10 day forecast for short-term guidance during low flow season

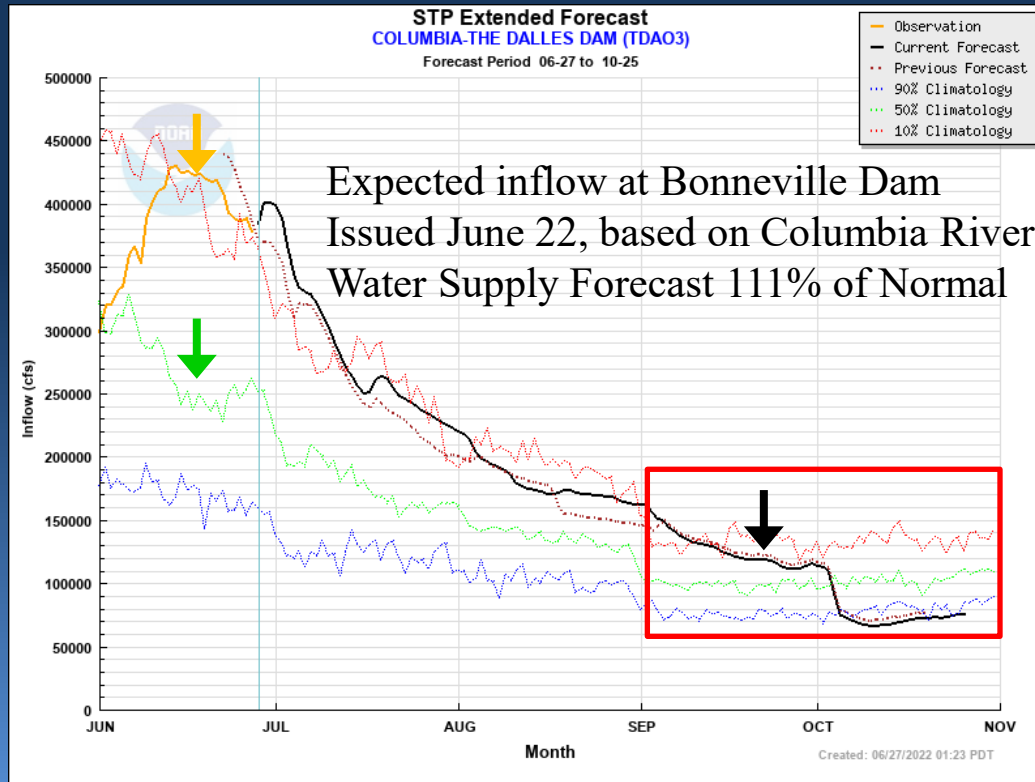


2022 Minimum Stage Outlook

Assumptions #1 and #2:



1. Upstream project flows are typically maintained at or near historical minimum targets during late summer and early fall.
2. Minimum Bonneville Dam releases typically occur on **weekends** (lower power demand).



SOURCE: [HTTP://WWW.NWRFC.NOAA.GOV/STP](http://www.nwrfc.noaa.gov/stp)



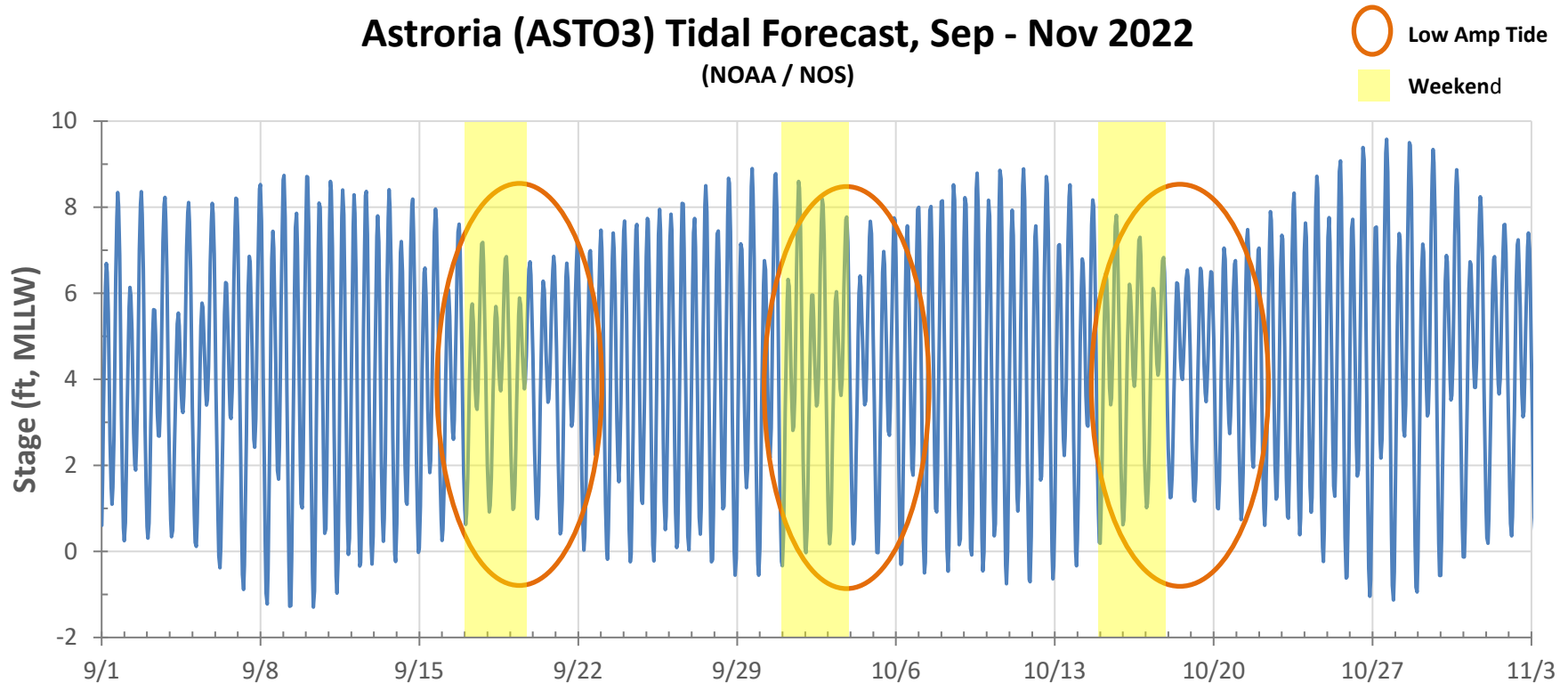
2022 Minimum Stage Outlook

Assumption #3:



3. Lowest stages tend to occur during a low-amplitude tidal sequence at Astoria

Astoria (ASTO3) Tidal Forecast, Sep - Nov 2022
(NOAA / NOS)





2022 Columbia River Minimum Stage

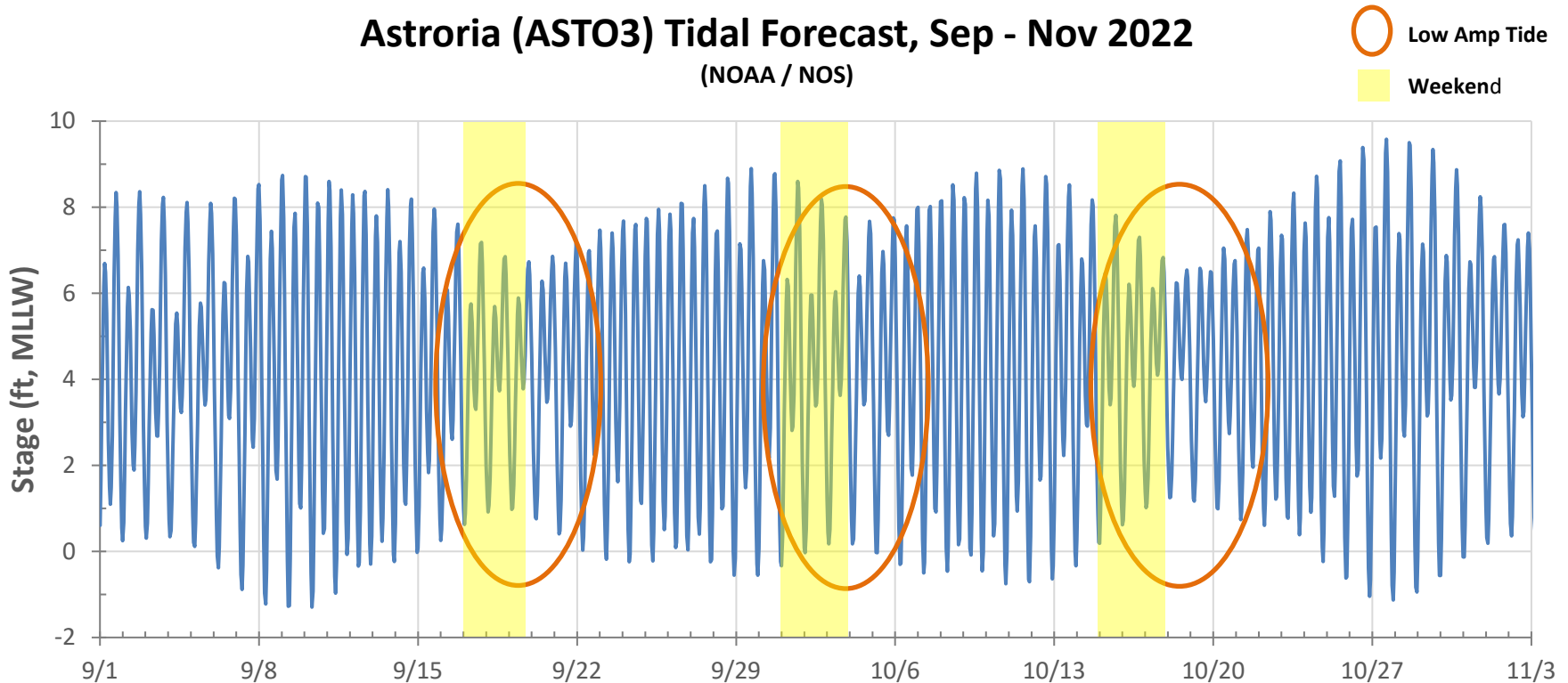
Impact of Tidal Influence



NOS Tide Predictions for **Astoria** are used to identify the timing of low amplitude tidal sequences expected during the Columbia River low flow period:

Potential tidal sequences were identified during September to October.

Astoria (ASTO3) Tidal Forecast, Sep - Nov 2022
(NOAA / NOS)



Low amplitude tide sequences that are coincidental with weekends are likely candidates for minimum stages.

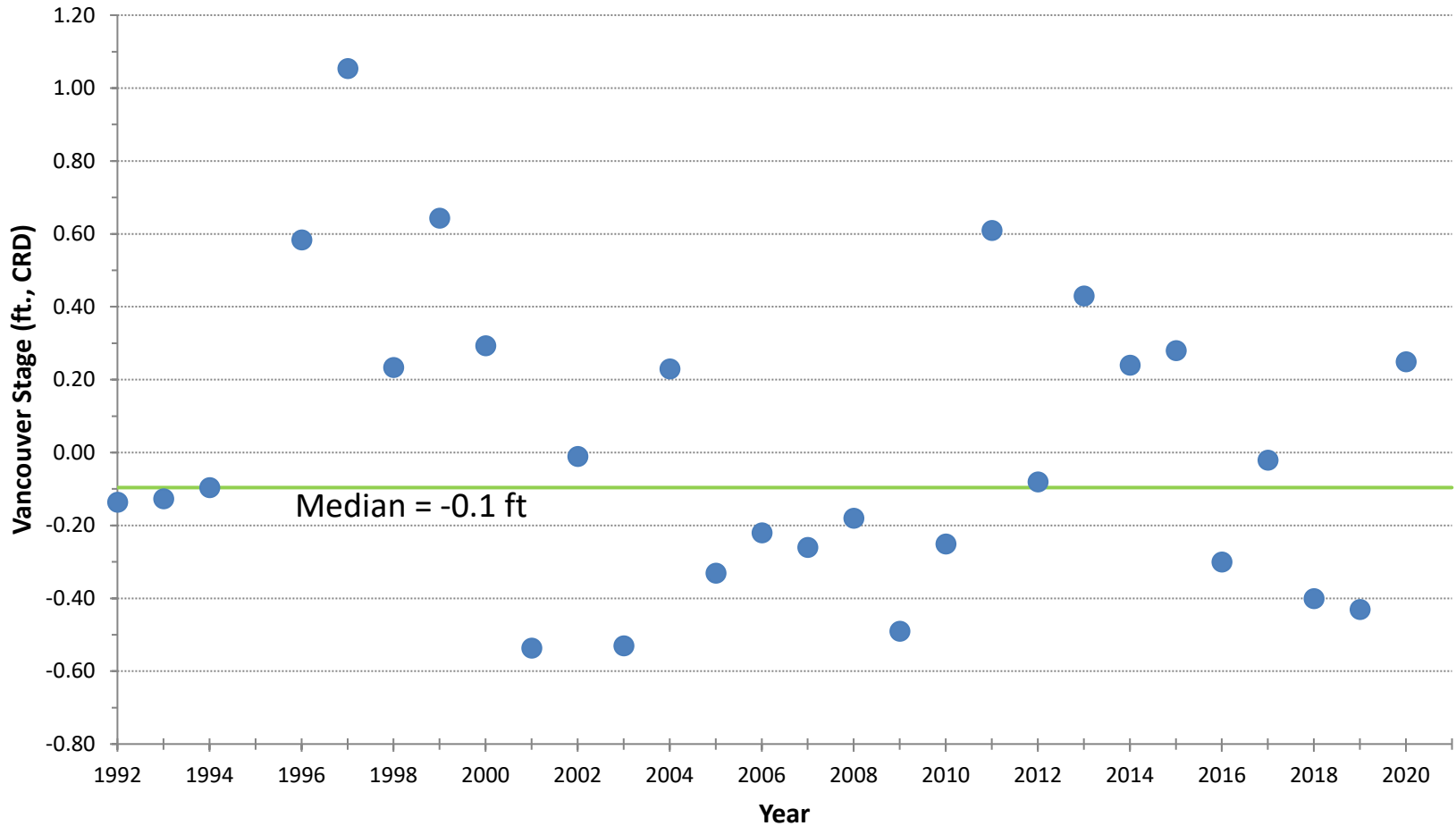


2022 Minimum Stage Outlook

Historical Minimum Stage



Columbia R. at Vancouver
Annual Minimum Stage: 1992-2021





2022 Minimum Stage Outlook Summary



The minimum stage outlook for the Columbia River at Vancouver is most likely to occur:

- **October 15 – 17, 2022** and **range between -0.1 to +0.45 feet (CRD)**.

Other dates of potential minimum or near-minimum stage include:

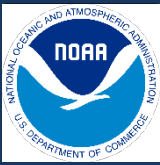
- **October 1 – 3, 2022**
- **September 17 – 19, 2022**

Minimum stages are most likely to occur when low amplitude ocean tidal sequences are in phase with periods of low flow in the Columbia River.

Heavy late summer or early fall rain can mitigate minimum stages, but are not considered in this outlook.

Minimum stages for the Willamette River at Portland are typically within 0.2 feet of the Columbia River at Vancouver gage and can be expected to occur at the same time.

The lowest observed stage for the Columbia River at Vancouver was recorded July 2001 and September 1973 (-0.54 ft). *Source: COE Portland-Vancouver Harbor Information Package.*

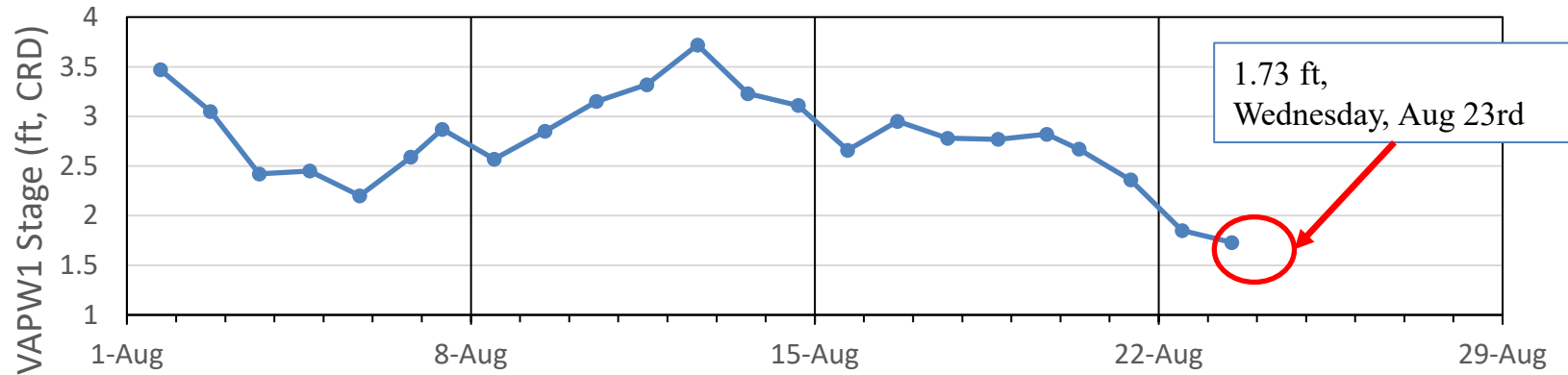


2022 Minimum Stage Outlook

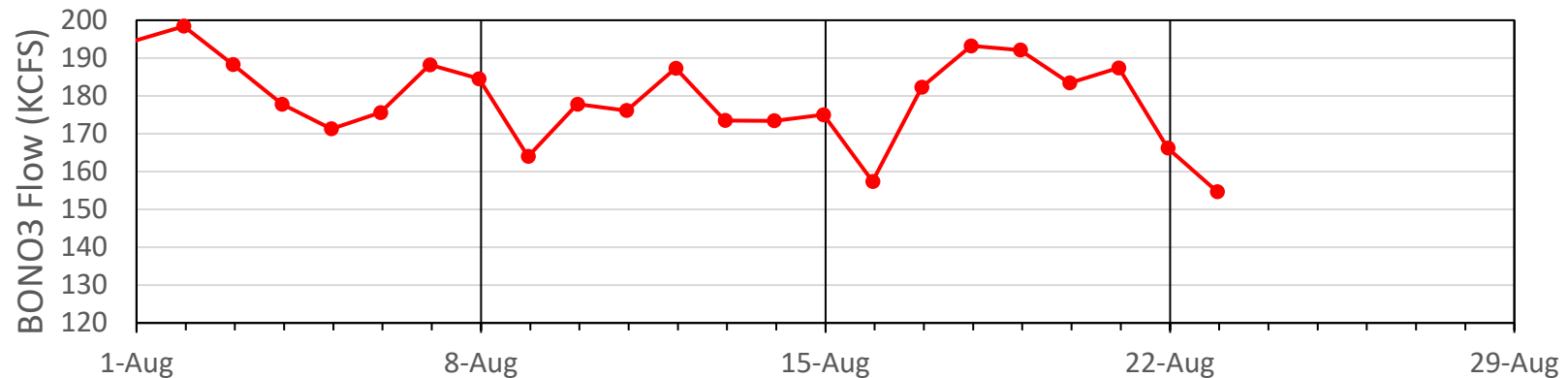
Observed this month



Columbia River at Vancouver Daily Minimum Stage (Sep, 2022)



Columbia River at Bonneville Dam Daily Mean Flow (Sep, 2022)





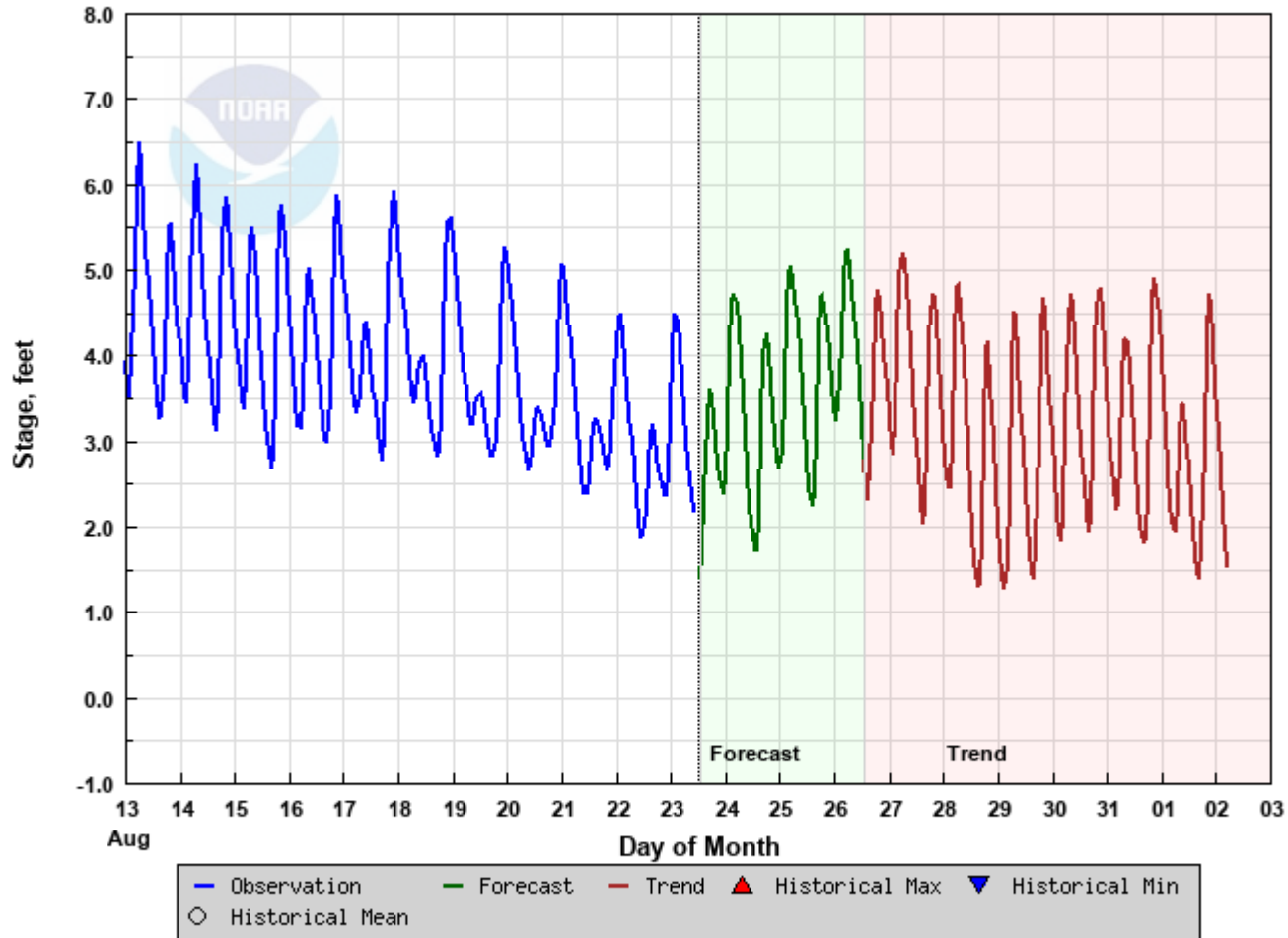
2022 Minimum Stage Outlook

Yesterday's Forecast



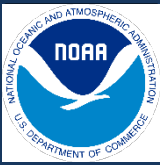
COLUMBIA - AT VANCOUVER POP (VAPW1)

Latest Observation: 2.19 ft 08/23/2022 10:36 PDT



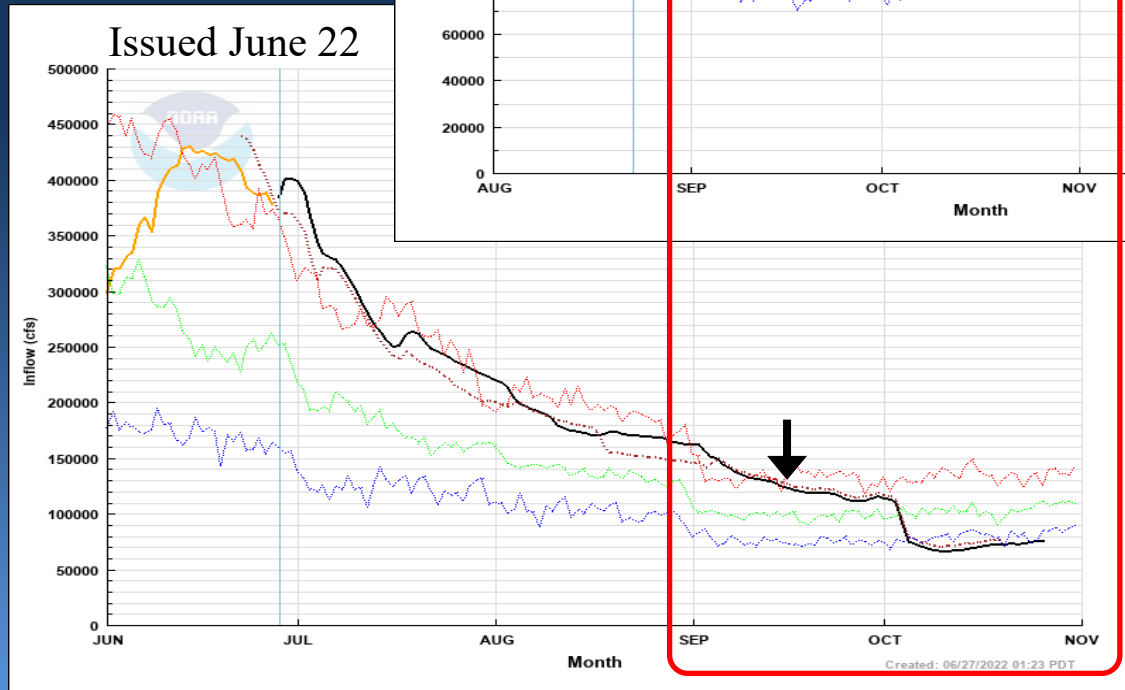
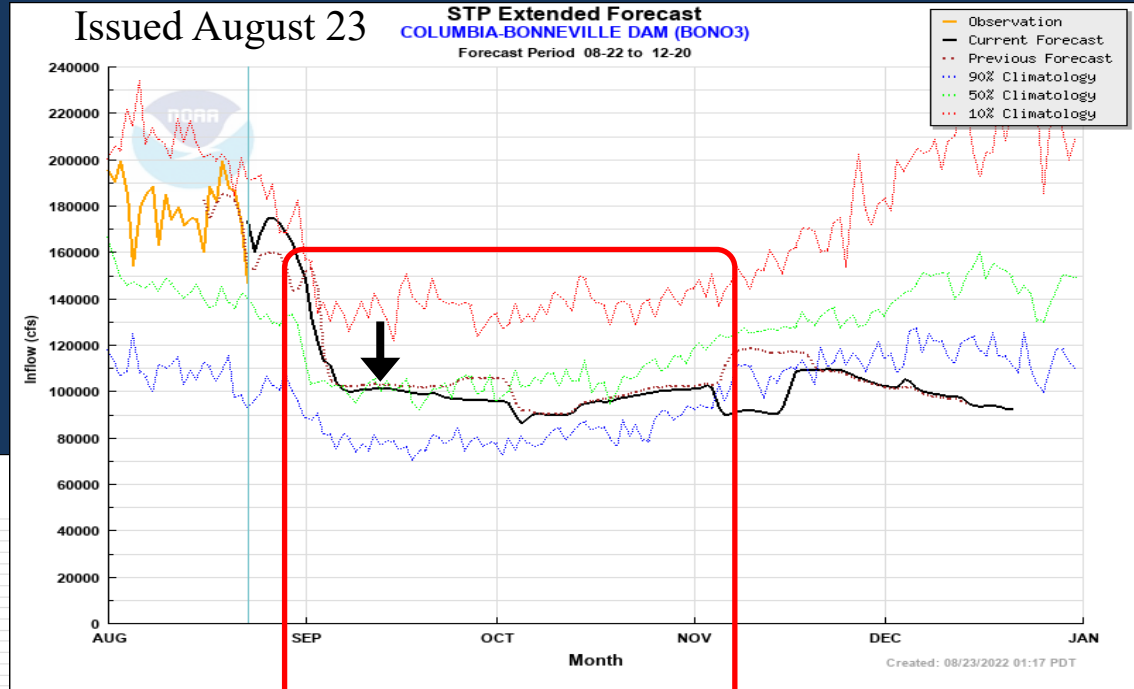
Forecast Created: 08/23/2022 08:56 PDT
Plot Created: 08/23/2022 13:15 PDT

Observations Provided by NOS



2022 Minimum Stage Outlook

Recent Bonneville Dam inflow projections





2021 Minimum Stage Verification

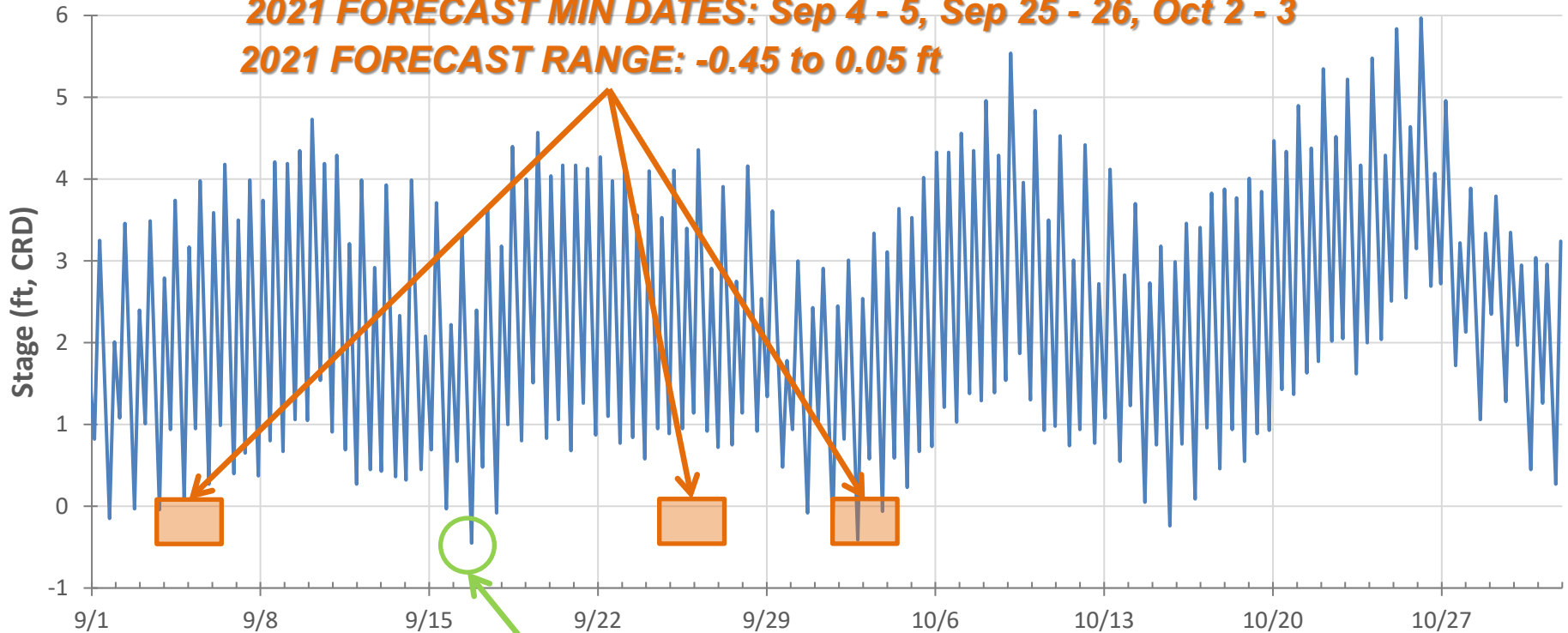


2021 Minimum Stage Verification

Columbia River at Vancouver (VAPW1)

Columbia River at Vancouver (VAPW1) - 2021

2021 FORECAST MIN DATES: Sep 4 - 5, Sep 25 - 26, Oct 2 - 3
2021 FORECAST RANGE: -0.45 to 0.05 ft



OBSERVED MIN STAGE and DATE OF OCCURRENCE: -0.45 ft on Sep 16

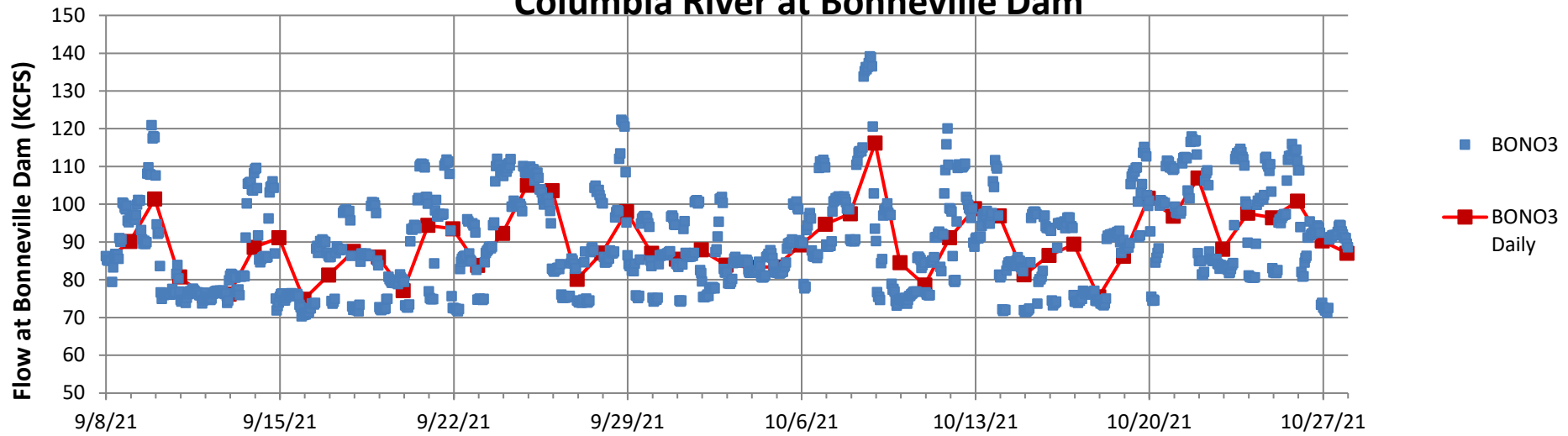


2021 Minimum Stage Verification

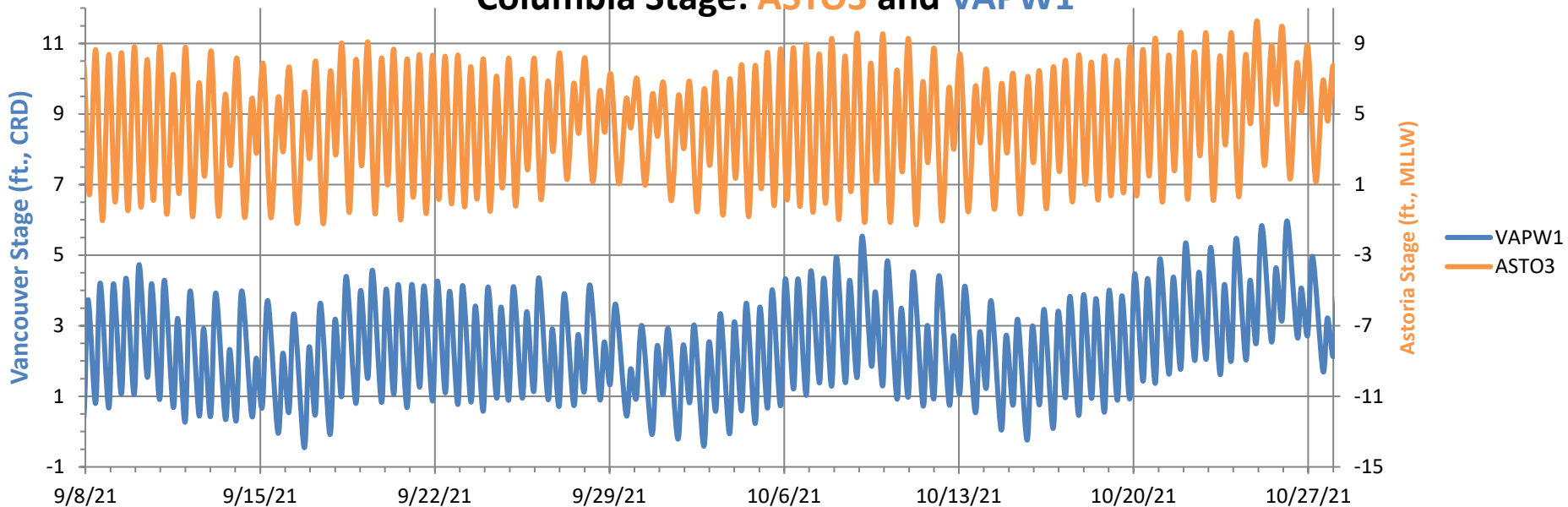
Looking at boundary conditions

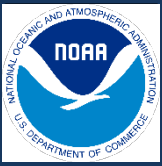


Columbia River at Bonneville Dam



Columbia Stage: ASTO3 and VAPW1





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Southside Government Island Looking East From I-205
Vancouver Gage (VAPW1) at ~0 feet (CRD)

Source: PDX WFO