

# Appendix I

## Seepage Meter Deployment Supplemental Information

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**From:** [Ryan Barth](#)  
**To:** [Young, Hunter](#)  
**Cc:** [Peterson, Lance](#); [Azhar, Wardah](#); [Bob Wyatt](#); [Jen Mott](#)  
**Subject:** RE: US Moorings Second Phase PDIWP - proposed seepage meter timing  
**Date:** Wednesday, July 13, 2022 10:31:52 AM  
**Attachments:** [USM Project Area Second Phase PDI Seepage Mtr Rationale Supp Figs\\_071322.pdf](#)

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As requested in your below email regarding our proposed seepage meter deployments in the US Moorings Project Area (Project Area) as part of our *First Phase Pre-Design Investigation Data Summary Report and Second Phase Pre-Design Investigation Work Plan* (Work Plan), this email and attached figures provide an evaluation of groundwater levels in representative upland monitoring wells and Willamette River elevation data to substantiate the targeted conditions for offshore seepage meter deployments proposed in the Work Plan (i.e., fall for the first round of deployment during low river elevations and spring for the second round of deployments during high river elevations).

As described in the U.S. Environmental Protection Agency's (EPA's) *Remedial Design Guidelines and Considerations – Portland Harbor Superfund Site, Portland, Oregon* (2021), porewater and seepage meter deployments should be conducted “at a time of the year when groundwater flux into the river is at its maximum.” This occurs when the river elevations are lowest relative to upland groundwater in hydraulic connection with the locations of the proposed seepage meter deployments (i.e., during the fall period). In addition, NW Natural proposes to collect offshore seepage data during high river elevations to understand the variability of seepage relative to groundwater elevations. To evaluate when these hydraulic conditions occur within the Project Area, Anchor QEA, LLC, evaluated the nearshore groundwater elevations in the Fill Water-Bearing Zone (WBZ) on the northeast portion of the Gasco property closest to the US Moorings property because there are no monitoring wells on the US Moorings property. We compared the river elevations over a 5-year period (2017 through 2021) to the measured observation well elevations at OW-7-17, OW-8-15, OW-9-25, and OW-10F (see attached Figure 1). These Fill WBZ observation wells are not affected by pumping from the Gasco property hydraulic control and containment (HC&C) system and are directly upriver from the US Moorings property, so they are representative of the groundwater/surface water interactions in the Project Area. Figures 3 to 7 depict a comparison of the mean measured river elevations during the 5-year period, starting with OW-10F, which is closest to the US Moorings property, and extending to OW-7-17 slightly farther upriver from the property. This multiyear comparison documents that the river elevations are lowest and highest relative to nearshore groundwater elevations in September/October and March/April, respectively. Therefore, consistent with the deployment period identified in the Work Plan, NW Natural proposes to deploy the seepage meters during these two periods.

River elevations were also evaluated over a 5-year period (2017 through 2021) to determine the time of year with the lowest elevations. Figure 2 shows a box plot for each month of the river elevation data for the 5-year period. The box plots show that mean water levels are lowest in September and October and that the river typically begins to rise with seasonal rainfall beginning in October. NW Natural previously received EPA approval to deploy seepage meters at the Gasco Sediments Site Project Area during these low river elevation periods in August 2005, October 2007, and September 2017.

Please let us know if you have any questions or comments on this evaluation and whether we have approval to proceed with the seepage meter deployments during September/October and March/April. We look forward to your feedback. Regards.

**Ryan Barth, P.E.**

Principal

**ANCHOR QEA, LLC**

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**From:** Young, Hunter <Young.Hunter@epa.gov>

**Sent:** Tuesday, June 7, 2022 11:11 AM

**To:** Bob Wyatt <rjw@nwnatural.com>; Jen Mott <jmott@anchorqea.com>; Ryan Barth <rbarth@anchorqea.com>

**Cc:** Peterson, Lance <peterstone@cdmsmith.com>; Azhar, Wardah <azharw@cdmsmith.com>

**Subject:** US Moorings Second Phase PDIWP - proposed seepage meter timing

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Bob, Ryan, Jen,

For consistency with what's being requested at other project areas, EPA asks that you provide an evaluation of groundwater levels in representative upland monitoring wells and Willamette River stage data to substantiate the targeted conditions for seepage meter deployments proposed in the Second Phase PDI Work Plan (i.e., late summer/early fall for the first round of deployment and spring for the second round). EPA recommends including a plot(s) of changes in groundwater elevations and river stage data over a period of at least one year. Note that the data to be used for this evaluation should be as localized to the US Moorings Project Area as possible. If groundwater data from nearby areas is used, justification should be provided for its relevance to the US Moorings Project Area. No resubmittal of the PDI Work Plan is necessary; the information can be transmitted to EPA via email. Please reach out with any questions.

Thanks,

Hunter Young  
U.S. Environmental Protection Agency  
Region 10 - Oregon Operations Office  
[Young.Hunter@epa.gov](mailto:Young.Hunter@epa.gov)  
(503)-326-5020

**USMS0038079**

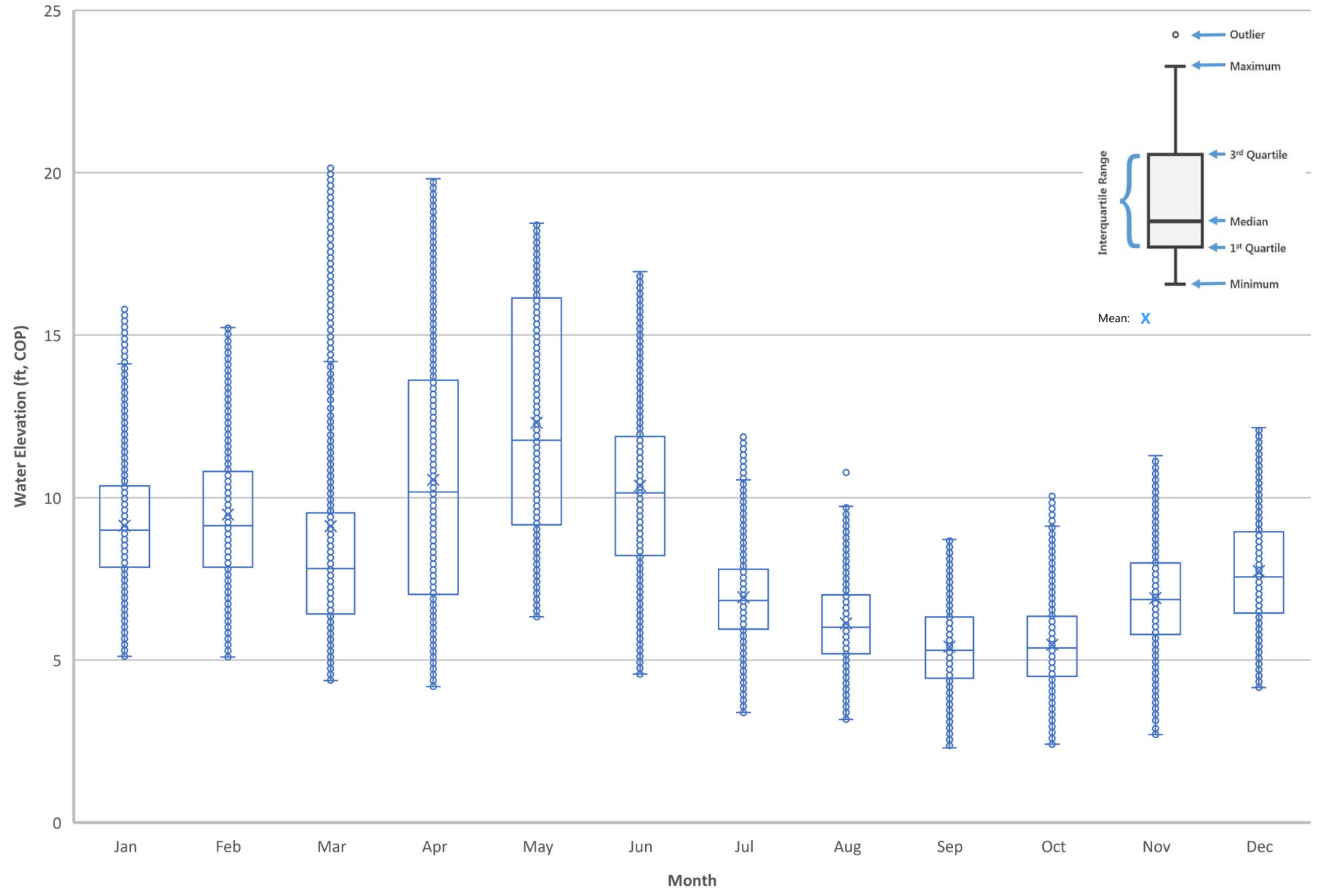


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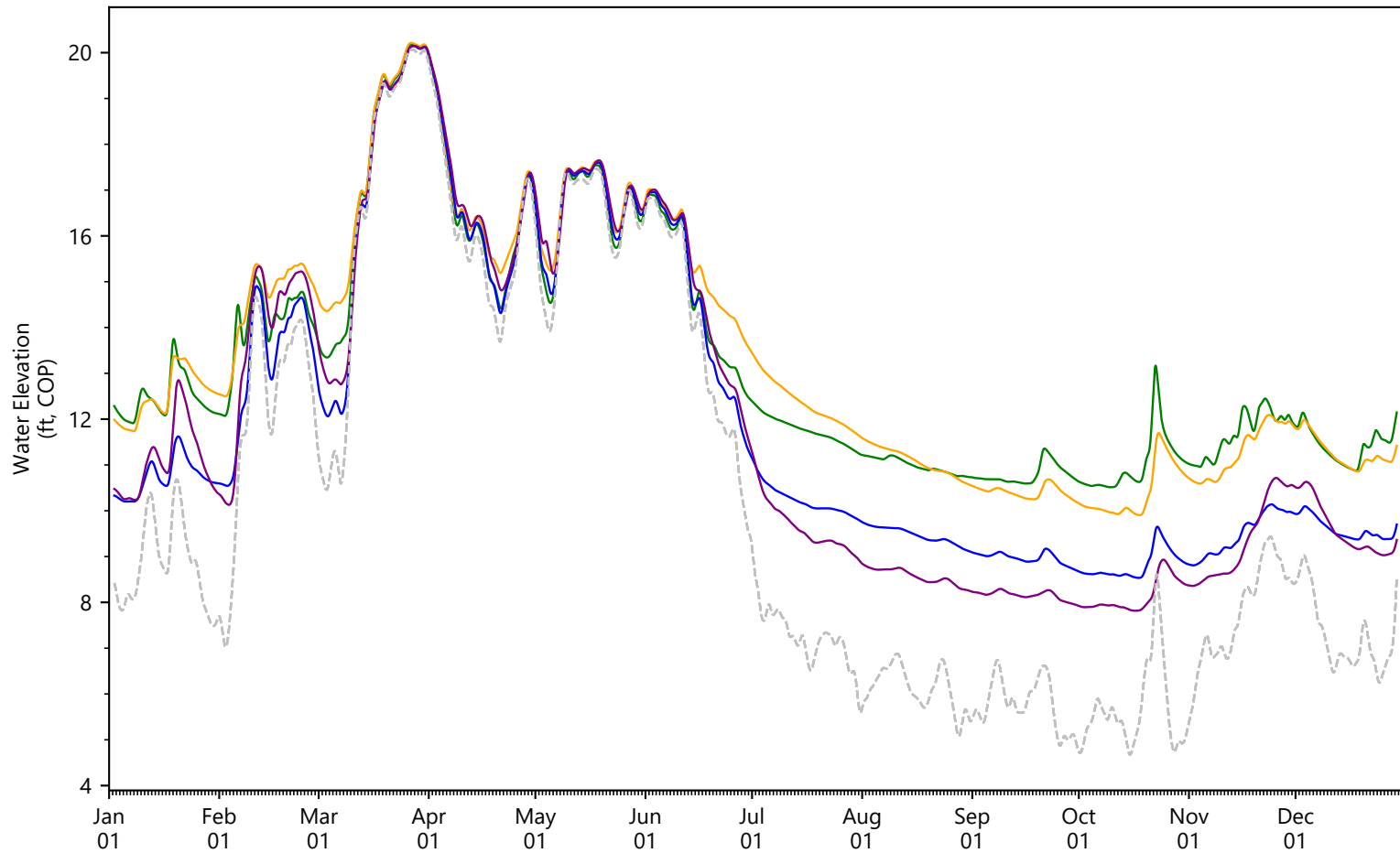


**Figure 1**  
 Site Plan Showing Upland Groundwater Monitoring Wells Used for Elevation Assessment  
 NW Natural Gasco Site

# WILLAMETTE RIVER ELEVATION



**Figure 2**  
**River Elevation 2017 - 2021**  
NW Natural Gasco Site  
USMS0038081



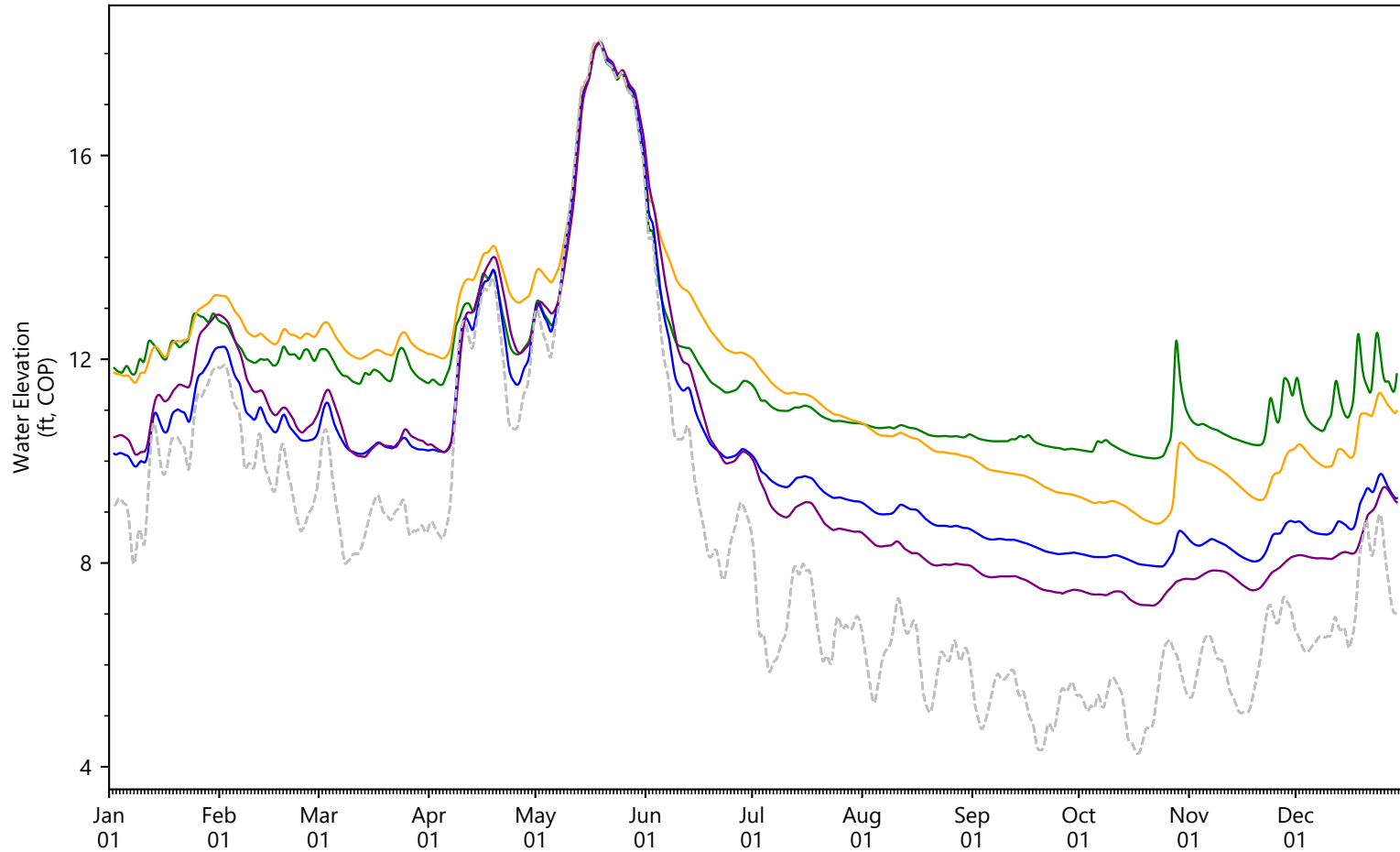
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 — OW-9-25: Fill Averages   
 - - - River: Serfes Averages  
— OW-8-15: Fill Averages   
 — OW-10F: Fill Averages

**Figure 3**  
**Groundwater Elevation Compared to River Elevation 2017**  
 NW Natural Gasco Site



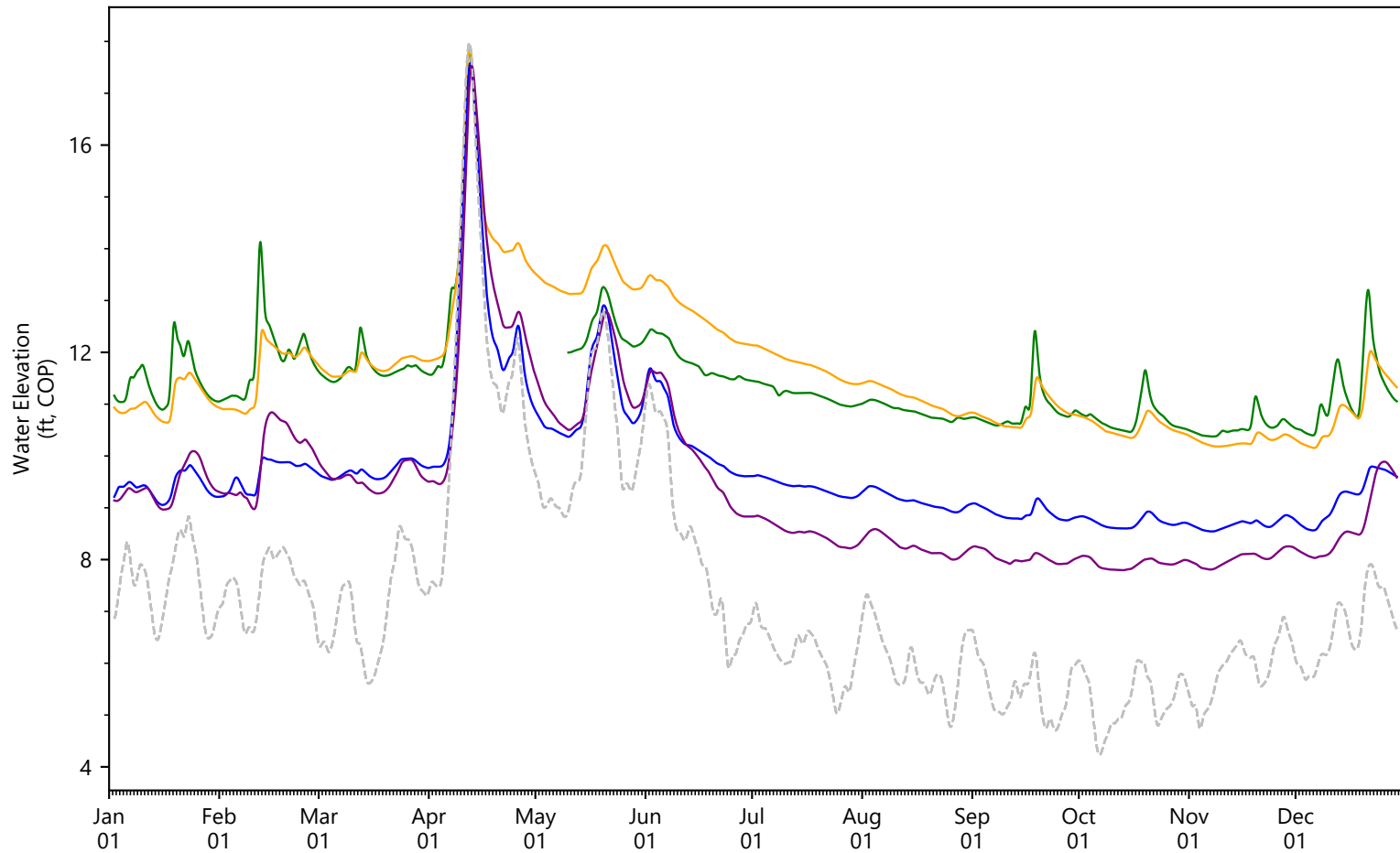
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— OW-8-15: Fill Averages   
 — OW-10F: Fill Averages

**Figure 4**  
**Groundwater Elevation Compared to River Elevation 2018**  
 NW Natural Gasco Site



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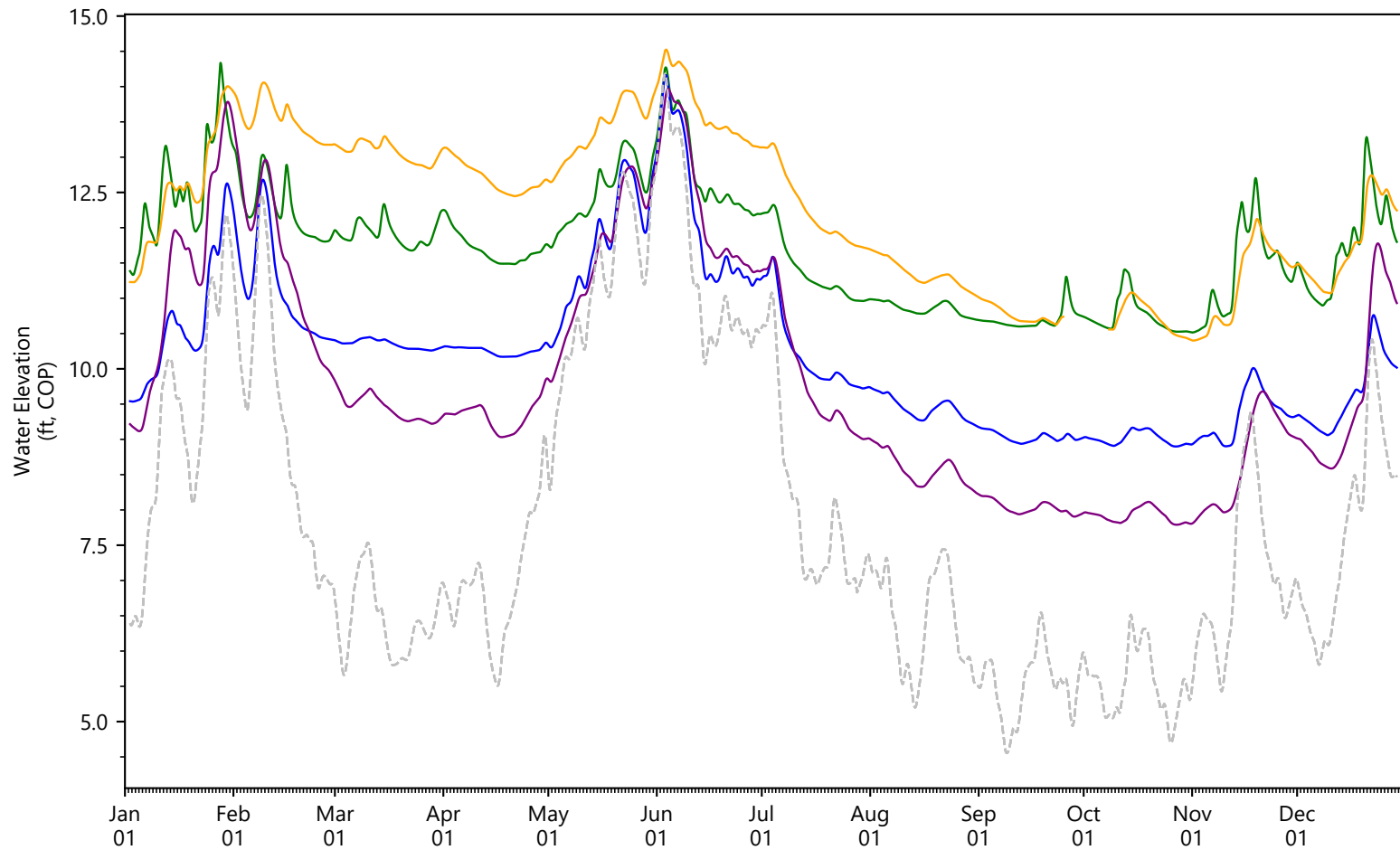
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— OW-8-15: Fill Averages   
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**Figure 5**  
**Groundwater Elevation Compared to River Elevation 2019**  
 NW Natural Gasco Site





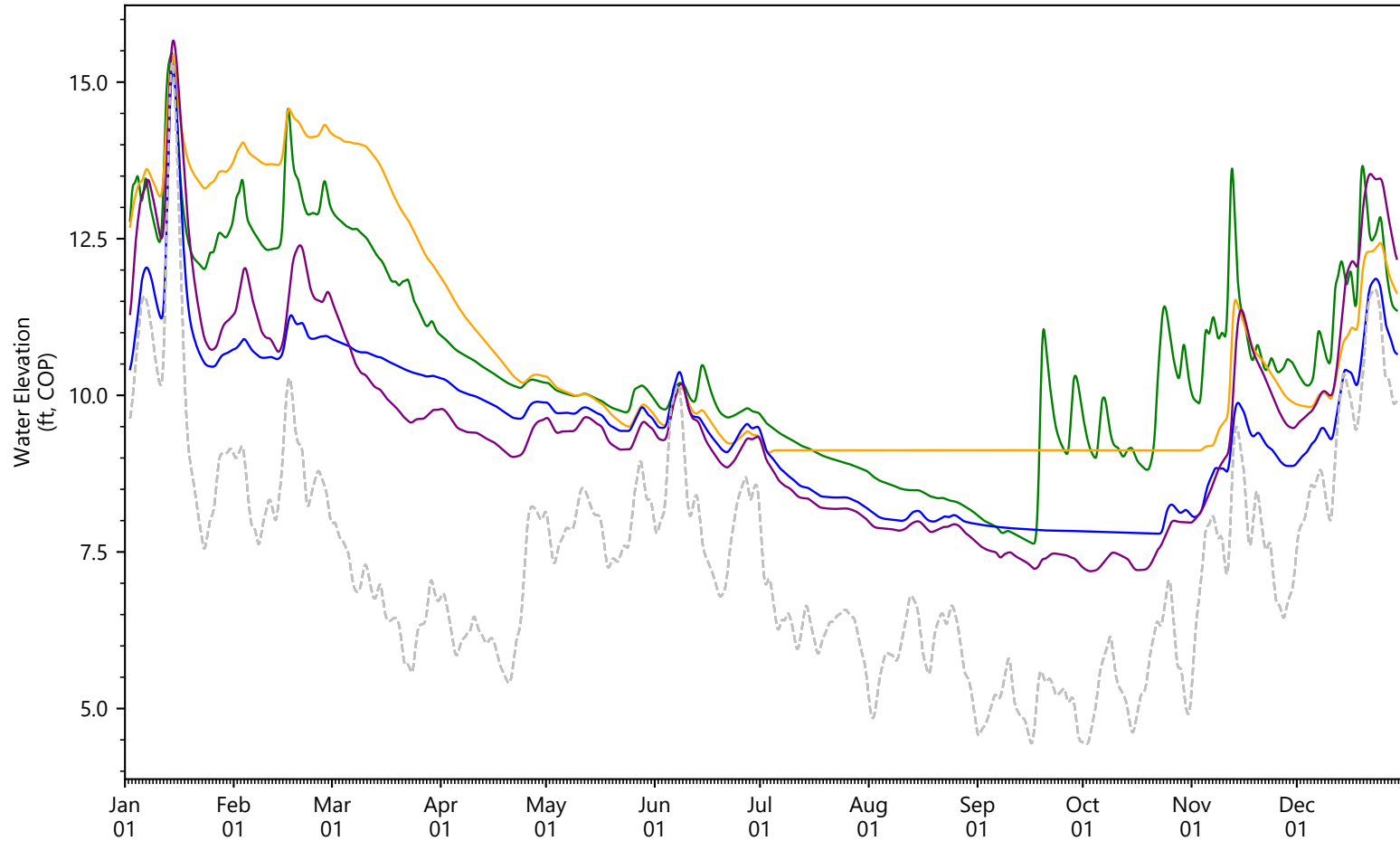
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 - - - River: Serfes Averages  
— OW-8-15: Fill Averages   
 — OW-10F: Fill Averages

**Figure 6**  
**Groundwater Elevation Compared to River Elevation 2020**  
 NW Natural Gasco Site



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— OW-7-17: Fill Averages   
 — OW-9-25: Fill Averages   
 - - - River: Serfes Averages  
— OW-8-15: Fill Averages   
 — OW-10F: Fill Averages

**Figure 7**  
**Groundwater Elevation Compared to River Elevation 2021**  
 NW Natural Gasco Site

OW-7-17 responded to mid-September precipitation. OW-8-15 and OW-9-25 did not respond to this precipitation because they were dry during this time period.

USMS0038086