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Washington

December 27th in Puget Sound:

A widespread and unprecedented extreme coastal water level event

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Gig Harbor, December 27th
All photos: MyCoast/King Tides

Widespread impacts

Widespread: East (Seattle/Duwamish)

https://www.youtube.com/watch?app=desktop&v=0uVaqYfNoZs

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Widespread – Union on Hood Canal

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Widespread – Port Townsend

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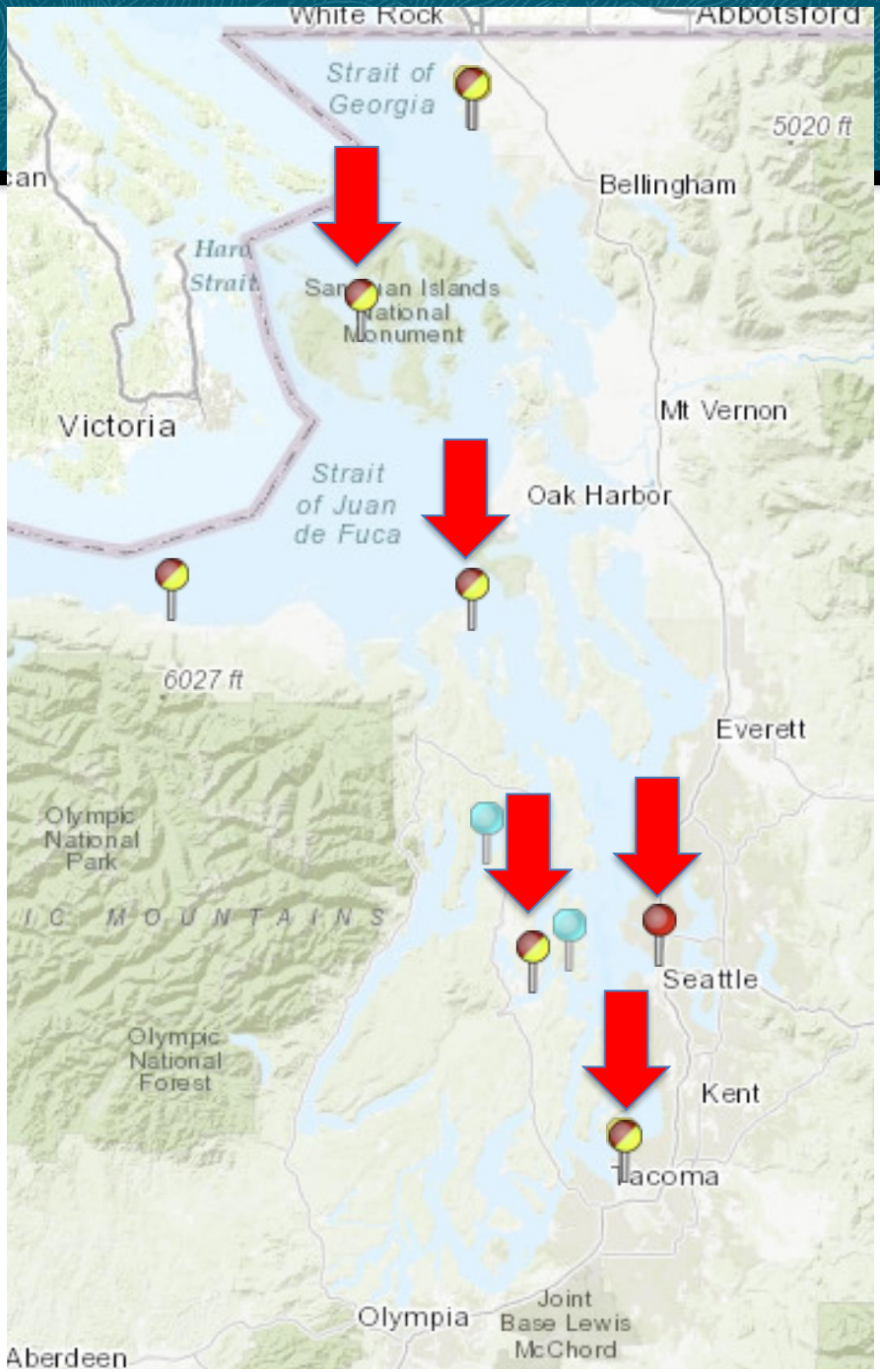
Unprecedented:

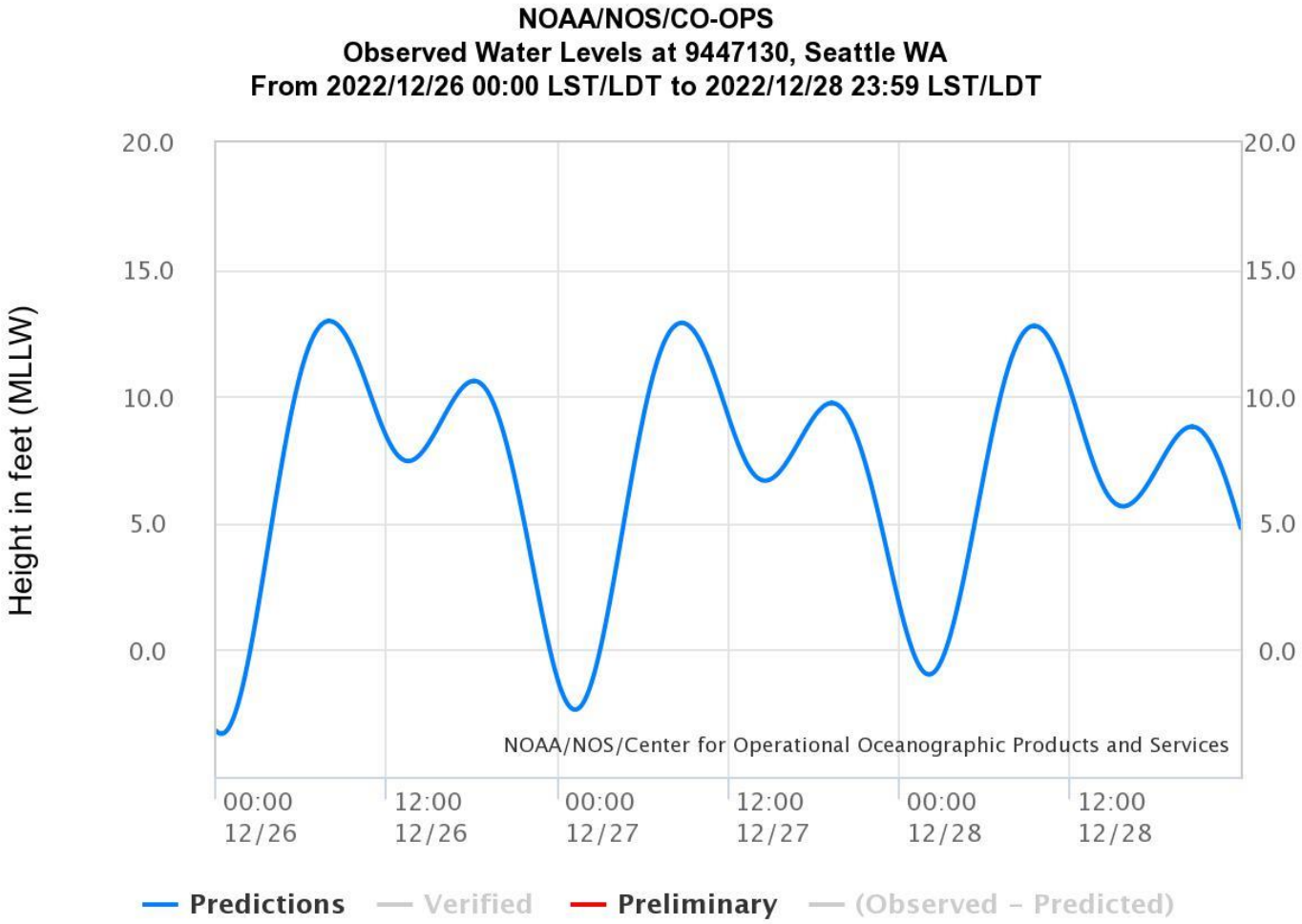
5 tide gauges set record highs



Some of those records were smashed…

Location	Max WL, ft MHHW	Previous record, ft MHHW	Previous Record Date	Length of Record (years)
Friday Harbor	3.51	3.38	1982 (Dec 16)	89
Port Townsend	3.51	3.08	1982 (Dec 16)	51
Bremerton	3.8	NA	NA	<1
Seattle	3.76	3.16	2022 (Jan 7)	125
Tacoma	3.88	3.27	2022 (Jan7)	26

What makes a high-water event in coastal Washington?



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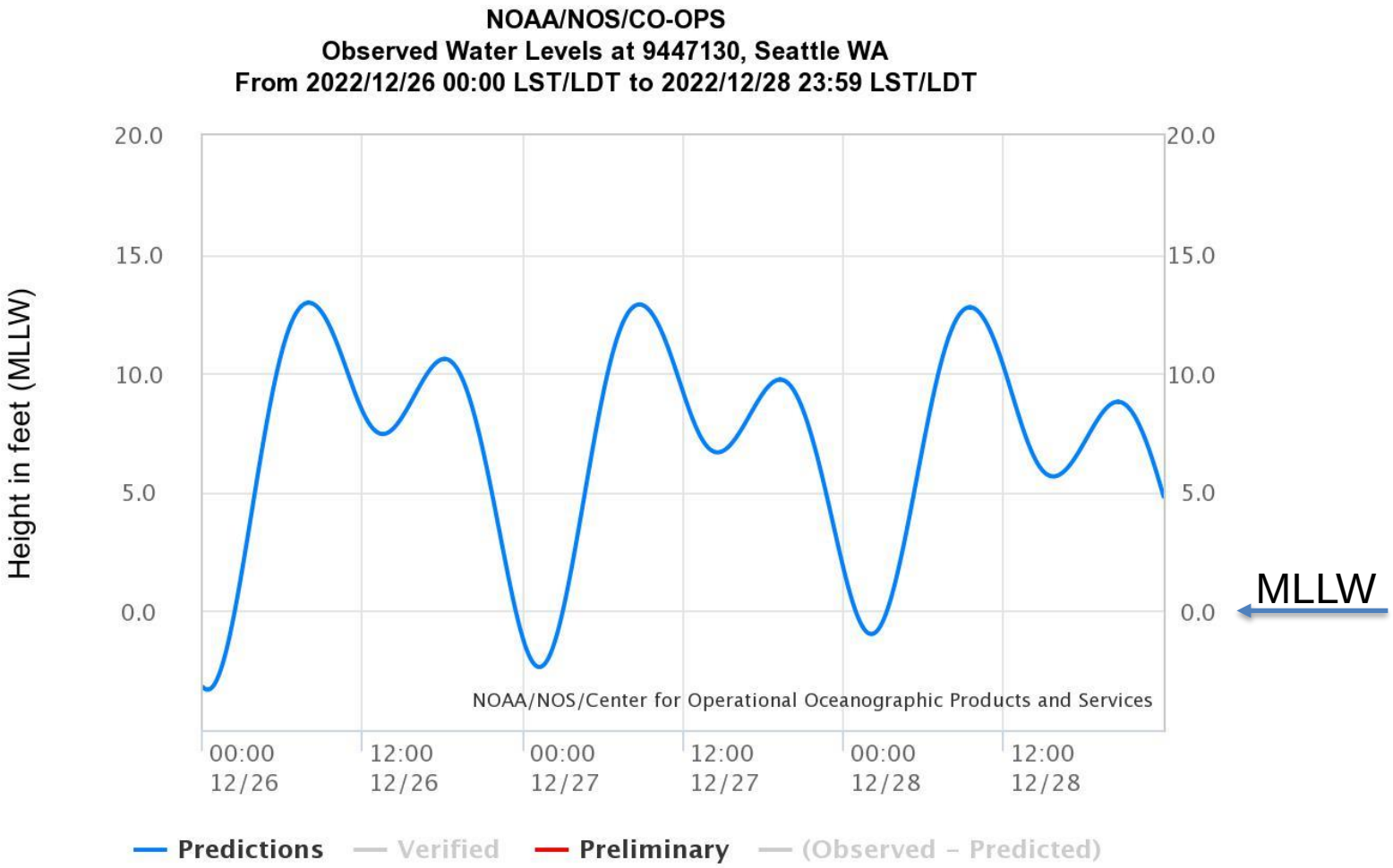

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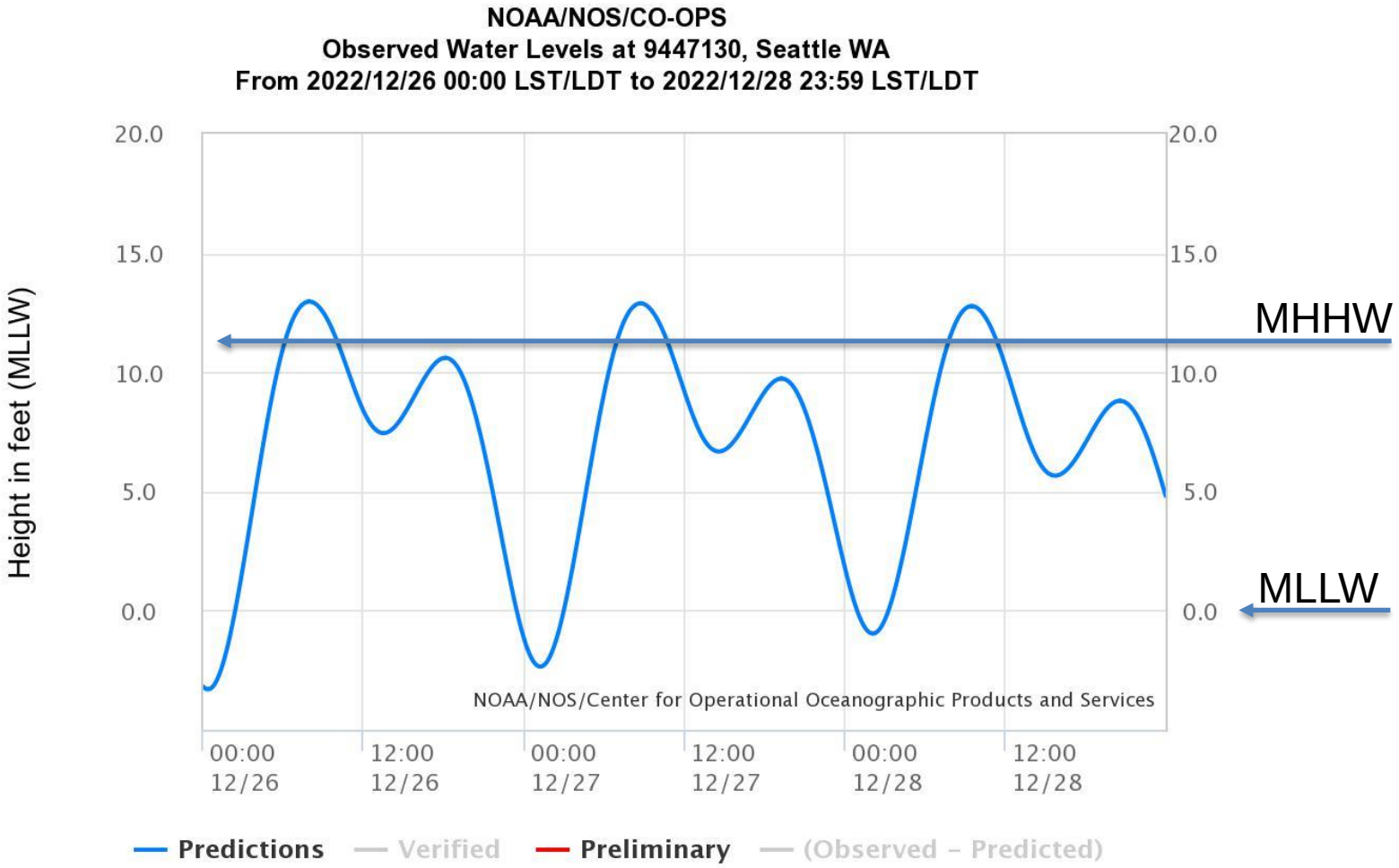

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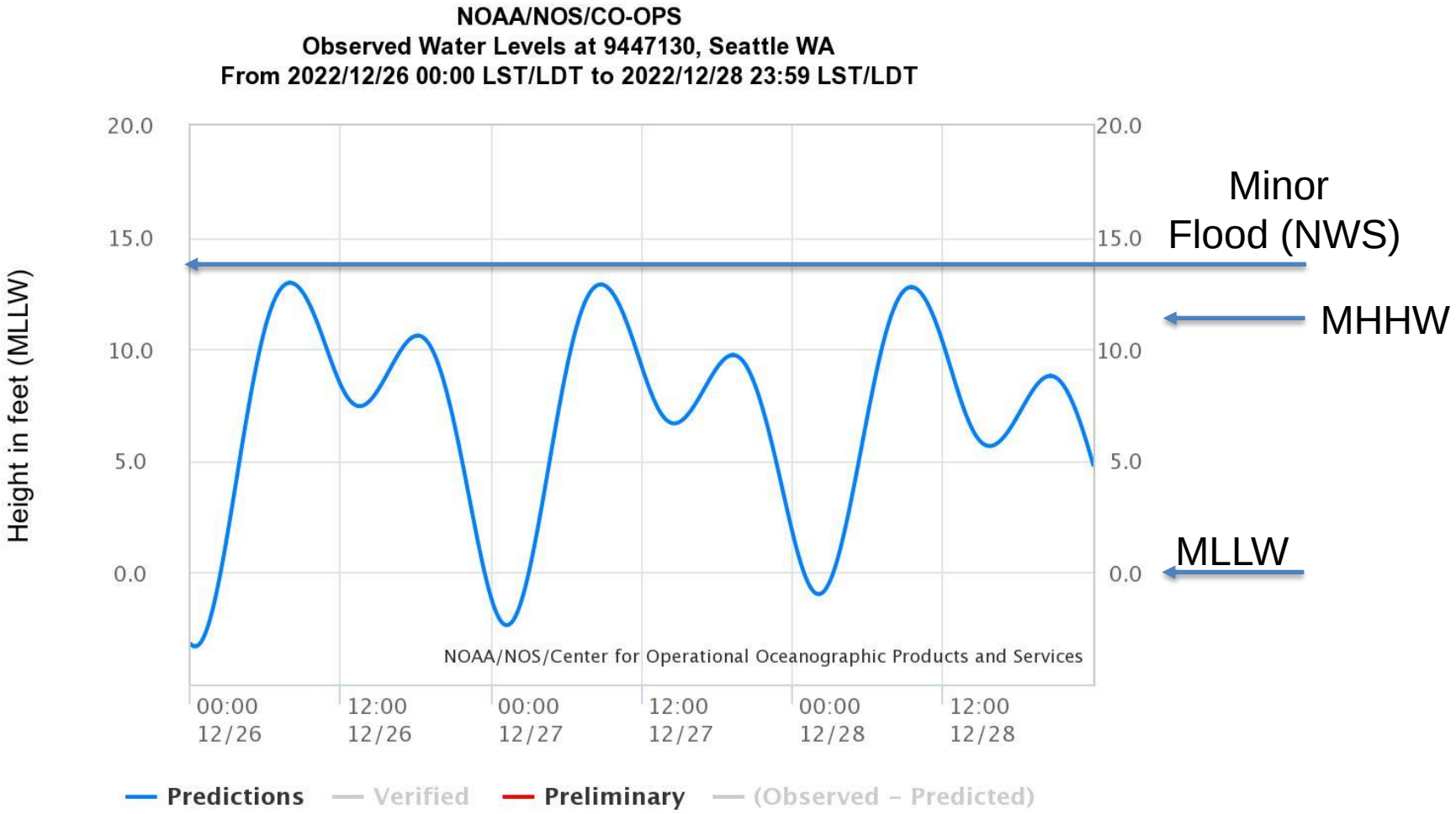

What makes a high-water event in coastal Washington?

Every winter we also make multiple rolls of the weather dice

“Waves”

“Storm Surge” or NTR

What makes a high-water event in coastal Washington?

17 December 2012: West Seattle Blog
“Still Water” flooding

Some other day: Melissa Poe, WSG
“Wave-driven” flooding

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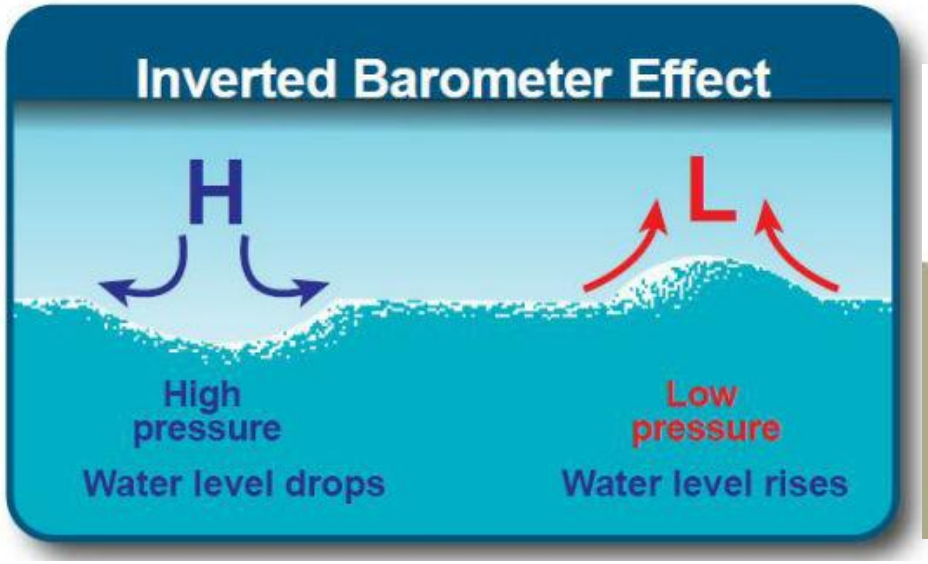
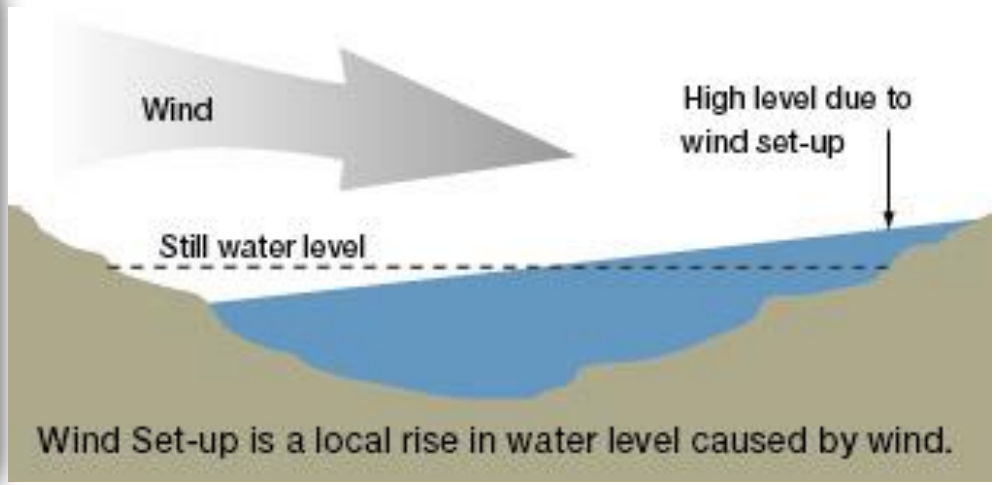
What makes a high-water event in coastal Washington?

"Storm Surge" or "Non-Tidal Residual"



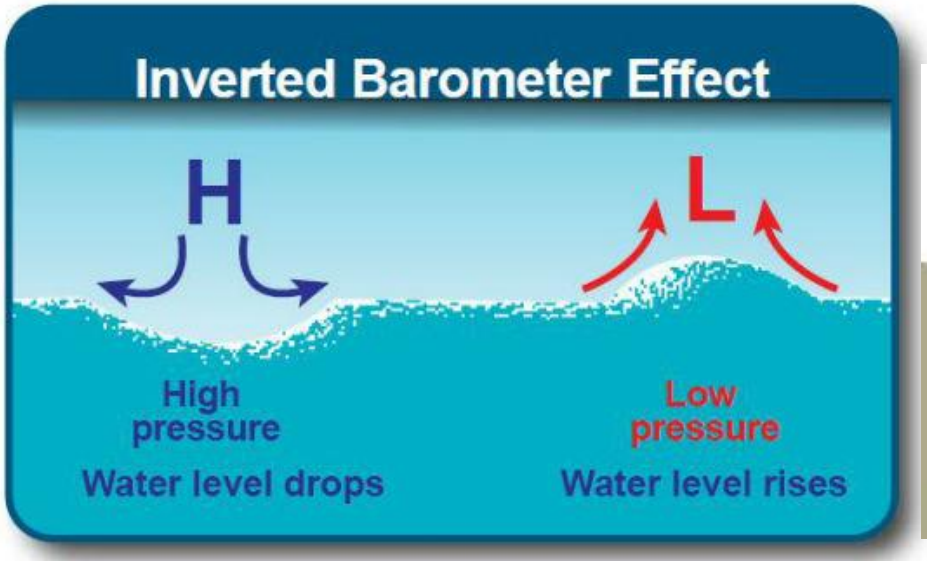
"Inverse Barometer"



"Wind Set-up"

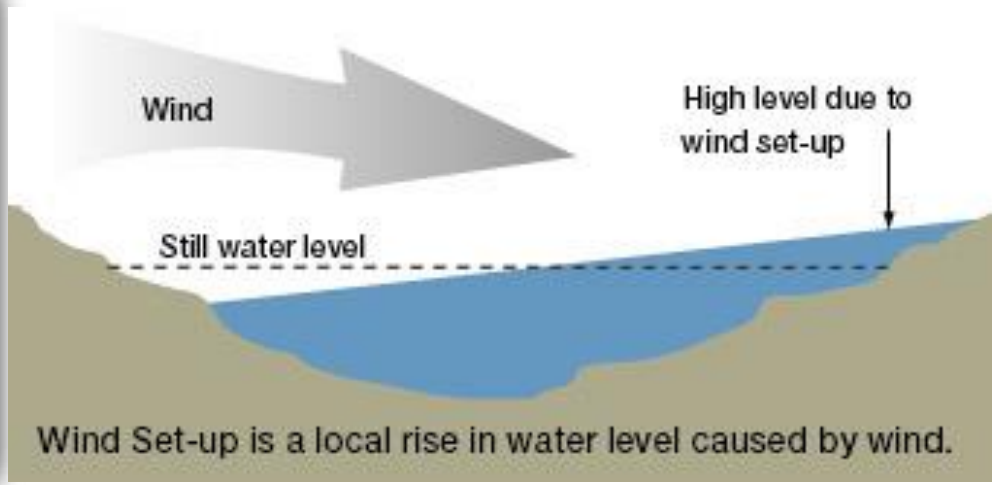
What makes a high-water event in coastal Washington?

"Storm Surge" or "Non-Tidal Residual"



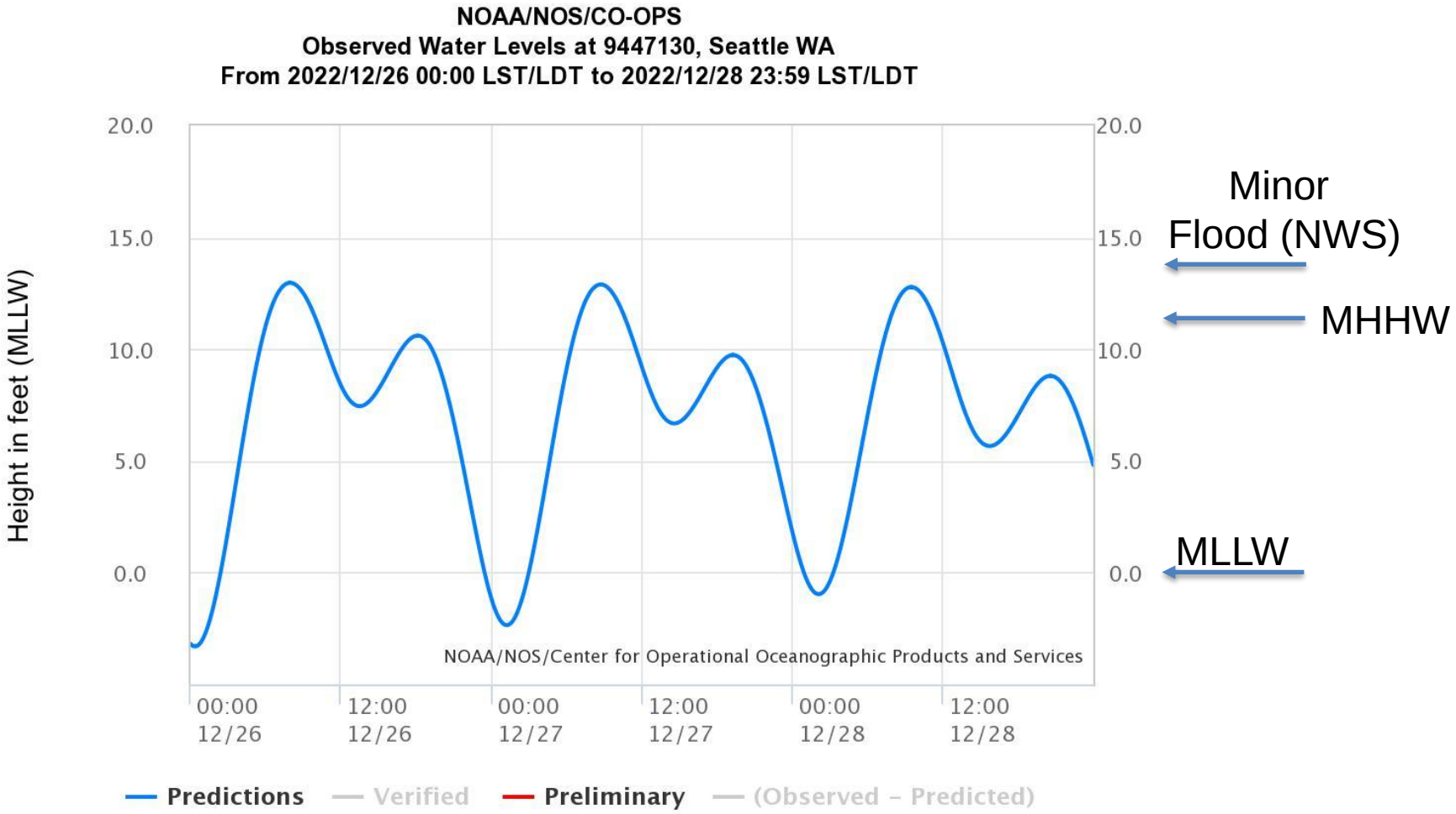
"Inverse Barometer"

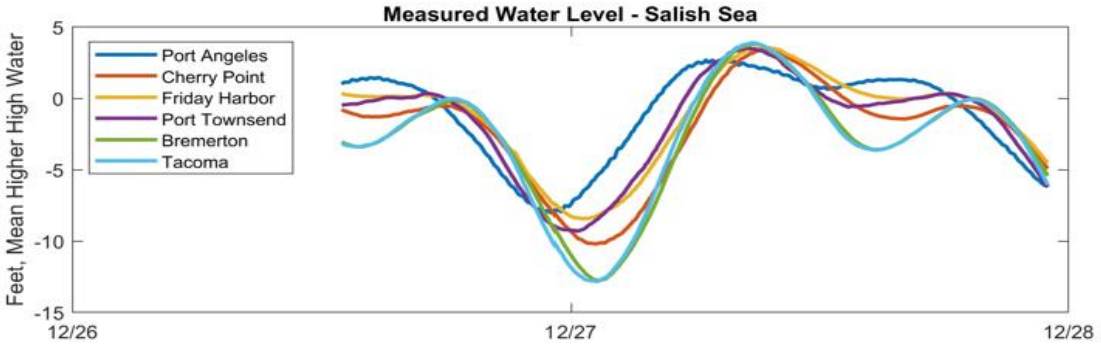
Seems to be the bigger influence in Puget Sound?

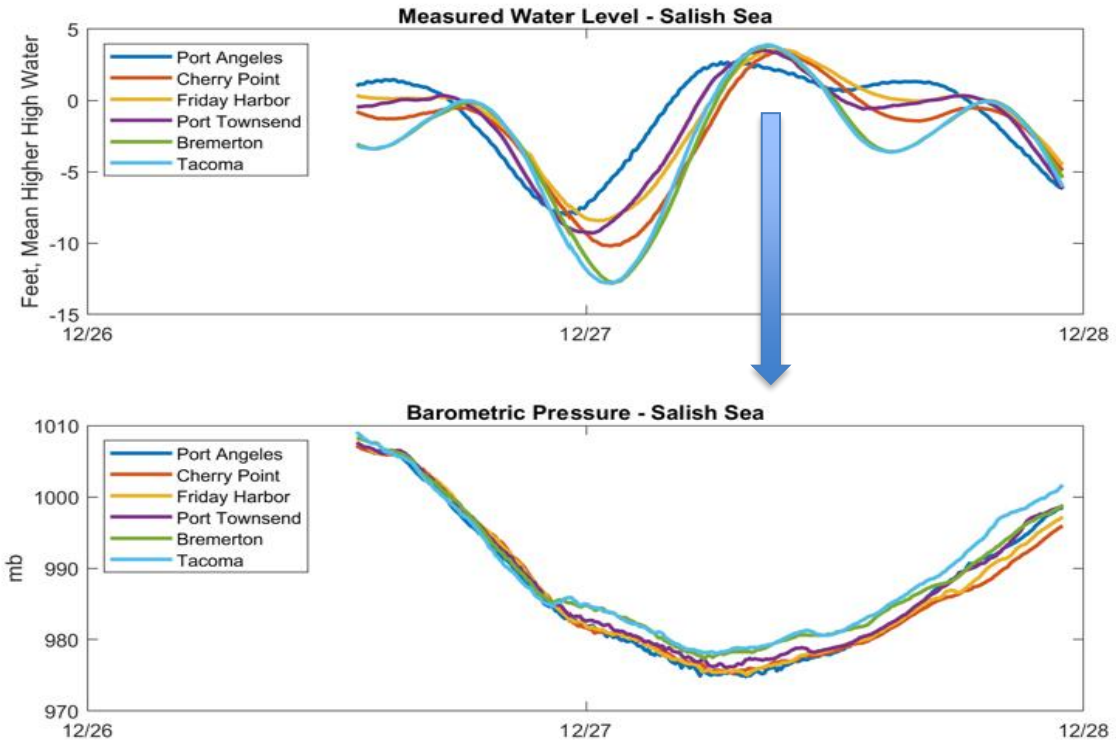


"Wind Set-up"

December 27th was a 20 roll on the surge dice




Measured Water Level - Salish Sea
Feet, Mean Higher High Water
5
0
-5
-10
-15
12/26
12/27
12/28
Port Angeles
Cherry Point
Friday Harbor
Port Townsend
Bremerton
Tacoma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Barometric Pressure - Salish Sea
mb
1010
1000
990
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970
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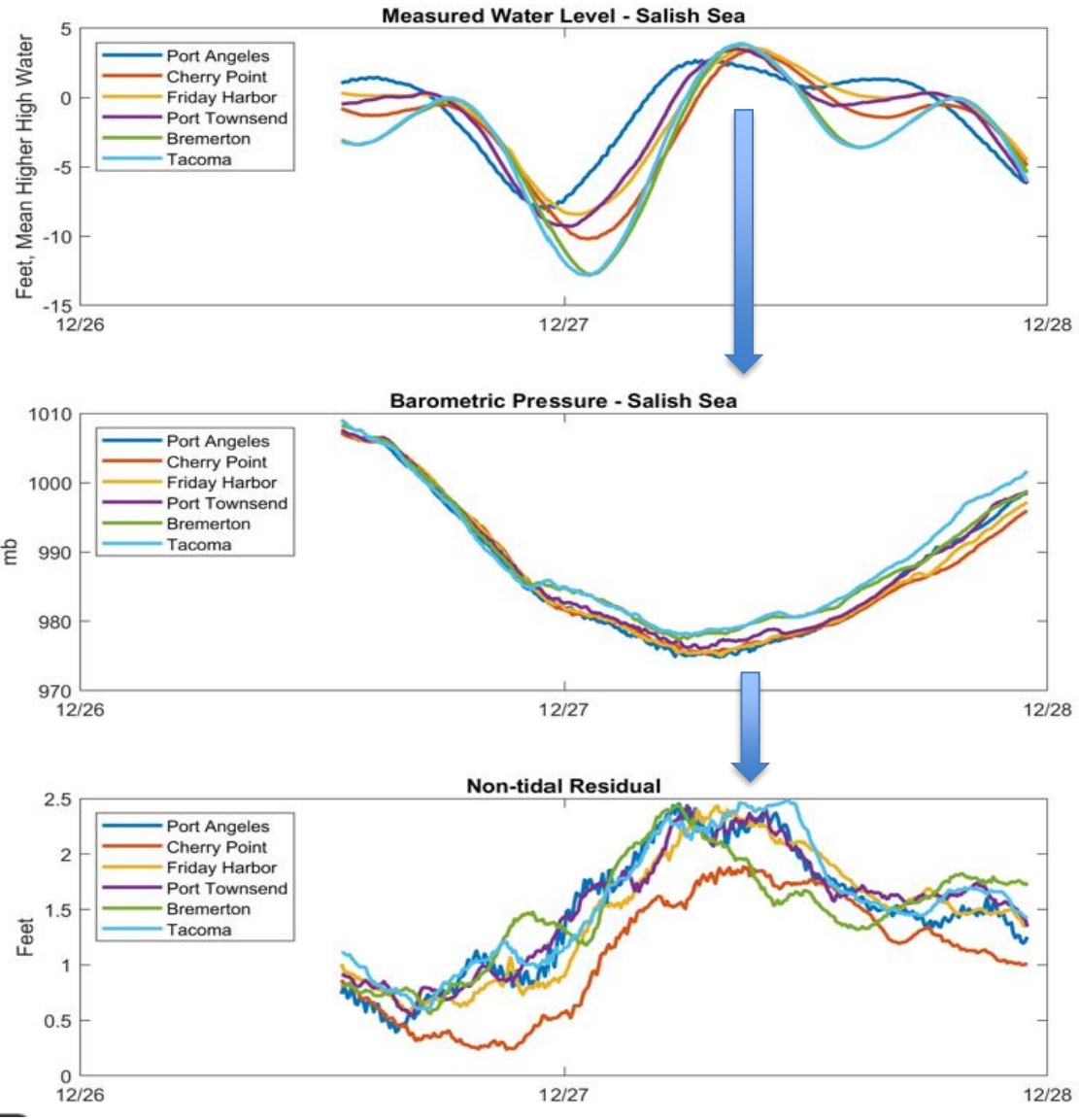
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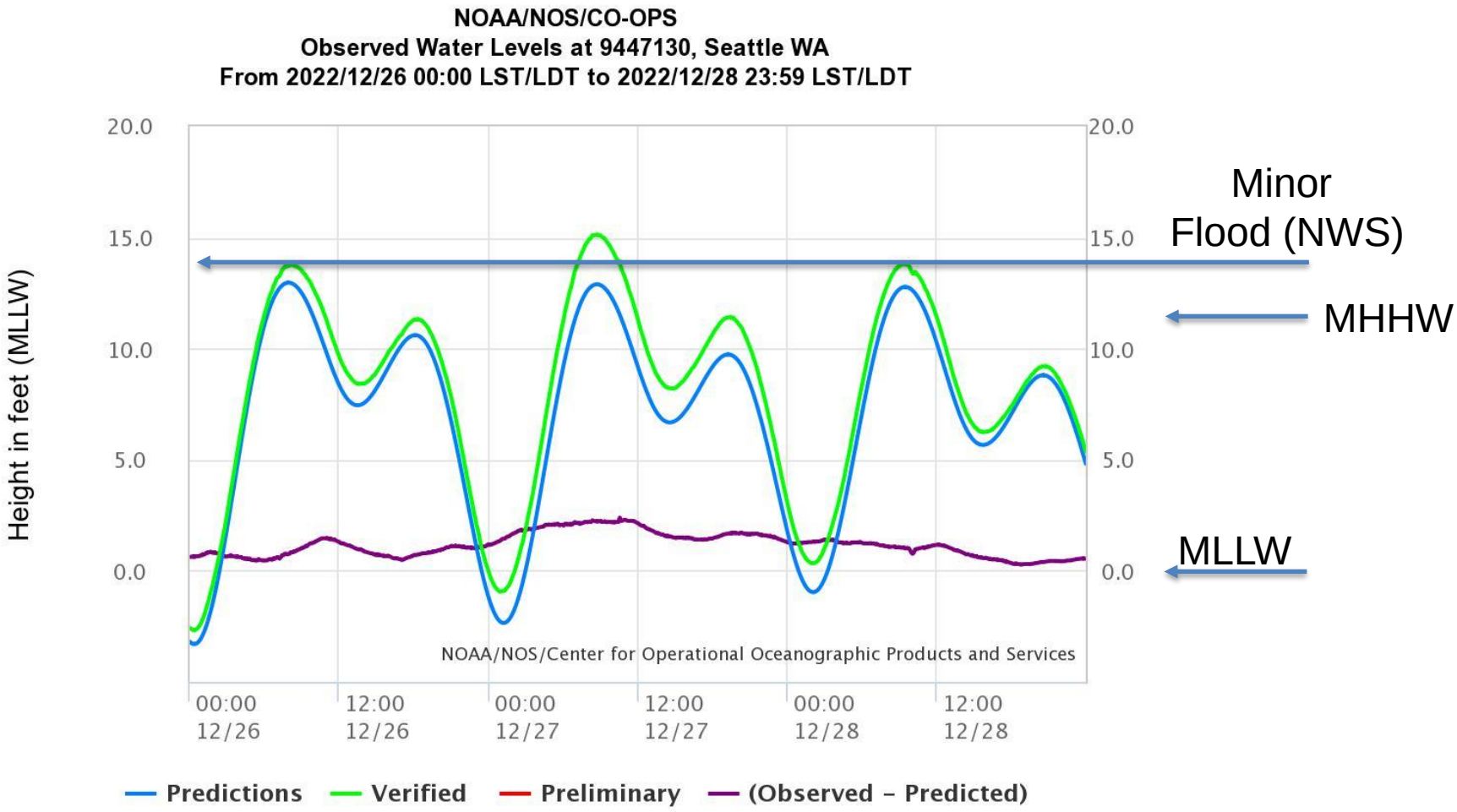

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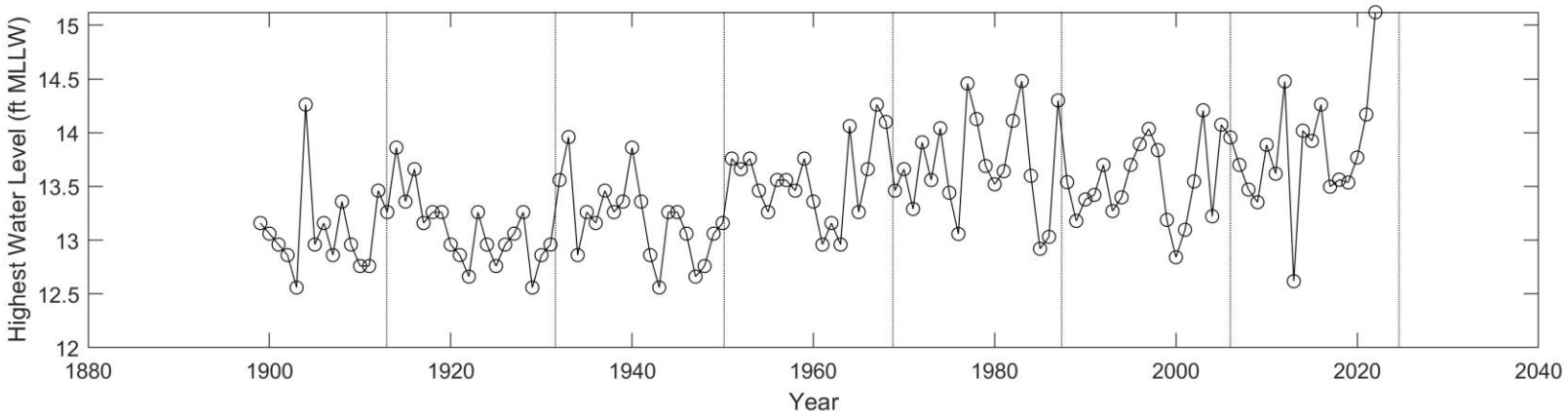
So statistically-speaking how extreme WAS this event?



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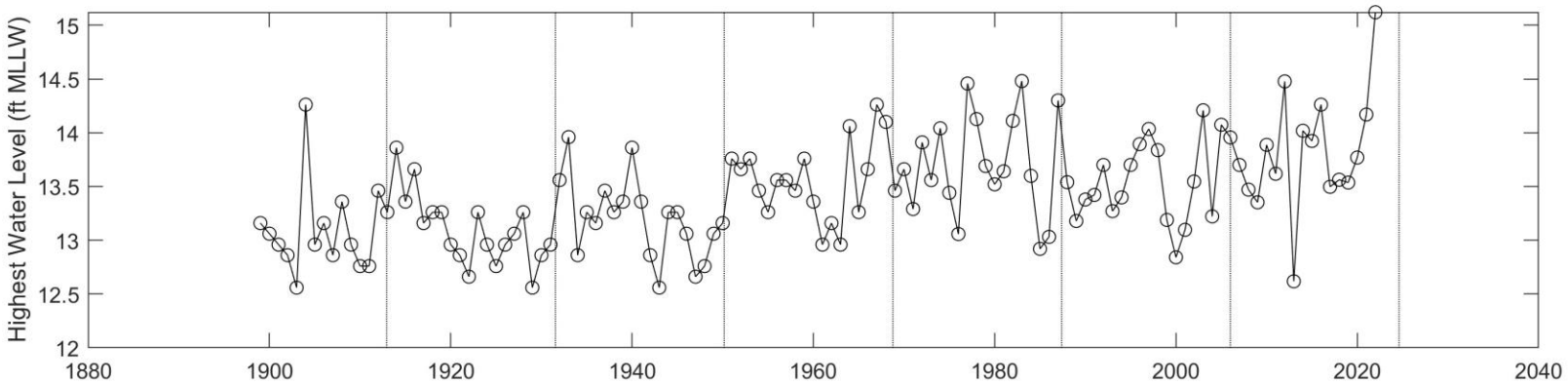

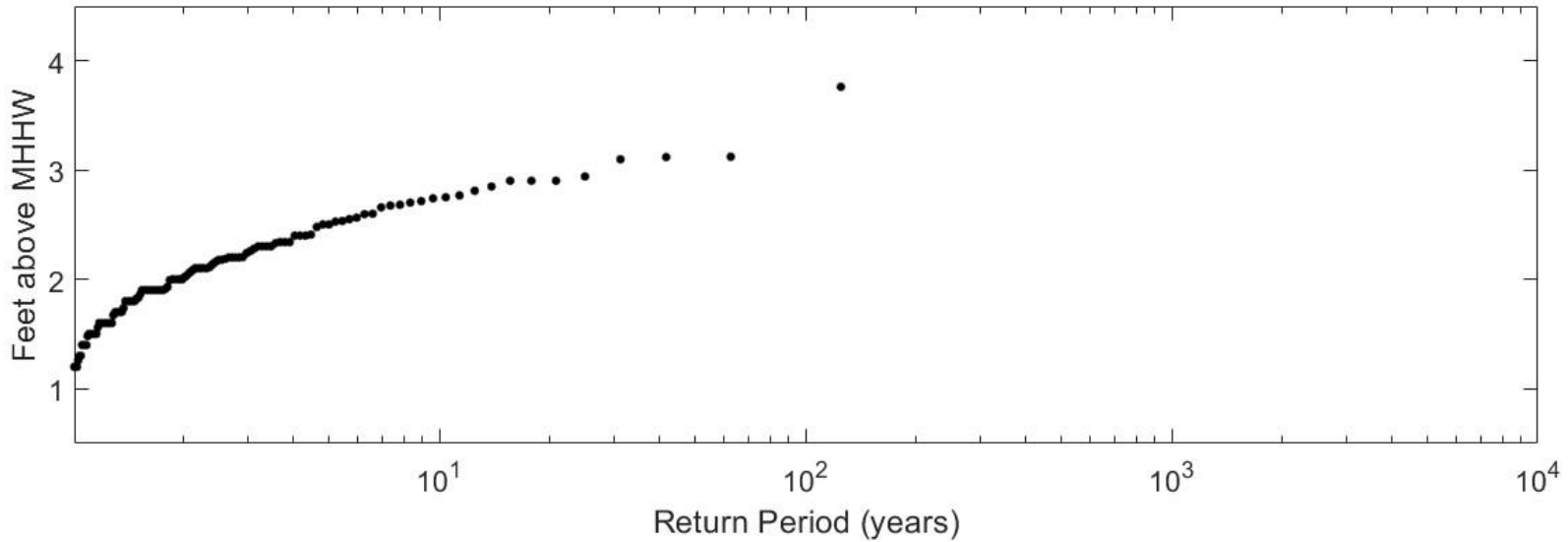

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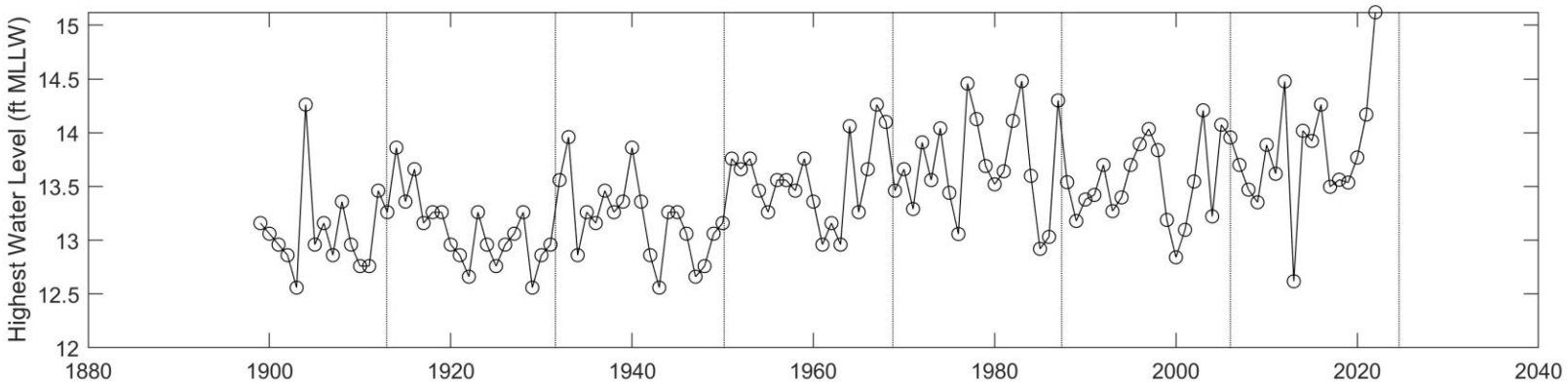

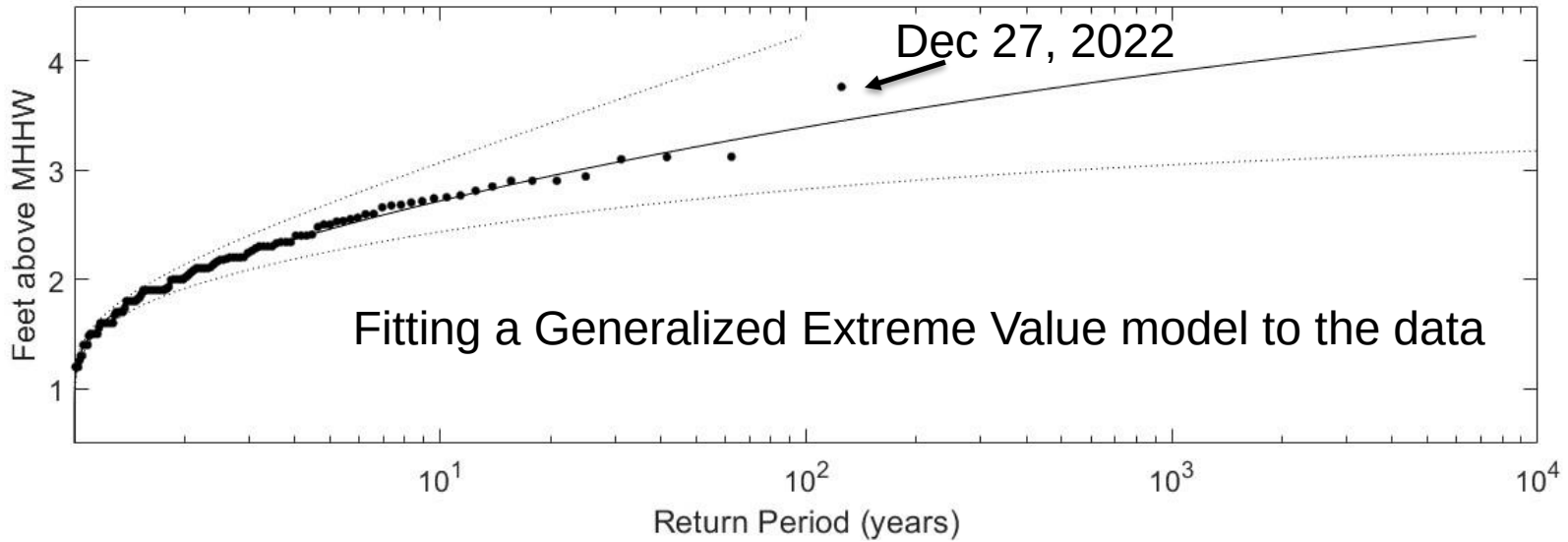

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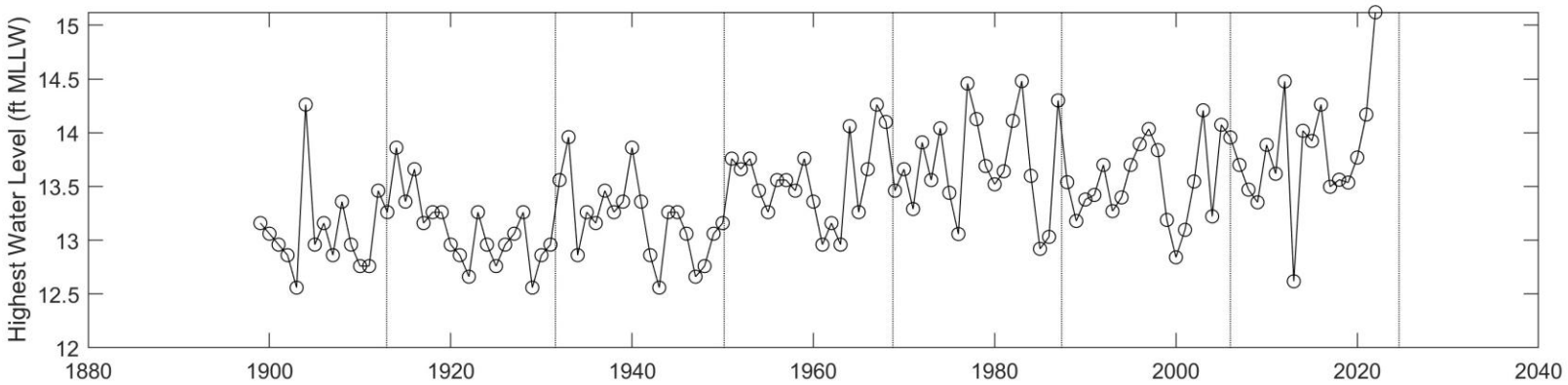

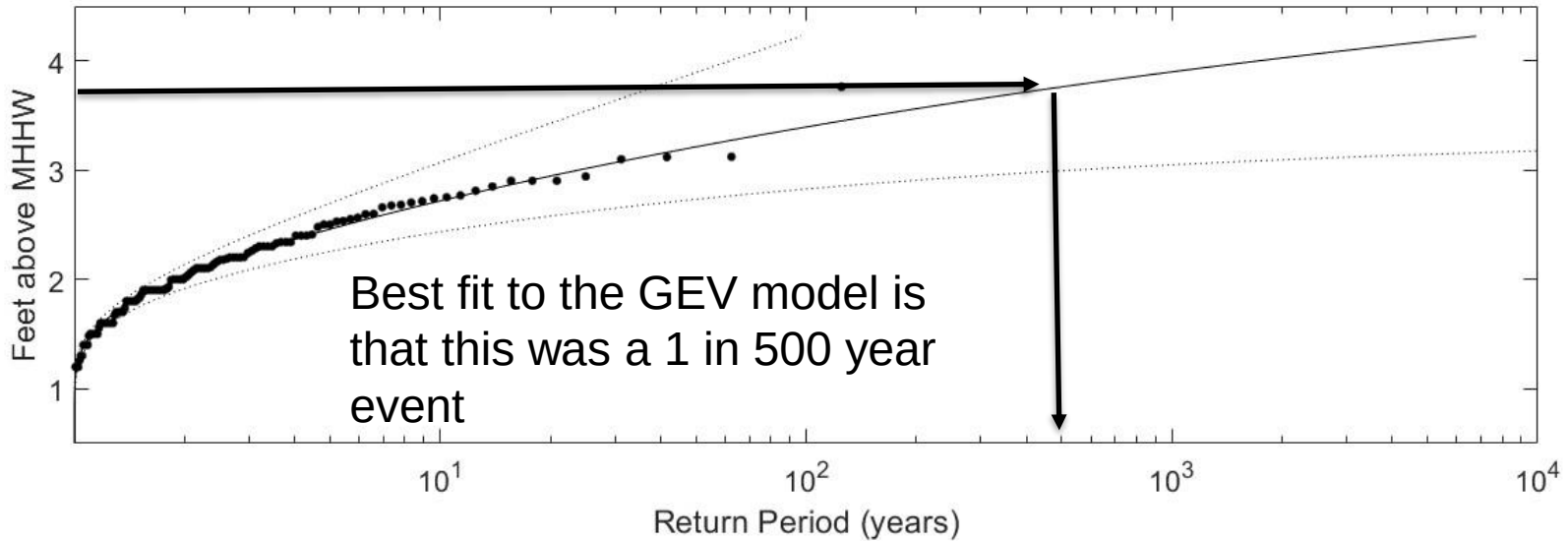

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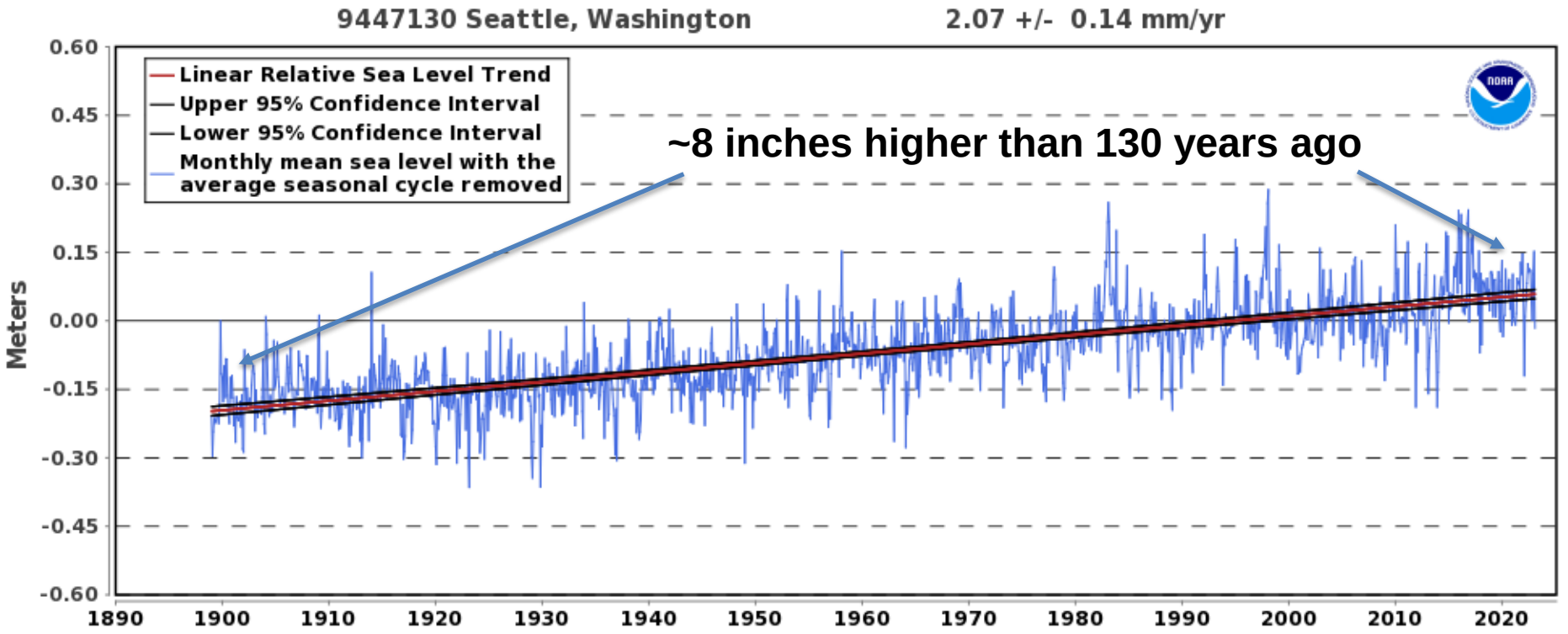
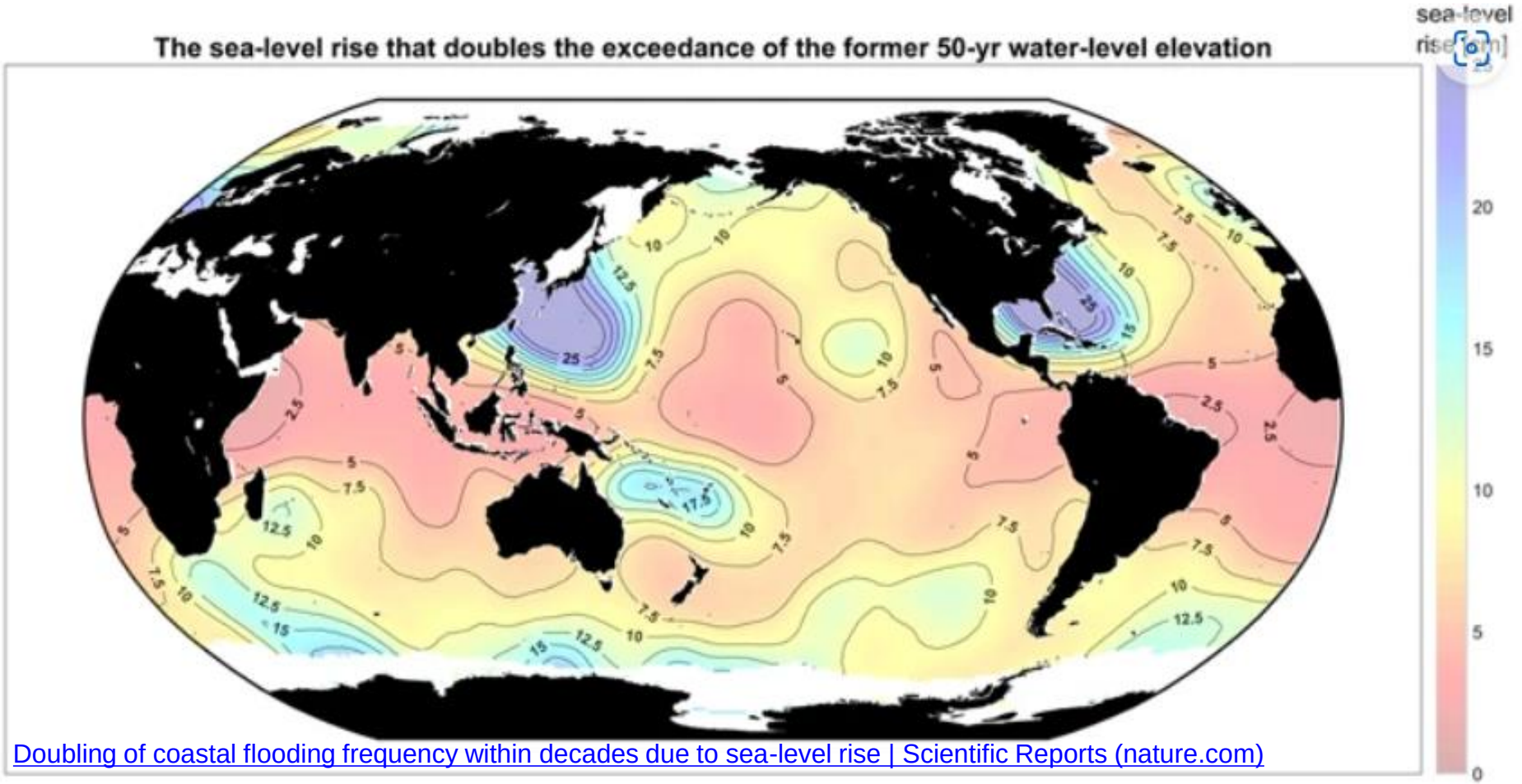
So…did SLR play a role?

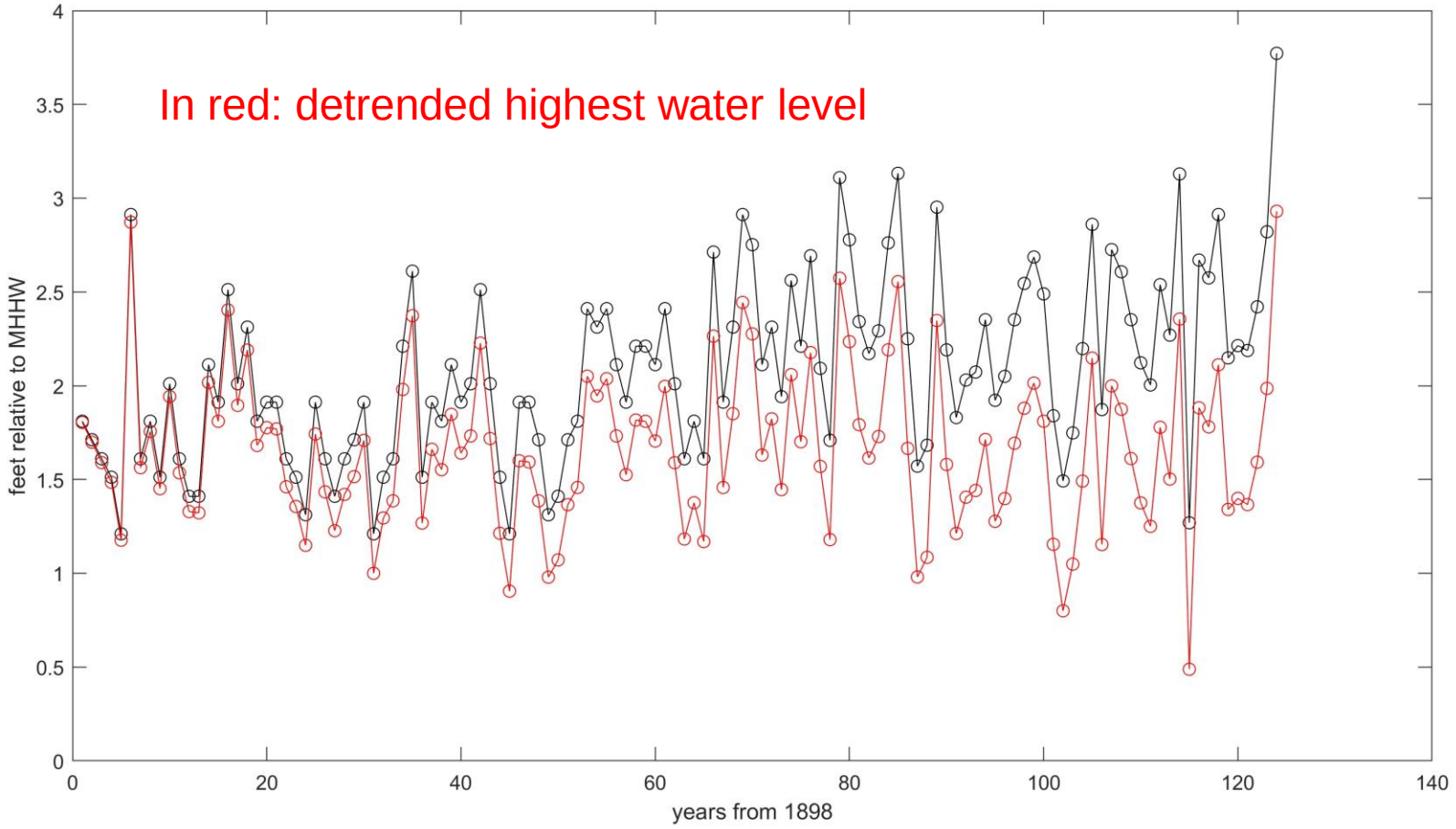


In our area, between 3-4 inches (7.5 – 10 cm) of sea level rise should make what was a 1-in-50 year event occur, on average, once every 25 years…

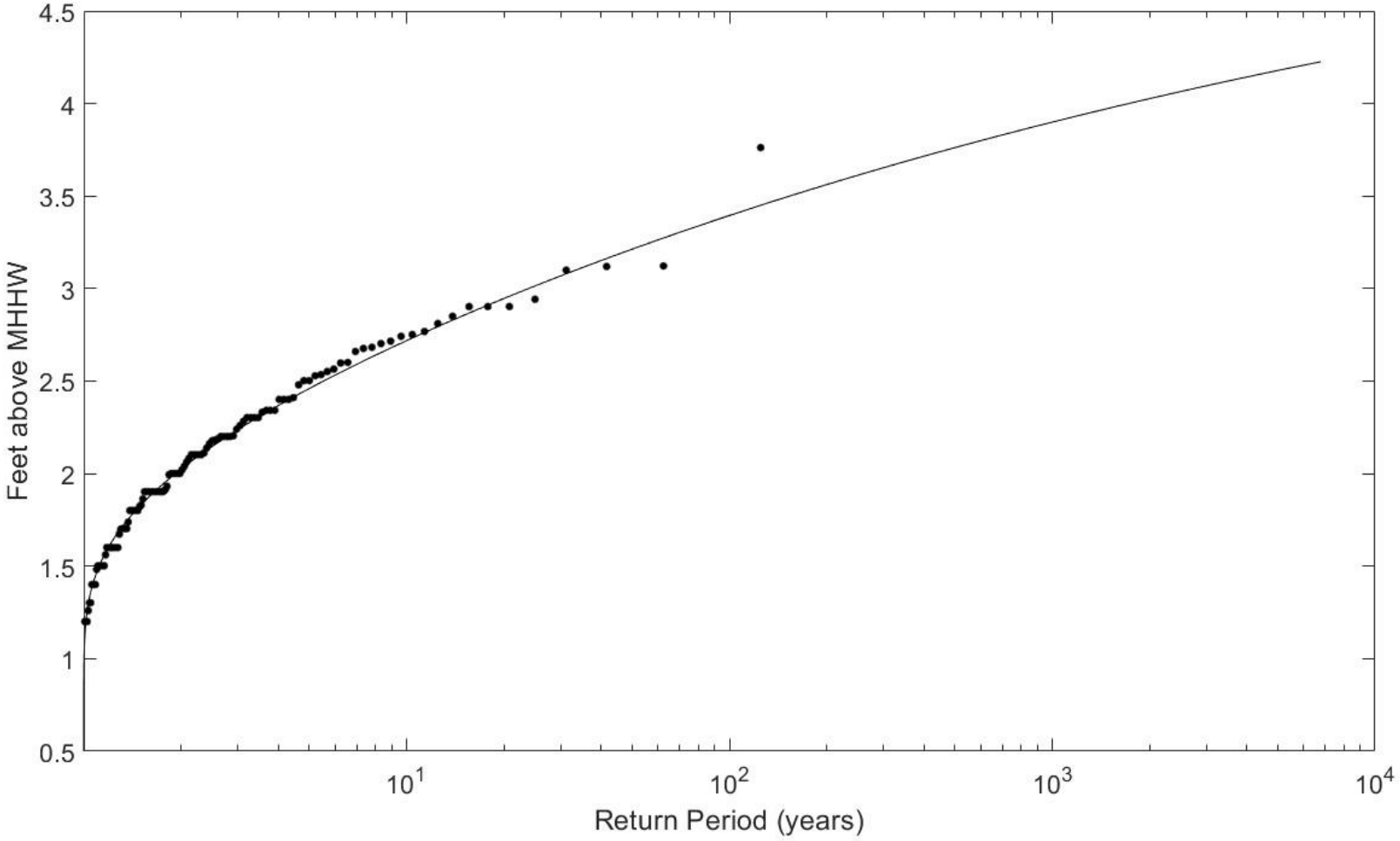


Doubling of coastal flooding frequency within decades due to sea-level rise | Scientific Reports (nature.com)

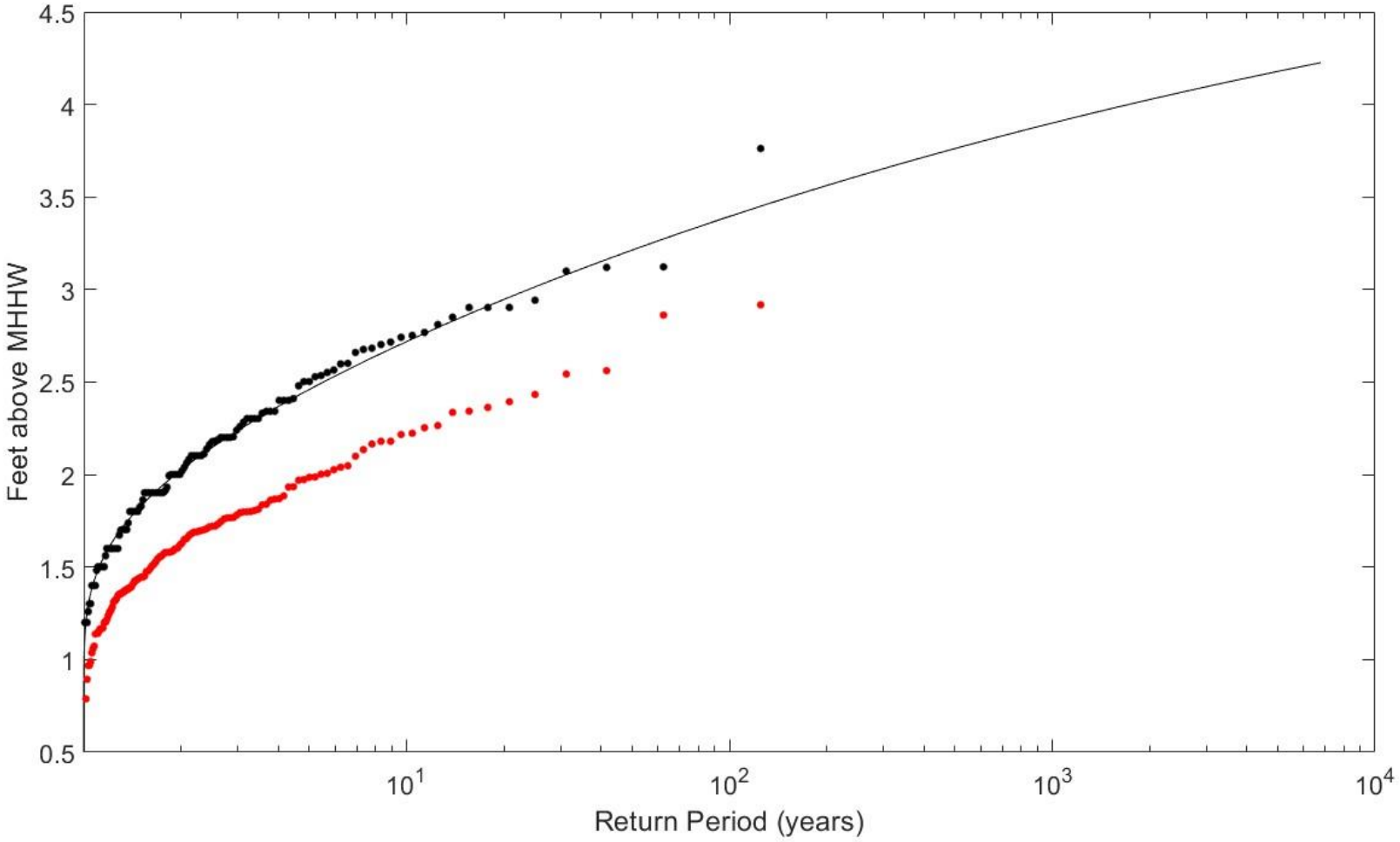
First, lets create a extreme coastal water level record for Seattle with SLR removed…



And then revisit our REAL return frequency curve for Seattle….



And add our fake record (with sea level rise removed)….



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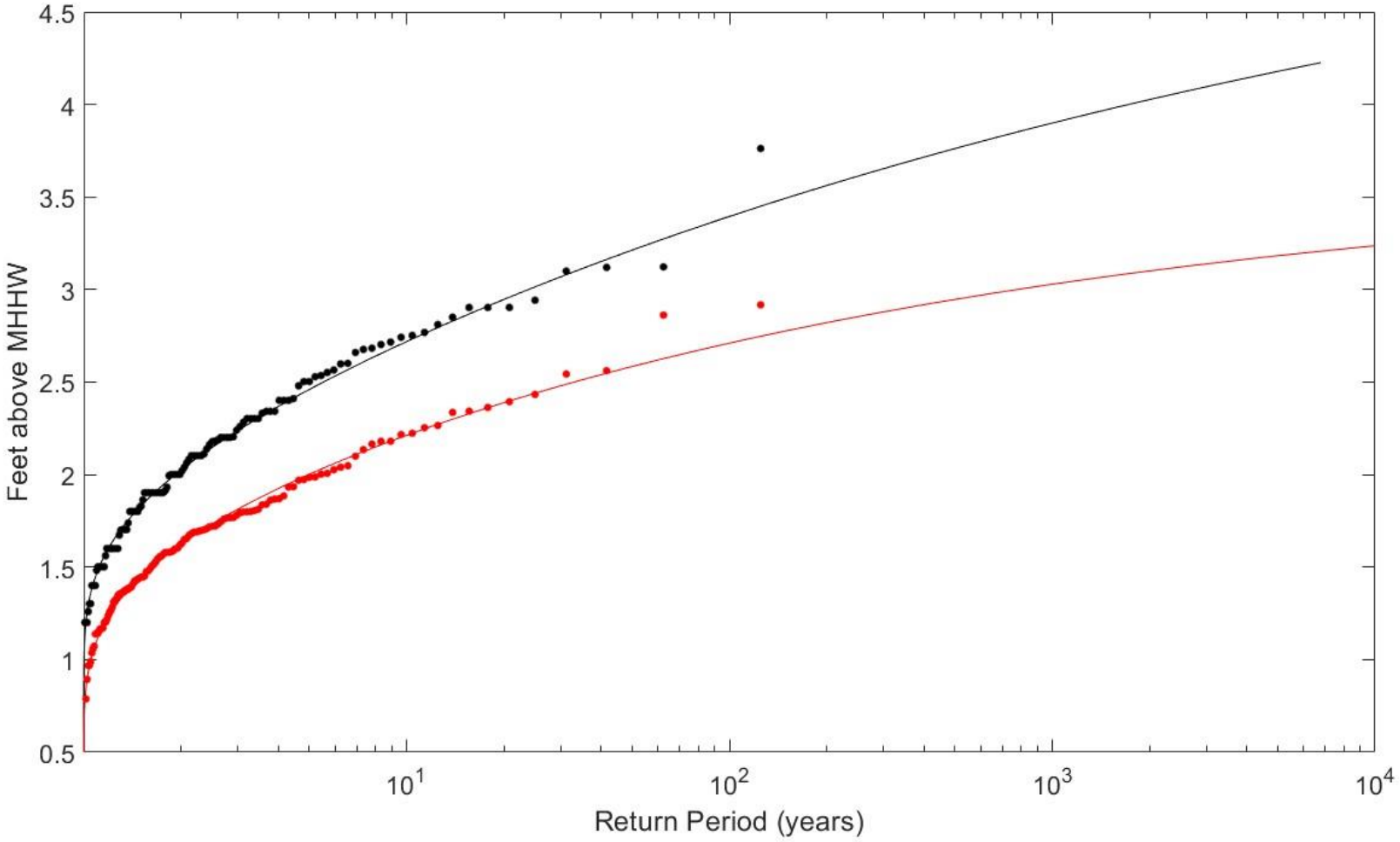
And fit a Generalized Extreme Value model to it…



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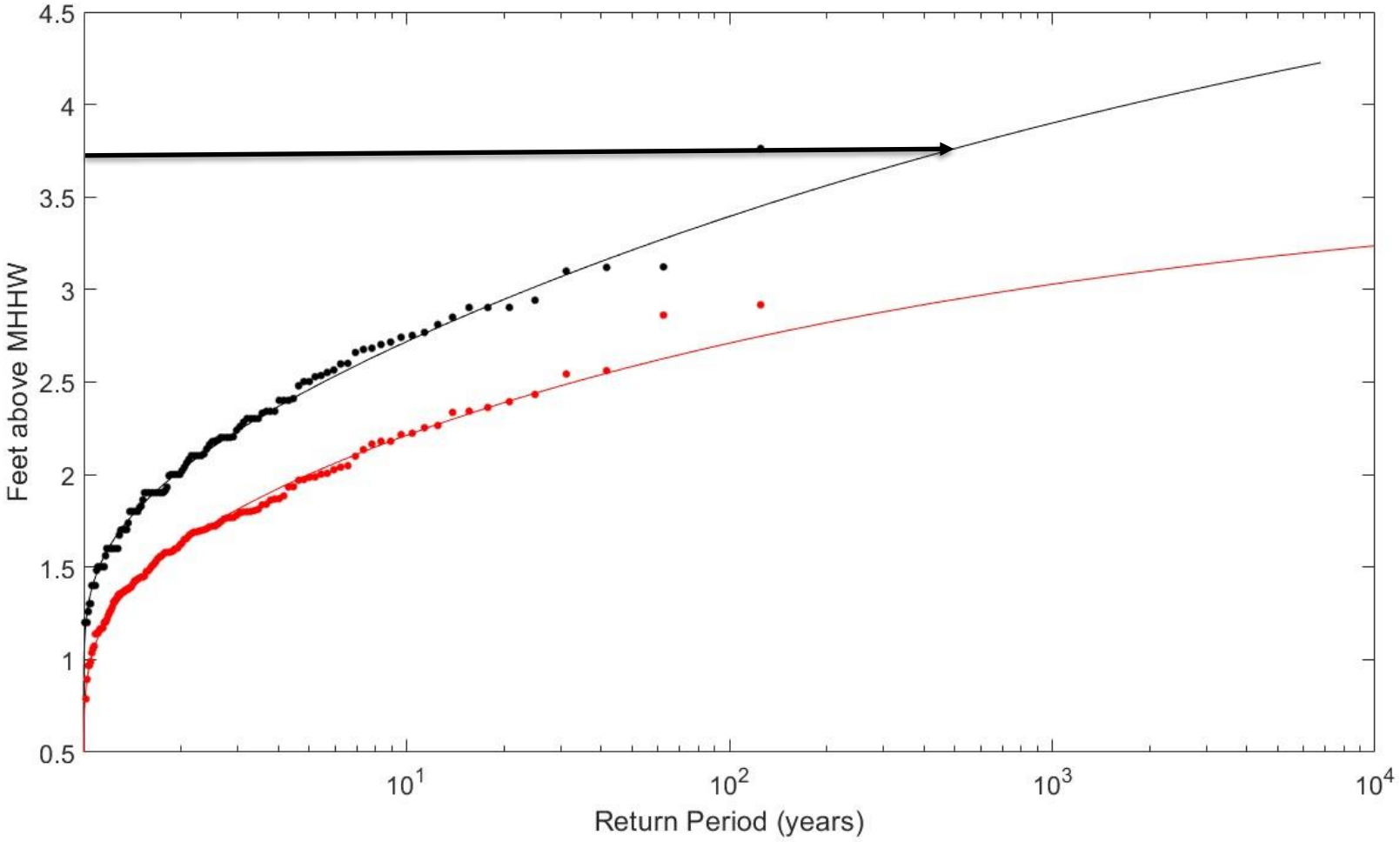
And our formally extreme event becomes essentially impossible



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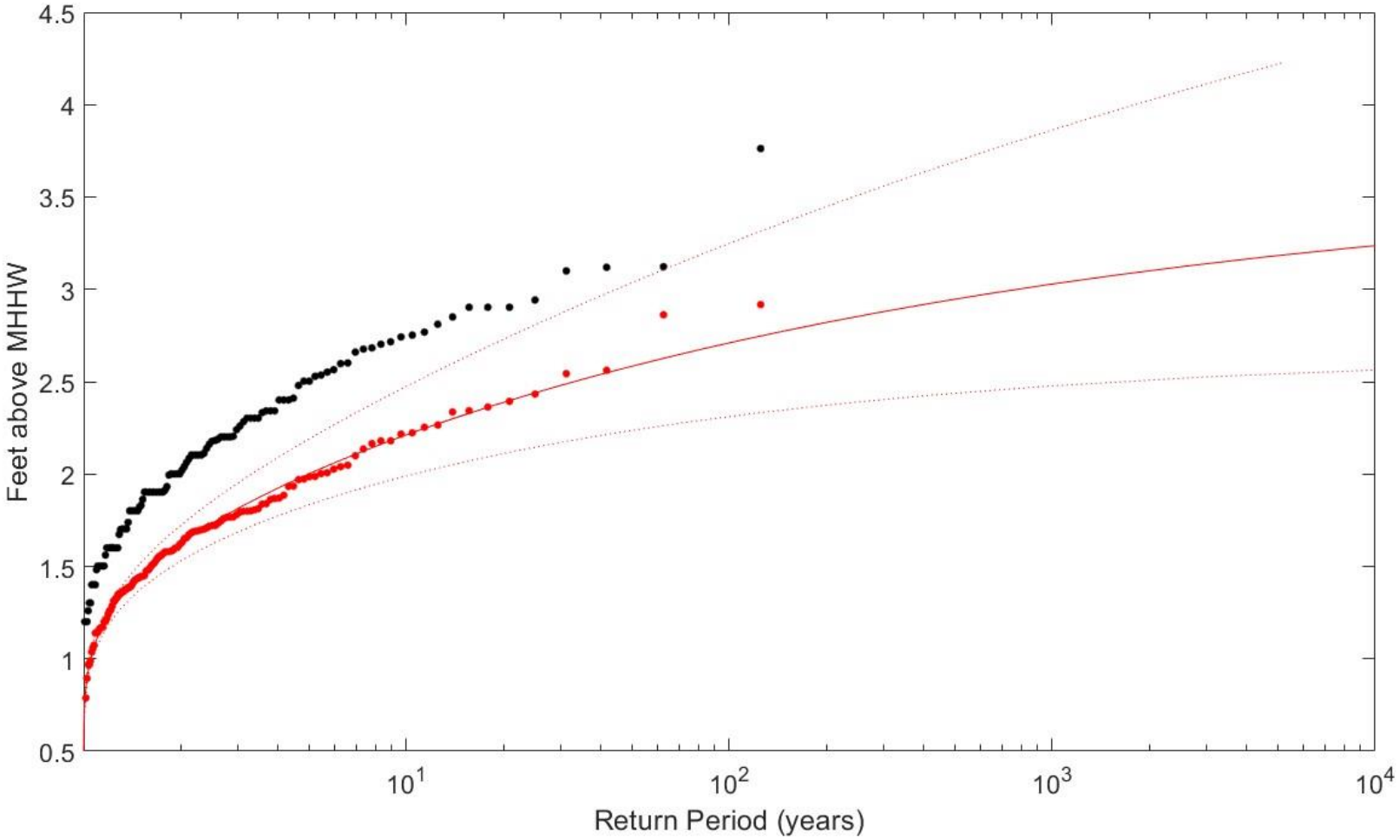
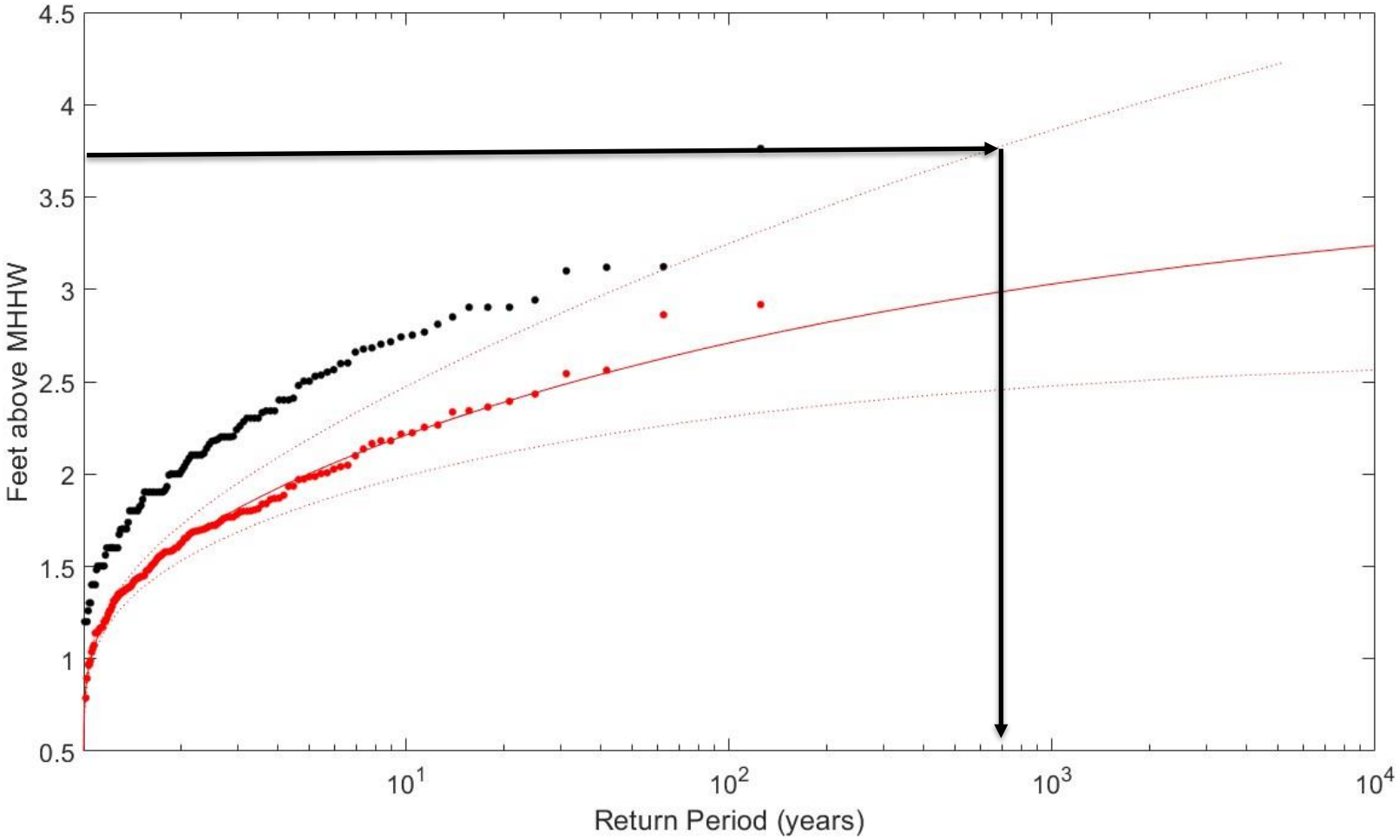
Or, even if we account for the confidence intervals…



An event with a much lower likelihood (1 in 700 instead of 1 in 500)



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The Coast Nerd Gazette

WEDNESDAY, JANUARY 4, 2023

Anatomy of a Coastal Storm: December 27th

Photo by David Barker, submitted to the King Tides program via MyCoast, on the morning of December 27th. Gig Harbor area

Well somehow I went a whole year without a post...not exactly sure what happened to be honest, except that I was very focused this year on a few projects that are now wrapping up. But an event that hit the Washington shoreline in the last week of December was more than enough to snap me out of it. The long and the short of it is that this

Blog Archive

- ▼ 2023 (1)
  - ▼ January (1)
    - Anatomy of a Coastal Storm: December 27th
- ► 2021 (10)
- ► 2020 (6)
- ► 2019 (8)
- ► 2018 (14)
- ► 2017 (14)
- ► 2016 (11)
- ► 2015 (13)
- ► 2014 (23)
- ► 2013 (28)
- ► 2012 (31)
- ► 2011 (15)

https://coastnerd.blogspot.com/

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Which is why where we end up is so important…