

Behavioral changes and a warming climate flip seasonal PM2.5 maximums on the Olympic Peninsula

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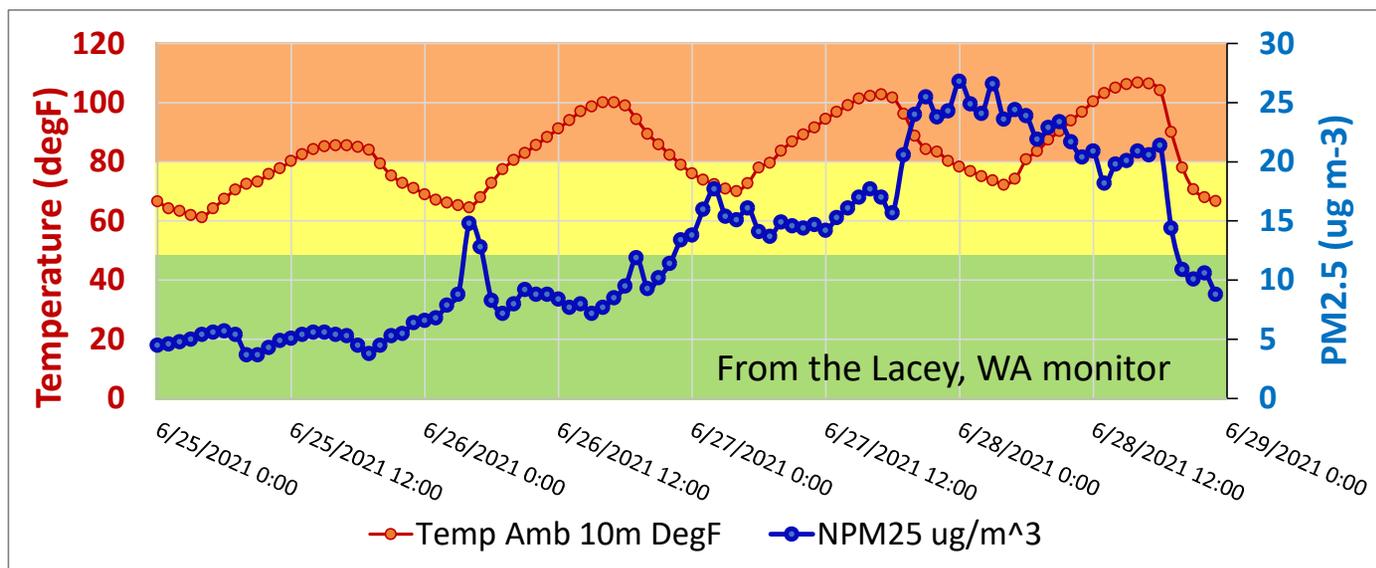
Thurston county was declared non-attainment for PM10 in 1991

- Residential wood heating was identified as the primary PM source
- The worst AQ days corresponded to cold surface temperatures (thermal inversions) and maximum wood smoke emissions
- ORCAA policies for mitigating pollution:
 - Removing uncertified woodstoves
 - Burn ban enforcement
 - Smoke opacity enforcement
 - Educating communities about clean burning
 - Most recently, incentives to replace woodburning devices with gas or electric heat pumps
- Dec 4th 2000: ORCAA filed the paperwork to be removed from the non-attainment list
 - Continue to submit annual reports for the 20-year maintenance plan until 2020
- Until 2017, the worst air quality in our region occurred during winter months
- During the last 4 years, daily PM2.5 values are peaking in summer and driving design values (DV)

Wildfires

- Smokey wildfires are rare in Western Washington
- In early 2000s, occasional smoke would affect 1 or 2 sites for a few days, but had little impact on annual design values
- Recent years have seen a drastic increase in imported smoke to the region from:
 - Eastern WA, ID, MO
 - British Columbia
 - OR, CA
- Wildfires are not the only source of summer PM_{2.5} related to climate change

Record Heat & Air Quality



- Lacey¹, Shelton & Raymond monitors recorded worst AQ of 2021 on June 28th
- Aberdeen & Port Townsend monitors recorded 2nd worst AQ of 2021 on June 28th
 - Worst AQ day in Aberdeen was 4th of July
 - Worst AQ day in PT was from wildfire smoke in mid-August
- Port Angeles & Cheeka Peak recorded 3rd worst AQ day in 2021 on June 28th
 - 2 worst days in PA & CPO were from wildfire smoke in mid-August

1) Lacey data are unofficial. Data were invalidated due to a failing quality check 7 days later.

13-Year Design Value (DV) Record at 5 Olympic sites

Looked at annual 3-yr design values for the last 13 years

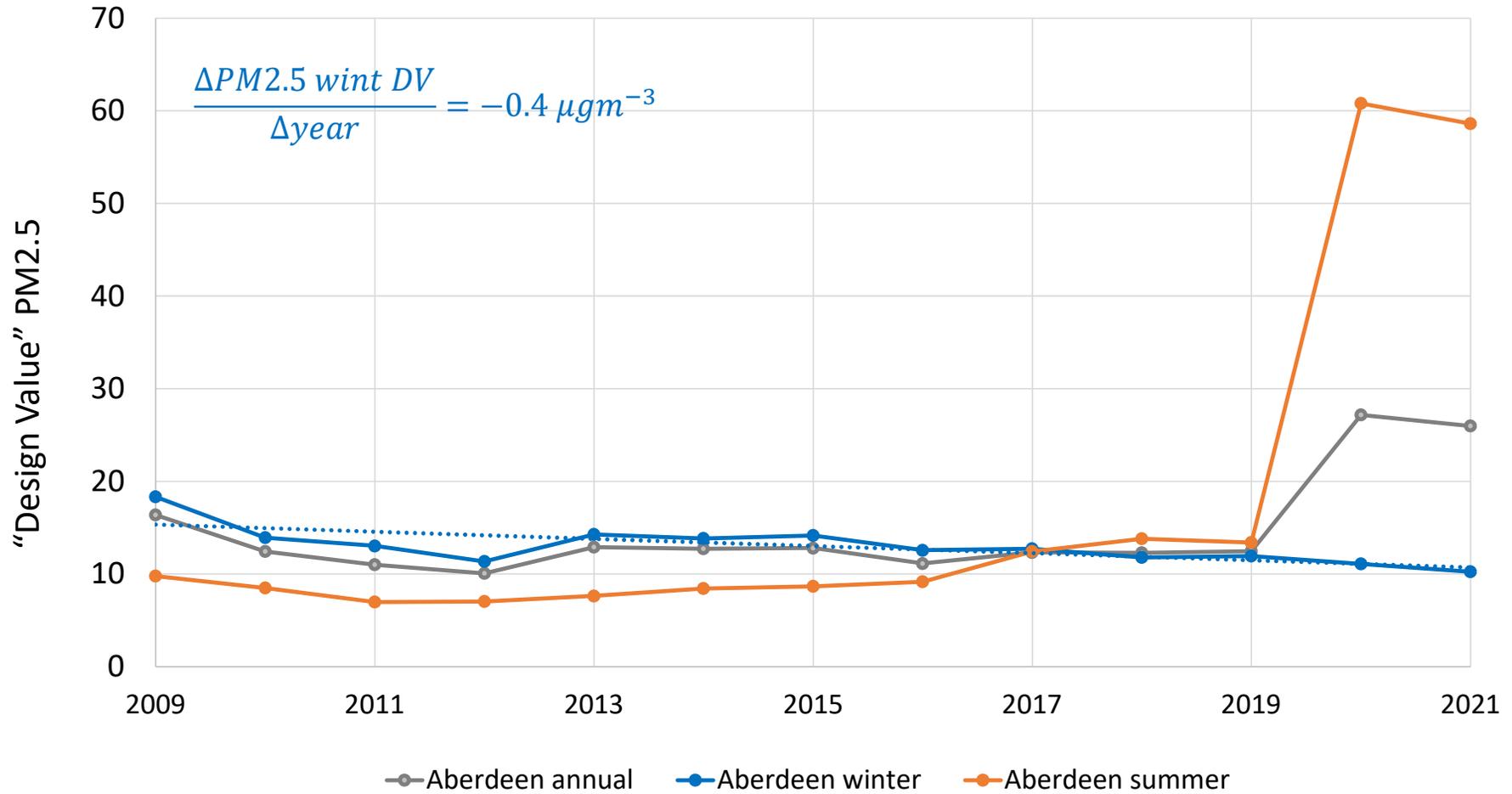
- Found 8th highest daily PM2.5 value in each year
- Design value is the average of the given year and the two previous years

To find “seasonal design values”, each year was split: summer (Apr – Sept) and winter (Jan – Mar, Oct – Dec)

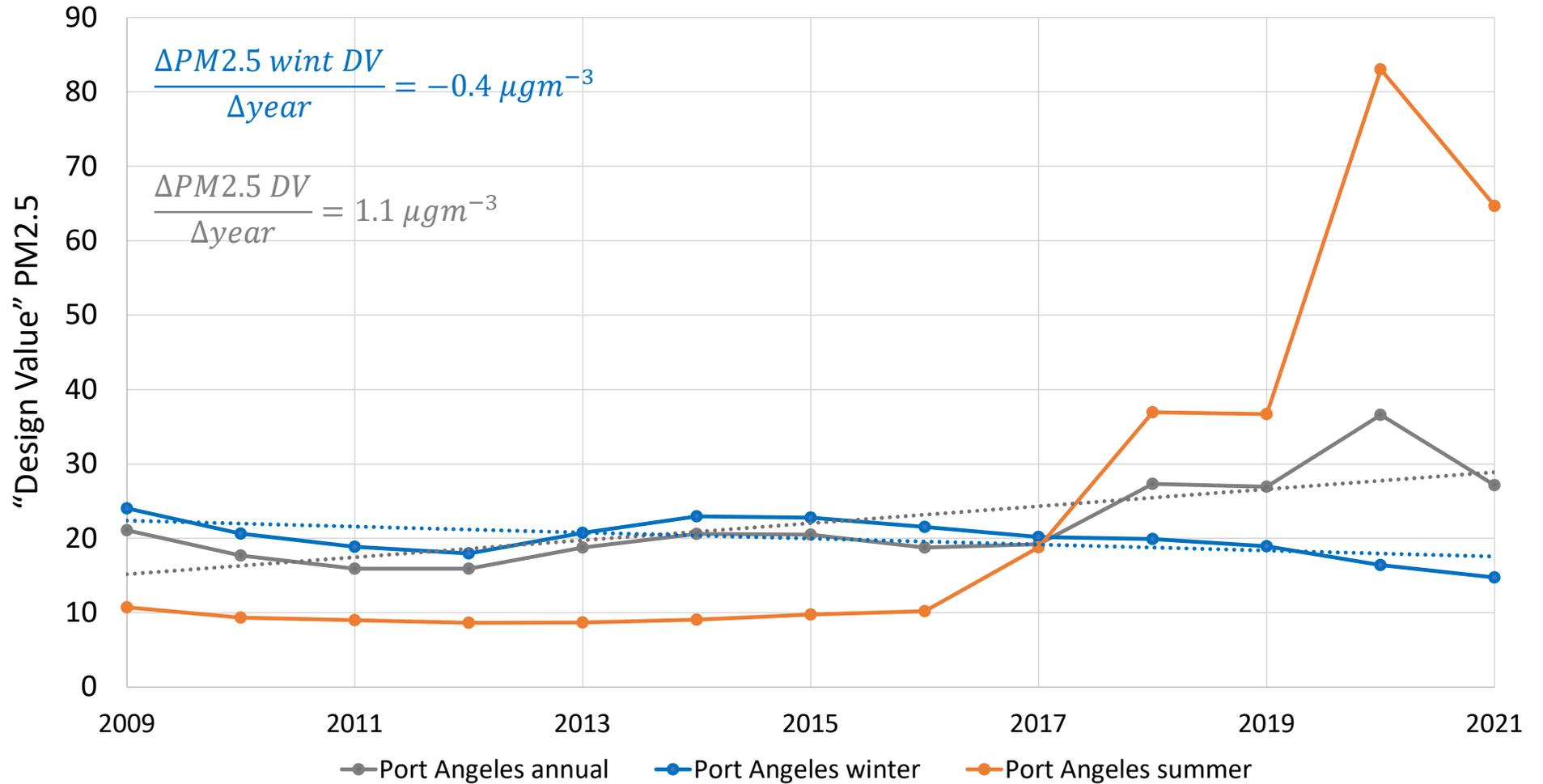
- Found 4th highest daily PM2.5 (98th percentile) in each season
- Average the 4th highest value over three years
 - Example: 2021 DV is the avg of 2019, 2020, & 2021



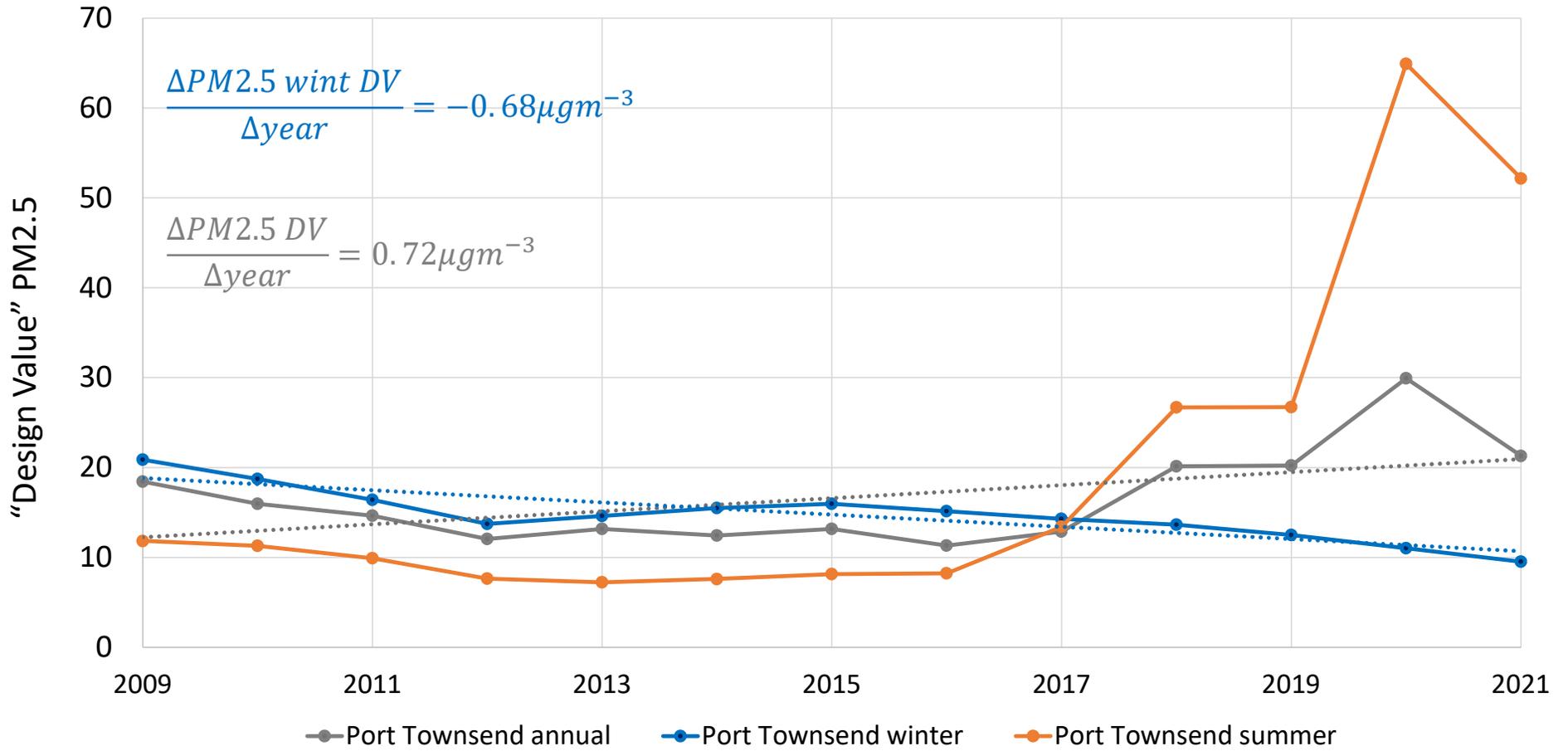
Aberdeen



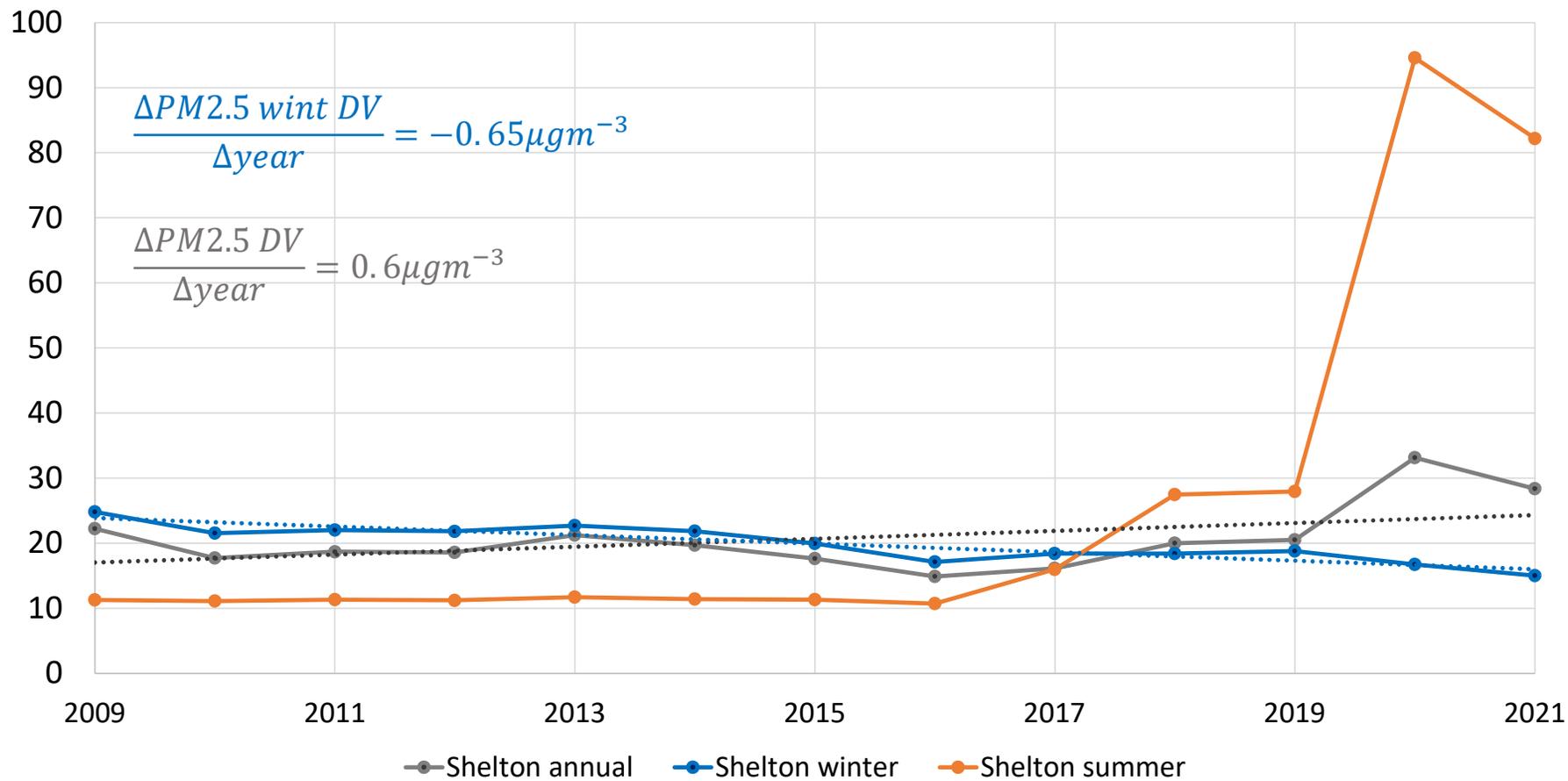
Port Angeles



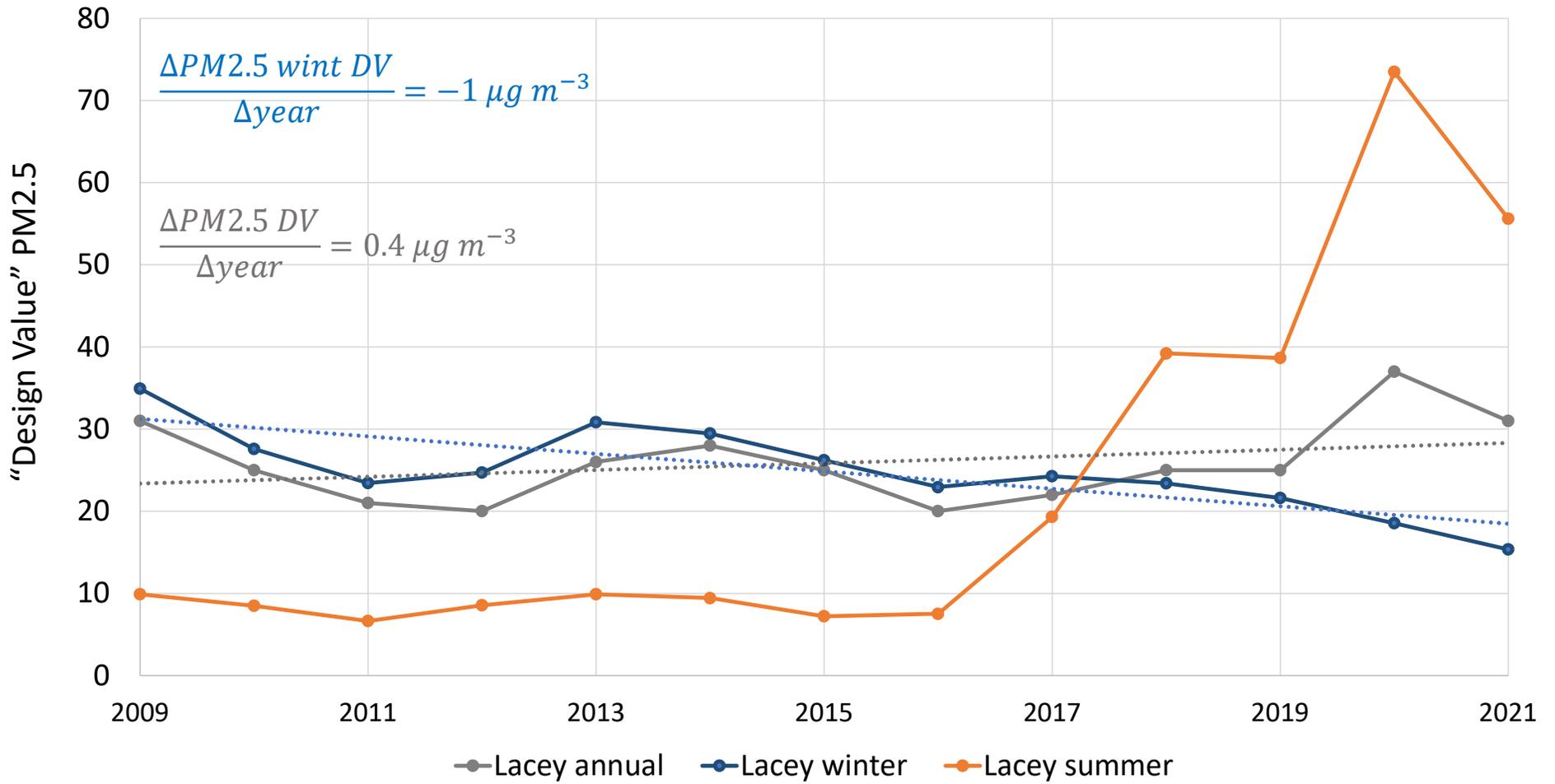
Port Townsend



Shelton



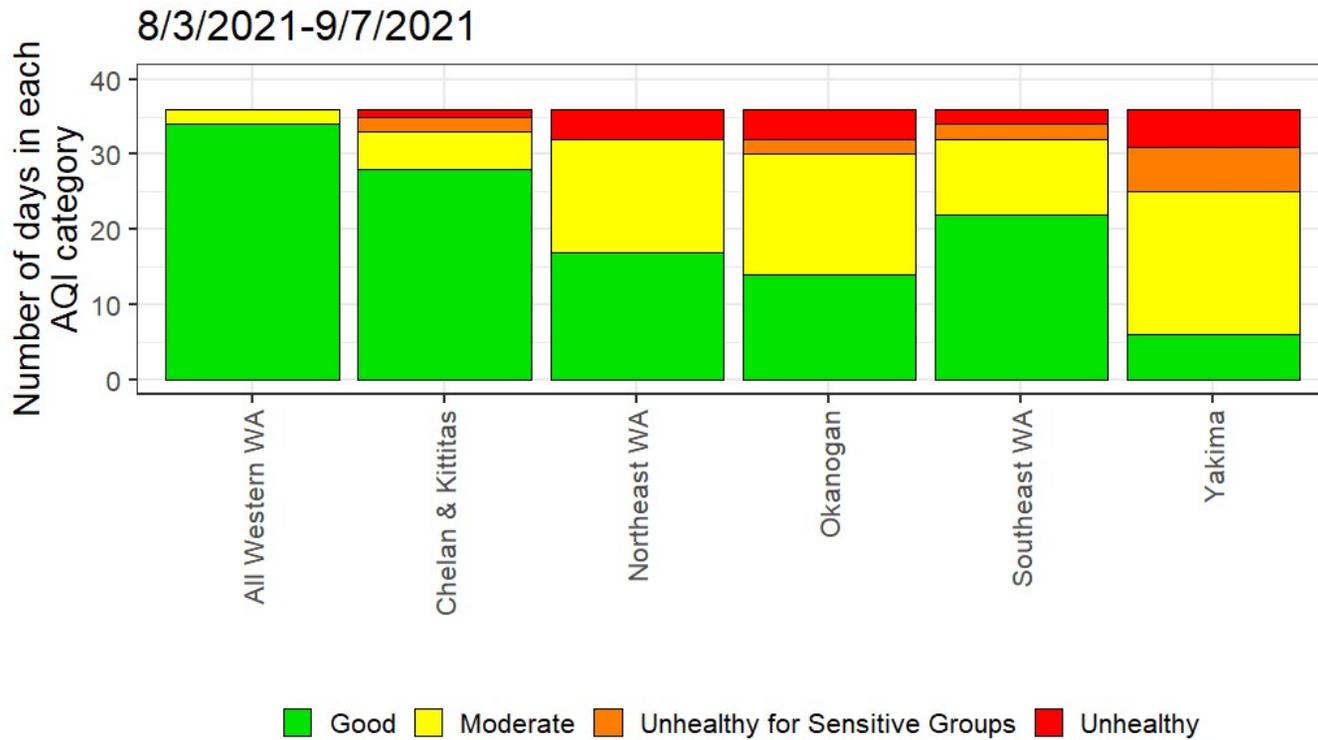
Lacey



Some final thoughts and next steps:

- We've made excellent progress in reducing winter PM2.5
 - Unsure what percentage of PM2.5 reduction can be attributed to meteorological changes
- Summer heat and wildfires are driving up annual design values at all sites in recent years
 - We can and do file exceptional event exceptions but that doesn't change the impact on air quality and what folks are breathing
 - In other regions, the impact of heat and wildfires is likely more extreme
- Is W. Washington the "canary" for west coast air quality response to climate change?
 - Compare analysis with last twenty years at AQ sites in Oregon, California, and Eastern Washington

W. WA spared from wildfire smoke in 2021



*Courtesy of Beth Friedman and
the WA Smoke Blog*



Setting sun over Westport June 28th, 2021

Photo credit: Robert Moody