# 2024 Long-Term Environmental Monitoring Program

## Review of Findings

PWSRCAC Board Meeting
Jan 23 2025
By Morgan Bender, PhD

fjord & fish sciences



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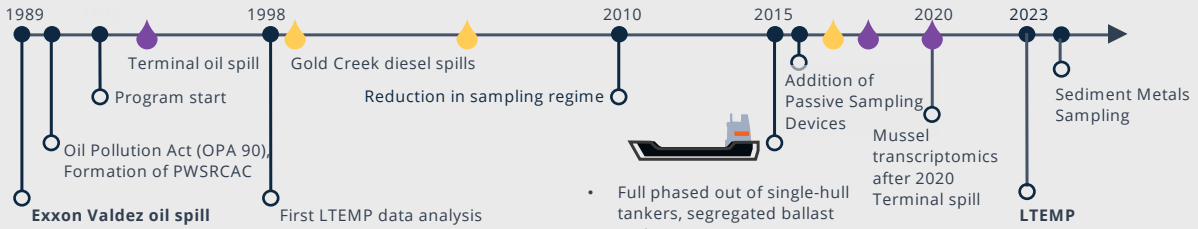
## Long-Term Environmental Monitoring Program Timeline of Events




- Full phased out of single-hull tankers, segregated ballast tanks
- Upgrades to Ballast Water Treatment Facility

**31**
**Years**
of environmental sampling

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**245k**
**Chemical Datapoints**
**in dataset**

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## The 2024 LTEMP Campaign

- Fieldwork was carried out by PWSRCAC's Danielle Verna, Jeremy Robida, and contractor Morgan Bender in May/June 2024
- Chemical analysis was done by Alpha Analytics and by Oregon State University FSES laboratory
- Reporting was divided into a brief **Summary Report** and a **Technical Supplement** like in 2021 & 2023

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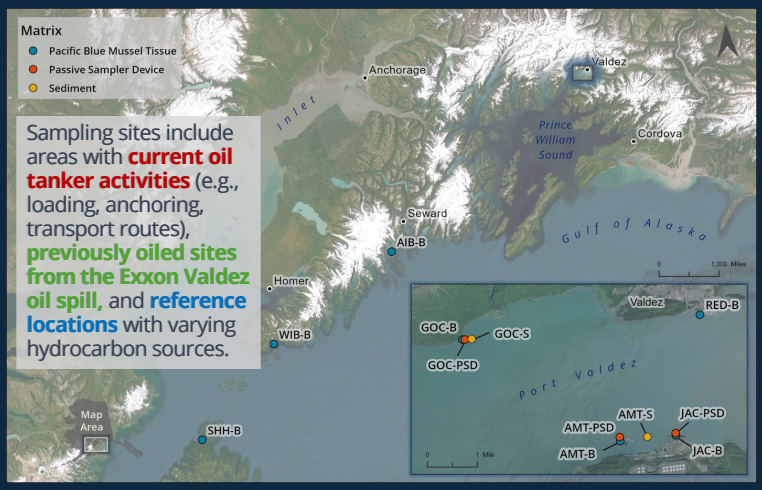
# IN 2024, SEDIMENTS, MUSSELS, AND WATER WERE SAMPLED IN PORT VALDEZ. MUSSELS WERE ALSO SAMPLED AT EXTENDED SITES




SEDIMENTS

- Alyeska Marine Terminal
- Gold Creek

PACIFIC BLUE MUSSEL TISSUE

- Saw Island
- Jackson Point
- Gold Creek
- Valdez Small Boat Harbor
- Aialik Bay
- Windy Bay
- Shuyak Harbor

WATER via PASSIVE SAMPLING DEVICES

- Saw Island
- Jackson Point
- Gold Creek

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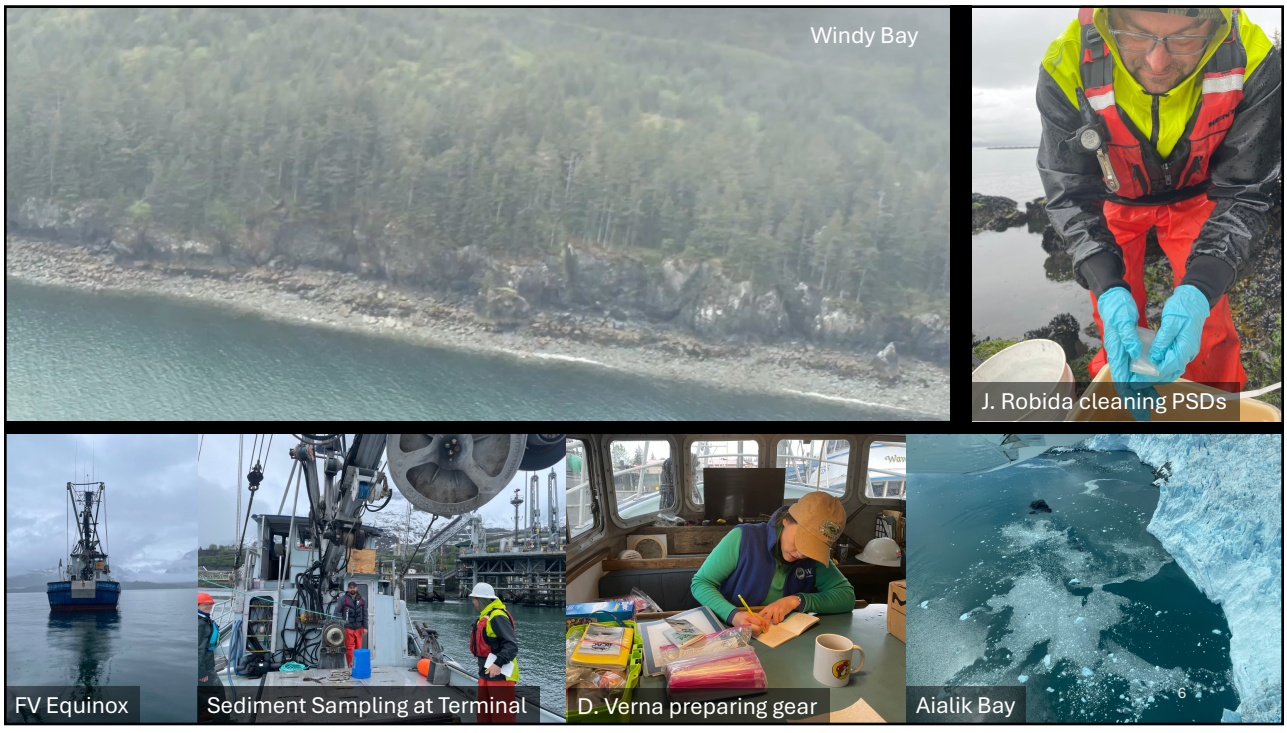


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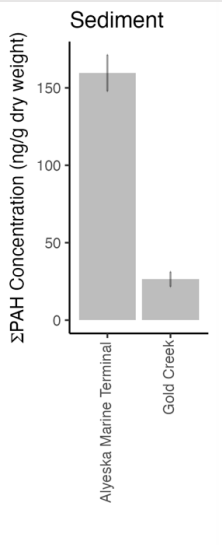
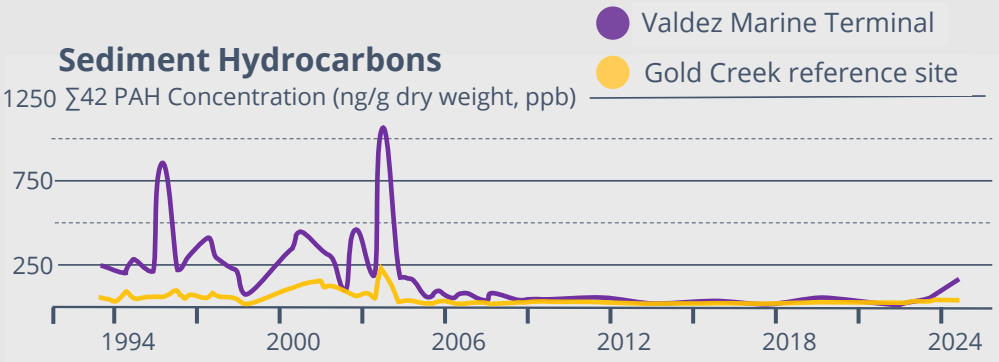
# IN 2025, HYDROCARBONS WERE FOUND AT LOW LEVELS IN PORT VALDEZ SEDIMENTS



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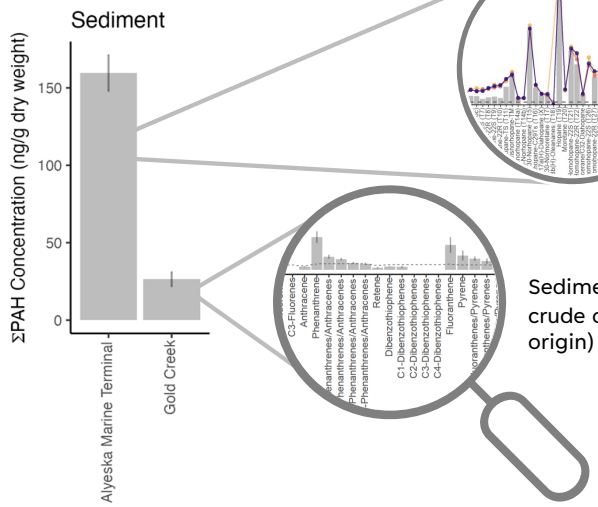
# HYDROCARBON FINGERPRINTING REVEALED DIFFERENT SOURCES AT EACH SITE BUT CONSISTENT ACROSS YEARS




Sediments at the **Terminal** had petrogenic (of crude oil origin) hydrocarbons sourced from **Alaska North Slope Crude** with other pyrogenic sources

Sediments at **Gold Creek** had petrogenic (of crude oil origin) and pyrogenic (of combustion origin) hydrocarbons **likely from mixed sources**



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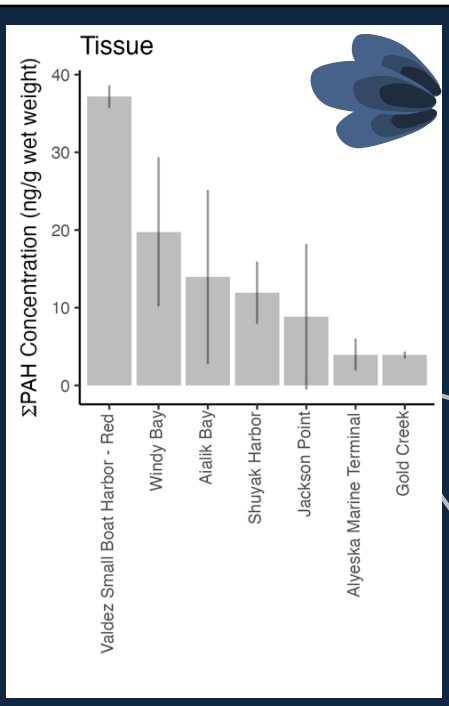


# IN 2024, HYDROCARBONS WERE FOUND AT LOW- MODERATE LEVELS IN PORT VALDEZ AND NORTH GULF OF ALASKA COAST PACIFIC BLUE MUSSEL TISSUE

Clear pyrogenic patterns at remote sites and the Valdez Small Boat Harbor

Windy Bay, Aialik Bay, and Shuyak Harbor - heavily weathered petrogenic hydrocarbon sources mixed with pyrogenic sources of diesel combustion emissions and/or wood / coal combustion



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# 2024 mussel sampling sites show differing mussel bed communities




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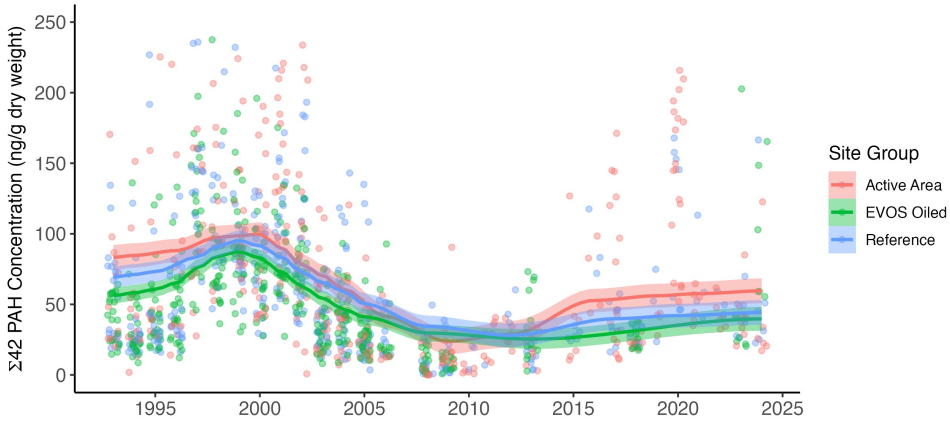
# HYDROCARBON CONCENTRATIONS IN MUSSEL TISSUE ARE LOW EXCEPT AFTER SPILL INCIDENTS (and in single samples)



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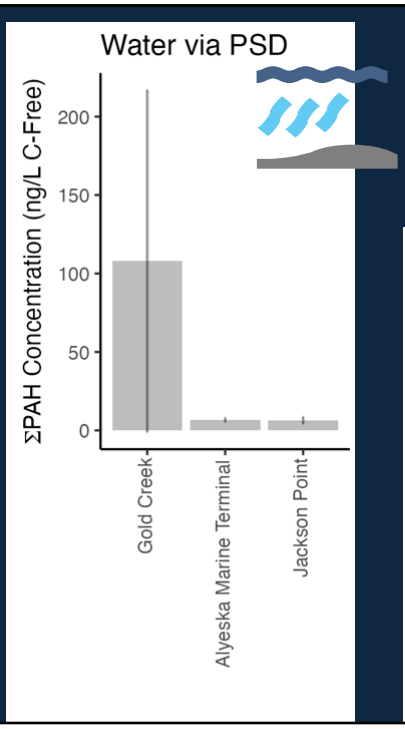
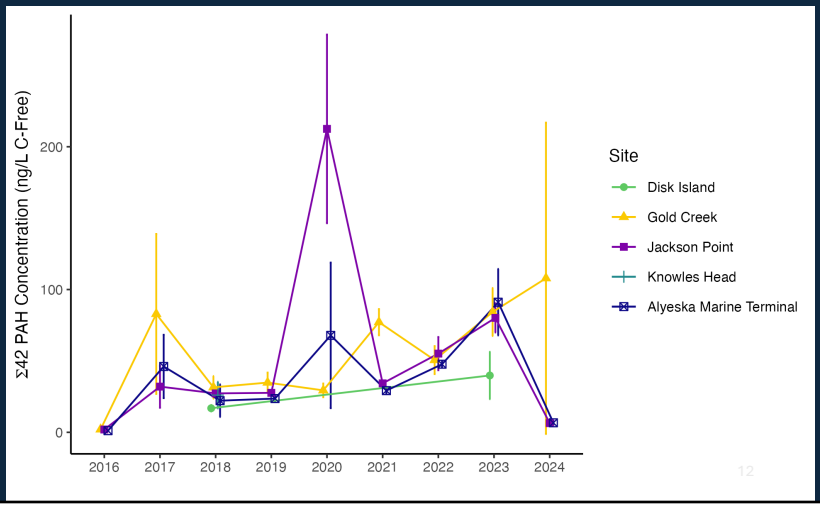
# IN 2024, DISSOLVED HYDROCARBON CONCENTRATIONS IN SEAWATER *measured via passive sampling devices* WERE LOW



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# What do the hydrocarbons levels in PWS mean for aquatic life?

**Sediments**

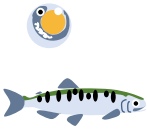
**Low Risk**
Sediments hydrocarbon concentrations were <1% of the EPA Benchmark threshold for toxic effects

**Intertidal Mussels**

**Low Risk with Variability**
Mussel hydrocarbon concentrations are likely too low to elicit adverse effects in mussels or lead to adverse effects if consumed by other animals

**Passive Sampling Devices**

**Low Risk**
Bioavailable, water-soluble hydrocarbon concentrations are likely too low to elicit adverse effects even in sensitive life stages (e.g., embryos and larvae)





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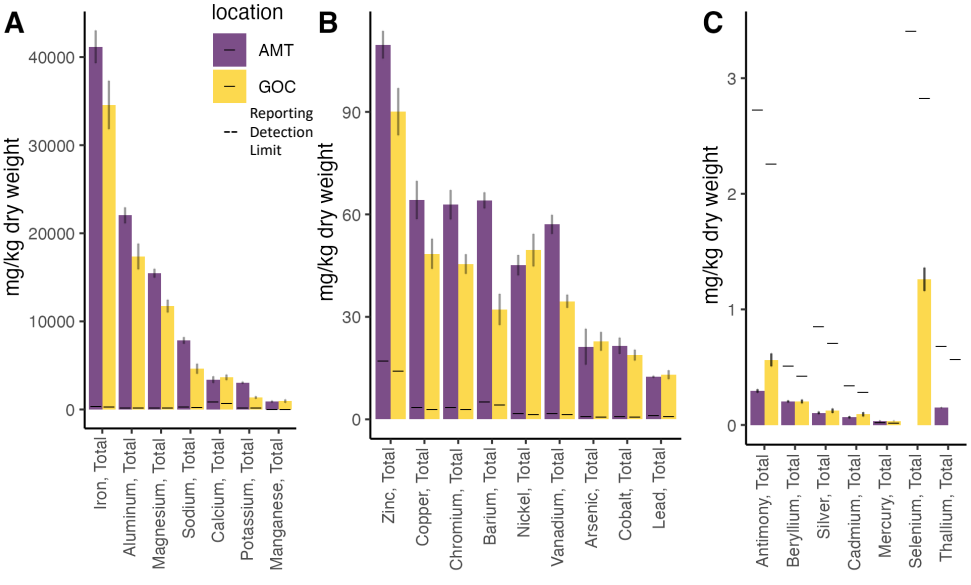
**PILOT STUDY**

# Metal accumulation in sediments

**The terminal sediments had higher metal concentrations than Gold Creek**

The terminal had statistically significantly higher concentrations of **iron, aluminum, magnesium, sodium, potassium, zinc, copper, chromium, barium, and vanadium.**

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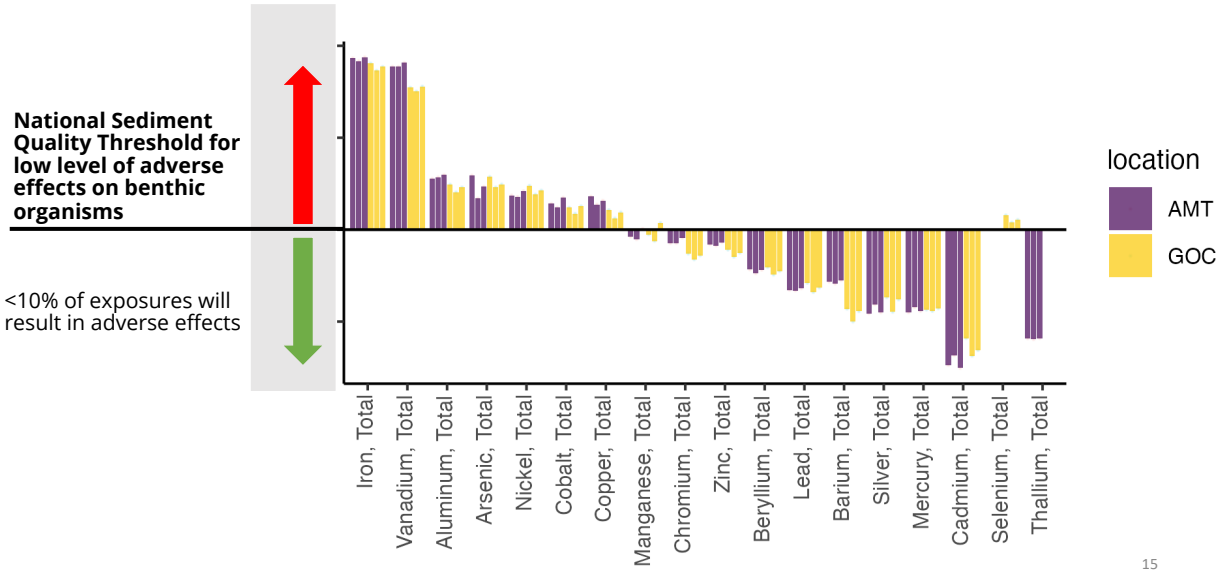
# Are these metal levels of concern for biota?

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# FUTURE PERSPECTIVES

**1. Consider expanding sampling efforts**

**2. Increase project visibility**

a. Expand Dissemination

b. Archive Data

**3. Evaluate specific aspects of LTEMP**

a. Changes in intertidal community

b. Metals accumulation in sediments

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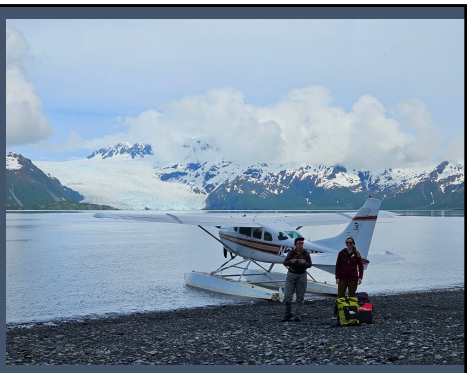

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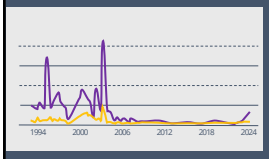
# THE 2024 LTEMP SUMMARY

**I.** The **hydrocarbon fingerprints** in the 2024 samples vary by site with those near the Alyeska Marine Terminal revealing **Alaska North Slope Crude Oil**. Other sites reveal **mixed sources**.

**II. Low potential environmental and toxicological risk** is posed by hydrocarbons contributed by the Terminal and tankers in 2024




**III.** Analysis of historical trends in hydrocarbon concentrations reveals generally low concentrations that spike locally after spill events.

**iron, copper, and vanadium.**

**IV.** A pilot study found metals accumulating in Port Valdez sediments.