



Apr 6th, 2:00 PM - 2:15 PM

Monitoring stormwater contaminants in the Puget Sound nearshore: an active biomonitoring tool using transplanted mussels (*Mytilus trossulus*)

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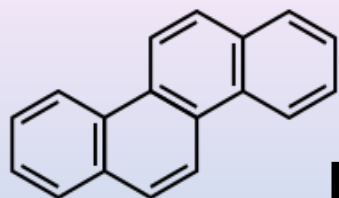
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Lanksbury, Jennifer; Carey, Andrea J.; Langness, Mariko M.; Lubliner, Brandi; Niewolny, Laurie A.; and West, James E., "Monitoring stormwater contaminants in the Puget Sound nearshore: an active biomonitoring tool using transplanted mussels (*Mytilus trossulus*)" (2018). *Salish Sea Ecosystem Conference*. 566. <https://cedar.wwu.edu/ssec/2018ssec/allsessions/566>

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Speaker

Jennifer Lanksbury, Andrea J. Carey, Mariko M. Langness, Brandi Lubliner, Laurie A. Niewolny, and James E. West



Puget Sound Mussel Monitoring



Long-term Active Biomonitoring of Contaminants in the Nearshore



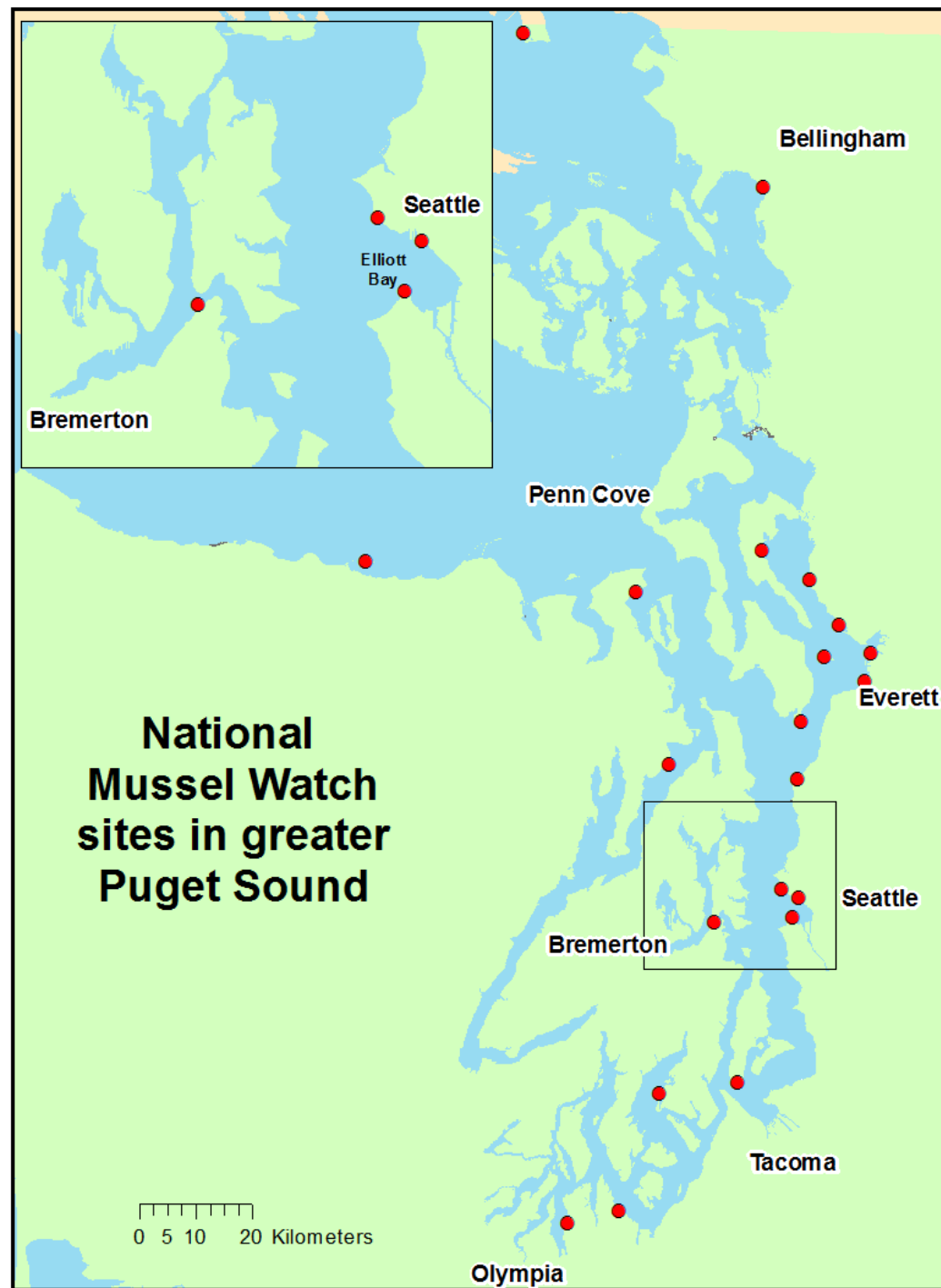
Jennifer Lanksbury and Mariko Langness
Toxics-focused Biological Observing System (T-BIOS)
Washington Department of Fish and Wildlife



Washington Department of
FISH AND WILDLIFE

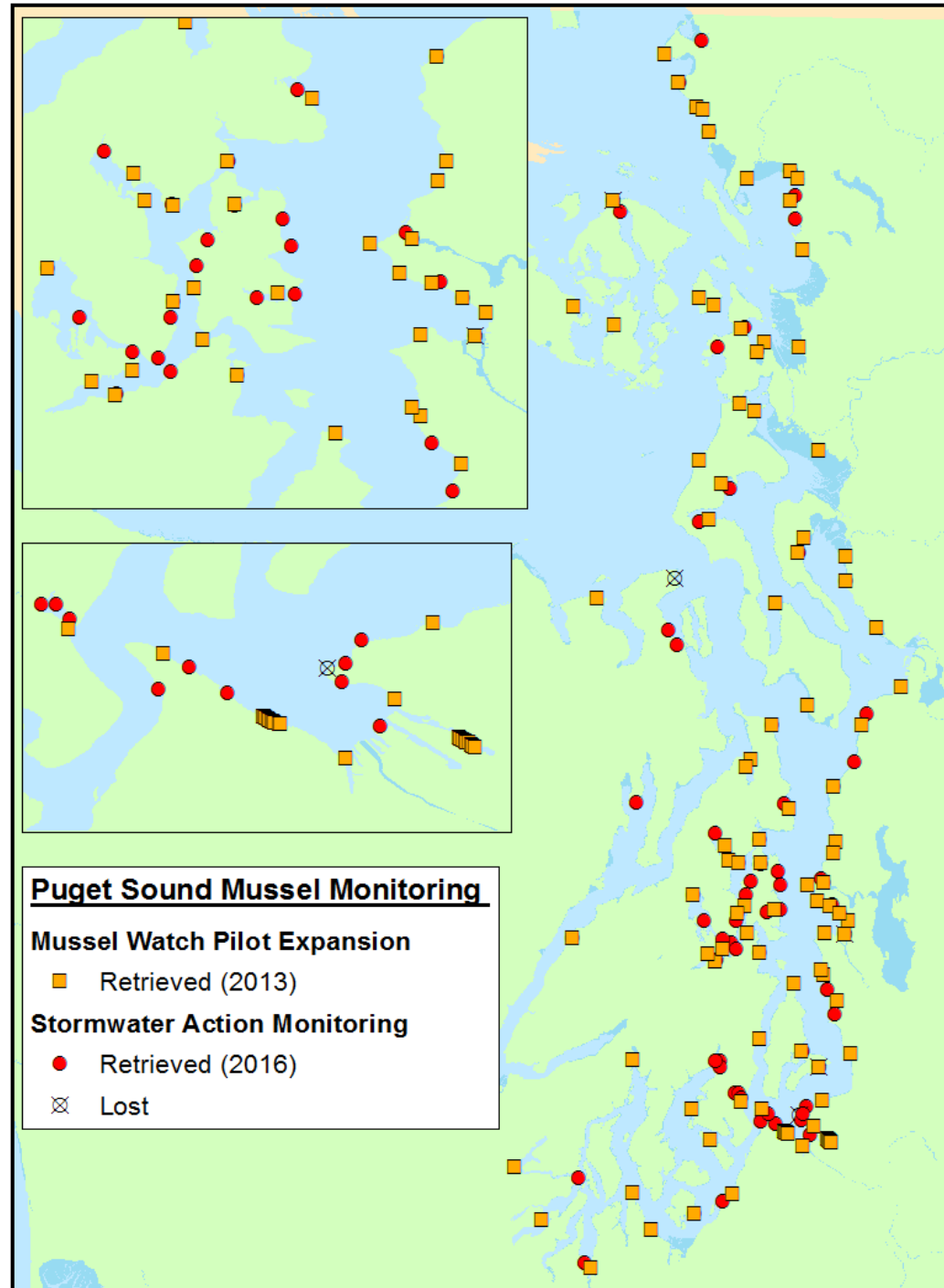
Puget Sound Mussel Monitoring

- Started with the NOAA's Mussel Watch program
 - 1986 - 2011
 - Wild mussels
 - Biennial monitoring
- Evolved into Puget Sound Mussel Monitoring cooperative program
 - 2012 - present
 - Transplanted mussels
 - Biennial monitoring



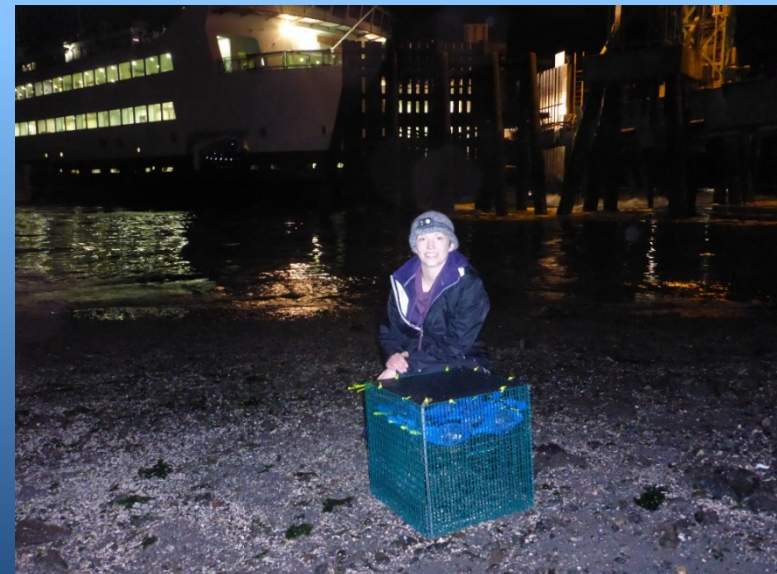
Puget Sound Mussel Monitoring

- Mussel Watch Pilot Expansion study (2012/13)
- Stormwater Action Monitoring survey (2015/16)
 - First mussel survey in new, long-term status & trends stormwater monitoring program



Mussel Cage Deployment/Retrieval

- Cages left out between Oct/Nov. – Feb.
- Cages placed in center of intertidal zone
- 100+ volunteers/partners help deploy/retrieve cages over 4-5 nights of low tides



NOAA Mussel Watch assessed PAHs in mussels on a national scale from 1986 - 2011

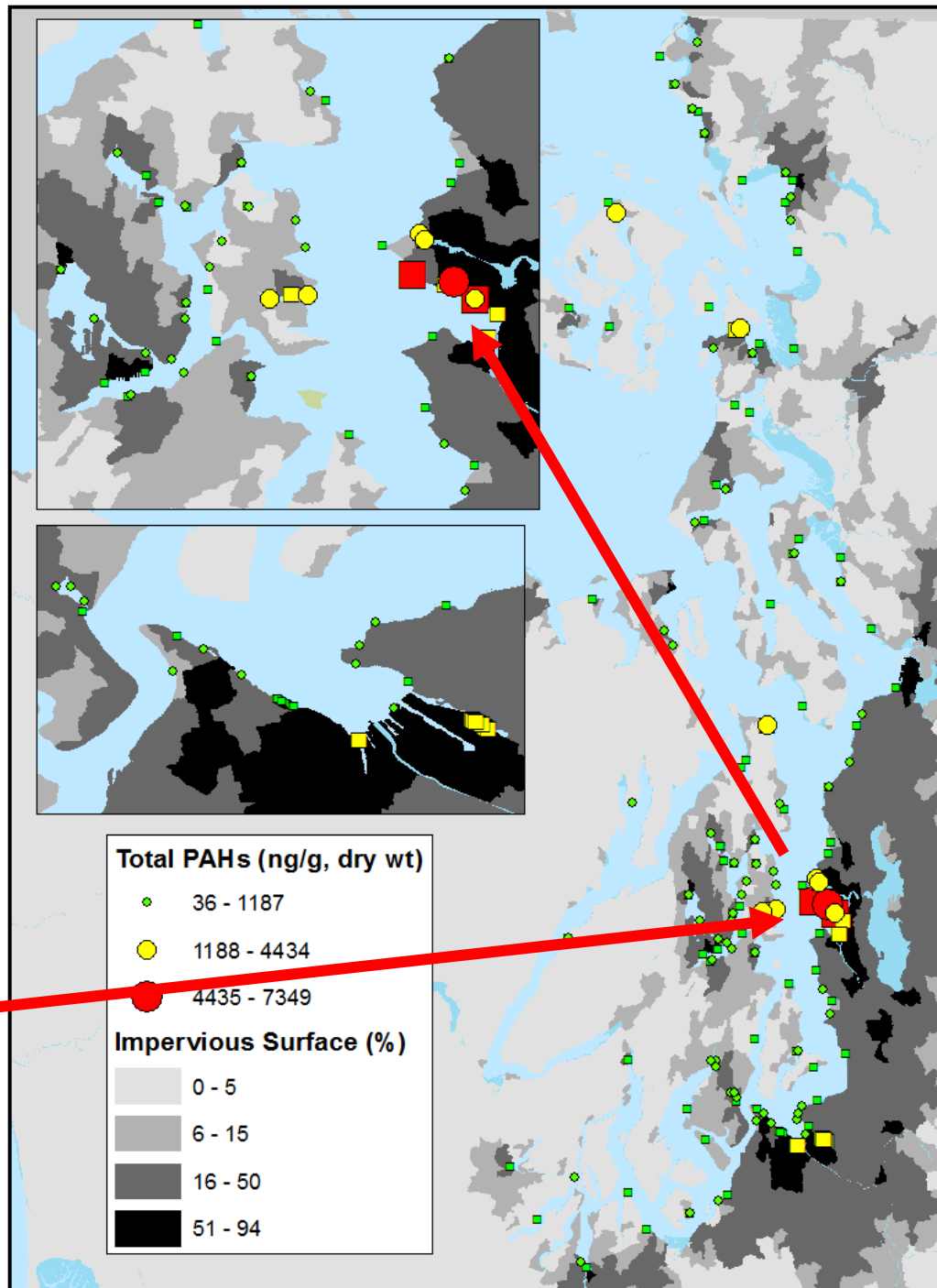
National levels of PAHs
from 2005:

Low 63 – 1187

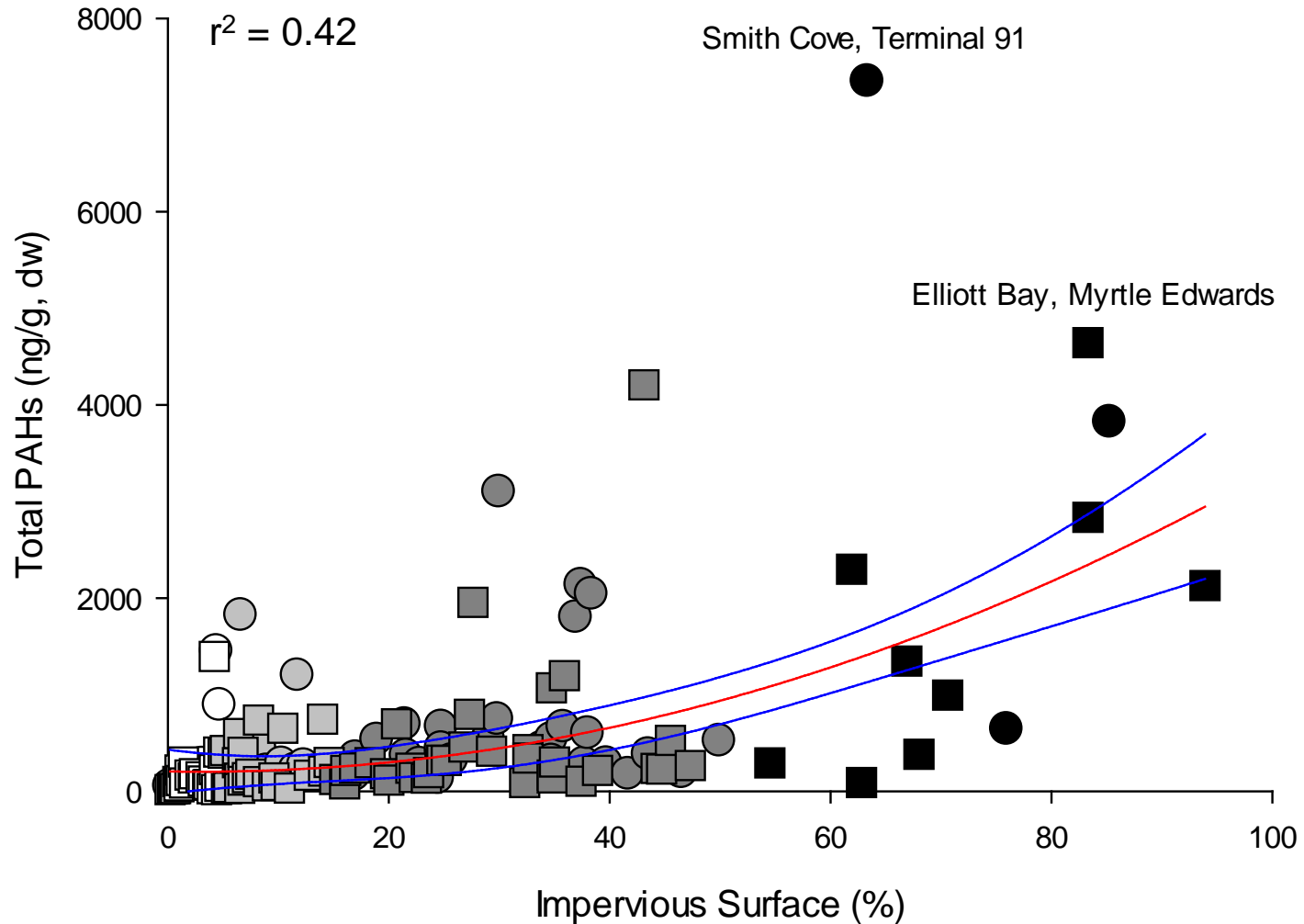
Med 1188 – 4434

High 4435 – 7561

ng/g, dry weight (parts per billion)



Significant positive relationship between conc. of PAHs and impervious surface





PAH fingerprinting



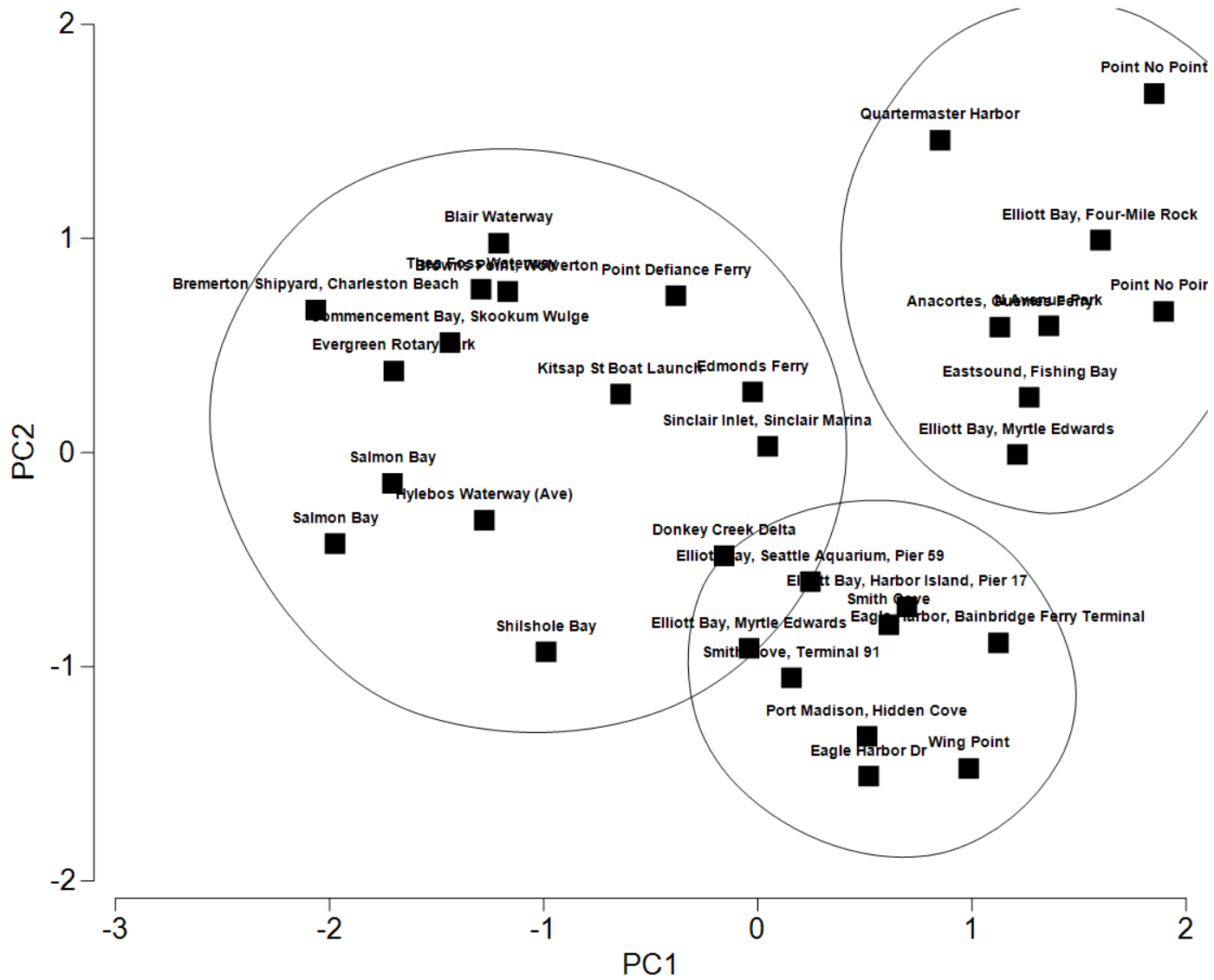
(of sites with >50% detected PAHs)

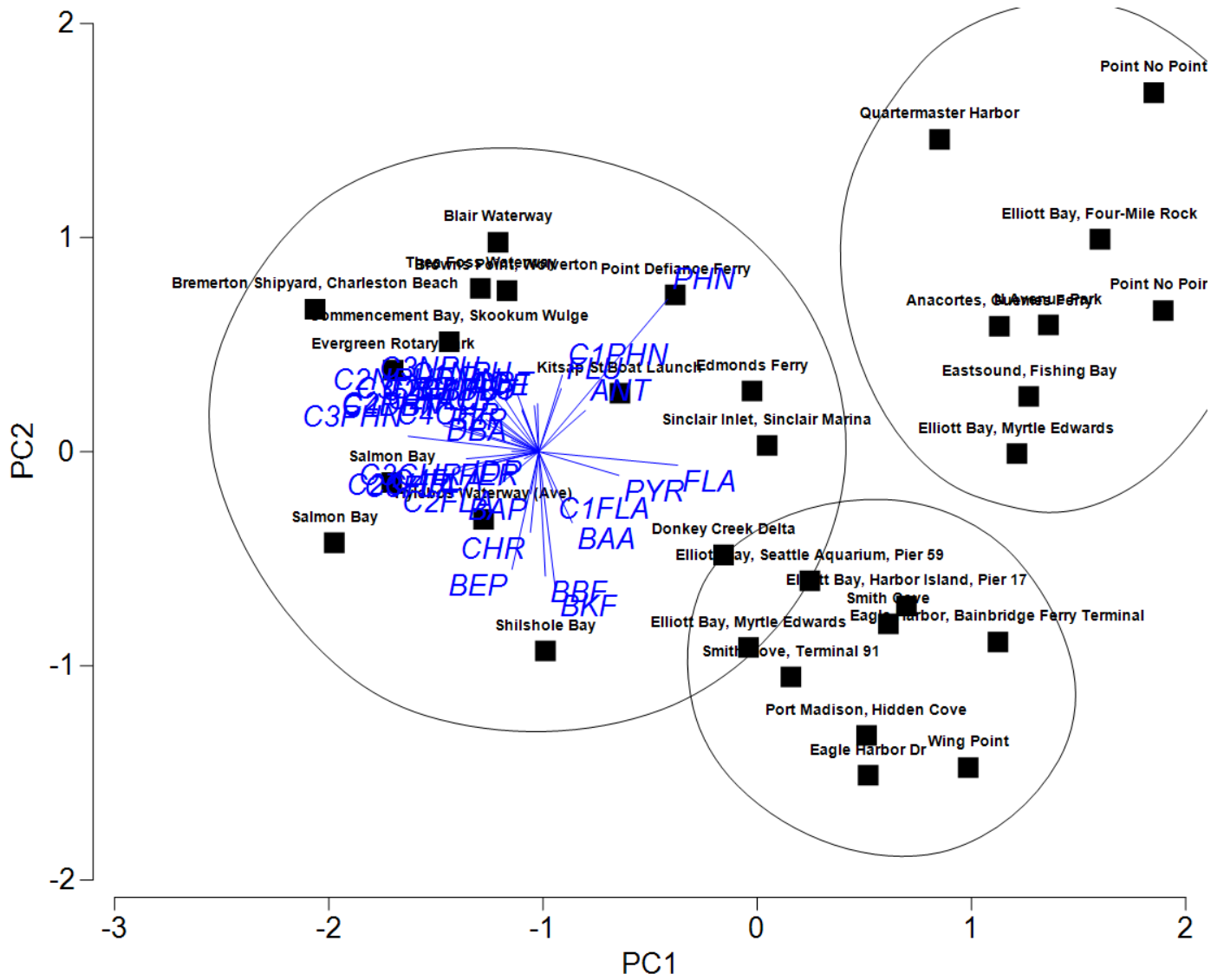
Petrogenic: unburned petroleum products

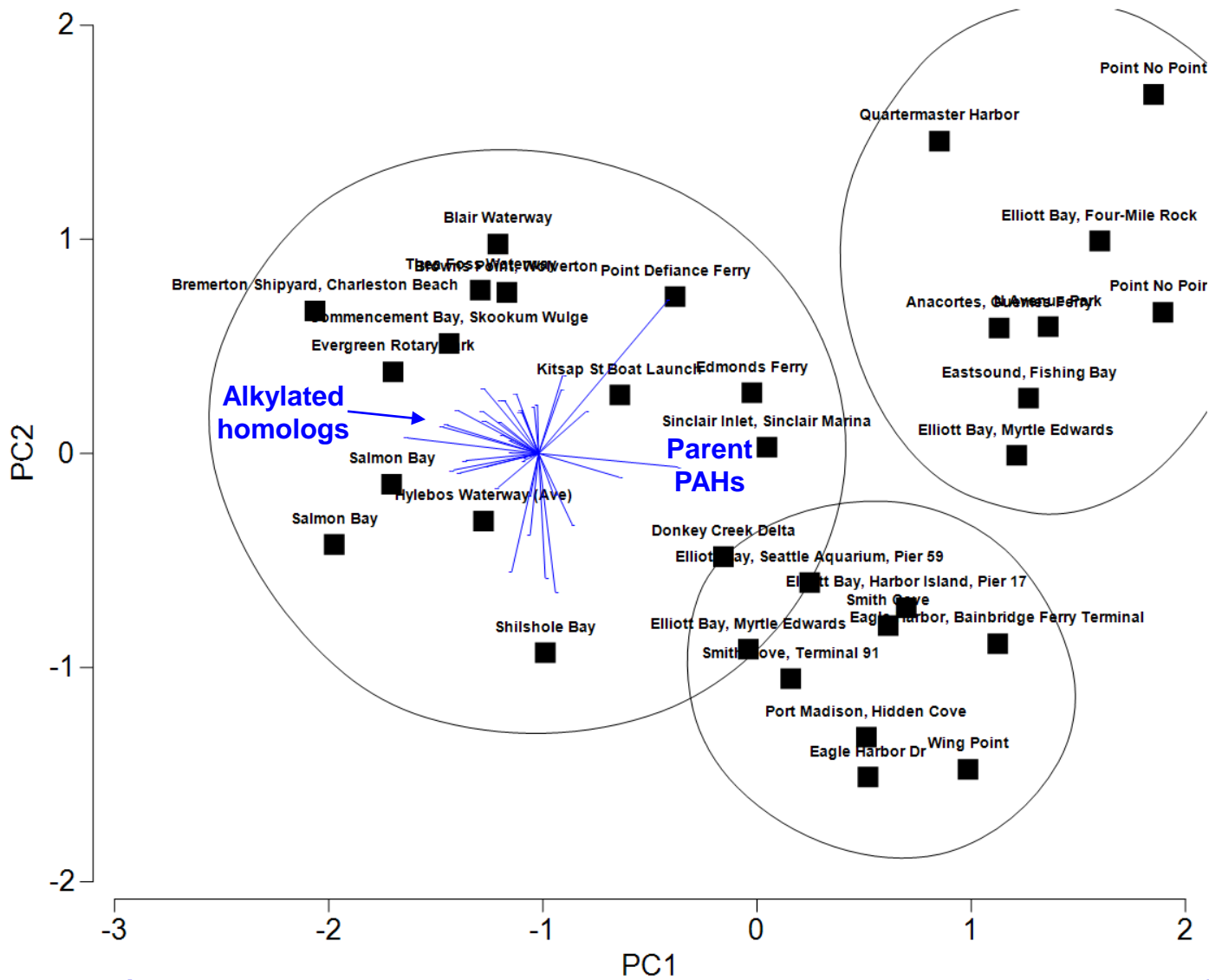
- Oil or gasoline spills
- Oil seeps
- Runoff with oil leaked from cars
- More Alkylated Homolog PAHs

Pyrogenic: incomplete combustion

- Petroleum burning – engine exhaust
- Biomass burning – wood, grass, coal smoke and ash
- More Parent PAHs



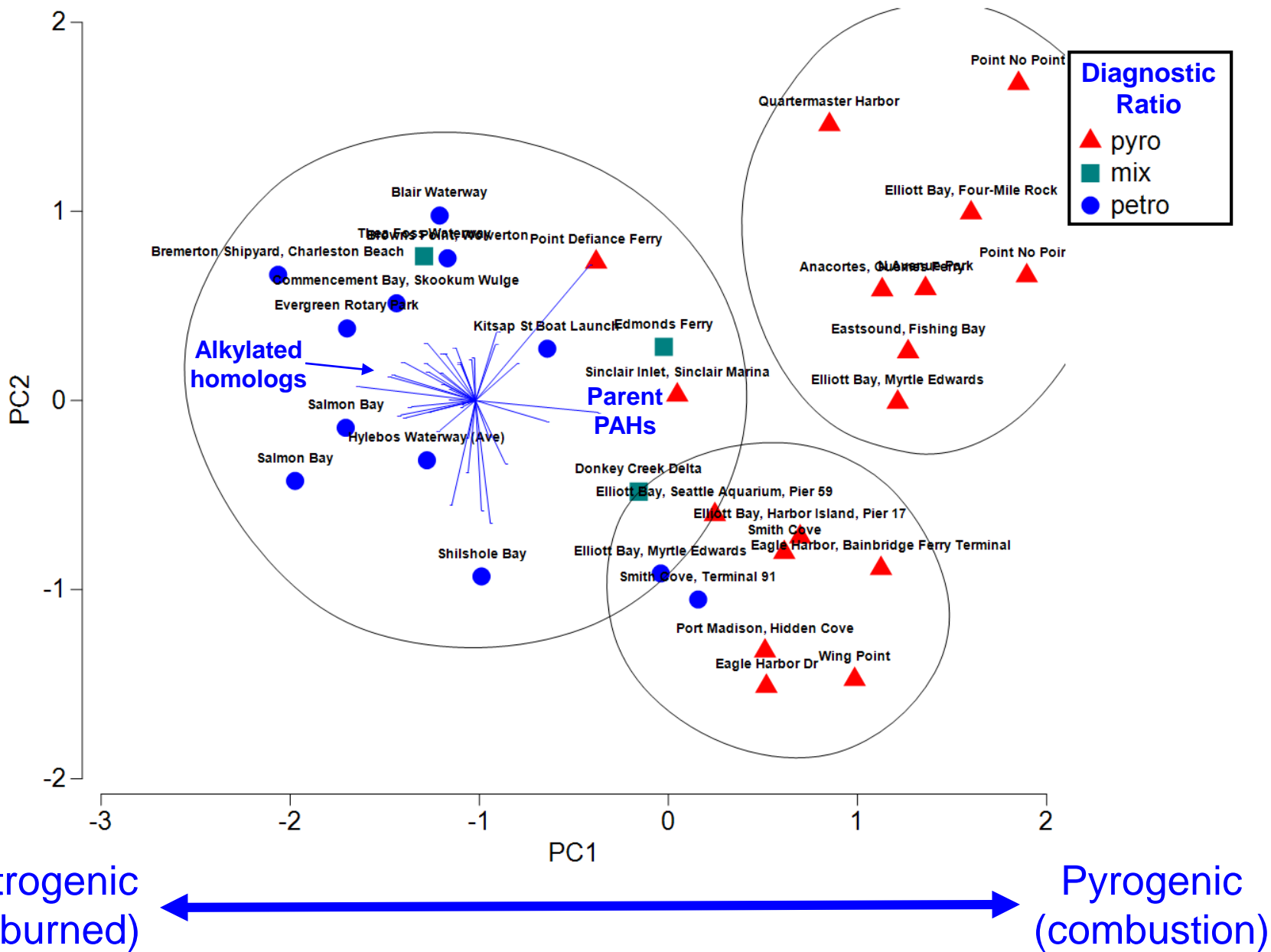


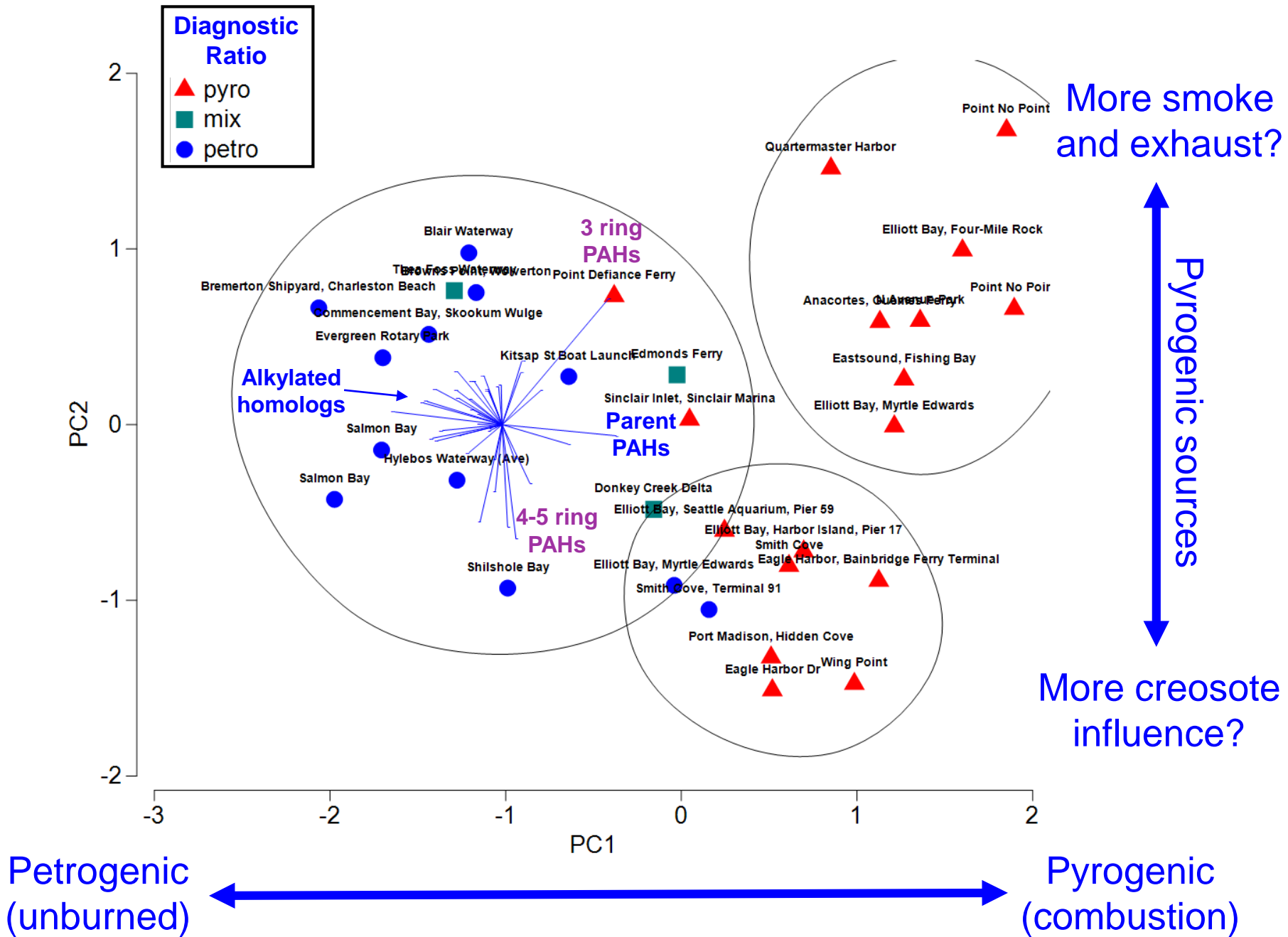


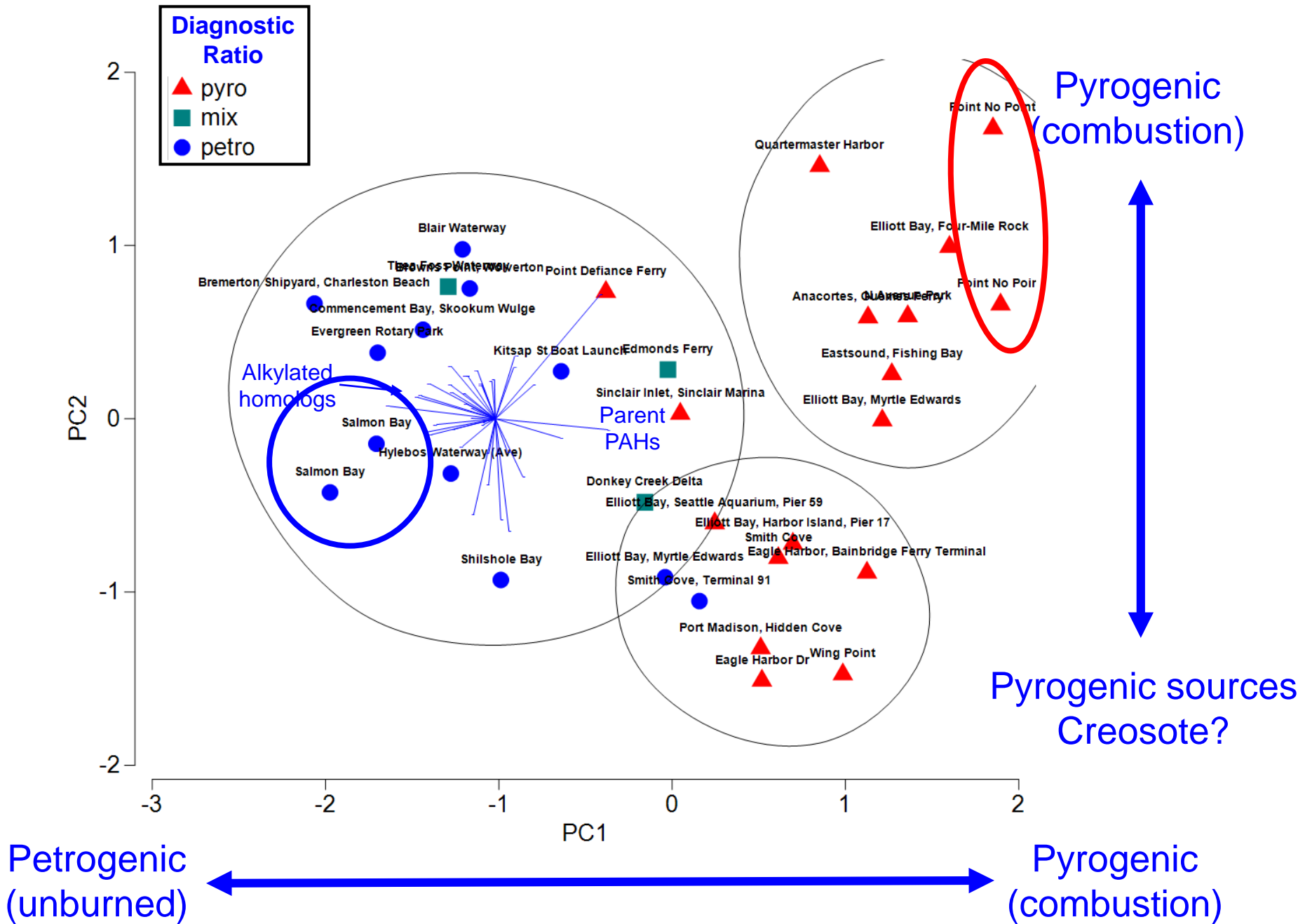
Petrogenic
(unburned)



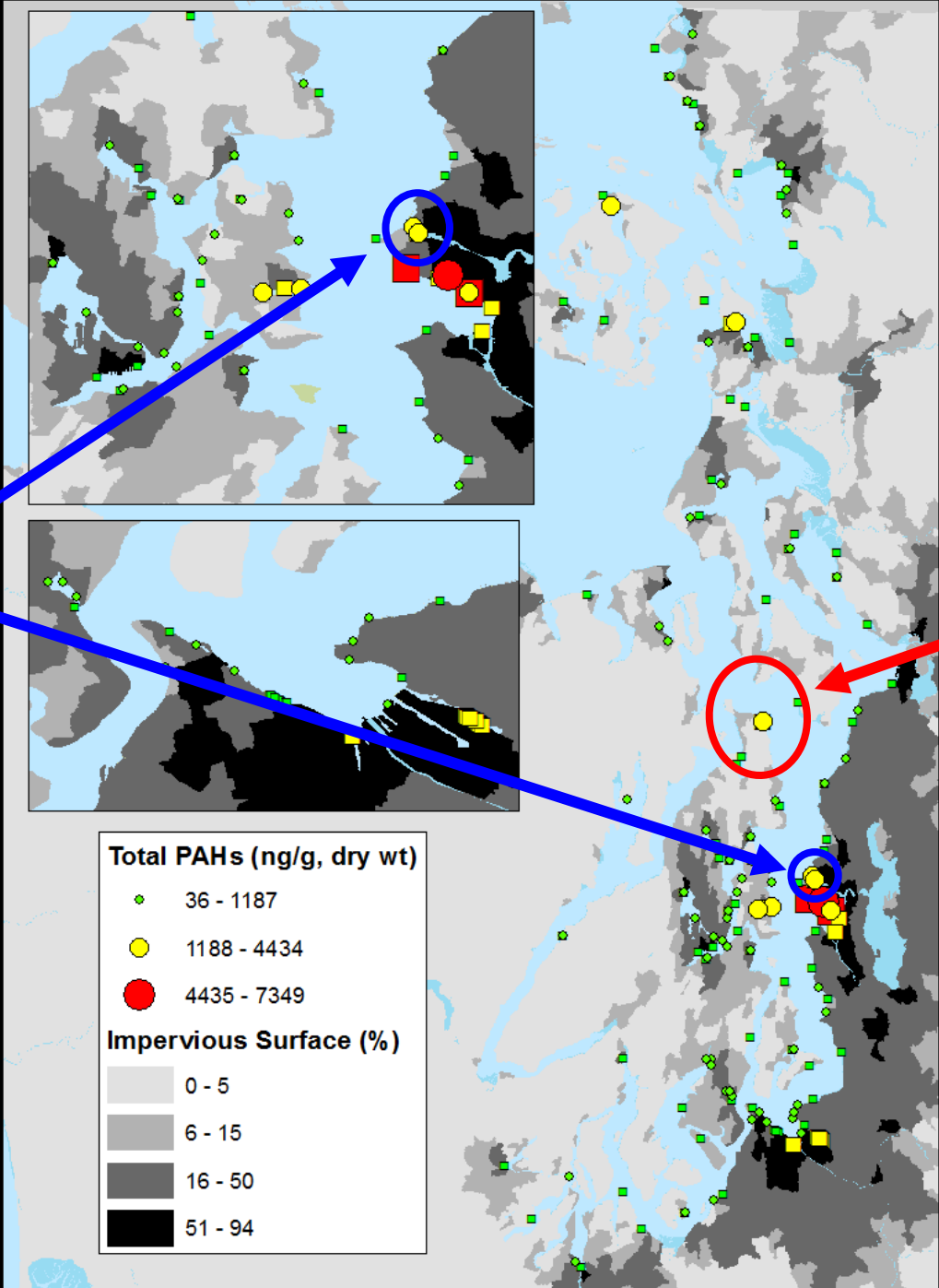
Pyrogenic
(combustion)







Salmon Bay



Point No Point

Total PAHs (ng/g, dry wt)

- ◆ 36 - 1187
- 1188 - 4434
- 4435 - 7349

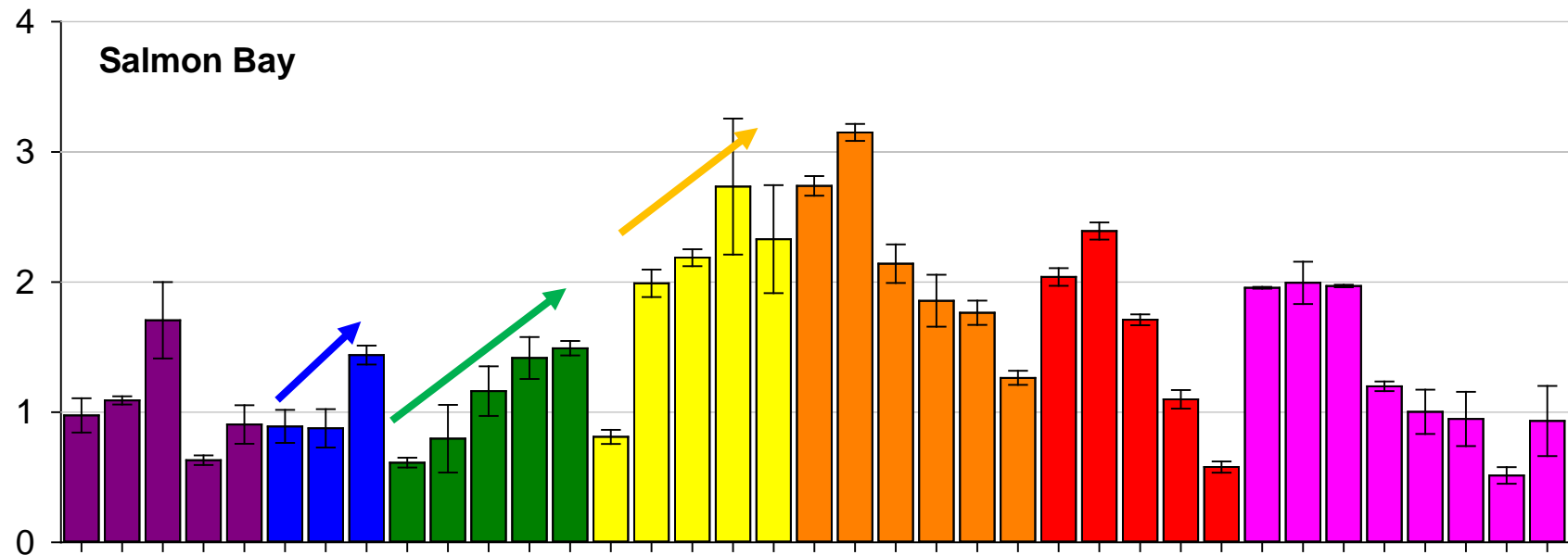
Impervious Surface (%)

- 0 - 5
- 6 - 15
- 16 - 50
- 51 - 94

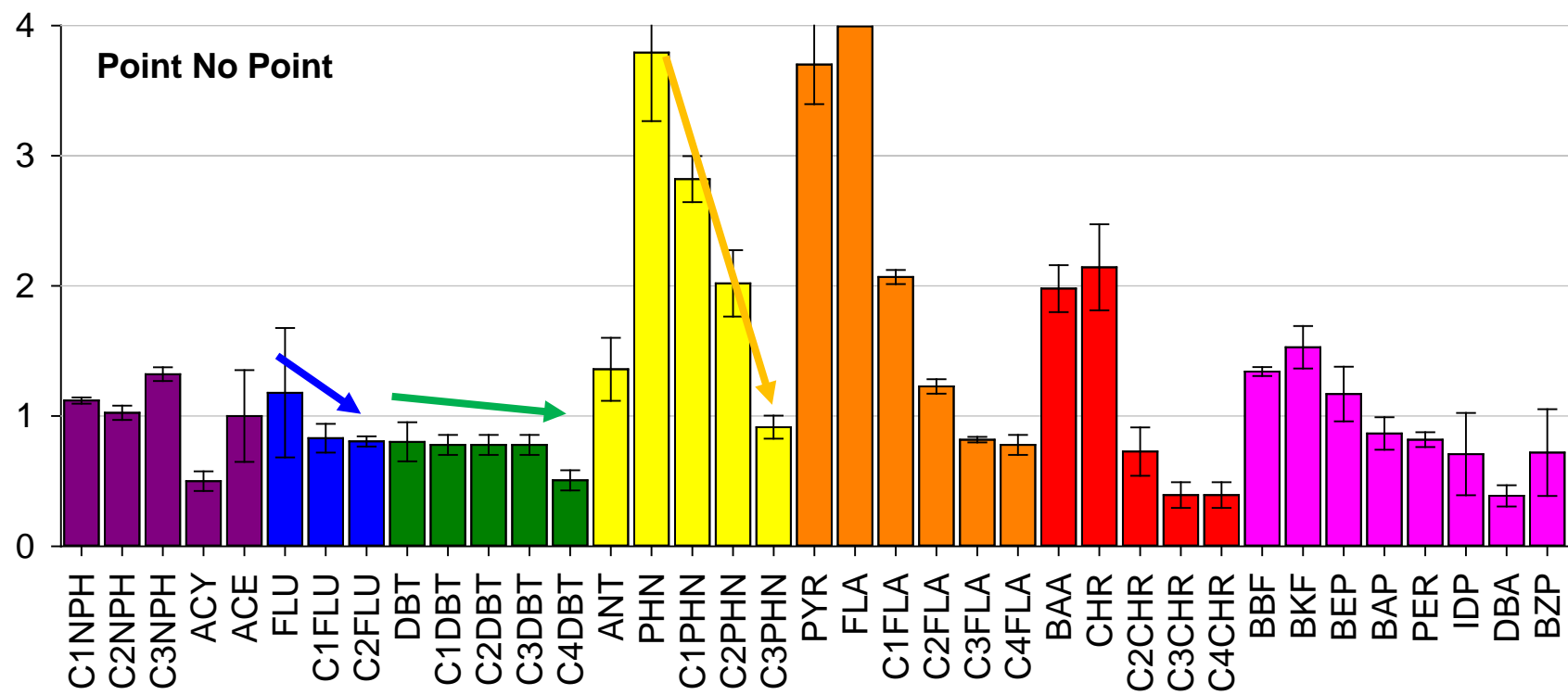
□₃₇PAHs

(standardized, square root-transformed)

Salmon Bay



Point No Point



EYES OVER PUGET SOUND

...takes aerial photos of Puget Sound water conditions on a regular basis.

Their photographic evidence of frequent oil sheens in Salmon Bay and Lake Union support our fingerprint findings.

http://www.ecy.wa.gov/programs/eap/mar_wat/surface.html



Conclusions to date

- Toxic contaminants are entering the nearshore food web of the Puget Sound, especially along shorelines adjacent to highly urbanized areas.
- Impervious surface in the watersheds adjacent to the shoreline affected the levels of organic contaminants and some metals in mussels.
- PAH patterns in mussels can help reveal potential contaminant sources.

Reports now available online:



Puget Sound Ecosystem Monitoring Program (PSEMP)

Toxic Contaminants in Puget Sound's Nearshore Biota: A Large-Scale Synoptic Survey Using Transplanted Mussels (*Mytilus trossulus*)

Final Report
September 4, 2014

Jennifer A. Lanksbury, Laurie A. Niewolny, Andrea J. Carey and James E. West



WDFW Report Number FPT 14-08

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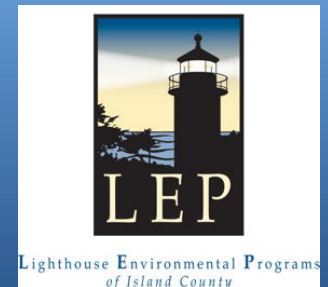
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Thank you!

