



Apr 5th, 4:30 PM - 4:45 PM

## Contaminants of emerging concern in bay mussels throughout the Salish Sea

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James, Christopher Andrew; West, James E.; O'Neill, Sandra M.; and Lanksbury, Jennifer, "Contaminants of emerging concern in bay mussels throughout the Salish Sea" (2018). *Salish Sea Ecosystem Conference*. 416.

<https://cedar.wwu.edu/ssec/2018ssec/allsessions/416>

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# Contaminants of Emerging Concern in Bay Mussels throughout the Salish Sea

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Washington Department of Fish and Wildlife



[www.eopugetsound.org](http://www.eopugetsound.org)

April 2018

# Mussel Tissue Screening for Contaminants of Emerging Concern

Objectives to monitoring activities:

- characterize exposures to marine organisms in the nearshore environment
- highlight those which are present and have potential to cause environmental risk



# Bay Mussel Sampling

Caged mussels transplanted from a single aquaculture source

Deployed for 2-3 months over winter

- 2013 for targeted
- 2016 non-targeted

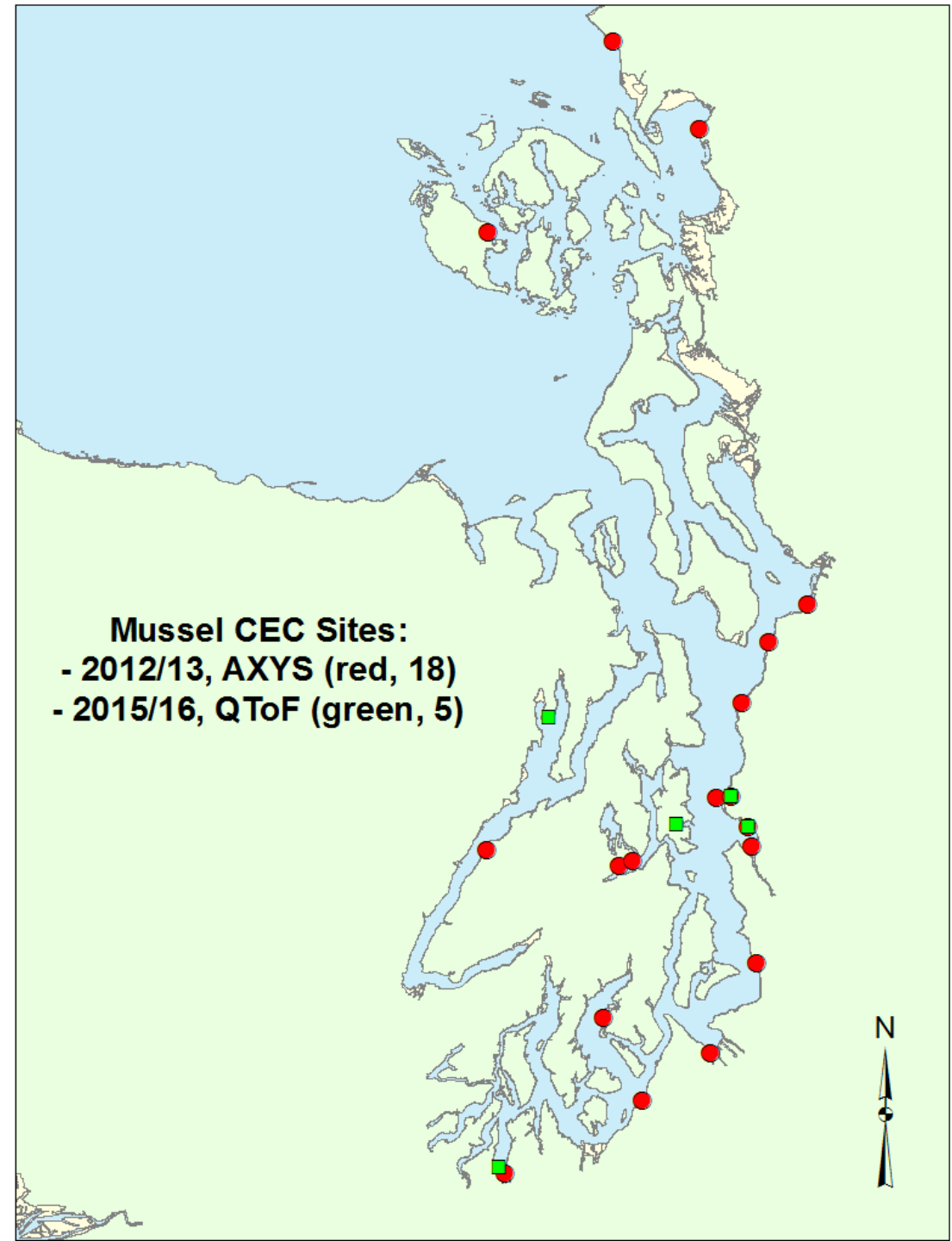
Processed and stored at -20°C until analysis

## Targeted Analysis

- Pharmaceuticals and Personal Care Products (~140 compounds)
- Nonyl- and octyl-phenols
- Pesticides
- Perfluorinated compounds

## Non-Targeted Analysis

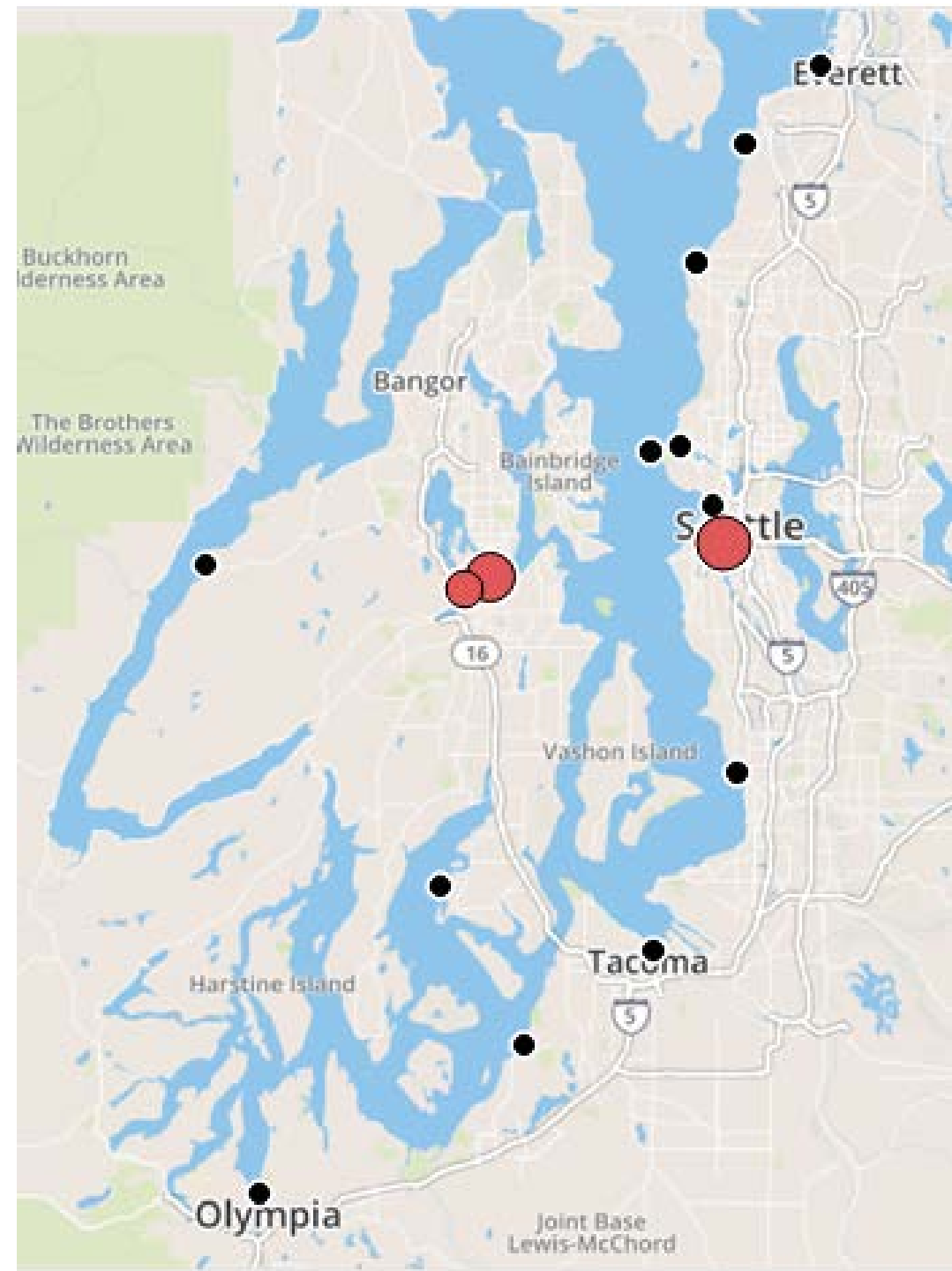
- High Resolution Mass Spectrometry



# Oxycodone

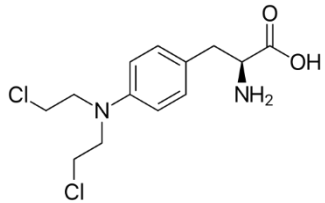
(opioid pain medication)

- 90% is metabolized in humans
- Some removal through WWTP
- Measured in WWTP effluent
- No reports in Puget Sound water
  
- May be metabolized by fish  
(likely not mussels)
- May be bioactive in fish  
(fish have opioid receptor pathways)



# Melphalan

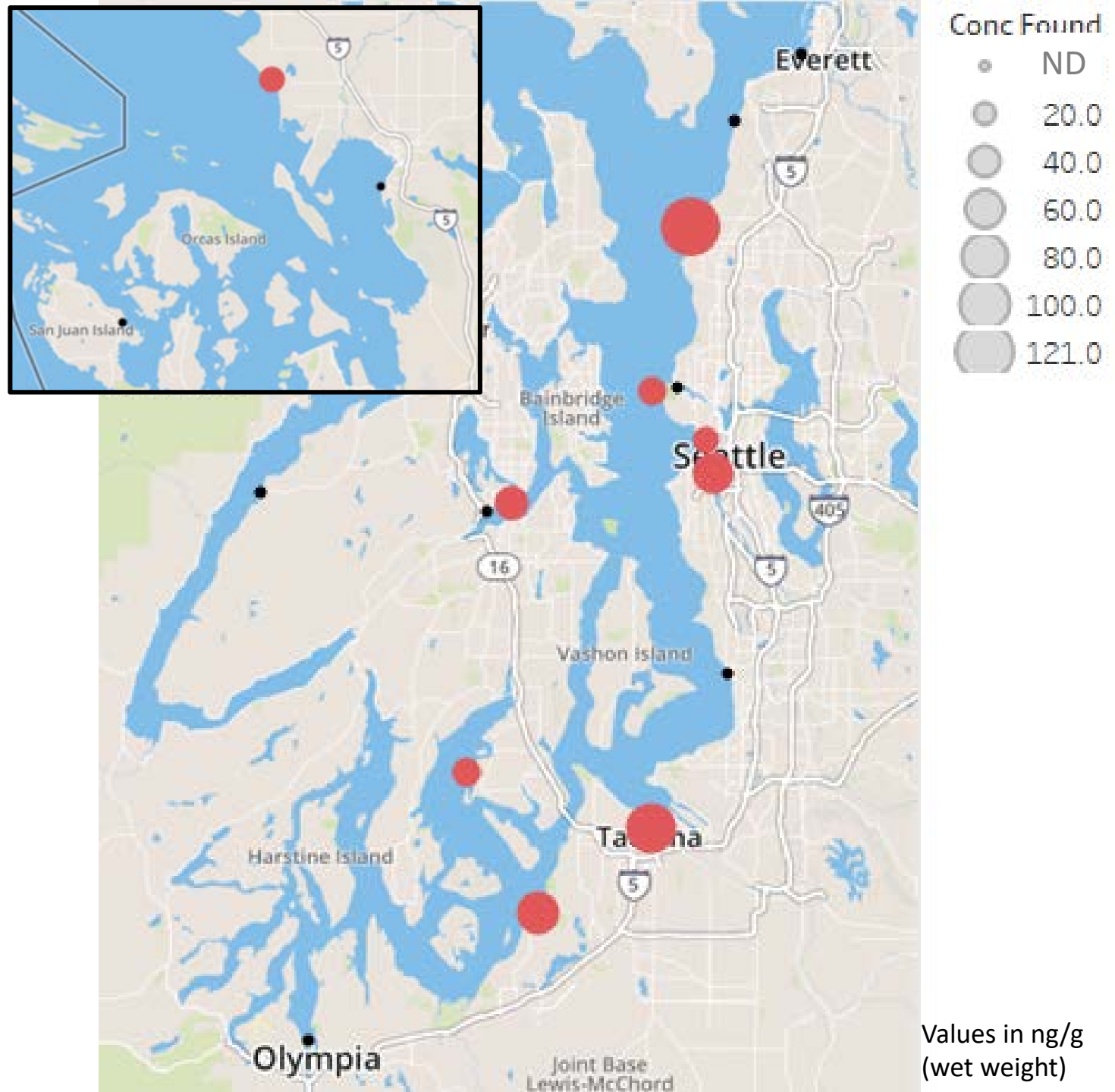
(chemotherapy drug)



Carcinogen due to DNA interactions

Potential EDC

Shown to induce heritable deletions and mutations in male germ cells (mice)



Values in ng/g (wet weight)



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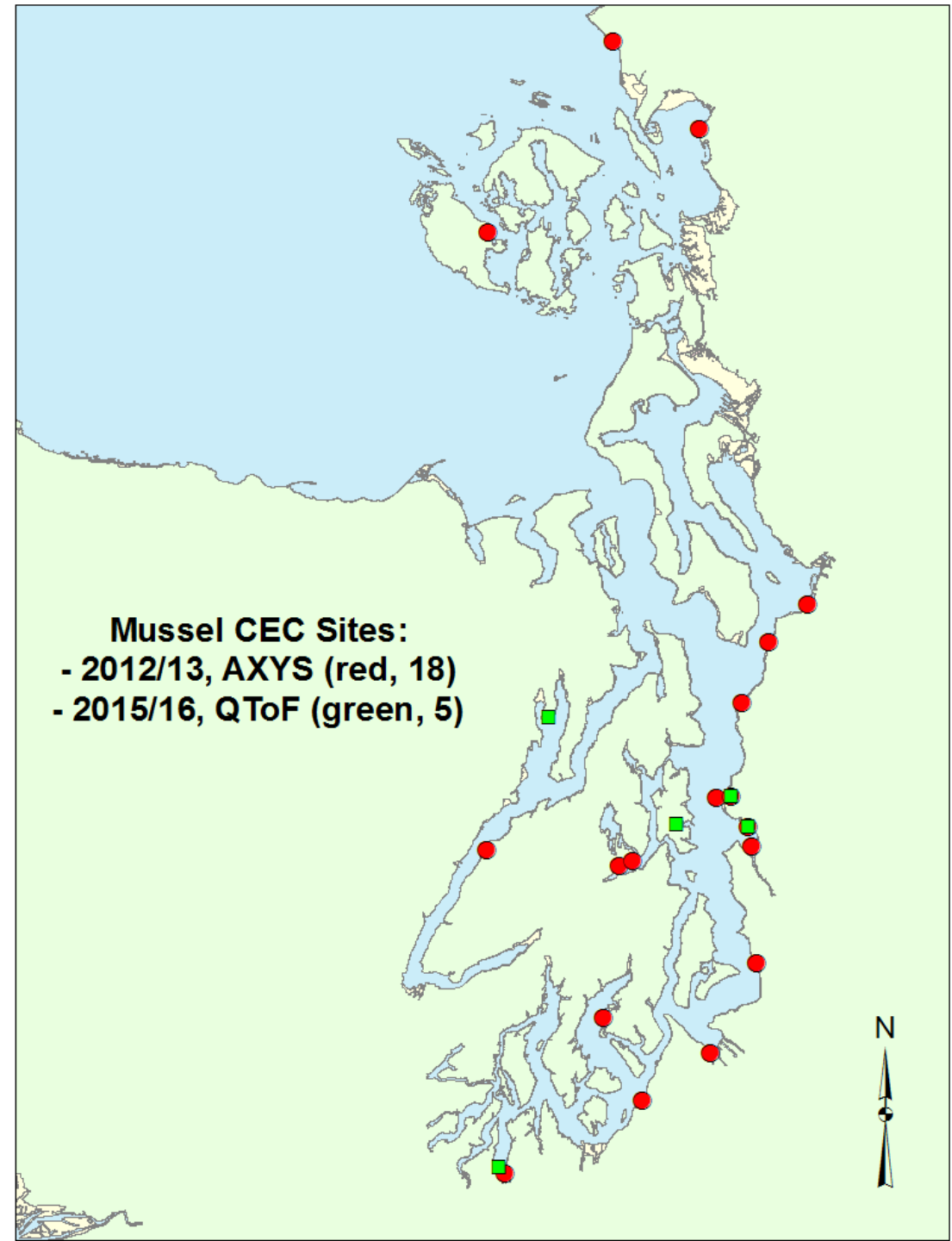
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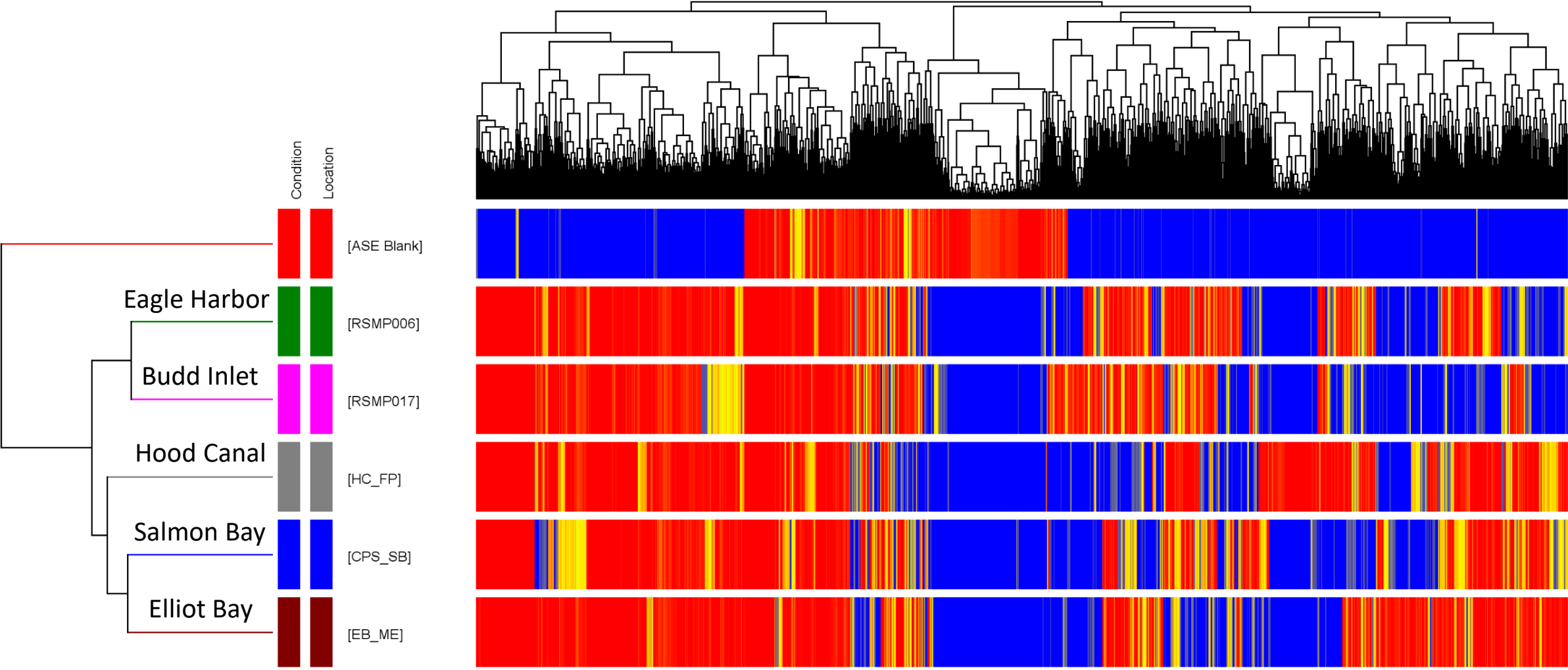
## Non-Targeted Analysis

- High Resolution Mass Spectrometry

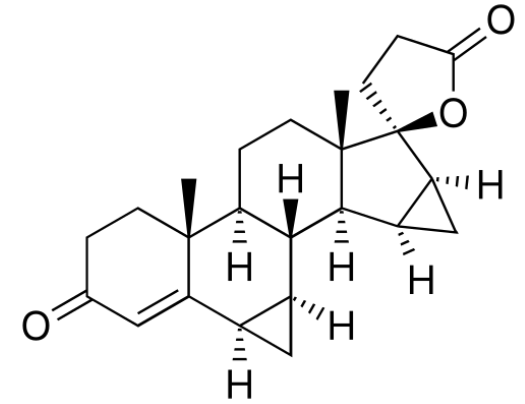
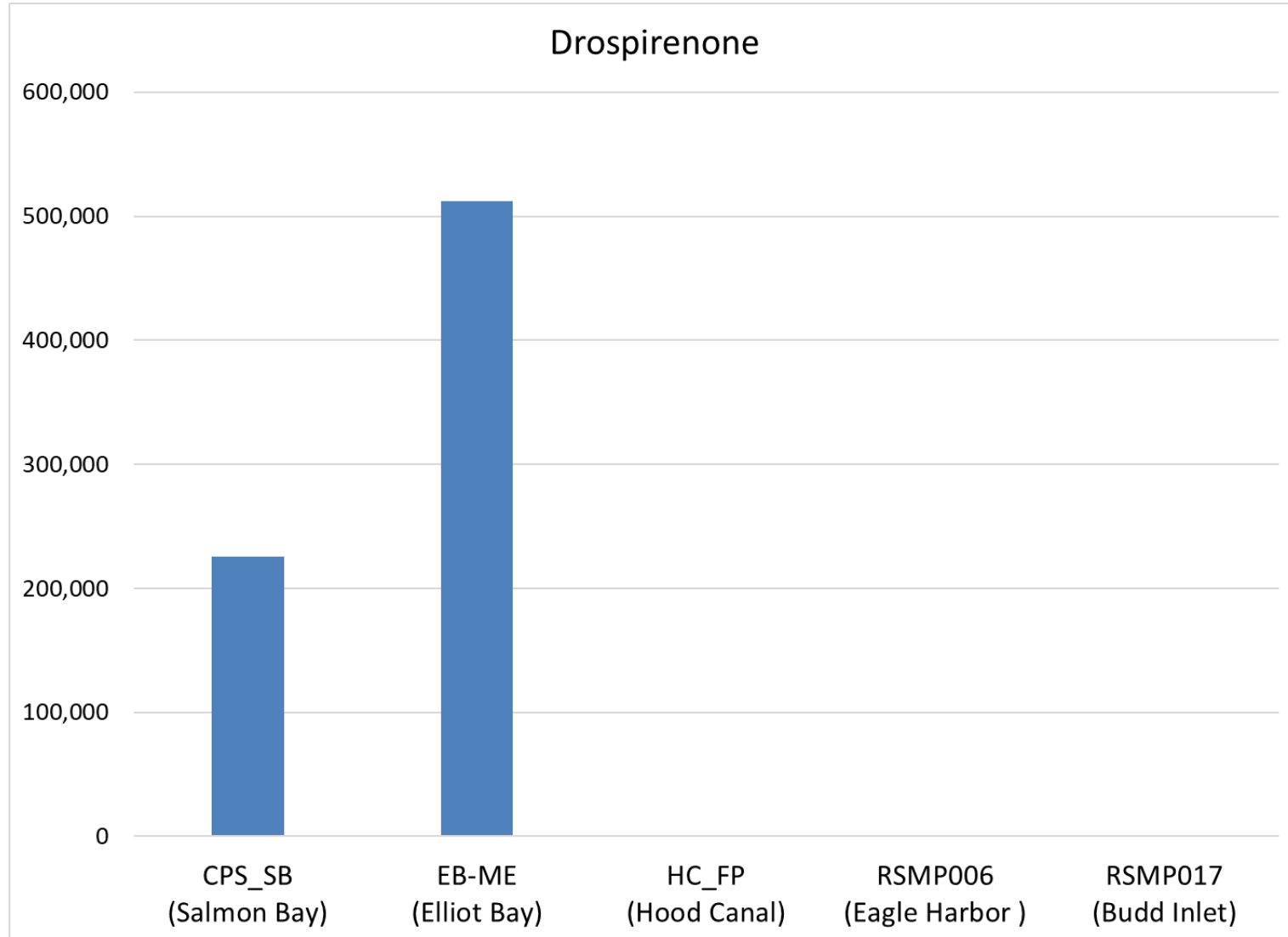




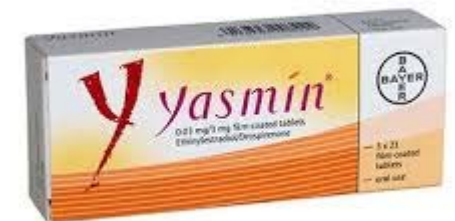
# High resolution mass spectrometry



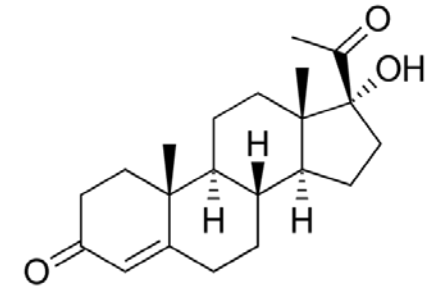
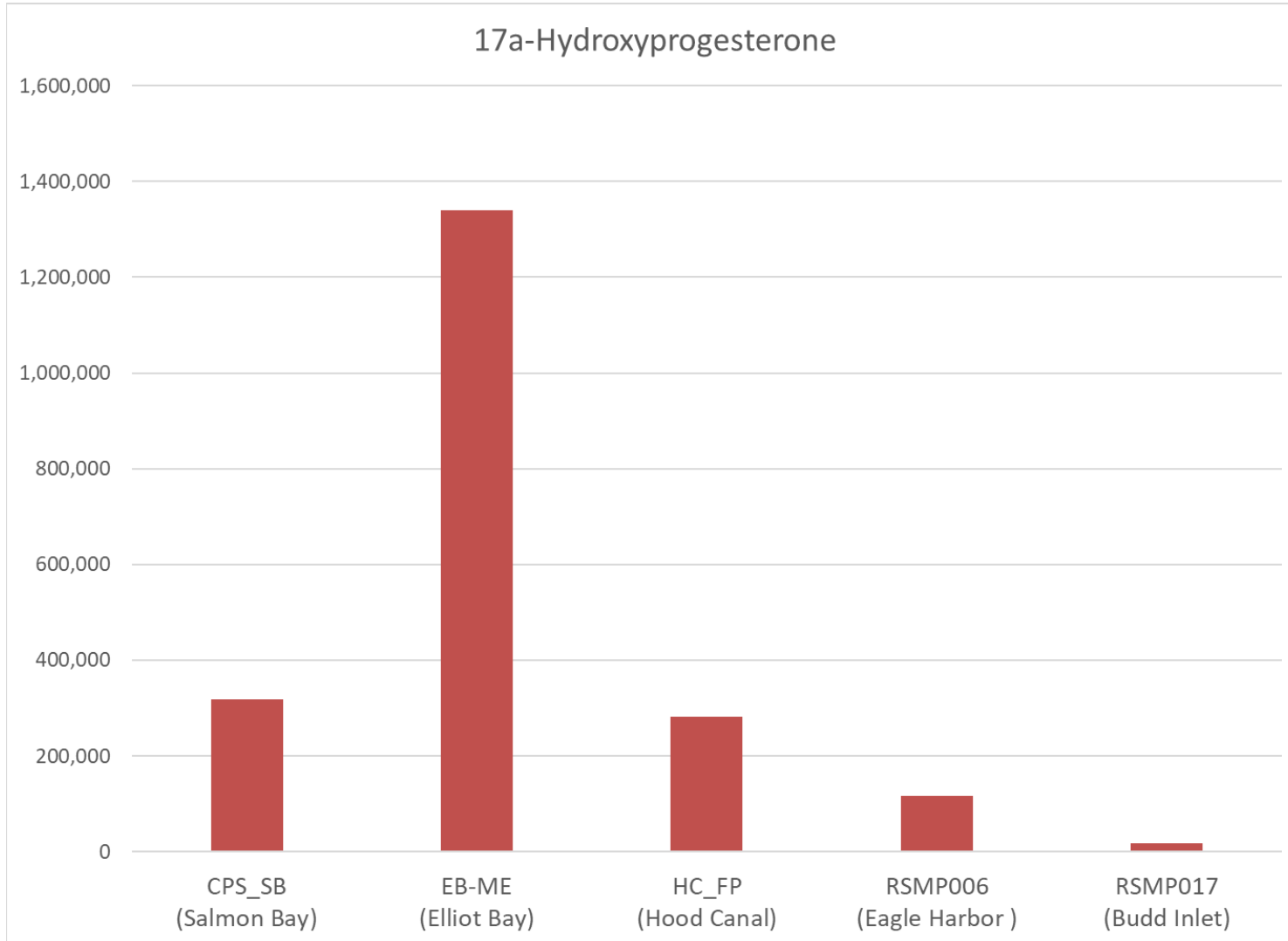
# Mussel Tissue Screening



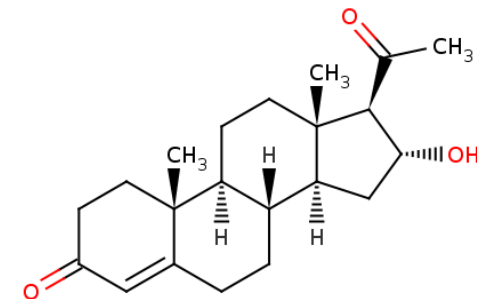
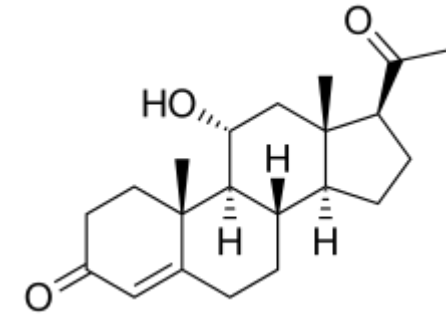
used in birth control and hormone replacement therapy



# WDFW Mussel Tissue Screening



endogenous  
progesterone  
metabolite



# Mussel Tissue Screening

- Evidence that organisms in the nearshore are being exposed to a wide range of compounds,
- Levels will probably not sufficient for toxicity, though do likely affect reproduction and health



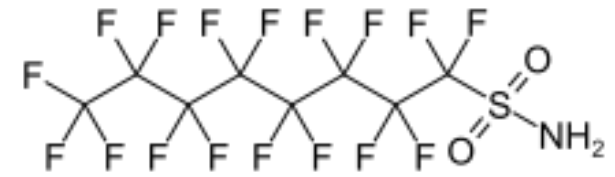
# Perfluorinated Compounds

Analyzed for 13 different compounds – result was a single detection of PFOSA (<1 ng/g wet weight)

80% of juvenile chinook had PFOS at ~10 ng/g

Lack of accumulation of perfluorinated compounds in mussels may be due to MXR transporter protein expression

Fernández-Sanjuan et al (2013)



PFOSA



PFOS

## Other compounds

### 4-nonylphenol

Breakdown product of surfactant - exposure probably widespread through Salish Sea

### Sertraline

SSRI

### Iopamidiol

Contrasting agent. Seem to persist and be present throughout

### Amitriptyline

Antidepressant. May bioaccumulate.

