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Regional patterns in seagrass distribution, and their implications for management in greater Puget Sound

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WASHINGTON STATE DEPT OF NATURAL RESOURCES

HILARY S. FRANZ
COMMISSIONER OF PUBLIC LANDS

INTRODUCTION

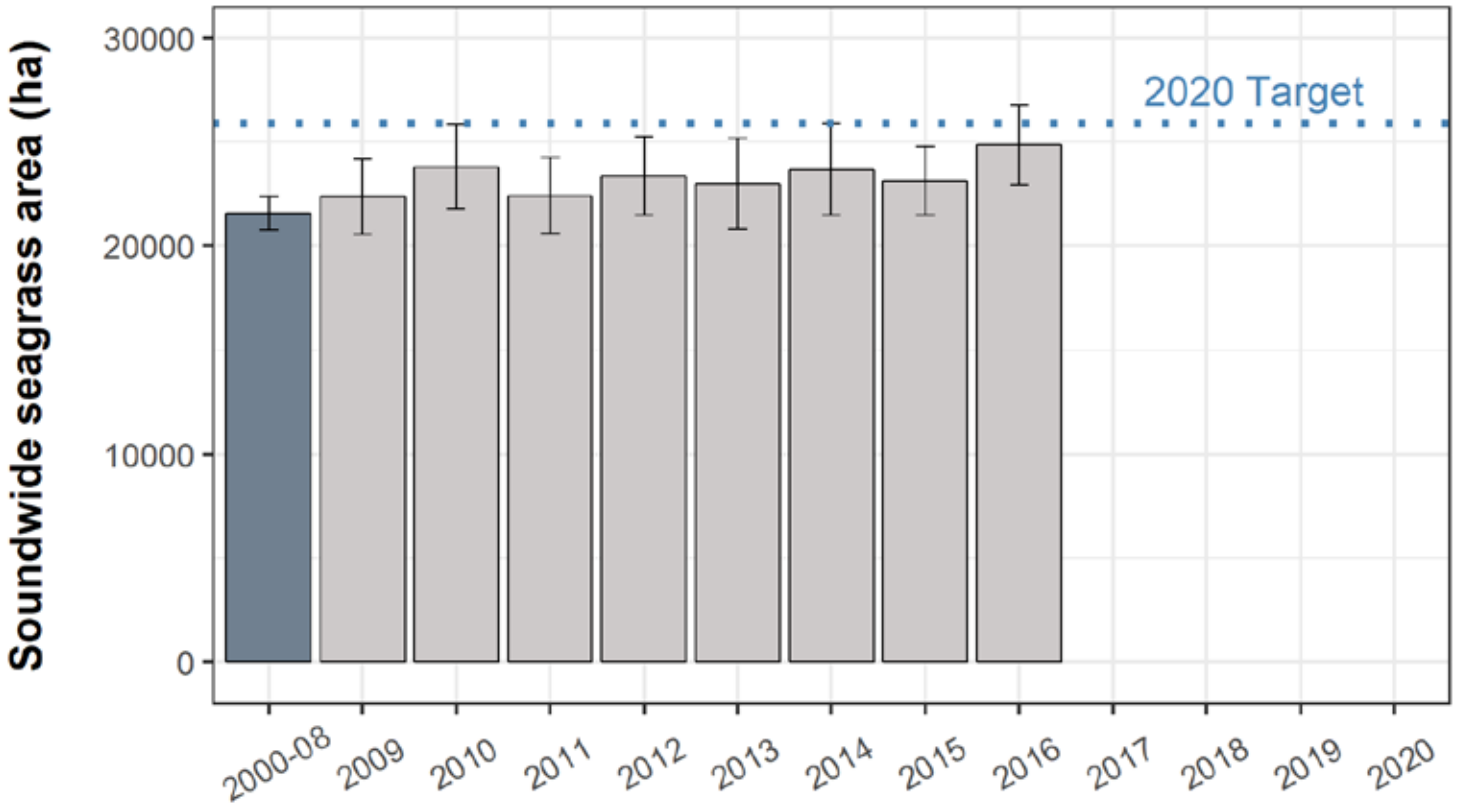
Seagrass in greater Puget Sound


Zostera marina


Zostera japonica


Phyllospadix sp.

Indicator: soundwide eelgrass area



Management target defined on a soundwide scale: 20% increase relative to 2000-2008 baseline by 2020

Advantages

- Intuitive – easy to communicate
- Good for detecting long-term / large area change

Disadvantage

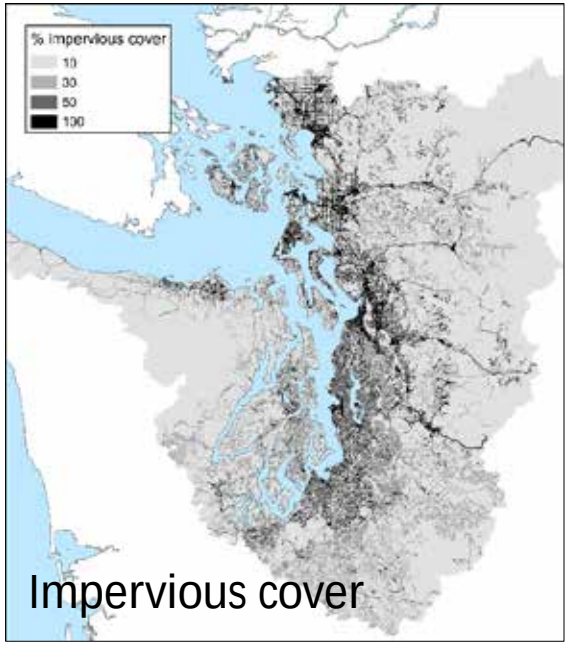
- oversimplifies complexity on smaller spatial scales

Beyond the indicator …

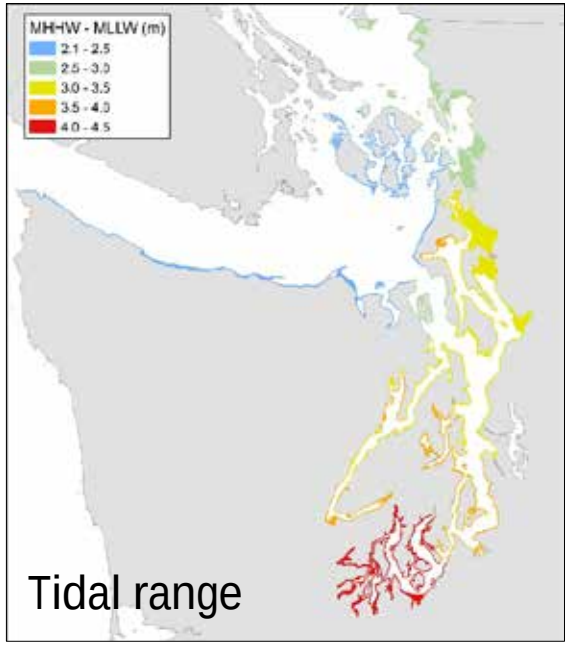
Greater Puget Sound has regional differences in

- geomorphology
- impervious cover
- tidal range
- available substrate
- water clarity
- …

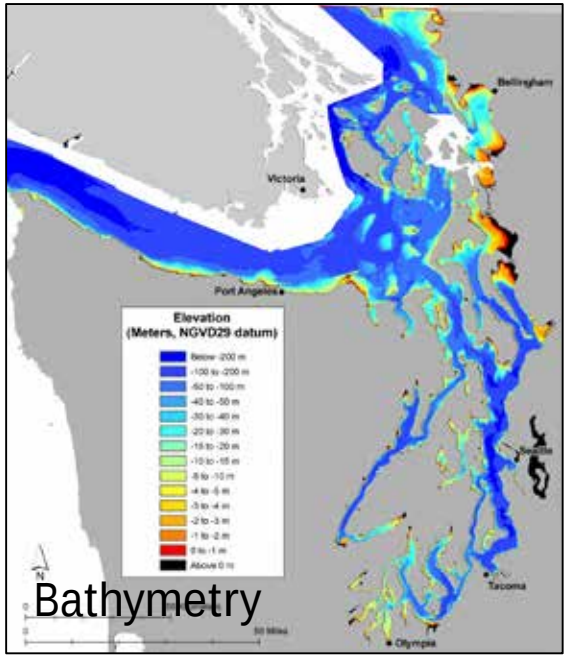
Are there regional differences in characteristics of eelgrass beds?



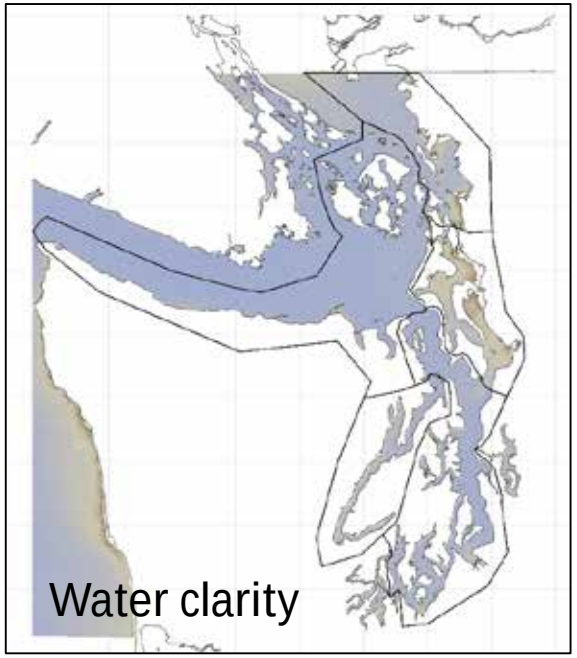
Impervious cover



Tidal range

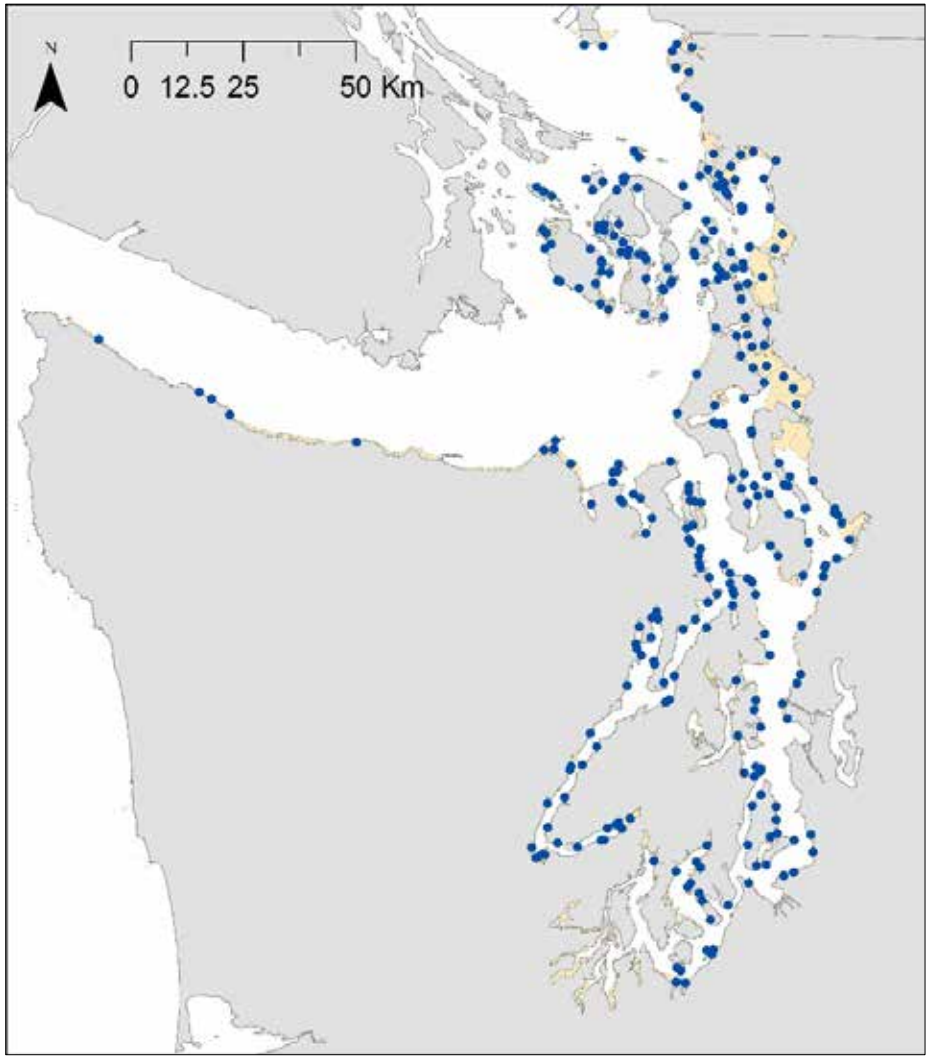


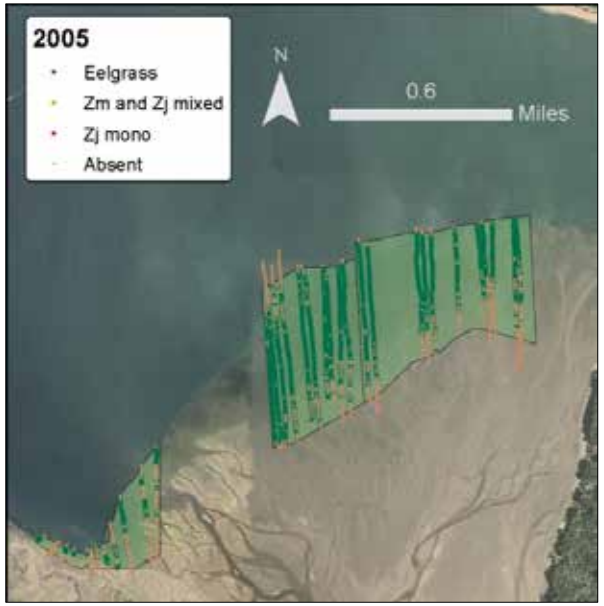
Bathymetry


Water clarity

MONITORING PROGRAM

Submerged Vegetation Monitoring Program

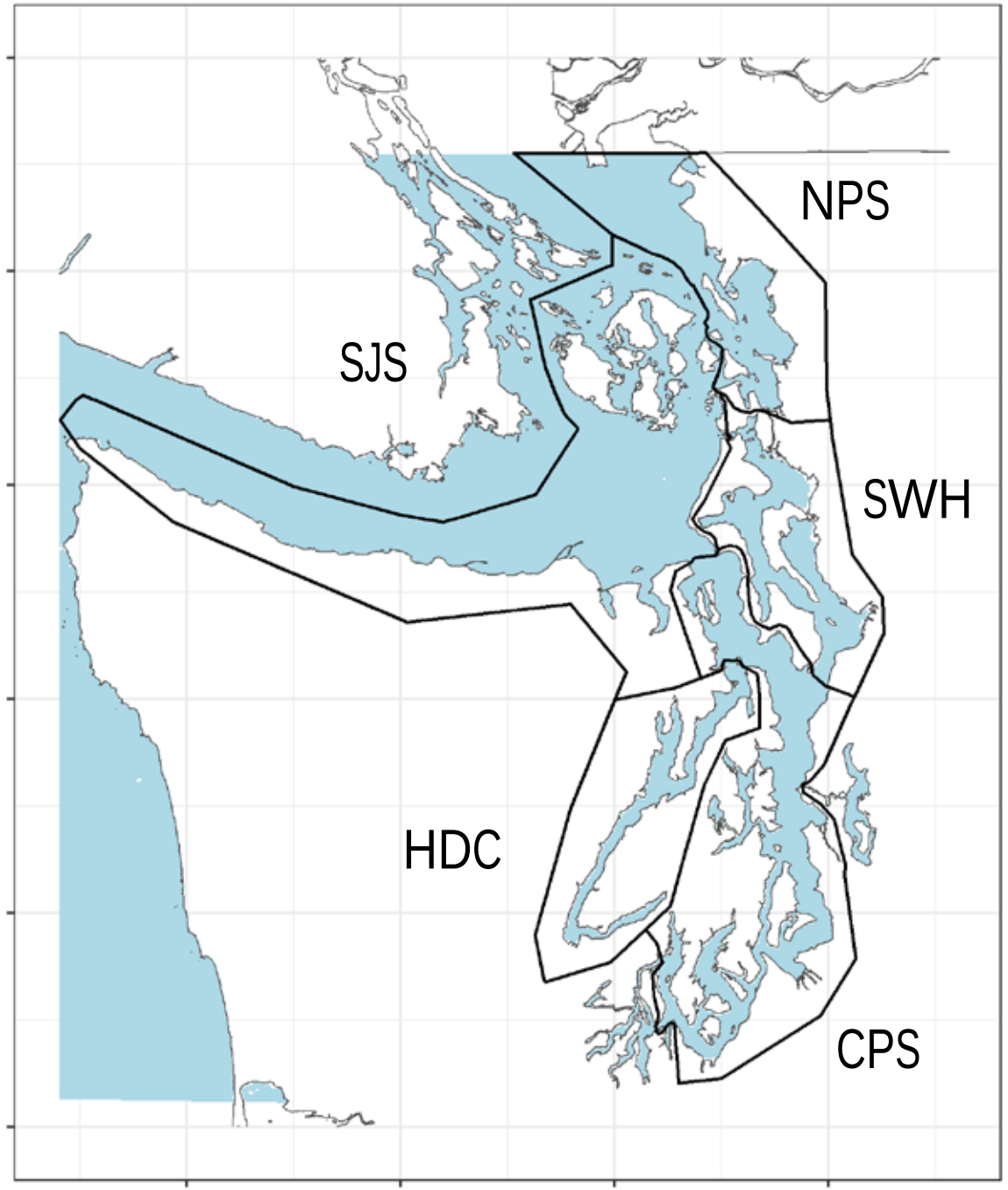




MONITORING PROGRAM

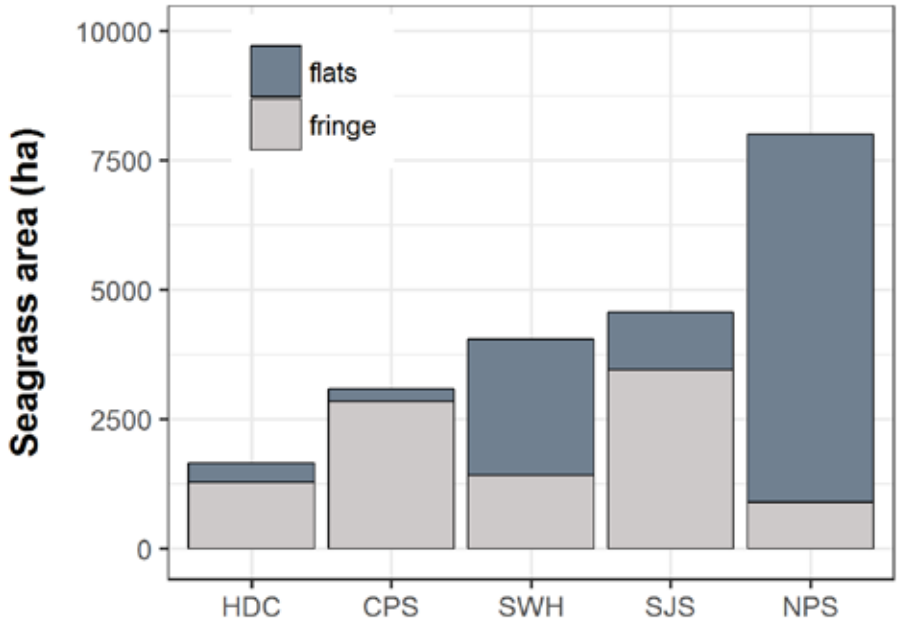
Regions in greater Puget Sound

- SJS: Strait and San Juan Islands
- NPS: Northern Puget Sound
- SWH: Saratoga Whidbey Basin
- CPS: Central Puget Sound
- HDC: Hood Canal



EELGRASS AREA

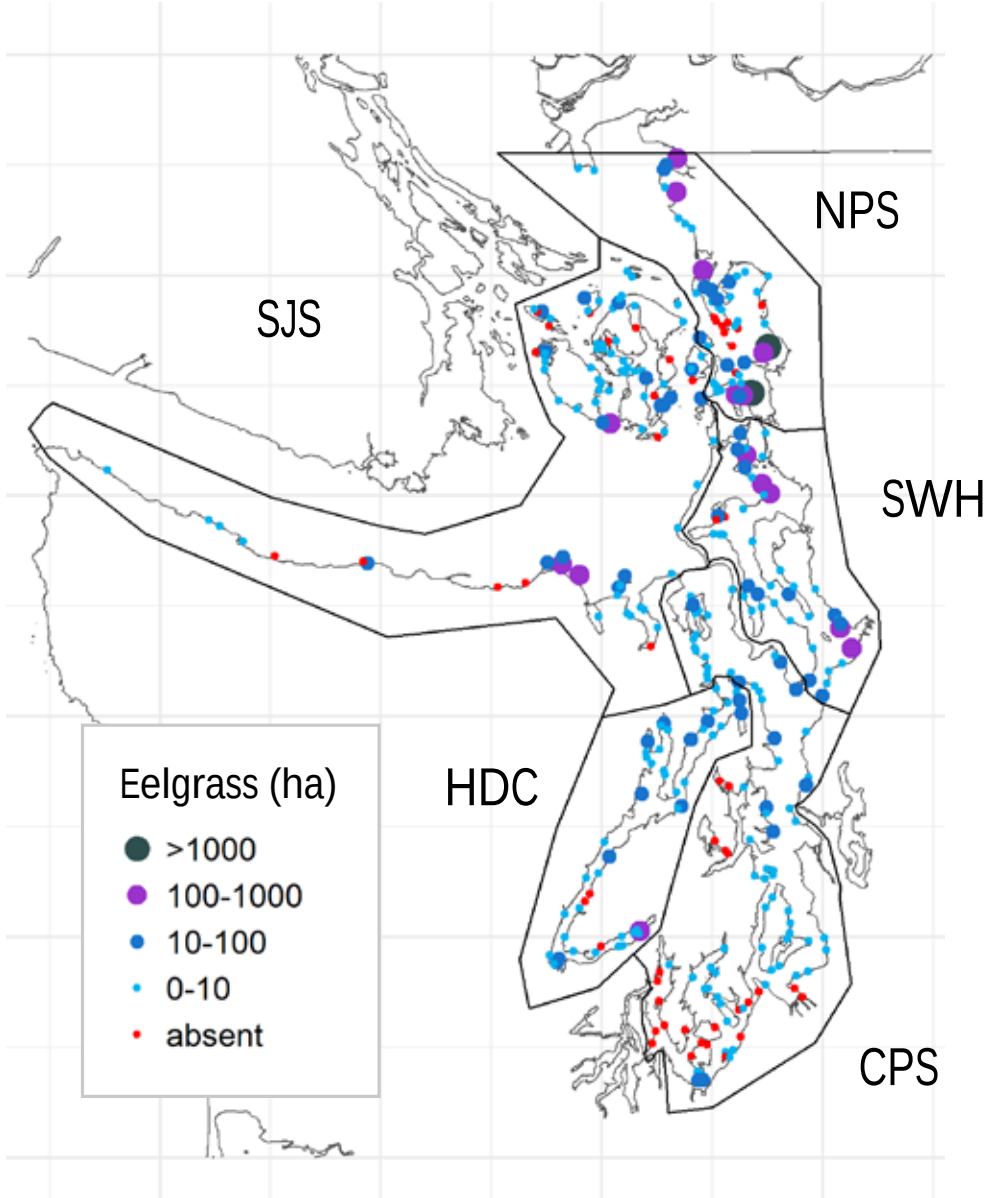
Where does eelgrass grow in Puget Sound?

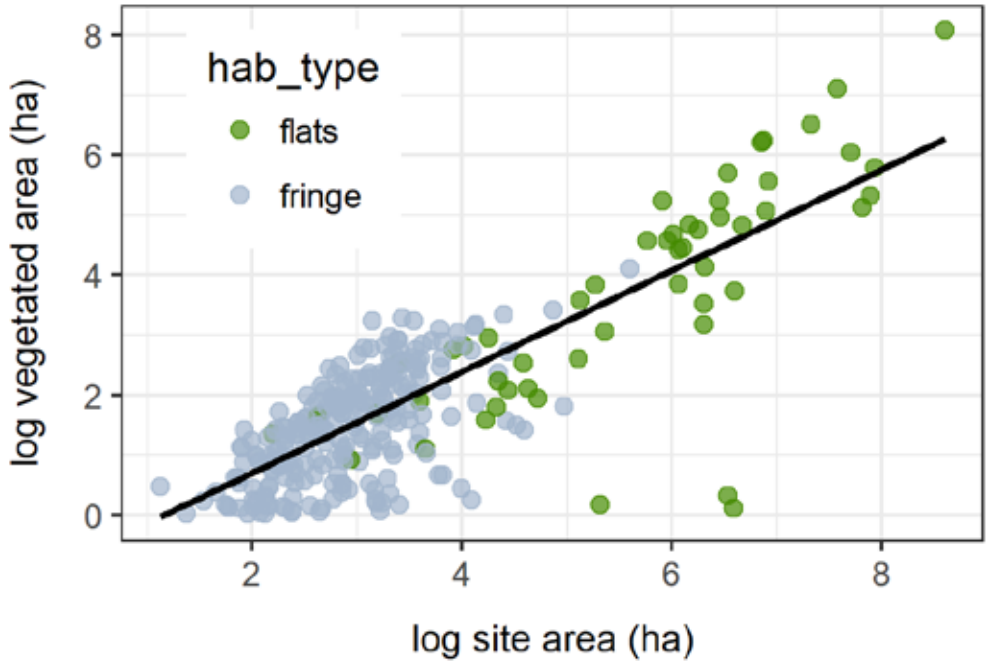


- Approximately 22,000 ha of eelgrass in greater Puget Sound
- ~ 50% of eelgrass on tidal flats (74 sites total)
- Distribution different in each region

EELGRASS AREA

Where does eelgrass grow in Puget Sound?

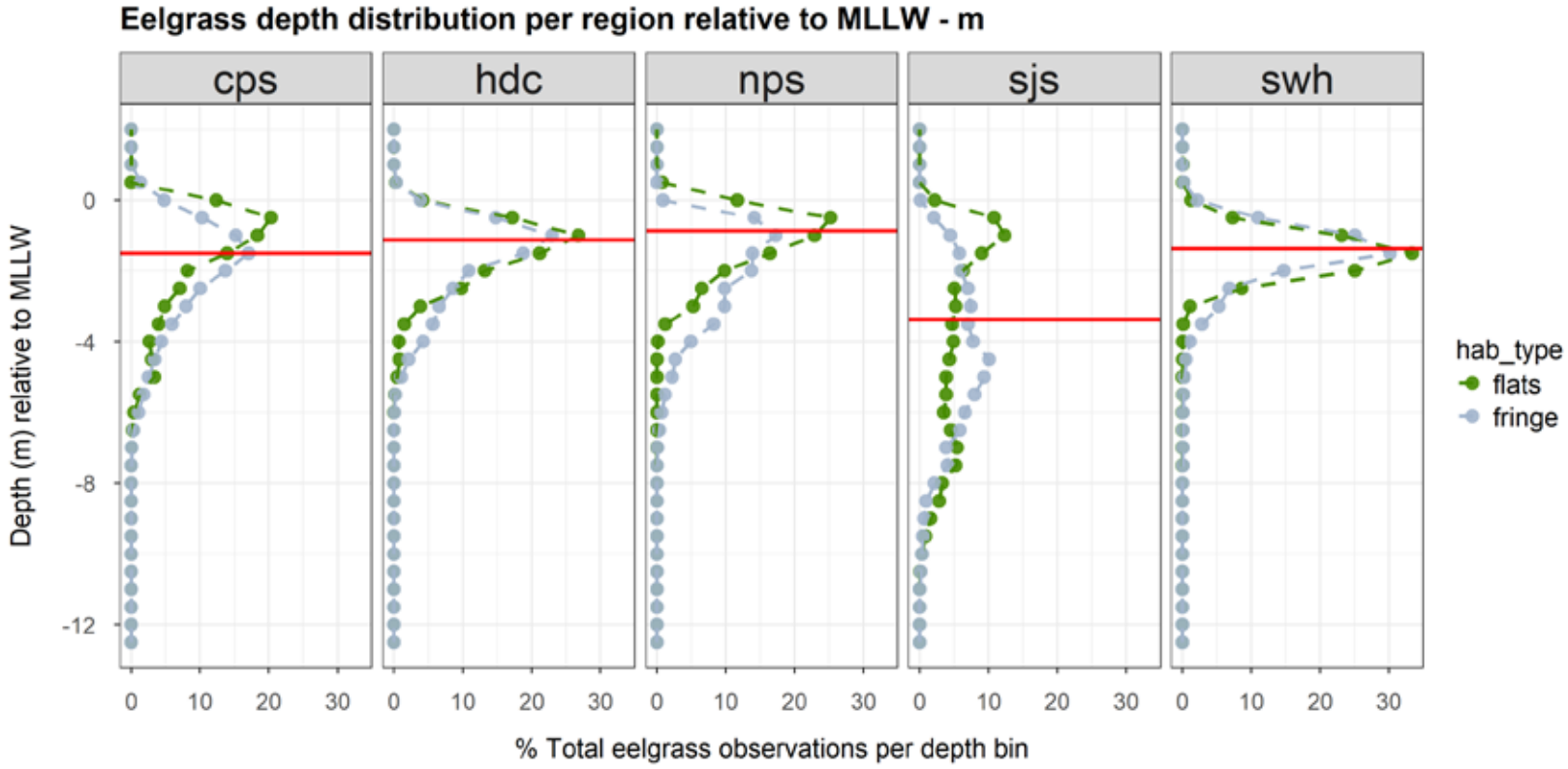




Spatial patterns in eelgrass area in part determined by the amount of available substrate

DEPTH DISTRIBUTION

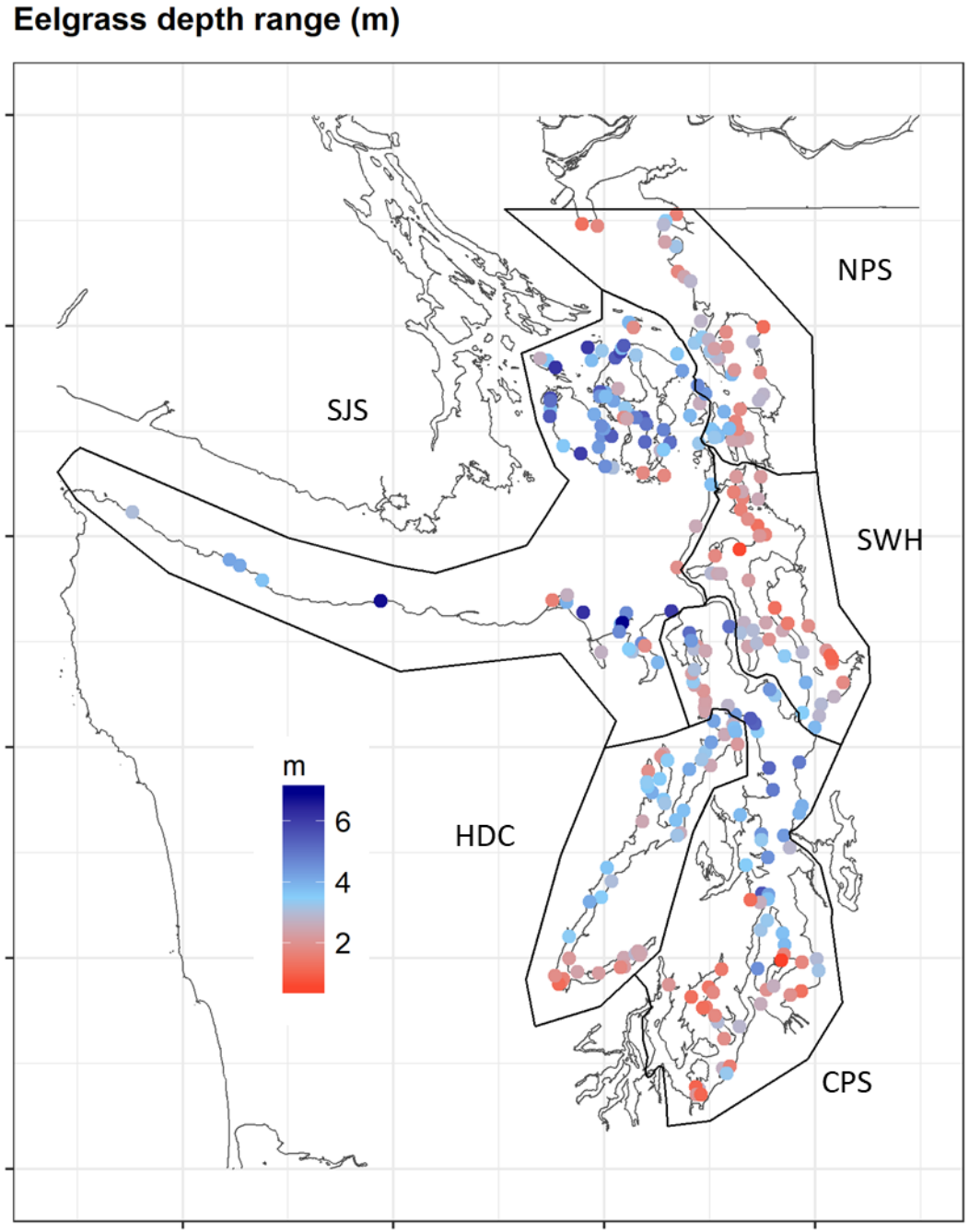
What is the depth distribution?



- Eelgrass grows between +1.4 and -12 m (MLLW)
- Optimal depth range appears to be between 0 and -4 m (MLLW)
- Different depth distribution regions / flats vs fringe

Spatial patterns

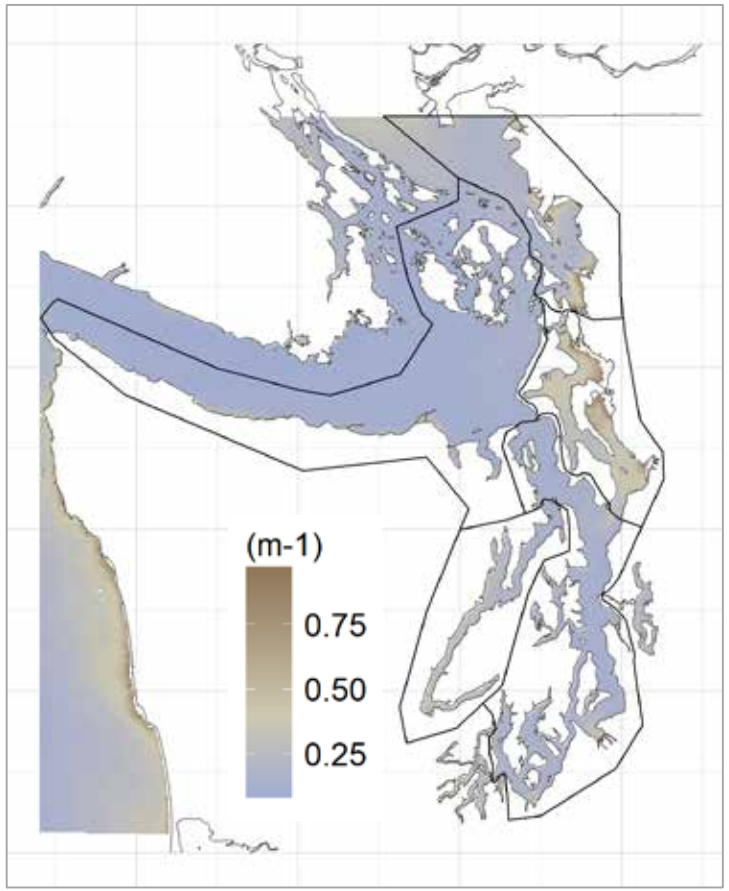
- Spatial gradients in eelgrass depth range throughout the entire greater Puget Sound
- Spatial patterns caused by natural or anthropogenic drivers?
- Can spatial patterns help identify vulnerable areas in Puget Sound?



ENVIRONMENTAL DATA

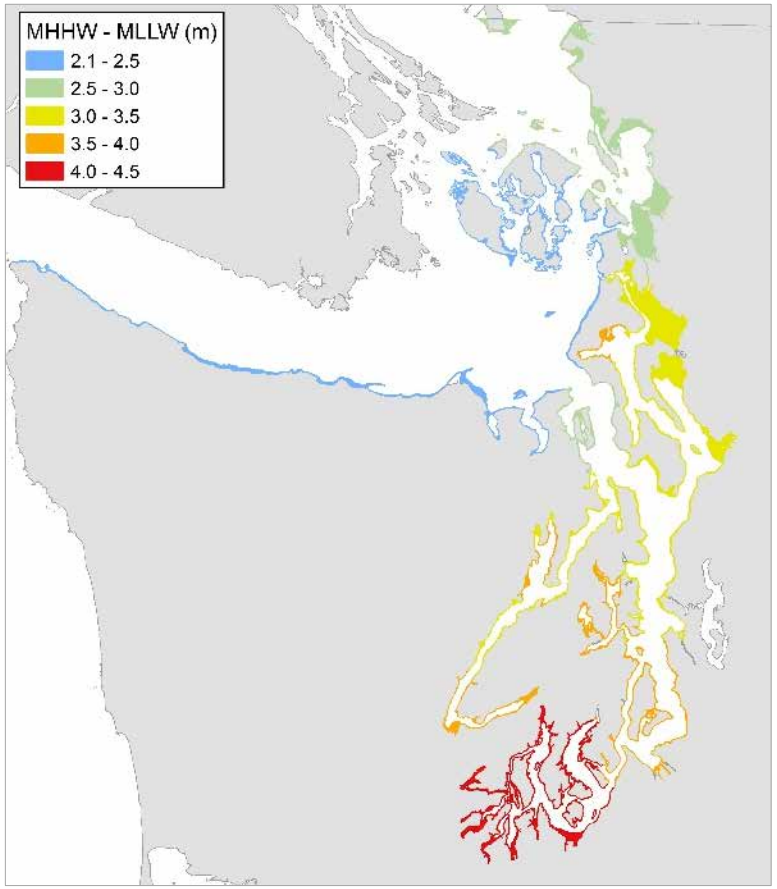
Environmental parameters

Turbidity (kd490)



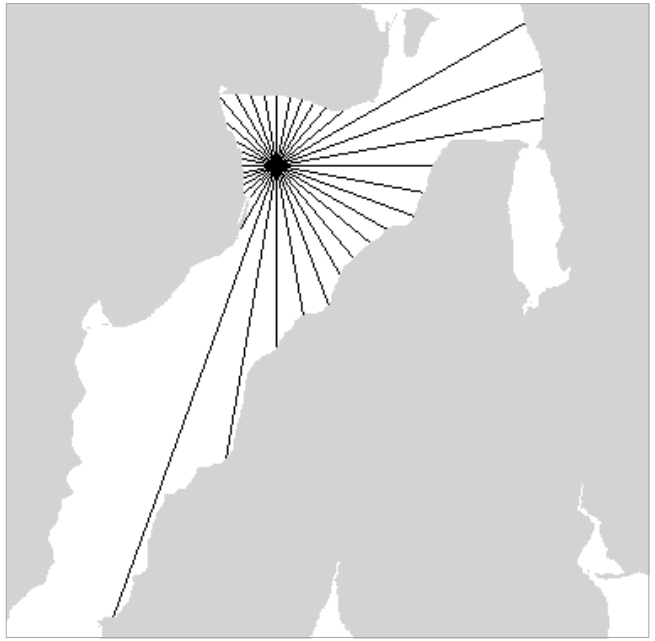
Satellite data by Brandon Sackmann, Integral Consulting

Tidal range (MHHW – MLLW)



VDATUM (NOAA)

Exposure (Fetch)

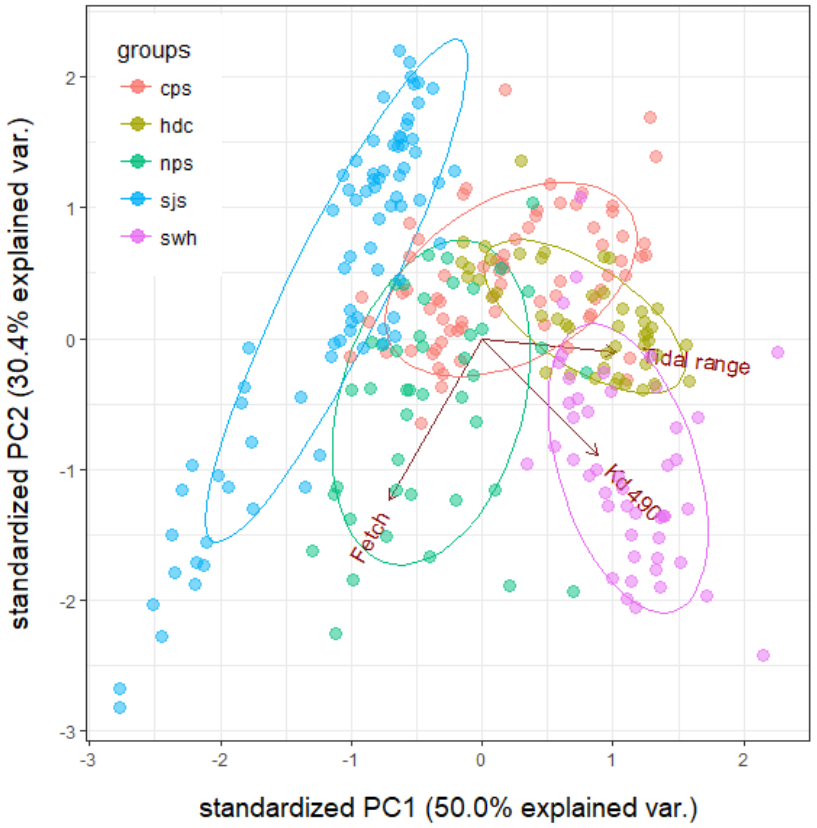


FetchR

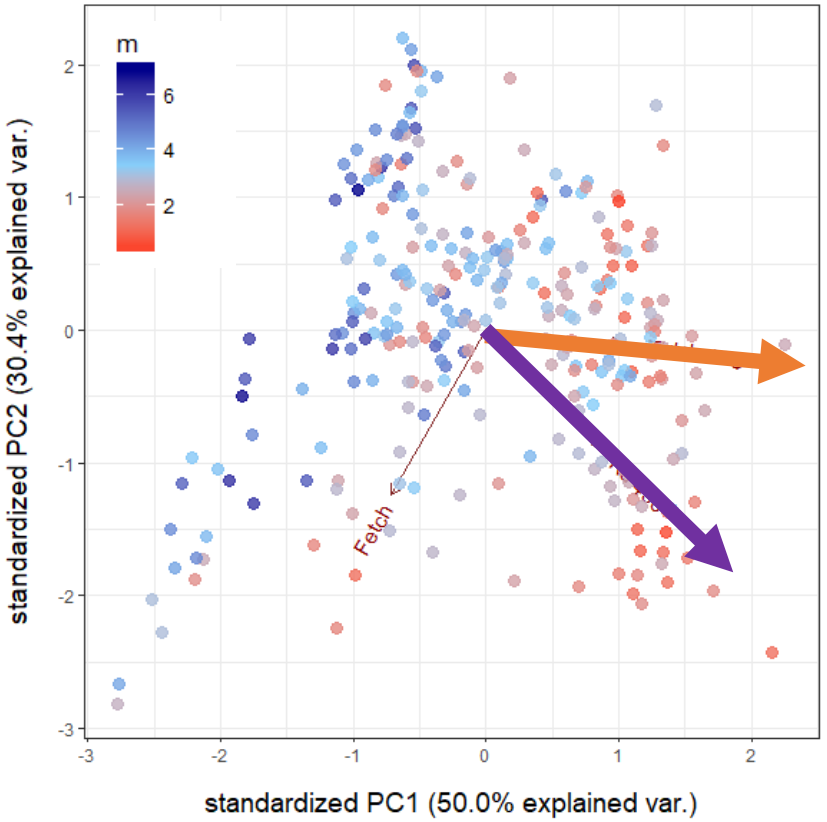
ENVIRONMENTAL DATA

PCA analysis of environmental parameters

Region



Eelgrass depth range



Eelgrass depth range becomes narrower with increasing turbidity and tidal range

IMPLICATIONS FOR MANAGEMENT

Implications for management

1. Soundwide eelgrass area: important regional performance measure

- Intuitive, easy to communicate
- Large scale / long term trends

2. Eelgrass area not evenly distributed

- Size of eelgrass beds vs. available habitat
- Different distribution (flats/fringe) in depending on region
- Different function (blue carbon vs. migratory corridors for salmon)?

IMPLICATIONS FOR MANAGEMENT

Implications for management

3. Approximately 60% of eelgrass grows in the subtidal:

- Large fraction on State Owned Aquatic Lands

4. Patterns in eelgrass depth range:

- Smallest depth range : Saratoga Whidbey, South Puget Sound and lower Hood Canal
- Longer residence times / high turbidity / high tidal range

5. Areas of concern: narrower depth range = more vulnerable to disturbance, as eelgrass is more limited in available habitat.

Acknowledgements

- Jim Norris & Ian Fraser, Marine Resource Consultants, field work
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