RETURN TO EQUILIBRIUM: MONITORING THE RECOVERY OF A SALT MARSH IN KINGSTON, WA

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Background

- Salt marshes protect coasts from extreme weather events and preserve water quality.
- Many salt marshes have been converted into riparian woodlands due to land use such as agriculture and infrastructure.
- Considerable effort to restore salt marshes have been taken in recent years.

Figure 1: West Kingston Bridge after 2018 construction, returning tidal flow from Puget Sound.

- However, the transition of riparian woodlands into salt marshes is not well documented. Thus, there is a need to identify appropriate monitoring methods.

Question

What are effective methods of monitoring the restoration of salt marshes?

Internship

- Interned at **Stillwaters Environmental Center.**
- The removal of two culverts in the Carpenter Creek Estuary has returned tidal flow in the salt marsh (Figure 1).
- My project was focused on examining the relationship between the increased soil salinity and the declining health of Red Alder trees.

Methods

- Collected quantitative data on the growth and health of red alder trees along salt marsh edge.
- Measured soil salinity with Hanna meter, measuring electrical conductivity, which was converted into PSU (practical salinity unit).
- Conducted a literature review to better understand methods used by researchers to record tree health.

Figure 2: Hanna Meter measuring conductivity of soil sample mixed with distilled water.

Results

Figure 3: Crown loss in trees.

Comparing Crown Loss with Salinity:

- Each tree was classified on a scale of 1-4 based on their crown coverage (1=healthy, 4=dead) (Figure 3).
- The trees with the least crown coverage tended to be closer to the marsh edge, which had the saltiest soil.
- A significant downfall of this approach is that it only captures a moment in time, rather than changes over years.

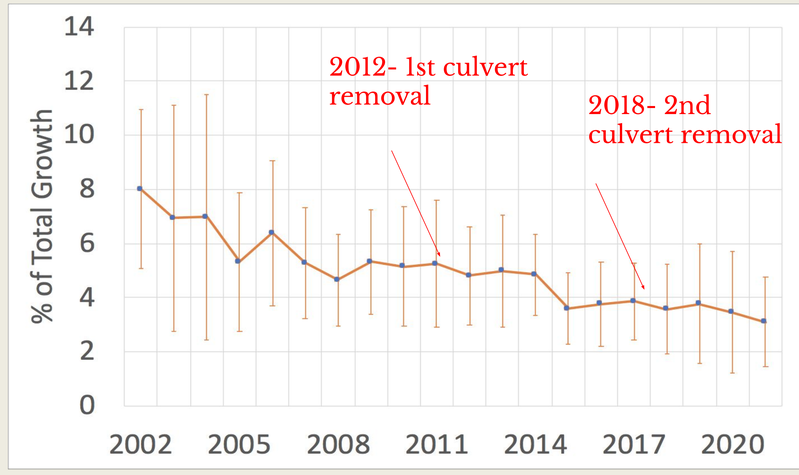

Figure 4: The mean ring width of the alder trees as a percentage of its growth from 2002 to 2021.

Comparing Alder Tree Rings with Salinity:

- The alder trees showed a decline in growth year after year with higher salinity soils.
- Using tree rings can be very effective because each ring correlates to one year of growth, making it easier to track when certain events may have influenced its growth (Figure 4).

Significance

- By expanding tree core monitoring to the entire perimeter of a salt marsh, it could be an effective procedure for tracking the long term transition of riparian woodlands into salt marshes.
- Monitoring salt marsh restoration projects can serve as a proxy for how similar ecosystems may cope with sea level rise in the future.

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