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Explaining foreshore vegetation die-off

BCS Rivers and Estuaries Science

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Project Team granted
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Context

At key locations in the Swan Canning Riverpark there is evidence of riparian decline. At Guildford, widespread die-off of *Eucalyptus rudis* (flooded gum) has occurred and *Phytophthora* pathogens are suspected to play a role. However, this is a complex issue and a range of adverse environmental changes can influence the disease. There is potential to link LiDAR data, vegetation survey, information on plant water requirements, salinity tolerance and hydrodynamics in order to better understand the vegetation decline. The Swan Canning Estuary Response Model, housed at UWA, will be used for this purpose. An associated study being undertaken by Murdoch University is exploring pathogen presence and soil influence on vegetation decline at Guildford. Together these investigations will work to understand what may be causing the decline in vegetation in that area.

Aims

- Use remote sensing to identify and map historic vegetation condition change.
- Combine field survey and model development to determine to what extent hydrodynamic changes (inundation extent, period and salinity) have contributed to the vegetation decline at agreed locations in the Swan-Canning Riverpark.
- Investigate tree health by examining leaf nutrients, pathogen presence, soil moisture, nutrients and mycorrhiza.
- Trial phosphite injection and nutrient implants as treatment option to combat *Phytophthora* for affected flooded gum in the Guildford area.
- Predict where future change is likely to create heightened risk of tree decline, and make recommendations for remediation and revegetation approaches, and future research.

Progress

- Groundwater salinities were high (approximately one-third of seawater) driven by accumulation of surface salts following high water events (greater than 1m AHD), and via subterranean movement of river water into the floodplain aquifer (summer/autumn).
- The Swan Canning Estuary Response Model was linked with LiDAR data to provide a domain that extended into the riparian zone and enabled simulation of water levels, inundation and salinity. This enabled creation of local and regional habitat-salinity risk maps for 2008-2018 and a drier climate for 2050.
- The phosphite injection and nutrient implant trial involved community participation. At the Helena confluence in Guildford, 120 trees, divided into 30 groups of four trees were treated either with phosphite; nutrient implant (Phoscap®), phosphite or Phoscap® combined; or left untreated.
- None of the treatments were effective and did not result in significant health responses in the tree canopies, as determined by three health measures, over the 12 months of monitoring.

Management implications

- The model provides an exploratory tool to view the sensitivity of riparian zones under forecast hydrodynamic conditions. Low lying, poorly drained areas between Bayswater and Guildford are at greatest risk of tree decline under hydrodynamic projections.
- Site scale appraisal of drainage and surface water to enhance freshwater flushing and / or groundwater freshening may be required to address salinity in areas where flooded gum are at high risk. Where this is not possible, revegetation approaches should focus on salt tolerant species.
- Salinity intrusion into the Helena confluence area may be making flooded gums more susceptible to *Phytophthora* and rendering treatment approaches ineffective. Flooded gum revegetation should be focussed in low to moderate risk areas.

Future directions

- This study is complete.