

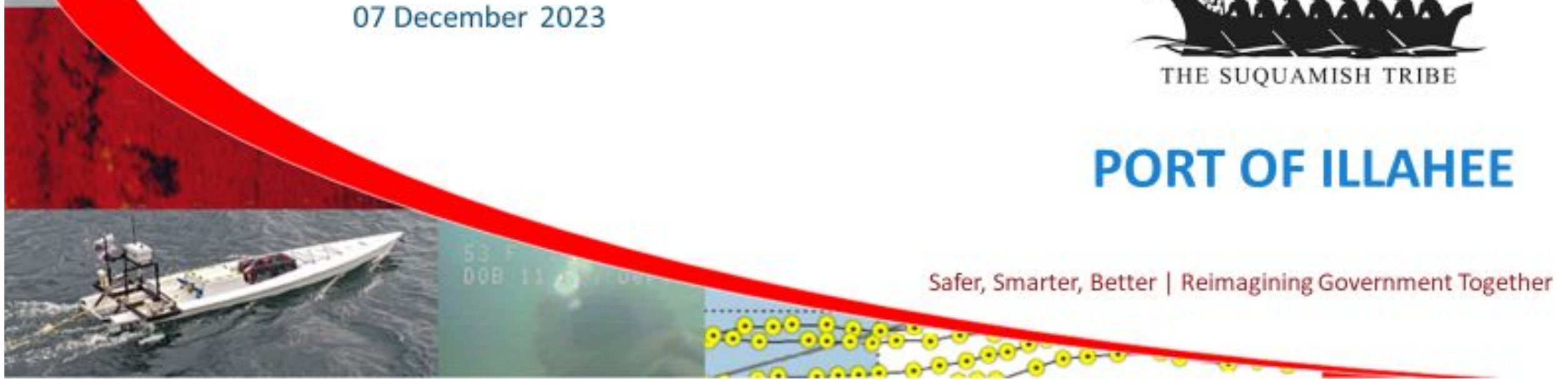


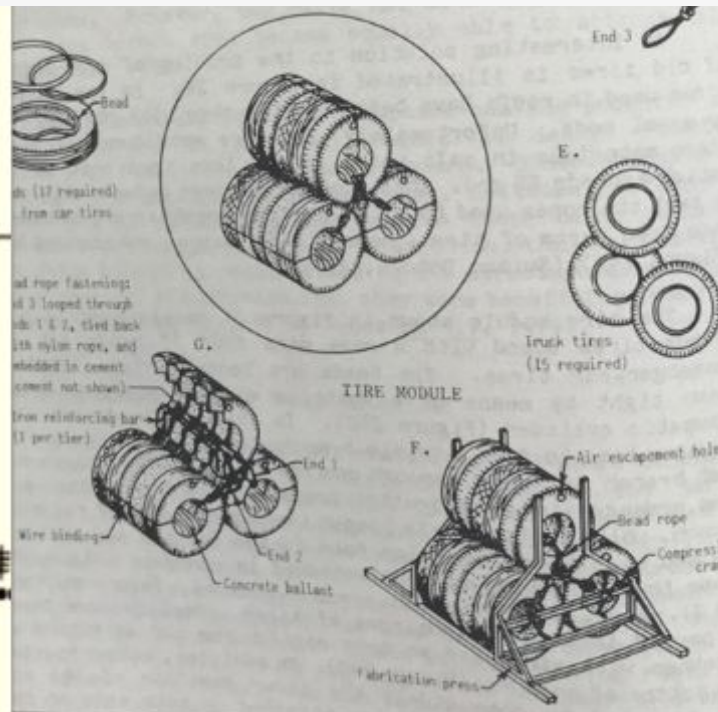
Illahee Marine Survey Tire Reef Cleanup Phase 1

07 December 2023

PORT OF ILLAHEE

Safer, Smarter, Better | Reimagining Government Together





History

- Artificial tire reefs were constructed to enhance fishing in Puget Sound between the 1970s and 80s.
- While thought to be beneficial at the time, these reefs have been found to cause more harm than good to the marine environment.
- SERCO approached WAV-C and KEDA to demonstrate uncrewed and autonomous capabilities in support of the clean up of the tire reef located near the community of Illahee near Bremerton.

SERCO Team

- Program Manager (Dustin Teuton)
- UAS Operator (Mike Yount)
- Marine Survey Lead (Troy Barnhart)





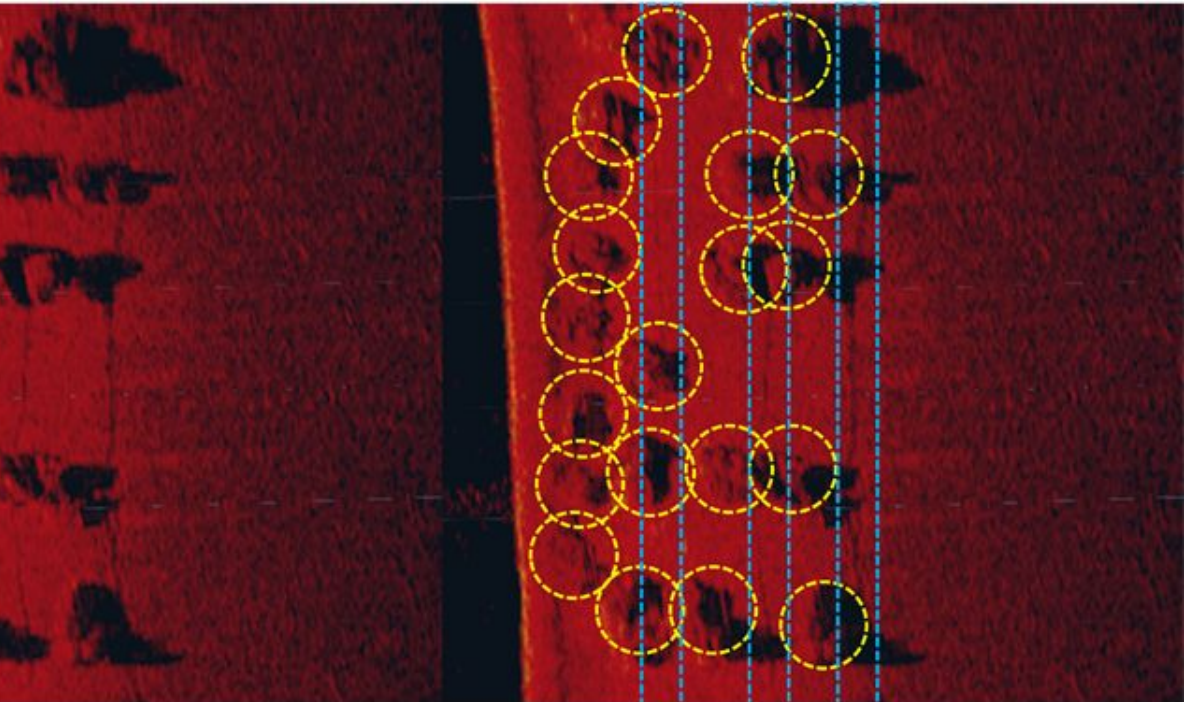
Impact

- Chemical leaching:
 - 6PPD-quinone (lethal to endangered Coho Salmon population)
 - Formaldehyde
 - Other Petroleum Based chemicals
 - Up to six times the maximum permissible limit
- Sediment transport
 - Barrier to natural along shore transport of sediment.
 - Inhibits the shoreline's ability to "self heal"
 - Prevents the redistribution of nutrients
- Habitat destruction
 - Eliminates the natural pre-existing biome
 - Diminishes the normal habitat available for Eel grass and Oyster beds
 - Spawning and rearing grounds for critical forage fish populations
 - Dispersal poses a risk to benthic plants and animals native to Puget Sound
 - Currents and storm surge can cause reefs to break up,
 - Substantially increasing the cost of locating and removal

Assessment Methods

- Marine Survey (USV Archer)
- ROV Inspection (JW Fisher Sealion-2)
- UAS modeling (Skydio S2)





Marine Survey (USV ARCHER)

- Length- 4.5m
- Draft- .3m
- Weight- 500 lbs
- Sonar- 450Khz
- Endurance- 4-6hrs





ROV Inspection (JW Fishers Sealion-2)

- Size- 584 x 406 x 305mm
- Weight- 43 lbs
- Forward and Rear HD Camera Systems



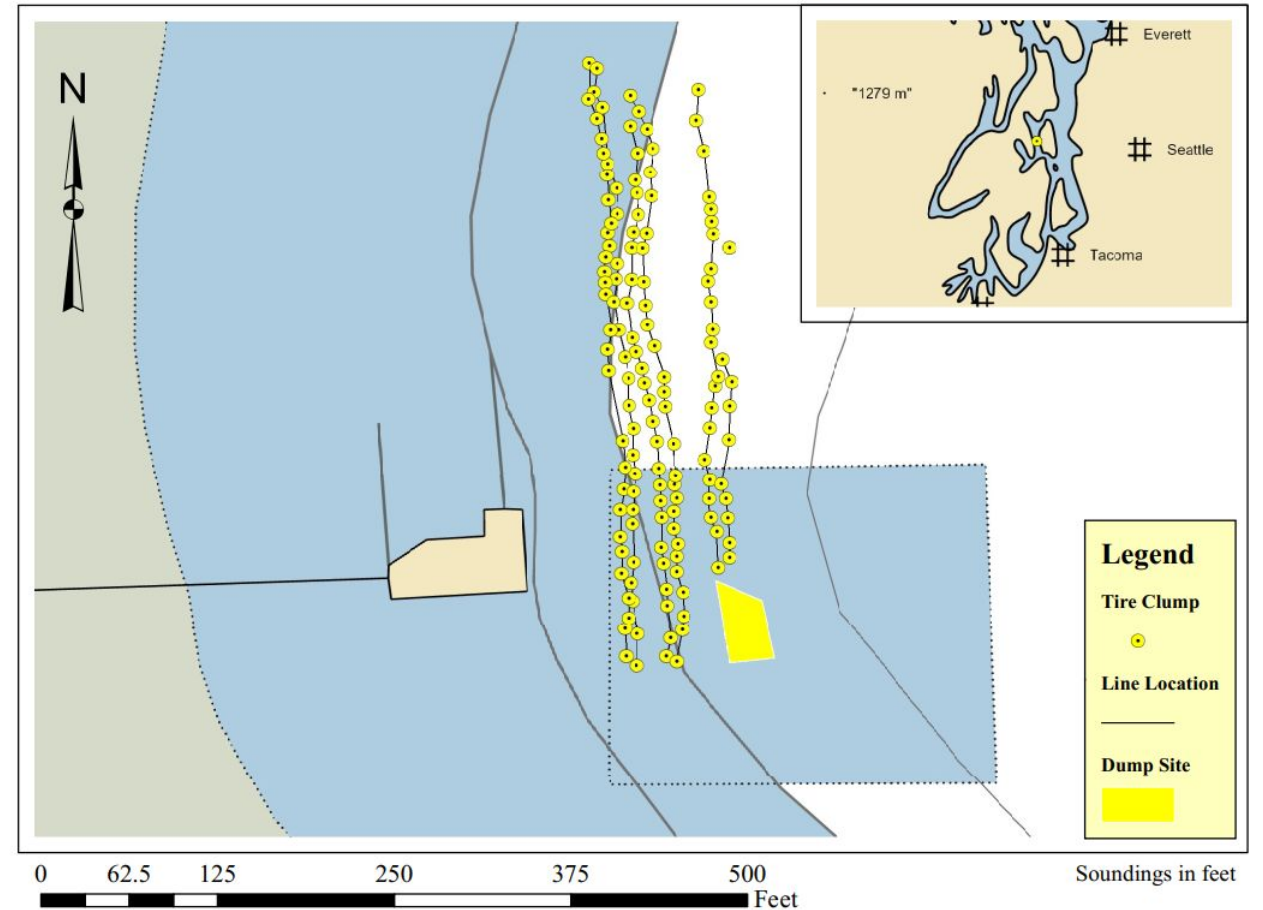
UAS Model (Skydio S2)

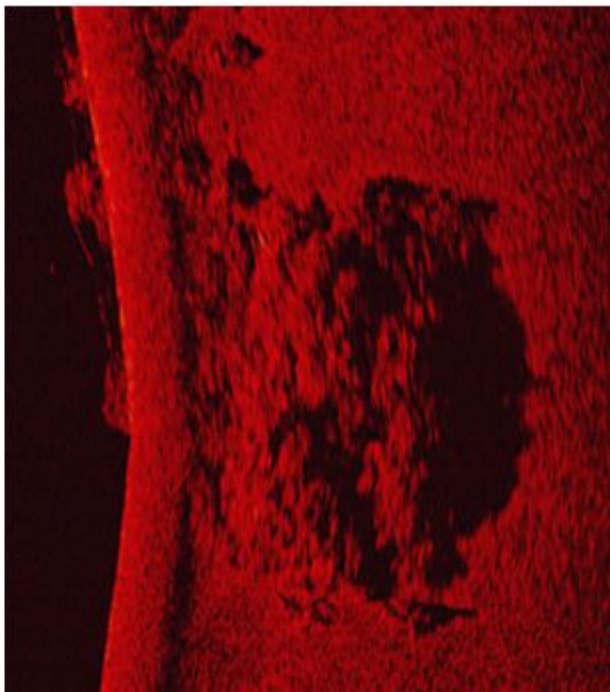
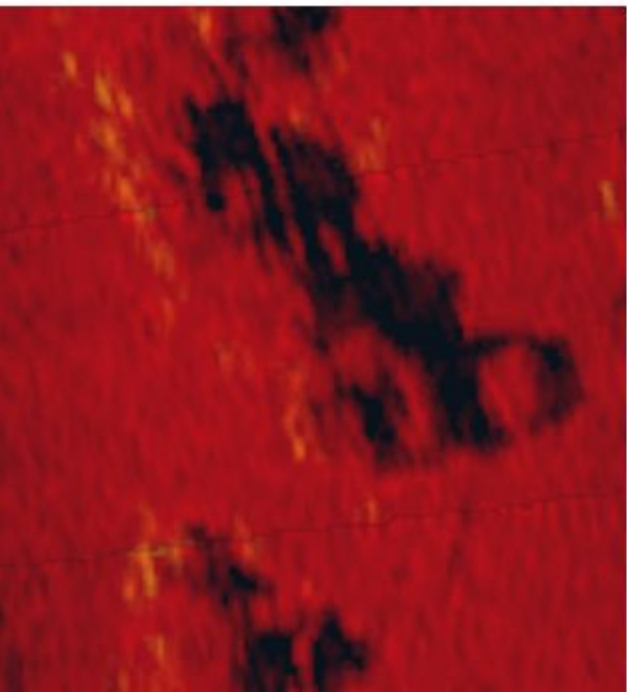
- Size- 229 x 274 x 126 mm
- Weight- 1lb 12oz
- Endurance- 27min / battery (field swappable)
- Camera- 12.3Mp



Findings

- 128 acres surveyed
- Survey completed in < 1hr
- 138 distinct tire clumps located
 - 12-20 tires per Clump
- 60,000 – 100,000 lbs of material to be removed





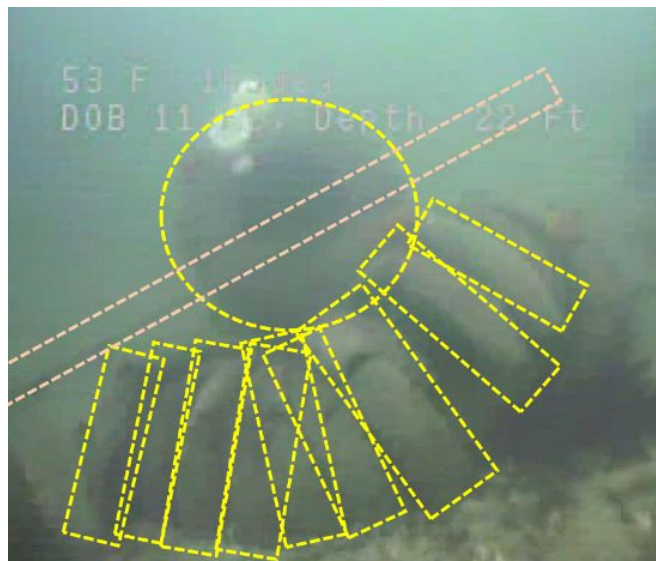
SONAR Findings

- High resolution Side Imaging SONAR shows at least 138 distinct tire clumps connected by lines in the vicinity of the Illahee pier.



ROV Findings

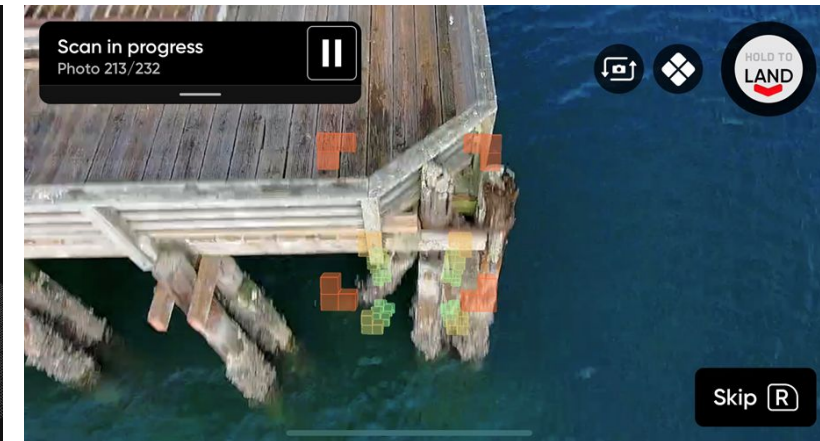
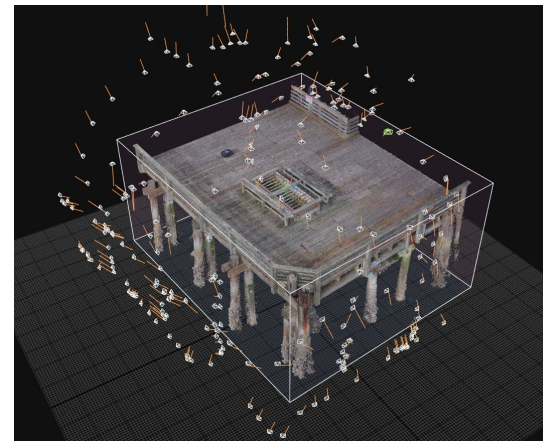
- ROV Inspection confirmed SONAR imaging and provided the “per clump” estimated number of tires (between 12 and 20).
- This also shows that many of the clumps are at least partially buried and helps with recovery planning.





UAS Findings

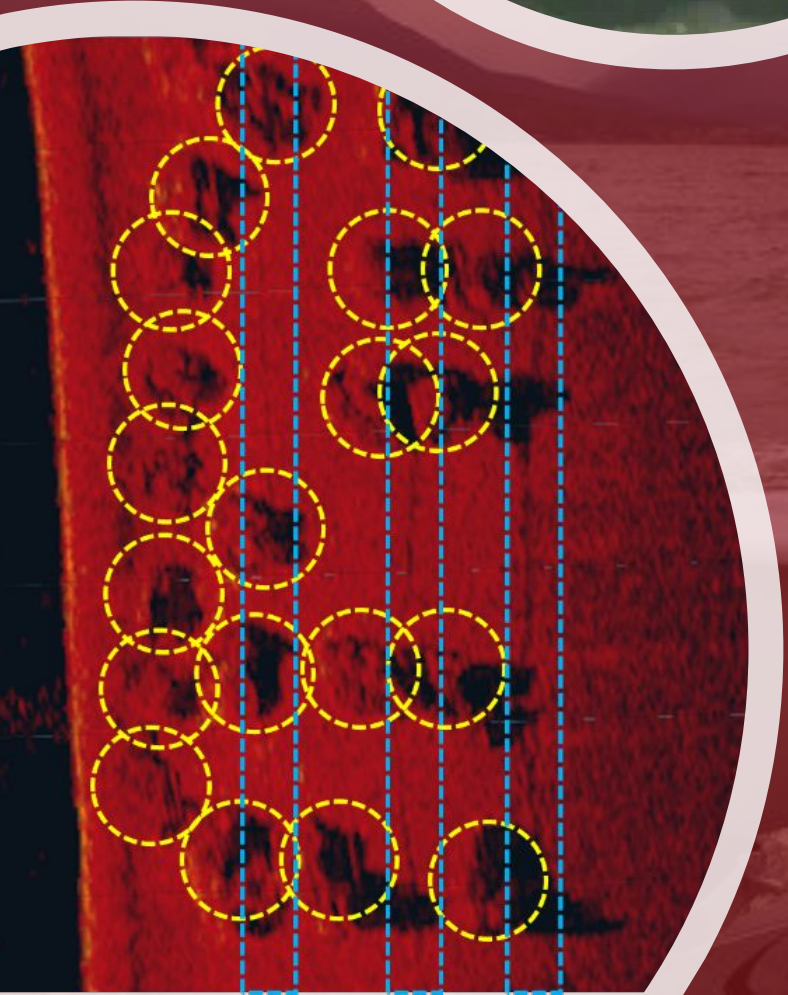
- UAS Inspection of the Pier and surrounding area was completed to create a 3d model and establish a baseline condition of the pier infrastructure for future comparison.





Next steps

- Local SAR dive team working to schedule test recovery of 1-3 clumps Summer 2024.
 - Collaboration needed with Port, WDFW, Tribal Government
 - Establish per clump effort required and best practices/ site monitoring
- The impact of tire based artificial reefs should be managed and responded to at a regional level.
- Tire reef cleanup is too big a burden for small ports to bear alone.
- This presents an ideal investment in green industry to ensure a bright clean future for the waters of Puget Sound.



Questions