Apr 21st, 9:00 AM - Apr 22nd, 4:45 PM

Measuring the effectiveness of Seattle's seawall enhancements on juvenile salmon-an acoustic perspective

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Do Seattle's seawall enhancements influence juvenile salmon distribution along the urban waterfront? An acoustic perspective

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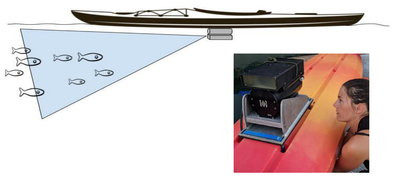
INTRODUCTION

- Seattle's waterfront is a key migration route for Puget Sound Pacific salmon. This includes 3 species of obligatory nearshore migrators, one of which is Puget Sound Chinook, listed as 'Threatened' (ESA)
- Seattle's new seawall (Phase I completed in 2018) is the largest eco-engineering project of its kind
- Habitat enhancements include: 1) light-penetrating glass blocks in overhanging sidewalk, 2) habitat bench to restore shallow water depths, 3) textured seawall and shelves
- Test of new application for acoustic camera
  - Mobile surveying of small fish
- First in-depth study of nighttime fish distributions along Seattle's waterfront

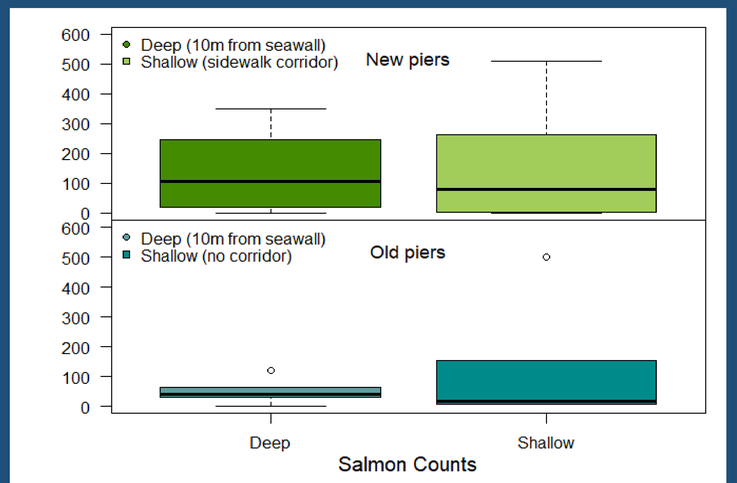
METHODS

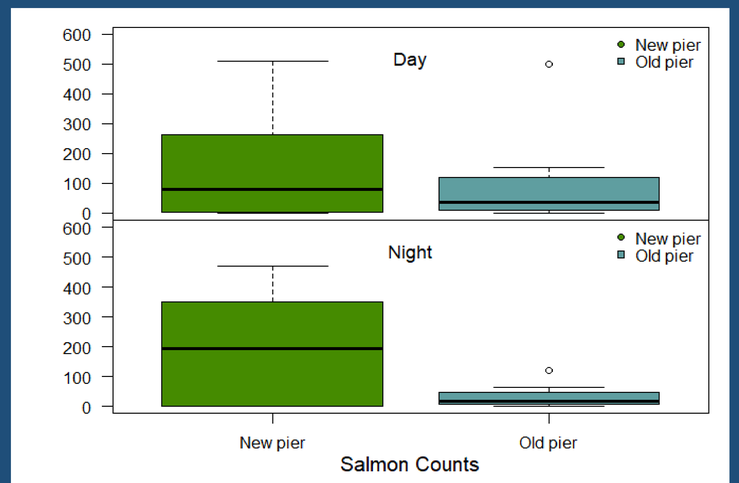
- 1,070 25m acoustic surveys at set transects April-August 2019
- High frequency sonar camera quantifies salmon and other fish population densities at modified and original seawall sites, and reference beaches
- Analyses include generalized linear models and multivariate statistics

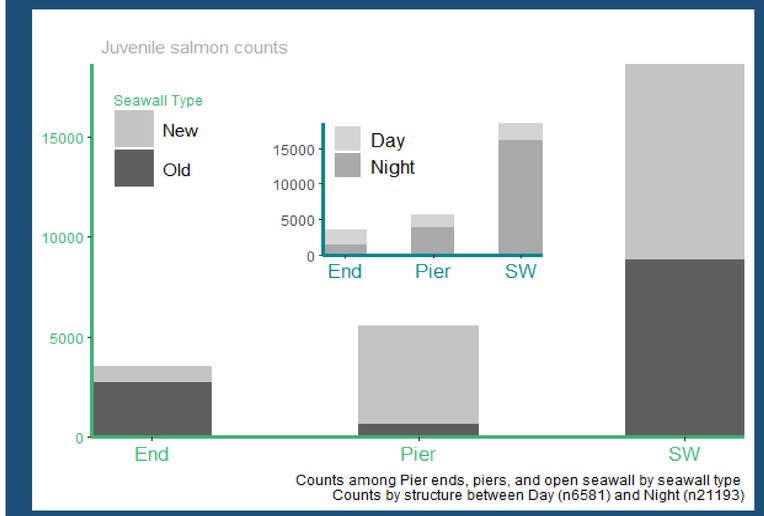


DIDSON (dual-frequency identification sonar) mounted to kayak hull

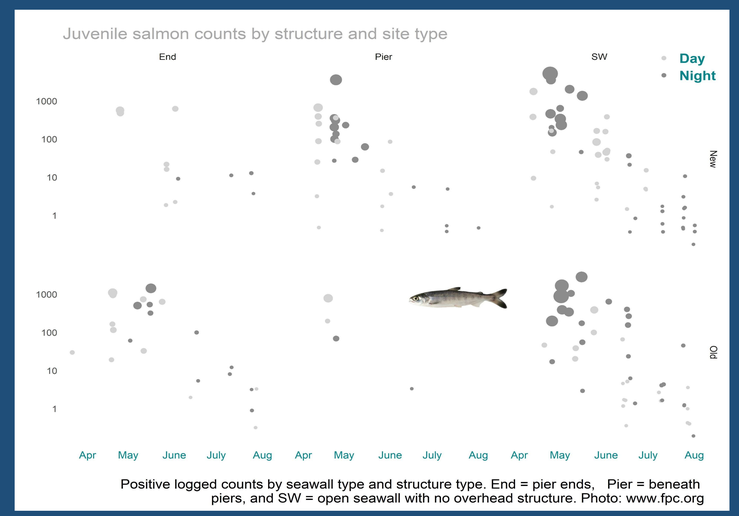
Seattle's **seawall enhancements** influence juvenile **salmon distributions**







Counts among Pier ends, piers, and open seawall by seawall type
Counts by structure between Day (n6581) and Night (n21193)

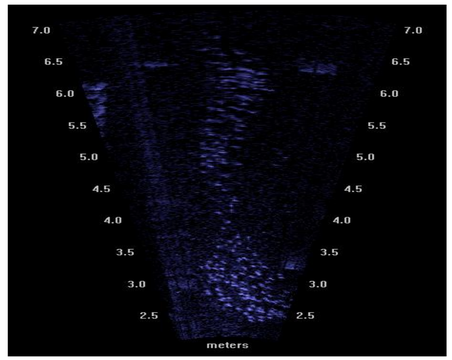


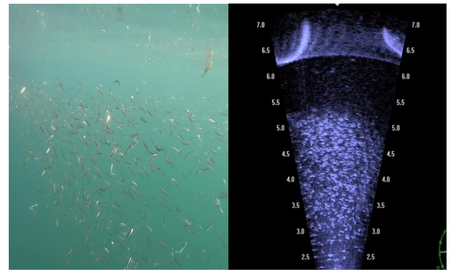
Positive logged counts by seawall type and structure type. End = pier ends, Pier = beneath piers, and SW = open seawall with no overhead structure. Photo: www.fpc.org

Salmon densities are higher at

- **New pier** sidewalk corridor compared to old piers with no corridor
- **Deep** open transects (10m from seawall) compared to shallow transects
- **Night** compared to day

Salmon are more **evenly distributed** between piers and open seawall at new sites





Above: Chum schooling in new corridor
Below: Herring simultaneously in GoPro and acoustic camera footage

FURTHER IMPLICATIONS

Seawall modifications may be important to salmon at night, with higher nighttime densities in new corridor compared to day

Salmon may navigate more around pier ends with no sidewalk corridor

Sea Grant Washington

SDOT Seattle Department of Transportation

SAFS School of Aquatic and Fishery Sciences