Surveying and monitoring nearshore forage fish in the Salish Sea using acoustic-optic technologies

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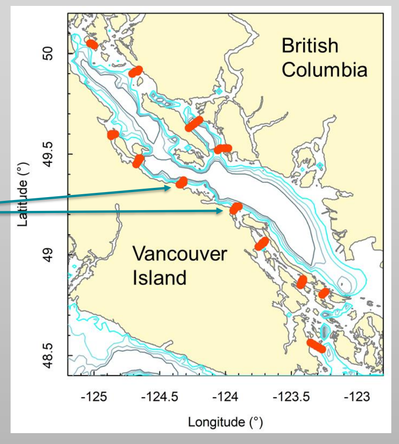
Why are we doing this?

- Forage fish comprise an important link between zooplankton and predatory fishes, birds and marine mammals
- In the Salish Sea, Pacific herring are the most abundant forage fish
- Pacific herring spawn in the spring and larvae hatch about 2 weeks later
- Juveniles are thought to occupy nearshore habitats in the following summer and fall
- The number of juvenile herring present in the fall has been linked to recruitment to spawning populations

Surveying juvenile herring

- DFO has conducted a seine survey since 1992 to estimate the relative abundance of juvenile herring in September (stations in orange below)
- In 2021, we began using advanced sampling technologies (acoustics, optics and spatial modeling) to estimate herring abundance and to improve our understanding of juvenile herring residency nearshore

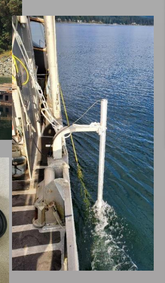
Stations with moored acoustics and stereo cameras

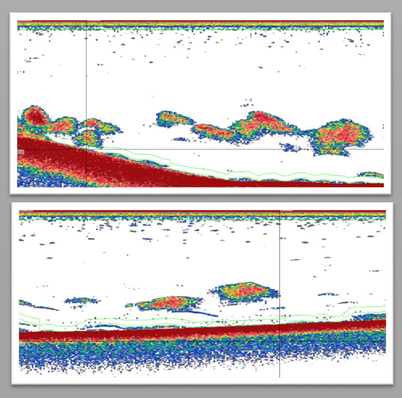


Acoustic tools

Shipboard acoustics

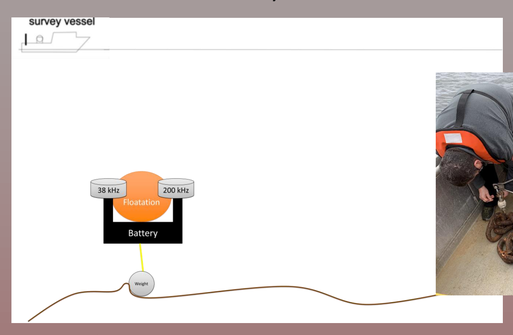
- Pole mounted transducer (38 and 200 kHz)
- 2-3 acoustic transects per site prior to seining





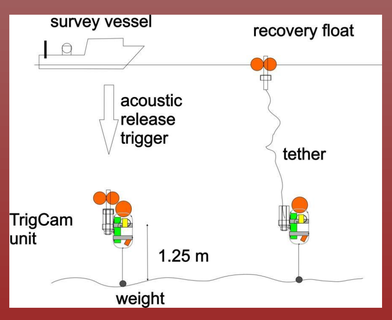
Moored acoustics

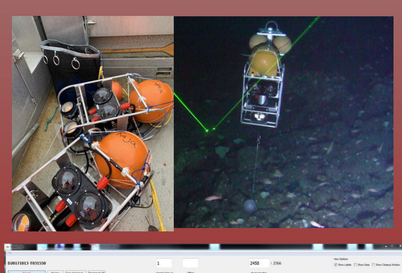
- Upward looking transducers (38 and 200 kHz)
- Deployed at 2 transects in February 2021 (recovery in November 2022)

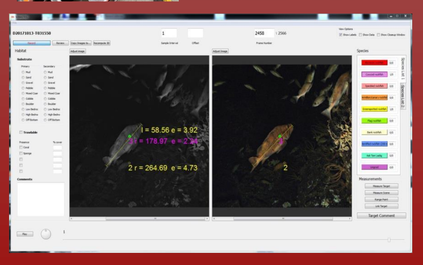


Optic tools

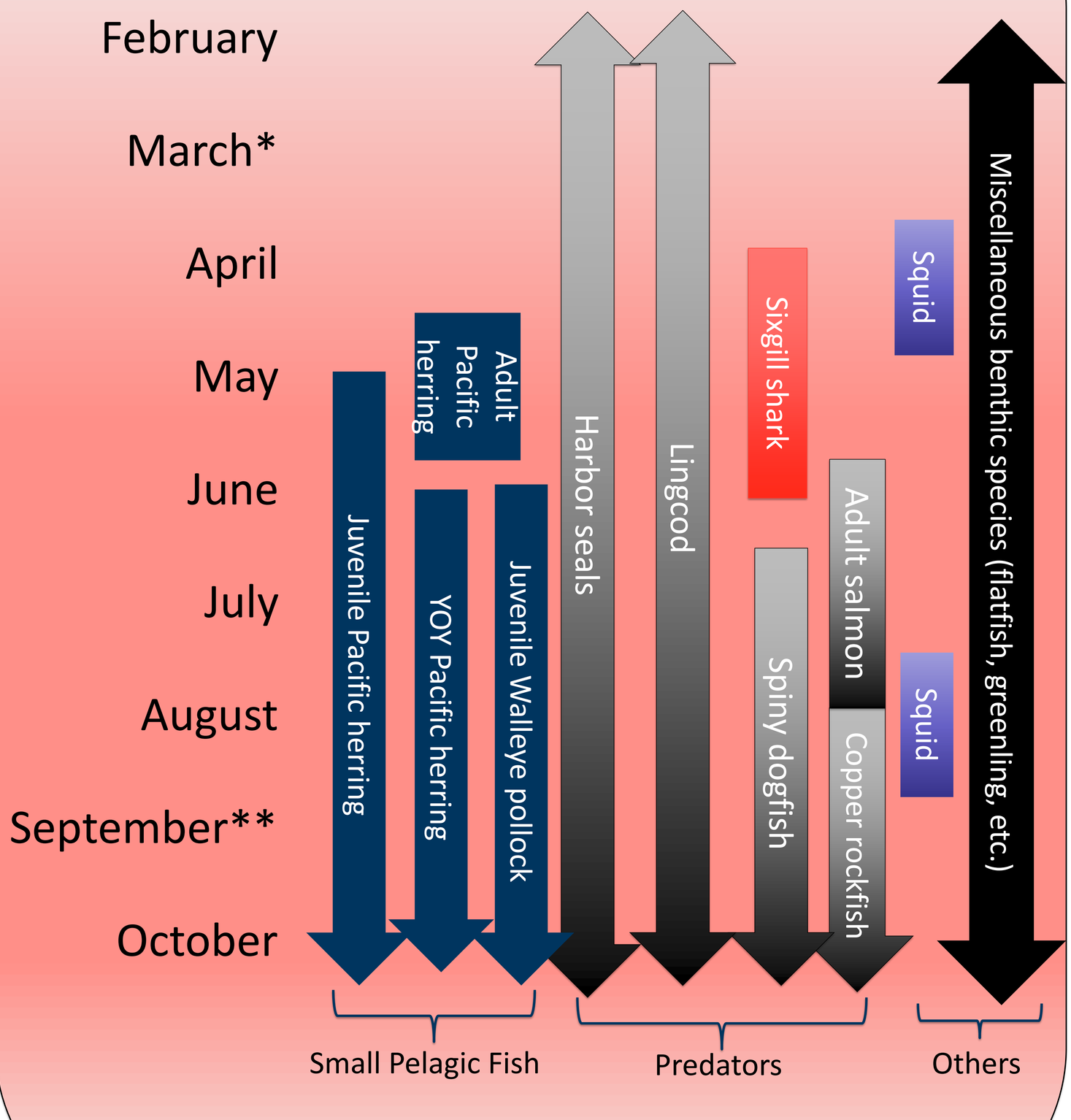
- Stereo-camera systems
- Deployed at 1-2 transects per month (24 hours)





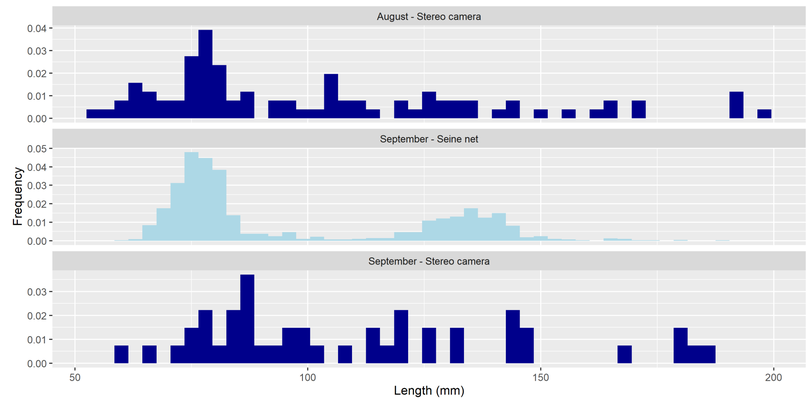


Temporal patterns in species residence



*Spawning in Salish Sea ~March 3-24, 2022
** Juvenile herring survey ~Sept. 6-30, 2021 and 2022

Juvenile herring length frequency



Summary of preliminary findings

- YOY Pacific herring appear in late spring, but juveniles are in the nearshore throughout the year
- Pollock appear to be the other dominant small pelagic fish in the nearshore in the Salish Sea
- The shipboard acoustics show similar spatial patterns in abundance to seine net catches
- Stereo cameras perceive similar size distributions as are captured in seine nets
- Stationary acoustics have not been recovered yet and camera deployments will continue until the end of March

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