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Factors that affect the vertical distribution of Olympia oyster larvae in Fidalgo Bay, WA

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Vertical distribution of Olympia oyster larvae in Fidalgo Bay

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WA State Priority Areas for Olympia Oyster Restoration

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Larvae influence their transport through vertical swimming behaviors.
Olympia oyster larvae in Coos Bay, OR, exhibit tidal migrations.

Peteiro & Shanks 2015
Olympia oyster larvae in Coos Bay, OR, exhibit tidal migrations.

Peteiro & Shanks 2015
Current speed affects larval vertical distribution.
Oyster larvae change distribution over development.
WA State Priority Areas for Olympia Oyster Restoration

Fidalgo Bay

Oyster beds

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Dinnel 2016
Research Questions

1. How do current velocity, tidal stage, and larval size affect larval vertical distributions?

2. Does Fidalgo Bay exhibit vertical shear or a two-way flow?
Sampling location

Oyster Beds
1 of 4 Field Sampling Days
Reference larvae

Lab reared Olympia oyster larvae

ID Guides

Olympia oyster

Loosanoff et al. 1966

Bivalve Species

Henricks et al. 2005
Research Questions

1. How do current velocity, tidal stage, and larval size affect larval vertical distributions?

2. Does Fidalgo Bay exhibit vertical shear or a two-way flow?
Sampling Events
Current velocity significantly affected larval weighted mean depth.

GAMM

$F_4 = 11.74$

$p << 0.001$
Current speed, not tidal direction, significantly affected larval weighted mean depth.

\[ \text{LME; } p << 0.001 \]
\[ \text{Marginal } R^2 = 47\% \]
Larval size did not affect larval weighted mean depth.
Larval size did not affect larval weighted mean depth.
Research Questions

1. How do current velocity, tidal stage, and larval size affect larval vertical distributions?

2. Does Fidalgo Bay exhibit vertical shear or a two-way flow?
Larvae distributed shallower when current speeds were faster.
Larvae distributed deeper when current speeds were slower.
Active or Passive?

Larvae distributed deeper when current speeds were slower.
Bivalve larvae actively respond to hydrographic cues by...

- Swimming upward faster
- Sinking
- “Dive-bombing”
Unclear whether larvae in Fidalgo Bay exhibit an ontogenetic migration strategy.
We might have missed a portion of this size class due to our sampling design.
Olympia oyster larvae distribute in surface waters during both ebb and flood; they do not exhibit a tidally-timed vertical migration strategy.
Tidal currents do not exhibit strong vertical shear or two-way flow, so larval behavior little to no affect on transport through the main channel.
Vertical Distribution + Hydrodynamics
Delft3D flow model pairs:
• Tides
• Atmospheric pressure
• Wind direction & speed
I give a big thank you to...

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Questions?

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