Four decades of subtidal clams in Tillamook Bay, OR

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INTRODUCTION

Tillamook Bay is an important recreational and commercial clamming area in Oregon. The Oregon Department of Fish and Wildlife (ODFW) has surveyed the subtidal habitat and clam populations there for over four decades starting in 1974. The most recent survey in 2012 was conducted by the Shellfish and Estuarine Assessment of Coastal Oregon project (SEACOR) on target bay clam species: cockles (*Clinocardium nuttallii*), gaper clams (*Tresus capax*), butter clams (*Saxidomus gigantea*), and native littleneck clams (*Leukoma staminea*). This long temporal dataset provides a unique opportunity to study the trends in clam density (# clams/m^2), biomass (grams/m^2), and associated habitats. Here, we evaluate subtidal bay clam populations over time, the clam-habitat associations, and summarize regulation changes based on these findings.

GOALS

- **How have target clam species' biomass and densities changed over time?**
- **Which habitats are significant for subtidal bay clams?**
- **How can these data support clam population management?**

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MARINE RESOURCES PROGRAM

METHODS

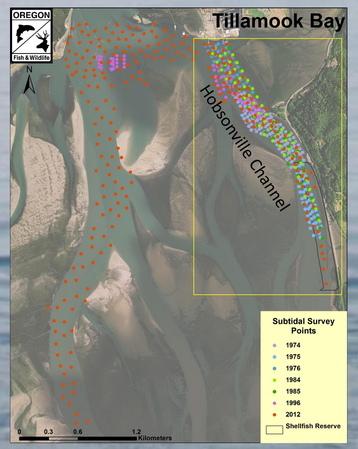
Subtidal dive surveys
- SCUBA divers extracted clams with a megacoring suction pump system

Historical ODFW surveys: 1974-76, 1984, 1985, and 1996
- Focused on area with commercial harvest potential and activity
- 1996 data excluded given the limited comparative area

ODFW SEACOR survey: 2012
- Focused on areas with historical data, commercial harvest activity, and no previous data

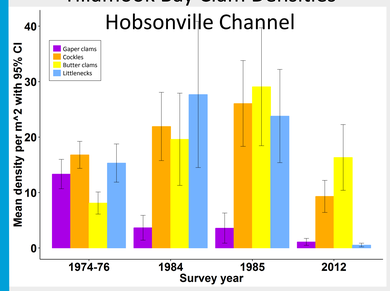
Tillamook Bay Historical Subtidal Surveys

The disparity between the area sampled among surveys limited this analysis to the Hobsonville Channel points (outlined) for 1974-76, 1984, 1985, and 2012. The area surveyed in 1996 was < 25% of the other years.



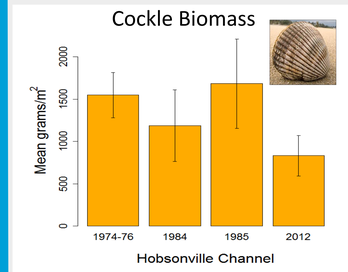
RESULTS

Tillamook Bay Clam Densities
Hobsonville Channel

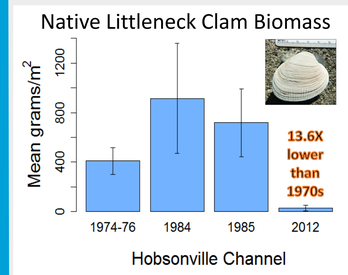


- Butter clam populations increased since the mid-1970s.
- Gaper clam densities have declined slightly since mid-1970s. However gaper clam biomass in 2012 was not significantly lower than in the mid-1980s.
- Cockle densities also declined some since the mid-1970s, yet no statistical difference was found in cockle biomass between surveys (see figure below). This indicates a variable but stable population.

Cockle Biomass

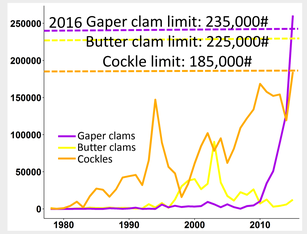


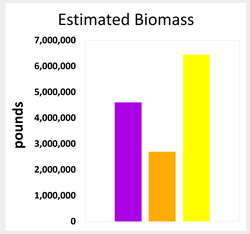
Native Littleneck Clam Biomass



Native littleneck clam subtidal densities and biomass were much lower in 2012 compared to historical data.

Tillamook Bay Commercial Clam Harvest



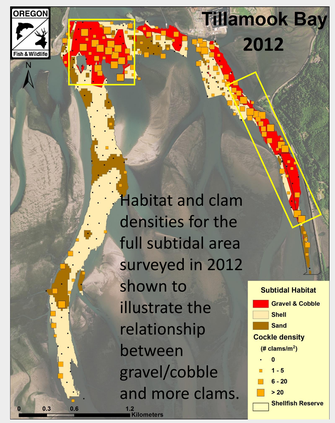


Recent increases in commercial cockle and gaper clam harvest prompted ODFW Shellfish Program to review population data and recommend rule changes. New commercial dive harvest limits adopted Jan. 1, 2016 were based on 10% of the lower 95% CI of stock biomass for cockles and gaper clams, and 5% of the lower 95%CI of stock biomass for butter clams (biomass estimates used SEACOR 2012 data).

Tillamook Bay Subtidal Clam Habitat

Target clams were often associated with gravel/cobble habitat, with mean densities highest for:
- Cockles in every decade
- Butter clams in 3 out of 4 decades
- Gaper clams in 2012.

No significant habitat association was found for native littleneck clams.



Habitat and clam densities for the full subtidal area surveyed in 2012 shown to illustrate the relationship between gravel/cobble and more clams.

Subtidal habitat was interpolated by IDW from four decades of data in ArcGIS v10.1. Results are grouped by sand, shell, and gravel/cobble.

CONCLUSIONS

- For 3 of the 4 bay clams species surveyed, population biomass has remained stable over the last 4 decades. These findings indicate sustainable harvest levels.
- In 2012, native littleneck clam biomass and densities were significantly lower than all previous surveys. Commercial harvest no longer allowed in Oregon. Further study is needed to understand this decline, especially in the face of population declines noted for this species across the Pacific Northwest.
- These results prompted the ODFW Shellfish program to recommend commercial harvest regulation changes that were adopted January 2016.