Oregon: Not the "show" me state. A study on the accuracy of *Tresus capax* (gaper clam) burrow hole counts

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INTRODUCTION

When conducting clam surveys, there are tradeoffs between survey time, area covered and data accuracy. Clams can be identified from species specific burrow holes, or "shows", which are created after the clam's siphon is withdrawn from the sediment surface. Historically, burrow hole counts were used to quickly collect abundance data over a large spatial scale (Hancock et al. 1979). In the past, the state's harvest regulations were based on the best clam population data available, primarily burrow hole count data. However, different species burrow holes can occasionally look somewhat similar in appearance (Figure 1) or submerged aquatic vegetation (SAV) may obscure burrow holes.

A

Name	*Tresus capax* (Gaper clam)	*Saxidomus gigantea* (Butter clam)
Siphon Shape (top view)		
Siphon Shape (lateral view)		
Show Shape		
Siphon Color	dark brown, dark leathery tips	dark brown
Other Features	fused siphon with leathery tips, separate inhalant and exhalant tube	siphon is united often with multiple shades of brown and black stripes

B

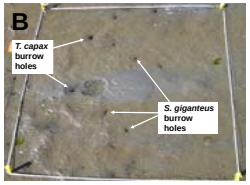


Figure 1: Siphons and burrow holes of *T. capax* and *S. gigantea*. A) Species specific characteristics of *T. capax* and *S. gigantea* siphons. B) 1m² sample site containing *T. capax* and *S. gigantea* burrow holes.

METHODS

We utilized two sampling methods to assess clam abundance in Oregon estuaries: a rapid assessment method (RAM) and a detailed assessment method (DAM).

RAM allows for broad areas to be sampled quickly. This method quantifies burrow holes, SAV and other habitat characteristics in a 1m² area (Figure 2).
DAM was used to determine clam abundance by digging a 1m² area to a depth of 35 cm. DAM provides more complete quantitative information on clam populations, but is more time and resource intensive (Figure 3).

We conducted RAM and DAM at the same 1m² area at 20 replicate sites in both Tillamook and Yaquina Bays. We compared RAM and DAM by determining the accuracy of burrow hole counts in predicting presence/absence and abundance of *T. capax*. We also determined how SAV, average clam size and sediment type influence the accuracy of clam abundance data determined from burrow hole counts.

RAM

Figure 2: Conducting RAM. A) Visually surveying a 1m² sample site to estimate percent cover of SAV. B) Counting *T. capax* burrow holes in a 1m² sample with dense cover.

DAM

Figure 3: Conducting DAM. A) Digging a 1m² sample site to collect shellfish. B) Measuring and recording data from collected shellfish.

RESULTS

A crew of four can RAM an average of 20 sites or DAM a maximum of 5 sites during a negative low tide. However, DAM requires additional lab time after field data collection to measure the collected clams.

In Tillamook Bay, burrow hole counts accurately predicted the presence or absence of *T. capax* at a sample location 75% of the time (Figure 4 A). In Tillamook Bay, 57 burrow holes were counted during RAM, while 93 *T. capax* were dug in DAM. When using burrow counts alone, the abundance of *T. capax* was underestimated by 2.5 clams per m². In Yaquina Bay there was only a 20% chance of accurately predicting if *T. capax* were present (Figure 4 B). Although 38 clams were collected in Yaquina Bay during RAM, only one burrow hole was detected from RAM sampling.

Sediment type and average size of *T. capax* were similar in both bays. In Tillamook Bay, SAV percent cover ranged from 0% to 90% and the accuracy of burrow hole counts was inversely proportional to percent cover (Figure 5). Presence of SAV did not affect burrow holes count accuracy in Yaquina Bay since percent cover was always less than 10% (sparse).

A

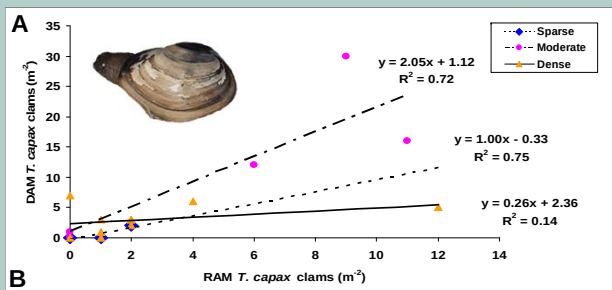
Tillamook Bay *T. capax*	Holes Present	Holes Absent
Clams Present	60%	15% (not detected)
Clams Absent	10% (mis-ID)	15%

B

Yaquina Bay *T. capax*	Holes Present	Holes Absent
Clams Present	5%	80% (not detected)
Clams Absent	0% (mis-ID)	15%

Figure 4: Ability to determine presence/absence of *T. capax* based on burrow hole counts, verified by clam collection from DAM. Values are reported as the percentage of samples in each category. Highlighted boxes indicate when the prediction was correct. Mis-ID occurred when burrow holes were observed but no clams were present. N=20 in each bay. A) Tillamook Bay. B) Yaquina Bay.

A



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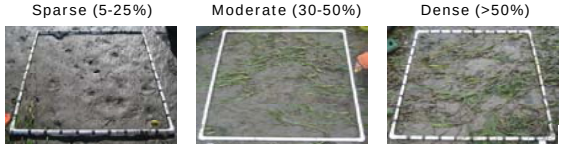

Figure 5: Accuracy of burrow hole counts in predicting presence/absence and abundance of *T. capax* based on percent cover of SAV in Tillamook Bay. A) Abundance of *T. capax* from RAM data versus abundance from DAM data fitted with regression lines. Y-intercept represents the number of *T. capax* not detected per sample. Different shapes represent different SAV percent cover values. B) Sample plots showing differences in percent cover bins.

DISCUSSION

Burrow hole counts were a more accurate method of estimating presence/absence and abundance of *T. capax* in Tillamook Bay than in Yaquina Bay. Differences between bays could be due to:

	Tillamook Bay sites	Yaquina Bay sites
Tidal Height (MLLW)	0'	+2'
Sampling Time	May and June	March and April

- RAM will likely be used in the future based on sampling efficiency but should be used in conjunction with DAM to balance the need to survey large areas with the accuracy needed to obtain the best possible population estimates.
- Correction factors incorporating the abundance of undetected clams in an area could be used to more accurately represent *T. capax* distribution and abundances.
- Correction factors may need to be bay specific since the ability to predict *T. capax* presence/absence and abundance seems to vary between estuaries.

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