

A comparison of external and internal aging methods of the Pacific cockle (*Clinocardium nuttallii*)



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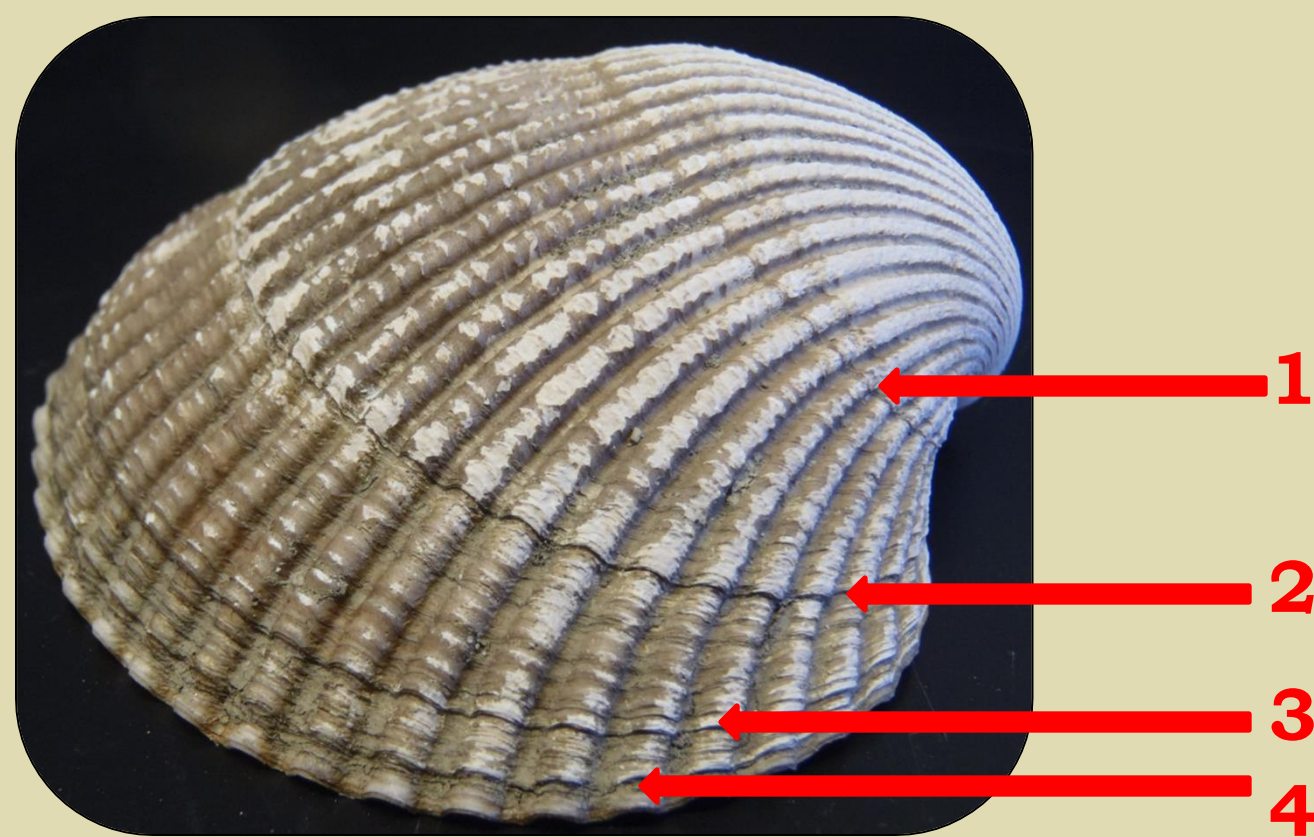
Accurate aging methods are the first step to creating growth curves

Growth curves are a crucial component in managing harvested species¹. Shellfish managers use age and growth data to determine age structure for a given year¹. The Pacific cockle is a recreationally harvested species² and it occurs throughout Yaquina Bay. Accurate age data for the Pacific cockle can help determine spawning stock biomass and provide an estimate of how many cockles can be harvested in Yaquina Bay^{1,3}.

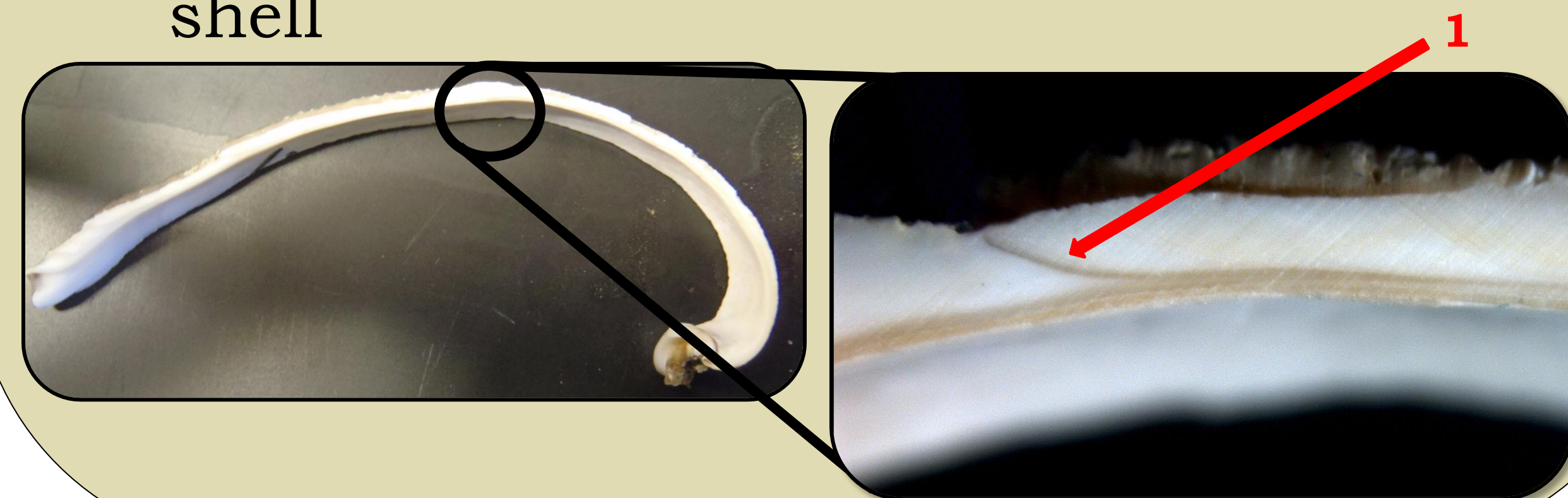
Is there a difference between internal annuli counts and external annuli counts of the Pacific cockle?

To answer this, we compared 2 aging methods:

1. External bands on the outer shell



2. Internal annuli along a cross section of the shell



Acknowledgements

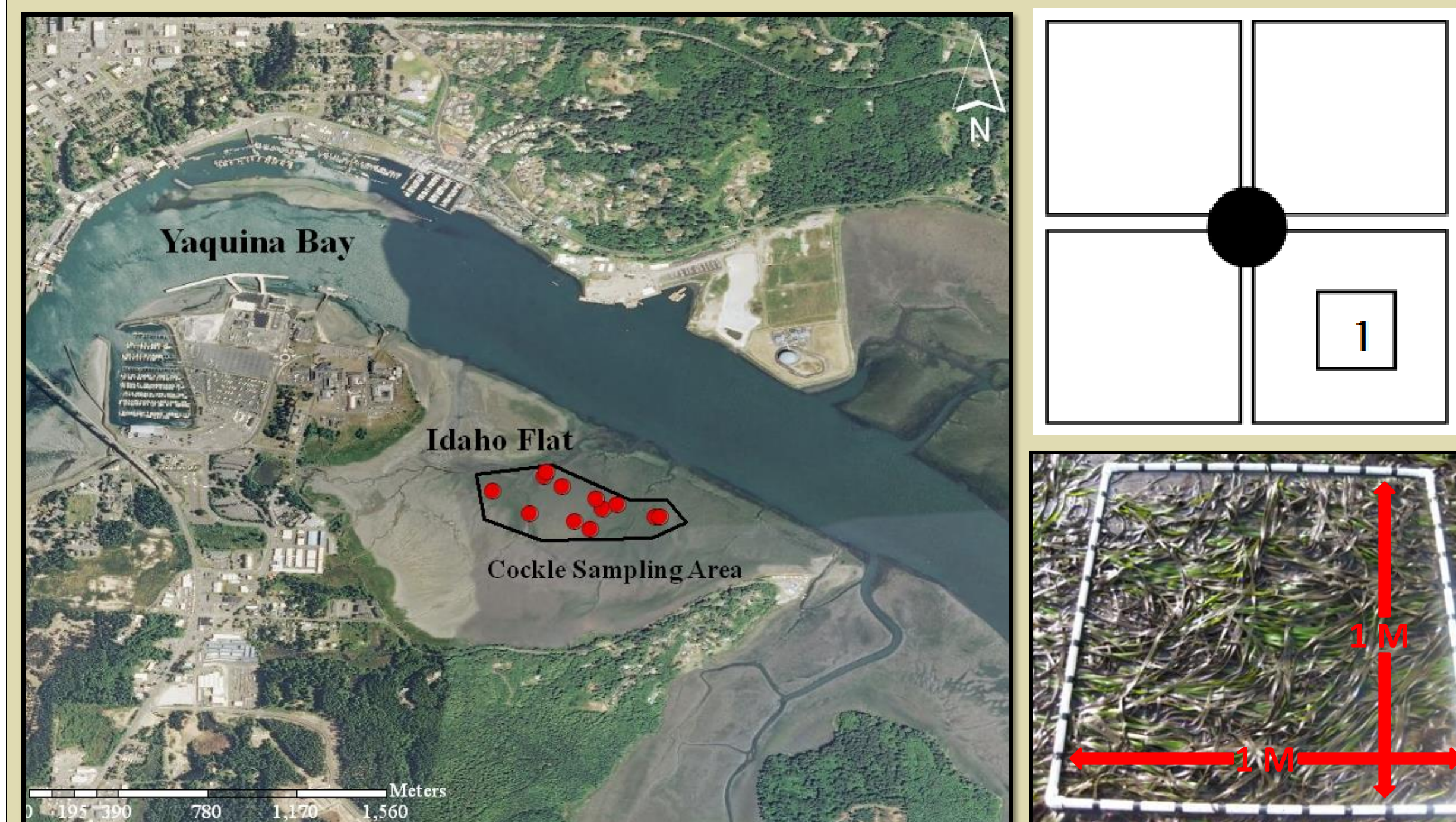
Tony D'Andrea, Amy Hutmacher, , Eva Reidlecker, Stacy Galleher, Oregon Department of Fisheries and Wildlife, Environmental Protection Agency

References

1. Jacobson, L. et al. 2006. Report from the Atlantic surfclam aging workshop. NEFSC Reference Document 06-12.
2. Gallucci, V.F. and B.B. Gallucci. 1982. Reproduction and ecology of the... Mar. Ecol. Prog. Ser. 7:137-145.
3. Richardson, C.A. Surface rings and internal shell growth patterns: bivalves. Oceanogr. Mor. Biol. Ann. Red. 39:103-164.

We had to collect, shuck and dry the shells. Shells also had to be cut for internal counts.

Collected 51 cockles from 11 sites at Idaho Flats in Newport, OR. 4 quadrats were placed around each point and raked.



Next, we shucked and dried each cockle. External counts could now be made.



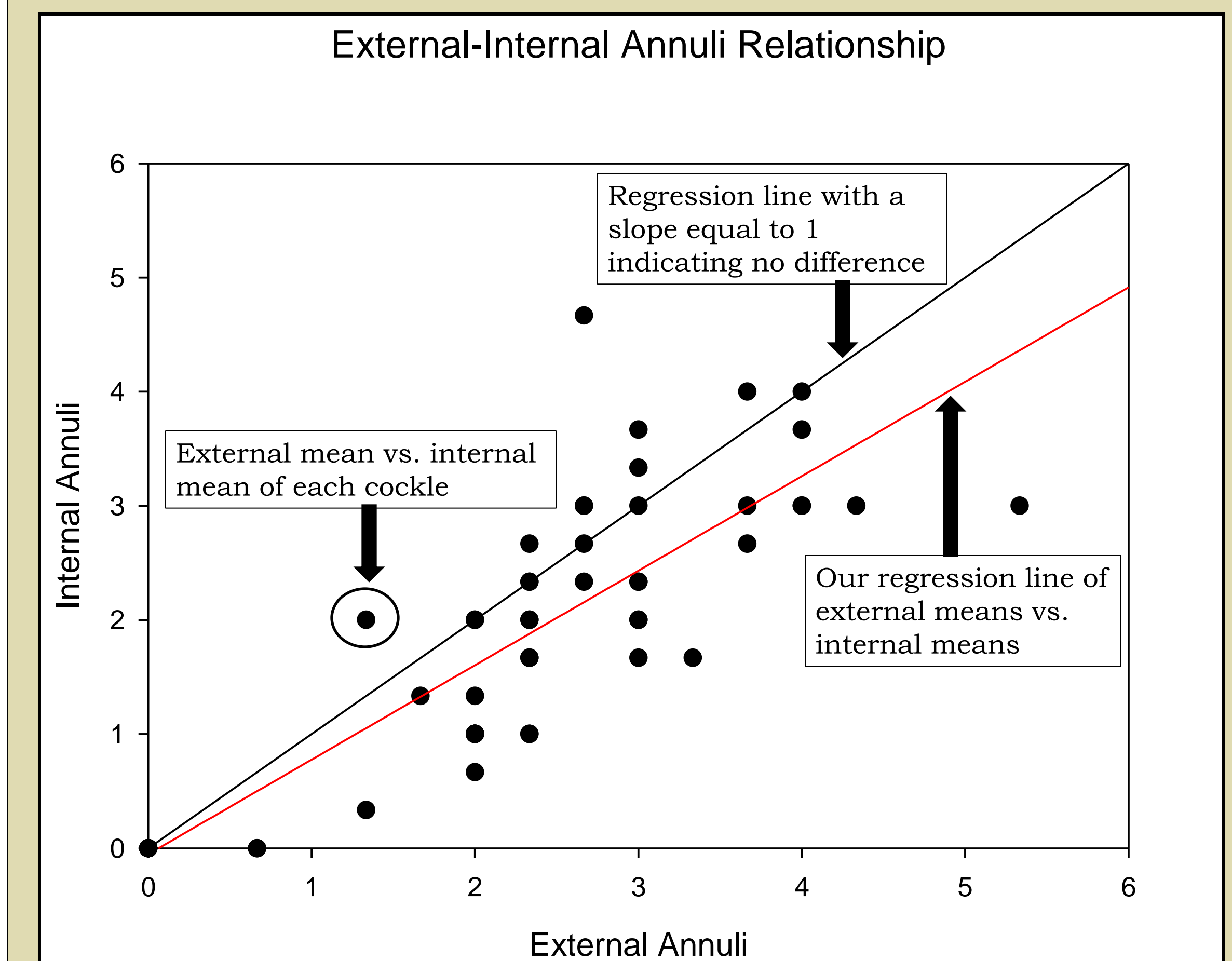
We used a diamond-infused rock-cutting saw to cut 6 mm cross-sections from the umbo to the growing shell margin of the left valve to count internal annuli.



3 group members independently counted each cockle's internal and external annuli. Their counts were averaged. External mean age was plotted against internal mean age.

A linear regression compared the slope of our external vs. internal line to a slope of 1.

A slope of 1 indicates no difference between aging methods. A slope other than 1 indicates there is a difference.



Linear Regression Report			
Slope	St. Err. of Slope	Degrees of Freedom	Adj. R-squared
0.8277	0.0843	49	0.6561

$\alpha=0.05$

2-sided t-test
(0.8277-1) / 0.0843
= -2.04389

P-value= 0.046359

Conclusion: There is a difference between external aging methods and internal aging methods

There is a significant difference between the 2 aging methods. Using external annuli consistently overestimated the ages of cockles in Yaquina Bay. This bias needs to be considered.

Next step: validate cockle ages using mark-recapture experiments³.