



2013 - 2014 SCIENCE PROJECT

Clam breakage in survey mode: implications and data correction

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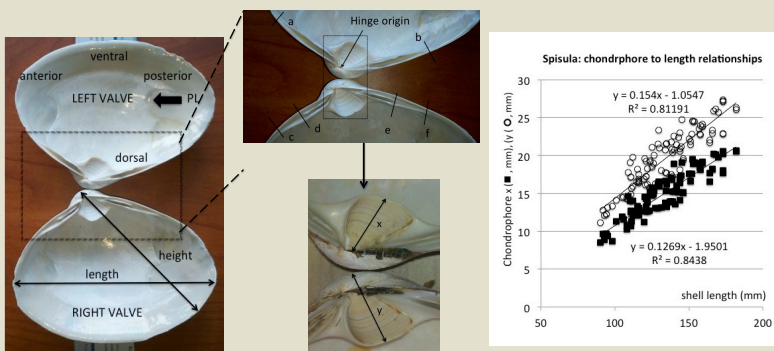
Recent change in the surf clam and ocean quahog survey to a commercial vessel sampling platform has resulted in considerable shell breakage in sample collections. At each survey station a swept area tow is taken (known area from tow length and dredge width) and a count made of bushels of clams caught. A subsample is taken and the length of each clam recorded to provide a length demographic that is converted to age using a length-age relationship.

Increasingly sophisticated models are used to estimate population size in support of quota setting. In these models, it is critical that the age demographic of the population be appropriately represented in the data from field sampling. Broken clams present a potential problem in this representation. If small (younger) clams are disproportionately broken and not included in the record, then data collection will depict a population that is older than the real situation. If larger (older) clams are disproportionately broken, then data will depict a population that is younger than the real situation.

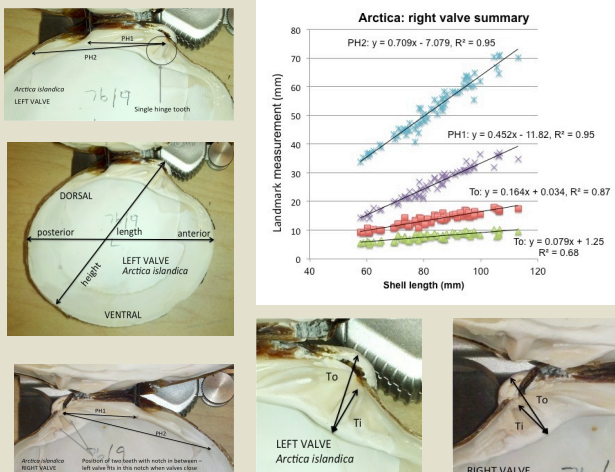


Broken hinge sections from ocean quahogs, NEFSC survey, August 2013 (image D. Munroe).

Objective: To insure that all collected material, broken and unbroken, is included in the length/age description of the population at each sampling station. Clam shells are consistent in shape, so we can develop predictors of shell length from other measures that can be obtained from broken shell parts, notably hinges. Measurement of hinges, using defined "landmarks", allows recasting of broken shell data for completion of length, and hence age demographics in survey mode. Data reported herein are from experiments performed during the NEFSC survey on the F/V Pursuit, August 2013.



Relationships can be developed for lengths and landmarks in both surf clam shells (above) and ocean quahog shells (below). While surf clam chondrophores (x and y) are symmetrical (see figure, above right) the asymmetry in the quahog hinge requires separate descriptor for the left and right valves (see figure, below right).



At sea operation: broken valves are measured as part of the ongoing sampling protocol. Landmark measures are employed to generate corresponding length values in the data summary as illustrated below with estimated length in red numerals.

A typical data sheet for a quahog station from NEFSC Pursuit survey with recast length data in red.

Date	August 18 2013							
Station	93							
specimen #	1	2	3	4	5	6	7	8
Valve (R/L)	R	L	L	R	R	R	R	R
length	86.8	81.6	71.3	94	61.1	71.2	65.2	90.2
height	79.6	70.7	65.7	85.1	54.6	66.8	58.2	84.1
tooth/out	15.91	13.66	9.72	14.75	9.32	12.27	10	15.2
tooth/in	8.38	7.77	5.87	8.72	5.01	8.02	6.35	9.28
post hinge 1	28.68	23.15	22.95	30.87	15.98	19.69	17.3	29.63
post hinge 2	51.74	36.58	34.92	60.39	36.58	45.48	38.84	58.31
specimen #	14	15	16	17	18	19	20	21
Valve (R/L)	R	R	L	R	R	R	R	R
length	82.5	69.6	79.4	68.3	80.9	77.4	57.2	67.9
height	13.56	11.45	13.15	11.24	13.28	12.72	9.41	11.17
tooth/out	7.84	7.09	6.81	6.28	7.32	6.91	5.41	6.16
tooth/in	31.68	17.78	26.21	27.73	28.86	27	15.69	19.14
post hinge 1								
post hinge 2								