

scallop age sampling

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Background

Survey design (Smith et al. 2016)

- scallop beds are overlaid with a grid of 1 m² cells
- starting cells are randomly selected, followed by a systematic sampling of every third cell.

Scallop shell collection for ageing

- captured scallops are sorted into large (> 100 mm) and small (<=100 mm)
 - the number and round weight
- two-stage sampling for shell height and age/weight (by size class)
- 40 shells collected for shell height/weight
 - 10 shells are randomly selected from the 40 for ageing

Question

A pulse of small scallops has been observed during the 2016 and 2017 scallop surveys (Figure 1). Since the sampling strategy is consistent between large and small size classes (<=100 mm) this has led to a substantial number of small size shells collected for aging that have consequently been aged (Table 1). There is concern that these small scallops, that tend to represent few age cohorts, are being examined at a higher level than necessary for (future) analyses and are increasing the age production time.

Examination

An examination of shell height and age by bed (Figure 2) shows that there can be up to 10 age classes present at a 100 mm shell height. However, this decreases to 4 age-classes at 75 mm shell height. Since there is less age variability below 75 mm shell height we can sample at a reduced rate for these specimens. I've not heard of any problems with the collection methods in the field. Therefore, my recommendation is to adjust the number of shells being aged. This has two beneficial aspects: a) no changes in the field, b) we have additional shells in storage that can be sampled in the future if needed.

Coggins et al. 2013 suggest a sample size of 500-1,000 and 10 aged scallops per shell height bin. Based upon this and the general size structure observed in our current samples I recommend that 10 shells be aged from each of the following bins.

0 25 50 75 77 79 81 83 85 87 89 91 93 95 97 99 101 103 105 107 109 111 113 115 117 119 121 123 125 127 129
131 133 135 137 139 141 143 145 147 149 151 153 155 157 159 161 163 165 167 169 171 173 175 177 179 181
183 185 187 189 191 193 195 197 199

So a bin from 0-25, 26-50, 77-78, etc.

This will amount to a sample size of 660 if all bins have 10 individuals aged in them. If the target sample size ~550 is regularly being missed then the number of samples in each bin can be increased.

I recommend this sample size for each **district** for the time being. If we find that there are unique areas that need more information we can increase the sample size from our archived, but unaged, collection.

References

Coggins, L.G. Jr., D. C. Gwinn and M. S. Allen. 2013. Evaluation of Age–Length Key Sample Sizes Required to Estimate Fish Total Mortality and Growth, Transactions of the American Fisheries Society, 142:3, 832-840

Smith, Q., B. Williams, and R. Burt. 2016. Statewide Weathervane Scallop Survey Operational Plan, 2016 through 2018. Alaska Department of Fish and Game, Alaska Department of Fish and Game, Regional Operational Plan ROP.DF#R.YY-XX, Juneau.

2017 Kodiak Shelikof Bed 1

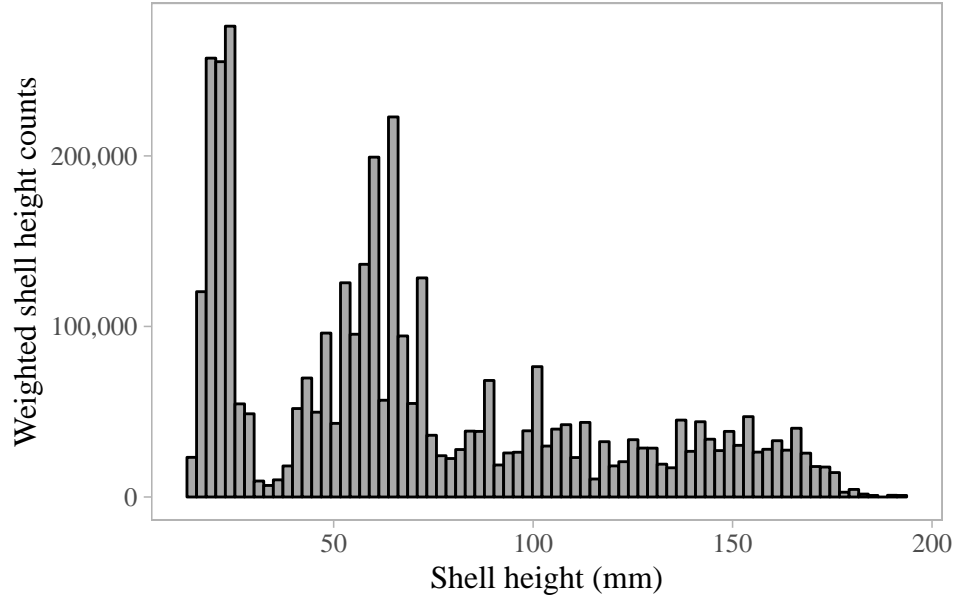


Figure 1: 2017 Kodiak Shelikof Bed 1 shell heights, expanded by area swept.

Table 1. Number of scallop shells aged by bed and age.

age	KNE2	KNE3	KNE6	KSH1	KSH2	YAK1	YAK2	YAK4	YAK5	YAKB
1	23	102	21	205	21	70	113	59	32	3
2	45	13	26	67	9	24	101	63	20	1
3	1	18	6	83	14	12	47	40	18	1
4	0	7	6	26	16	11	13	33	12	2
5	3	2	7	56	4	18	20	33	13	2
6	1	6	6	17	1	11	14	39	21	5
7	0	0	5	36	3	30	36	56	23	1
8	1	2	6	33	0	29	62	118	33	1
9	4	0	3	14	0	18	48	61	20	2
10	0	1	6	23	0	7	20	23	15	5
11	3	3	11	29	0	3	13	9	13	5
12	4	2	11	24	0	4	8	11	14	5
13	4	2	2	26	0	5	7	14	8	9
14	4	1	2	18	0	11	3	7	3	13
15	17	1	4	27	0	14	5	3	8	18
16	13	0	0	14	0	20	3	4	2	13
17	2	2	0	4	0	11	3	5	6	8
18	0	1	0	5	0	3	0	4	1	5
19	1	3	0	3	0	3	0	1	3	0
20	0	0	0	5	0	1	1	2	4	0
21	0	0	0	4	0	0	0	1	1	0
22	0	0	0	1	0	0	0	2	2	0
23	0	0	0	0	0	0	0	2	1	1
24	0	0	0	0	0	0	0	1	0	0
29	0	0	0	1	0	0	0	0	0	0

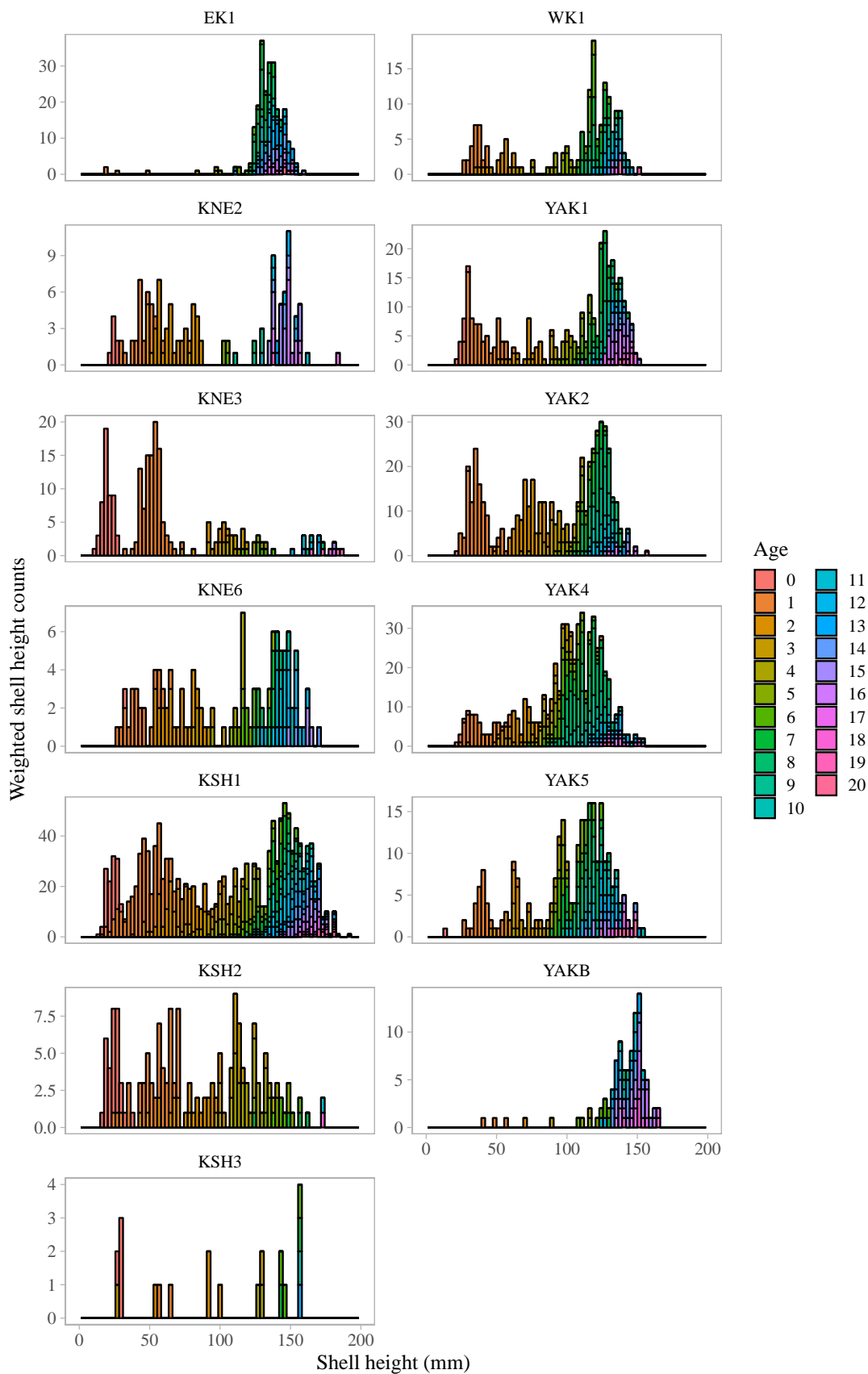


Figure 2: 2016/2017 scallop survey ages by shell height and bed.