**Response to reviews:**

1. Are the objectives and the rationale of the study clearly stated?

Reviewer #1: Yes

Reviewer #2: Yes

1. If applicable, is the application/theory/method/study reported in sufficient detail to allow for its replicability and/or reproducibility?

Reviewer #1: Yes

Reviewer #2: Yes

1. If applicable, are statistical analyses, controls, sampling mechanism, and statistical reporting (e.g., P-values, CIs, effect sizes) appropriate and well described?

Reviewer #1: Yes

Reviewer #2: Yes

1. Could the manuscript benefit from additional tables or figures, or from improving or removing (some of the) existing ones?

Reviewer #1: It may be helpful to include in the captions of figures 7-9 that the points represent species-year combinations

**Response: in the revision we have included in the captions of figures 7-9 that the points represent species-year combinations.**

Reviewer #2: No

1. If applicable, are the interpretation of results and study conclusions supported by the data?

Reviewer #1: Yes

Reviewer #2: Yes

1. Have the authors clearly emphasized the strengths of their study/theory/methods/argument?

Reviewer #1: Yes, as revised this provides a valuable and novel extension to previous studies of input sample size.

**Response: We appreciate the reviewers comment.**

Reviewer #2: Yes

1. Have the authors clearly stated the limitations of their study/theory/methods/argument?

Reviewer #1: Yes. Although it is standard practice to use ALKs for Alaskan stock assessments, this is not the case everywhere. For example, a quick check of recent stock assessments on the U.S. West Coast (<https://www.pcouncil.org/stock-assessments-star-reports-stat-reports-rebuilding-analyses-terms-of-reference/groundfish-stock-assessment-documents/>) shows that many assessments do not use an ALK to process randomly collected age data. This does not change the applicability of the manuscript, but suggests wording such as "it may be the case that an age-length-key (ALK) is employed", rather than "it is the case" (line 117). It would be unfortunate if potential readers did not see clearly that this study, at least the basic method and the applicability of adding ageing error, applies regardless of the use of an ALK.  
  
It might be worth noting in the discussion that future analyses could actually quantify the relative benefit in ISS of using an ALK or expanding randomly collected ages directly without benefitting from the expanded sample size of lengths but also adding the variability associated with growth.

**Response: following the reviewers suggestion we changed line 117 to ‘it may be the case’ in the revision. We have also added two sentences in the revised discussion (starting on line 580) following the reviewers suggestion that proposes future analyses be conducted to compare between methods that expand age composition through and ALK and those that do not.**

Reviewer #2: Yes

1. Does the manuscript structure, flow or writing need improving (e.g., the addition of subheadings, shortening of text, reorganization of sections, or moving details from one section to another)?

Reviewer #1: No

Reviewer #2: Yes

**Response: we have addressed reviewer #2’s revisions as responded to below.**

1. Could the manuscript benefit from language editing?

Reviewer #1: No

Reviewer #2: No

Reviewer #1: The authors have expanded and improved the analysis comprehensively in response to initial review comments.  
  
Minor editorial suggestions:  
Line 179 : 'numbers in year-y'  
Line 361: should "that" be "than"?  
Figure 6: Upper y-axis label is partially cropped.

**Response: in the revision we have include all of these editorial suggestions.**

Reviewer #2: The revision addresses my concerns from the initial review.  
  
I suggest two minor revisions:  
1. "Relative sample size" has replaced "relative sample size" which now matches the terminology used by Stewart and Hamel (2014) as noted on line 266. However the "relative sample size" remains on lines 82 and 92 and needs to be updated to match this change.

**Response: we have replaced ‘relative’ with ‘realized’ in lines 82 and 92 of the revision (and appreciate the reviewer catching that).**  
  
2. The figures added to the new supplementary material section are interesting although too small to be very helpful. Two changes could be useful to facilitate comparison across figures. First, use a consistent maximum (e.g. 500) for the y-axis rather than have differ by row within and among figures. Second, explain in the caption why the pooled growth treatment shown in Figure S1 does not include results for the the Aleutian Islands stocks of arrowtooth flounder and Pacific cod. I would have thought that pooling the data among years would have produced results for more stocks, not fewer.

**Response: In the revised supplementary material section we have fixed all the y-axis limits to be between 0 and 500. In the plotting code for Figure S1 there was a bug that inadvertently removed AI arrowtooth and Pacific cod, we have fixed this and replaced this figure in the revised supplementary material section.**