Appendix B: Tanner crab growth (molt increment) data

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Tanner crab growth data
During 2015 and 2016, NMFS and BSFRF collected the first sets of molt increment data for Tanner crab in the EBS. This new data is augmented by a large dataset collected by NMFS for Tanner crab growth in the Gulf of Alaska near Kodiak. These data are compared here to predictions from the 2016 assessment (Stockhausen, 2016) based on estimated growth parameters from the assessment model, which fits to size composition data and applies priors derived from the Kodiak data.

Mean growth
Mean growth in the 2016 assessment model was described using post-molt size as a sex-specific power function of pre-molt size, $z_{post} = e^a \cdot z_{pre}{}^b$. The estimated values for the sex-specific mean growth parameters were

parameter	males	females
a	0.4220295	0.6999999
b	0.9721004	0.8850577

These parameter estimates were constrained by priors on the parameters developed from the Kodiak data, with the prior mean values given by

parameter	males	females
a	0.437941	0.5656024
b	0.948700	0.9132661

Growth data and the 2016 assessment model
It is not possible to fit growth data in the TCSAM2013 modeling framework used for the current (2016) assessment model. Below, however, the EBS and Kodiak data is compared to the sex-specific mean growth functions estimated in the assessment model from size composition data (Figures 1-3). Male growth appears to be overestimated somewhat, but by less than 10%, at all sizes in the assessment model relative to both the EBS and Kodiak data. Female growth also appears to be overestimated in the model across all sizes relative to the EBS data, but again by less than 10%. Compared with the Kodiak data, the assessment model appears to overestimate female growth only at pre-molt sizes less than 40 mm CW. At larger female pre-molt sizes, predicted growth appears to be reasonably unbiased.

TCSAM02
The TCSAM02 modeling framework provides the opportunity to fit growth data directly in the assessment model. Results from several model runs fitting the growth data in different fashions are evaluated in the main report.

References
Stockhausen, W. 2016. 2016 Stock Assessment and Fishery Evaluation Report for the Tanner Crab Fisheries of the Bering Sea and Aleutian Islands Regions. In: Stock Assessment and Fishery Evaluation Report for the King and Tanner Crab Fisheries of the Bering Sea and Aleutian Islands: 2016 Final Crab SAFE. North Pacific Fishery Management Council. Anchorage, AK.
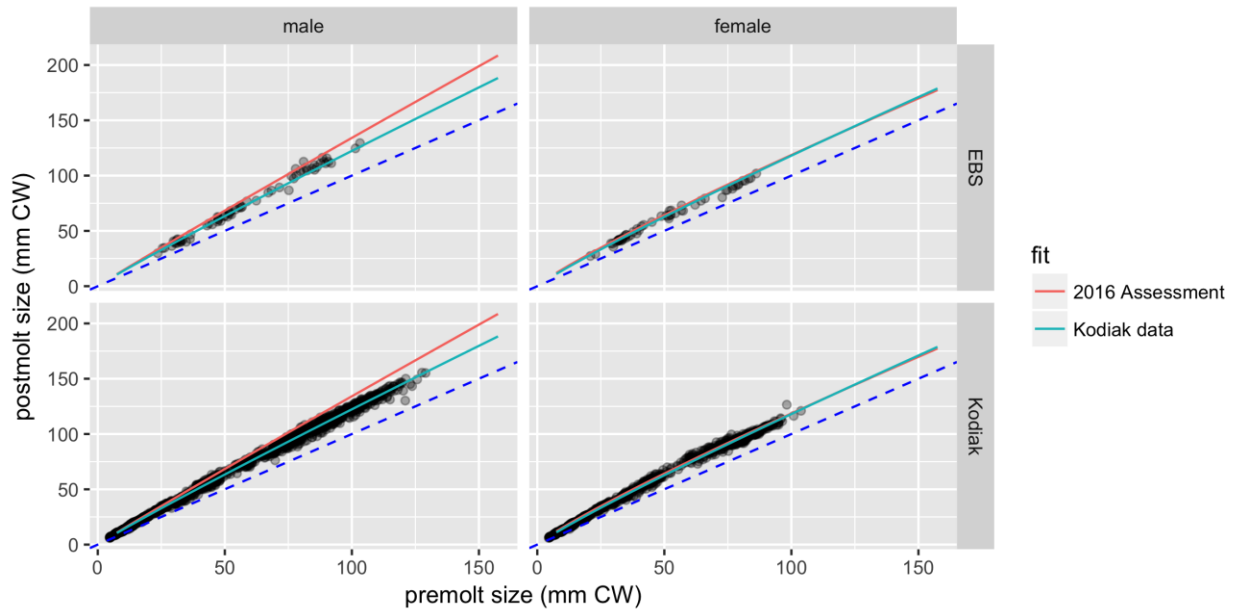
Figures

Figure 1. Tanner crab growth data, by region and sex. Colored lines indicate mean growth, by sex, as determined by the assessment model.
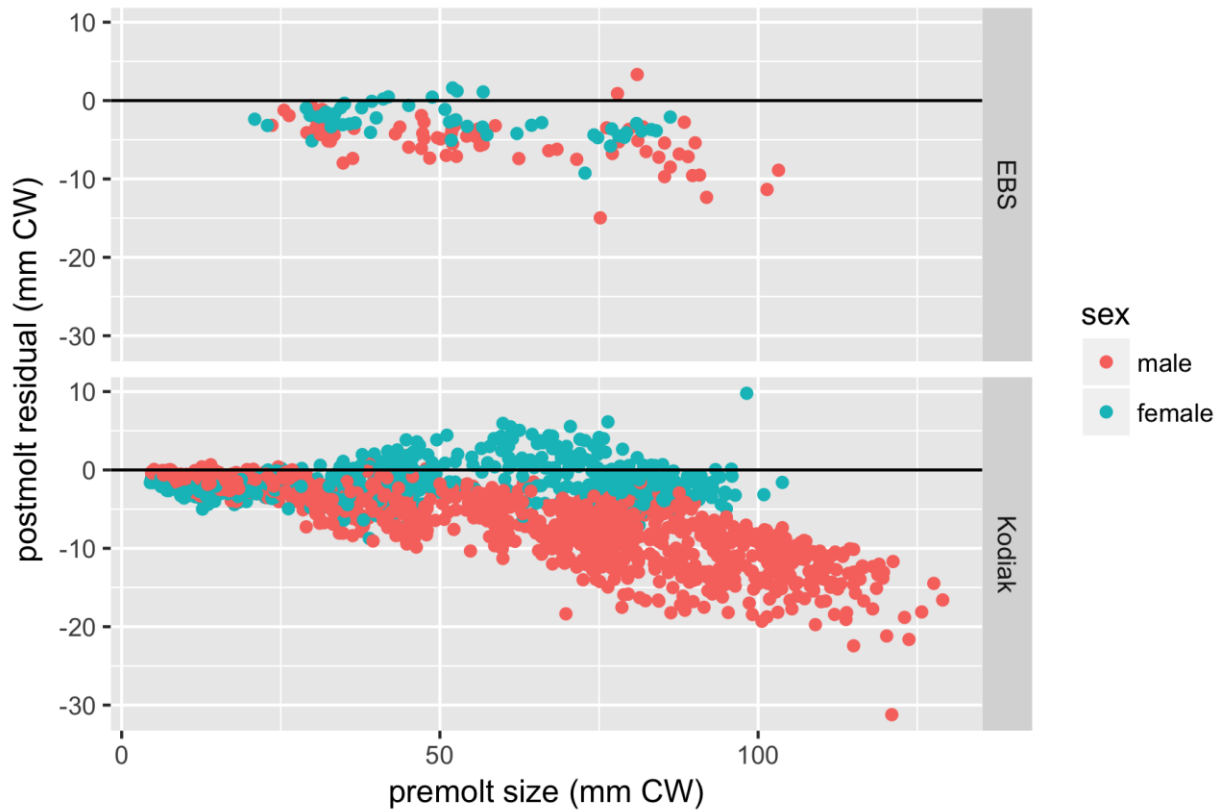

Figure 2. Absolute-scale residuals (observed – predicted) to mean growth as determined by the 2016 assessment model, by region and sex.
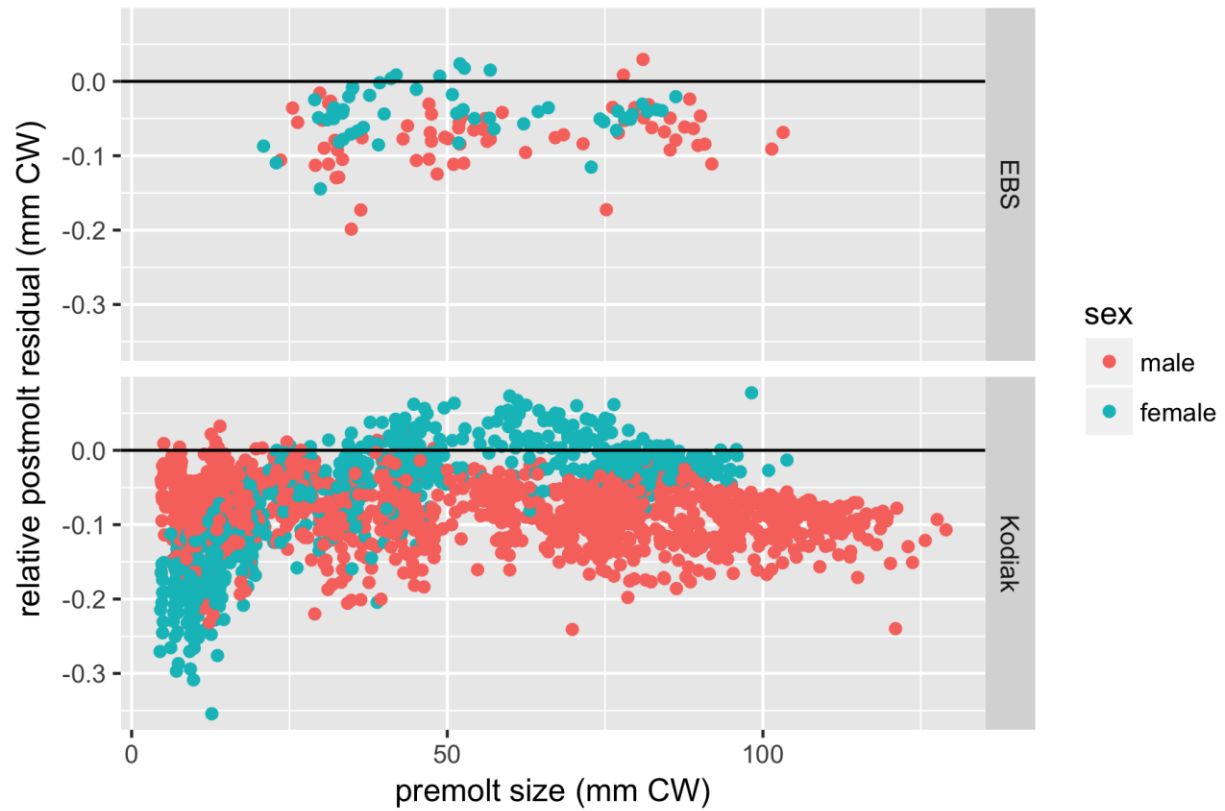
Figure 3. Relative-scale residuals (observed – predicted) to mean growth as determined by the 2016 assessment model, by region and sex.