Scallop Discard and Crab Bycatch Estimation

Tyler Jackson, Ryan Burt

Scallop Plan Team Meeting

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Kodiak, AK

Purpose

- Propose alternative method of:
  1. Estimating discard rate of small scallops and associated discard mortality
  2. Crab and halibut bycatch

Observer Data Collection

1. All discarded intact and broken scallops are collected into baskets.

2. One discarded scallop basket is selected as a subsample and sorted into two separate baskets - one for intact scallops and one for broken scallops.

3. The scallops in the discarded intact and broken subsample baskets are counted and weighed.

4. The remaining baskets of unsorted discarded intact and broken scallops collected are weighed.

Current Method

- Since 2014 Ryan Burt has maintained an Excel macro inherited from preceding biometrician
- Rate of scallop discards (round weight & number of animals) and bycatch (number of animals) per dredge is estimated for each day of fishing
- Scallop discards are

$$total\ discard = \sum_{i}^{n} \frac{discards_i}{sample\ hrs_i} \times\ dredge\ hrs_i$$

- Days without observer sampling are assigned a rate via a nearest neighbor selection

Current Method

- Discard mortality for scallops is estimated in terms of meat weight for all discards (broken and whole) by a variable meat recovery rate (8.3% – 10.8 %) and 20% mortality rate

$$disc\ mort = tot\ disc\ * meat\ rate\ * 0.20$$

Issues:

- Nearest neighbor selection is unclear, not well documented – results in a black box calculation
- Meat weight recovery rates are likely not accurate
- Broken discards will likely not experience 80% survival

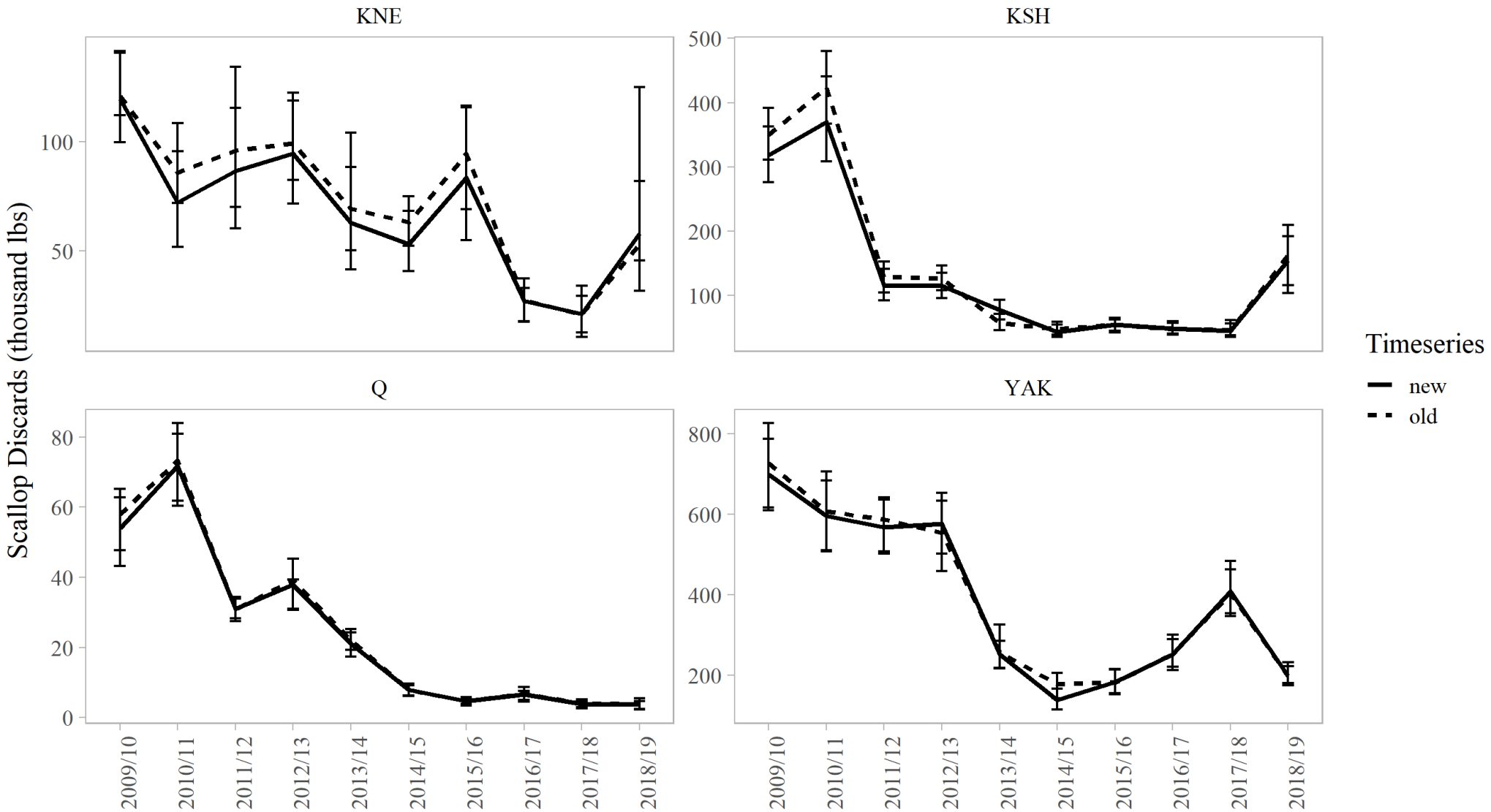
Proposed Method

$$total\ discard = \frac{\sum_i^n discards_i}{\sum_i^n sample\ hrs_i} \times \sum_i^n dredge\ hrs_i$$

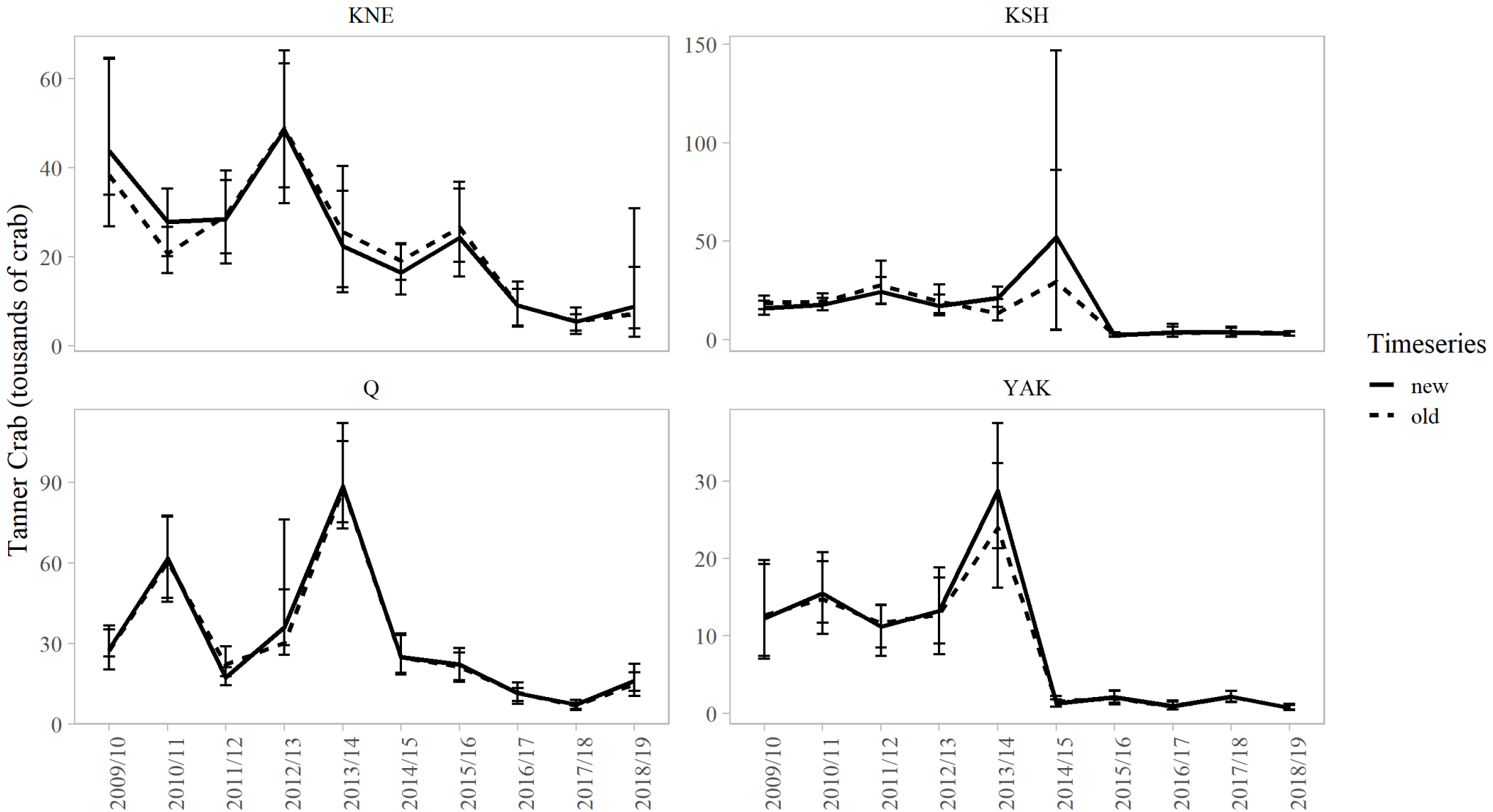
- Remove nearest neighbor catch rate assignment for days with no observer sampling, use rate based on cumulative for fishery
- Use 10% meat recovery for each district
- Assume 100% mortality for broken scallop discards, 20% for whole scallop discards

$$disc\ mort = (tot\ disc\ * 0.10\ * prop\ whole\ * 0.20) + (tot\ disc * 0.10\ * (1 - prop\ whole))$$

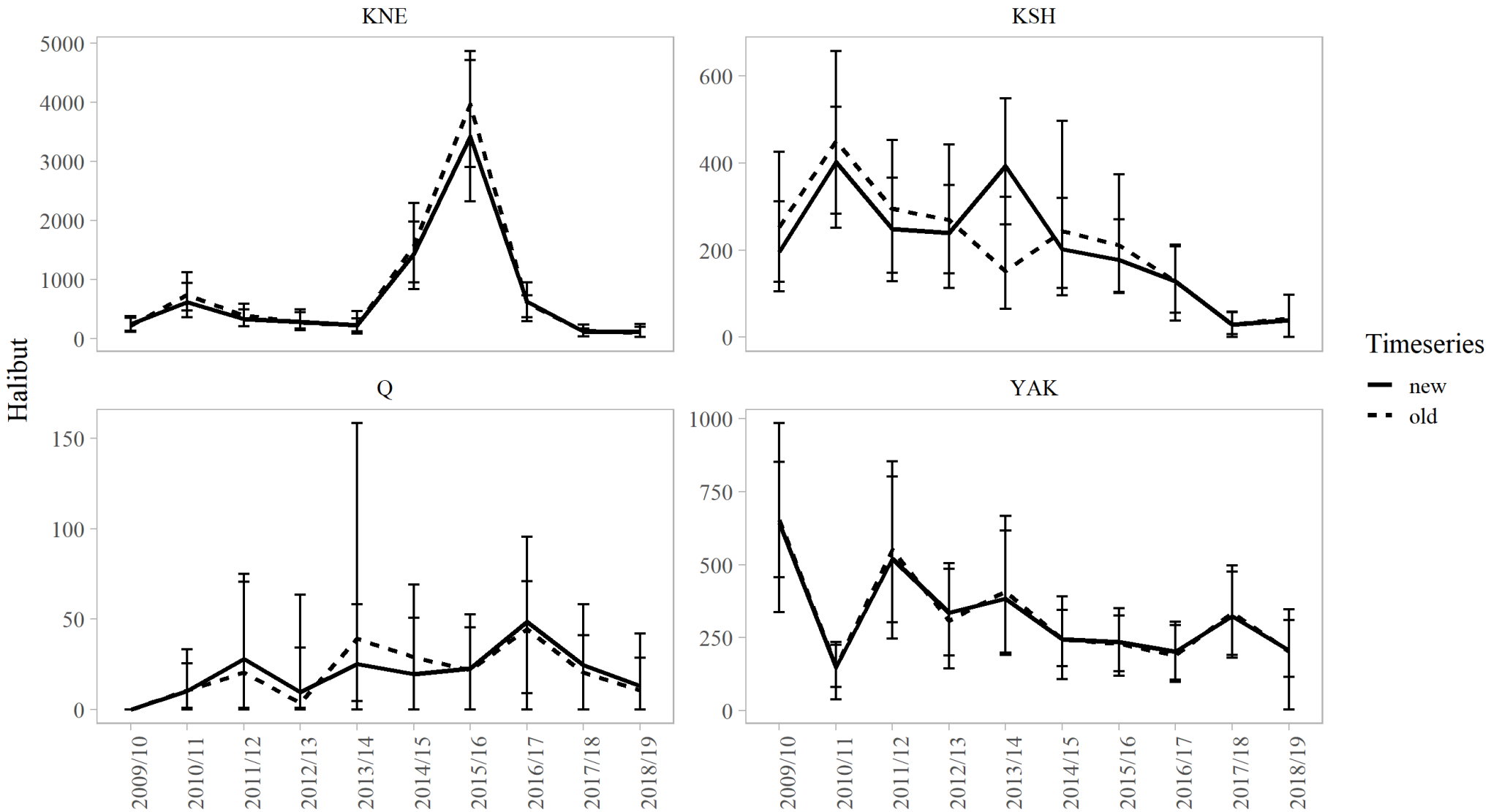
Scallop Discards



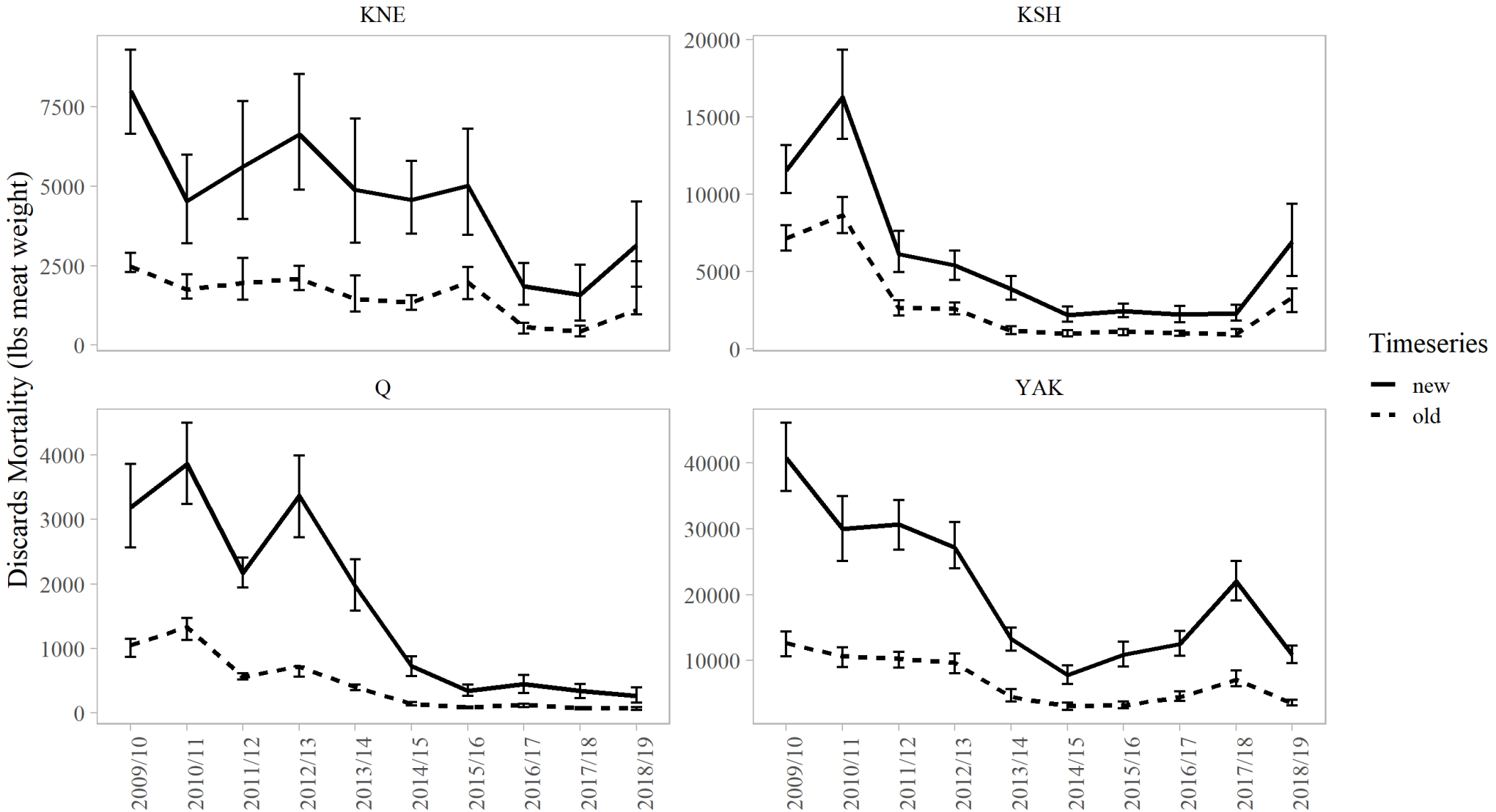
Tanner Crab Bycatch



Halibut Bycatch



Scallop Discard Mortality, Meat Weight



Summary

- Cumulative bycatch calculation aligns closely with nearest neighbor bycatch calculation and is more straightforward
- Applying specific mortality rates to broken and whole discards results in drastic changes in estimates (doubles or triples estimates), but follows similar trend

- Comments from the SPT?
  - Is round weight of discards more informative? (it's just meat weight / 0.1)
  - Estimated number of animals?