

Crab multi-area / stock model (outline and data)

Basic Structure-I

- Two stocks
 - Eastern Bering Sea Tanner crab
 - Eastern Bering Sea snow crab
- Objectives of the model:
 - Explore the impact of Ocean Acidification on the two stocks
 - Explore the impact of the snow crab fishery on the Tanner crab fishery (accounting for spatial structure)

Basic structure-II

- Three regions (currently):
 - South of 60°N ; West of 166°W
 - South of 60°N ; East of 166°W
 - North of 60°N ; West of 166°W
- Time period modelled:
 - 1985-2013 (due to data availability)
- Structure:
 - Length-structured
 - No division into mature/immature & old/new shell.

Fleets

(each fleet is in each area)

- Eastern Bering Sea Snow crab:
 - Directed fishery
 - Groundfish fishery
- Eastern Bering Sea Tanner fishery:
 - Directed fishery
 - Snow crab fishery
 - Groundfish fishery

Survey data

- Survey estimates of biomass (or numbers)
- Survey length-frequency

Data assembly

Survey Data

- Data are available by crab (the haul file)
- For each sampled crab
 - convert to numbers caught per nm^2 by dividing by area swept and multiplying by the sampling fraction
 - convert to weight as above, but accounting for the weight of individual crab.
- Sum scaled-up crab to station (and divide by the number of tows per station)
- Find the average density among stations in a stratum, and multiple by stratum area. Compute stratum variances.
- Sum stratum estimates (and variances by stratum)

Retention in the Directed Fishery

- Catches (From Bill G):
 - By ADFG area (statarea) and number / lbs.
 - Simply allocated to region based on statarea and summed.
- Catch Length-frequency
 - From Jack and Buck!

Discards in the Pot Fishery

(all from Bill G)

- Catches (by numbers and sex)
 - Catch by stat area is:
 - $\#discarded / \text{sampled pots} * \text{TOTAL effort}$
 - Sum catch over statarea with observer data
 - Rescale catches by unobserved effort
- Catches (by mass and sex)
 - Catches in number multiplied by average weight.
- Length-frequency
 - Simple sum of observations, no weighting by area, vessel, etc
- Analyses conducted by region
- Issues: statareas with sampling, but no effort!

Discards in the Groundfishery

(all from Bob)

- Catches (by numbers and sex)
 - Catches are given by statarea and species (in kg)
 - Simple sum.
 - Converted to numbers by dividing by mean weight
 - Data are NOT available for all years reported in past assessments...
- Length-frequency
 - Simple sum of observations - no weighting by area, vessel, etc.
 - Mean weight computed as average over ALL fishery (not regions)