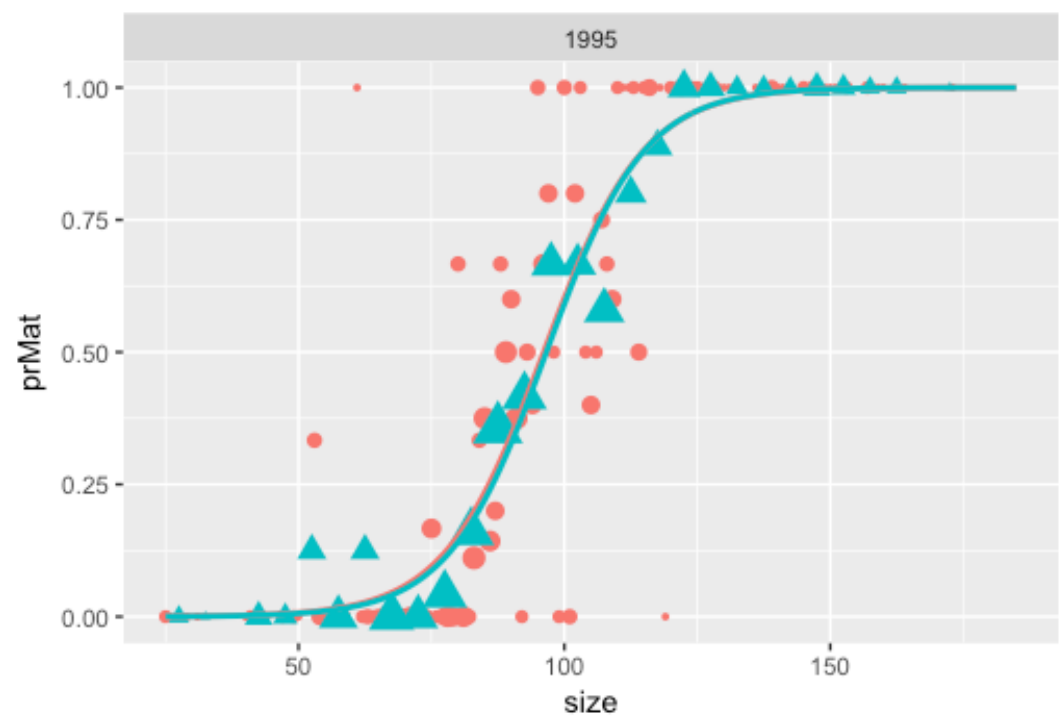
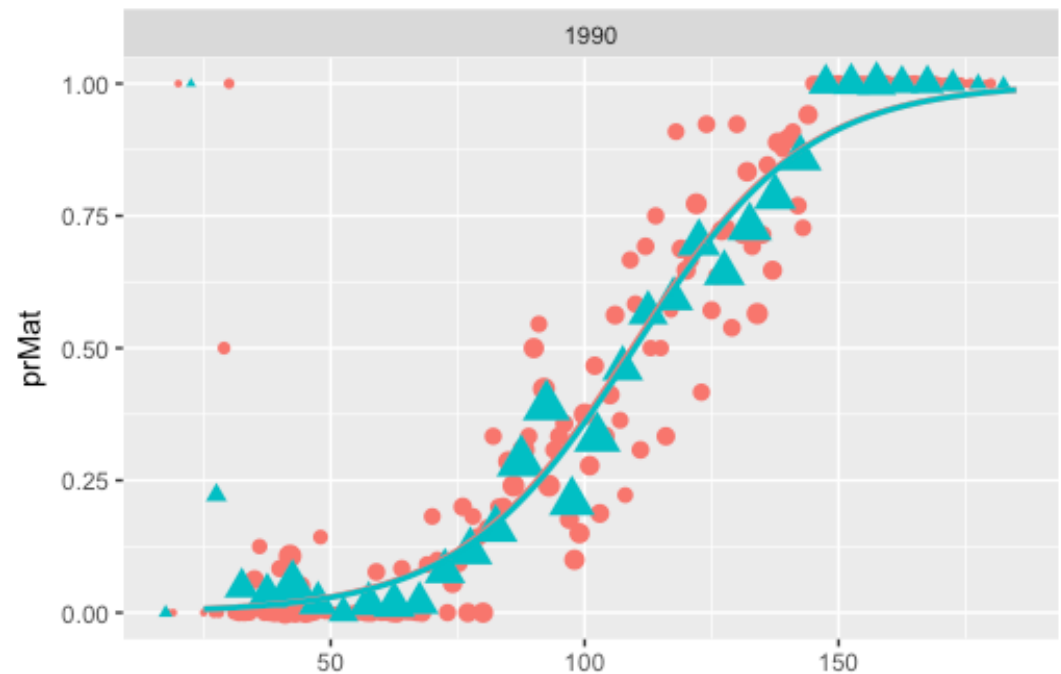


# Incorporating male chela height data into the Tanner crab stock assessment

William Stockhausen  
Alaska Fisheries Science Center  
NOAA/NMFS

# Incorporating male chela height data into the Tanner crab stock assessment

- Use male chela heights from NMFS trawl survey to determine immature/mature status for measured new shell male crab
- Add likelihood component to fit observed ratios of mature new shell males to total new shell males by size bin and year



# Changes to assessment model with incorporation of male chela height data

- Do not estimate male maturity status outside assessment model
  - Currently, NMFS survey abundance-at-size for males is converted to immature/mature abundance-at-size using a maturity ogive estimated outside the model (based on Rugolo and Turnock, 2012)
- Fit to NMFS survey total male biomass, total male size compositions by shell condition
  - Currently, the assessment model fits to
    - NMFS survey mature male biomass (summed over shell condition)
    - male size compositions by immature/mature categories (summed over shell condition)
- Fit observed ratios of mature male new shell-to-immature crab using NMFS chela height data using model-predicted ratios in the NMFS survey for the numbers of new shell mature males to immature males

$$p_{y,z} = \frac{M_{y,z}}{I_{y,z} + M_{y,z}} \sim B(\hat{p}_{y,z} = \frac{\hat{M}_{y,z}}{\hat{I}_{y,z} + \hat{M}_{y,z}} | n_{y,z} = I_{y,z} + M_{y,z})$$

- $M_{y,z}$  = observed number of mature, new shell males
- $I_{y,z}$  = observed number of immature (new shell) males
- $\hat{M}_{y,z}$  = predicted number of mature, new shell males
- $\hat{I}_{y,z}$  = predicted number of immature (new shell) males

$$-\ln(L) = \sum_{y,z} n_{y,z} \cdot \{p_{y,z} \cdot [\ln(\hat{p}_{y,z}) - \ln(p_{y,z})] + (1 - p_{y,z}) \cdot [\ln(1 - \hat{p}_{y,z}) - \ln(1 - p_{y,z})]\}$$

- Not currently done in assessment