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NOAA

Methods for examining in-season behavior of the cumulative discard estimation

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Data Sources (2010-2016)

- 1. Total catch: K
 - Dealer, VTR
 - merged in DMIS

- 2. Observed catch/discard: *k*, *d*
 - Northeast Fisheries Observer Program (NEFOP)
 - At-Sea Monitors (ASM)



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Source: NOAA/GARFO





Discard estimation – ratio

- Follows Standardized Bycatch Reporting Methodology
- Ratio estimator: observed discard/kept
- Extrapolate observed to unobserved trips
- Stratification

$$r_{jh} = \frac{\sum_{i=1}^{n_h} d_{jih}}{\sum_{i=1}^{n_h} k_{ih}} \qquad \widehat{D}_j = \sum_{h=1}^{L} K_h r_{jh}$$

Wigley et al. (2007) - SBRM



Discard estimation – uncertainty

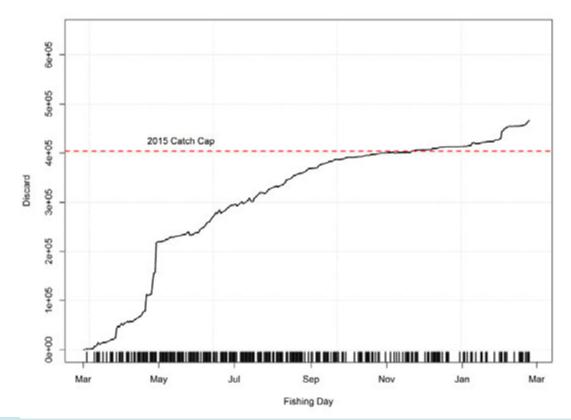
- Variance in observed discards
- Sample sizes
- Precision in estimates (CV)

$$V(\widehat{D}_{j}) = \sum_{h=1}^{L} K_{h}^{2} \left(\frac{N_{h} - n_{h}}{n_{h}N_{h}}\right) \frac{1}{\left(\frac{\sum_{i=1}^{n_{h}} k_{ih}}{n_{h}}\right)^{2}} \left[\frac{\sum_{i=1}^{n_{h}} \left(d_{jih}^{2} + r_{jh}^{2} k_{ih}^{2} - 2r_{jh} d_{jih} k_{ih}\right)}{n_{h} - 1}\right]$$
$$CV(\widehat{D}_{j}) = \frac{\sqrt{V(\widehat{D}_{j})}}{\widehat{D}_{j}}$$
Wigher et al. (2007) SEDM



Discard estimation – cumulative

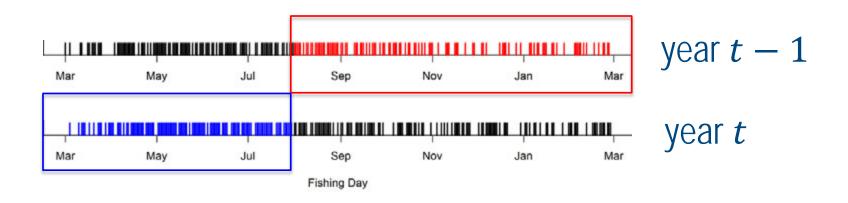
- Estimated weekly as trips occur
- Function of [N, K] and [n, r]





Discard estimation – transition rates

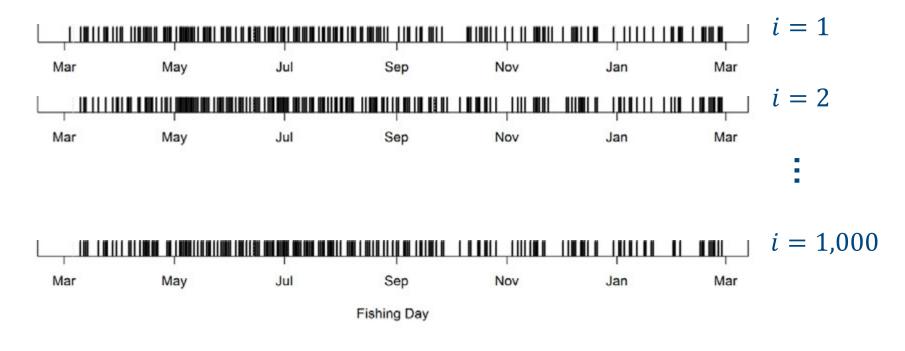
- Adjust early-season discard rate
- Use information from previous year
- Two approaches:
 - 1. Default (n = 5)
 - 2. Moving window





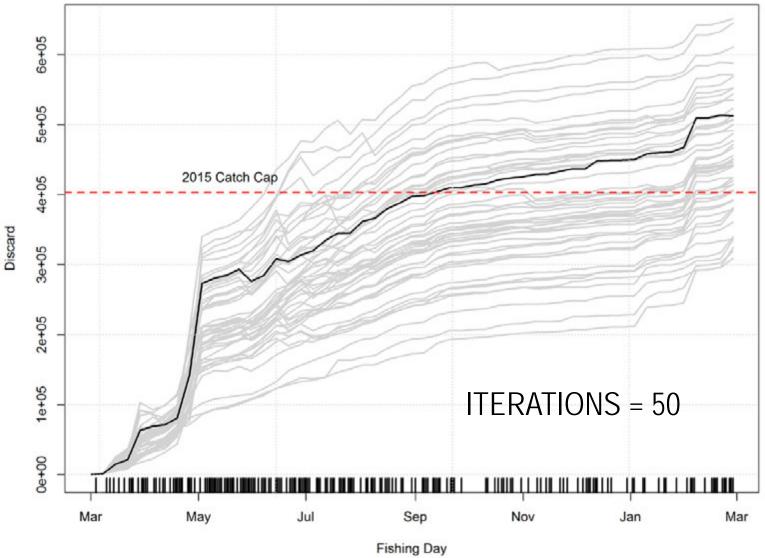
Sampling simulations (bootstrap)

- Resample the observed trips
- Calculate discard rate and total discard
- Do this 1,000 times!



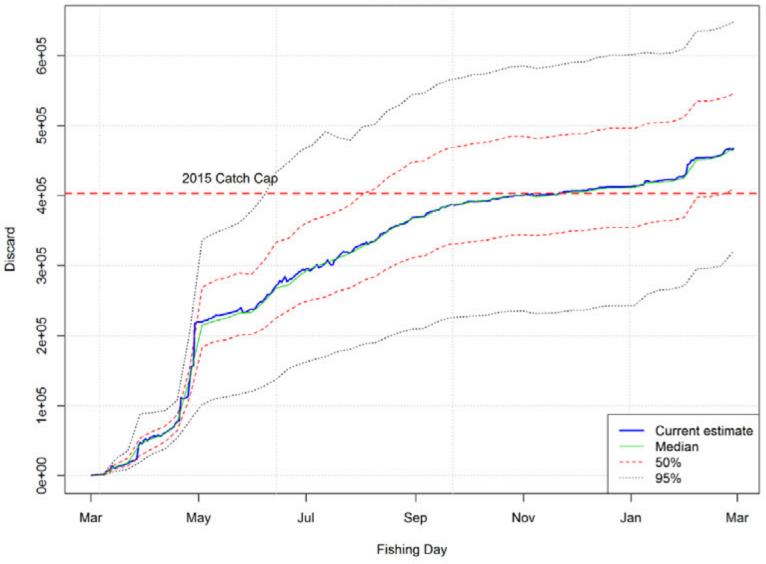


SCAL_WP_SNE FY 2015: 5 trip based Transition Rate BASELINE

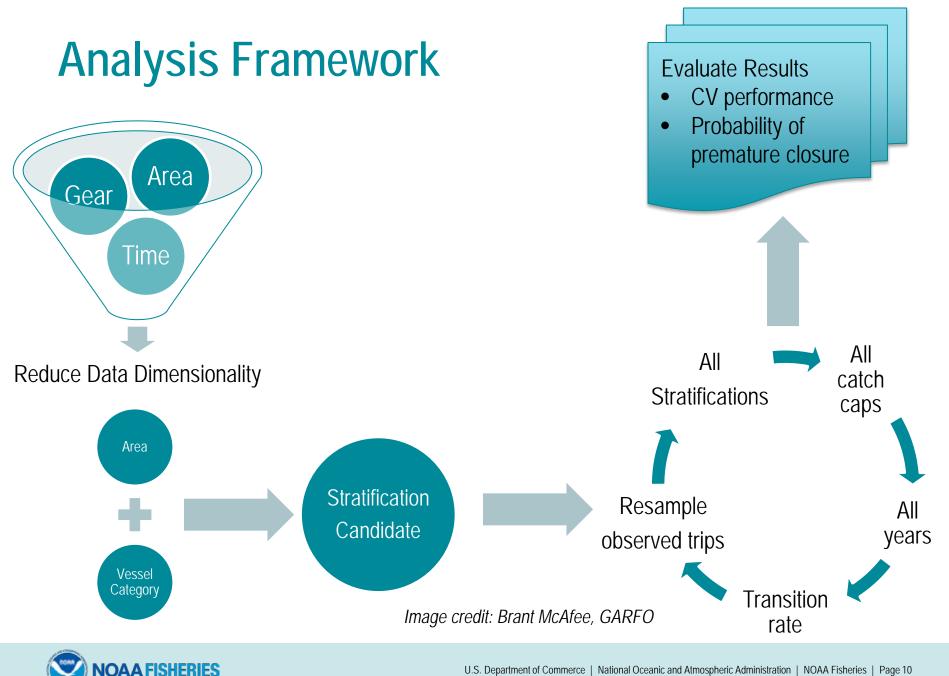




SCAL_WP_SNE FY 2015: 5 trip based Transition Rate BASELINE







Software tool

- Custom R package
- Current/future discard estimation
- Flexible and adaptable



