SEDAR 74 Gulf of Mexico Red Snapper Stock Assessment: Assessment Webinar 6

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Assessment Webinar 5 Review

- Moving forward with model that, for a given fleet, uses length or age composition to either facilitate selectivity and discard modeling (length) or cohort tracking from FI indices (age).
- Remaining Issues and Questions
  - Stock recruitment formulation
    - Deviations (simple/zero sum), R0 (time-varying or not)
  - GRSC
  - Most appropriate Nsamp
  - Discard Fraction

Stock Recruitment Formulation

SR Formulation

- From last webinar
  - We had proposed using no R0 block and simple deviations.
  - Questions were raised over the impacts of the SR parameterization decisions on modeled quantities.
- We explored 4 configurations of R0 blocking and deviations to further explore the topic.

SR Formulation

Questions that influence the need for an R0 block and restricted or simple recruit devs:

- Was there a real or perceived change in productivity for the stock?
    - Yes.
- What was the cause for this change in productivity?
    - Unknown. Productivity change could be due to changes in red snapper natural history or other unmodeled factors (habitat changes,changing M, changing growth, .etc)
- Do we have the data to accurately/precisely model changing productivity?
    - Probably not, Early R0 estimates based on little to no data since earliest relevant data sources begin in the mid 80’s.
- How does choice of R0 effect the estimation of reference points, stock status and projections?

SF Formulation Options

No shift in productivity & Restricted Deviations

- Not probable: Goes against known biological assumptions and forces poor fit to observed increases in recruitment through time.

Shift in productivity & Simple Deviations

- Not necessary: Parameters are confounded and over fitting to noise, decreased parsimony.

No shift in productivity & Simple Deviations

- Probable: Assumes RS productivity hasn't changed but allows for rec. deviations to account for unmodeled processes that affect recruitment success. Unmodeled processes are limited by data availability and model capabilities.

Shift in productivity & Restricted Deviations

- Probable: Assumes a permanent shift in productivity or allows the R0 parameter block to account for unmodeled processes that affect recruitment success. Either way, recent recruitment deviations are constrained by and derived from the new productivity regime.

SR formulation (Does the final choice matter?)

- For the "probable" options, % differences in terminal stock condition were negligible (Avg. F (3.3), SPR (7.1))

- Differences in analytically derived reference points (SSBspr26% and Fspr26%) were substaintal due to differences in SR parameters.

	No-block Simple devs	Block Restricted devs	
R0 type	Only one	Early	Recent
R0	11.437	11.301	11.792

- However, new SS projection flexibility allows forecast recruitment to be decoupled from the SR parameters allowing either approach to produce roughly equivalent reference points and stock status estimates.

Analytical Team Recommendation

- Choice is ultimately a management decision as there are risks associated with either approach.
- With either of the “probable” approaches, care will need to be taken to ensure reference points reflect desired productivity regime during the OA.
- For now, we will proceed with R0 block and restricted deviations due to historic precedent and improved model stability.

GRSC

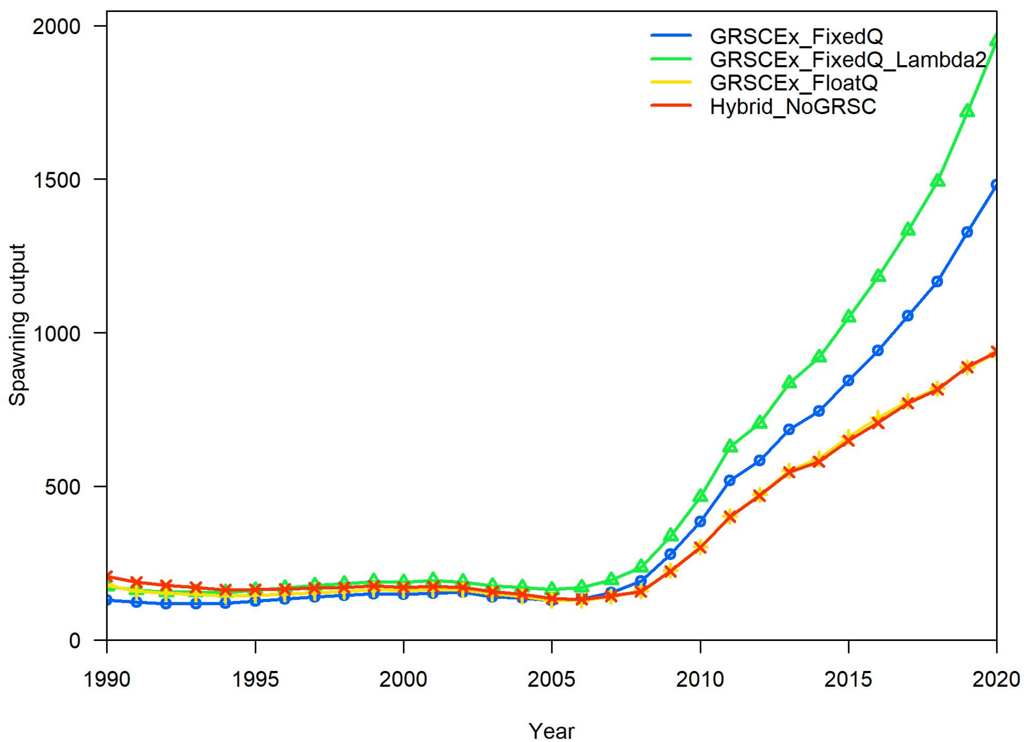
Inclusion of the GRSC

- Approximate regional values:
  - West = 40 million
  - Central = 43 million
  - East = 35 million
- Treat each regional estimate of absolute abundance as its own survey with independent and estimated catchabilities.
- Manipulate q and weighting parameters (4 setups):
  - Internally calculated analytical solution for q
  - Fix q at 1 ... CPUE =qN … CPUE=N
  - Fix q at 1 & increase data weight

GRSC Preliminary Findings

- Waiting for final GRSC numbers
- Able to get the model to respond to approx. GRS numbers:
  - Model finds an analytical solution for q
  - When q is fixed the model randomly adjusts fits to other data sources
  - Model responds to increasing weight of GRS data by sacrificing the fit to other data sources

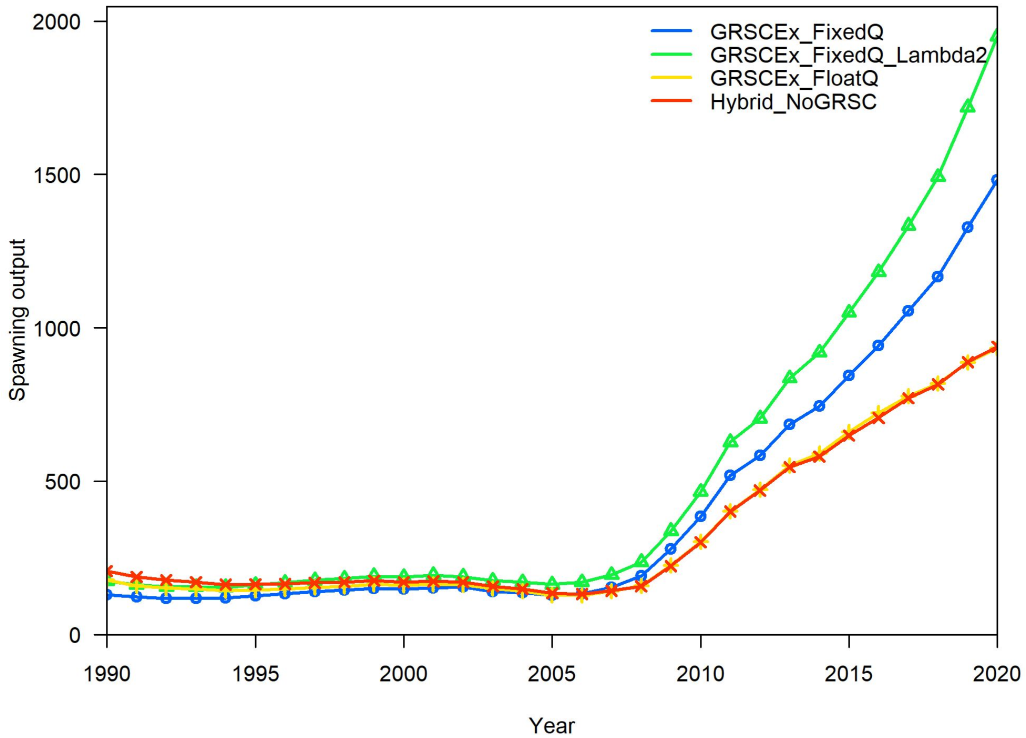
GRSC Preliminary Findings



- Floating q approach produces nearly identical results as the model with no GRSC. (model estimates q's that ignores GRSC)
- Fixed q options increase model estimates of recent abundance.

NOT final GRSC numbers

Analytical Team Recommendation



NOT final GRSC numbers

- For now, proceed with model development using fixed q's and lambdas = 1(blue result in figure). This approach implies the GRSC data receive equal weight to all other sources of data.

Most Appropriate Sample Size Unit (Nsamp)

Using Dirichlet-Multinomial Data Weighting

- Non iterative - effective sample size estimated during parameter estimation
- Unbiased to clusters of individuals in a sample
  - Accounts for data overdispersion (formally accounted for in assessments using “trips” as n)
- Uncertainty in data weighting is propagated through to forecasting

Input Units for Sample Size

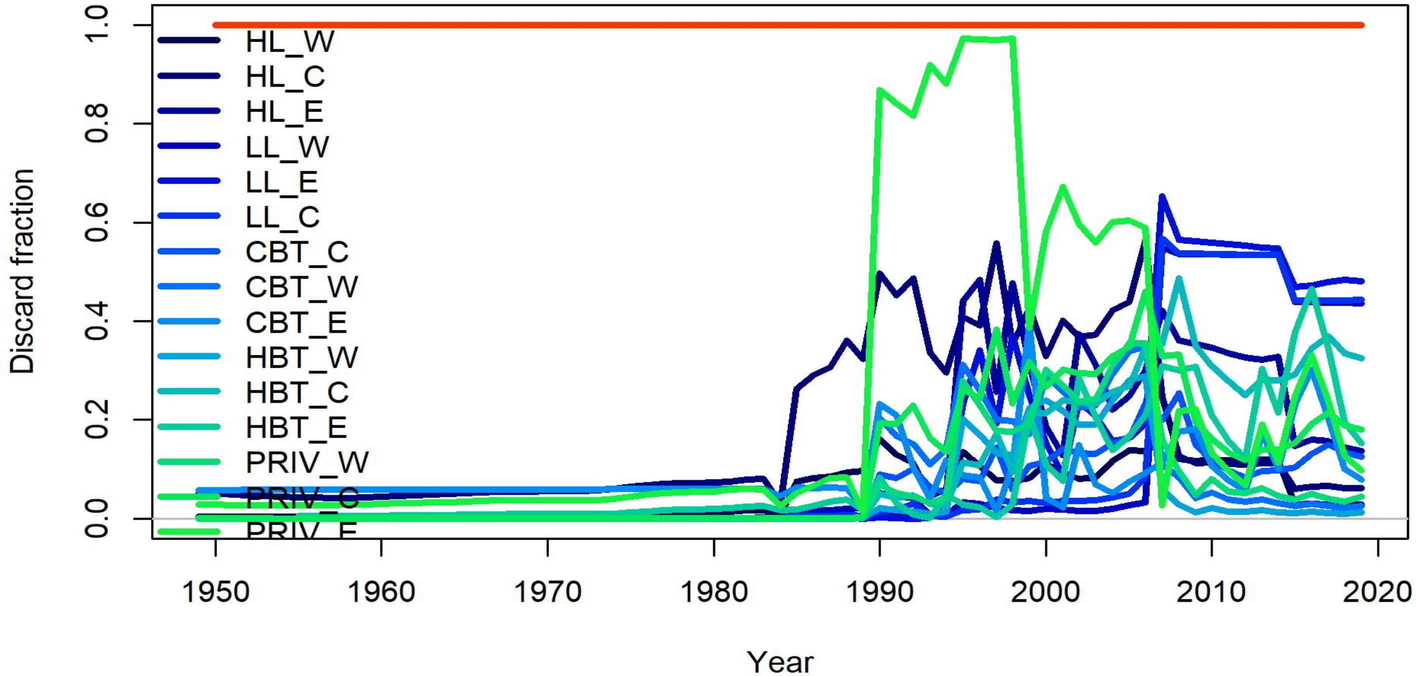
- Previously “trips” were used for sample size
- Goal is to move to “number of fish measured”
- Problem is no consistency in sampling units of provided data:
    - Comm Obs only provides “n” unique locations fished on a trip
    - For “numbers” the shrimp data needs to be resummerized by the analytical team (time intensive).

Analytical Team Recommendation

- Use “numbers of fish” where available.
- Request “numbers of fish” during data scoping for operational assessment.

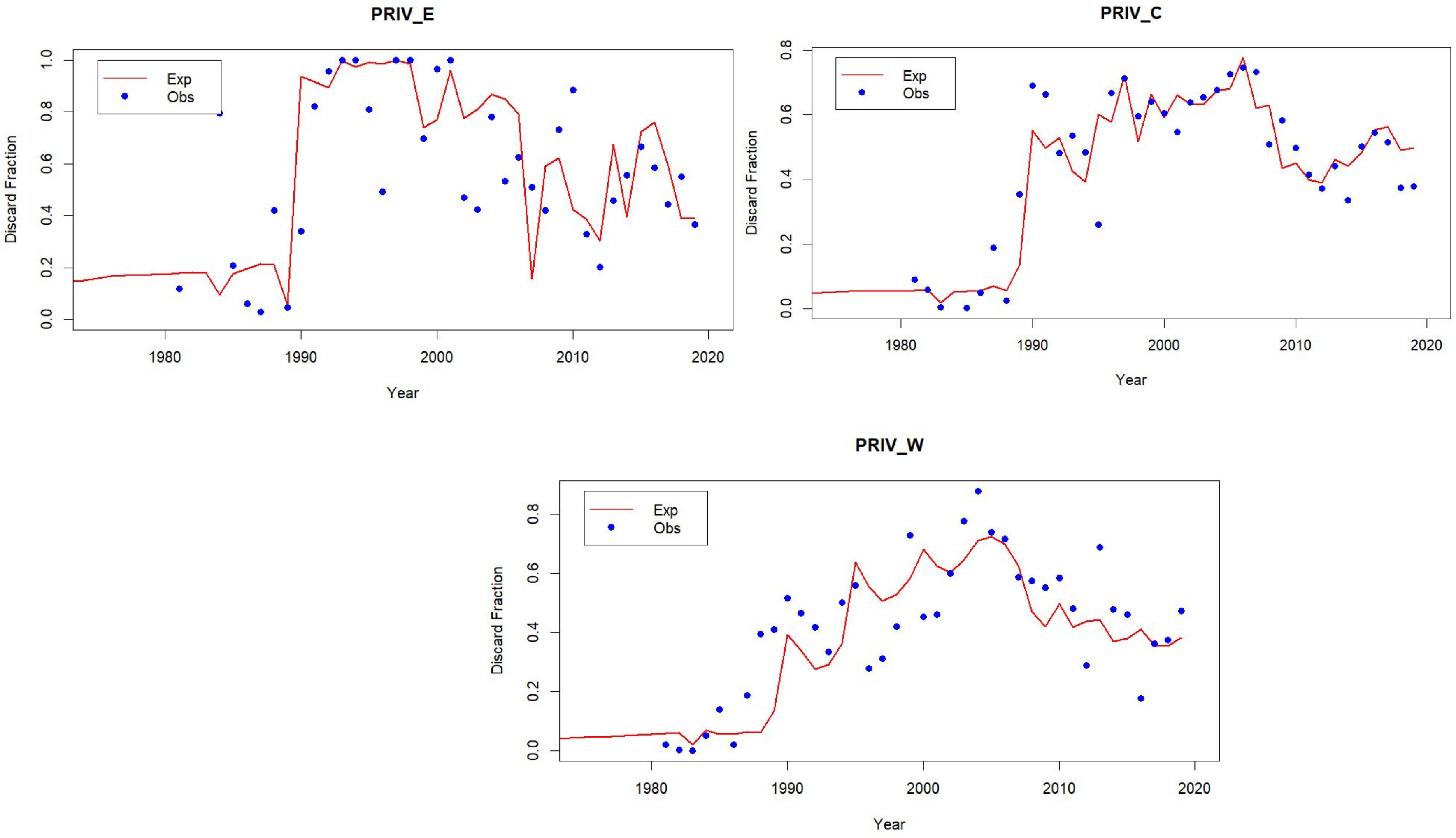
Discard Fraction

Discard Fraction

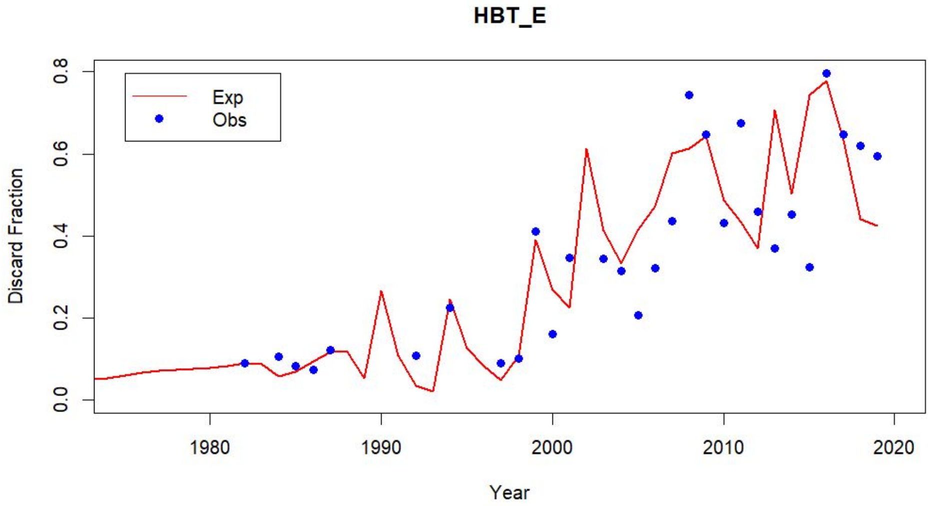


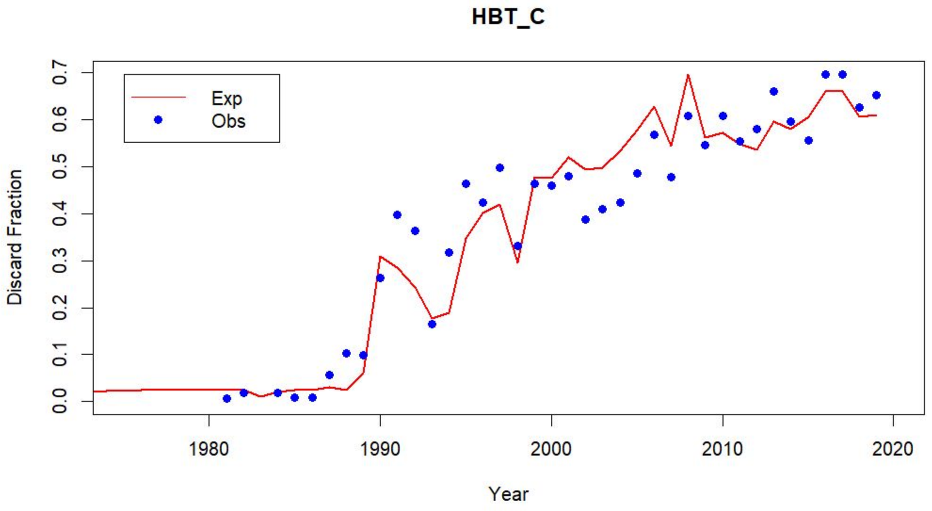
Balance between selectivity and retention processes has been improved with use of length comp; however, some issues remain with the commercial fleets,particularly the LL fleets

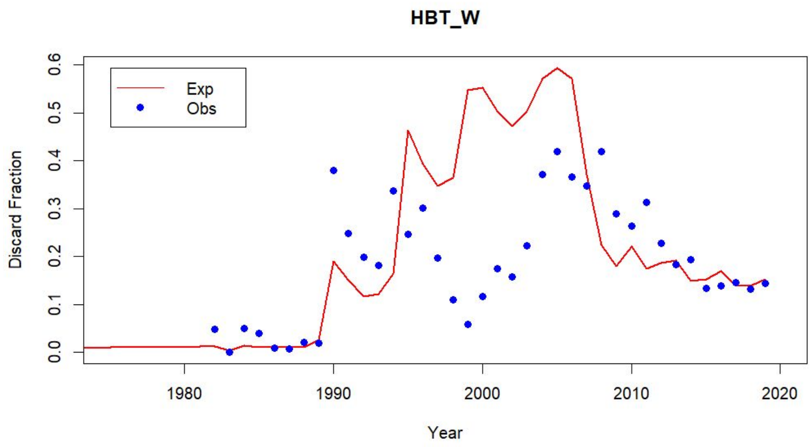
Discard Fraction (Private)



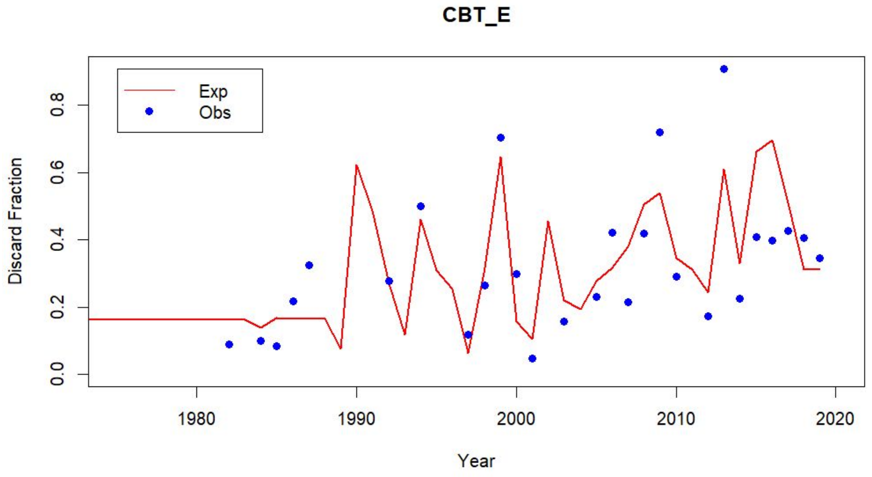
Discard Fraction (Hbt)

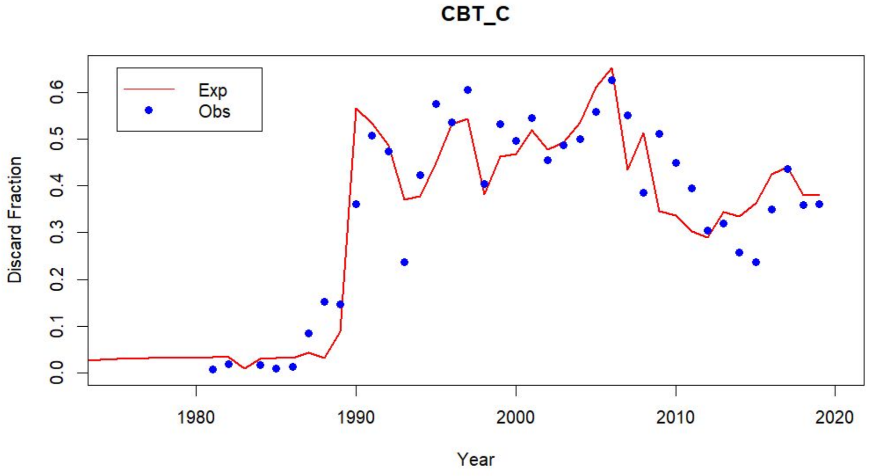


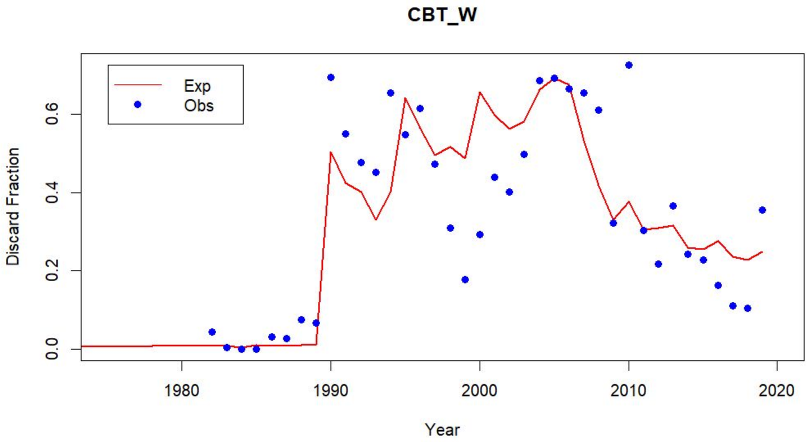




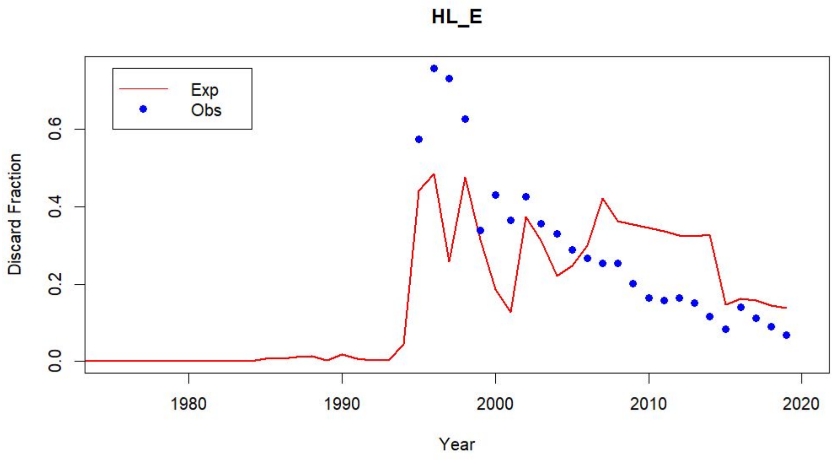
Discard Fraction (Cbt)

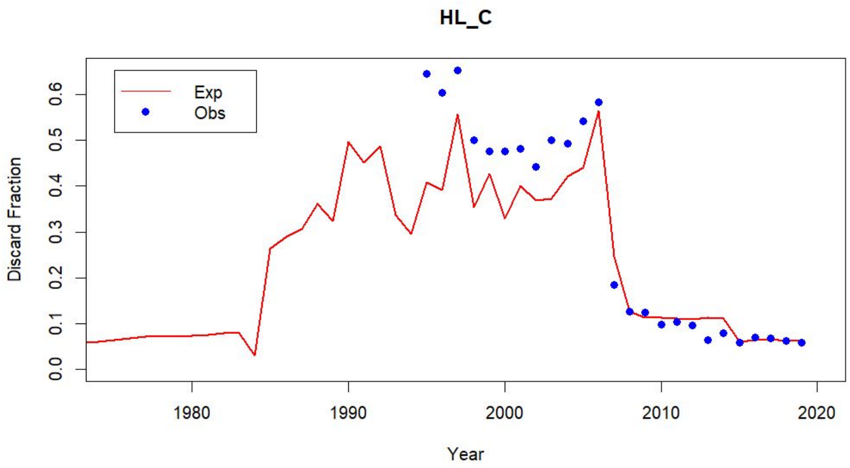


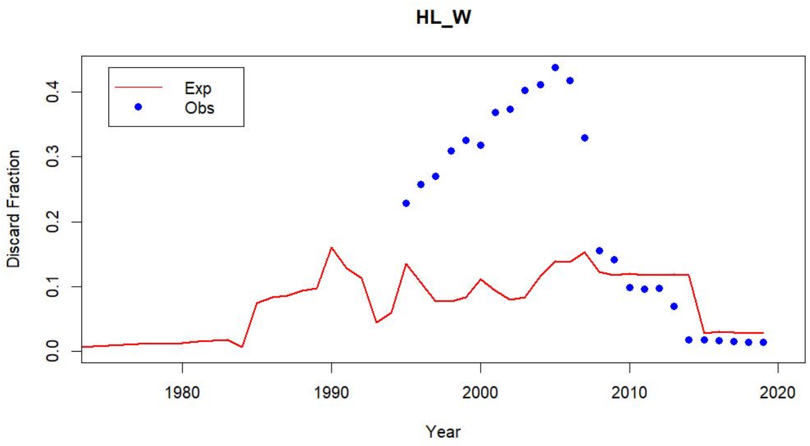




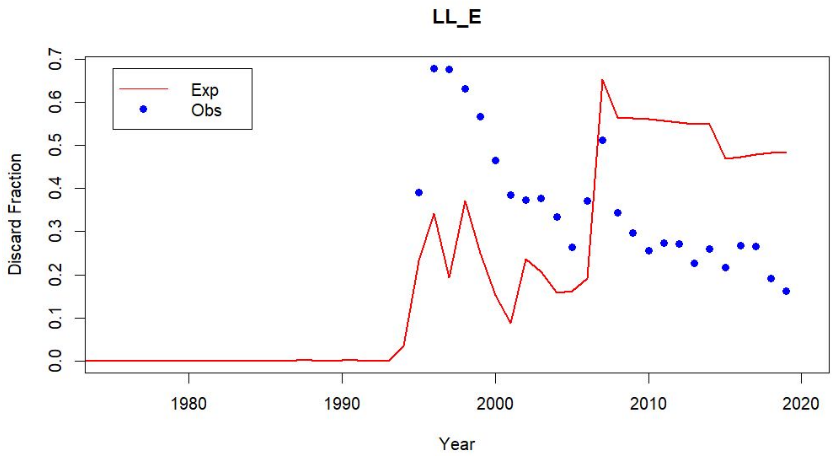
Discard Fraction (HL)

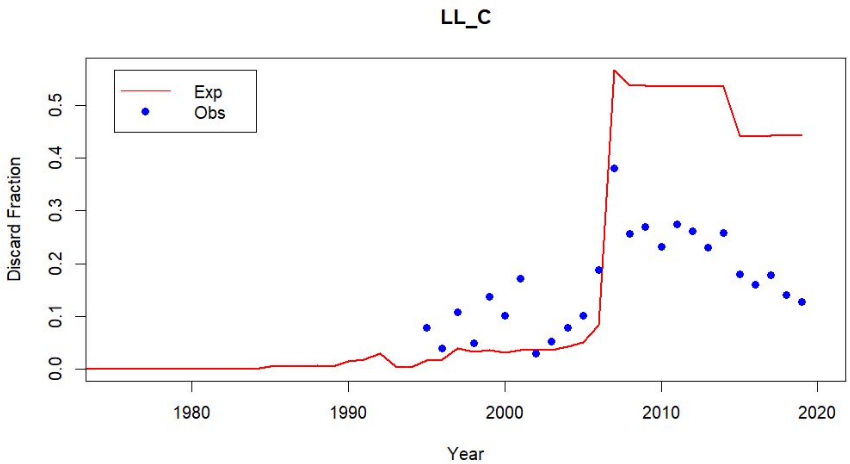


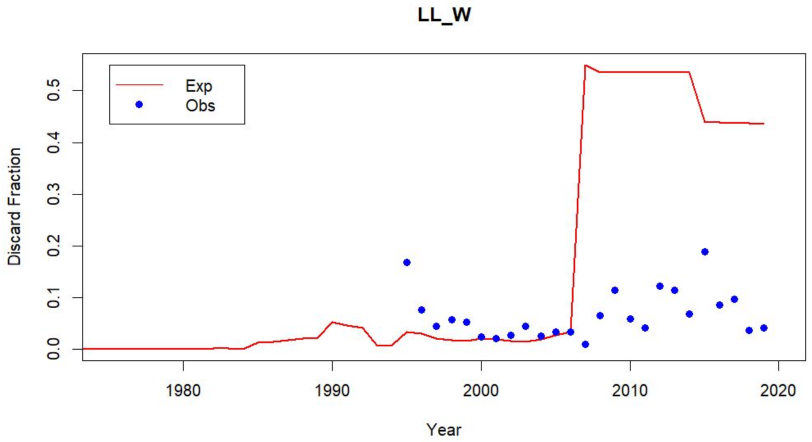




Discard Fraction (LL)

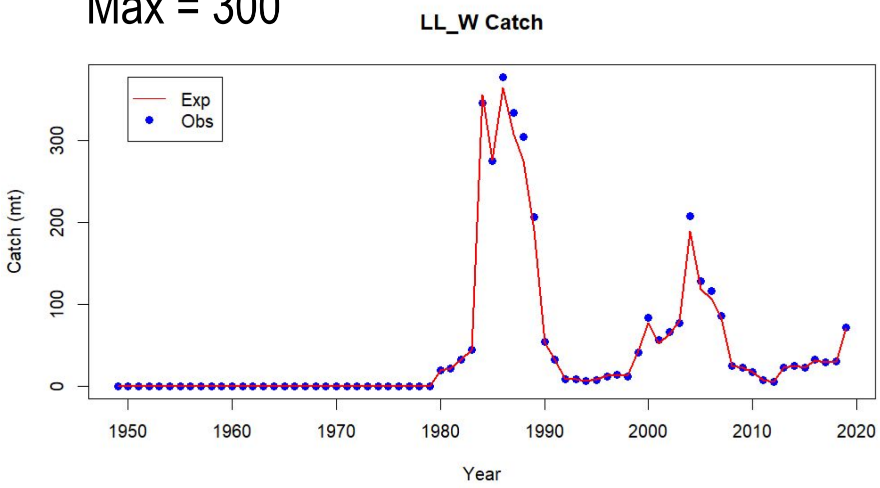




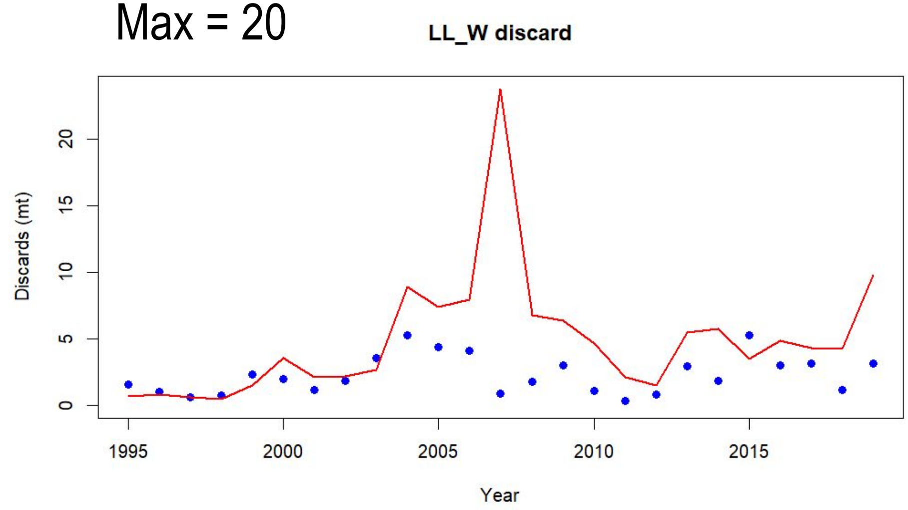


Longline Regional Magnitude

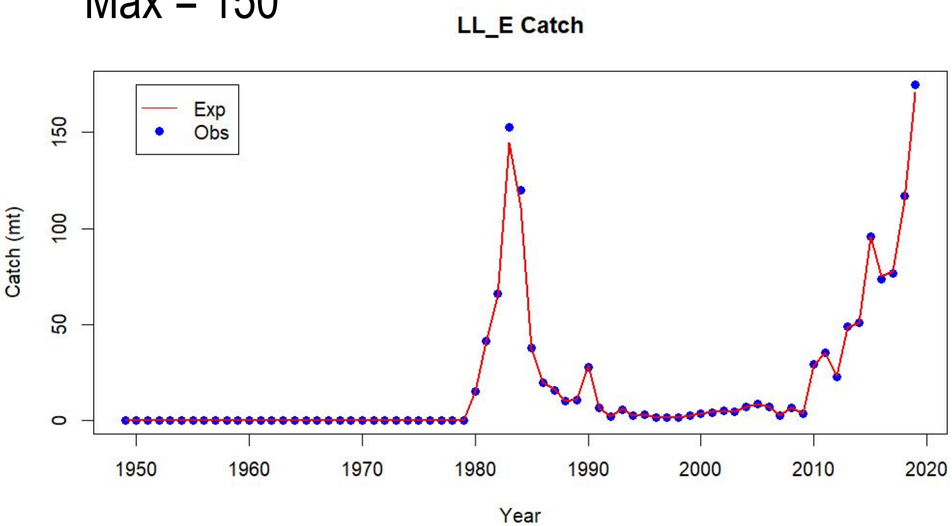
Max = 300



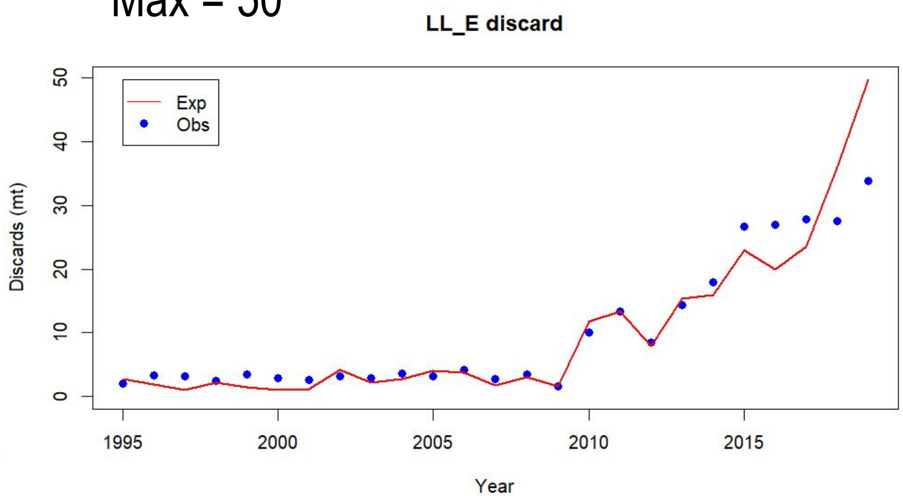
Max = 20



Max = 150

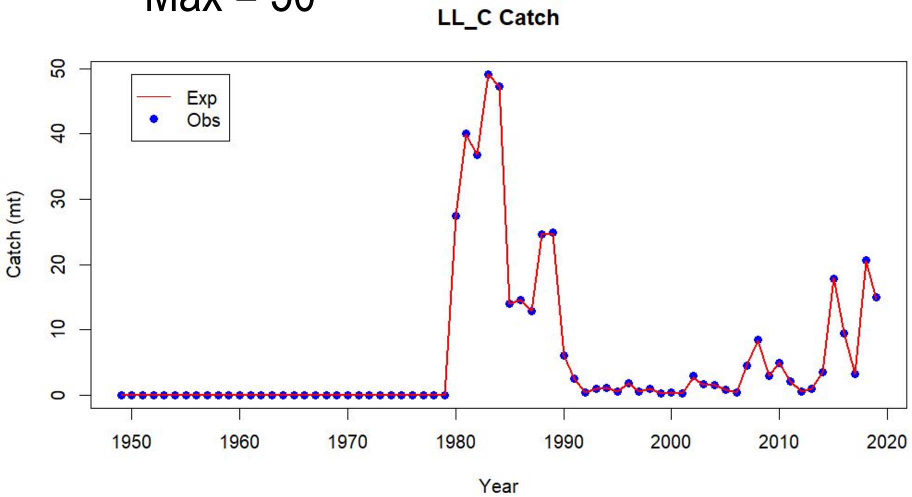


Max = 50

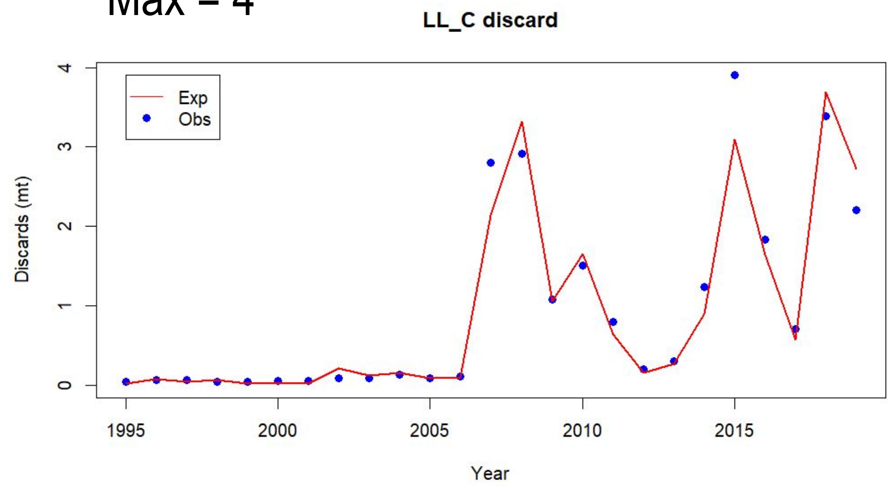


Longline vs. Handline Magnitude

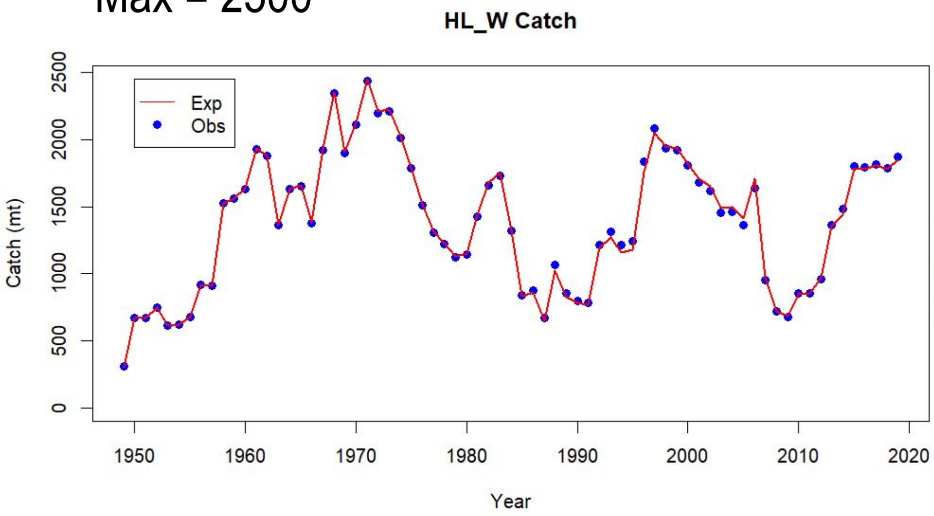
Max = 50



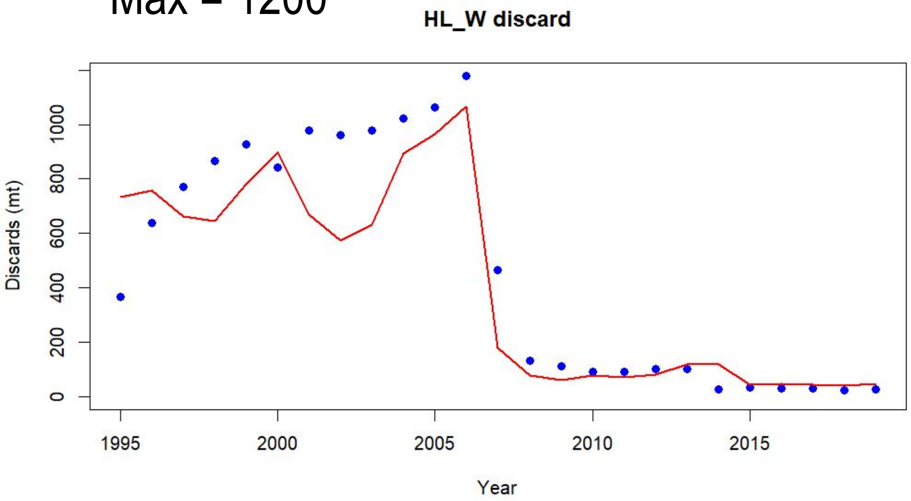
Max = 4



Max = 2500

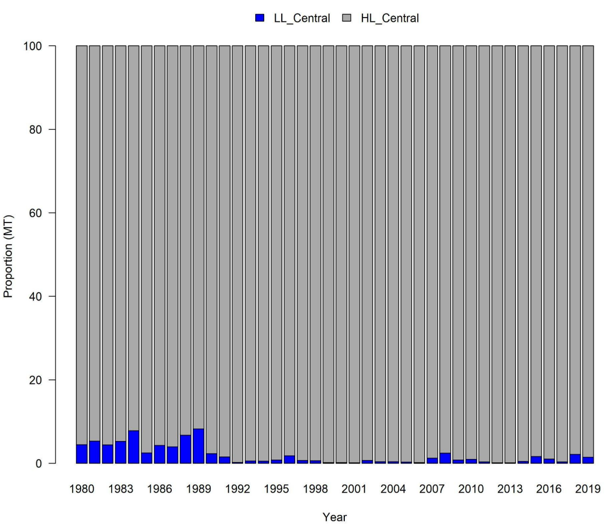


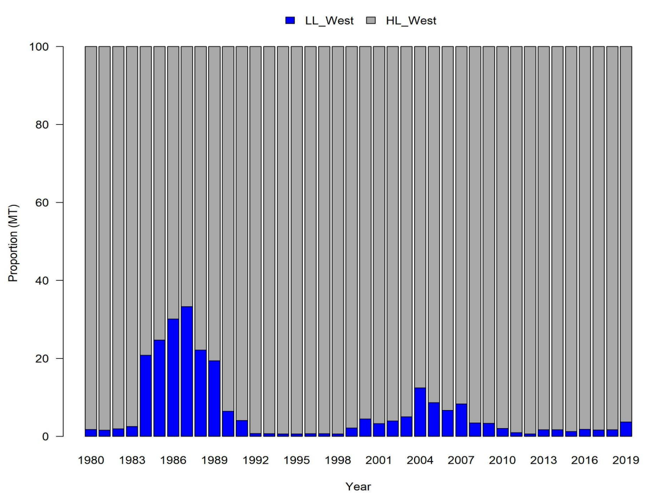
Max = 1200

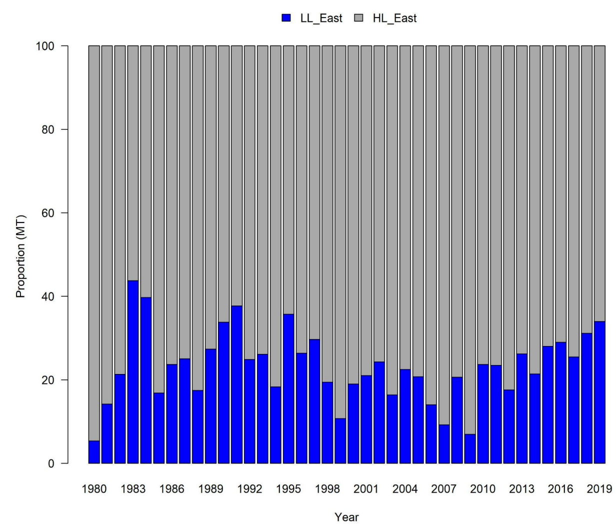


Longline Modeling

- Landing and Discard fits for "problem" fleets (LL's and HL_W) appear to be reasonable.
- Effect of LL discard fraction missfit likely small due to magnitude of LL removals and discards.







Analytical Team Recommendation

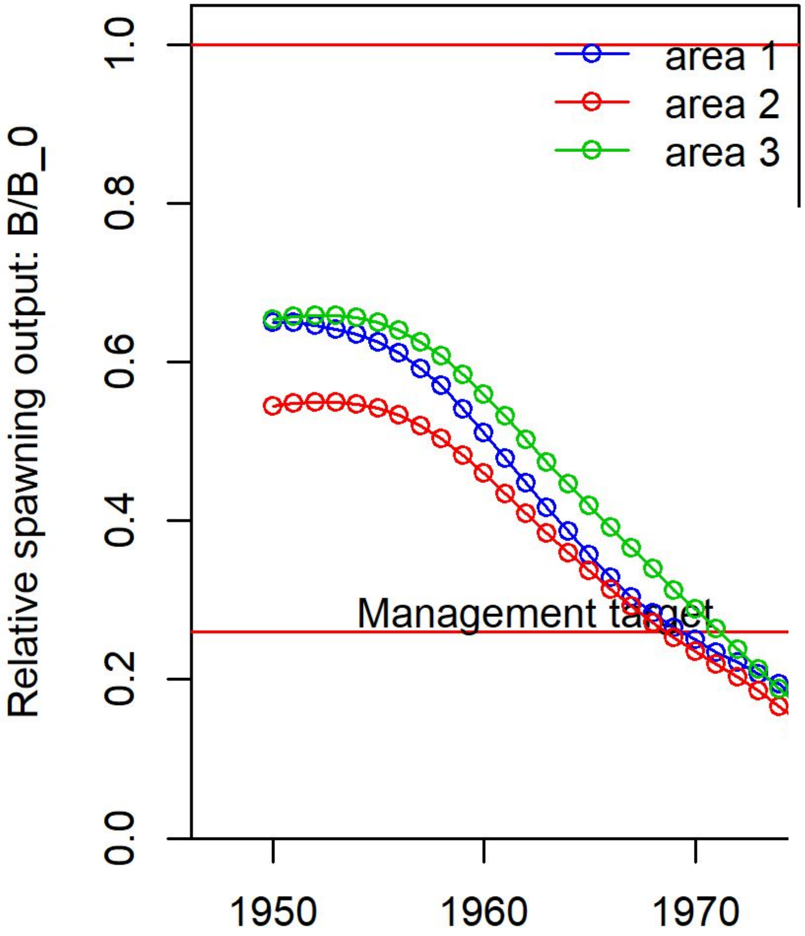
- Continue to attempt to improve fit to the commercial discard fractions through selectivity and retention parameterizations. (Low priority)

- Prioritize improving performance of HL_W fleet which show some missfit and has significant removals and discards.

Additional Explorations

Initial Catch and Equilibrium F's

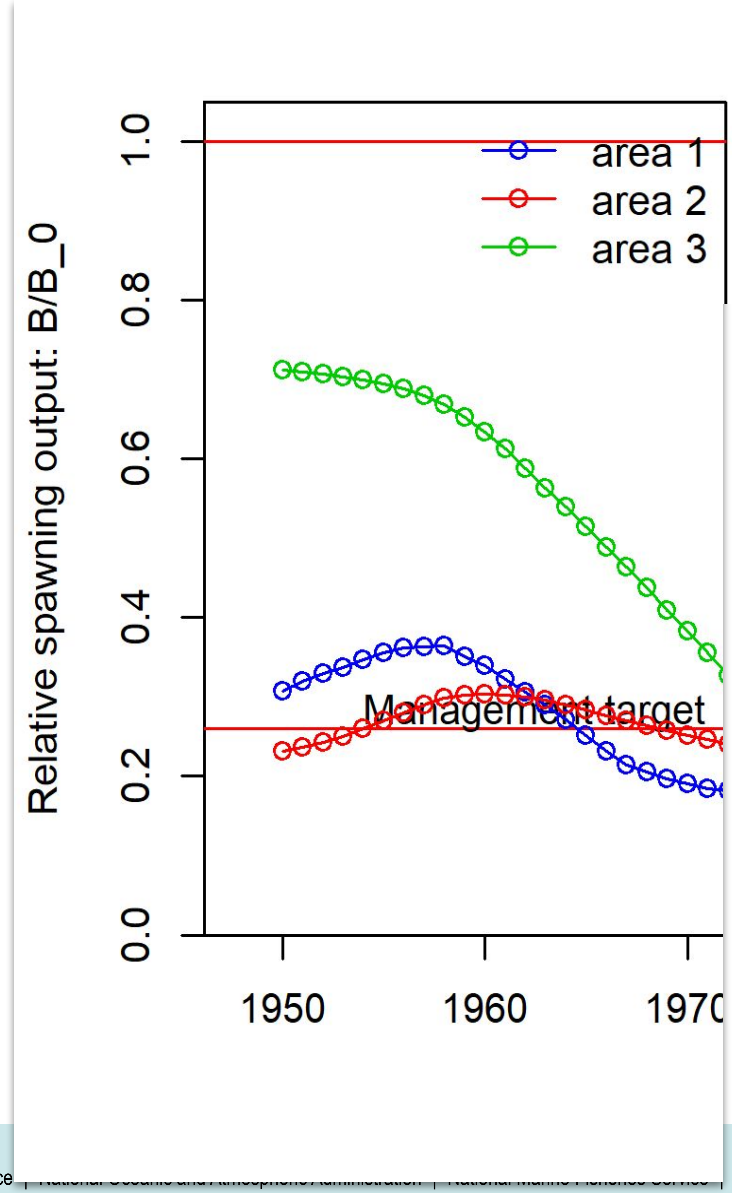
- Model estimates of initial equilibrium F were previously based on recent historic landings (i.e., 1955 for rec fleets and historic avg. 1940-1950 for commercial).
- Internal discussions suggested that region-specific initial depletions were not reflective of historic reality



Initial Catch and Equilibrium F’s

- Tests were done with commercial HL initial catch adjusted to the region-specific maximum 20 year running average of the historic catch time-series 1872 - 1949.

- Catch values reflected the greater removals from the east and central regions and model estimated depletions responded as anticipated.



Analytical Team Recommendation

- Continue modeling exercises with alternate initial catch values.
- Let model fit be the ultimate determinant of initial catch conditions while keeping an eye on whether the model results conform to perceptions of initial region-specific depletion in the 1950's.

Sensitivities

Sensitivities in Progress

- Natural Mortality
  - Data workshop suggested external M at age vector
  - Internal rescaling of average M for ages 2-20
- Removal of Fishery-Dependent Surveys
  - Headboat West & Central
  - Handline East
  - Commercial Observer East

Discussion/Questions

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