SEDAR 73
South Atlantic Red Snapper

"In-person" Workshop

1 December 2020

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Sustainable Fisheries Branch, Beaufort, NC
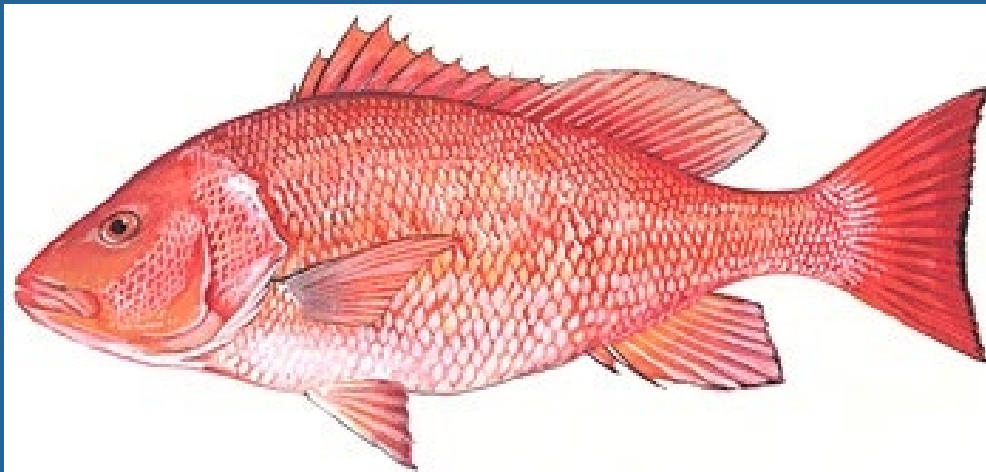
Outline

- Review of SEDAR-41 data sources

  - Life history

  - Removals

  - Compositions

  - Indices of abundance

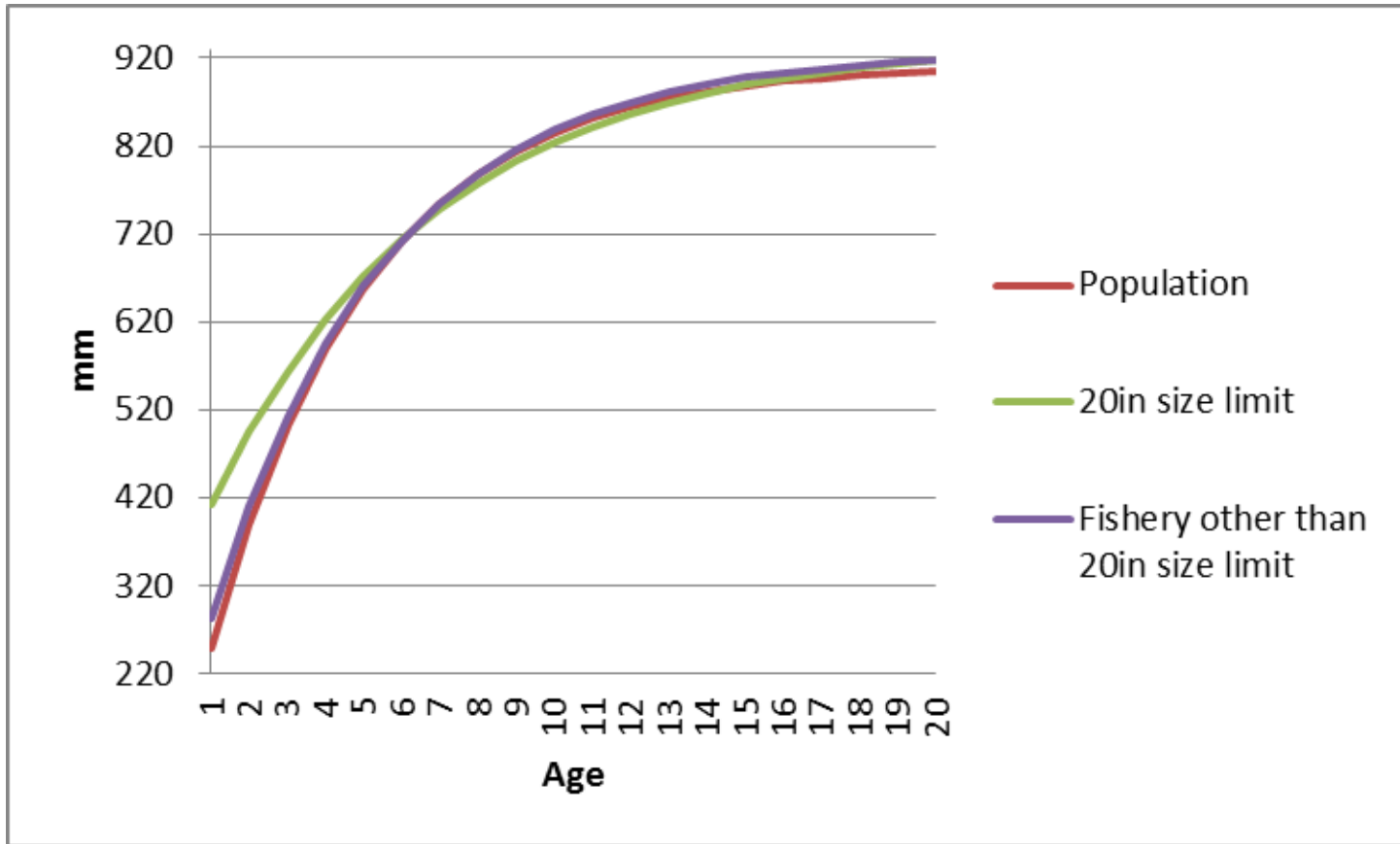- Findings of the Selectivity Workgroup

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Life history

- Three growth curves:
  - Population growth curve – all data
  - Fishery growth curve1 – fishery samples taken during 20" minimum size limit
  - Fishery growth curve 2 – fishery samples taken outside of the 20" minimum size limit
- Growth curves were estimated external to the model and used as input

Life History - growth curves

Life history – natural mortality

- Age-based method of Charnov et al. (2013) scaled to the Then et al. (2014) estimate using the maximum age of 51.

- Reason to modify this (e.g., to a Lorenzen curve)?
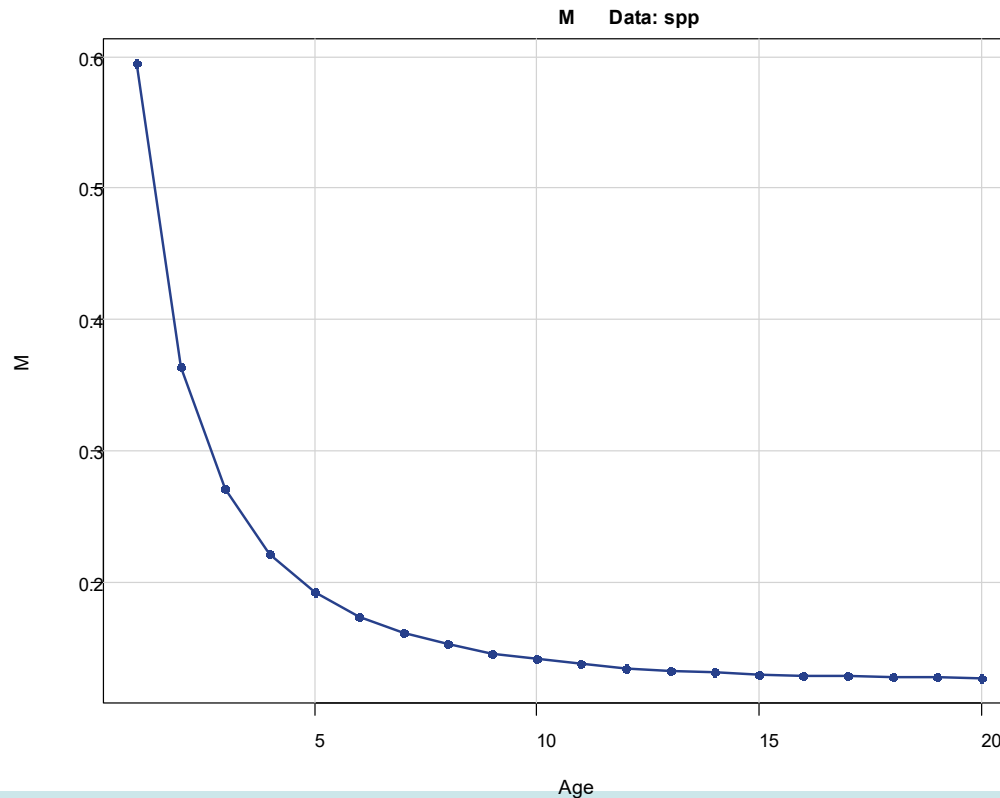
Life history - reproduction

- 50:50 sex ratio

- Logistic model for female maturity

- Spawning season April-October, peak in mid-summer

- Age-specific number of batches and batch fecundity.

- Spawning biomass is modeled as population fecundity
  - New data available
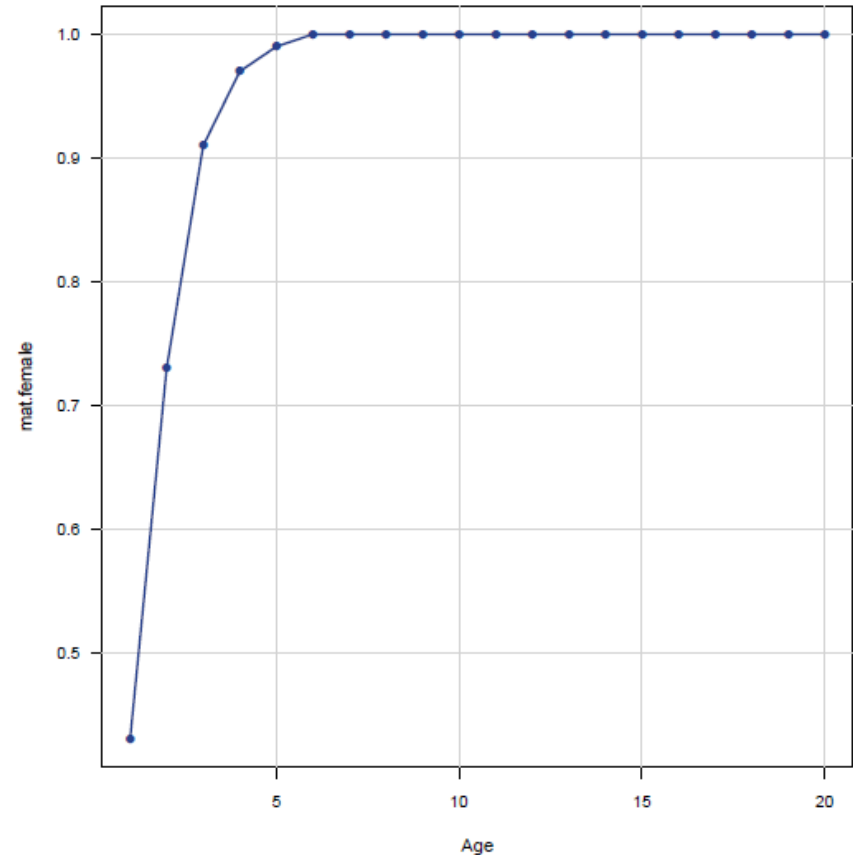
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Three fleets modeled

- Commercial handline (pooled with other gears)
- Recreational headboats
- General recreational (private + charterboats)

- Landings and dead discards modeled separately for each fleet

Regulations

- 1950 – None

- 1983 – 12" TL min size limit

- 1992 – 20" TL min size limit

- 2010–2019 – moratorium, mixed with commercial trip limits and quotas, and recreational mini-seasons during which there was no minimum size limit

Discard Mortality

Sector	Pre-Regulation	Range	Post-Regulation	Range
Recreational	37%	(27%-45%)	28.50%	(20%-36%)
Commercial	48%	(38%-58%)	38%	(28%-38%)

- Two time blocks based on hook type (J vs circle)
  - Recreational: pre-2011 and 2011-current
  - Commercial: pre-2007 and 2007-current

- We will revisit discard mortality rates, given new data
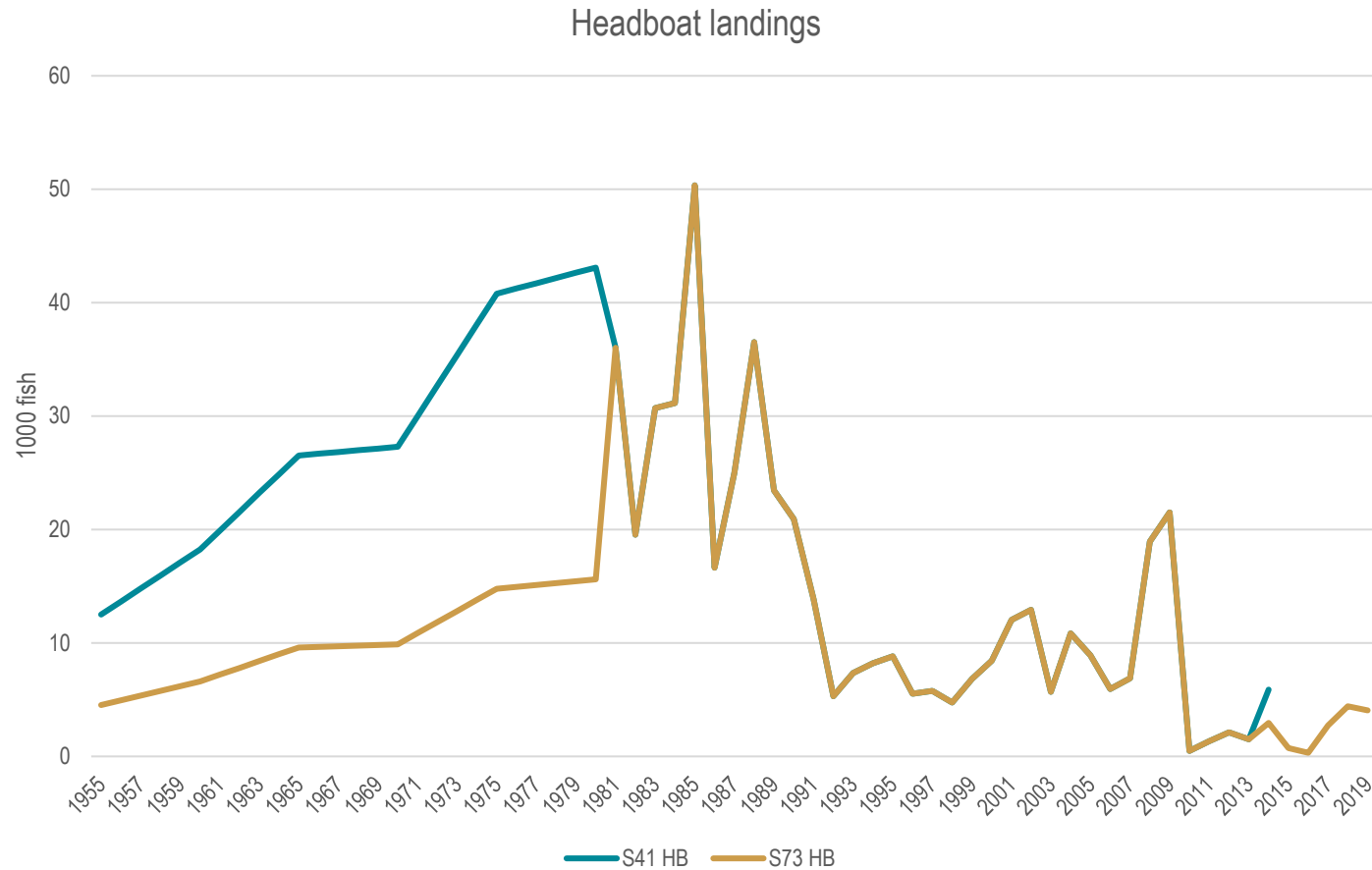
Commercial Landings

Commercial landings
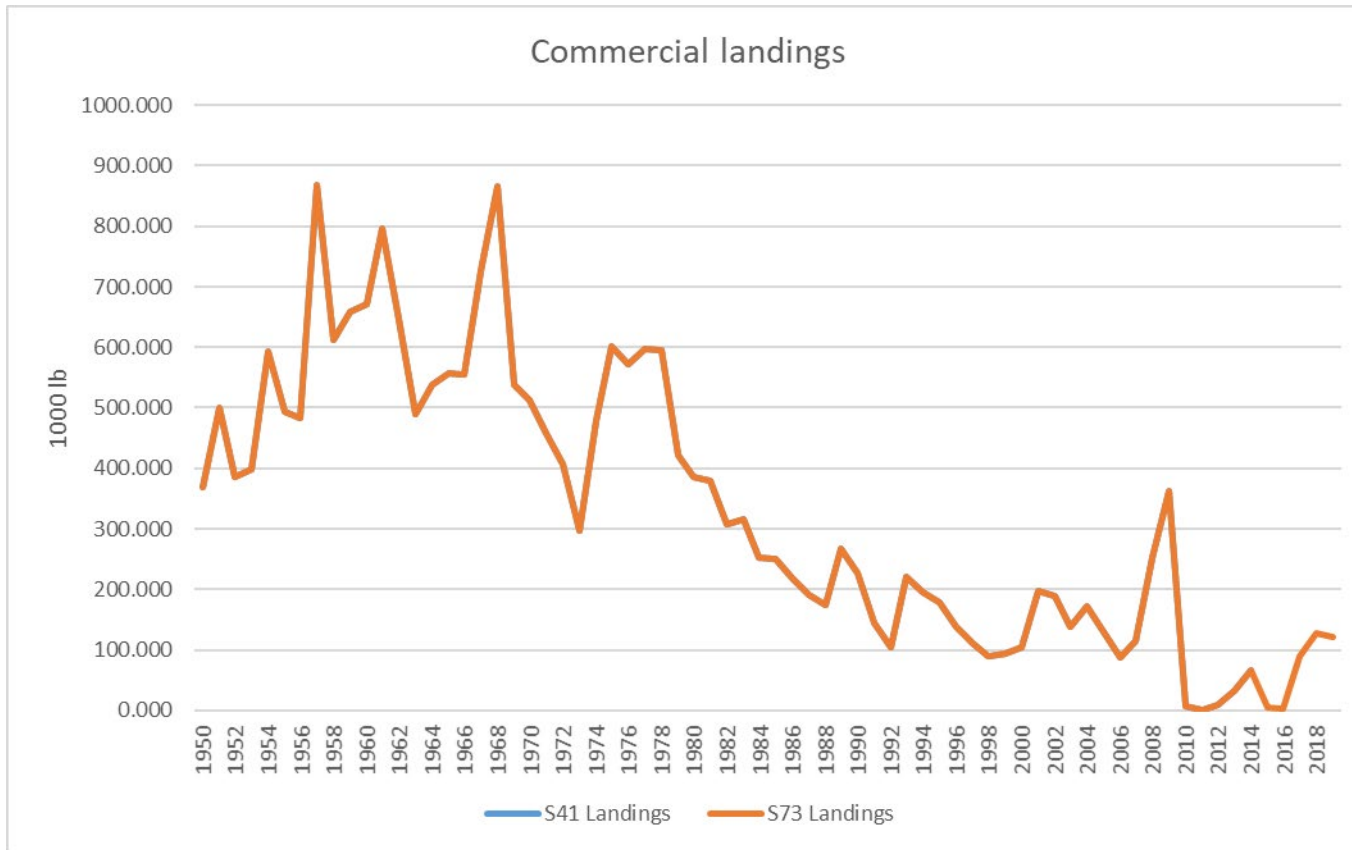
Commercial Discards
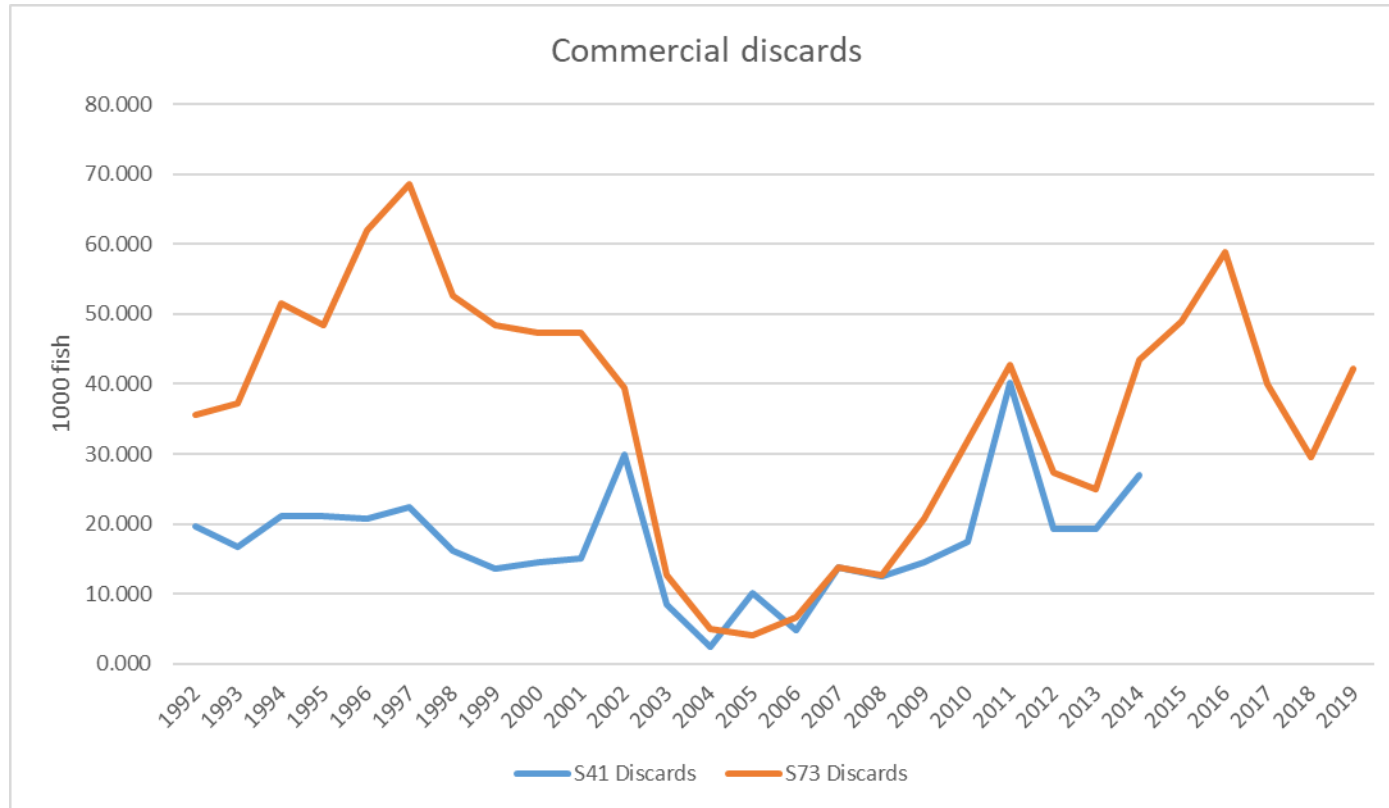
Headboat Landings

Headboat landings

Headboat Discards
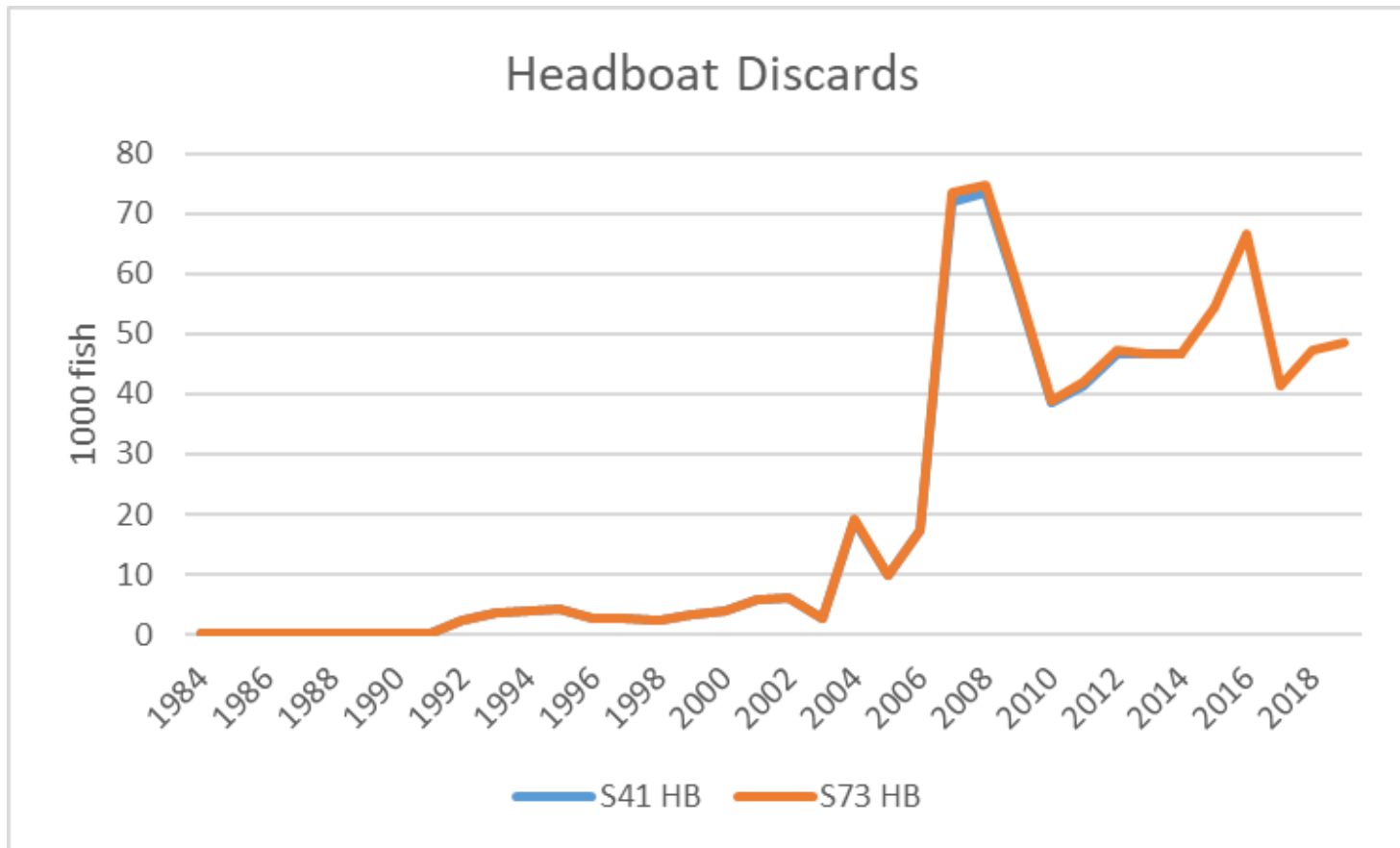
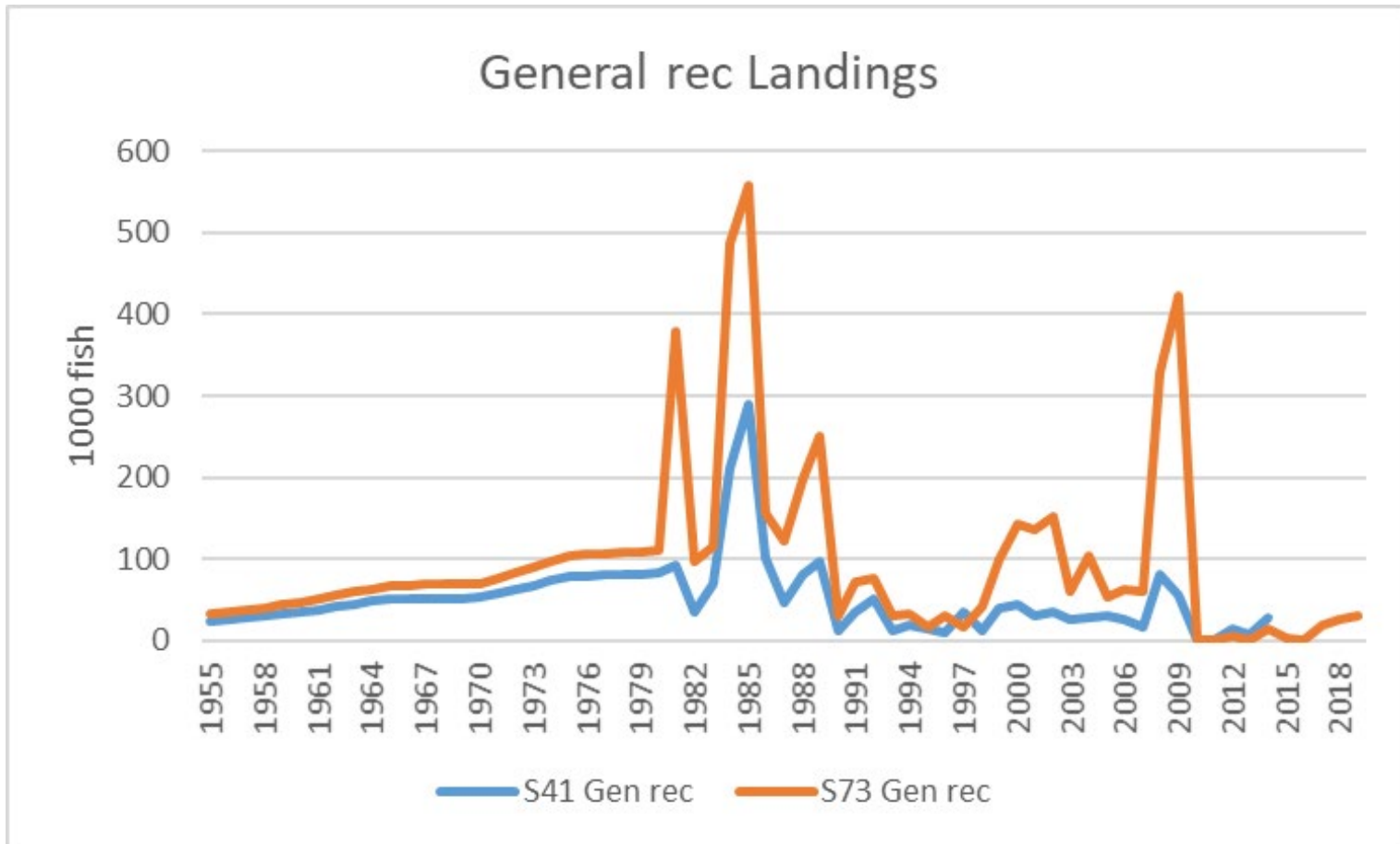# General Recreational Landings

General rec Landings

General Recreational Discards
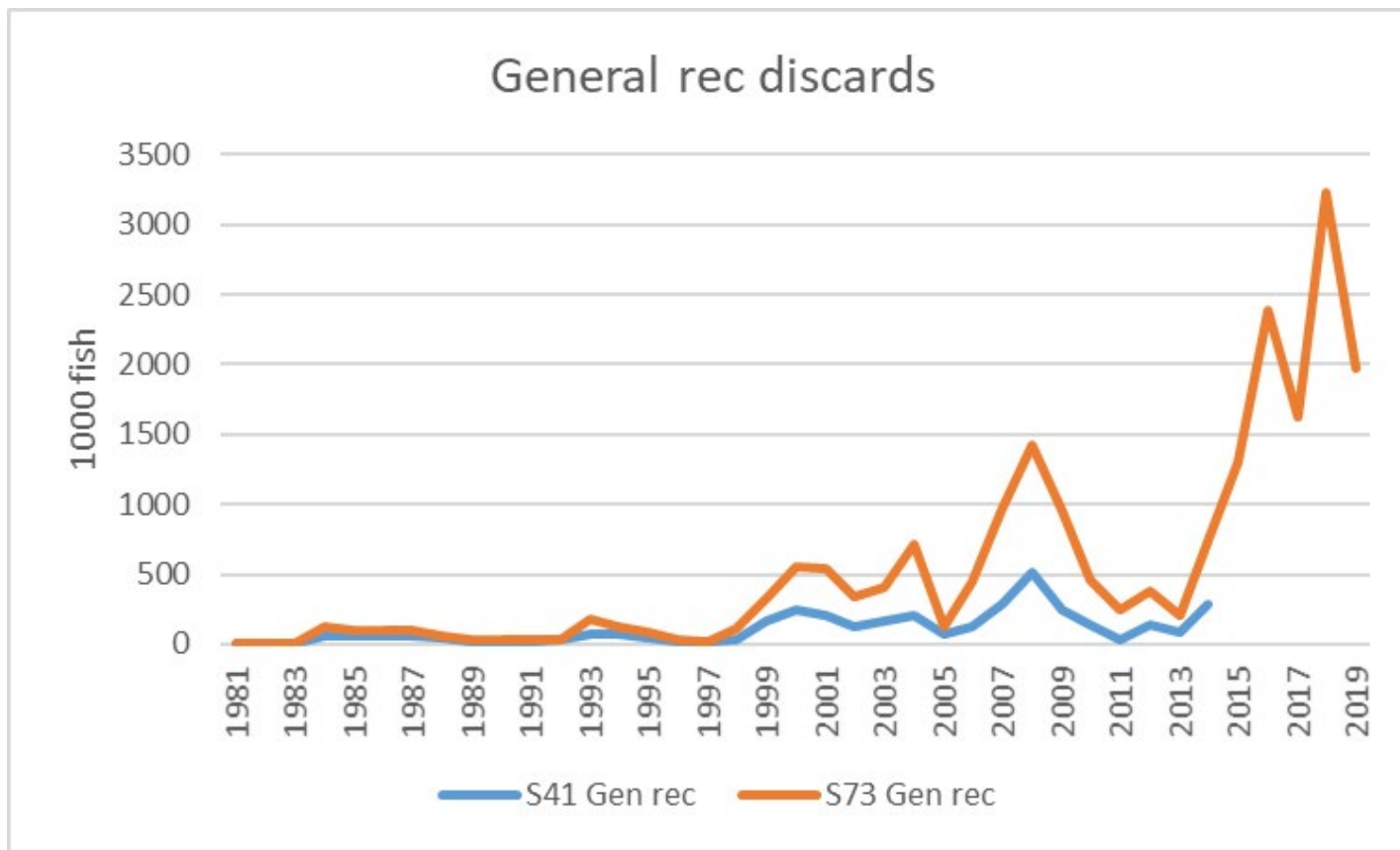
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Compositions

- Use a 30 fish minimum per region (Carolinas, FL/GA) annually for length comps, and 10 fish per region annually for age comps

  - These minima prevent very small comp sample sizes to be scaled up by large landings

- S41 removed all length comps after 1992, except for the discard length comps

  - Age comps are more informative of population-dynamic processes, such as mortality and recruitment

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Comps

- Lengths
  - Commercial landings 1984–1992
  - Commercial discards; pooled into <2010 and ≥2010
  - Headboat discards 2005–2019
- Ages
  - Commercial landings 1990–2019
  - Headboat landings 1978–2019
  - General rec landings 2001–2019
  - SERFS chevron trap 2010–2019

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Indices of Abundance

- Three fishery dependent indices of abundance
  - Headboat logbooks (1976–2009)
  - Commercial handline logbooks (1993–2009)
  - Headboat discards, only fish <20" (2005–2019)
- Logbook indices (landings per effort) were truncated at 2009, because of the regulations starting in 2010
- Two fishery independent index of abundance from SERFS
  - S41 combined the two indices, because of non-independence
  - Chevron traps (2010–2019)
  - Videos (2011*–2019)

Video index start year

- S41 started in 2010

  - Given the terminal year of 2014 (originally 2013), strong desire to keep all possible years

  - In SEDAR assessments, red snapper is the only species where this index was started in 2010

- S73-WP05 recommends starting in 2011, because:

  - Camera change in 2011

  - Restricted spatial coverage in 2010

  - Longer time series now, so incentive to include first year of the SEFIS survey is diminished, especially given the differences in sampling then

- Recommendation: Start the video index in 2011

All Indices
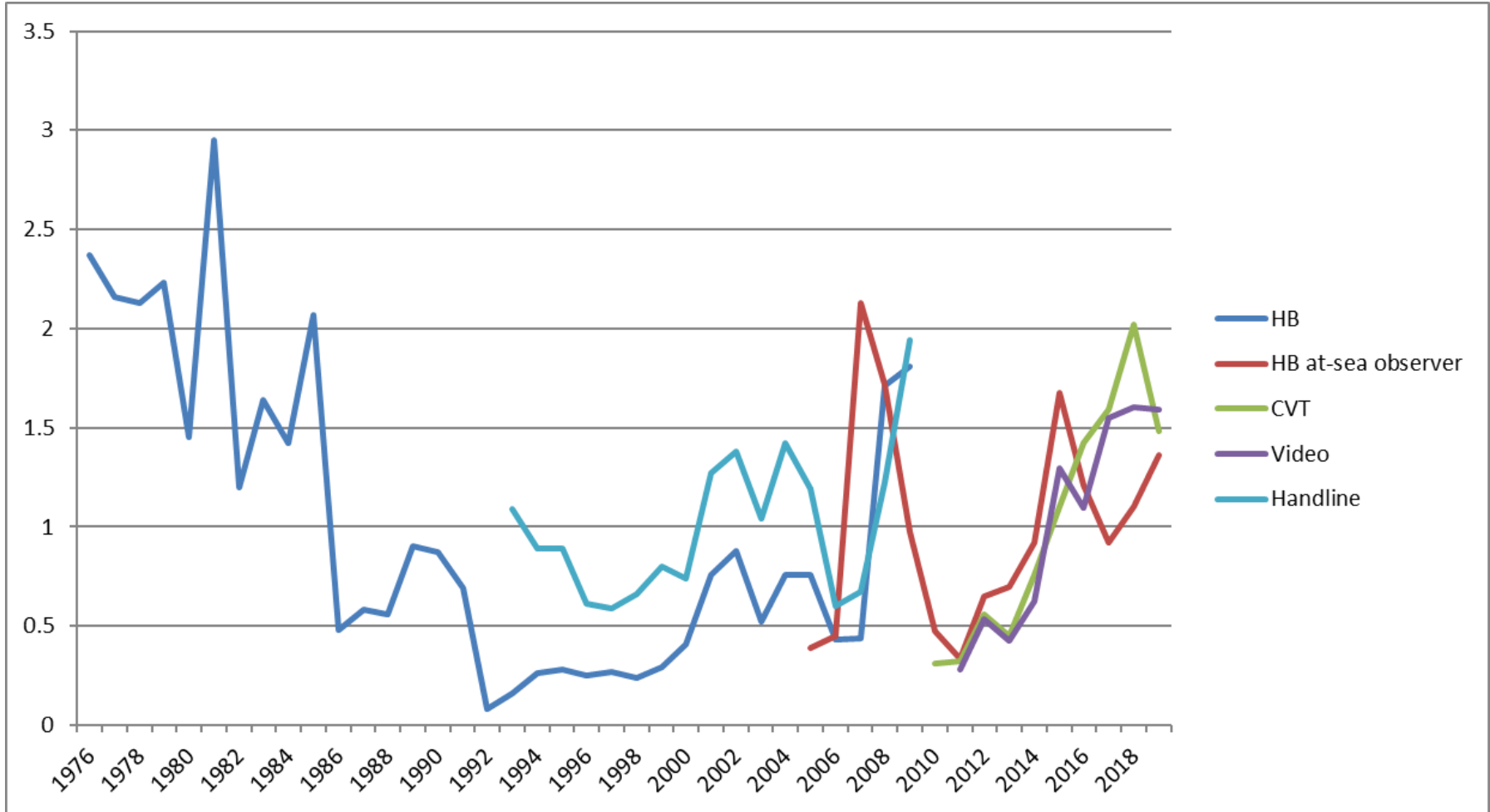
Uncertainty of indices

- The CVs of fishery independent indices come from the standardization procedure

- The CVs of the fishery dependent indices do not reflect true variation in abundance. As in S41, fix the CVs to literature values of 0.2.

  - *Francis et al. 2003. Quantifying annual variation in catchability for commercial and research fishing. Fish. Bull. 101: 293-304.*

Findings of the Selectivity Workgroup (S73-WP14)

- The workgroup examined FWRI data, SERFS data, and catch curves from multiple data sources

- Selectivity

  - Chevron traps are dome-shaped

  - Video gear is believed to be flat-topped, but this assumption should be tested

  - Ascending limb appears to be similar for chevron traps and video

- Indices

  - Sampling by the two gears is not independent

  - Not clear if the two indices should be combined, given different selectivities

  - The Workgroup discussed options, but left the decision to S73 participants (us)

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Indices from chevron trap and video gear

- Selectivity workgroup options discussed
  - Use only one of the gears (video or trap)
    - Note, if we fit only to the video index, we could still use trap age comps to inform the ascending limb of selectivity and estimation of recruitment
  - Use only one of the gears at a time, e.g., trap index 1990-2010 and video index 2011-terminal year. This option is not viable for red snapper given the start dates of each index.
  - Combine the indices externally into a single index (e.g., Conn method), then combine them internally prior to fitting (somehow).
  - Keep indices separate, acknowledging the added weight given to non-independent gears. Might not be so bad to emphasize the FI data.
- Additional ideas
  - Keep indices separate, but weight them by w and $(1-w)$, where e.g. $w=0.5$
  - Keep indices separate but fit them with a joint likelihood that allows for correlation.

Recommendations

- Keep indices separate, but weight their likelihoods each by w=0.5

- Attempt fitting with a joint likelihood, if time allows for development and review, otherwise make this a research recommendation

- Sensitivity run with just the video index, but including chevron trap age comps

Extra slides

S41 Data Availability

Yellow highlighting indicates reconstructed data, very low sample sizes, and/or uneven sampling design.