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Document de travail 2014/ 12

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Working Paper 2014/ 12

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Relative Abundance at Age and Size of Yellowtail Flounder off New England

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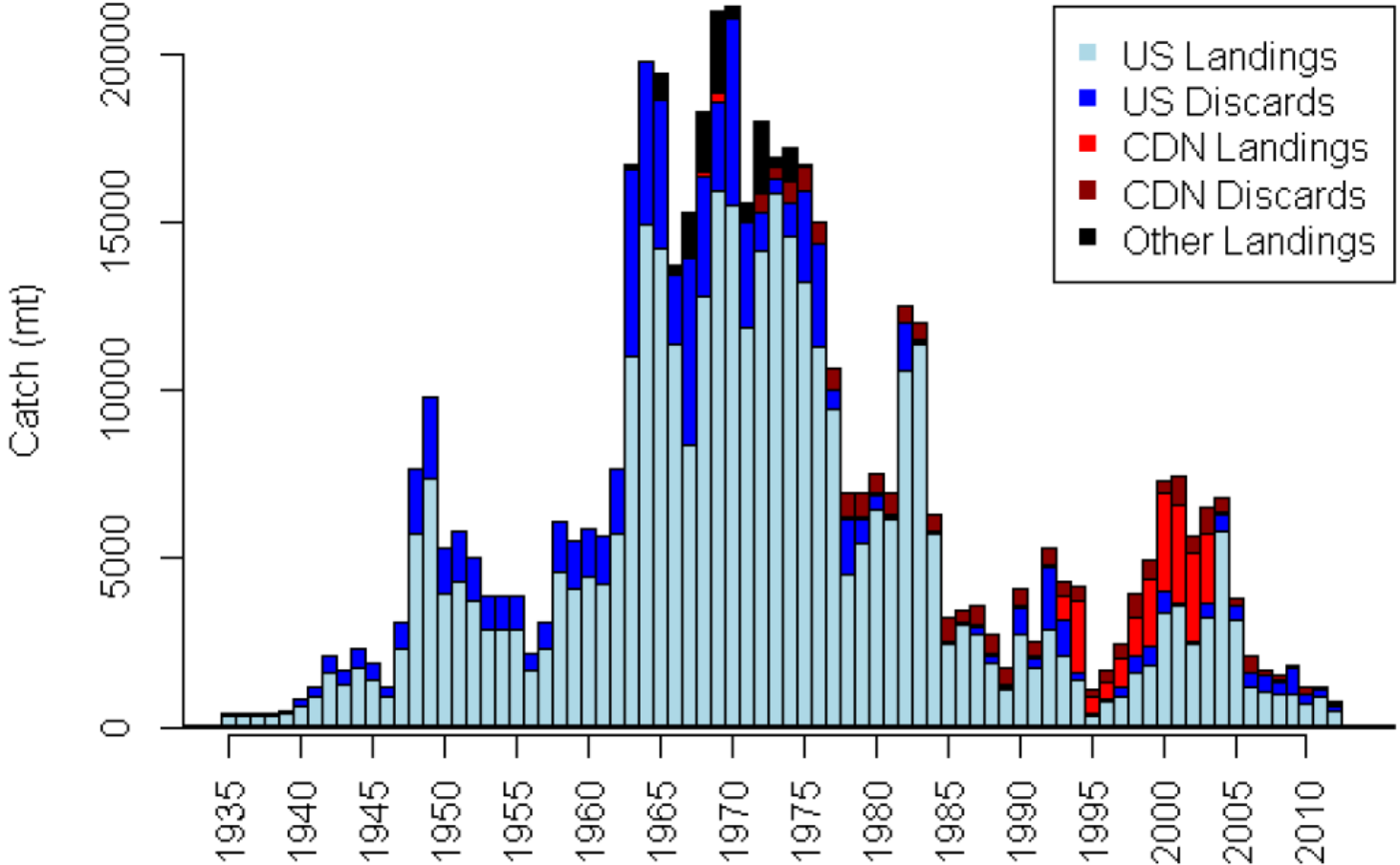
Canada

Background

- The retrospective pattern in the Georges Bank yellowtail assessment results from fewer survivors to old age than expected with such low recent fishery catch.



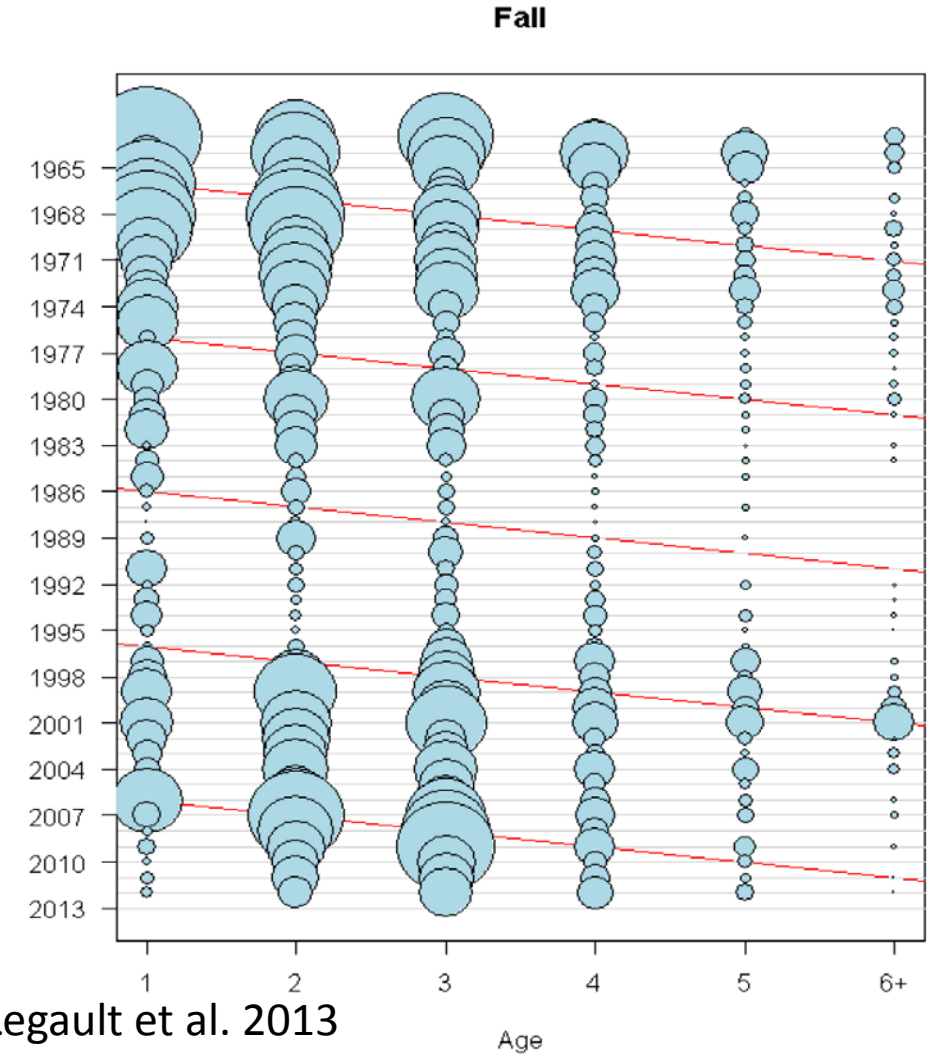
Assumed Natural Mortality

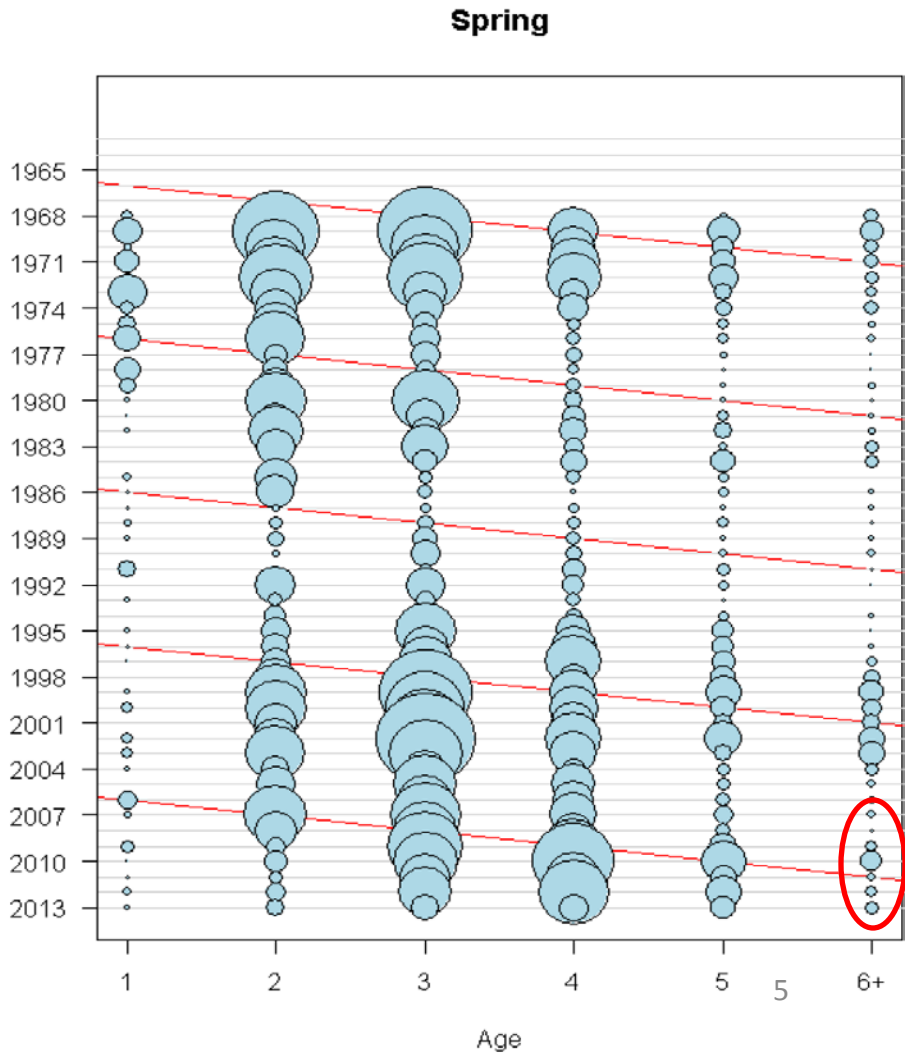
- US and Canadian assessments of Georges Bank yellowtail have assumed M=0.2 since 1969 based on:
  - Lux (1969) natural mortality of 20% or less per year, approximated from the probability of seven tagged yellowtail surviving to time of capture.
  - Lux & Nichy (1969) sampled a 14-year old yellowtail in the Cape Cod stock.
  - Brown & Hennemuth (1971) estimated M=0.2 from a regression of total mortality on fishing effort.

- Is the expectation of more older yellowtail a model artefact or based on empirical information?
- Possible sources of baseline information on unfished age distribution:
  - Historical surveys
  - Historical fisheries

Historical Surveys

- Catch at age in the Fall Survey suggests more old fish in the 1970s and late 1990s-early 2000s.

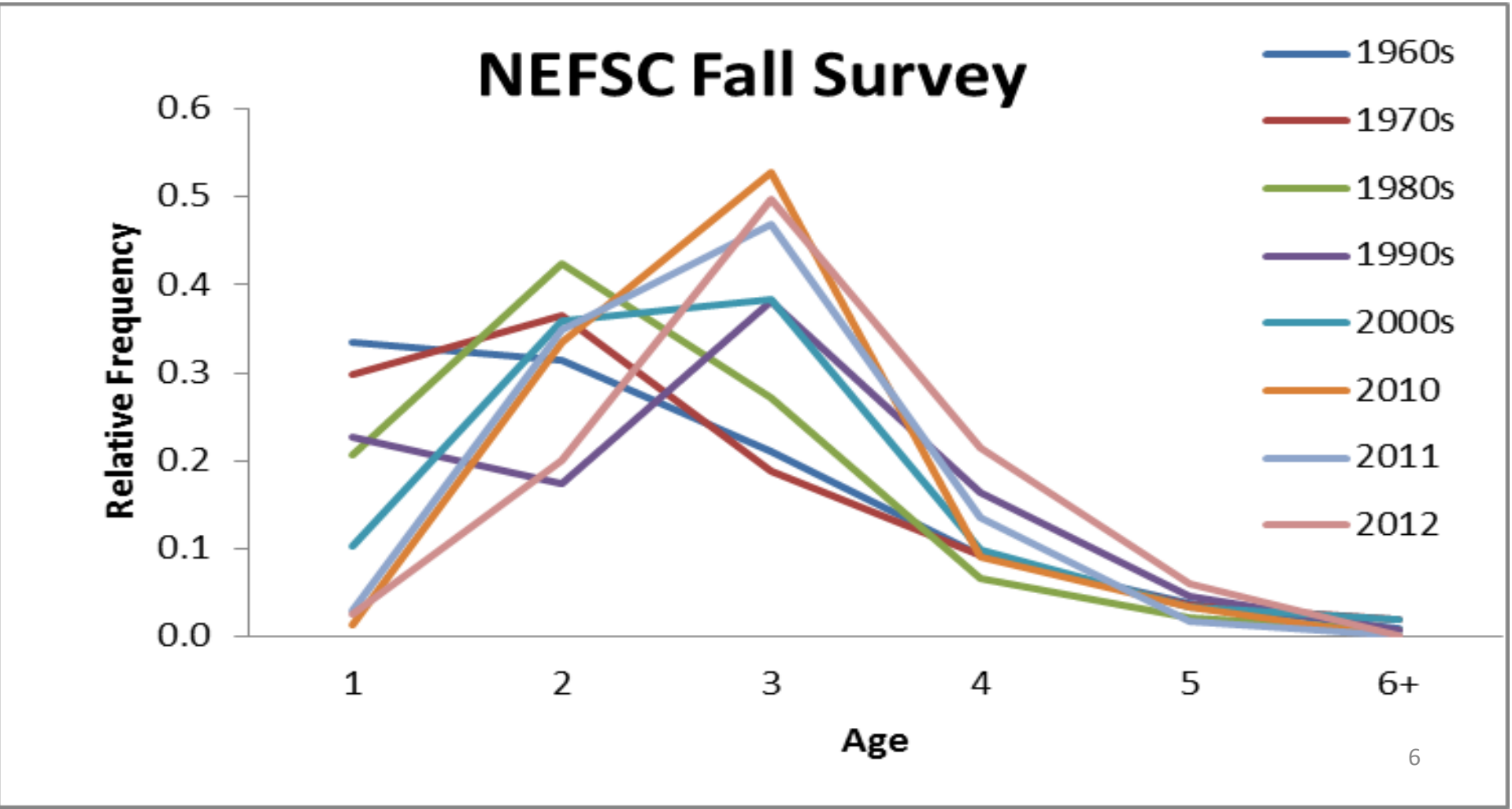




Legault et al. 2013

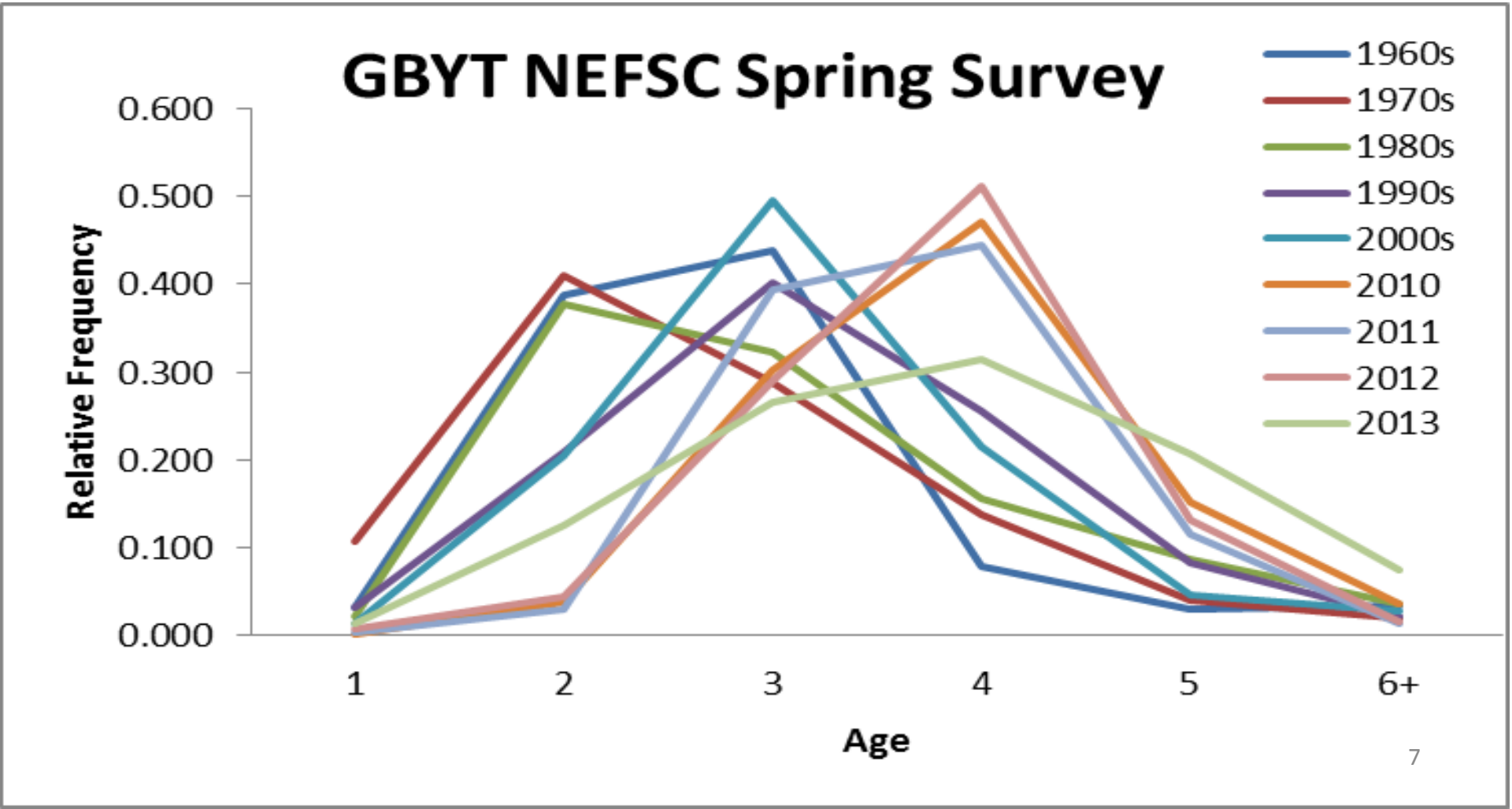
Historical Surveys

- … but the proportion of older yellowtail has been relatively constant.



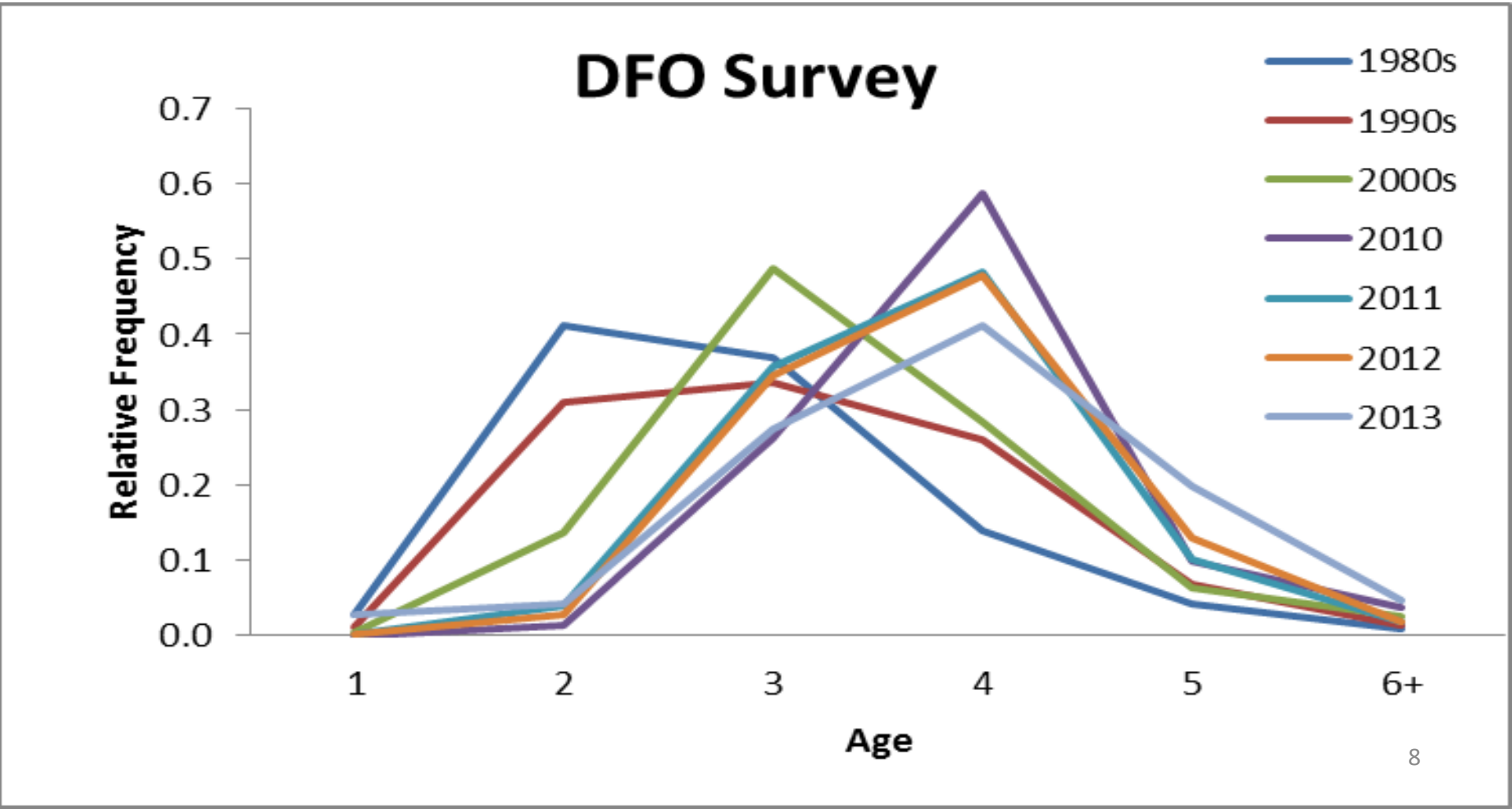
Historical Surveys

- There were proportionally more old fish in the 2013 spring survey than any previous decade.



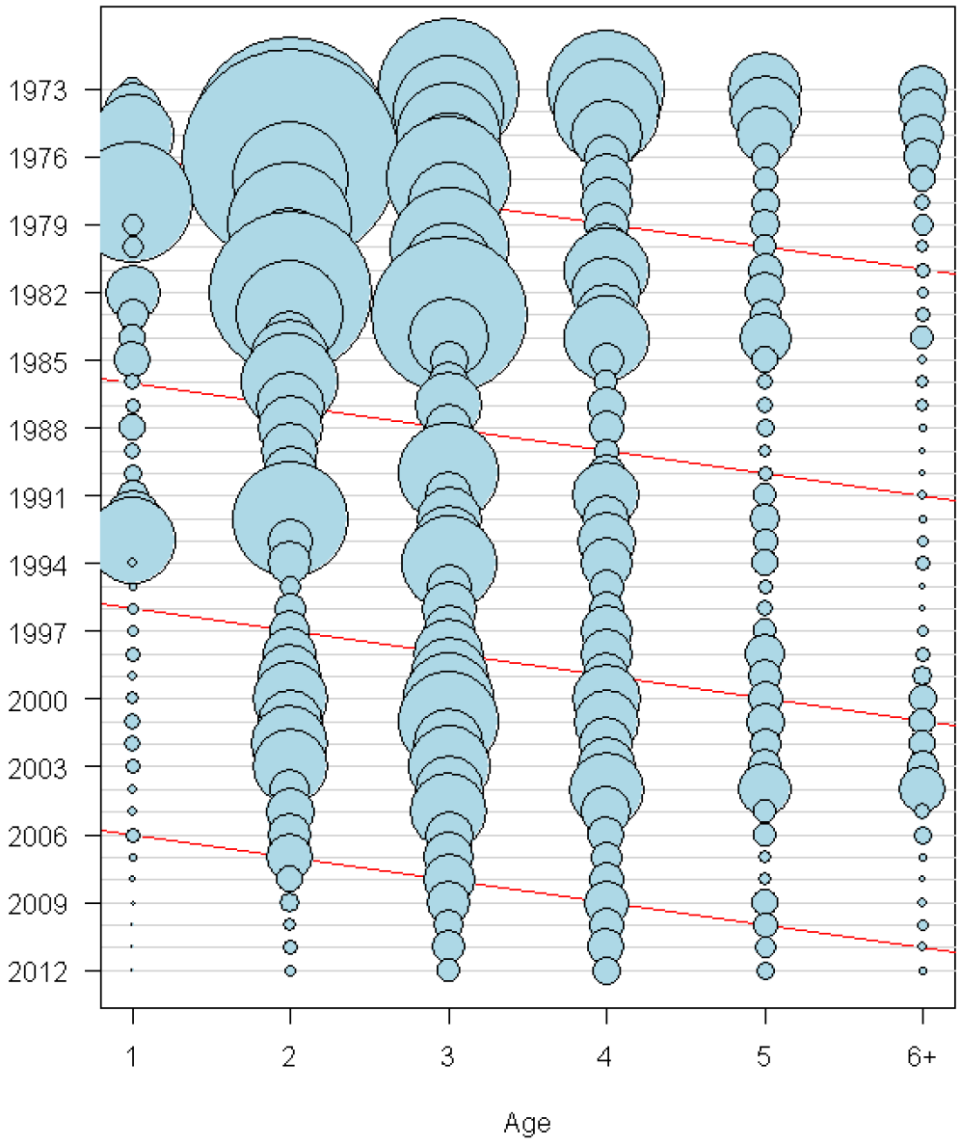
Historical Surveys

- There were proportionally more old fish in the 2013 DFO survey than any previous decade.



Historical Fishery

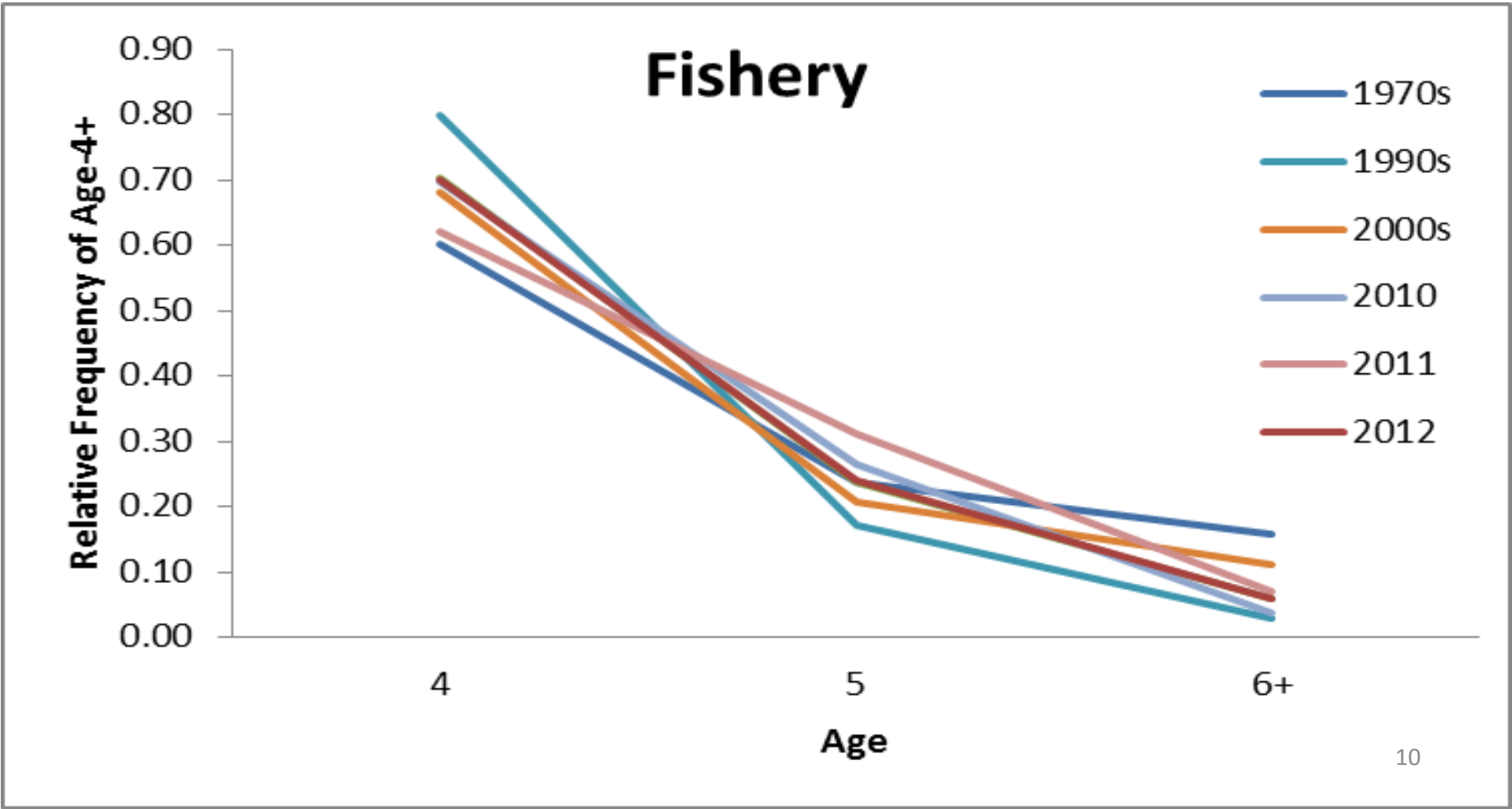
- Catch at age suggests more old fish in the 1970s and early 2000s.



Legault et al. 2013

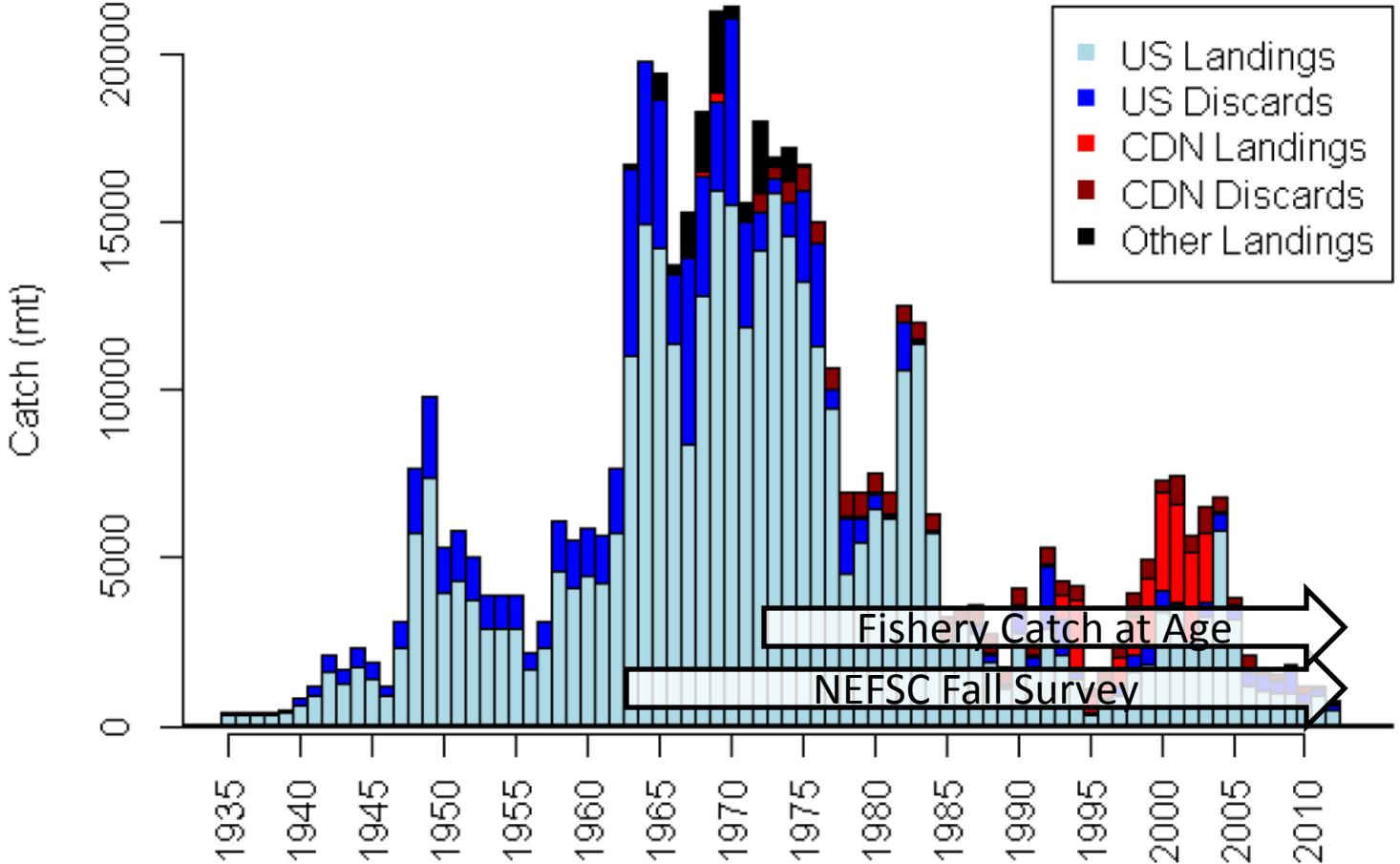
Historical Fishery

- … but the proportion of older yellowtail in the fully-recruited catch has been more constant.



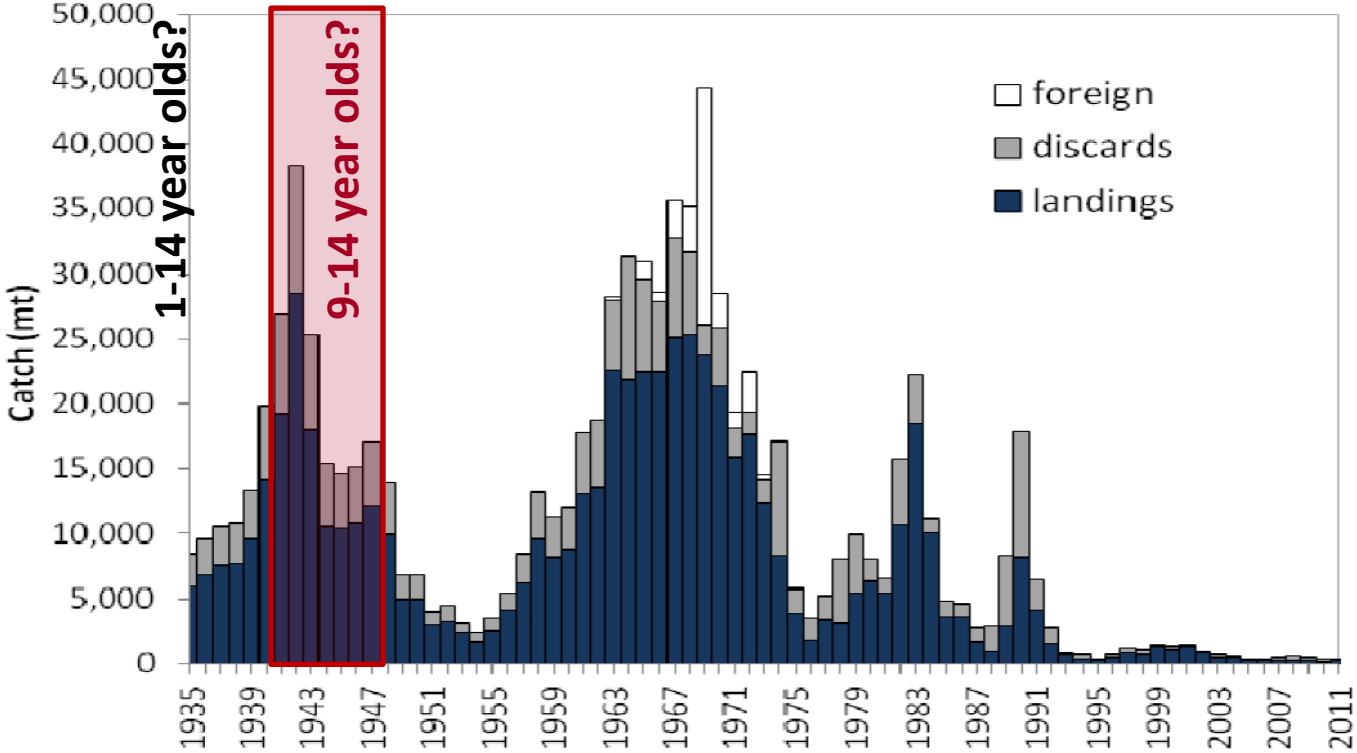
Exploitation History

- There was some fishery development before the early survey observations in the 1960s and peak catches before fishery age data in the 1970s.



Southern New England Yellowtail

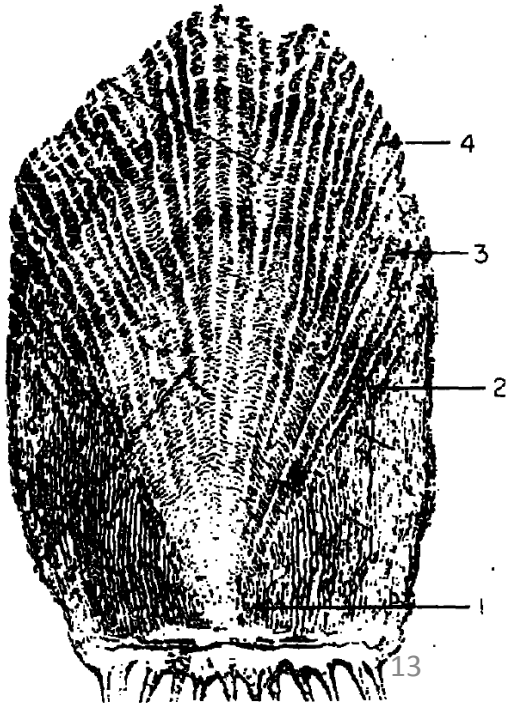
- The fishery began in 1935, as mobile gear shifted offshore from targeting winter flounder.
- Royce et al. (1959) monitored the 1942-47 fishery.
- If longevity is ~14 years, then some survivors from the 1934 unfished stock should be in the fishery samples 8-13 years later.



NEFSC 2012

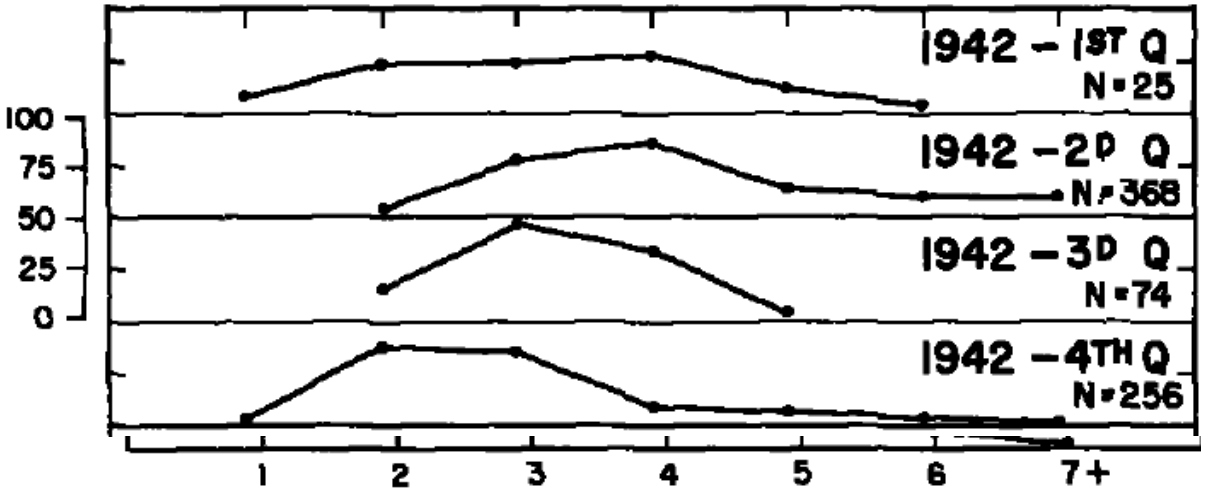
Southern New England Yellowtail

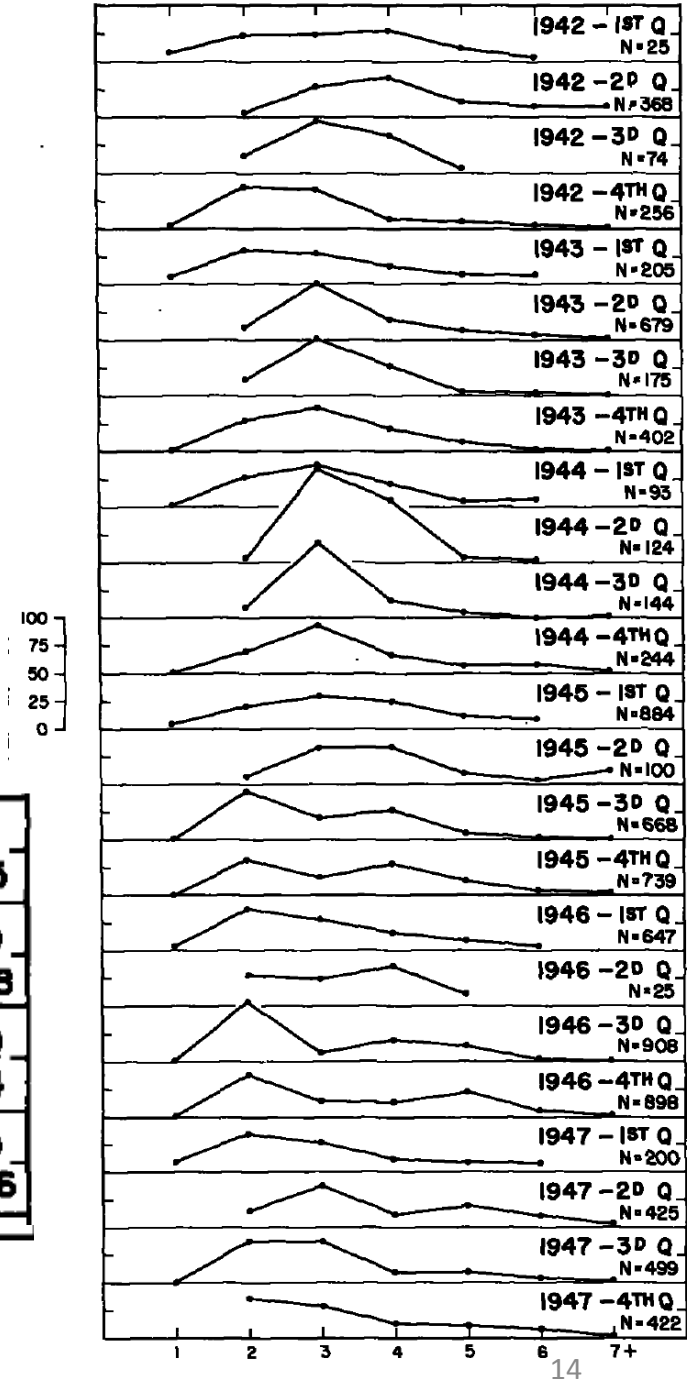
- Royce et al. (1959) sampled ~13,000 yellowtail over most months and vessels from 1942 to 1947 using a trip-based design that is similar to current US port sampling.
- Both scales and otoliths were sampled from almost 9,000 yellowtail, and scales were selected as the preferred ageing structure using a protocol similar to that used for current US ageing.



SNE Yellowtail

- After 8 years of fishing, there were few fish older than 7-years (none in the 1st or 3rd quarters).
- Where are the survivors from the virgin stock?

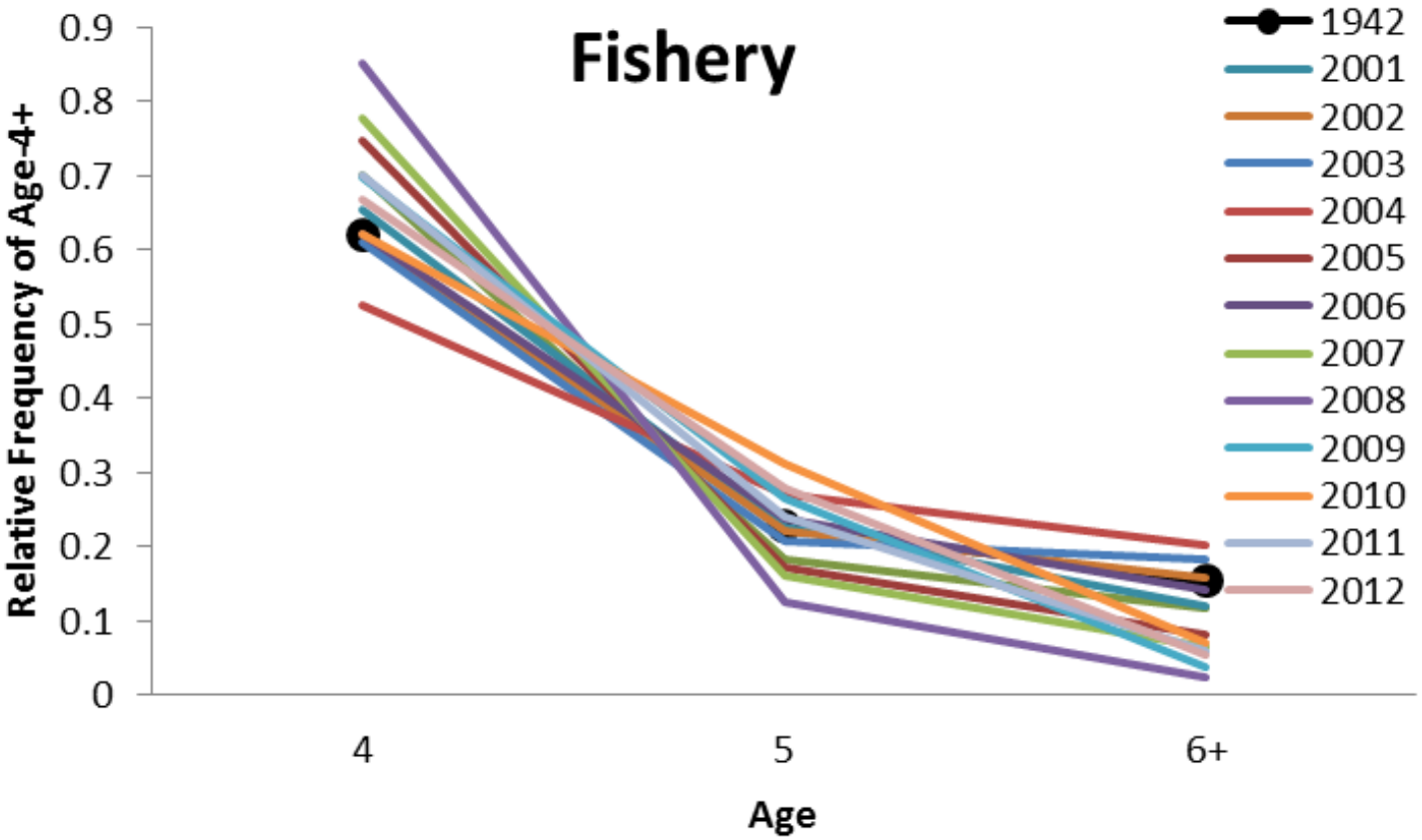




Royce et al. 1959

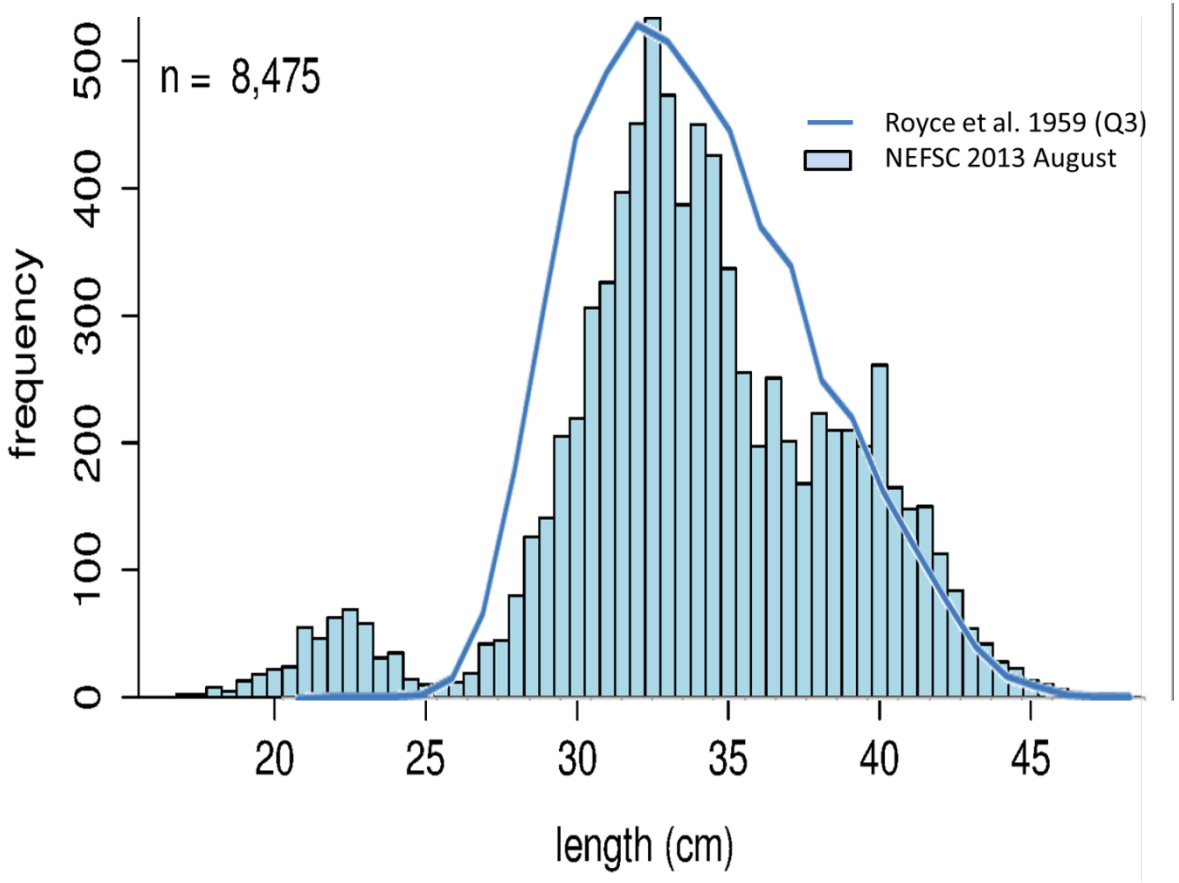
Age Distribution of the Fishery

- After eight years of fishing in Southern New England, Royce et al. (1959) found few old fish.
- The yellowtail fishery on Georges Bank is catching about the same proportion of old fish.



Southern New England Yellowtail

- The size distribution in the early fishery is comparable to current size distributions (e.g., NEFSC industry-based survey).



SAW54 Assessment of SNE Yellowtail

- Maximum age:
  - The maximum observed age was 11 years.
  - Hoenig's (1983) relationship with longevity suggests M=0.38.
- Reproductive effort:
  - McElroy et al. (2012) - Gunderson's (1997) relationship with gonadosomatic index (GSI) of mature females just prior to spawning suggests M=0.32 (0.26 to 0.38).
- Lifetime M was assumed to be 0.3, with an age-varying schedule based on the Lorenzen (1986) method.

Conclusions/Recommendations

- Conclusions
  - Although catches of yellowtail are relatively low in the fishery and the surveys, the proportion of old fish is not different than previous decades, including the early years of the fishery.
  - Expectations of more older (age 6+) yellowtail is based on the value of assumed natural mortality (M=0.2).
- Recommendations
  - Major: The assumed M for Georges Bank yellowtail should be re-considered.
  - Minor: In addition to fishery and survey catch-at-age, proportional age compositions should be plotted to offer a complementary view of the information (and the information that many SCAA models fit to).