MID-ATLANTIC
FISHERY MANAGEMENT COUNCIL

Mackerel Rebuilding 2.0 Overview

January 2022, Recorded

Agenda

- 1. Fishery & Assessment
- 2. Current management, anticipated rebuilding quotas, potential measures
- 3. Public Questions and Comment

Ground rules

- ?s and comments after full presentation
  - Use hand raise feature to enter queue (*3 if phone only) - staff will unmute individuals
- Q&A pod will also be activated at that point, will address as time allows after those in the queue, include your email for follow-up in case we run out of time (10pm)
- Uncivil participants muted/skipped

Acronyms

- SSB = Spawning Stock Biomass
- MTA = Management Track Assessment
- MRIP = Marine Recreational Information Program
- MSY = Maximum Sustainable Yield
- F = Fishing Mortality
- SSC = Scientific and Statistical Committee
- ABC = Acceptable Biological Catch
- DAH = Domestic Annual Harvest (Quota)

Timeline

MSB Committee Feb 14 – review webinar input and develop alternatives

March 16 – SSC locks in ABCs for the Council's already-identified rebuilding options based on updated projections. Final ABCs will transfer into quotas and other measures, allowing clearer delineation of expected outcomes and impacts. The likely quotas have already been presented to the Council but may change based on the final projections.

Late March – MSB Committee meeting refines alternatives given the SSC's recommendations

April Council Meeting – Council confirms and/or modifies alternatives from Committee

Late April Hearings – Possibly Cape May, NJ; New Bedford, MA; Gloucester, MA; Portsmouth, NH; and Brunswick, ME (will consult with states before finalizing)

Early May MSB Committee – review hearings, consider any final changes and/or analyses

Late May MSB Committee – develop recommendations for the Council

June Final Council Action (should allow January 1, 2023 implementation)

Assessment Review

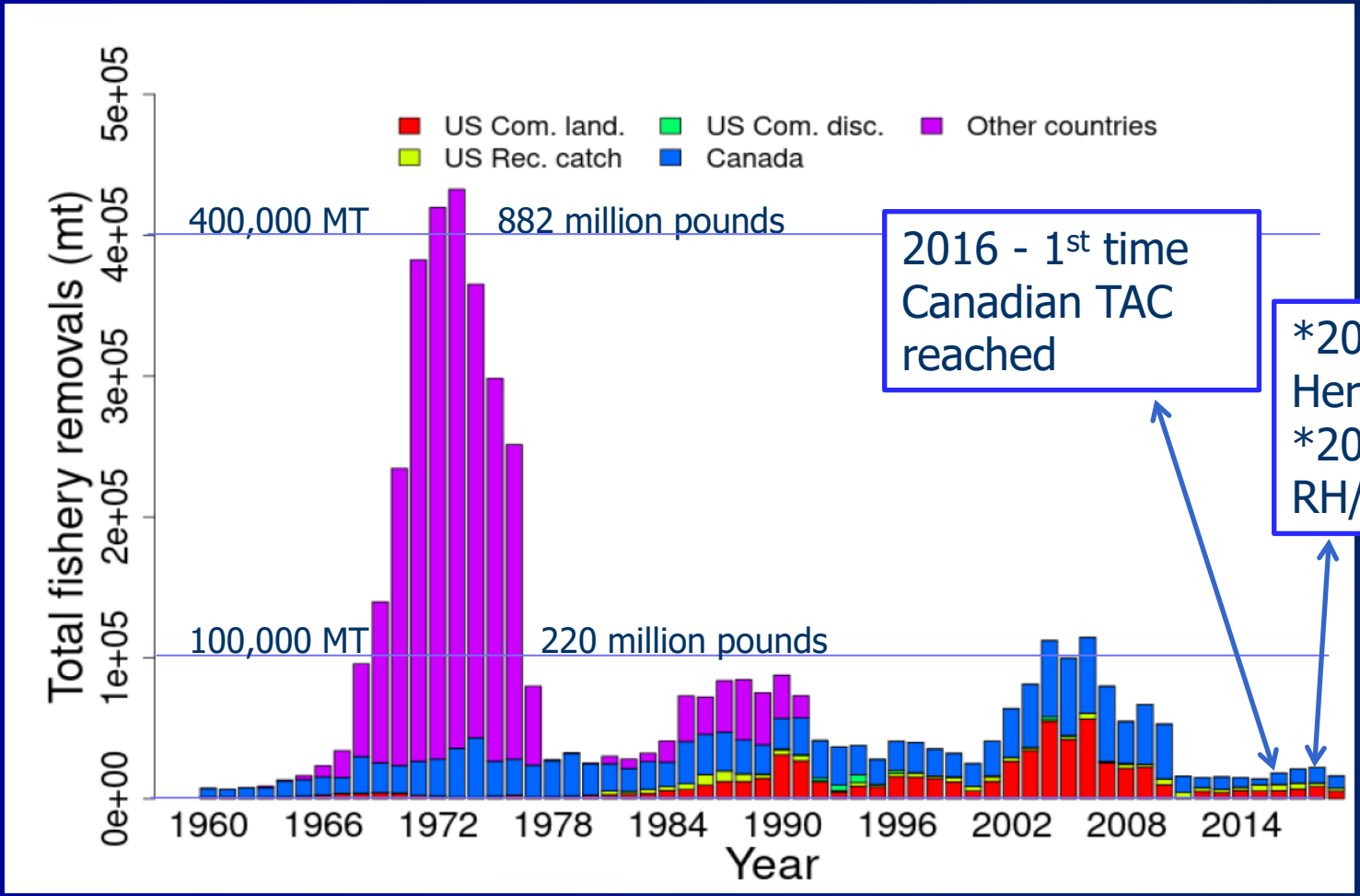
- Age structured assessment (ASAP)
- Positive reviews, complementary analyses
- Egg survey critical new component

- 2021 MTA
  - "…overfished for the last 12 years and…overfishing for the last 30 years…"

Assessment Review

- 2011-2014 low point
- Still about double overfishing in 2019
- SSB 2014 to 2019 about 3 X higher
  - 2014 = 8% of target SSB
  - 2019 = 24% of target SSB
  - target is fraction of early 70s stock

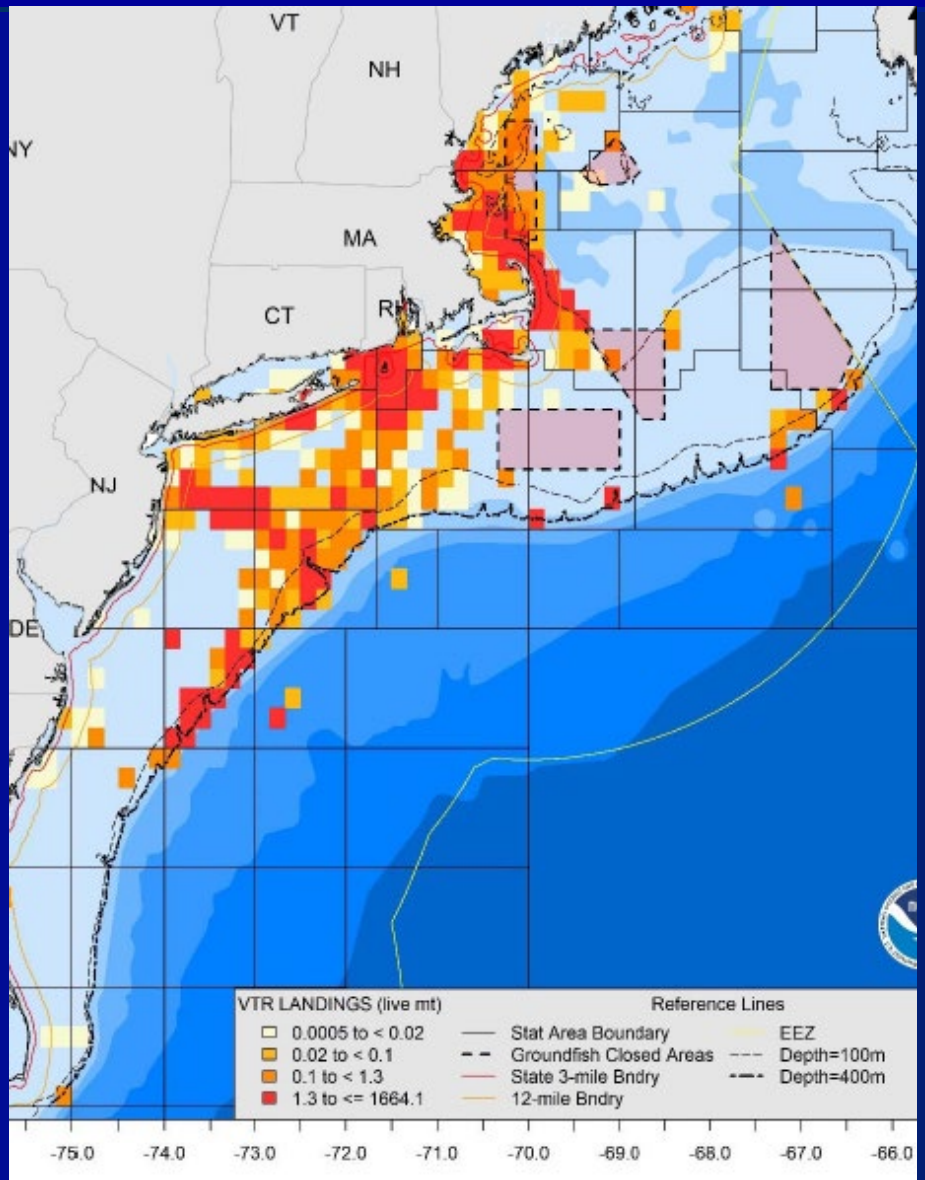
Catches up to 2019



(from MTA)

US Commercial Landings – Location

Just Example year - 2018



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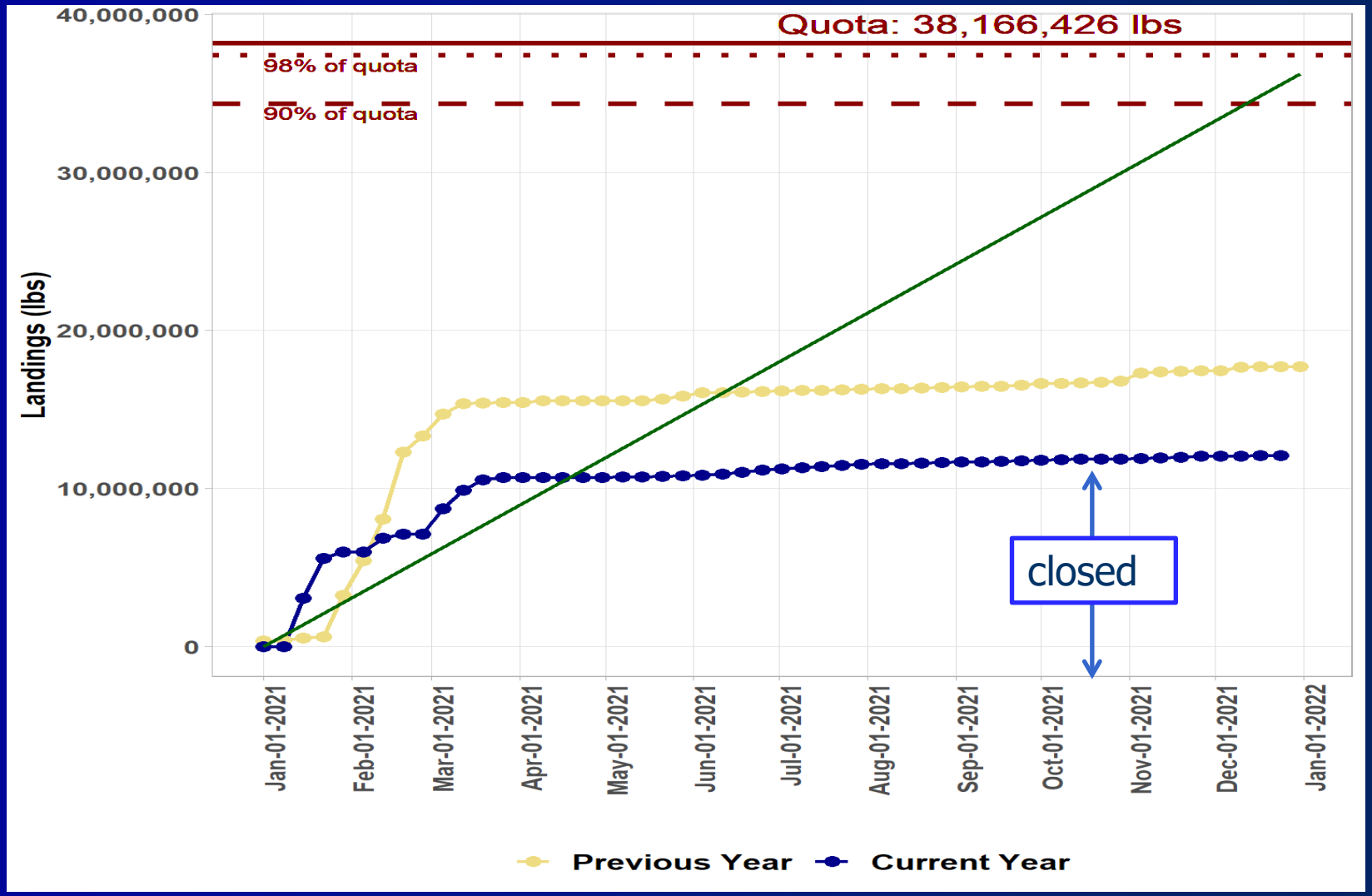
US Commercial Landings 2020/21



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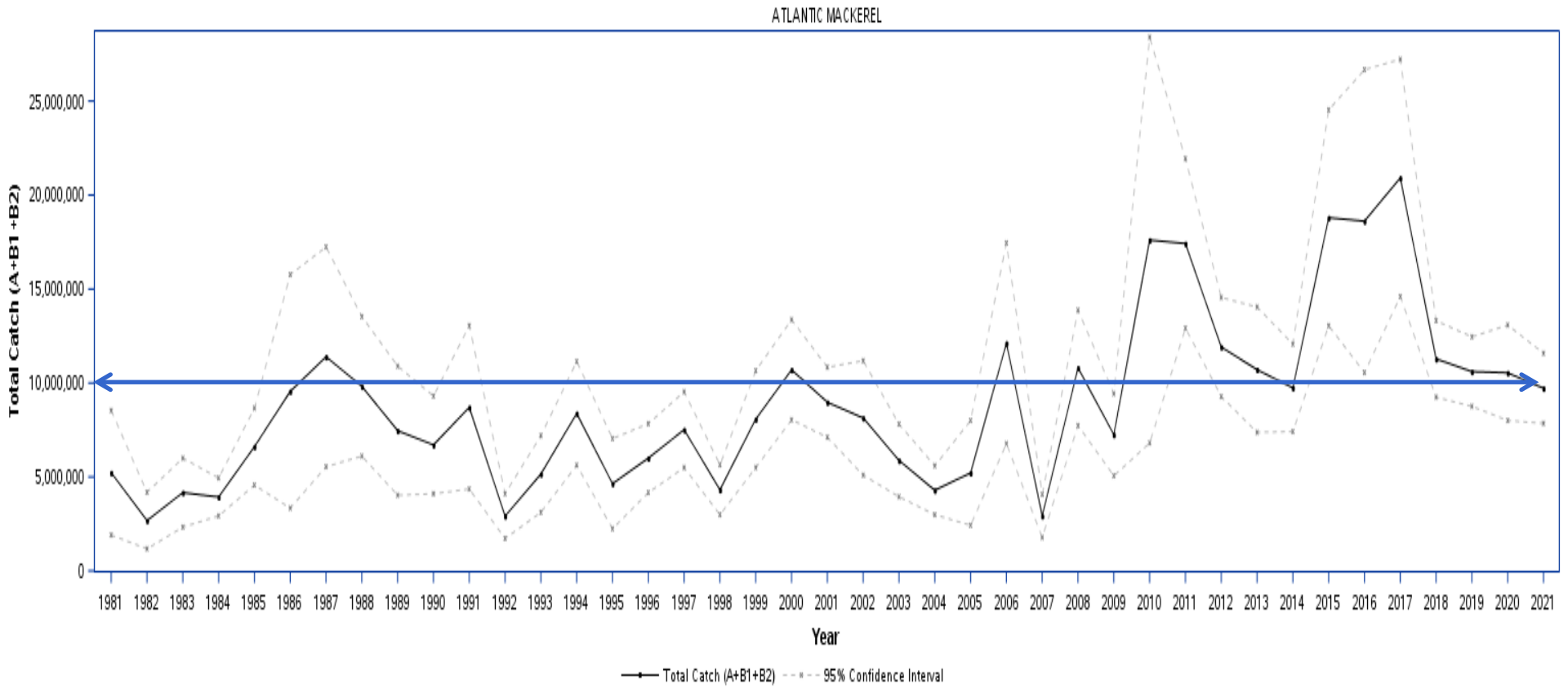
US Recreational Catch (#s MRIP)



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US Recreational Catch 2017-2021 (MRIP)

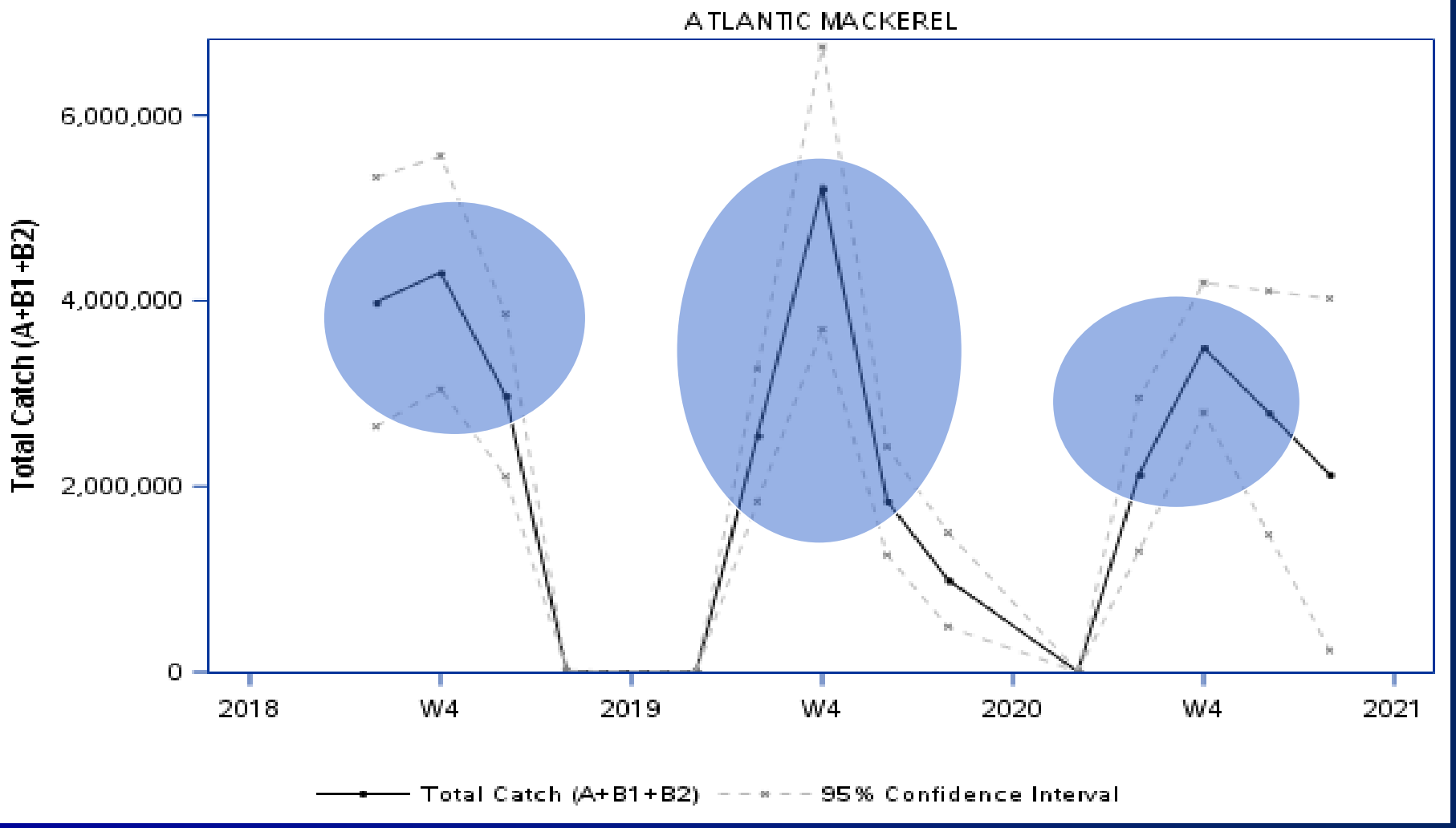
- Almost 6 million pounds average
- 2,600 MT
- Low part of time series total catch, likely substantial part of catch limit soon…

US Recreational Catch 2020 (MRIP)

(2018 and 2019 similar & decent PSEs)

- 3/6 MA; 2/6 ME; 1/6 NH
- 3/4 Private Boat; 1/5 Shore
- 1/2 State ocean; 1/3 State inland; 1/5 EEZ
- 6/10 B1's (rep harvest), 3/10 A's (eyes on), 1/10 B2's (rep discards)

2018-2020 US Rec Catch - waves



Why does assessment conclude overfished?

- Age structure - very few older fish in catches (U.S. Com, Can. Com, U.S. Rec) (not none)

Age - Length

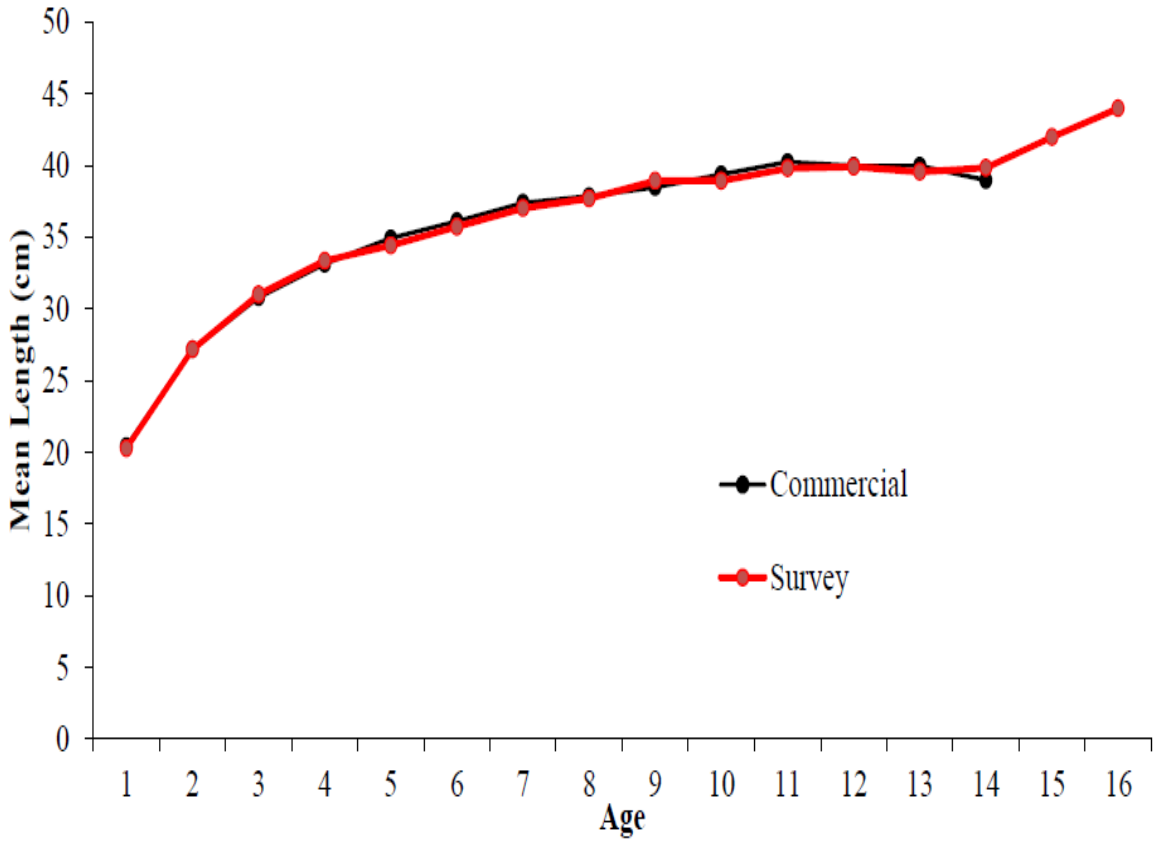
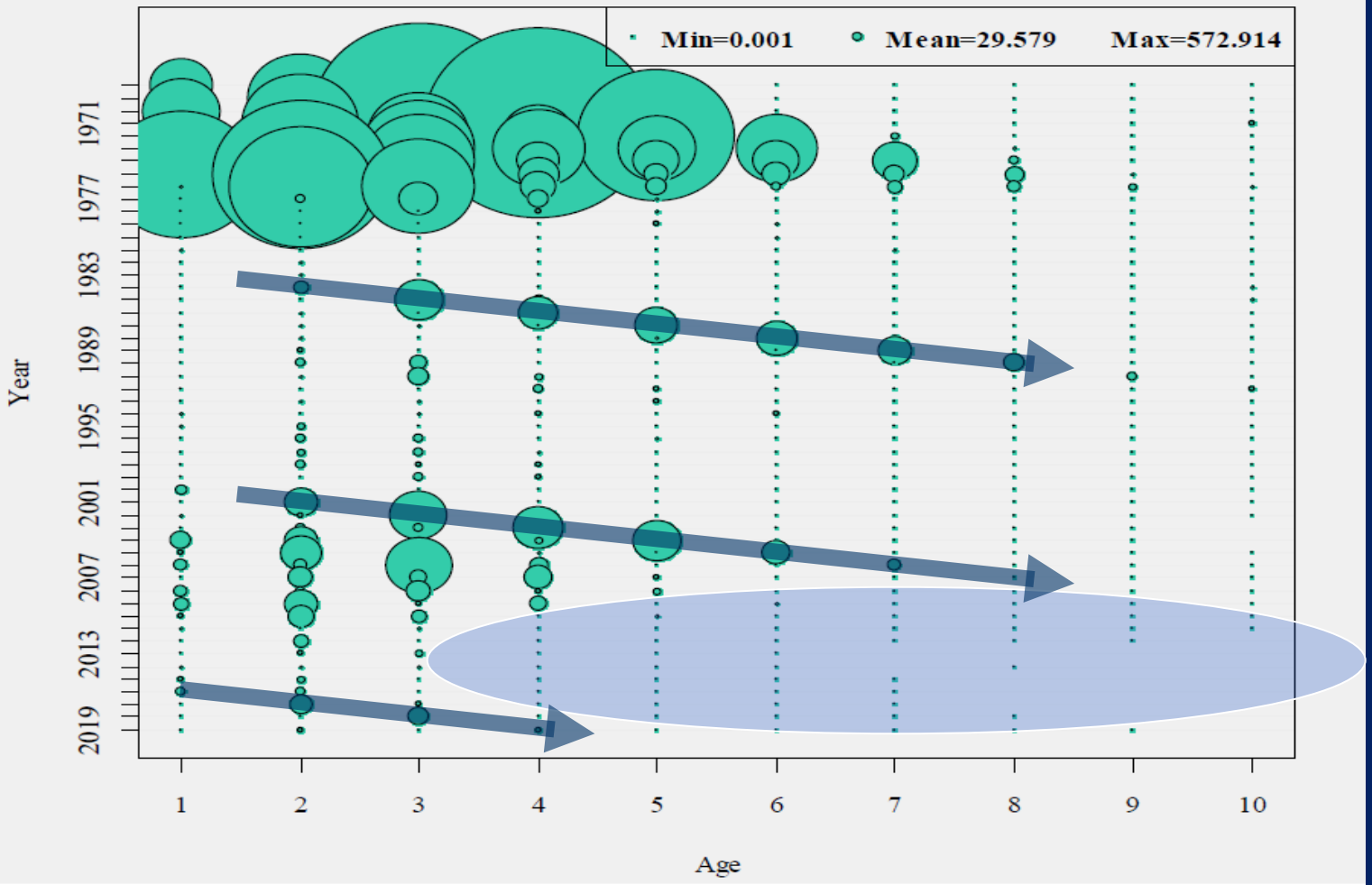


Figure A4: Atlantic mackerel mean length-at-age derived from U.S. commercial age samples and NEFSC spring bottom trawl survey age data.

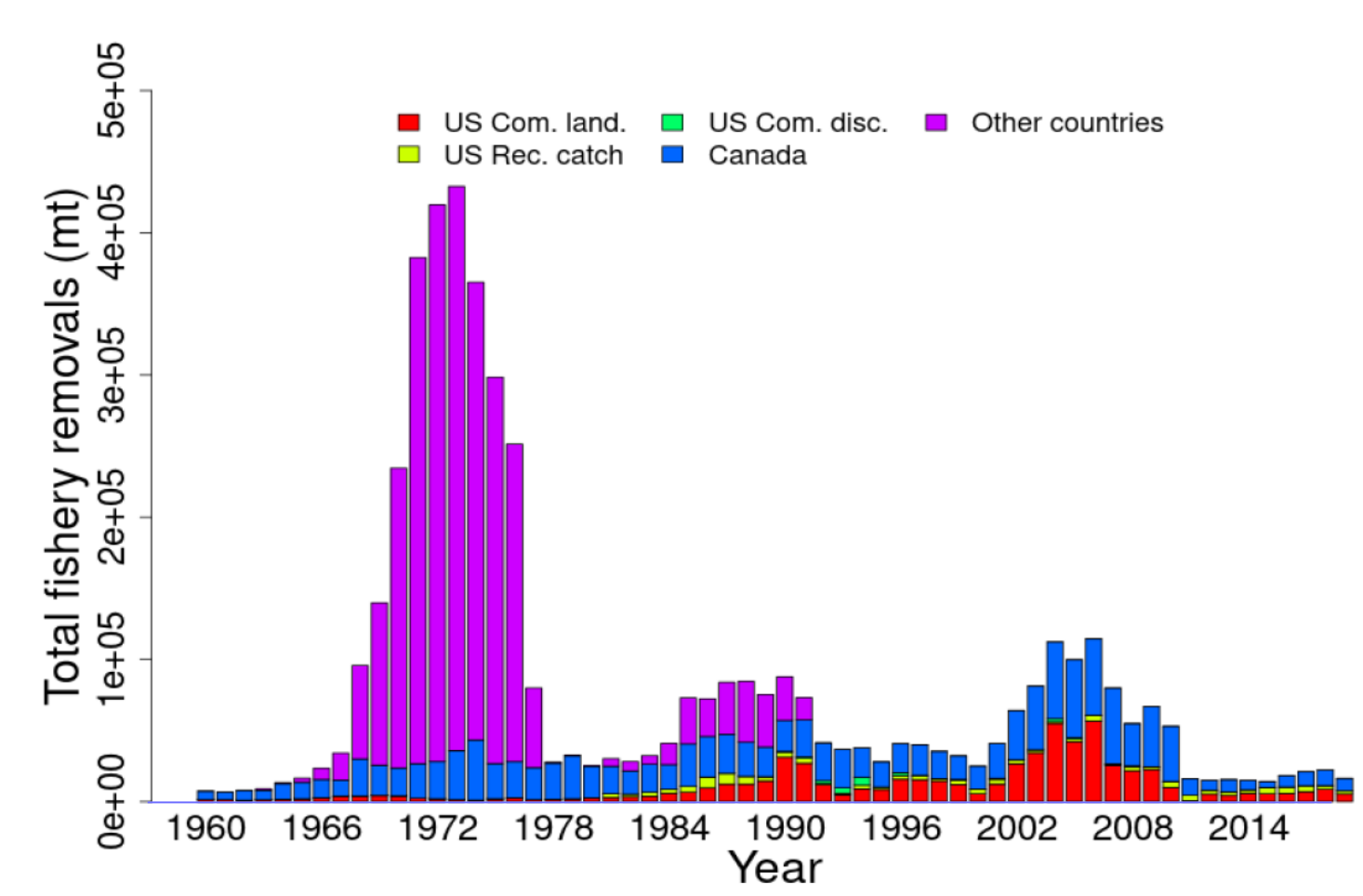
Years	Mean Inches (com)
1	8.0
2	10.7
3	12.1
4	13.0
5	13.7
6	14.2
7	14.7
8	14.9
9	15.2
10	15.5
11	15.9
12	15.7
13	15.7

Age Structure

Total catch-at-age (U.S. plus Canada)



Catches up to 2019

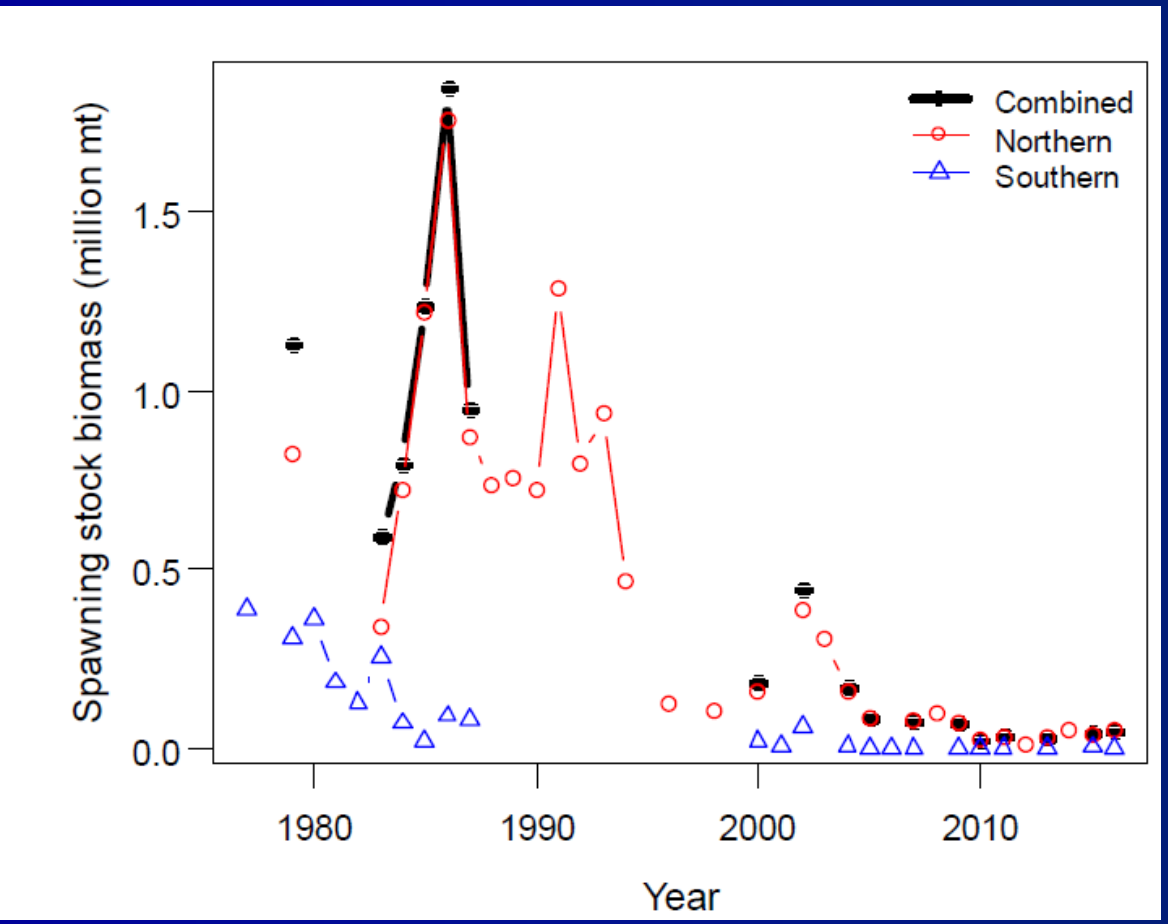


(from MTA)

Why does assessment conclude overfished?

- Age structure - very few older fish in catches (US Com, Can. Com, US Rec) (not none)
- Egg index down

Egg Survey



Canadian (northern) and US (southern) combined. Canadian survey = dedicated mackerel egg survey. U.S. from two ichthyoplankton surveys (MARMAP, 77-87 and ECOMON, 99-present) that in most years have comprehensively sampled the southern contingent's spawning area

Egg Survey - Canada

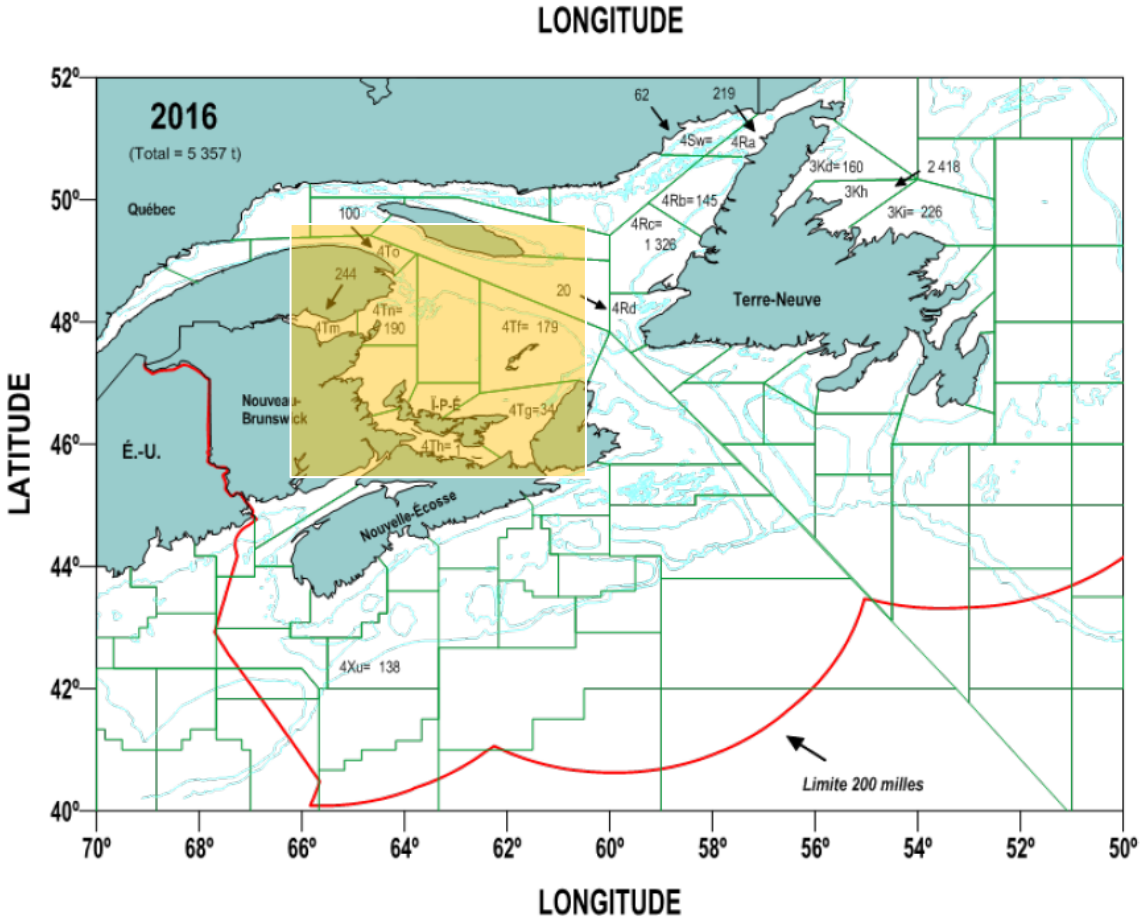


Figure 6. Map of Atlantic mackerel catches (t) in 2015 and 2016 by NAFO subdivision and unit area (u=unknown unit area).

Egg Survey - Canada

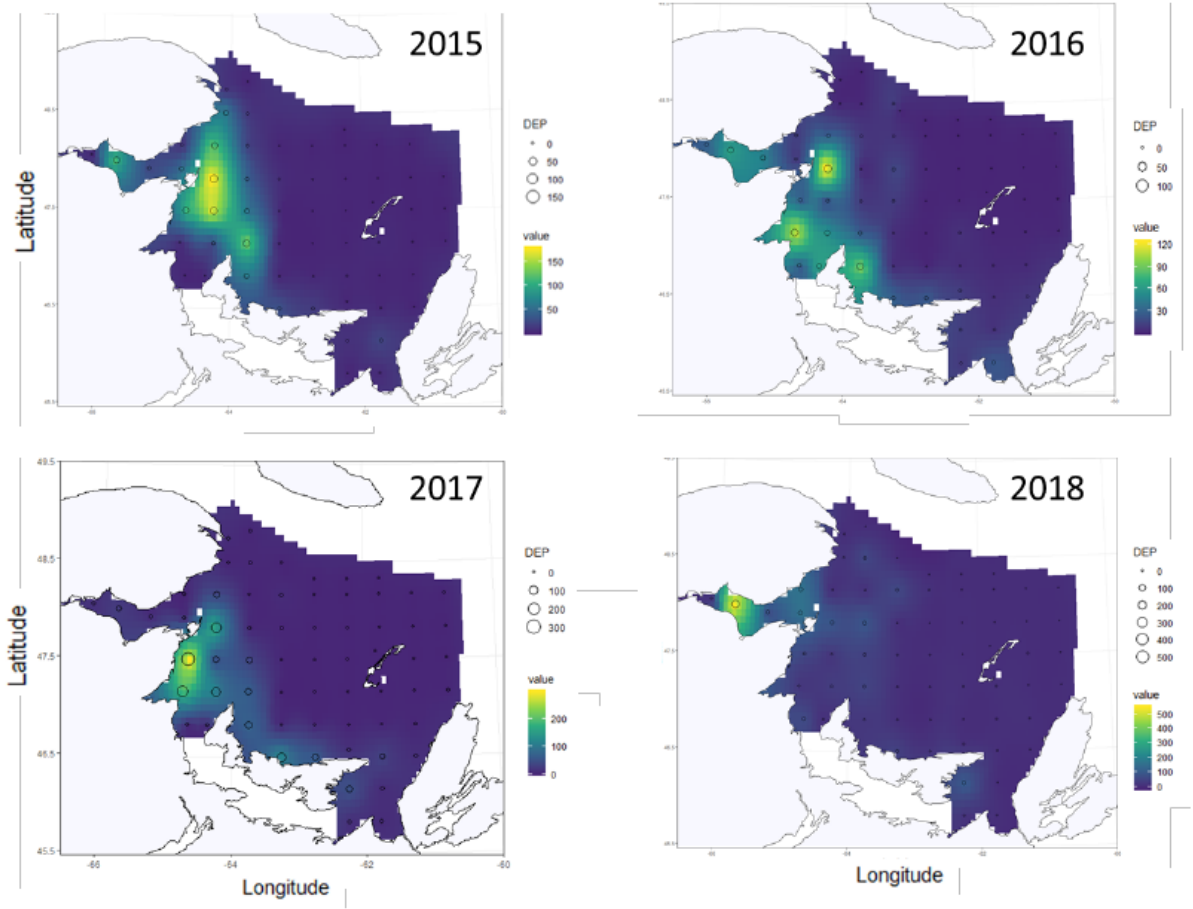


Figure 7. Daily egg production (DEP) of mackerel eggs (n/m^2) from 2015-2018. Sampling stations are indicated by circles, the size of which represents the calculated daily egg production for each station. The interpolated DEP values for the entire survey area are also shown.

Example years… 2021 U.S. assessment updated all data through 2019… (2020 not used due to Covid data gaps)

Egg Survey Prospecting - Canada

Multiple egg and larvae surveys 1922-2016 conducted i.e. Scotian Shelf & Newfoundland searching for additional spawning areas - minimal. Plus W vs E genetic analyses

Example study…

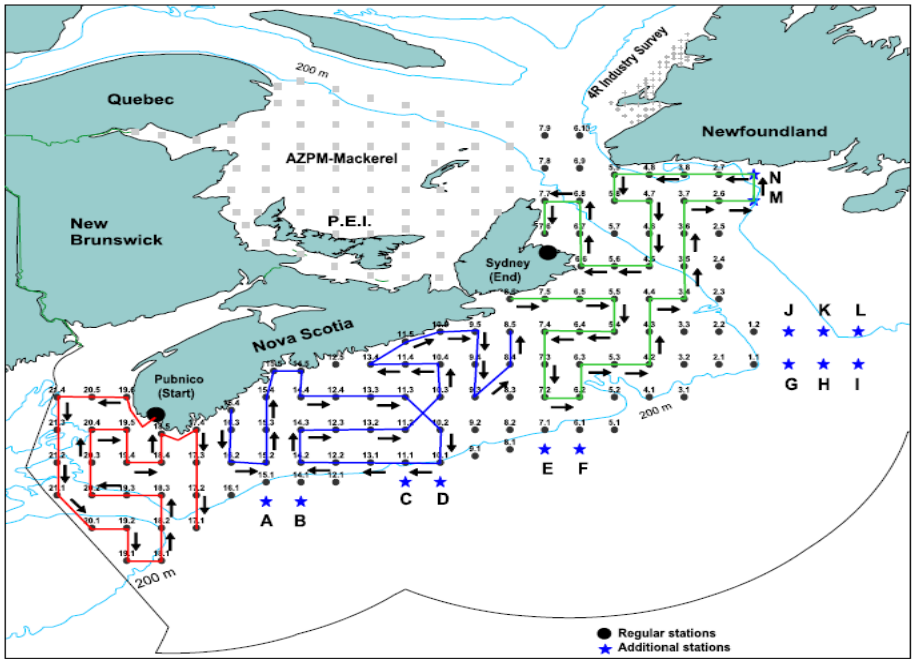


Figure 1. Map of the stations and sampling pattern of the egg survey conducted on the Scotian Shelf and Newfoundland's South Coast in 2009. The survey was conducted in three parts, each one is characterized by transects of a specific colour. Stations of the AZPM-Mackerel and Industry larval surveys conducted in the southern Gulf of St. Lawrence and on the west coast of Newfoundland are also indicated.

Egg Survey Timing - Canada

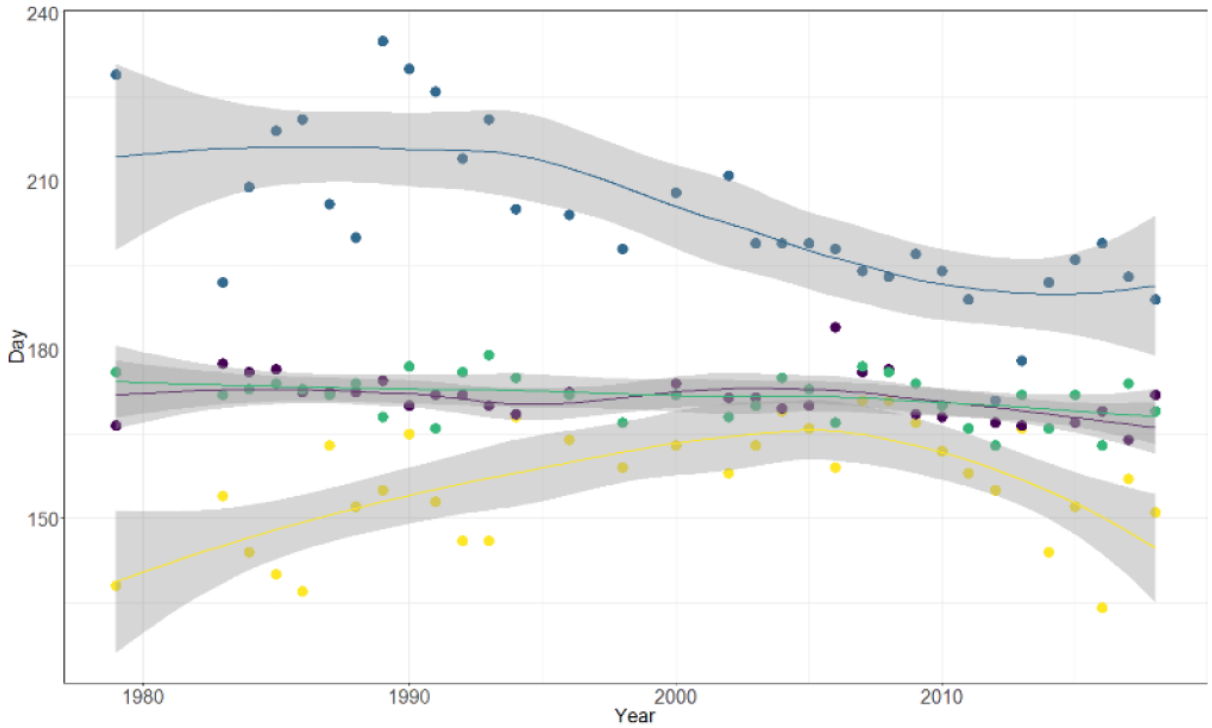
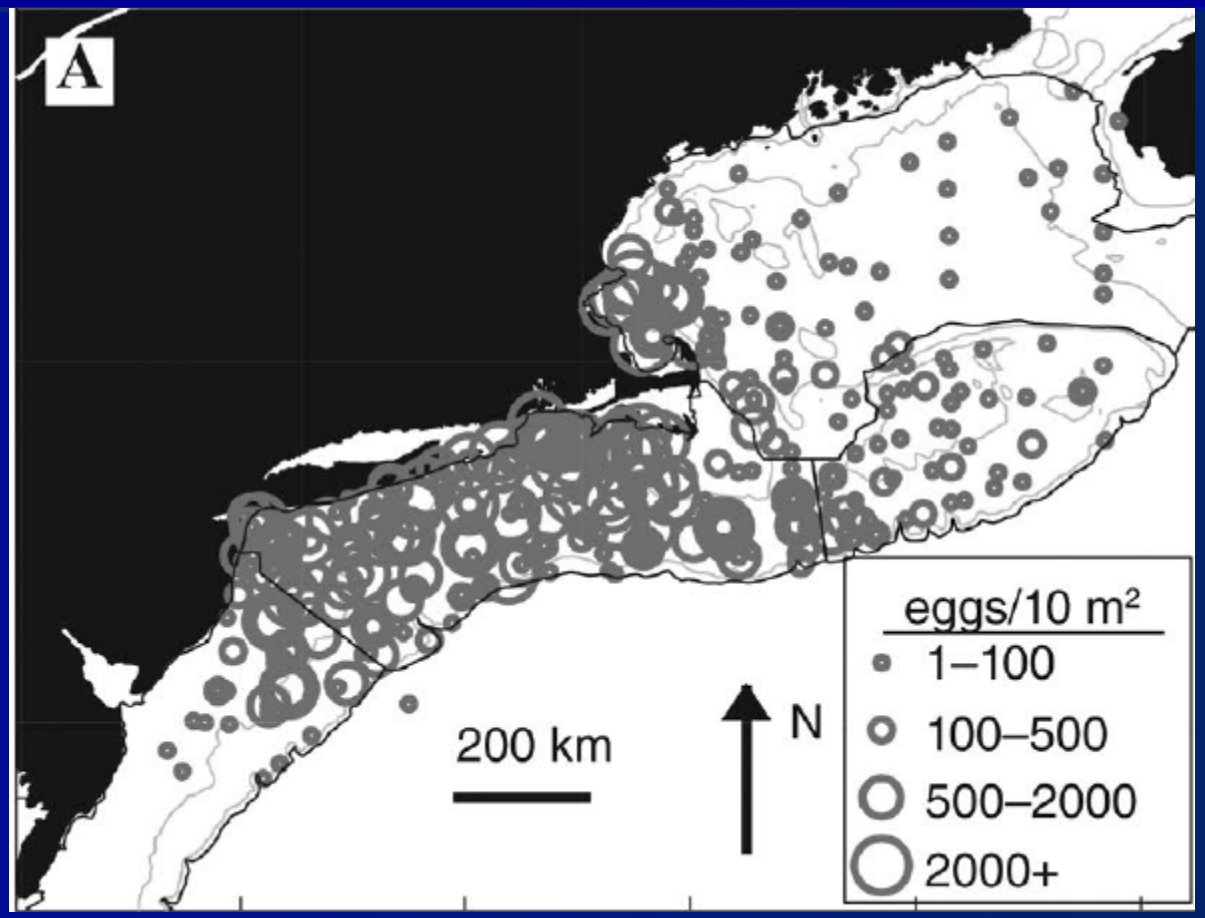


Figure 6. Atlantic mackerel spawning dates (Julian day) as calculated from biological samples from the commercial fishery. Colours indicate start date (yellow), peak spawning date (green), median mission date (violet), and spawning end date (blue).

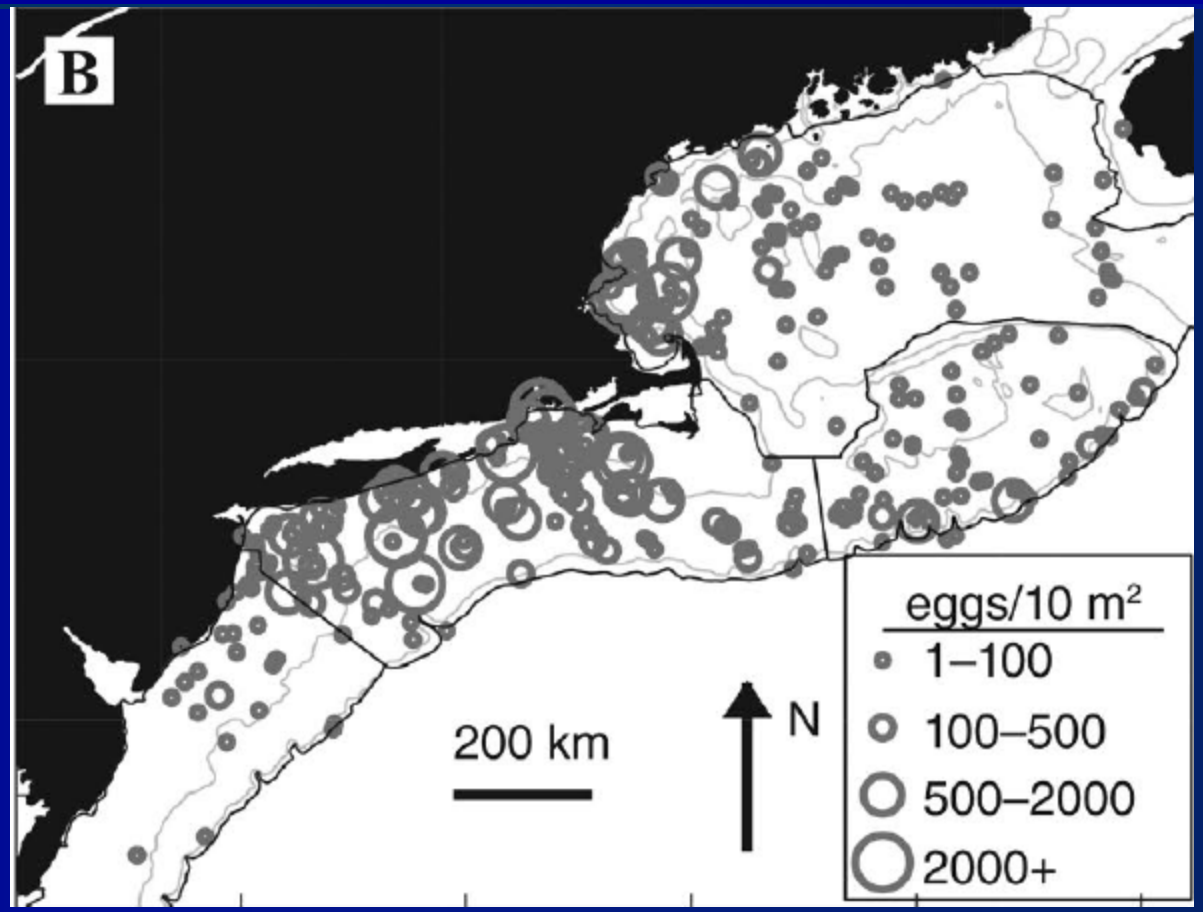
Egg Survey Timing - US

- Fishery occurs after/before spawning
- Use May-June, shelf-wide survey
- If the spawning season had shifted earlier we should see ripe adults and/or eggs starting to appear in the spring survey (we don't)
  - adjust for warmer water (fish stay in egg phase for shorter time).

Egg Survey – U.S. 1977-82



Egg Survey – U.S. 1983–1987



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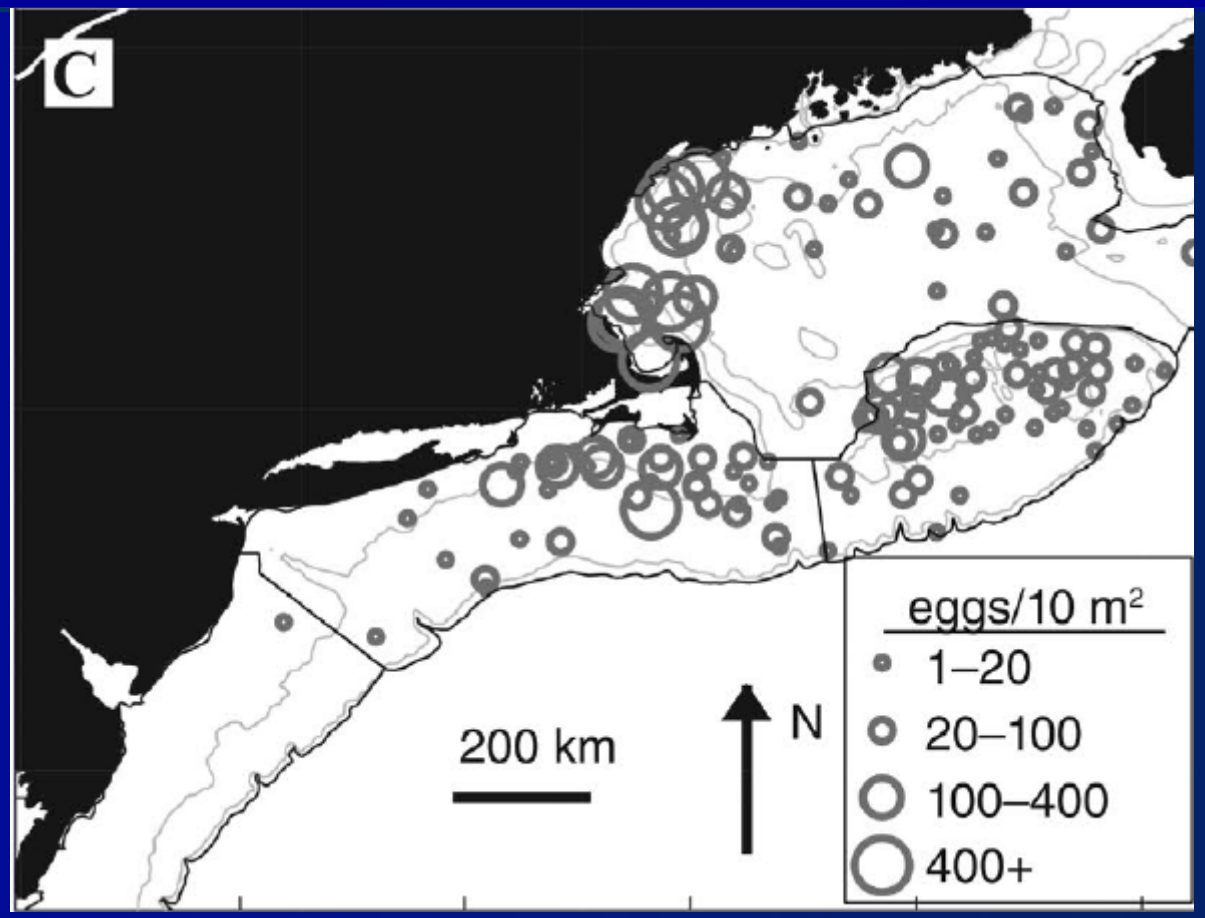
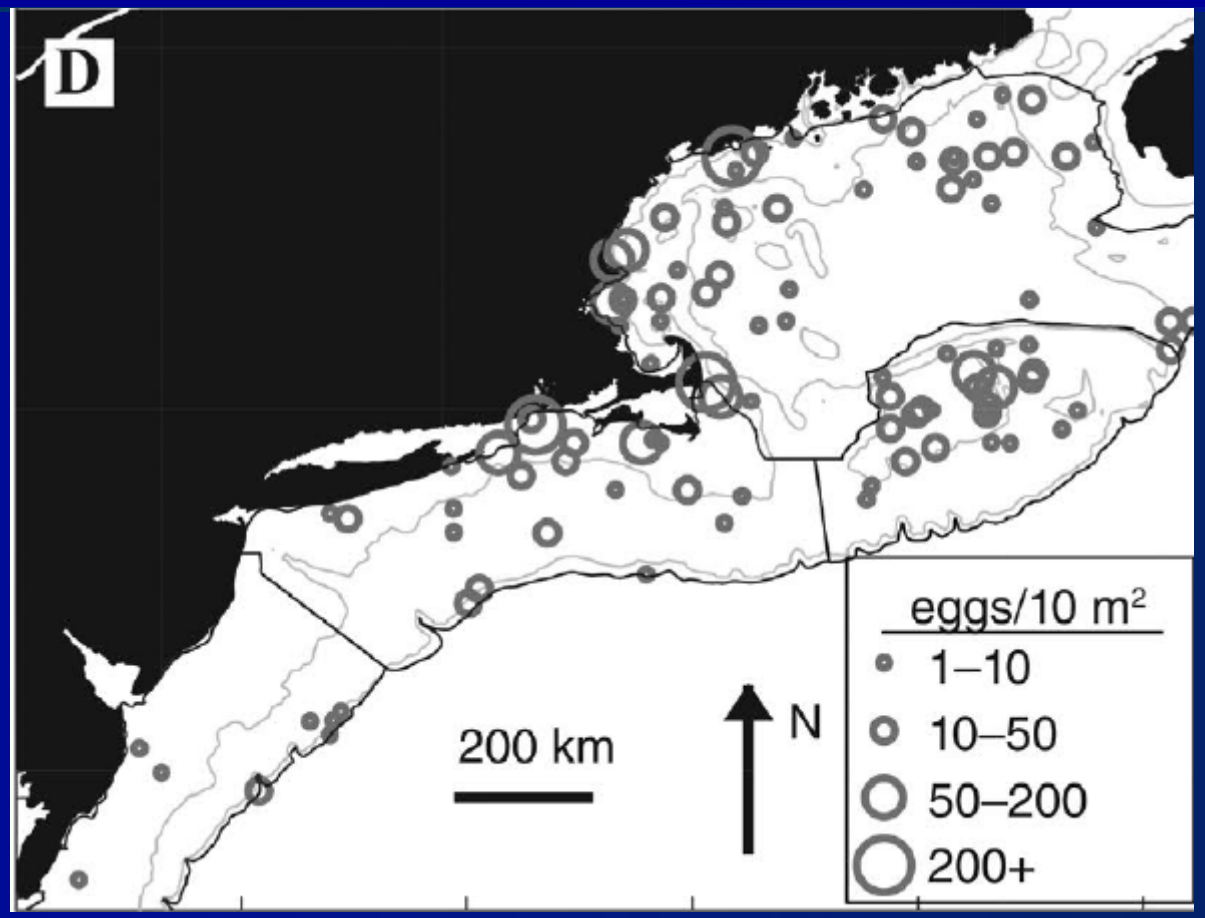
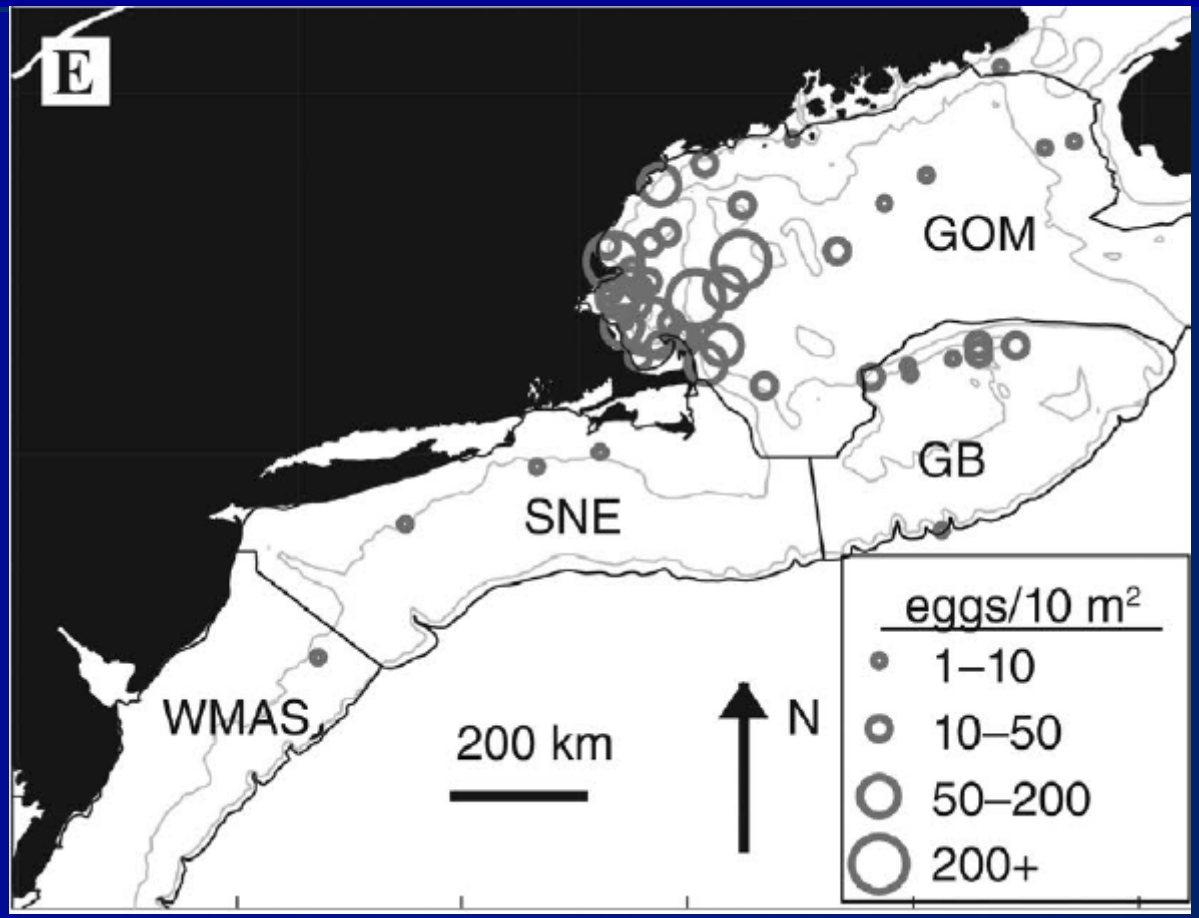
Egg Survey – U.S. 2000–2004



Egg Survey – U.S. 2005–2010

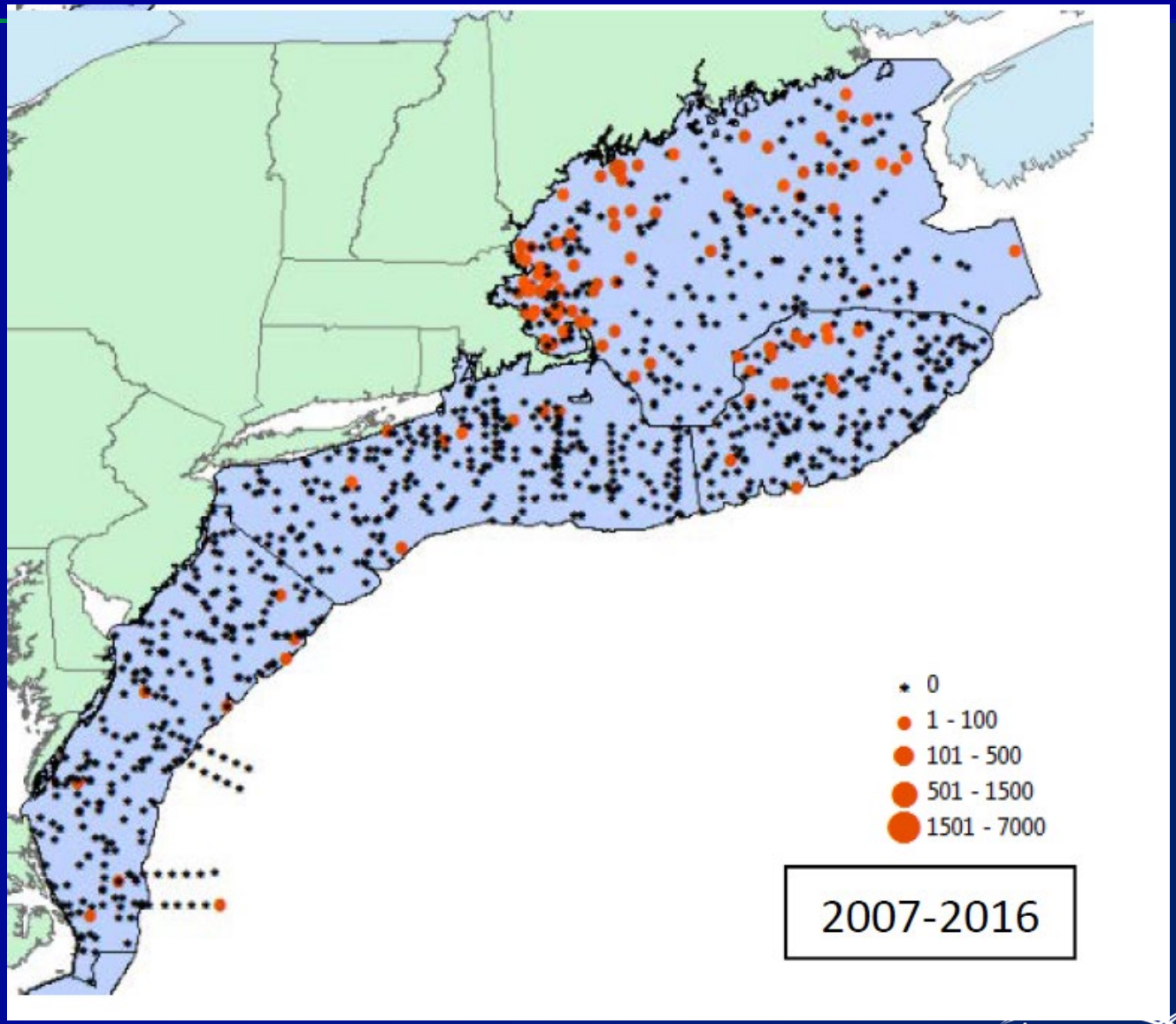


Egg Survey – U.S. 2011–2016

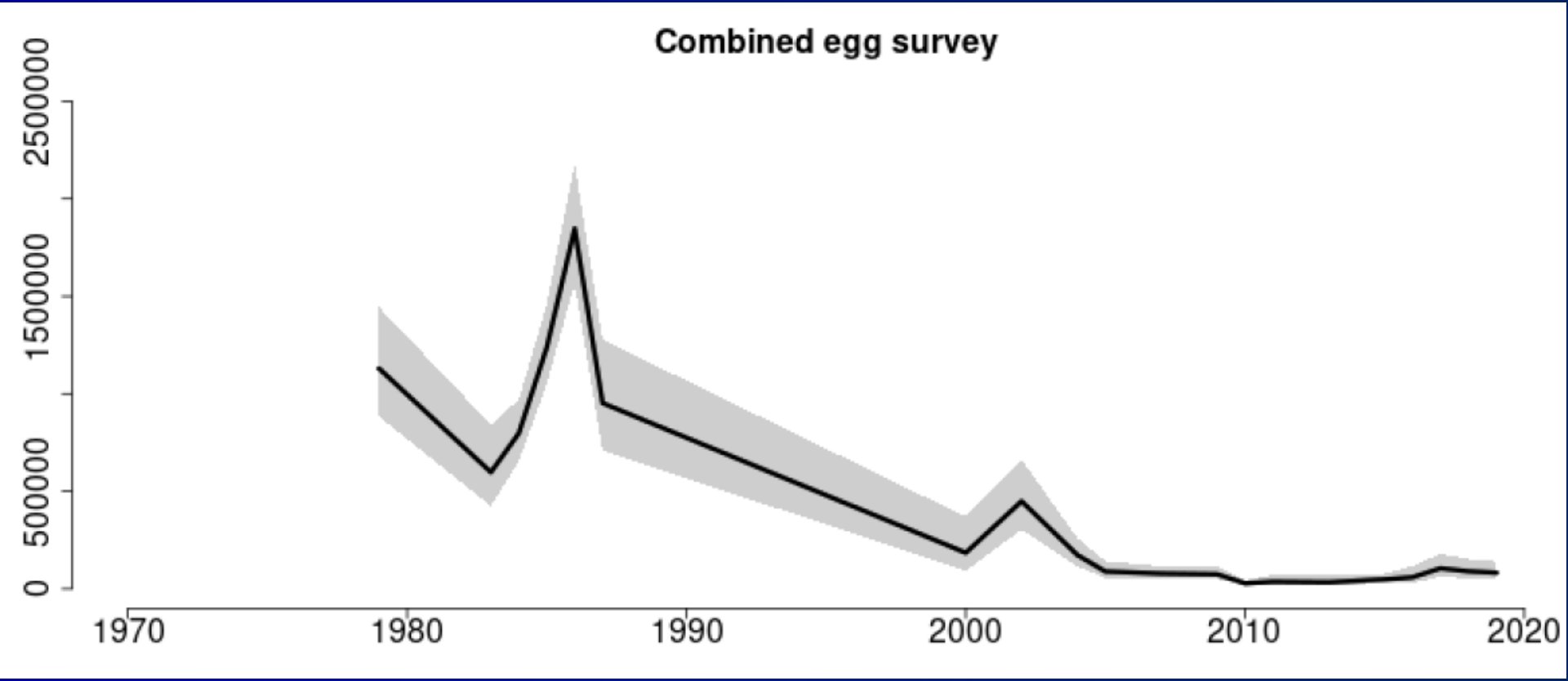


Egg Survey – U.S. 2007–2016

Example years to illustrate area of coverage.



Egg Survey Overall Trend

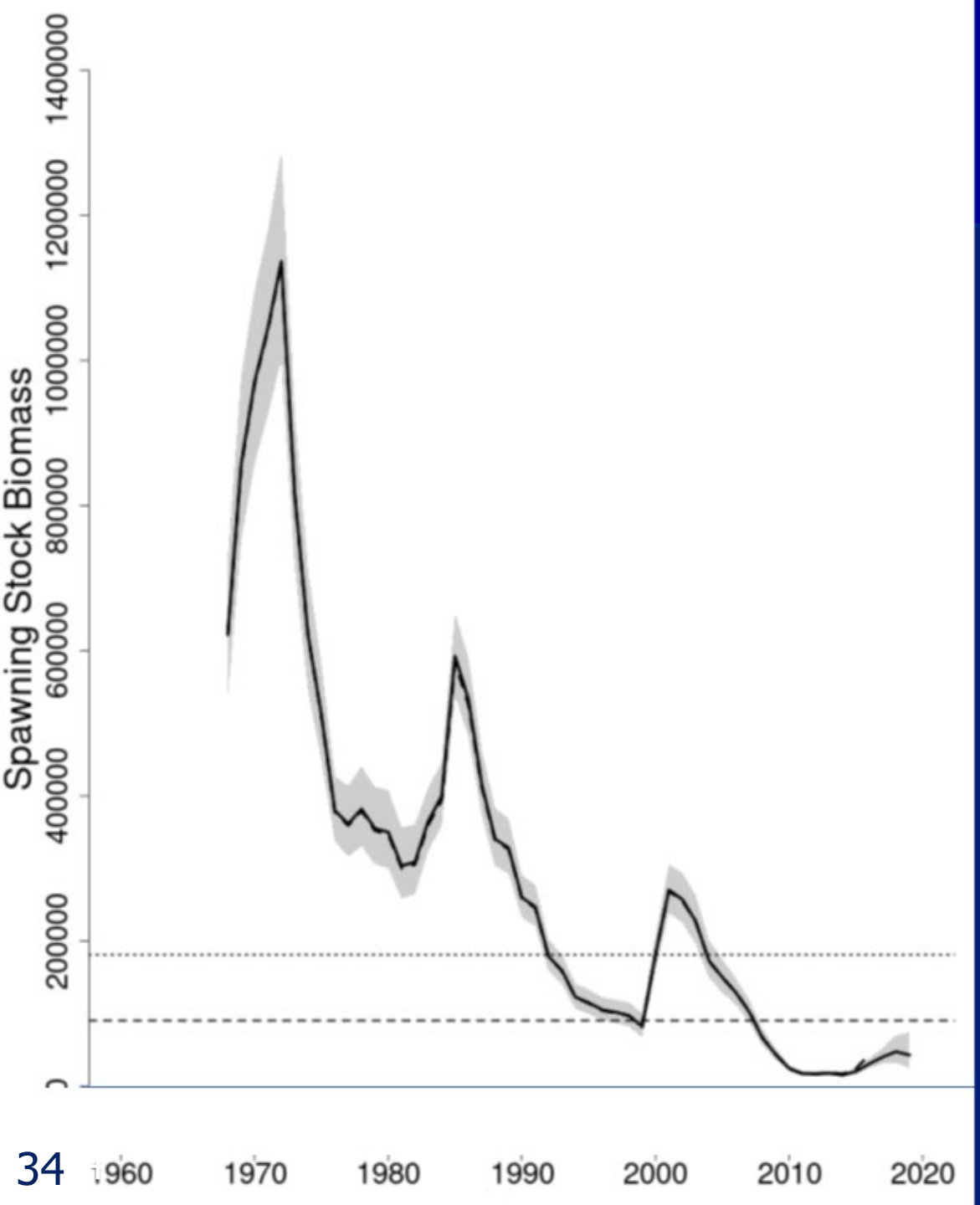


Through 2019

Why does assessment conclude overfished?

- Age structure - very few older fish in catches (US Com, Can. Com, US Rec) (not none)
- Egg index down
- Old assessments led to too-high quotas
  - 1997 catch level set about 10x the total SSB in that year (per current assessment)
- No fishery sector exceeded their specified levels

SSB



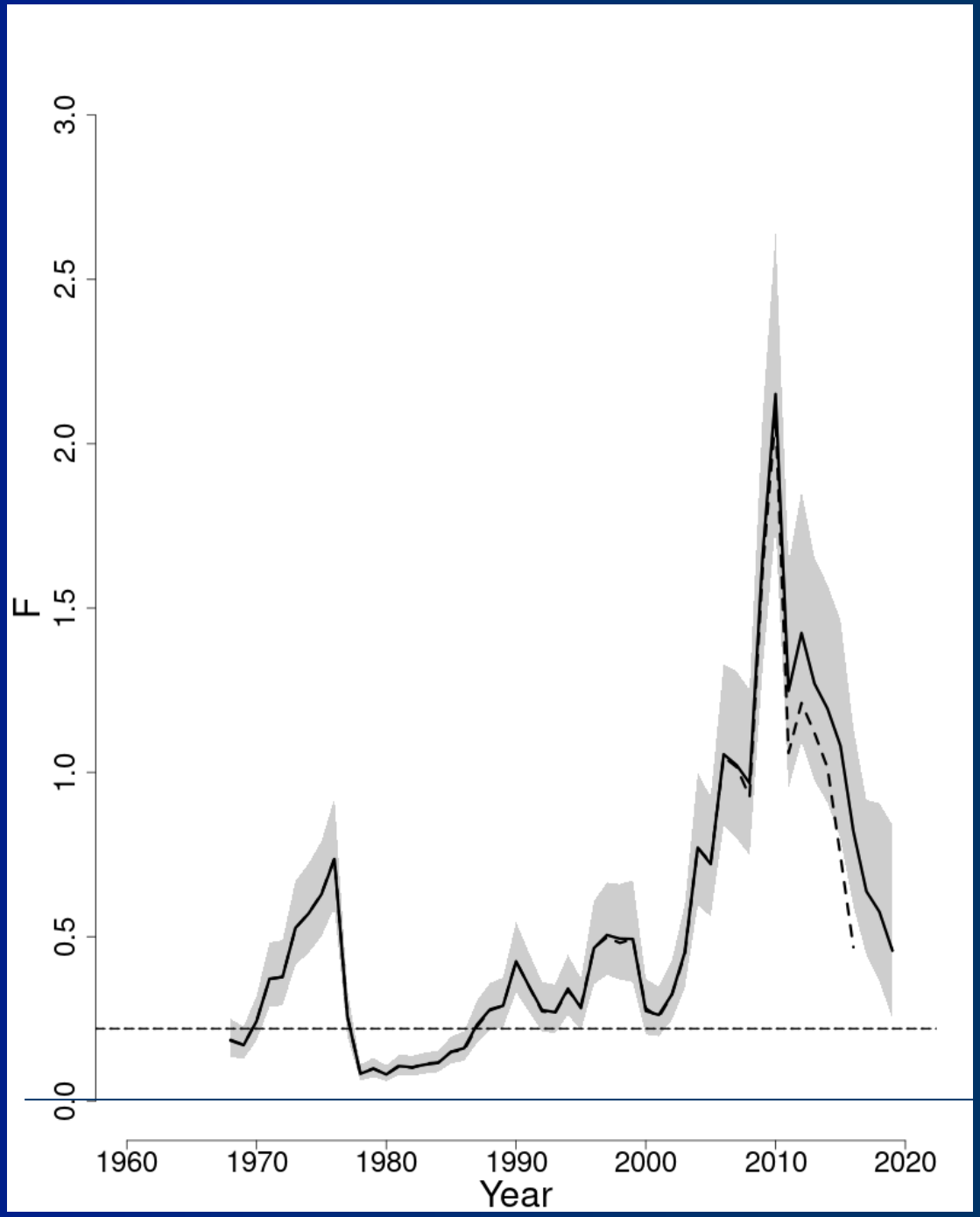
SSB Trends.

SSBThreshold (1/2 SSBMSY proxy; horizontal dashed line)

SSBTarget (SSBMSY proxy; horizontal dotted line)

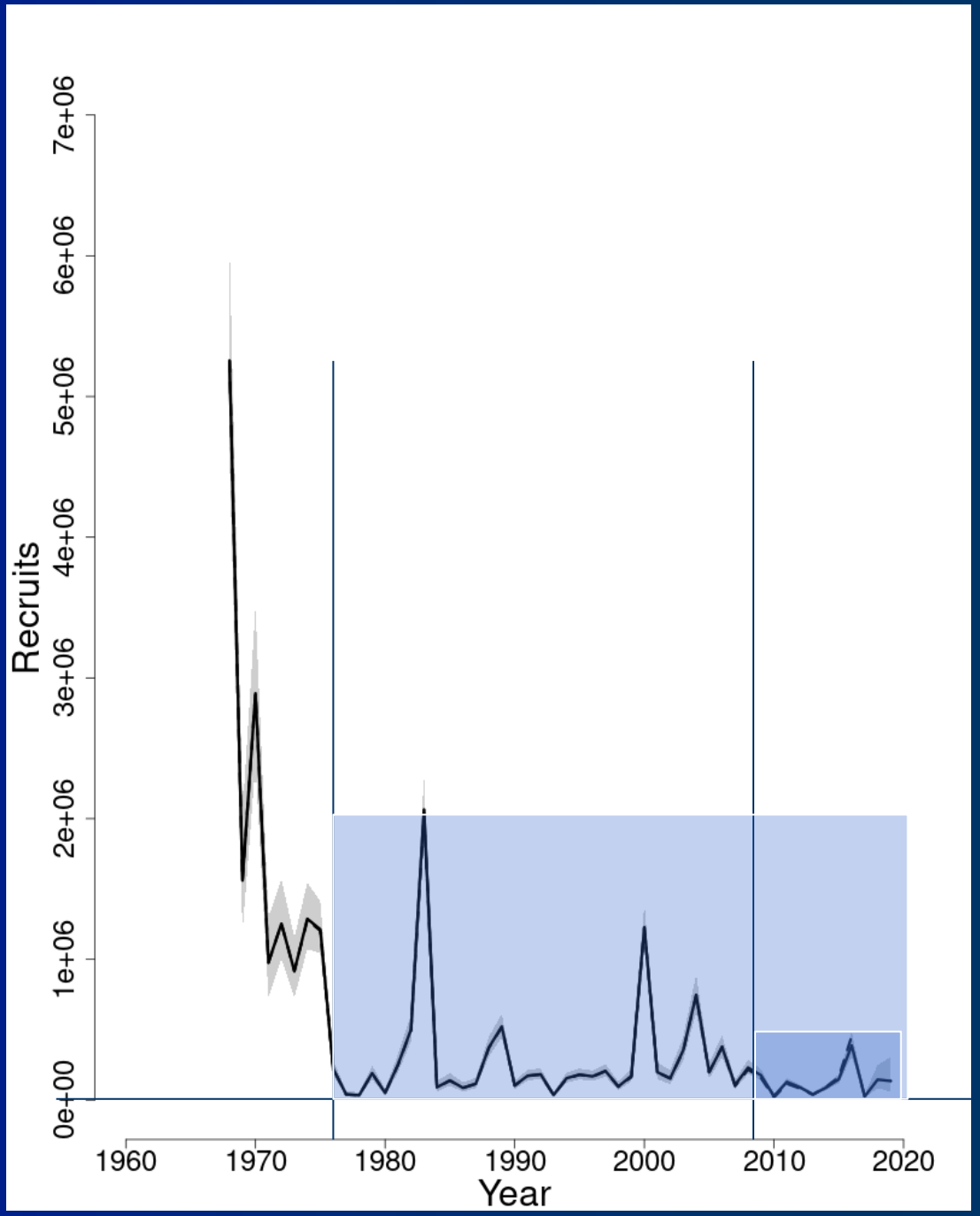
F

Figure 2: Trends in F current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ (F_{MSY} proxy=0.22; horizontal dashed line



Recruits

Figure 2: Trends in Recruits (age-1) (000s)



Review management

- Initial projections (2018) indicated rebuilding by 2023 – used 1975+ Recruitment
- 2021 MTA: changes needed (low recruitment so not rebuilding as projected)
- In-season adjustment closed 2021 fishery in October, emergency action for 2022 means 2022 catch should be around 2021 catch

Review management

- From start of 2021 into 2022 commercial quota cut by about 2/3
  - Likely more reduction coming in 2023: 80%+ reduction in quota vs start of 2021, and about a 60%+ reduction from 2018-2020 avg landings

Review management

- MSA: [if rebuilding needs lower harvest], allocate, taking into consideration the economic impact of the harvest restrictions or recovery benefits on the fishery participants in each sector,…
- any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors

Review management

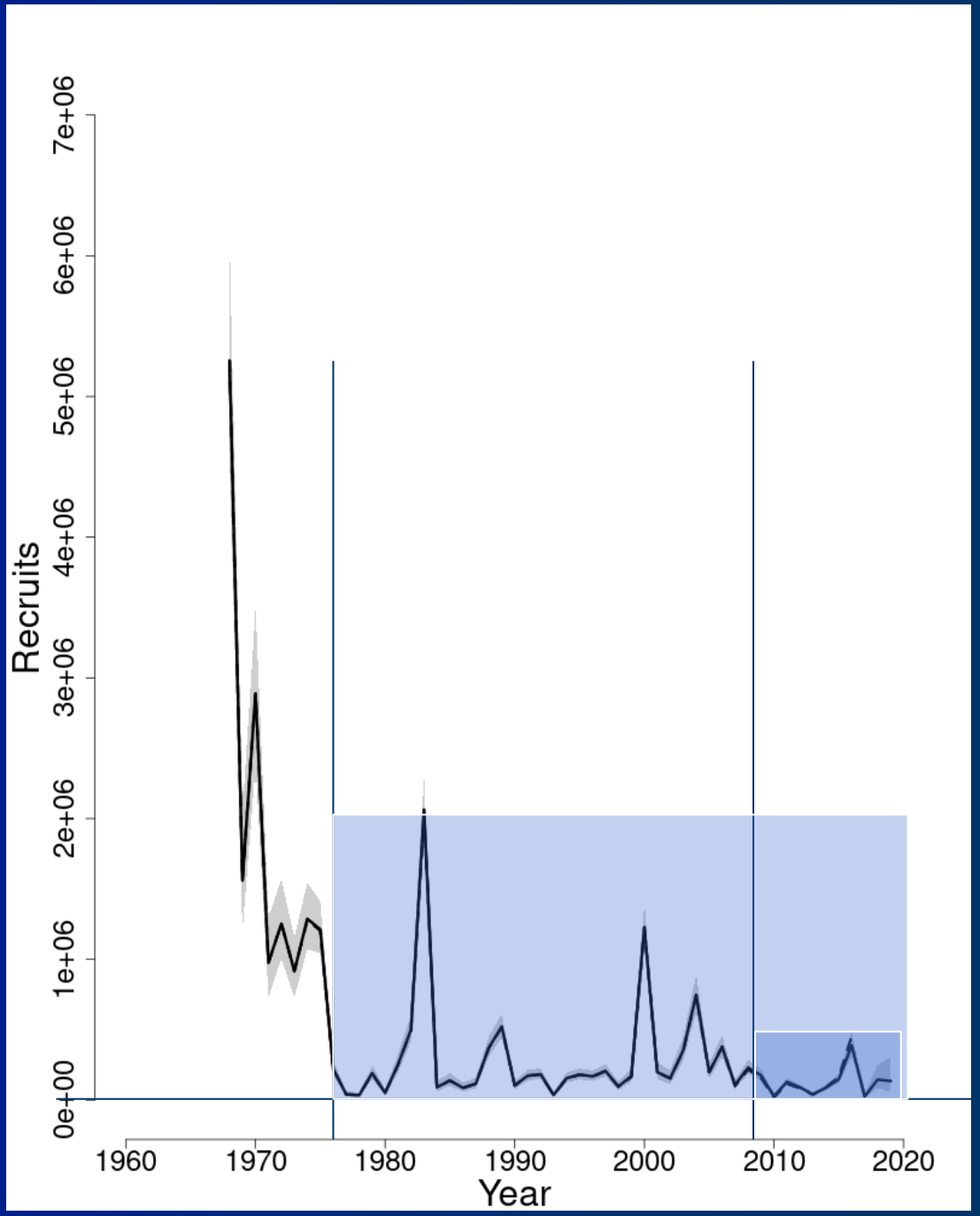
- Harvest restrictions on commercial sector fast-tracked, more likely coming
- Nothing done yet on recreational side, MSA requires restrictions on other sectors that are "fair and equitable"
- Commercial sector getting reduced by more than half… a 50% reduction for Rec/charter sector may approximate "fair and equitable"

Rebuilding v 2

- 10 years – start 2023, end June 2032
- 5 rebuilding options…
- 1 Assumes 2009+ (low) recruitment
  - Requires zero U.S. catch for 10 years, Canada would have to cut also
- 4 Assume 2009+ recruitment until get to ½ target biomass, then 1975+ recruitment…
  - Assume 4,000 MT for Canada

Recruits

Figure 2: Trends in Recruits (age-1) (000s)



Rebuilding v 2

- 2. Standard risk policy rebuilds <10 years; minimal initial U.S. catch
- 3. 60% chance rebuild in 10 years; initially about 4,000 MT U.S. catch
- 4. 50% chance rebuild in 10 years; initially about 6,000 MT U.S. catch (MSA minimum)
- 5. 50% chance rebuild in 10 years plus a risk policy deduction; low initial U.S. catch

Management Measures

- Calculating Commercial Quota:

- Canadian catch/quota deducted
- Recreational catch deducted
- Commercial fishery gets what's left.

Com Management Measures

- Quotas and closures, trip limits
- 3-inch minimum mesh requirement to retain more than 5,000 pounds of Atlantic mackerel (to mimic the butterfish regulations)

Rec Management Measures

- Continue to deduct expected recreational catch
- Align EEZ with state measures if states can roughly half the catch
- If not, close EEZ to possession w/o bill of sale for bait.

- *MSA requires rebuilding*
- *MSA requires fair and equitable restrictions*

?s

Comments and input…

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?s

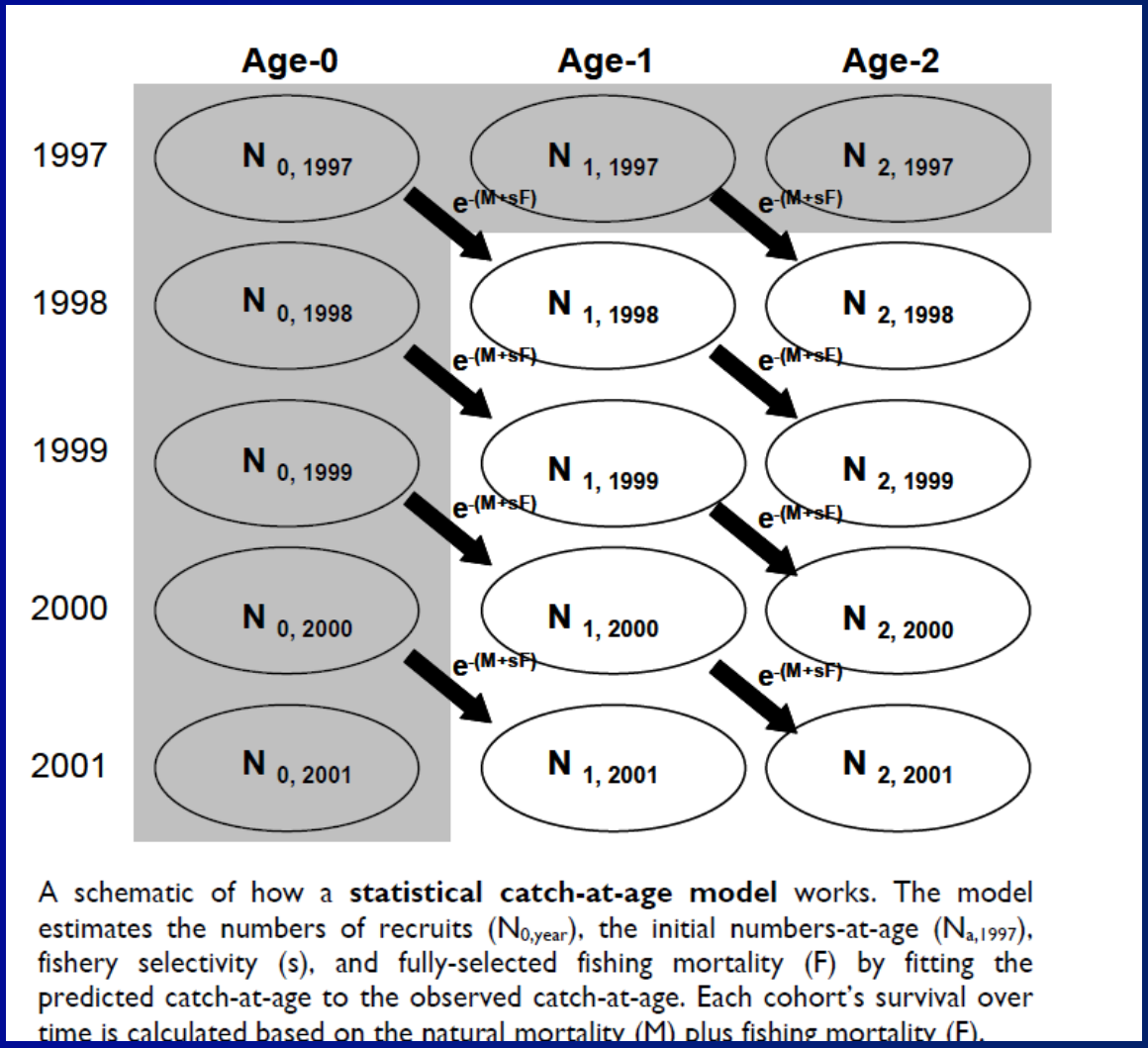
Comments and input…

Extra Slides

AP Fishery Performance Report

- Thermal/regime shifting
- Covid data gaps, fresh market impacts
- Trade issues – tariffs/container costs
- Herring RSA issue, New England's 12-mile line
- Mixed input on rebuilding approaches
- Concern over lack of ability to control recreational catch

Age structured assessment…



A schematic of how a **statistical catch-at-age model** works. The model estimates the numbers of recruits ($N_{0,year}$), the initial numbers-at-age ($N_{a,1997}$), fishery selectivity (s), and fully-selected fishing mortality (F) by fitting the predicted catch-at-age to the observed catch-at-age. Each cohort's survival over time is calculated based on the natural mortality (M) plus fishing mortality (F).

US Commercial Landings

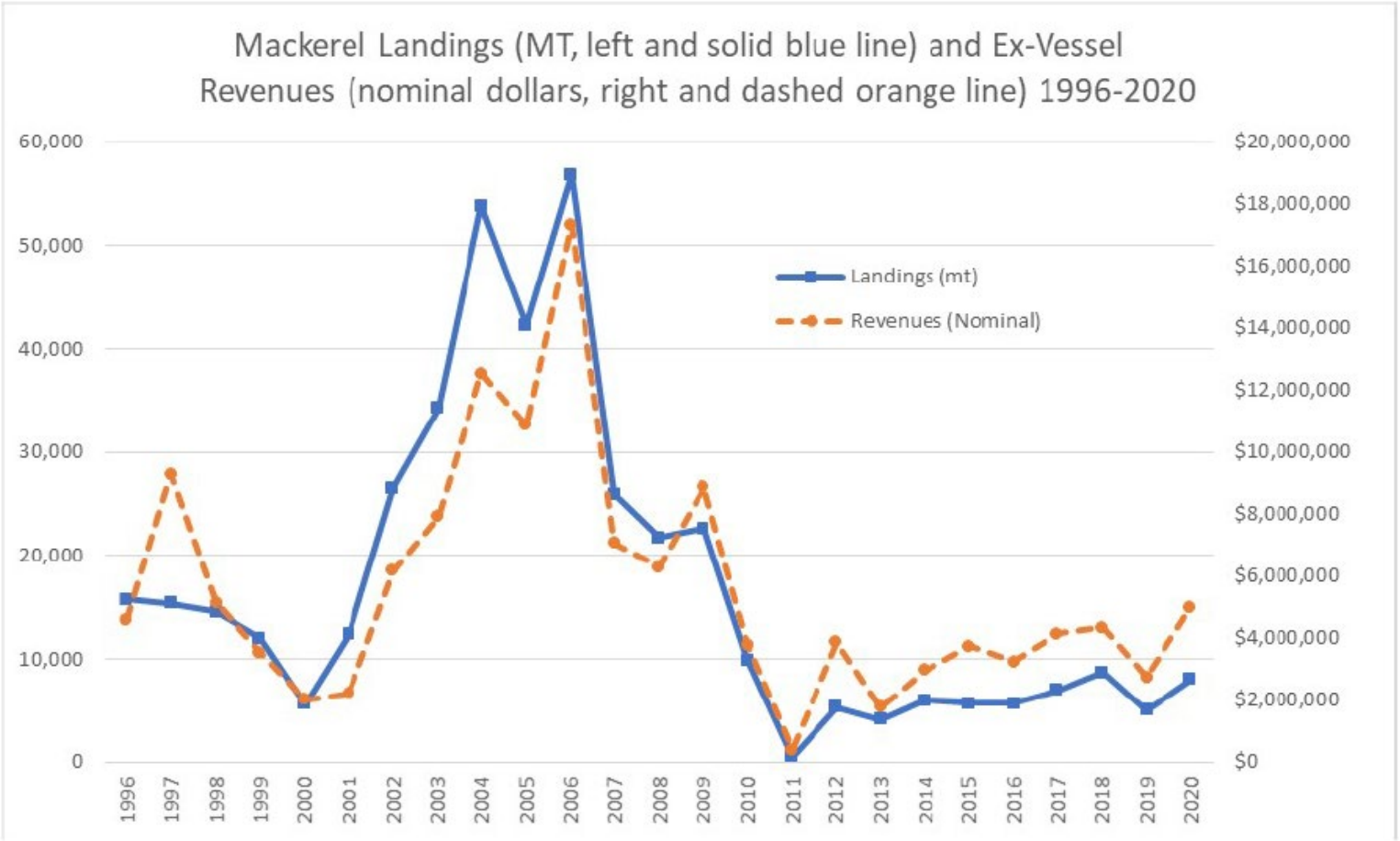


Figure 2. U.S. Mackerel Landings and Nominal Mackerel Ex-Vessel Values 1996-2020. Source: NMFS unpublished dealer data.