2020 Management Track Assessment & Panel Review: *Doryteuthis* (*Amerigo*) *pealeii*

Lisa C. Hendrickson

NEFSC Population Dynamics Branch

July 22, 2020

Outline

- Background
- Methods
- Results
- Stock Status
- Assumptions and Uncertainties
- Review Panel Recommendations

Background

- Last benchmark in 2010 (NEFSC, 2011) added data for 2002–2009
  - **2009 Status: not overfished, overfishing unknown**
- Last operational assessment in 2017 added data for 2010-2016
  - **2016 Status: not overfished, overfishing unknown**

NOAA FISHERIES

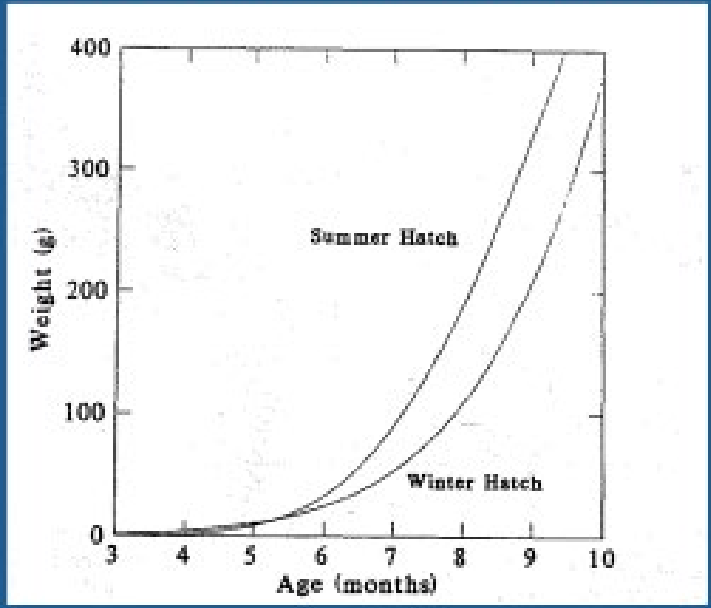
Background

Two dominant intra-annual cohorts

(Brodziak and Macy, 1996; Macy and Brodziak, 2001)

Different growth rates and median sizes-at-maturity

Summer-hatched cohort has faster growth rates and smaller sizes at maturity than winter-hatched cohort



NOAA FISHERIES

Level 3 enhanced review

- Same methodology as 2010 benchmark and 2017 operational assessments:
  - Update landings, discards and catches
  - Cohort-specific swept-area B and C/B est. for each cohort caught in NEFSC spring and fall surveys
  - B stock status not cohort-specific, rather based on annualized B (= avg. of spring and fall survey B)
  - F reference points could not be estimated
- *Level 3 review because exploratory cohort-specific B ref. points were developed and used in a stock status test* (not used to determine final 2019 stock status)

Methods

- Same as 2017 operational assessment; added data for 2017-2019
- Catch TS updated with new trimester-based discard est. for 2000 and 2007-2019 (trimester-based quotas)
- Swept-area B (1976-2019) and C/B (1987-2019)
  - B for NEFSC spring and NEFSC fall+NEAMAP fall (2009-2019)
  - Cohort-specific B and C/B
  - Annualized B and C/annualized B
- 2019 stock status based on annualized B ref. points as in 2017 assessment and compared with avg. of 2018 and 2019 annualized B; No F ref. points

NOAA FISHERIES

Methods: cohort-based B and C/B

Cohort-specific per-recruit models in assessments since 1996

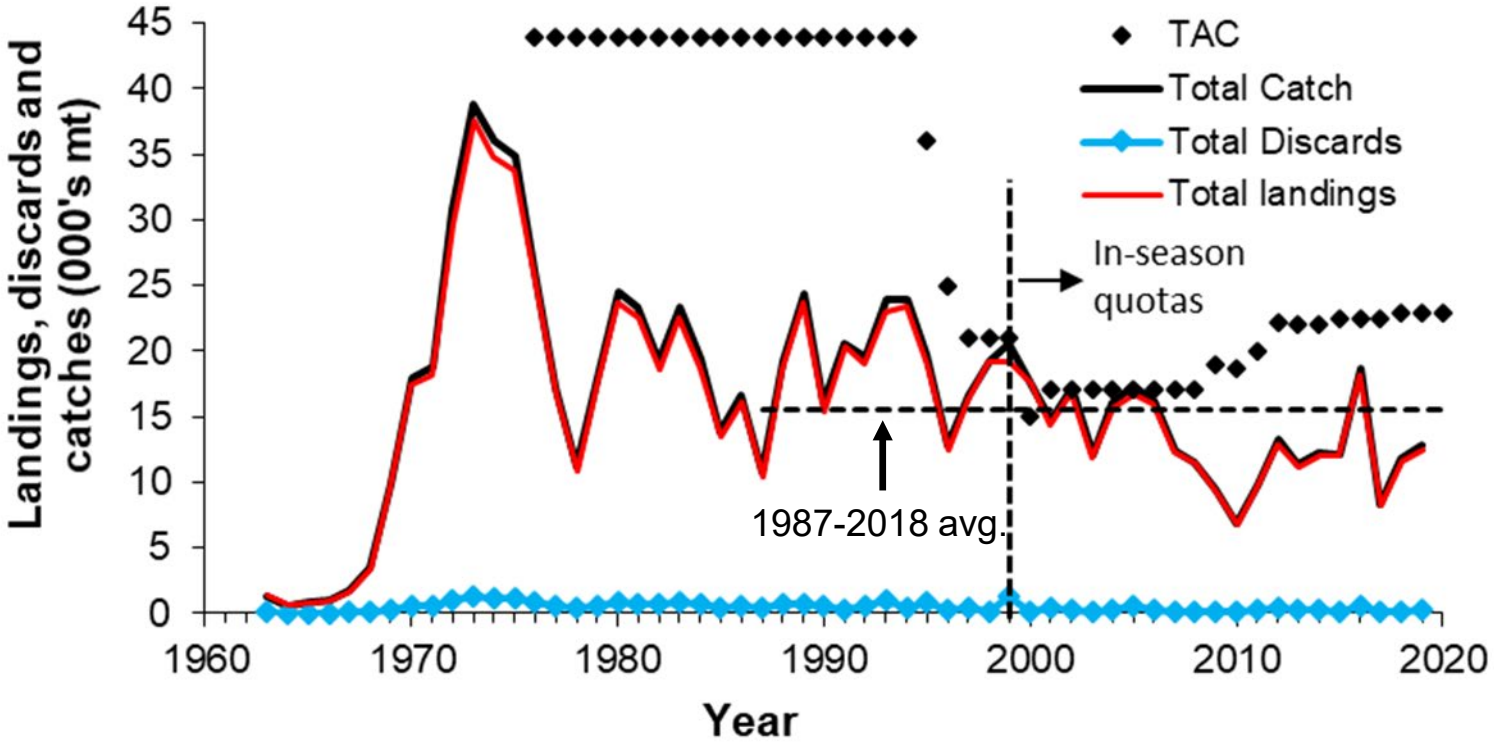
1. B for cohort caught in NEFSC spring surveys (mainly winter cohort)

   C/B = Jan-June catch/B of cohort caught in spring surveys

2. B for cohort caught in NEFSC fall surveys (mainly summer cohort)

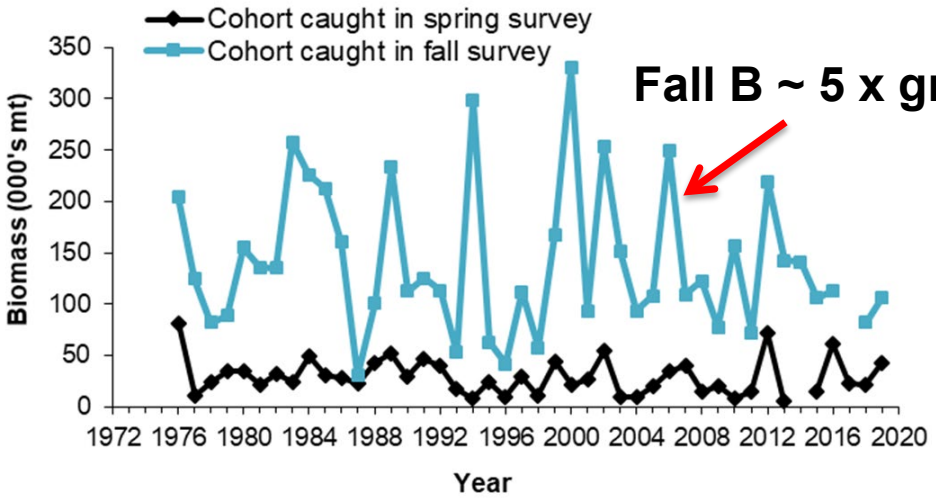
   C/B = July-Dec catch/B of cohort caught in fall surveys

Results: Catches



NOAA FISHERIES

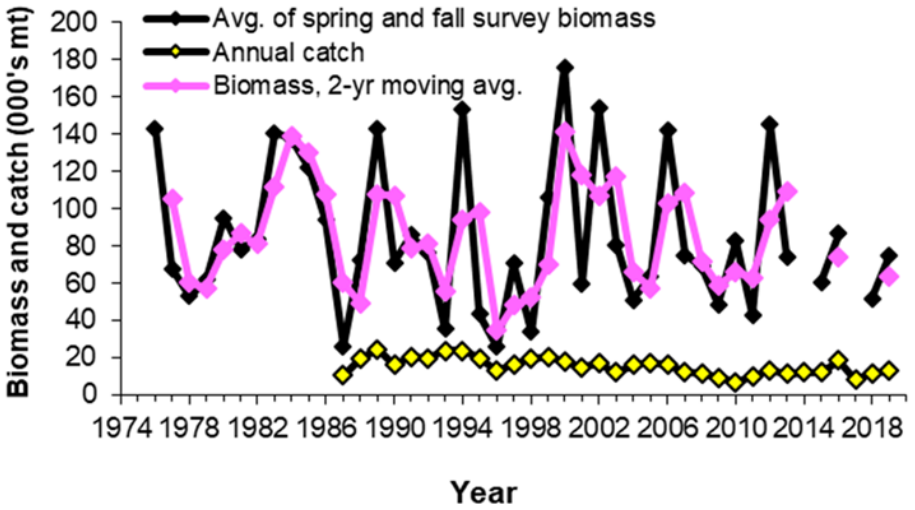
Results: B by cohort vs annualized



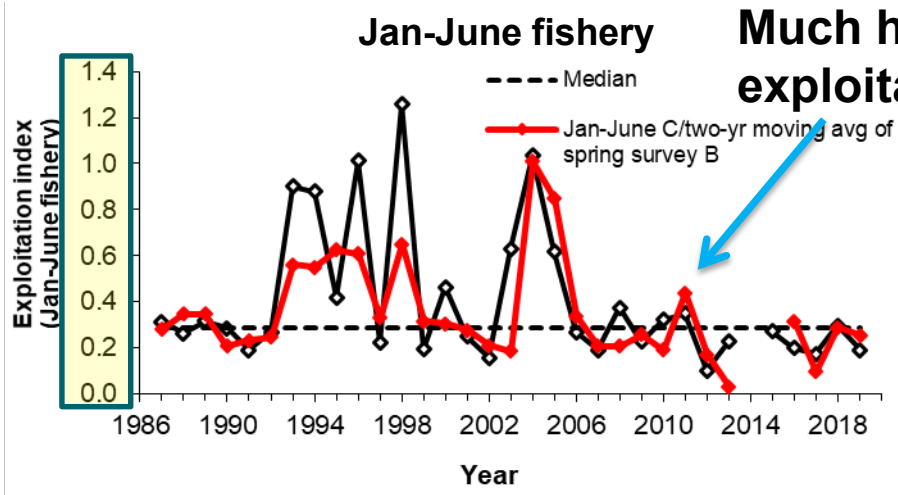
Fall B ~ 5 x greater

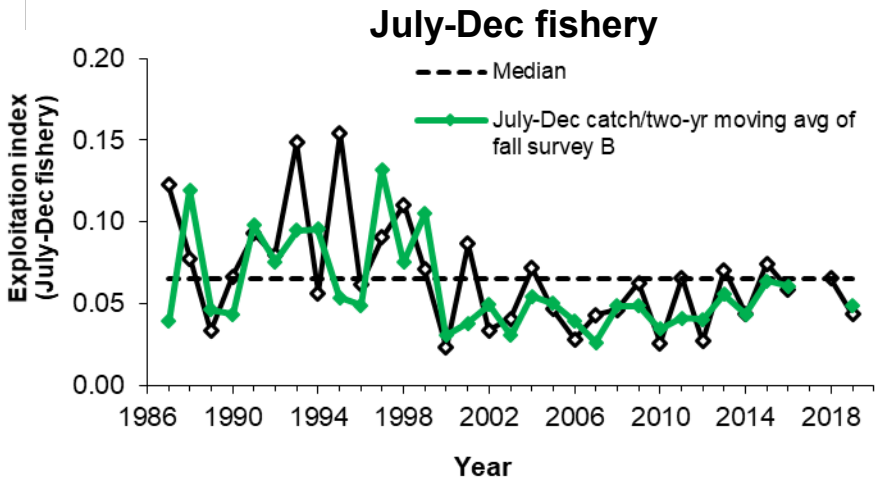
Apparent cohort productivity differences

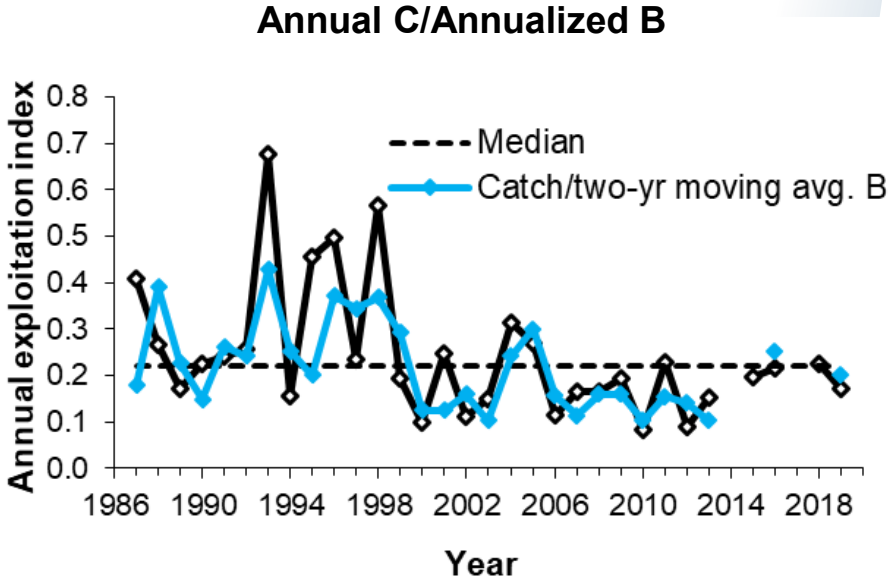
Annualized B and catch



Results: C/B by cohort vs annualized

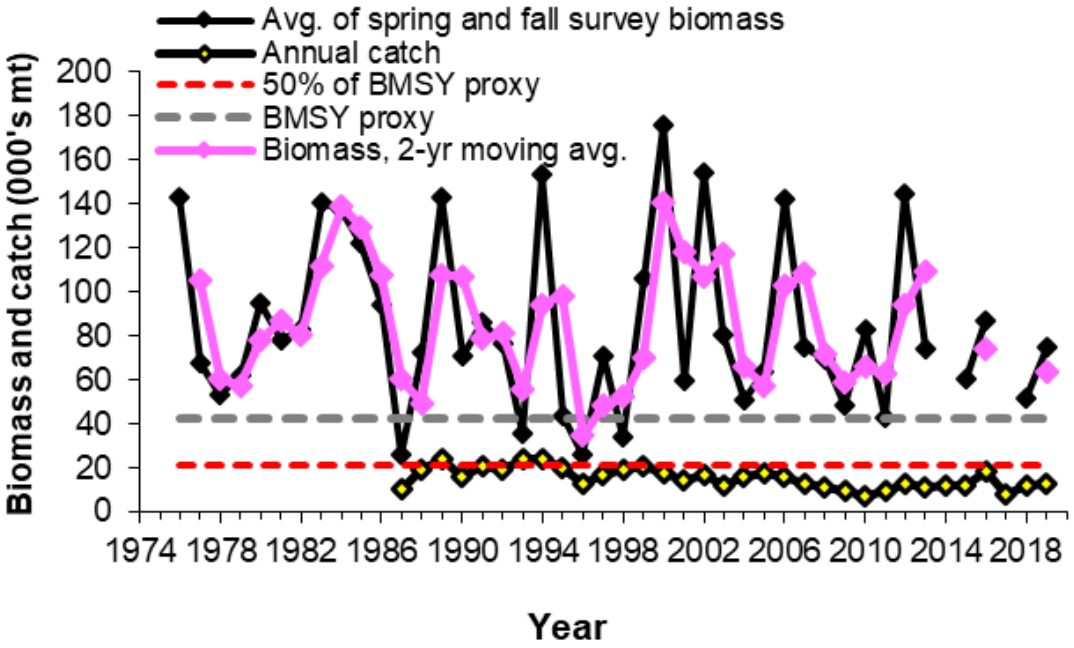






NOAA FISHERIES

2019 Stock Status



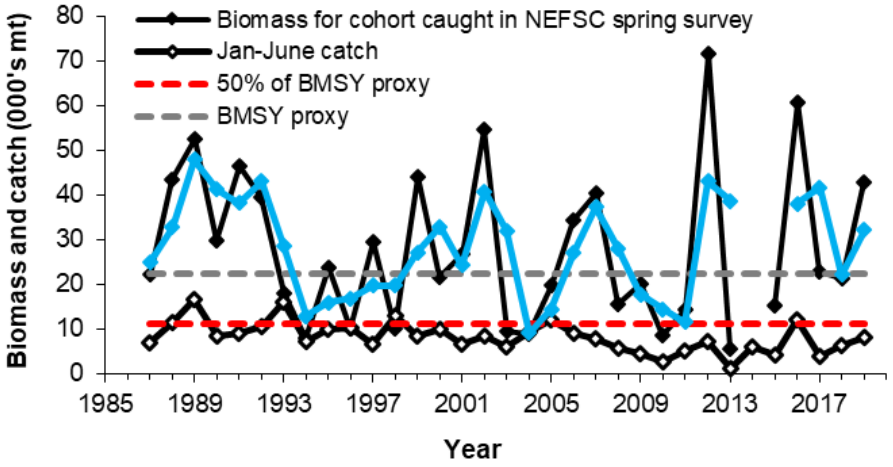
$B_{2018\text{-}2019\ avg}$ (63,349 mt) > $B_{threshold}$ (21,203 mt)

Not Overfished, Overfishing status is unknown

NOAA FISHERIES

2019 Overfished Status

Spring B

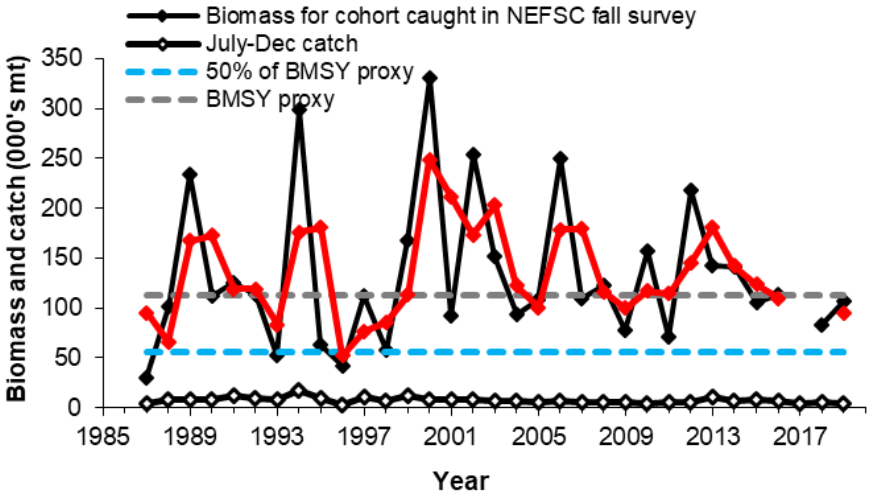


$B_{2018\text{-}2019\ avg}$ (32,092 mt) > $B_{threshold}$ (11,152 mt)

Not Overfished

Would have been OF in 2004

Fall B



$B_{2018\text{-}2019\ avg}$ (94,606 mt) > $B_{threshold}$ (56,268 mt)

Not Overfished

Would have been OF in 1996

NOAA FISHERIES

Assumptions and uncertainties

1. Existing assess. method assumes the fishery exploits a single population each year

2. The current BMSY proxy is assumed to represent 50% of K because the stock was assumed to be “lightly exploited” during 1976-2008

3. Averaging B of both cohorts ignores their apparent productivity differences; overfishing of one cohort could jeopardize stock sustainability due to recruitment overfishing
   Avg. B is so high, stock never overfished in the past 44 yrs

Review Panel recommendations

- **Consider cohort-specific ref. pts. to determine stock status in 2023 assessment**

  "…the current B averaging method used to determine overfished status could fail to be detected if B falls below the threshold with respect to each cohort"

  - **One way to apply cohort-specific B ref. pts. is to assume the stock is overfished if one or both cohorts are overfished**

- **Continue development of an assessment approach tailored to the squid life cycle and data availability: consider Pacific salmon assessment and management**