Northern Shrimp Survey 2019 Summary

Peter Chase

Northeast Fisheries Science Center

November 14, 2019

Door Comparison: June 2019

•15 minute tows were completed in pre-selected (non-random) areas in the Western Gulf of Maine.

•Tows were completed in A-B-B-A type pattern, alternating between Portuguese (old) and Bison (new) door types.

•All tows were fully processed so that differences in catches between door types can be thoroughly analyzed.

•These comparison tows are NOT considered part of the survey, are not used for assessment.

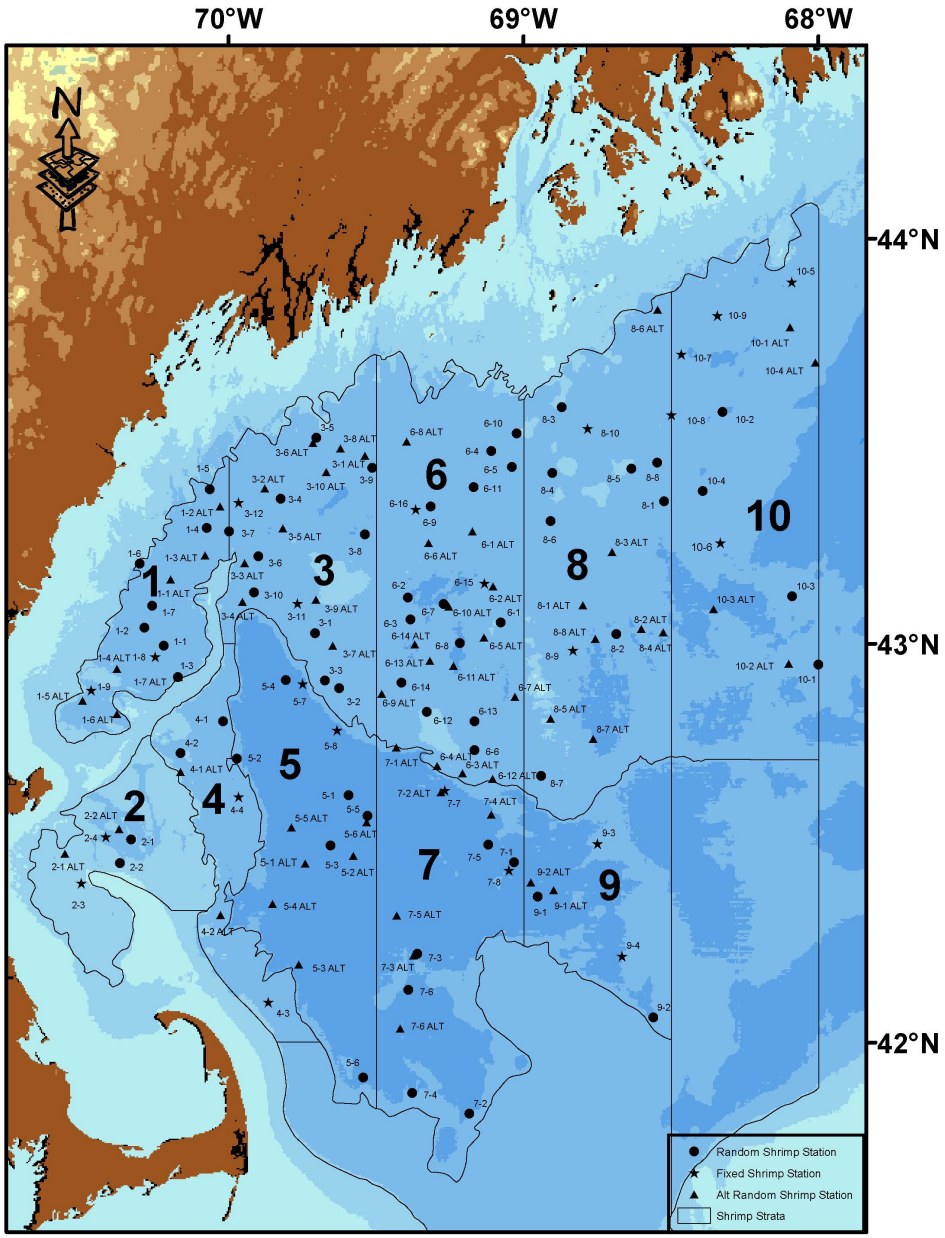
•39 paired tows completed to date (11 in 2019). Data will be analyzed this winter to determine if more calibration tows will be needed. Original target was 40-50 paired tows.

•Data will be used to derive a calibration coefficient that can be applied to the time series if data show that there are differences in catches between the door types.

NOAA FISHERIES

2019 Shrimp Survey – July

- 2019 Shrimp Survey was conducted over 4 weeks in July, after one week of door comparison.
- Survey was conducted using Bison doors.
- 84 stations plotted (61 random, 23 fixed) – see planned station plot to the right.
- Triangles on the map represent alternate stations.
- One alternate station was plotted for each random station in case of untrawlable bottom at primary random station.
- Locations of alternate stations were randomly selected.



2019 Shrimp Survey Stations

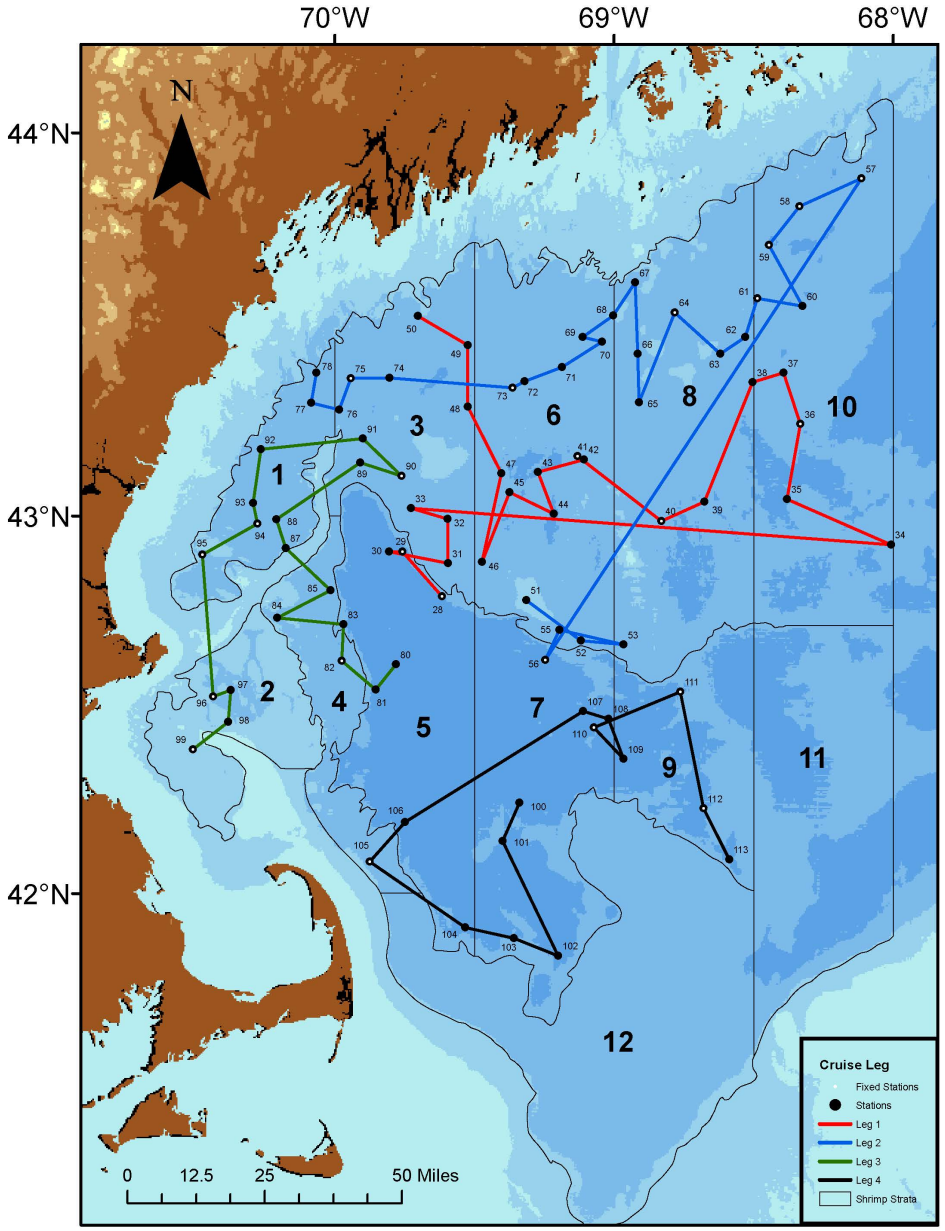
NOAA FISHERIES

2019 Shrimp Survey – July

- Final cruise track can be seen at right.
- 84 stations were plotted, 83 successful tows were completed during the survey (60 random, 23 fixed).

Survey success due to:

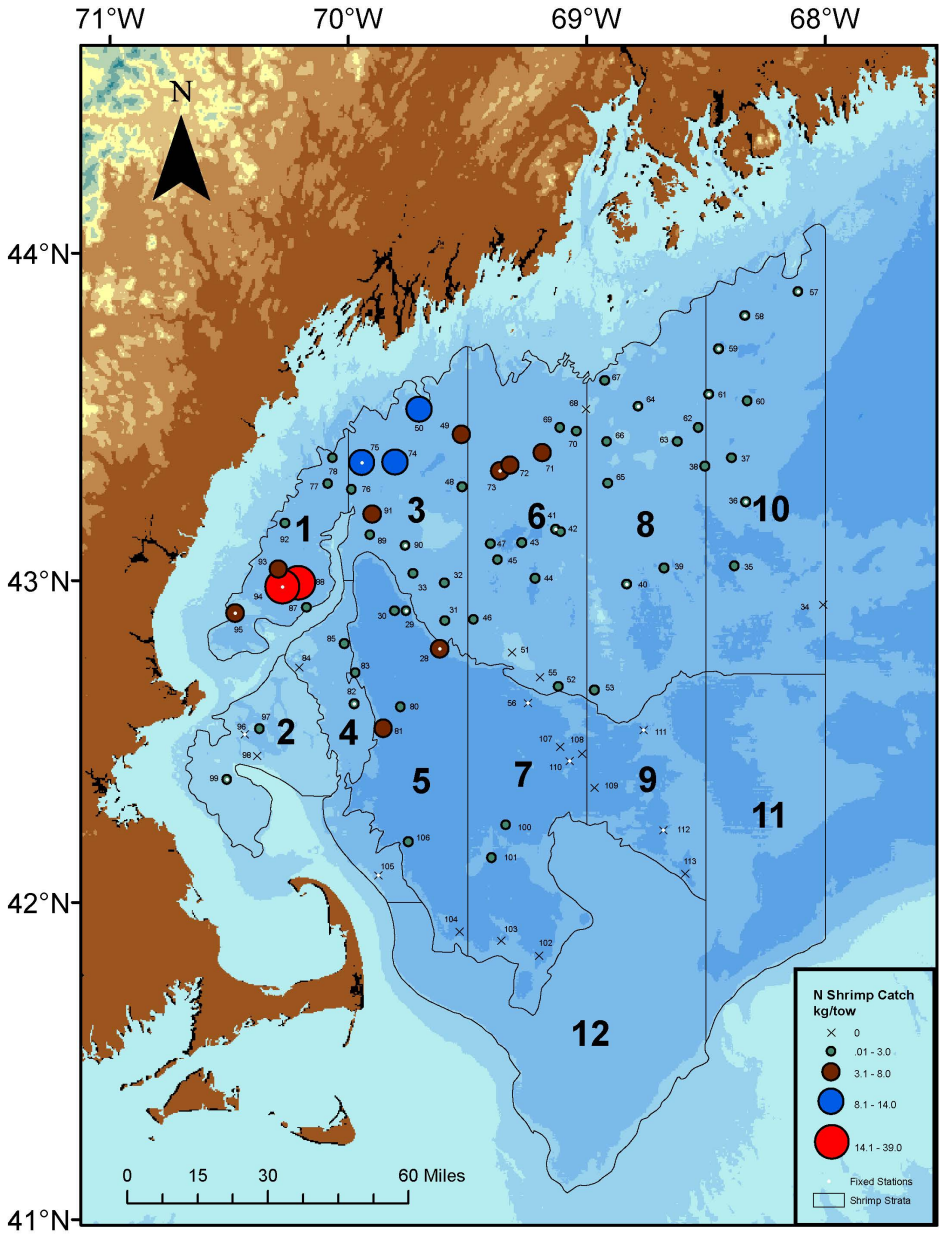
- Only about 2 days total lost to weather.
- No mechanical issues with vessel or equipment.
- New bathymetry data on the bridge helped with scouting.
- Alternate stations were used when necessary.
- A strict time limit of 1 hour was set on scouting at primary random stations.



NOAA FISHERIES

•Bubble plot to the right shows shrimp catches during the 2019 survey.

•Plot does not include door calibration tows.



NOAA FISHERIES

Gulf of Maine Northern Shrimp Data Update

2019

Prepared by the

ASMFC Northern Shrimp Technical Committee

Margaret Hunter, Chair (ME)

Robert Atwood (NH)

Alicia Miller (NEFSC)

Dr. Anne Richards (NEFSC)

Kelly Whitmore (MA)

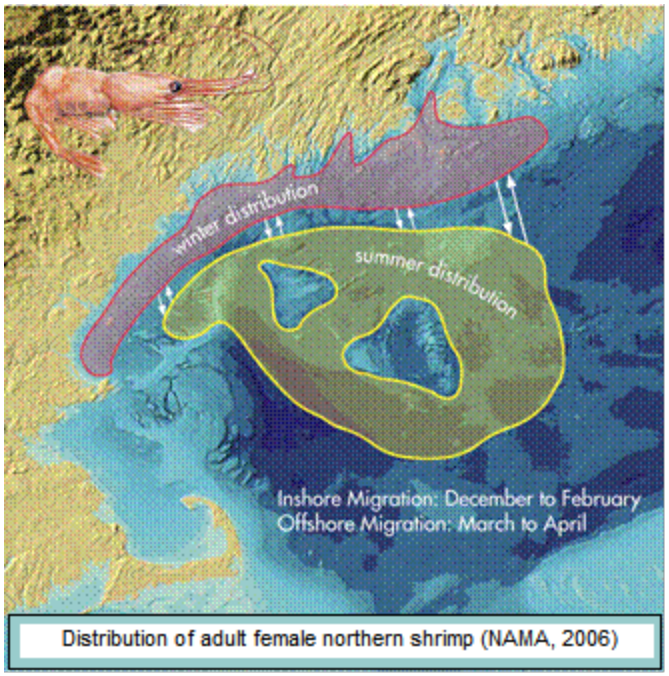
with

Dr. Katie Drew (ASMFC)

Dustin Colson Leaning (ASMFC)

Outline

- Review of 2018 Stock Status Update
- Review of Recently Acquired Data (since November 2018)



Distribution of adult female northern shrimp (NAMA, 2006)

Assessment Data

Fishery-Dependent

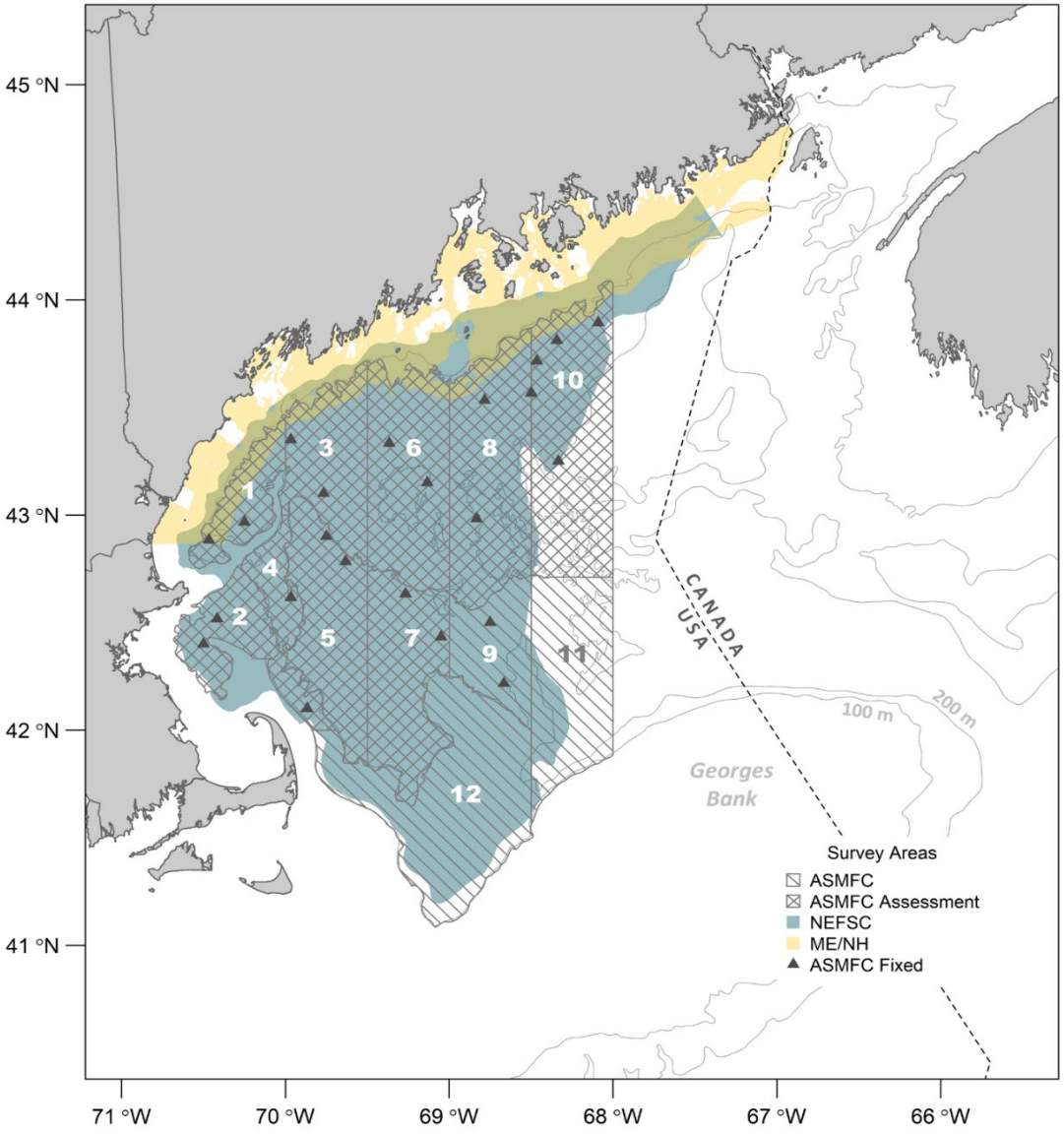
- Landings data from vessel trip reports (1985–2013) with a fishing moratorium for 6 winters (2014-2019)
- 1985–2013 port sampling program
- 2014–2018 winter sampling, catches and samples

Fishery-Independent Resource Surveys

- Summer survey (1984–2019)
- NEFSC fall survey (1968–2008; 2009–2018) shrimp and predator data
- *ME-NH spring inshore survey (2003–2019)

Environmental data (1984–2019) (for traffic light)

Resource Assessment Surveys



(2019 Fig. 1, p. 17)

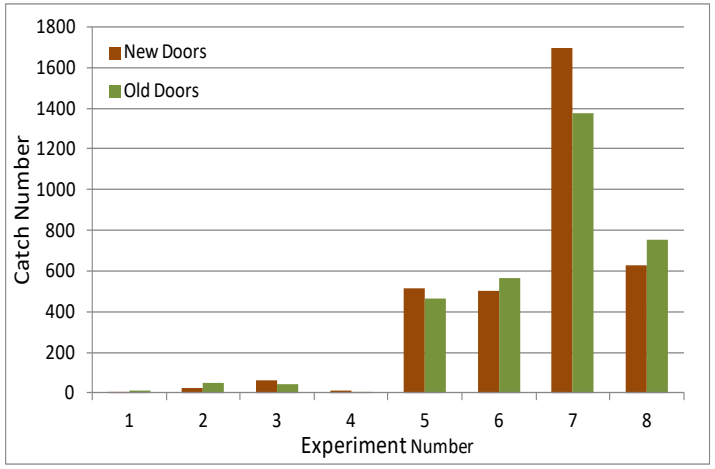
2017 Summer Shrimp Survey

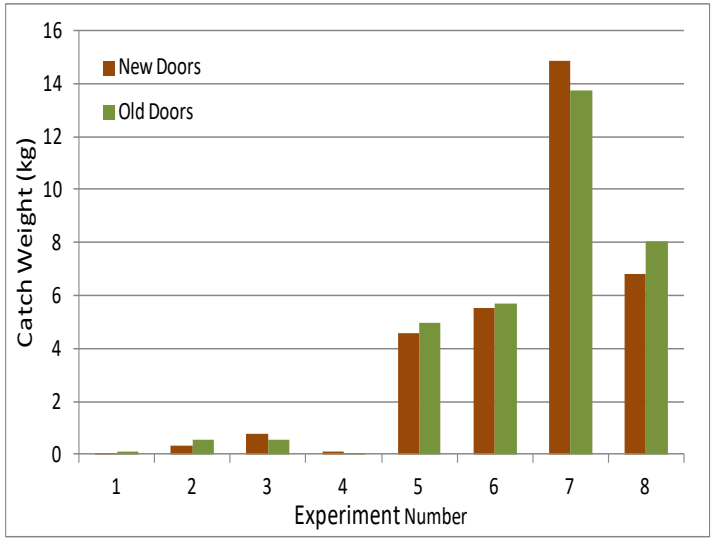
- ***RV Gloria Michelle*** **received new winches and doors in 2017. Portuguese doors replaced with Bison doors.**

- **Calibration tows (goal of 40-50 paired tows)**
  - **8 paired tows in 2017**
  - **Overall ratio of new doors/old doors: 0.98 (kg), 1.05 (numbers)**
  - **Differences between the doors were not statistically significant.**

- **More calibration tows were made in 2018 and 2019 for a total of 39 which have not been evaluated yet.**

- **The 2018 assessment and the 2019 data report assume there is no significant difference in shrimp catchability between the old and new gears.**



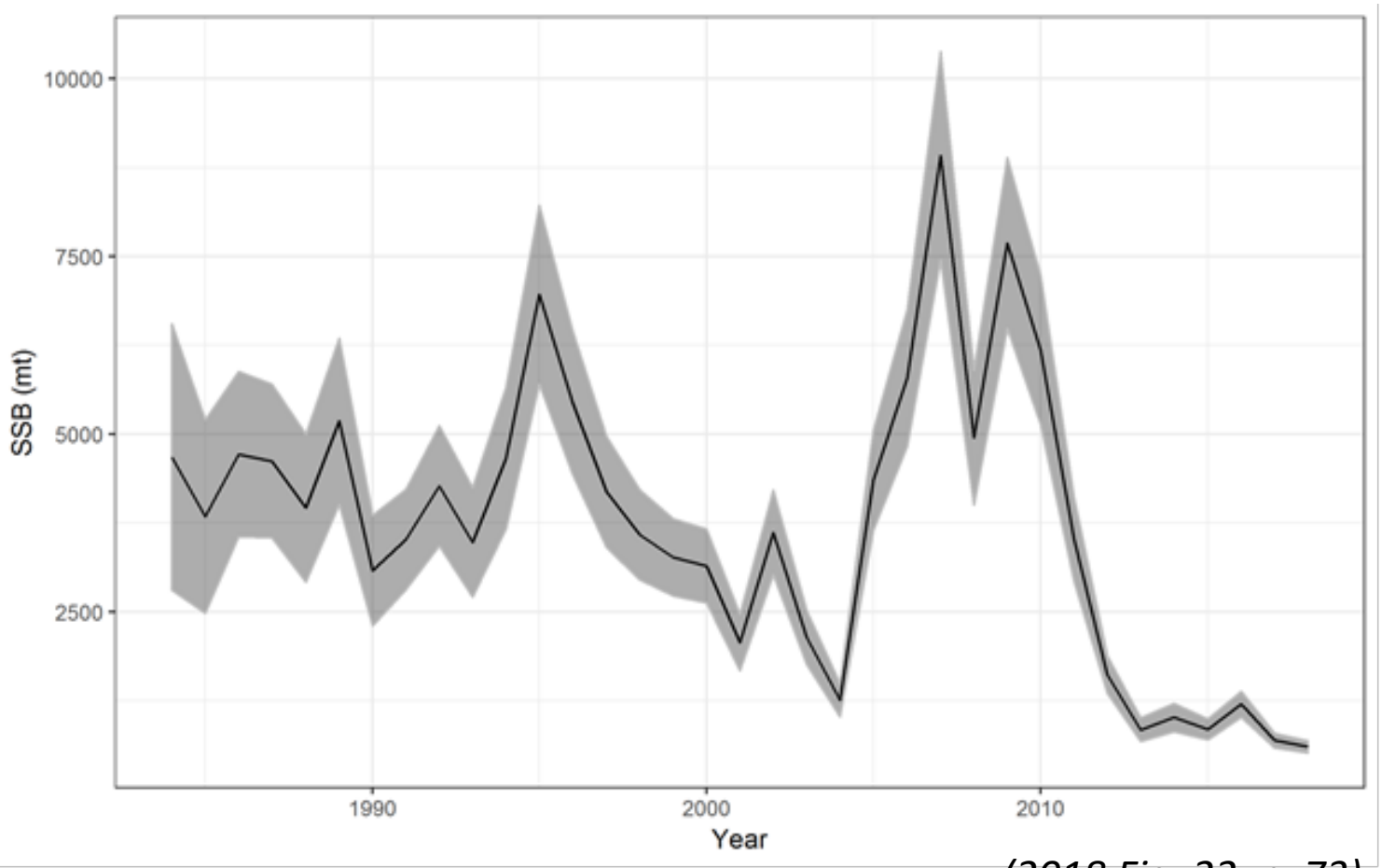


(2017, Appendix 2, Figs 1–2 p. 82)

UME Model Results — 2018

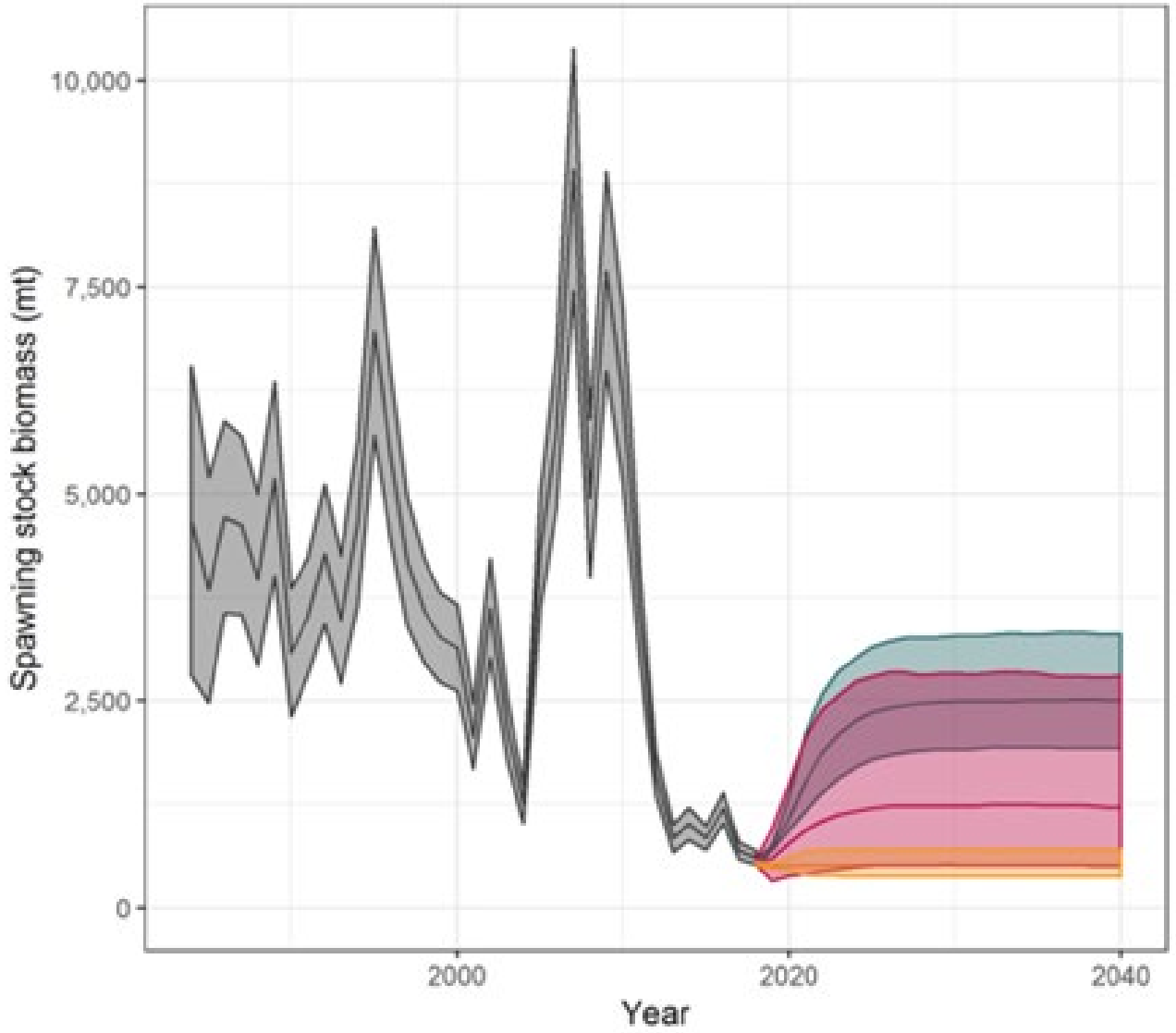
Spawning Stock Biomass (with 95% confidence intervals)

SSB was at the time-series low in 2018, estimated to be 600 mt.



(2018 Fig. 22, p. 73)

UME Model Results — 2018



F = 0 (no fishing)

Model
- Assessment output
- M=Time series mean, R=Recent
- M = Weighted Mean, R=Recent
- M & R = Recent

(2018 Fig. 26, p. 77)

2018 NSTC Recommendations

Given the continued poor condition of the resource, the extremely low likelihood of being able to fish sustainably in a 2019 commercial season, the ecosystem services that shrimp provide, and the value of maximizing spawning potential to rebuild the stock if environmental conditions improve, **the NSTC recommends that the Section extend the moratorium on fishing through 2019.**

2018 NSTC Recommendations

- Stock projections suggest that even small fisheries (3-40 mt) have a low chance of being sustainable, assuming recent high levels of natural mortality and low recruitment continue.
- Very small sampling programs with few boats and trips are of limited value because of small sample sizes and limited geographic coverage.

2019 Summer Shrimp Survey

Model-based Survey Indices —ASMFC Summer

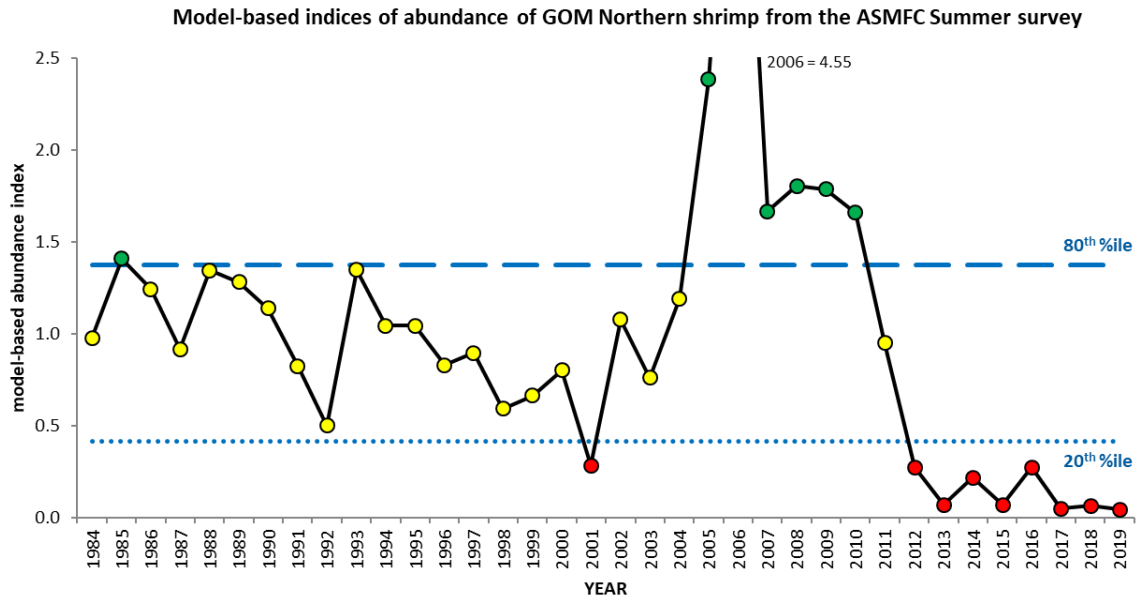
	Total Abundance	Total Biomass	Harvestable Biomass (>22 mm CL)	Spawner Biomass	Recruitment (age ~1.5)
2011	0.95	1.02	0.60	0.61	0.05
2012	0.28	0.34	0.26	0.24	0.01
2013	0.07	0.11	0.10	0.09	0.00
2014	0.22	0.17	0.06	0.07	0.18
2015	0.07	0.09	0.07	0.07	0.00
2016	0.27	0.27	0.16	0.16	0.19
2017	0.05	0.06	0.05	0.04	0.00
2018	0.07	0.08	0.05	0.05	0.04
2019	0.04	0.06	0.04	0.04	0.00

2010	1.66	1.58	0.91	0.75	0.57
2011	0.95	1.02	0.60	0.61	0.05
2012	0.28	0.34	0.26	0.24	0.01
2013	0.07	0.11	0.10	0.09	0.00
2014	0.22	0.17	0.06	0.07	0.18
2015	0.07	0.09	0.07	0.07	0.00
2016	0.27	0.27	0.16	0.16	0.19
2017	0.05	0.06	0.05	0.04	0.00
2018	0.07	0.08	0.05	0.05	0.04
2019	0.04	0.06	0.04	0.04	0.00

Table 2, p 15

2019 Summer Shrimp Survey

Abundance



Biomass

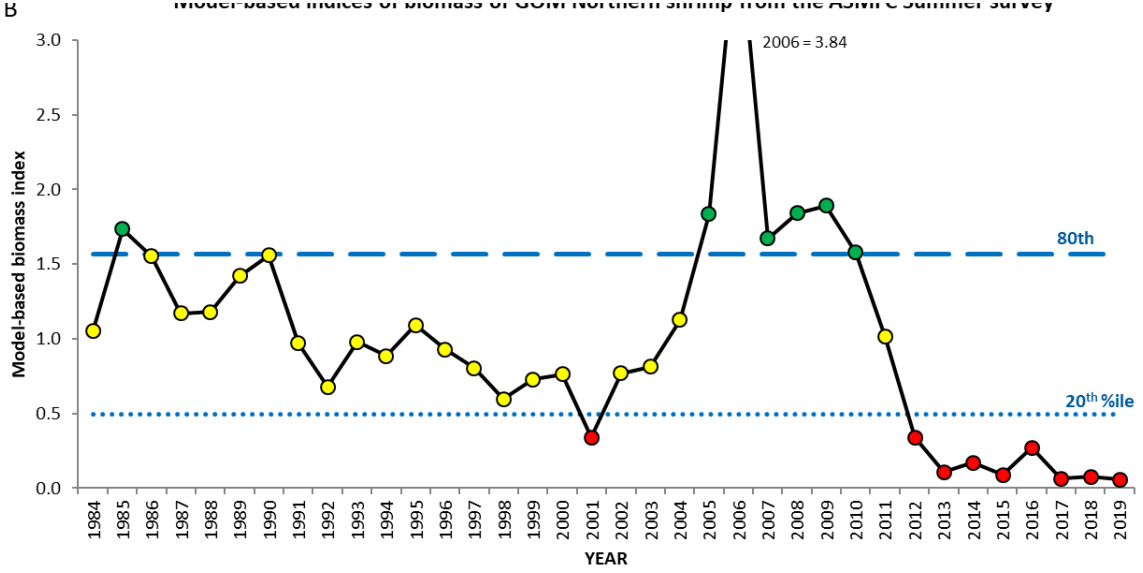
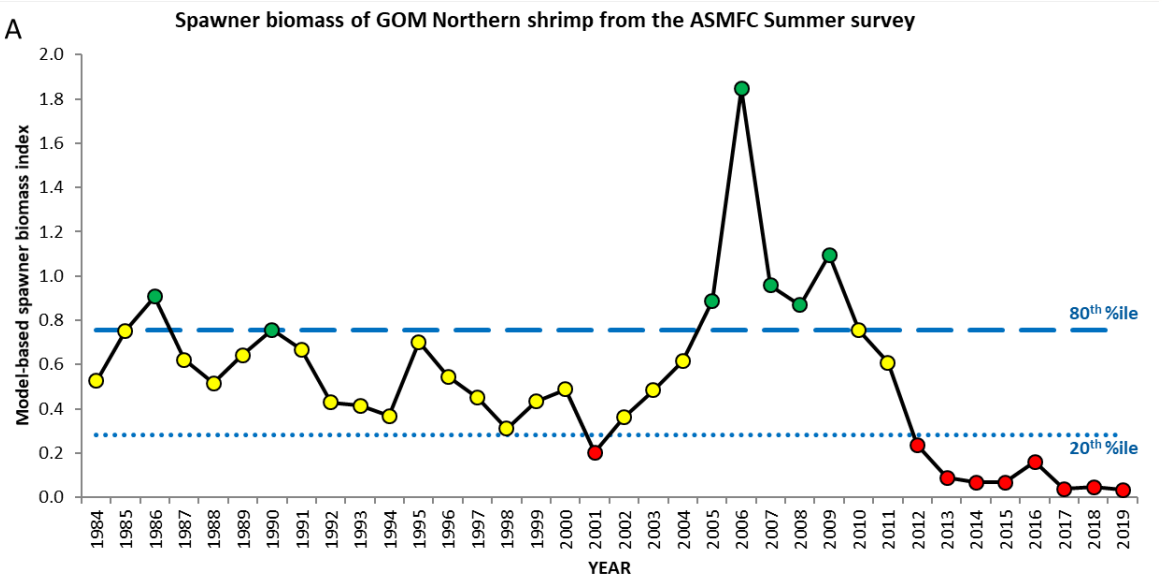


Figure 7, p. 28

2019 Summer Shrimp Survey

Spawning Stock Biomass (female biomass)



Recruits (age 1.5 numbers)

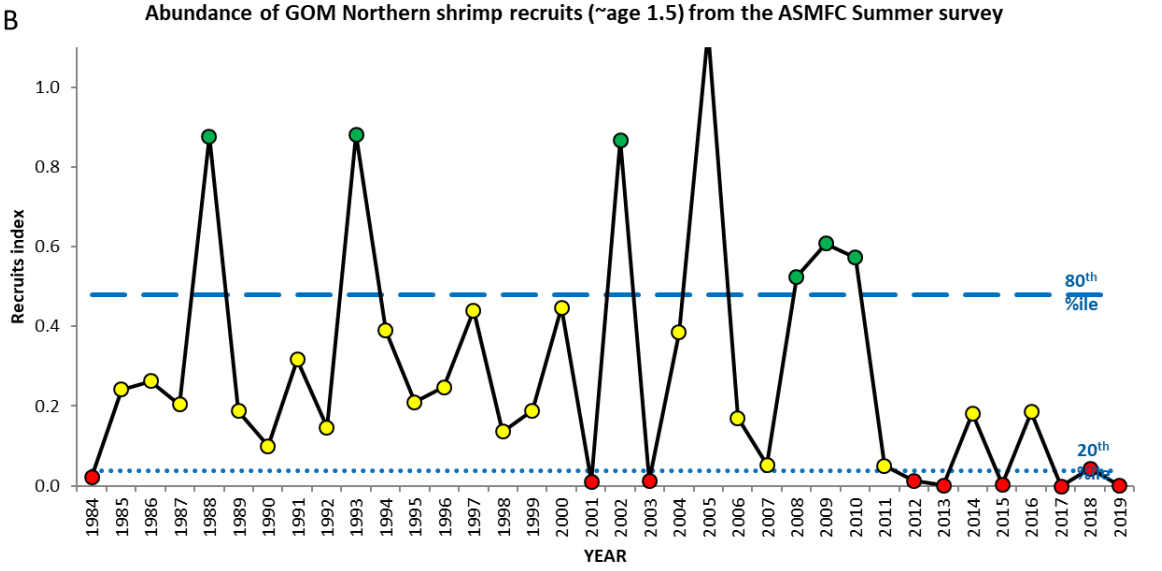
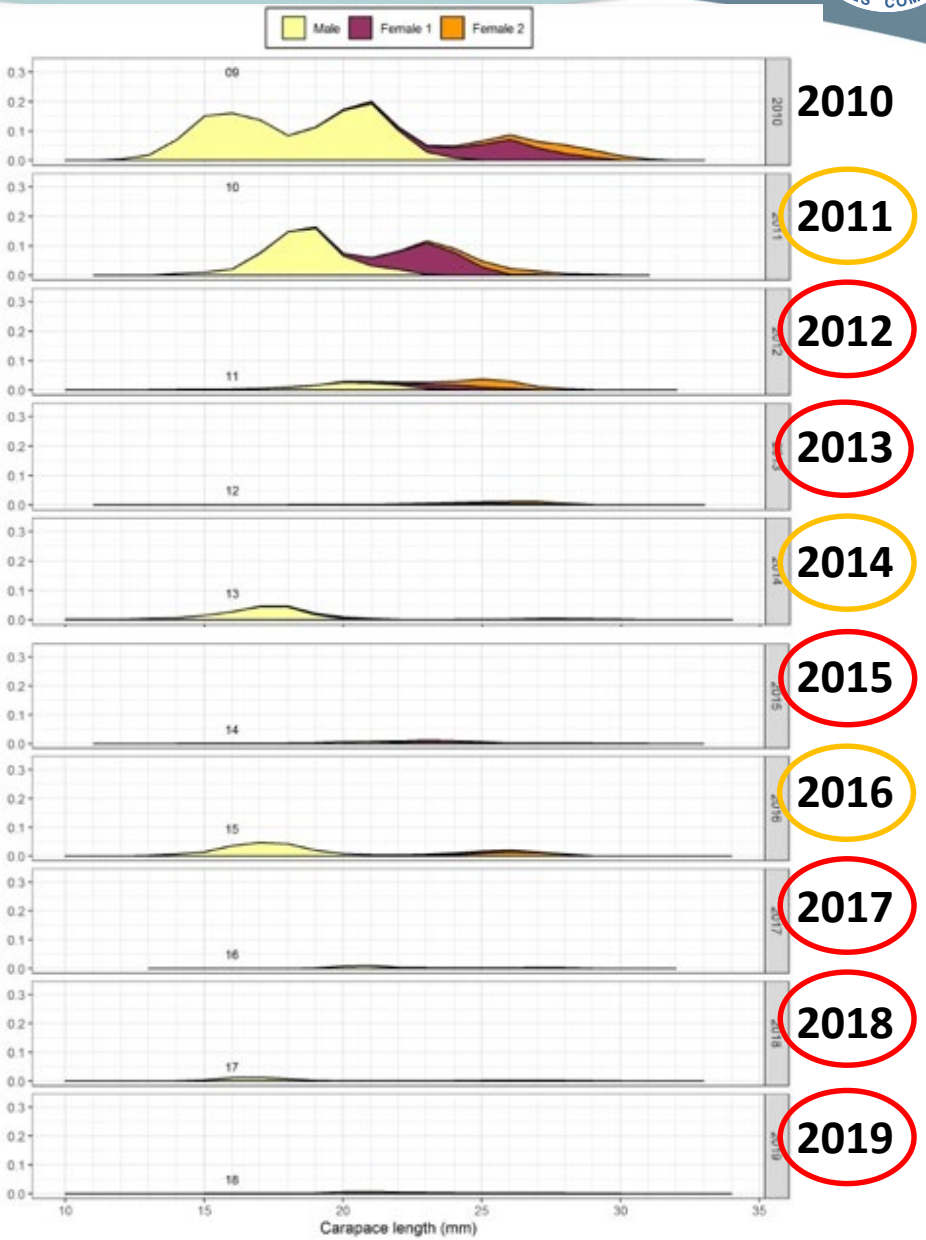


Figure 8, p. 29

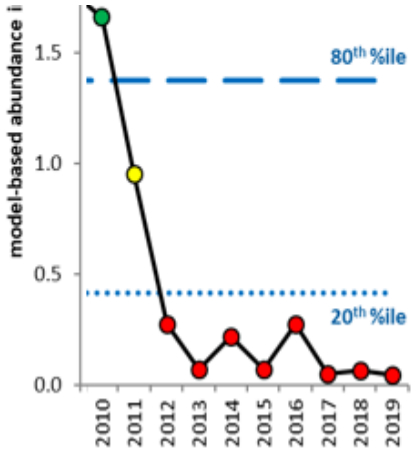
2019 Summer Shrimp Survey

Length & Stage Composition

- Extremely low abundance of all stages, 2012-2019
- 9 consecutive years of below-average or failed recruitment (age 1.5 males)



Abundance



Recruits

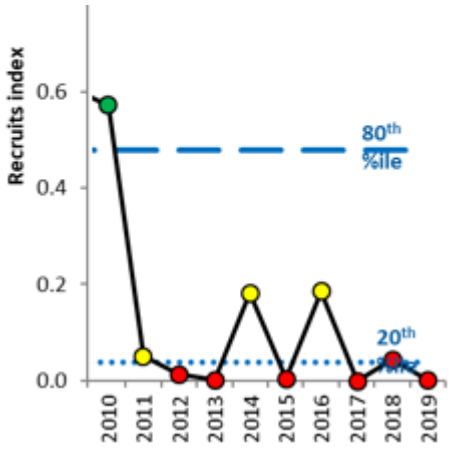
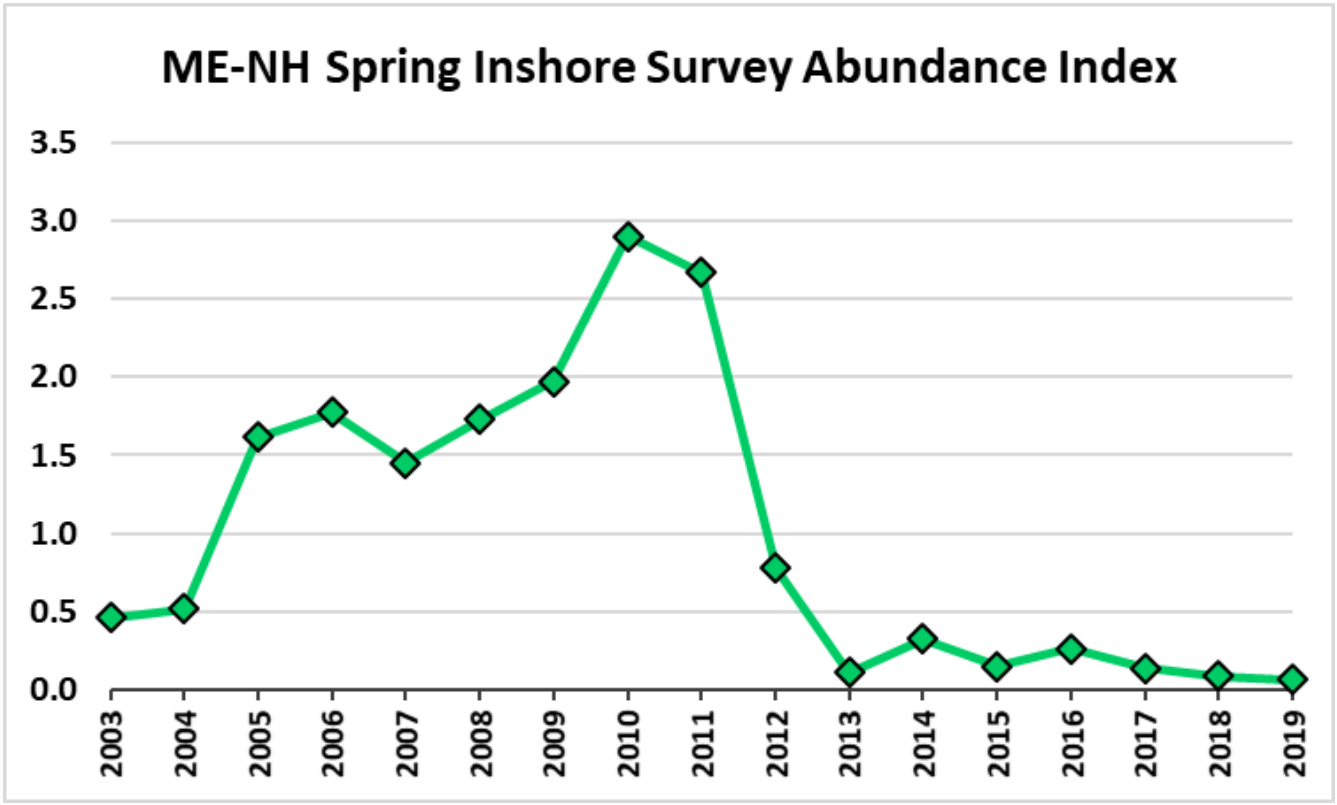


Figure 3, pp 19-22

2019 Spring ME-NH Inshore Survey

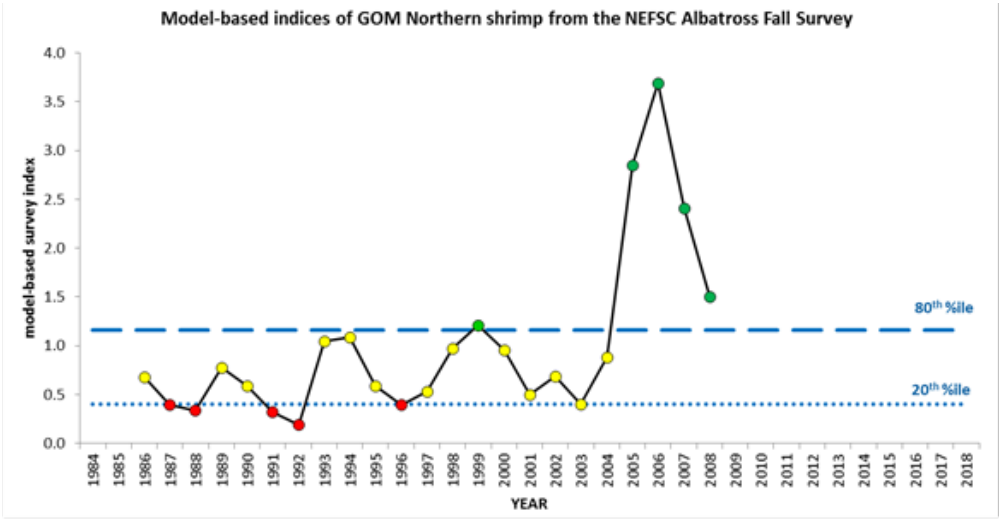
- 2019 had the lowest total abundance in the 17-year time-series: 0.06 (2003-2019)
- 7 consecutive years of low abundance



from Figure 6, p. 27

NEFSC Fall Surveys

- *Albatross* survey ended in 2008
- 2017 had the lowest total abundance in the *Bigelow's* 9-year time-series (2009-2017)
- 7 consecutive years of low abundance, beginning in 2012



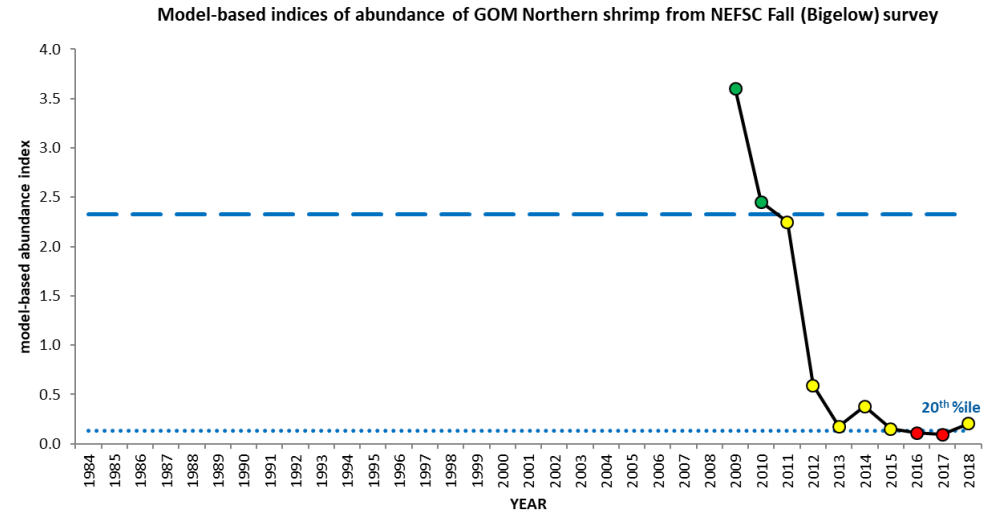
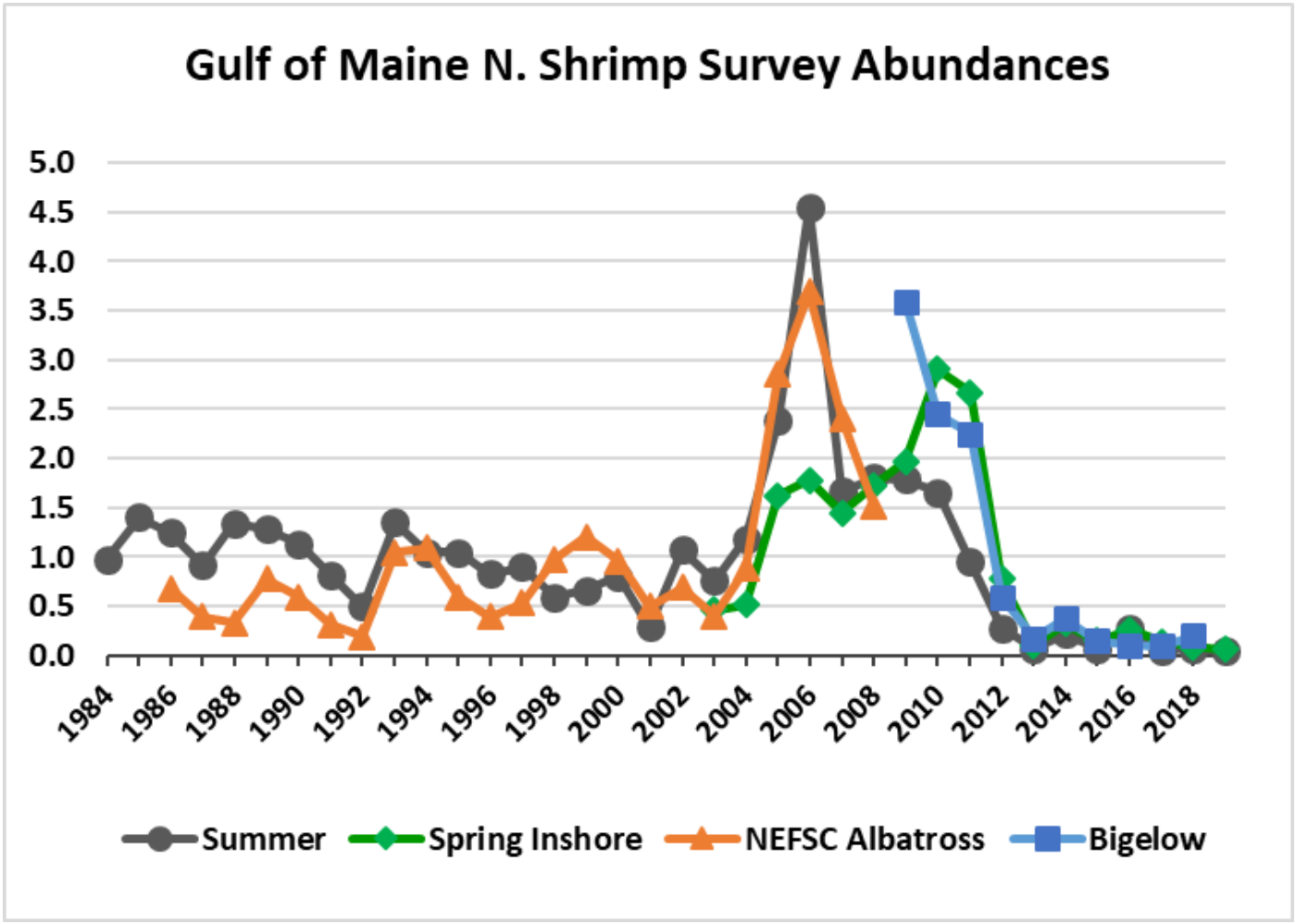


Figure 9, p 30

Resource Surveys



All three survey indices indicate dramatic stock declines between 2011 and 2012, and no evidence of recovery.

From Figure 6, p 27

Environmental Conditions

- (A) Predation pressure
- (B) Summer bottom temperature
- (C) Spring bottom temperature
- (D) Winter sea surface temperature

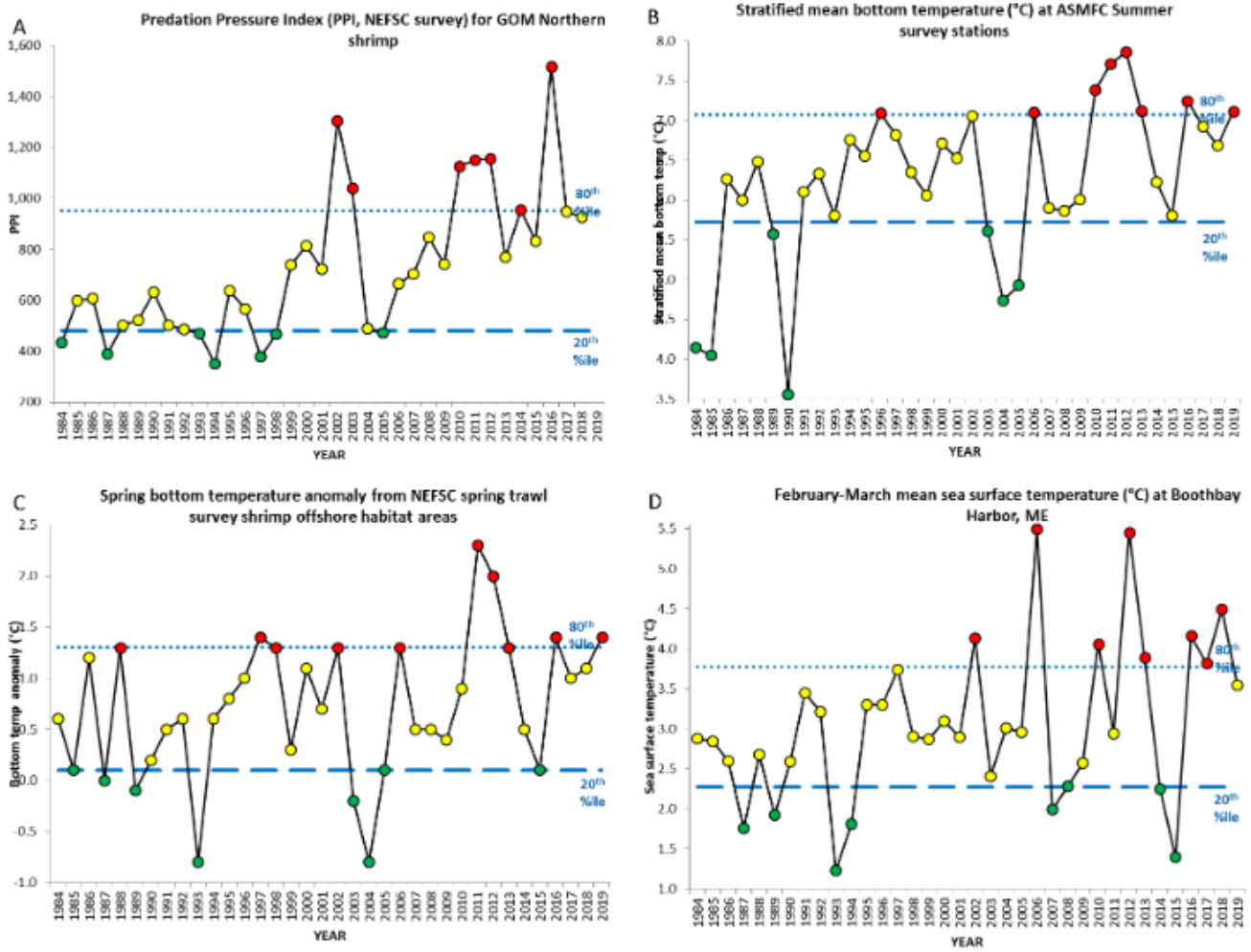


Figure 10, p 31

2019 Stock Status

- Indices of total biomass and spawning biomass have remained very low for an unprecedented eight consecutive years, including 2019.

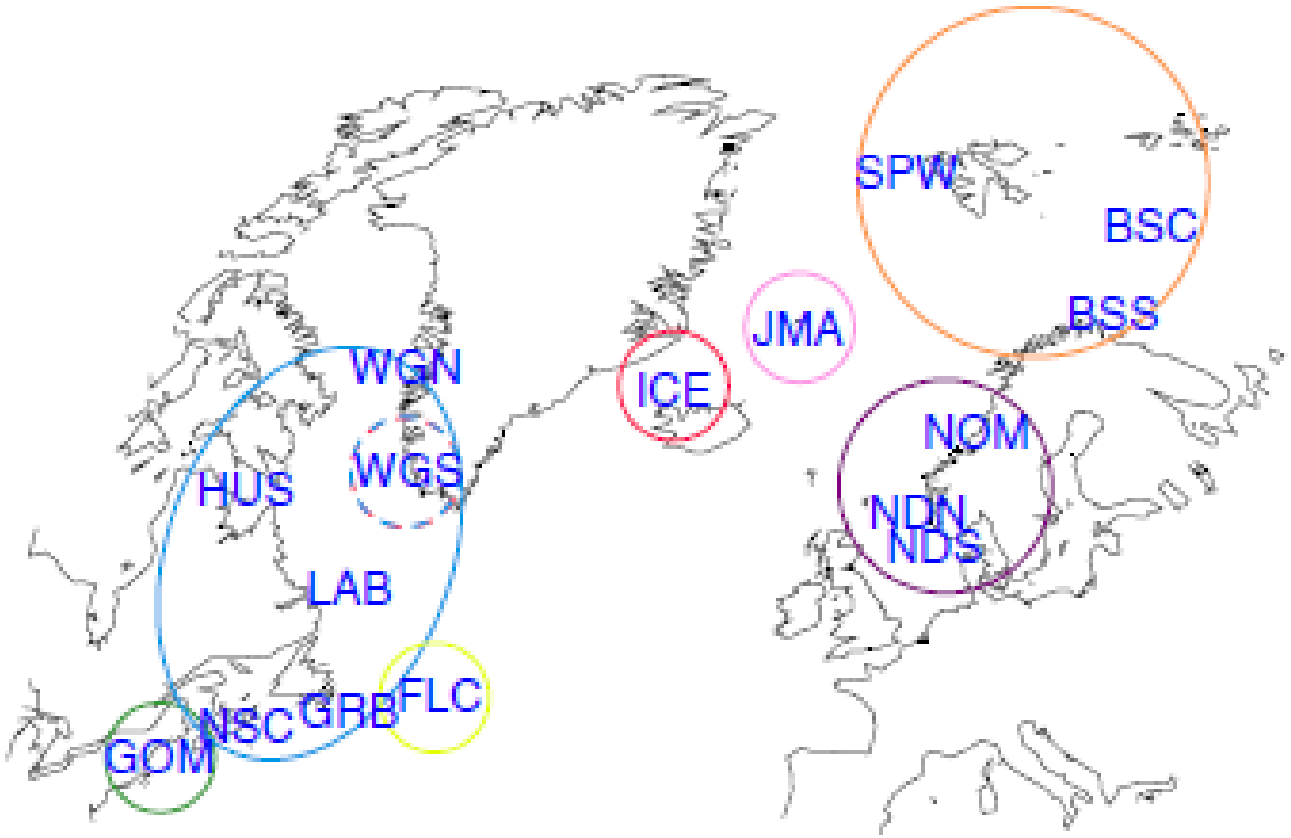
- Recruitment failure (below the 20th %) has been observed in six of the past nine years (the 2011, 2012, 2014, 2016, 2017, and 2018 year classes), and recruitment of the 2010, 2013, and 2015 year classes was below average.

2019 Stock Status

- The traffic light analysis of 2019 data indicated no improvement in status in 2019, with indices of abundance, biomass, and spawning stock biomass at new time-series lows, and recruitment the third-lowest in the time series.
- Environmental conditions continue to be unfavorable for northern shrimp.

Questions ?

Genetically distinct populations



- Gulf of Maine samples appeared distinct from other western samples and instead appeared more similar to Norwegian samples (P.E. Jorde et al. 2015)