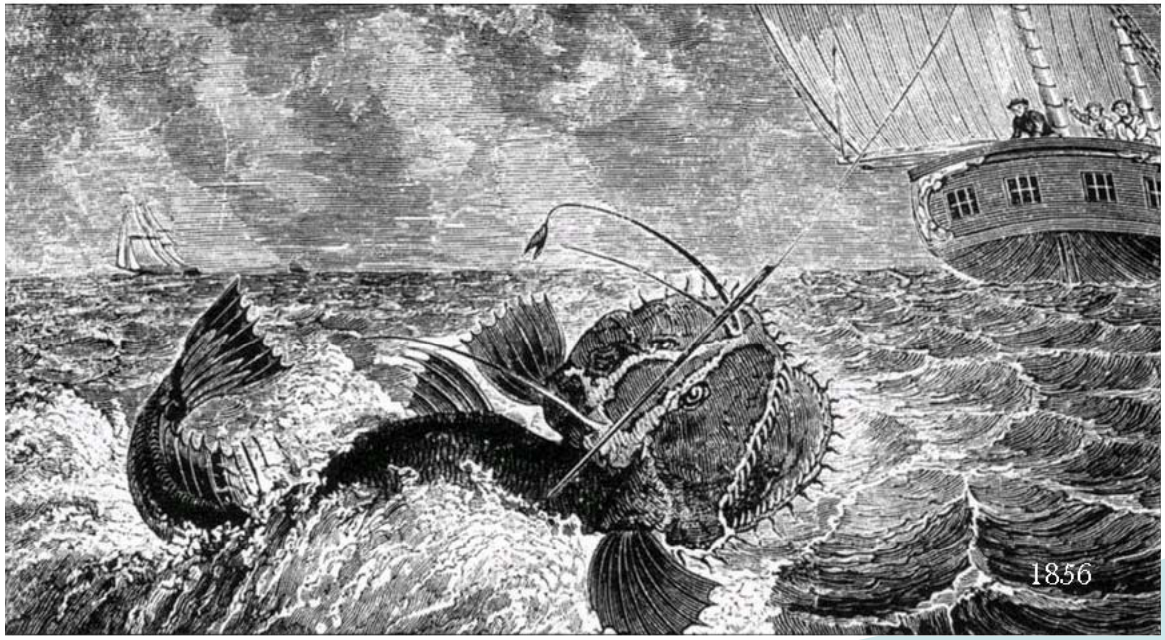
Monkfish Assessment Update 2016

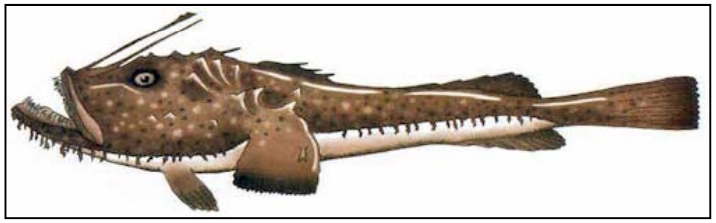
Working Group Meeting

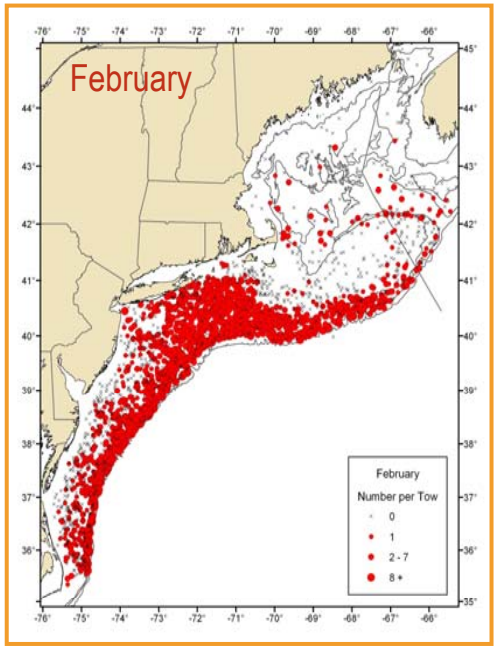


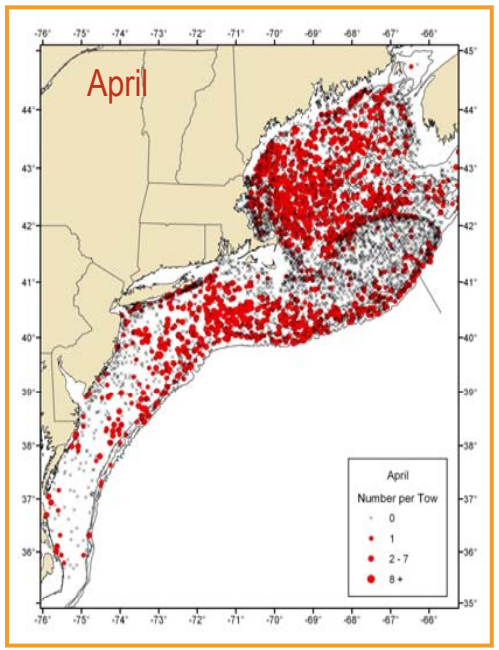
May 24-27, 2016

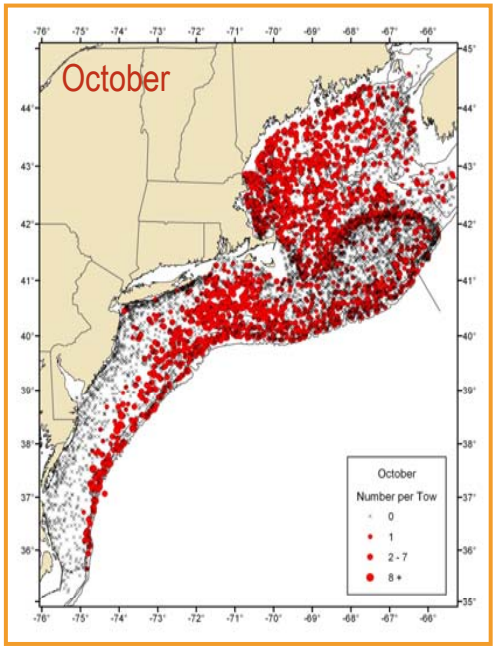
Background

- Non-schooling angler fish
- Distributed NC-Canada
- Seasonal migrations



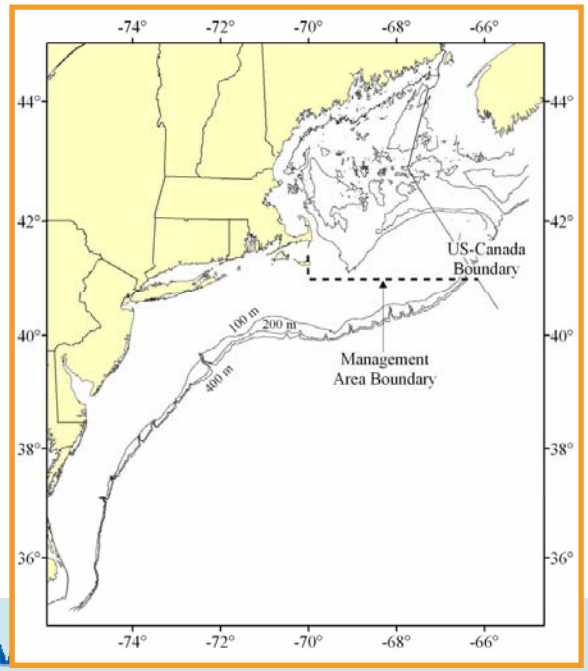






Background

- Important fisheries developed mid-1980s
- Management plan – 1999
- Biology poorly known
- Two management areas

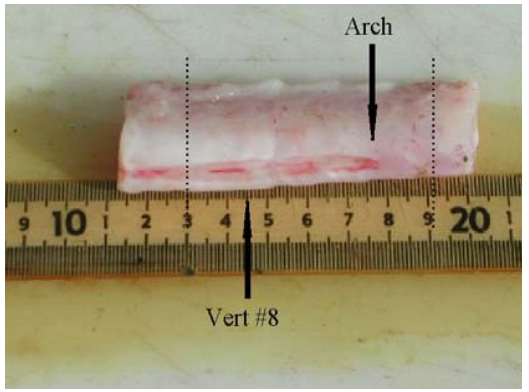


Assessment Underpinnings

- Stock structure
  - Management units vs. stocks
  - mtDNA studies: no stock delineation
  - Microsatellites: possible delineation in Mid-Atlantic

Assessment Underpinnings

- Growth
  - Linear at ~10 cm per year (up to ~90-100 cm)
  - 2016: ageing method invalidated
    - Incorrect # rings counted at margin in >half of fish
    - Long-standing questions about early growth
  - Growth model incorrect
  - Model not updated



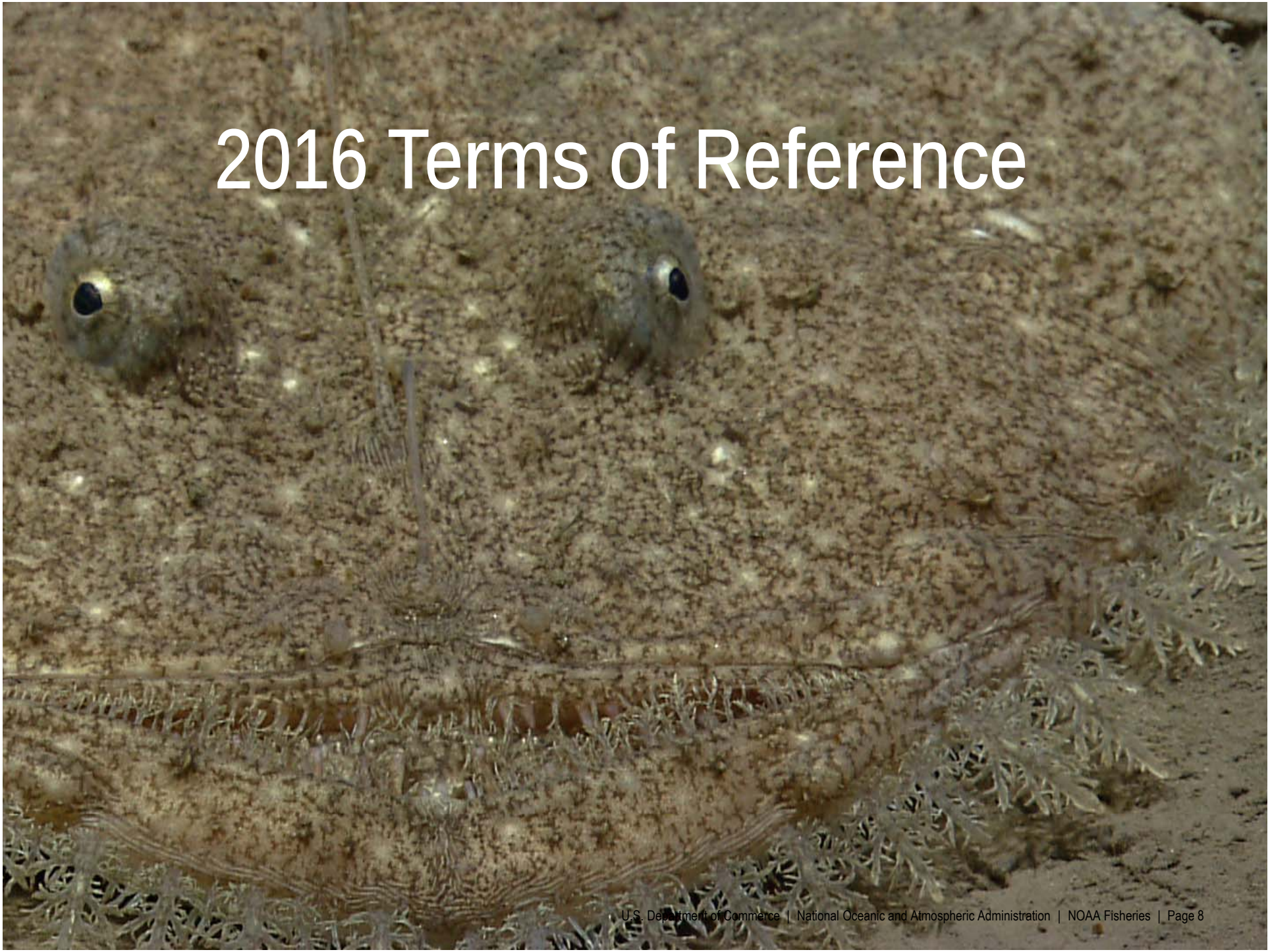
Ongoing research

- Stock structure
  - Genetics study
  - Tagging studies

Ongoing research

- Growth
  - Aging methods
    - use illicia?
    - Correct vert ages?
  - Tagging studies
  - Otolith microchemistry
  - Length progression of strong YC

2016 Terms of Reference



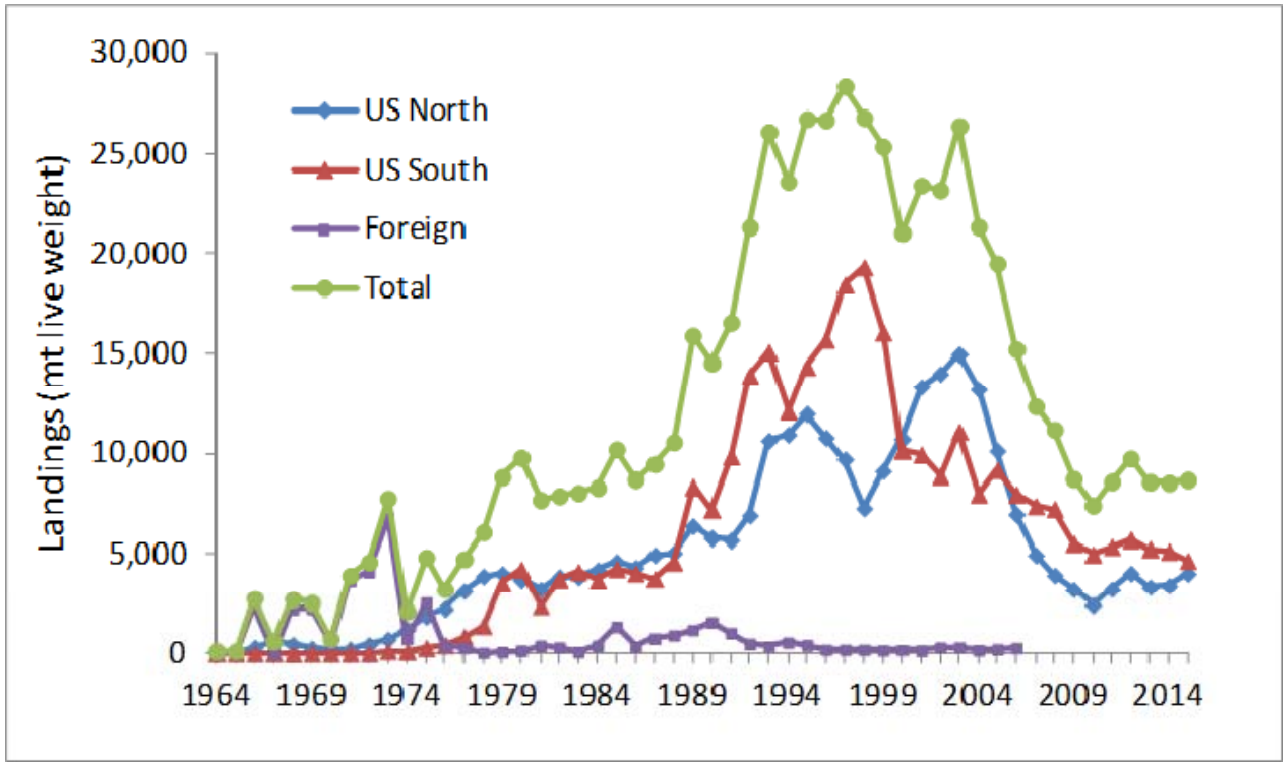
Terms of Reference (TOR)

- TOR 1: Update catch statistics
- TOR 2: Update fishery-independent indices
- TOR 3: Review evidence for biological changes
- TOR 4: Compare annual ACLs with catches
- TOR 5: Analysis to support SSC decisions

- TOR 1: Update catch estimates, including landings, discard, size composition of catch
  - Complete data for 2015 not yet available
  - 2013 assessment terminal year was 2011
  - Updates for commercial data therefore are 2012-2014

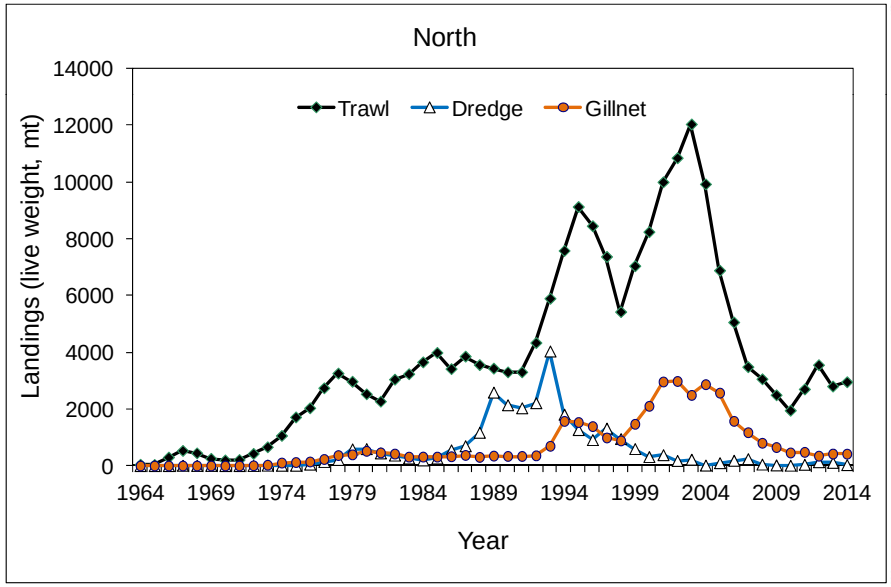
TOR 1. Catch statistics

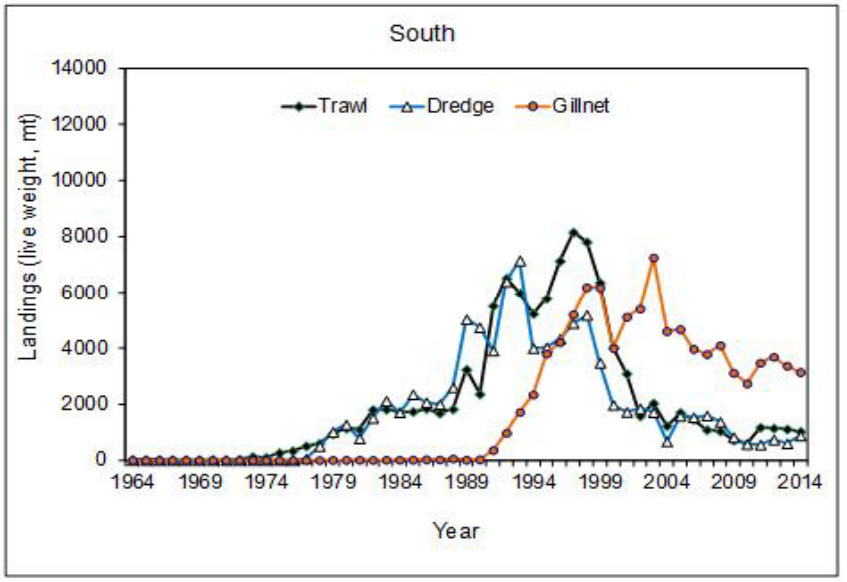
- Landings (includes 2015 prelim.)



TOR 1. Catch statistics – Gear type

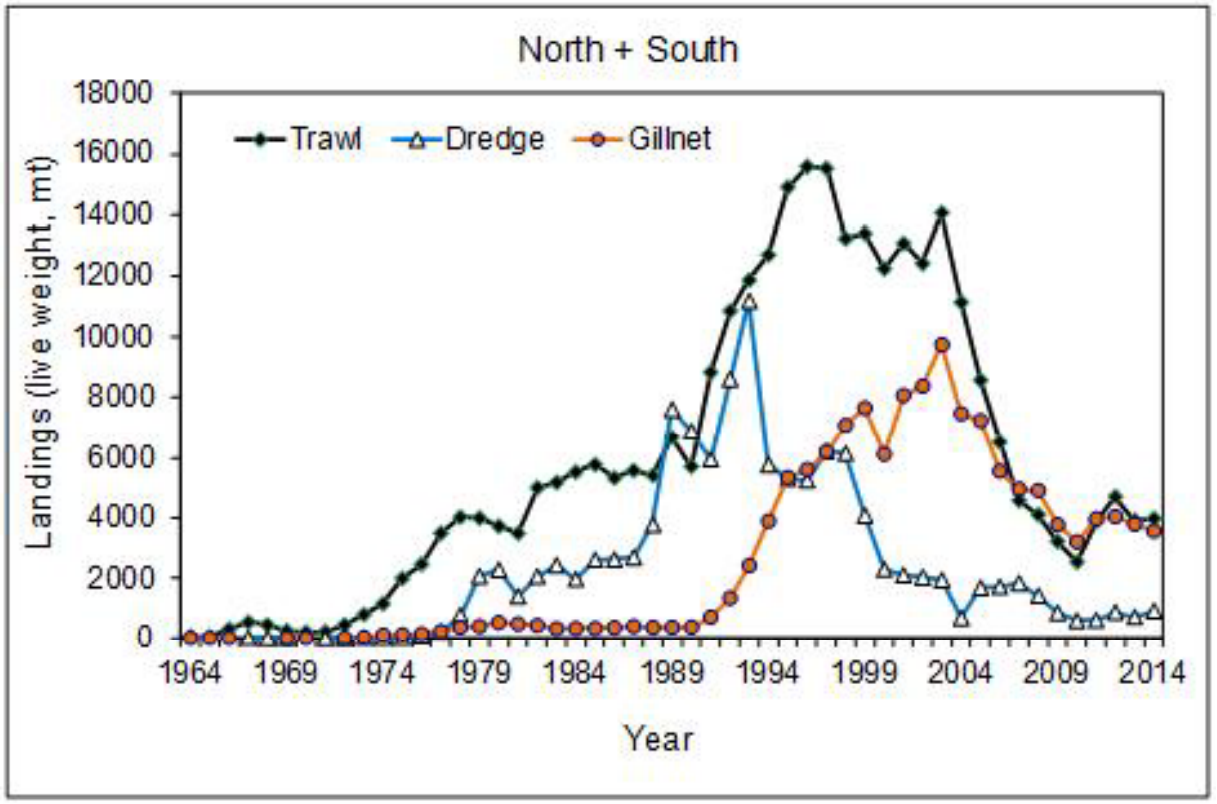
- North landings – trawls South landings – gillnets



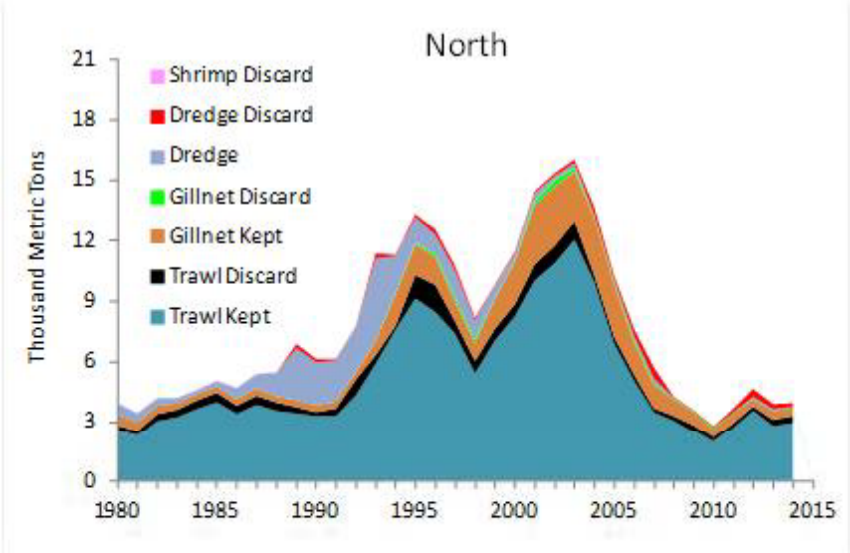


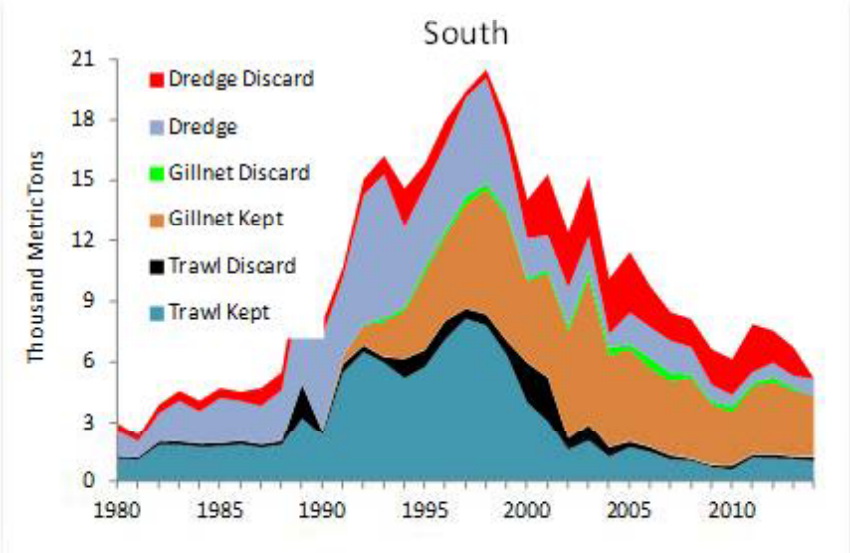
TOR 1. Catch statistics – Gear type

- Overall - trawl and gillnet landings equivalent



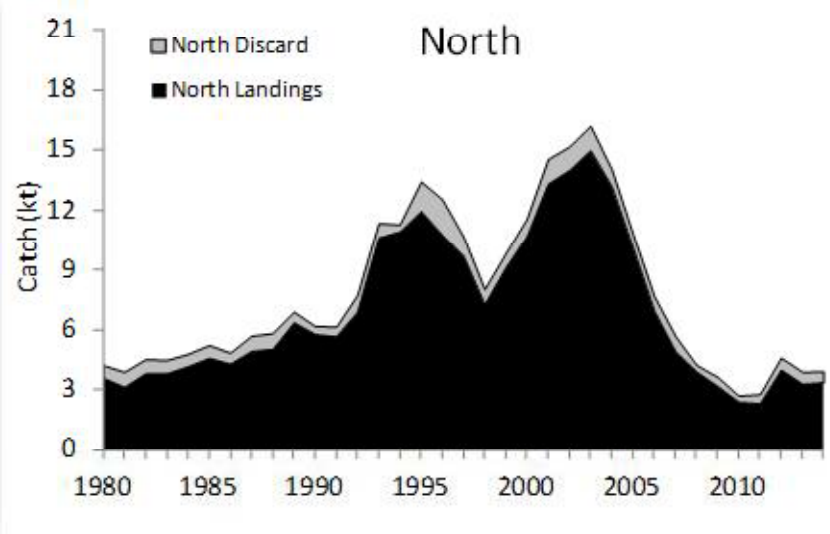
TOR 1. Catch statistics - Discards

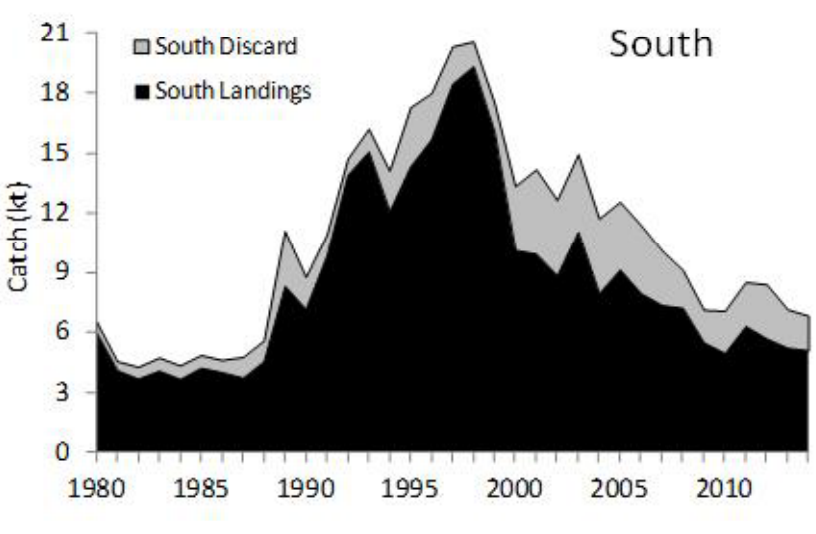




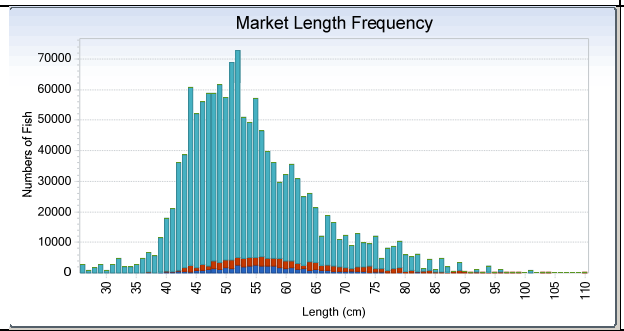
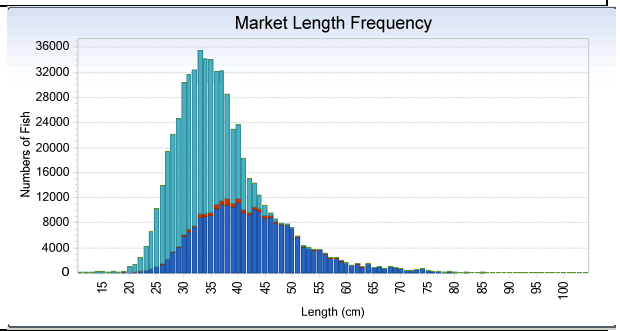
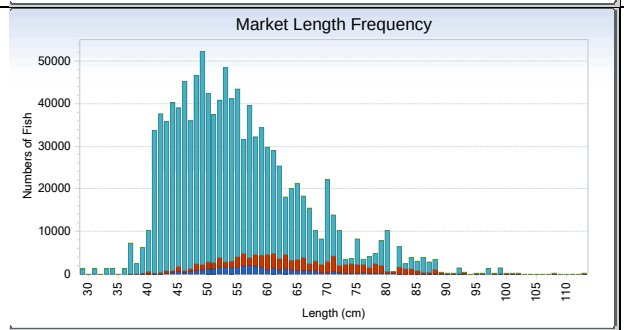
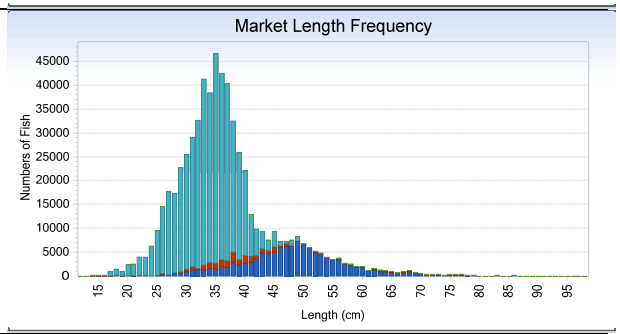
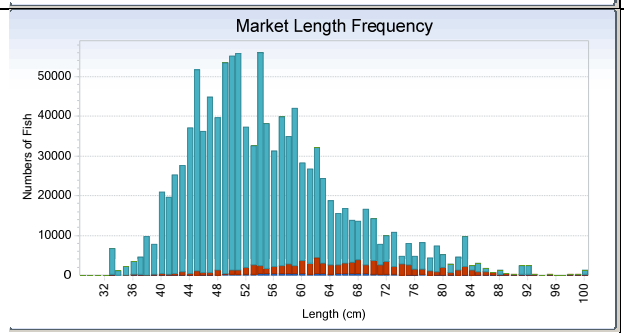
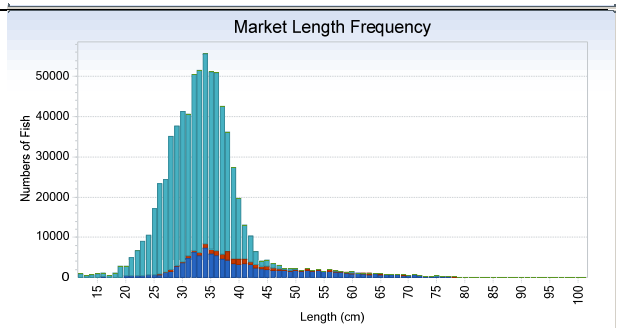
TOR 1. Catch statistics

- North (2012-2014) 14% South (2012-2014) 28%

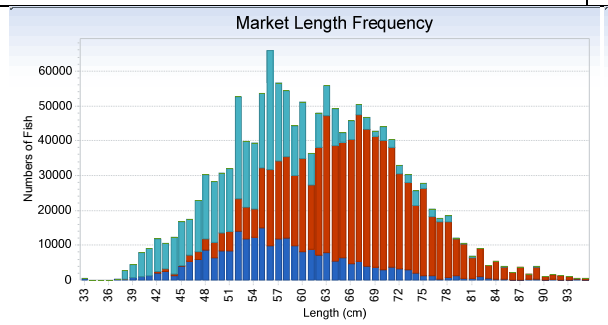
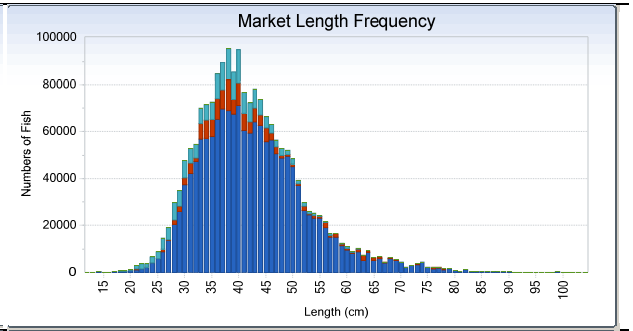
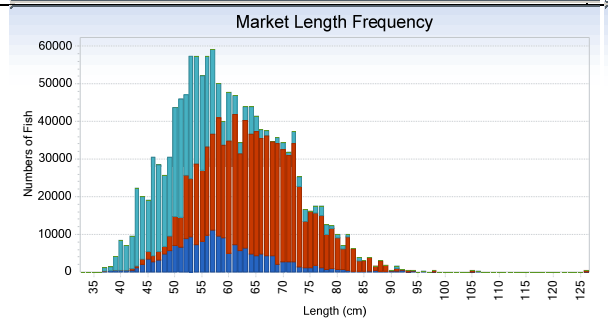
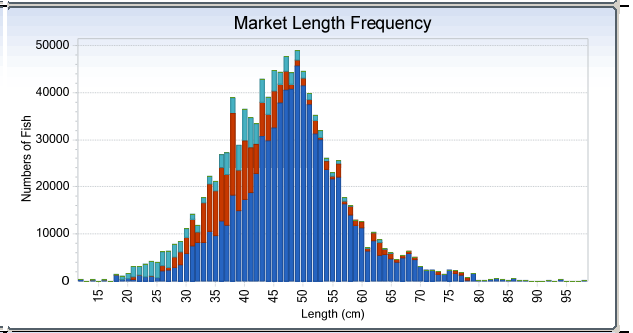
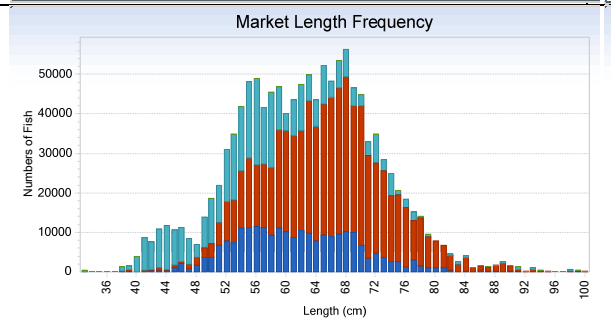
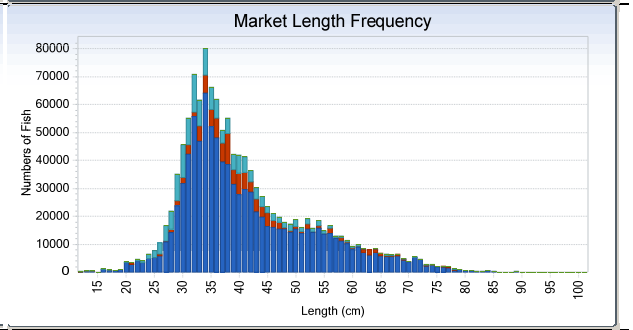




TOR 1. Catch length composition - North

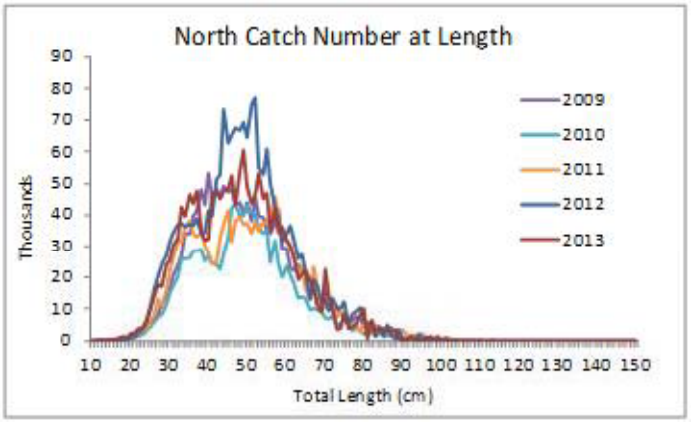
	North - Kept	North - Discarded
	Note: x and y axis scales vary	Dredge Gillnet Trawl
2012		
2013		
2014		

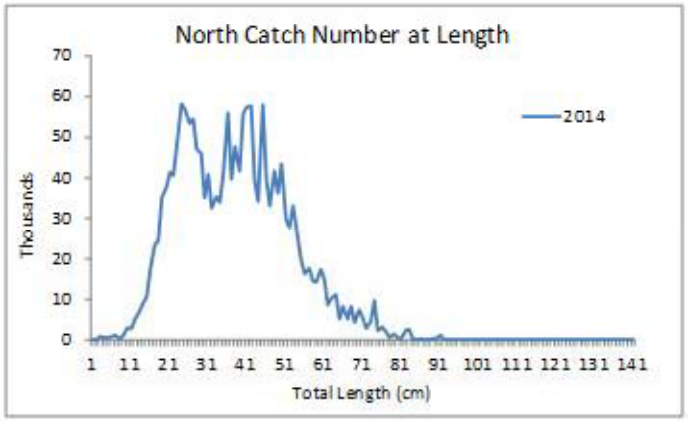
TOR 1. Catch length composition - South

	South - Kept	South - Discarded
	Note: x and y axis scales vary	Dredge Gillnet Trawl
2012		
2013		
2014		

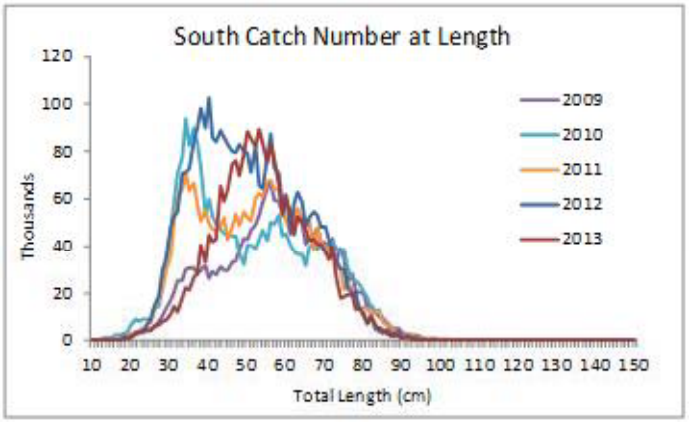
TOR 1. Catch length composition

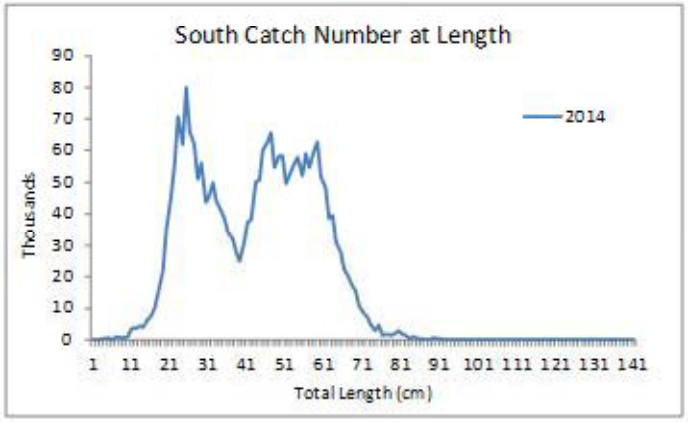
North





South

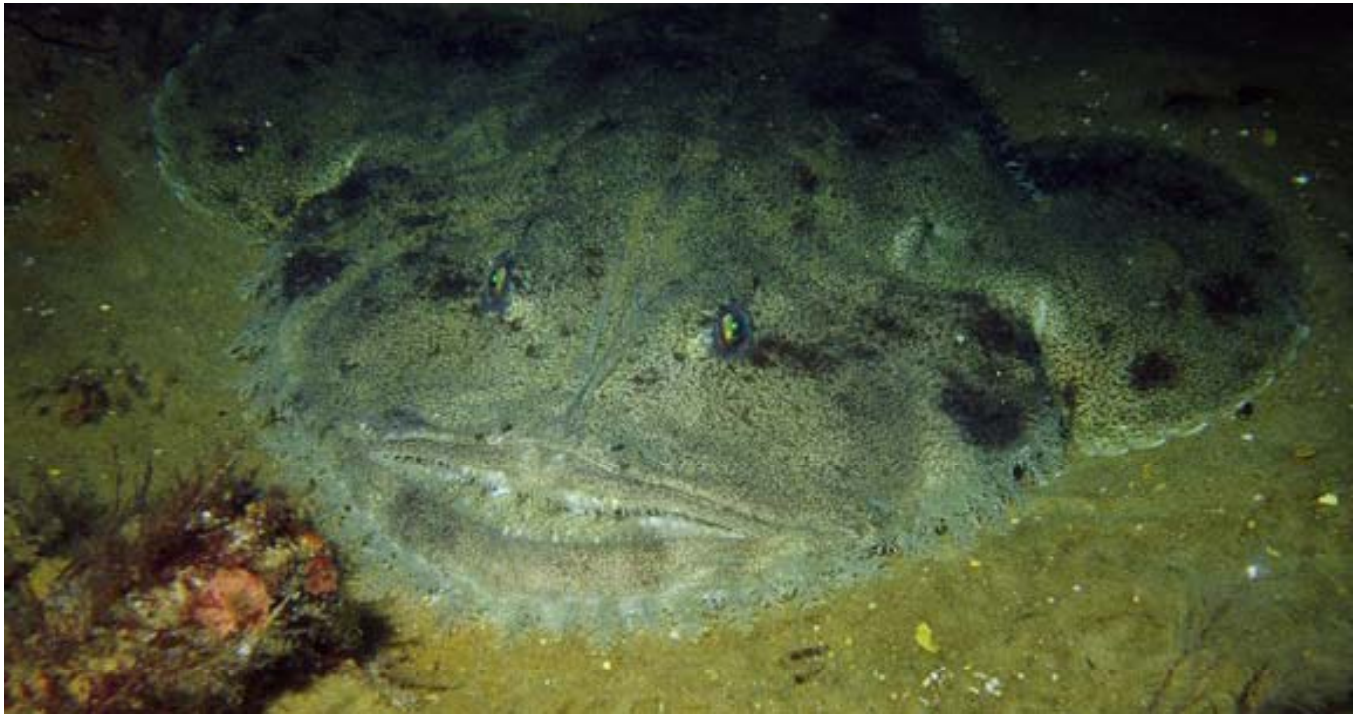




- TOR 1: Update catch estimates, including landings, discard, size composition of catch
  - Discussion?

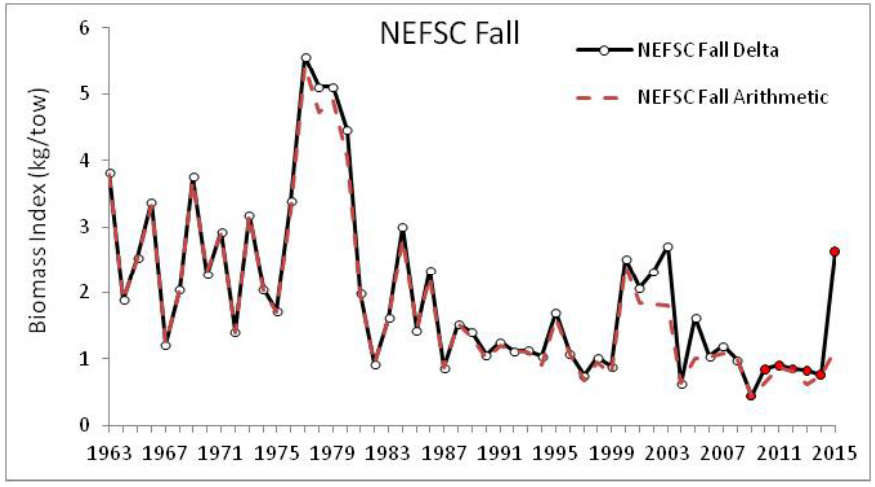
TOR 2. Fishery-independent indices

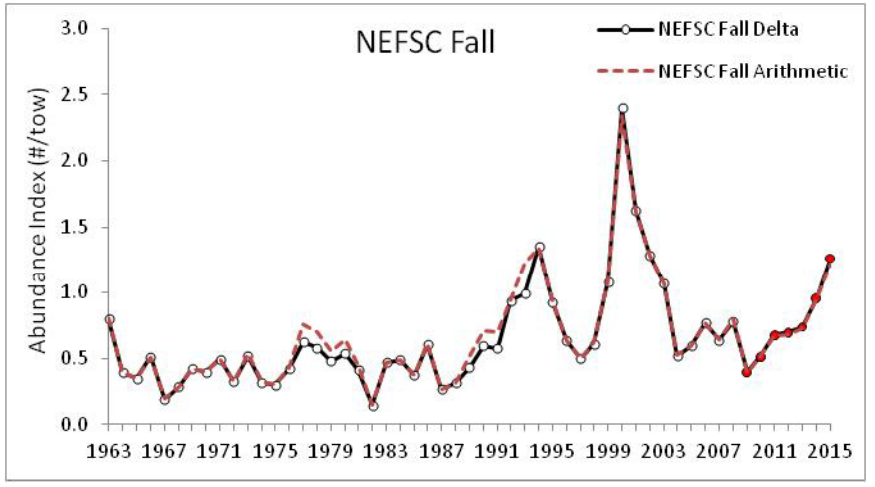
- Update fishery-independent indices, including recruitment indices and length composition of survey catches



TOR 2. Survey indices

- Change in estimators used for survey indices
  - Previously: delta distribution means
  - Problem: high catches of YOY in 2015 caused irrational behavior of biomass indices



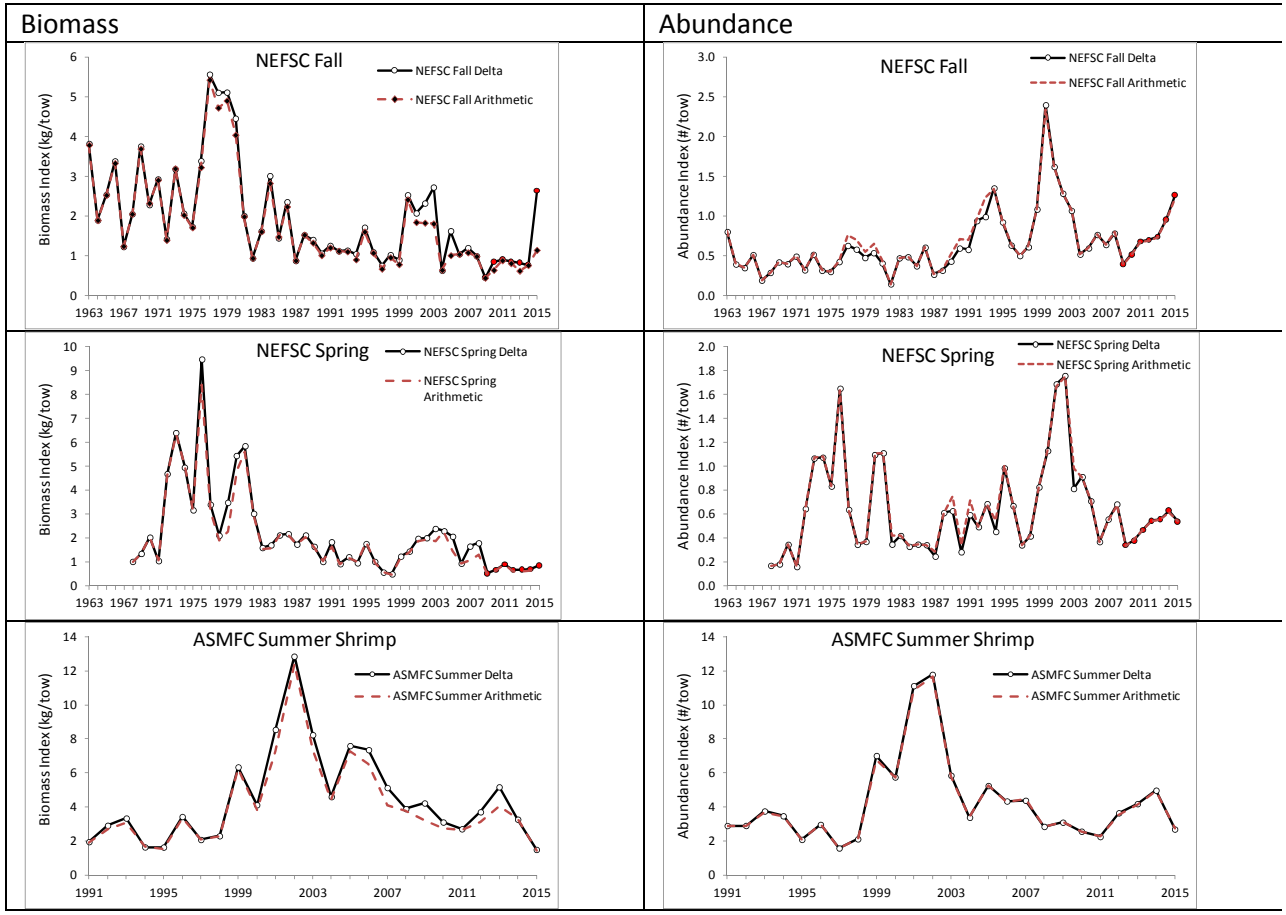


TOR 2. Survey indices

- Change in estimators used for survey indices
  - Solution: use arithmetic indices (bootstrapped variances)
  - Consequences: minor changes (updated all time series)

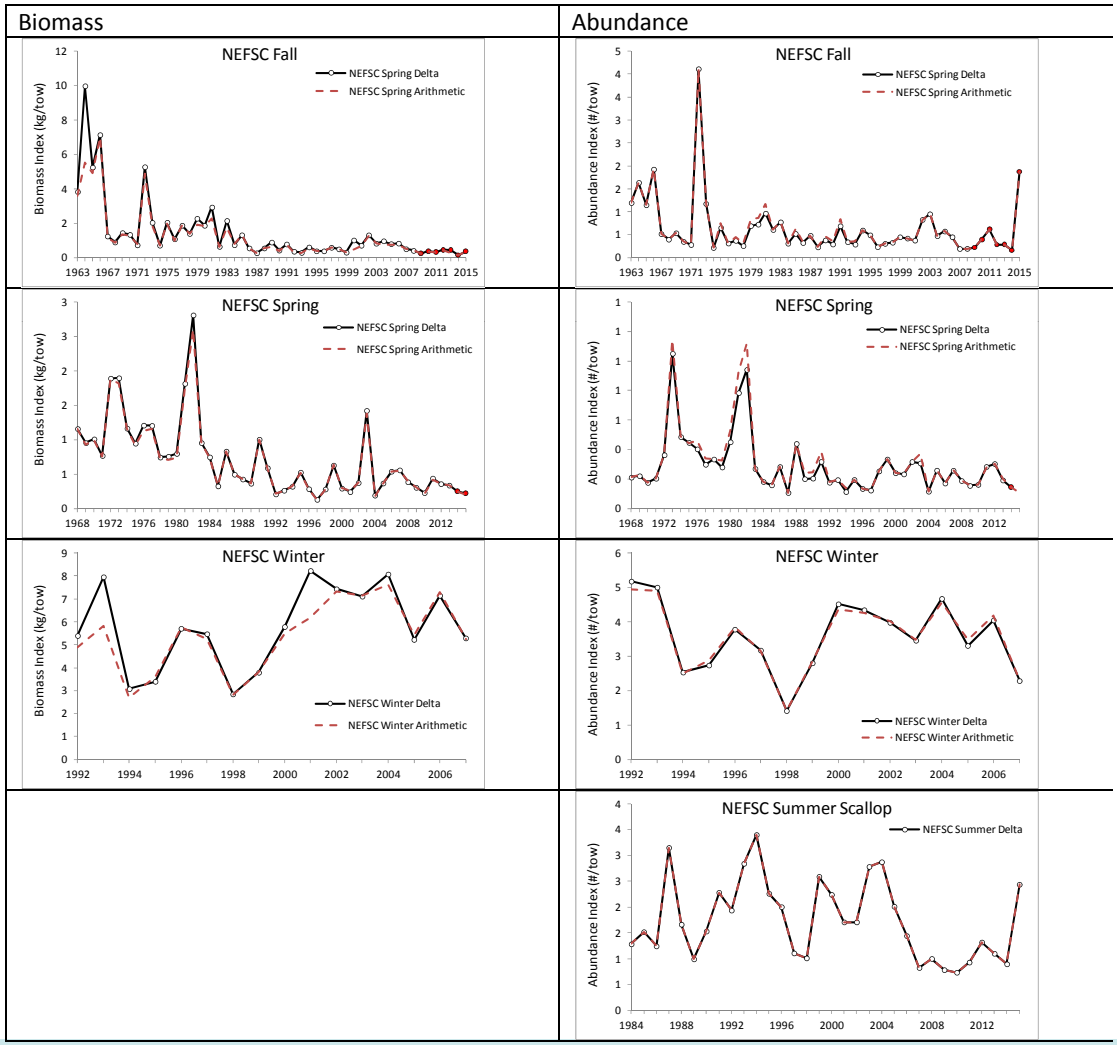
Delta Distribution vs. Arithmetic Estimators

- North



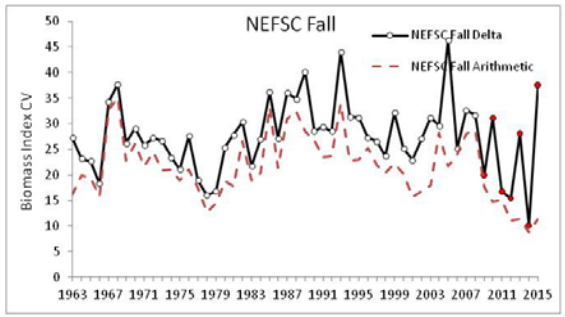
Delta Distribution vs. Arithmetic Estimators

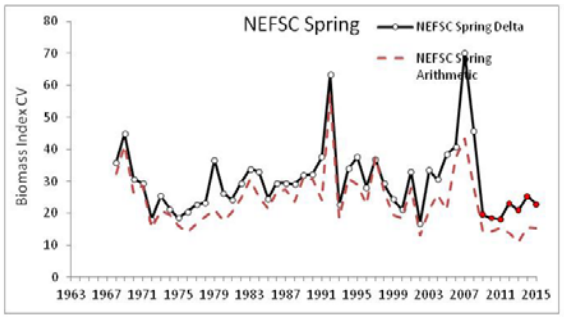
- South

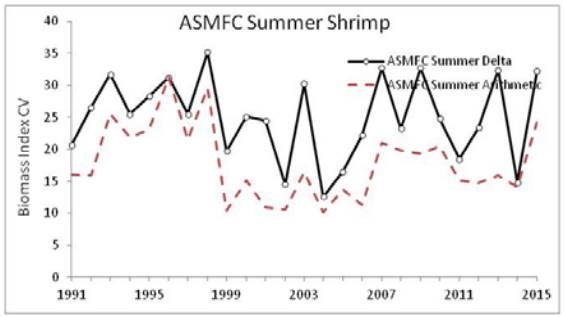


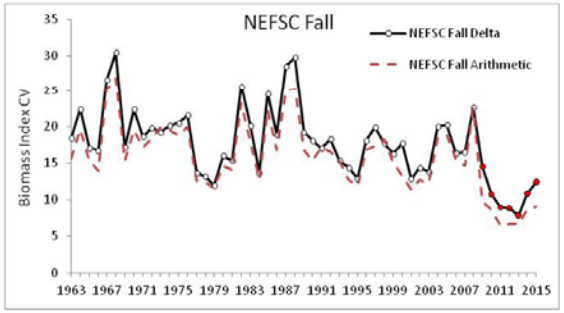
Delta Distribution vs. Arithmetic Estimators

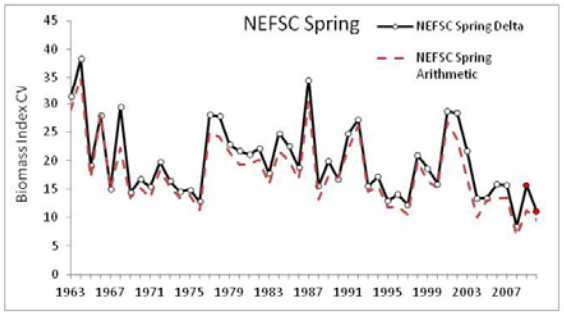
- North CVs

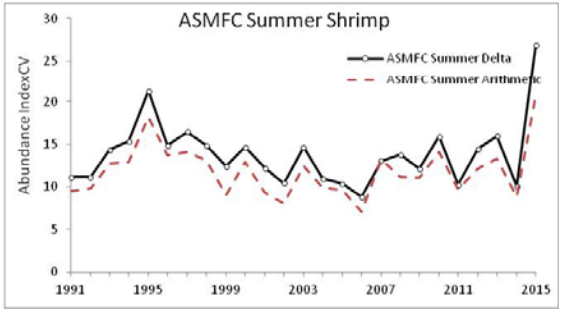












TOR 2. Survey indices - Estimators

- Decision point:
  - Does WG agree with using arithmetic indices?

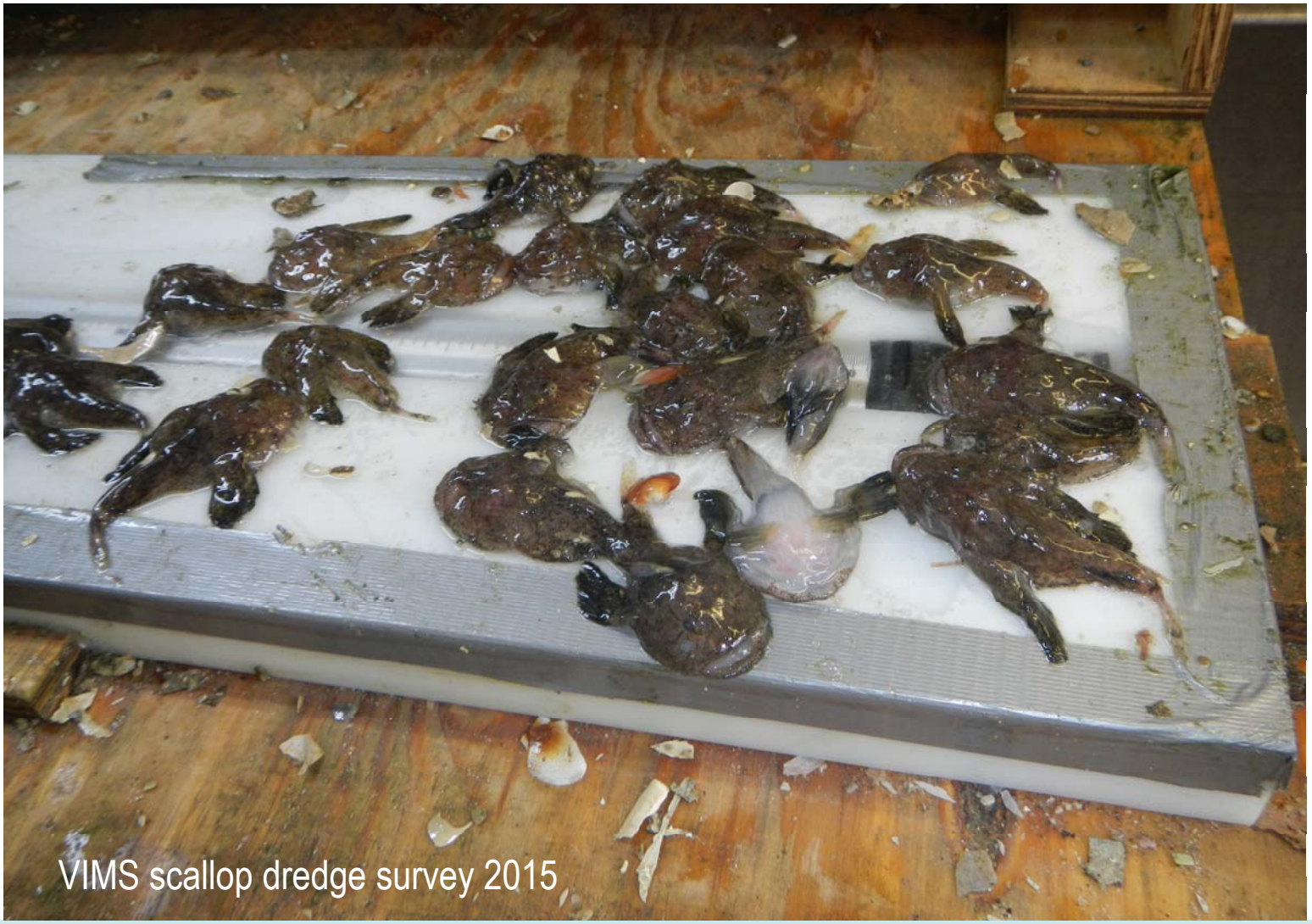
TOR 2. Fishery-independent indices

- Update fishery-independent indices, including recruitment indices and length composition of survey catches

TOR 2. Fishery-independent indices

- Update fishery-independent indices, including recruitment indices and length composition of survey catches

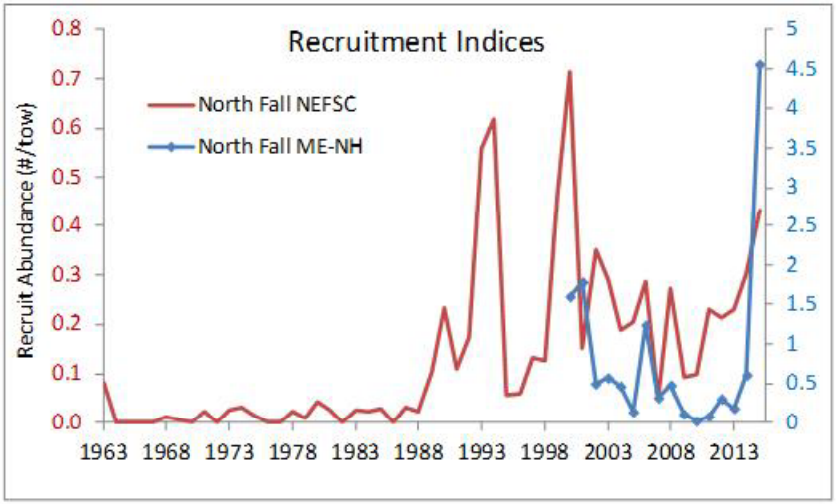
TOR 2. Survey indices - Recruitment



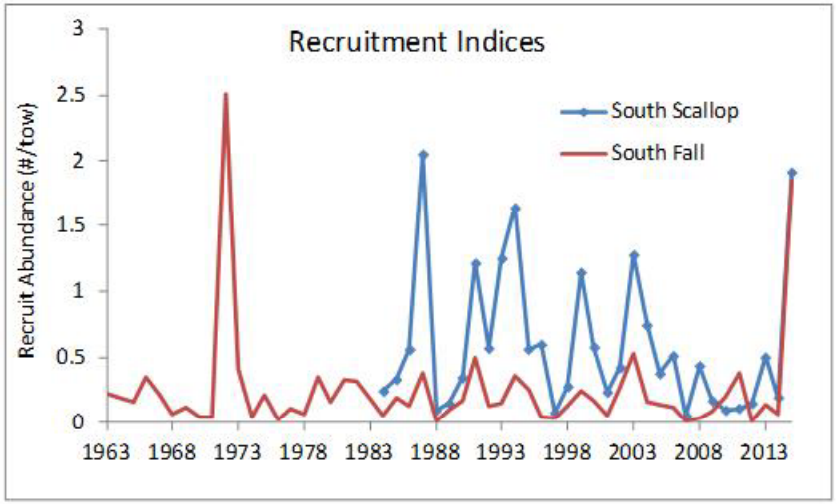
TOR 2. Survey indices - Recruitment

- Apparent recruitment event in 2015

North



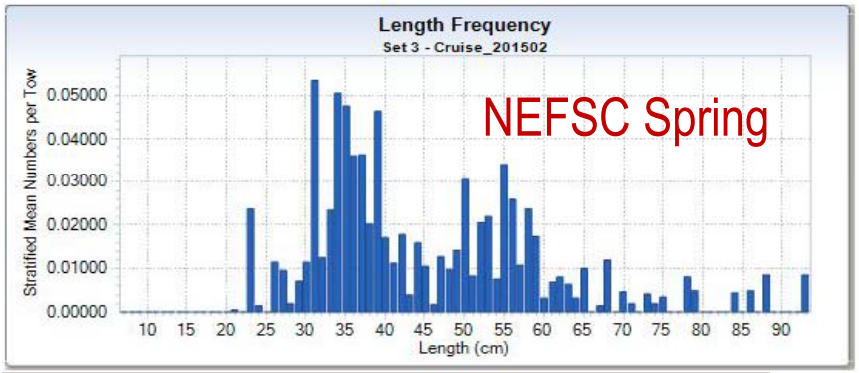
South



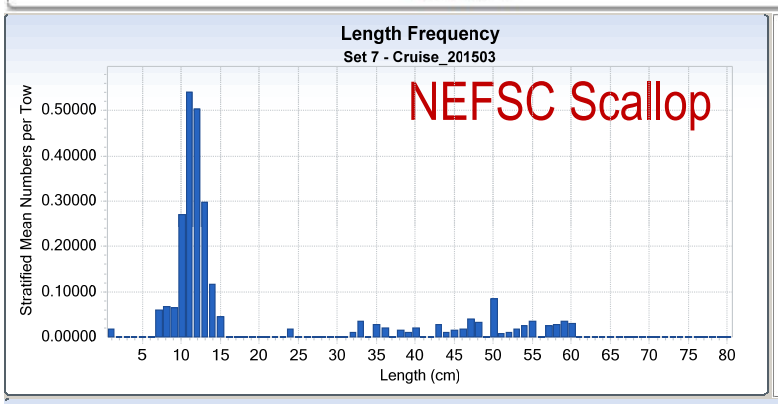
TOR 2. Surveys – 2015 recruitment event

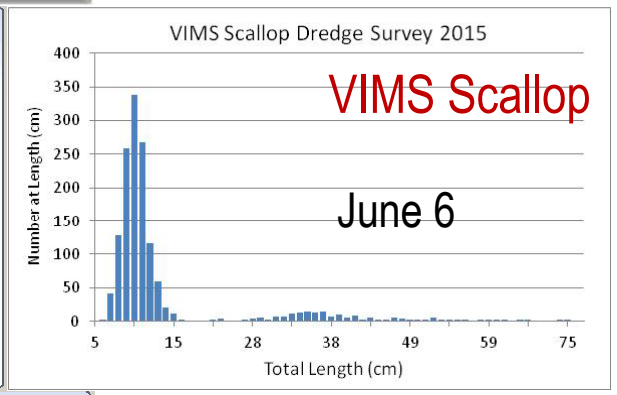
- South

April 2

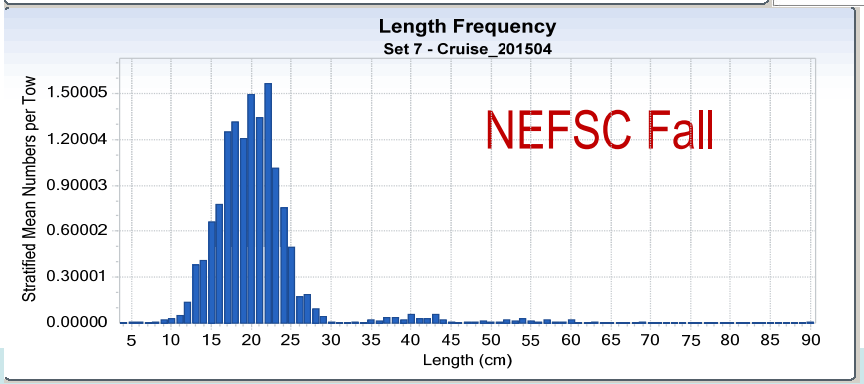


June 10





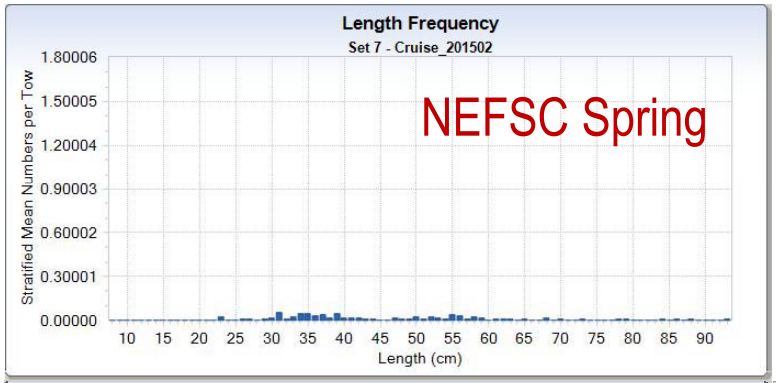
Sept 20



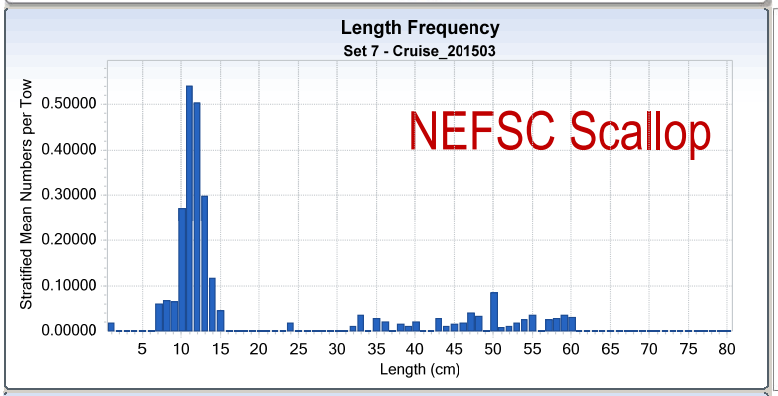
TOR 2. Surveys – 2015 recruitment event

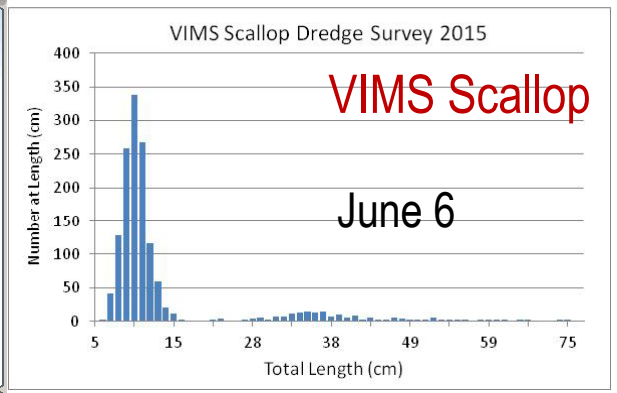
- South

April 2

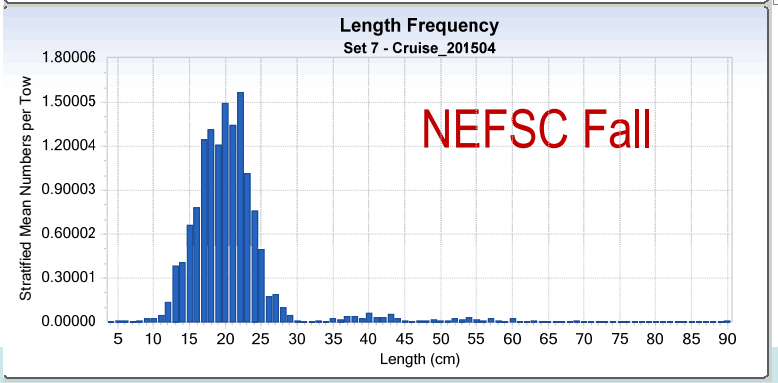


June 10





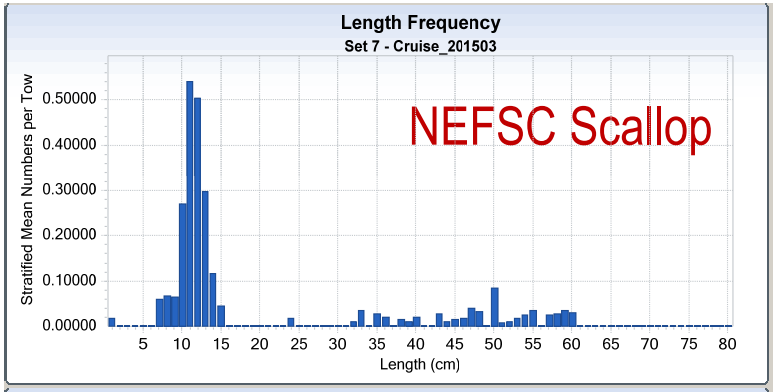
Sept 20



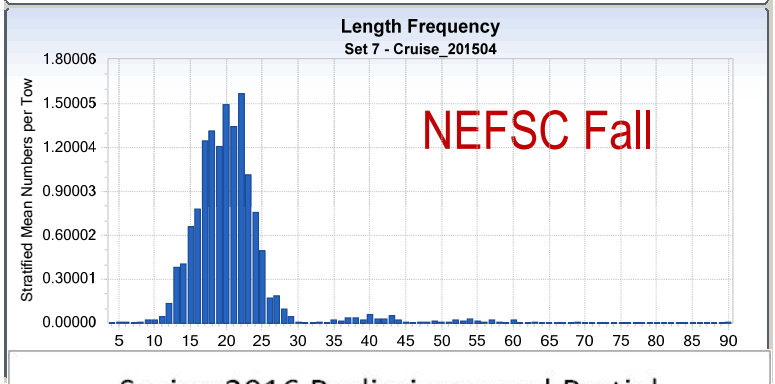
TOR 2. Survey indices – recruitment event

- South

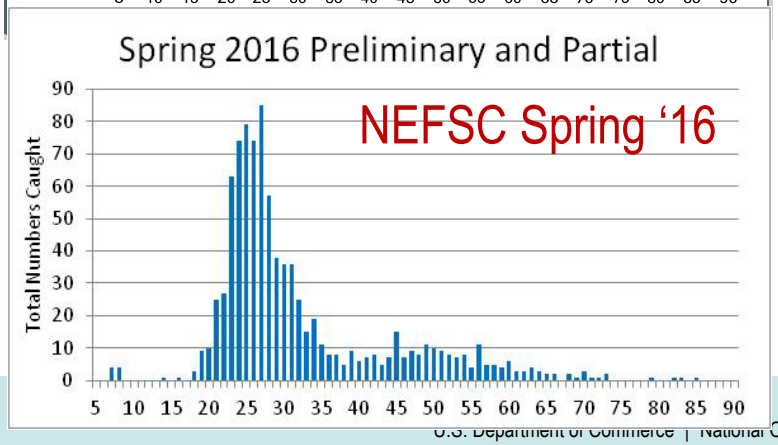
June 10



Sept 20

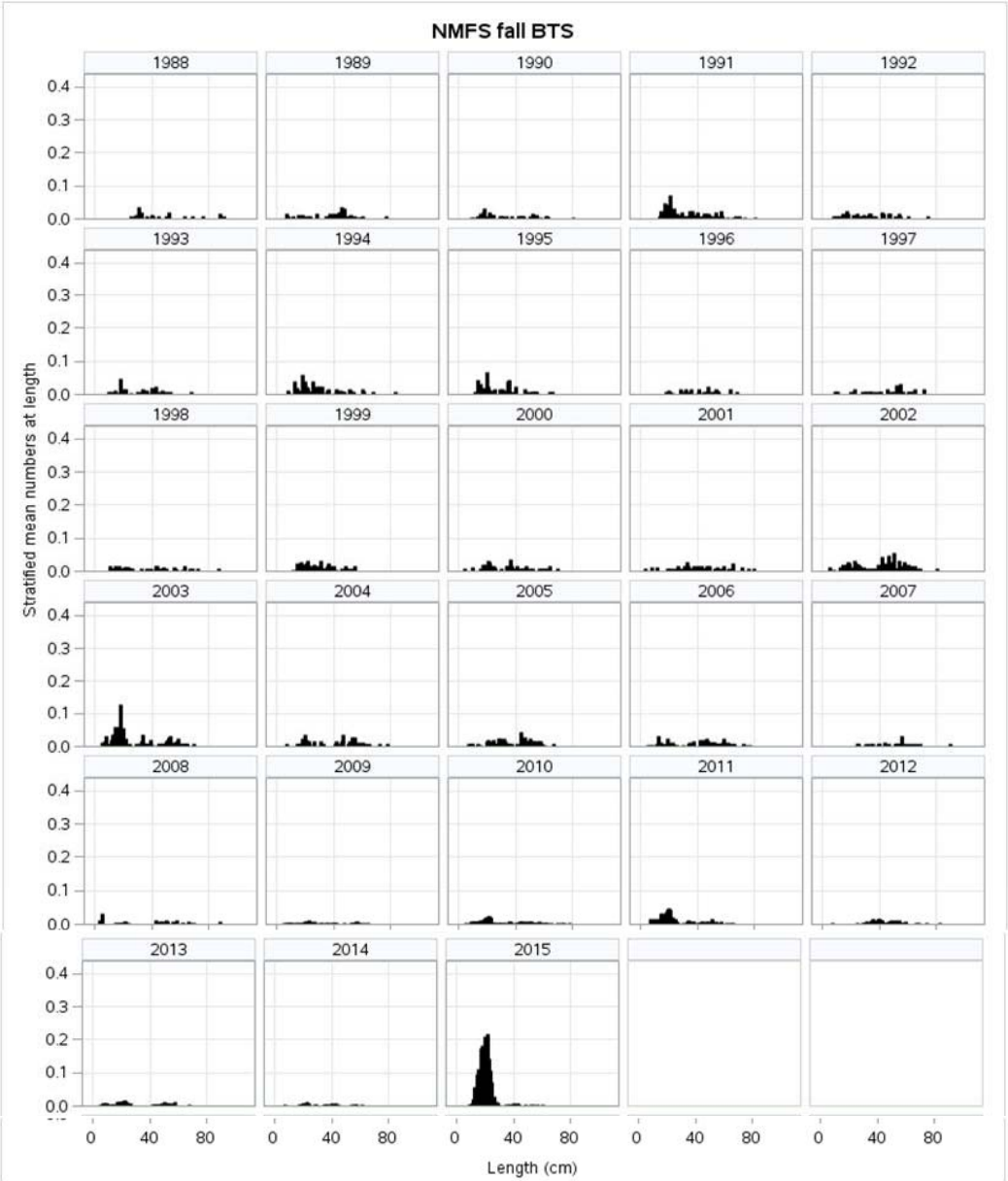


Mid-May



TOR 2. Surveys

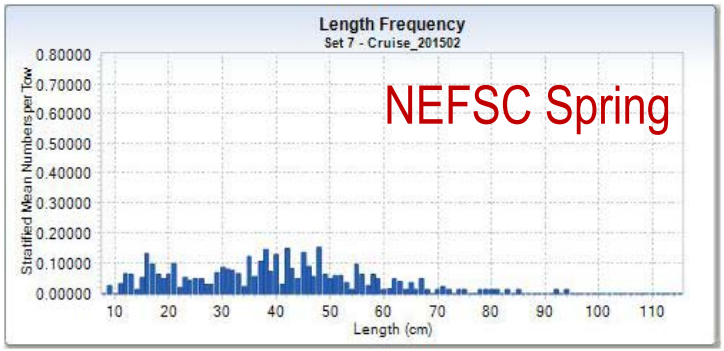
- Fall survey
  - South



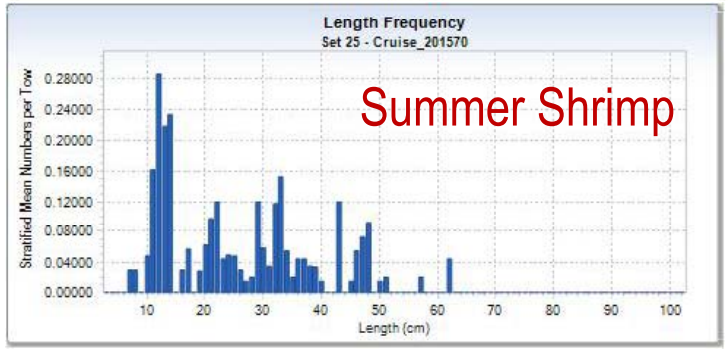
TOR 2. Survey indices – recruitment event

North

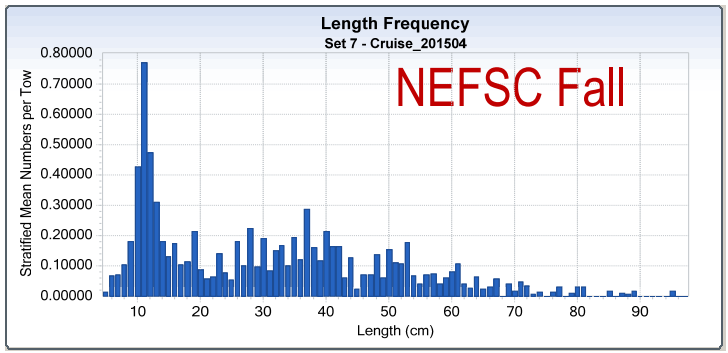
April 24

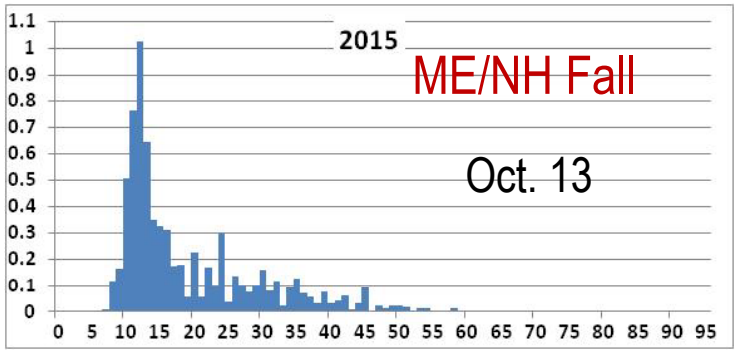


Aug 1

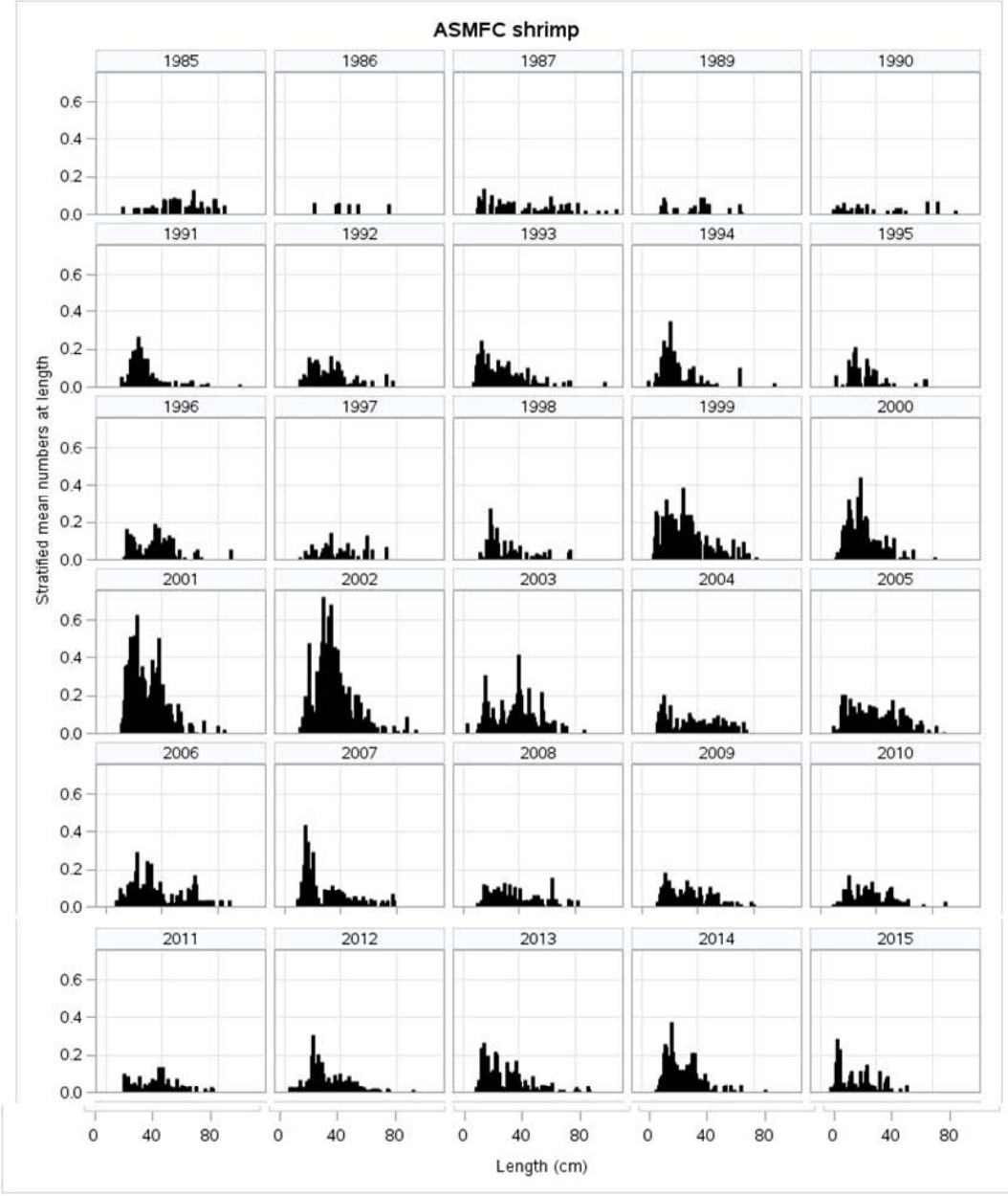


Oct 20



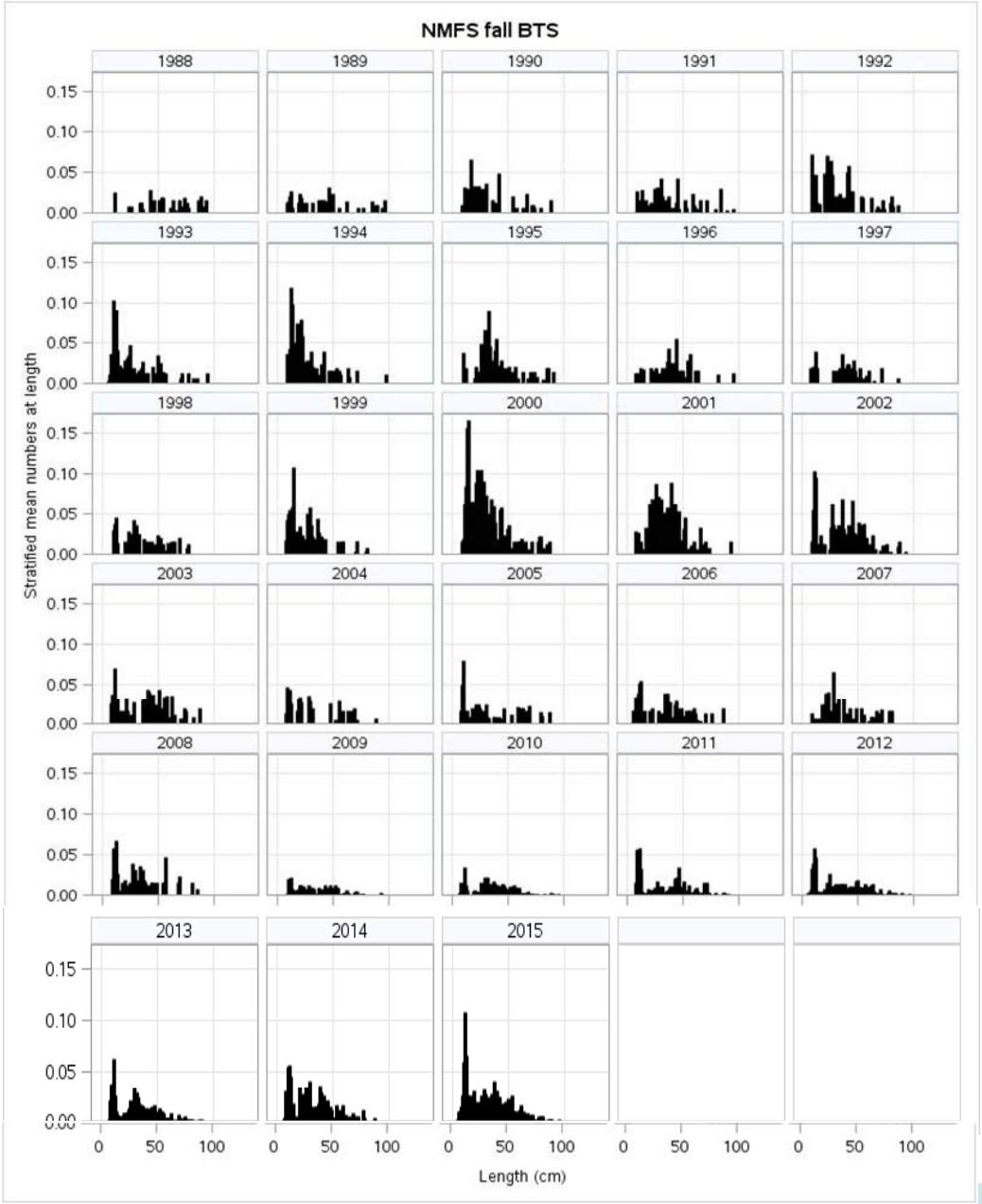


- Shrimp survey



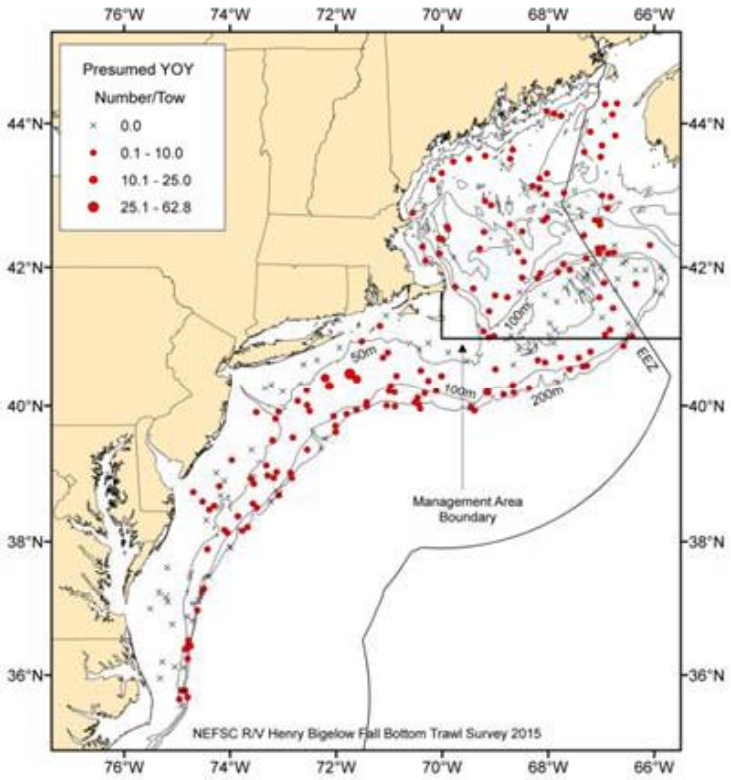
TOR 2. Surveys

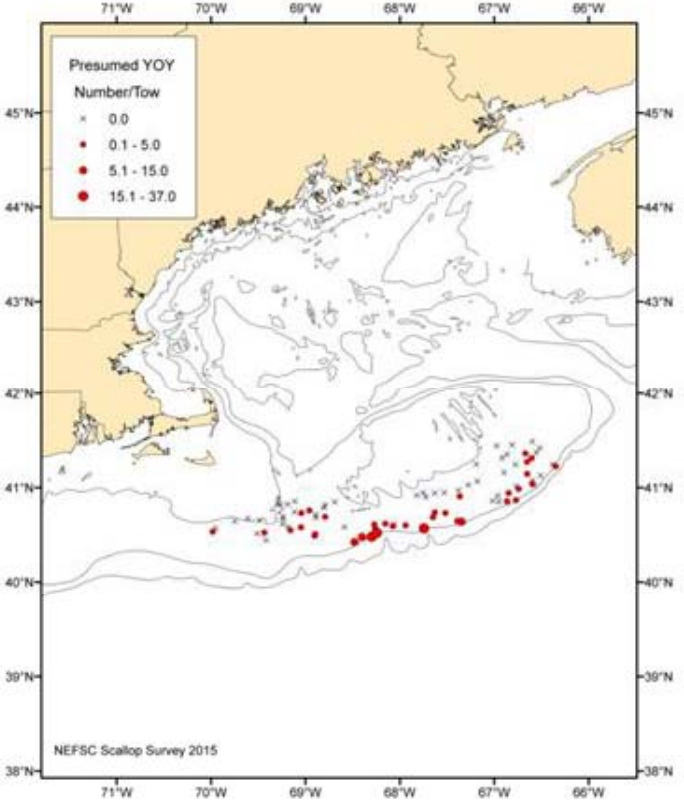
- Fall survey (north)



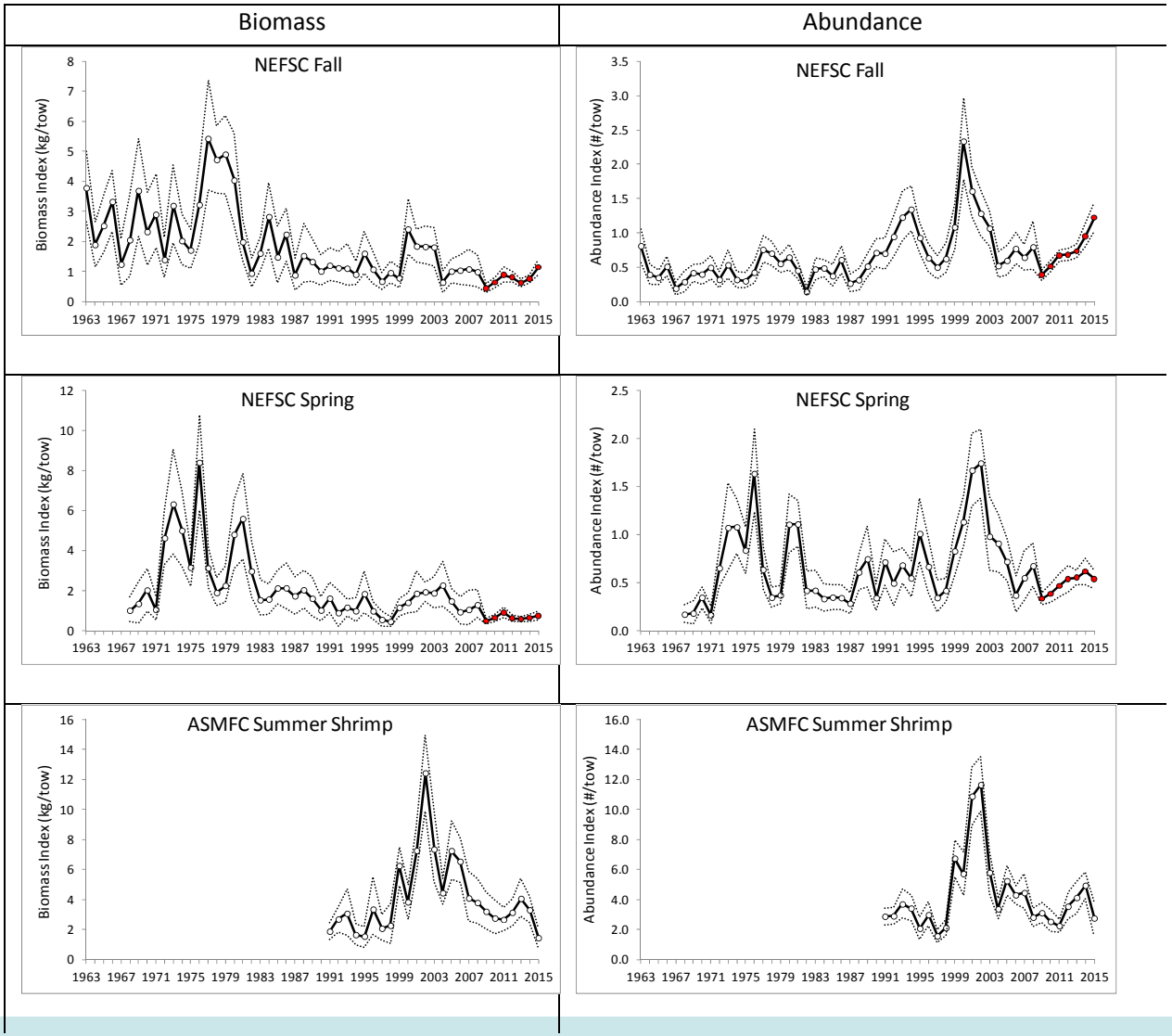
TOR 2. Survey indices - Recruitment

- Distribution of presumed YOY - 2015



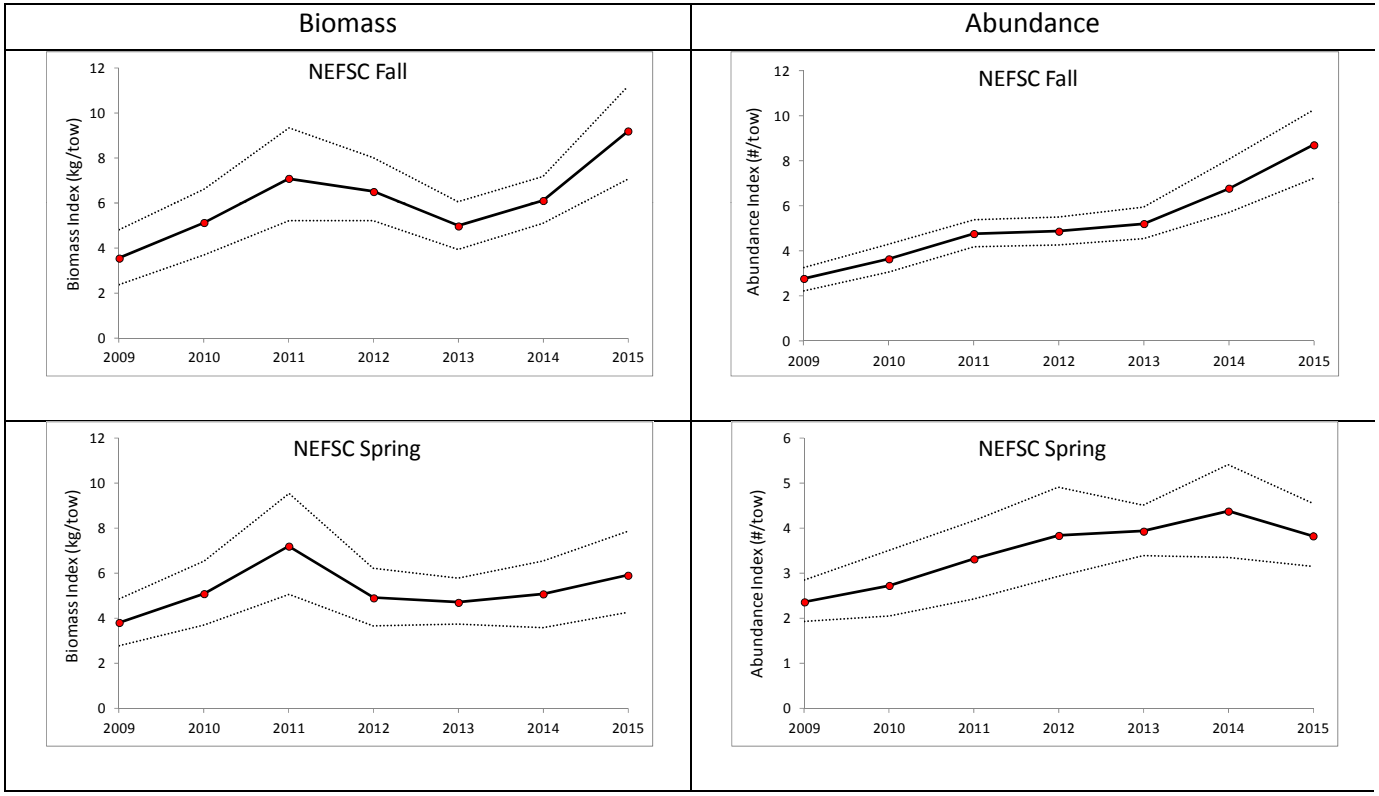


TOR 2. Survey indices - North



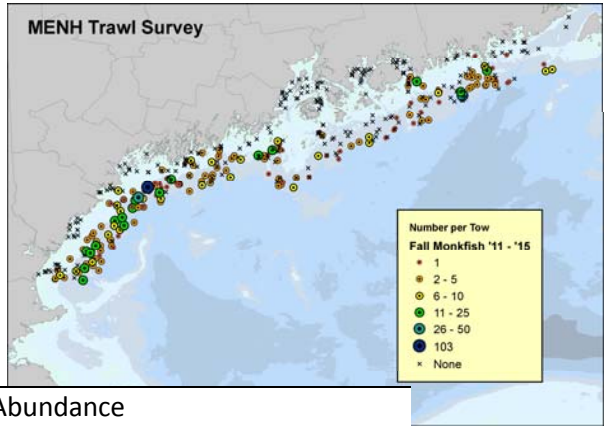
TOR 2. Survey indices - North

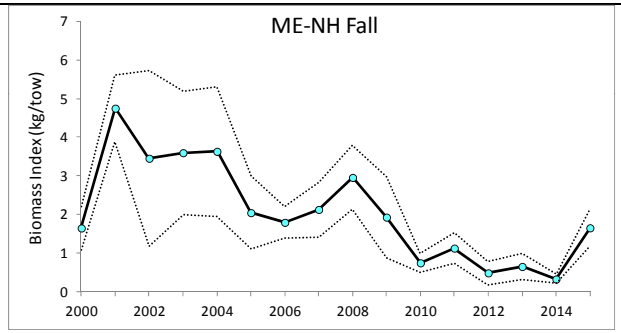
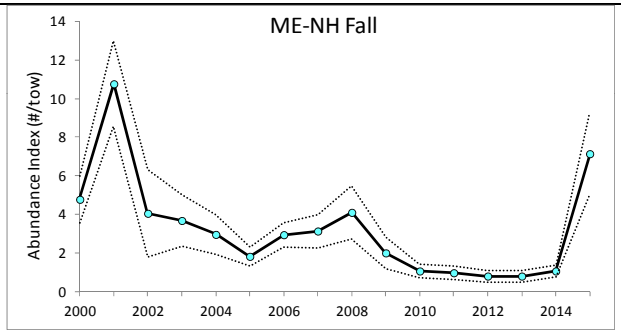
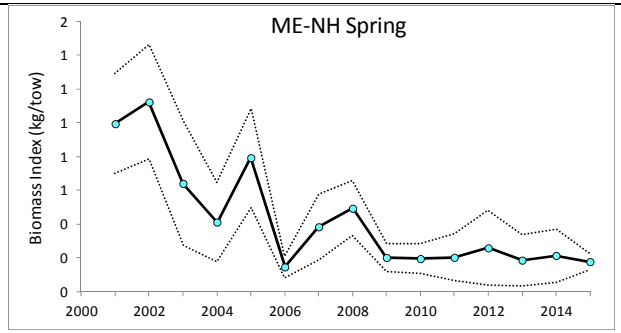
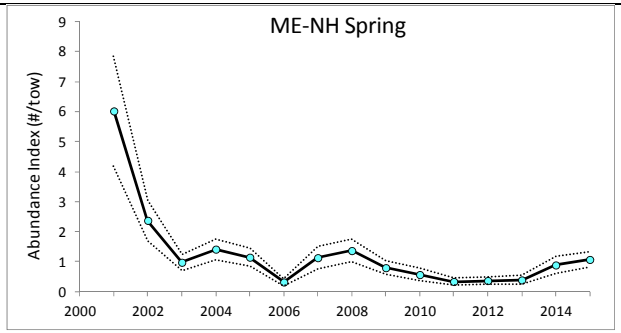
- *Bigelow* time series



TOR 2. Survey indices - North

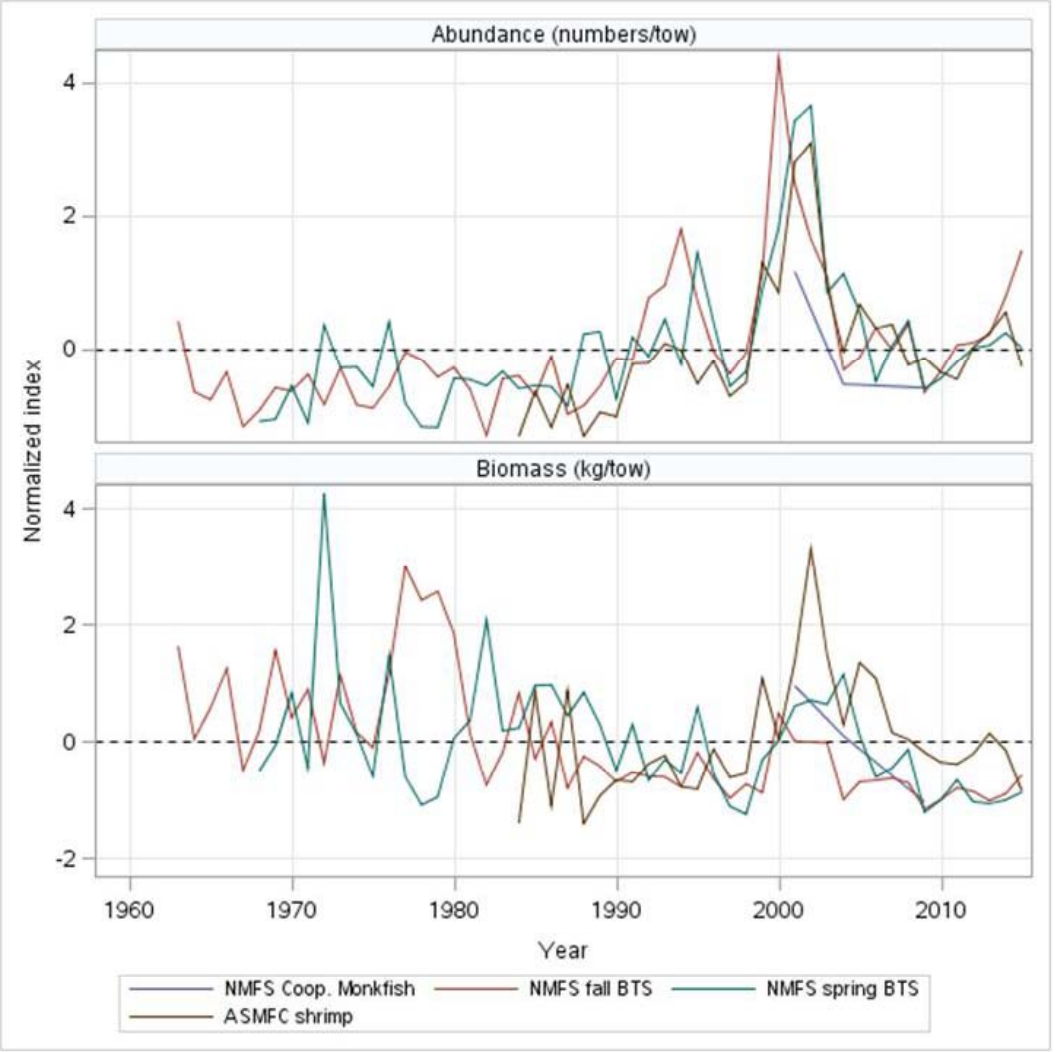
- ME/NH inshore survey



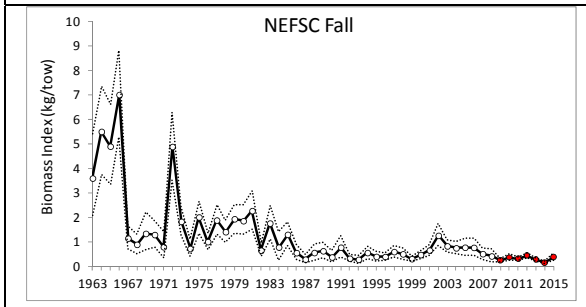
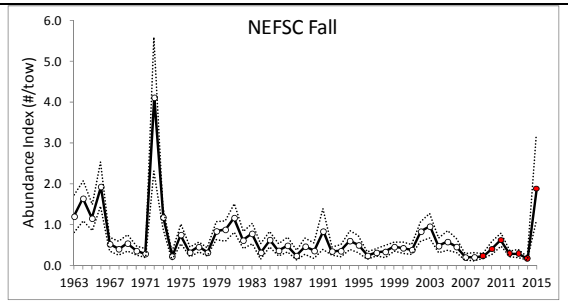
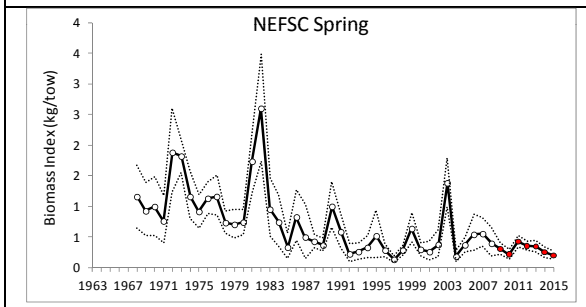
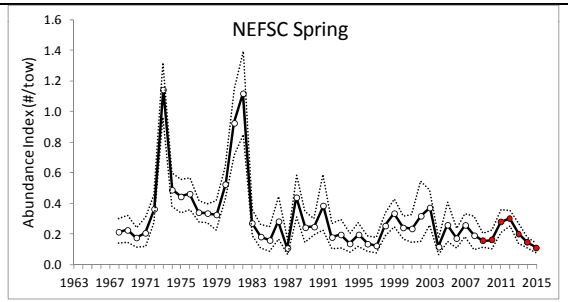
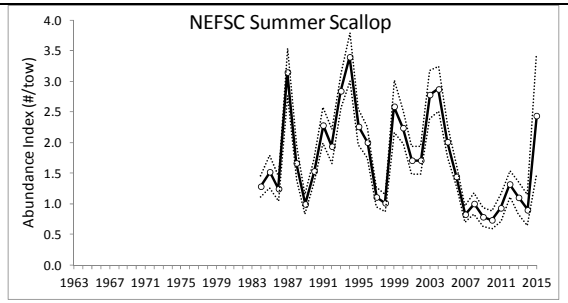
Biomass	Abundance
	
	

TOR 2. Survey indices - North

- All surveys



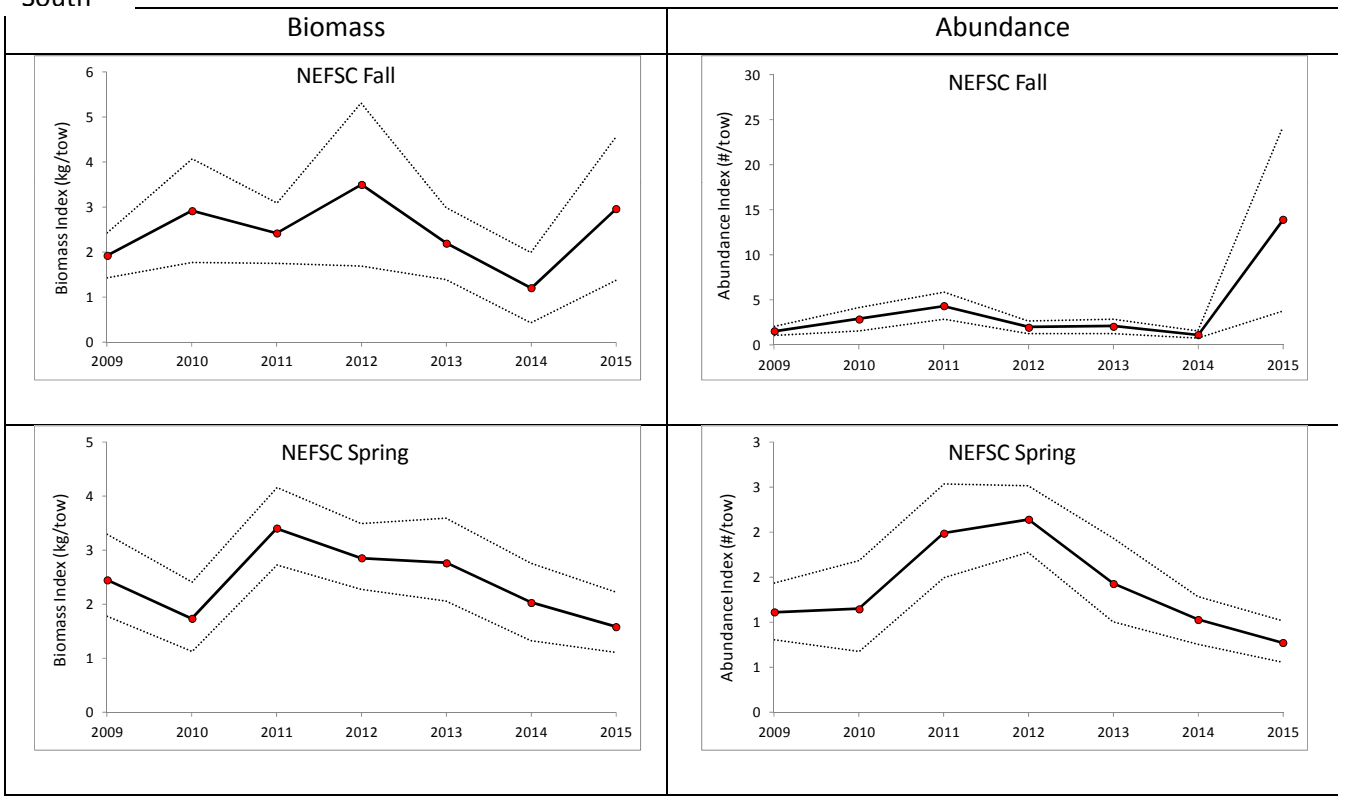
TOR 2. Survey indices - South

Biomass	Abundance
	
	
	

TOR 2. Survey indices - South

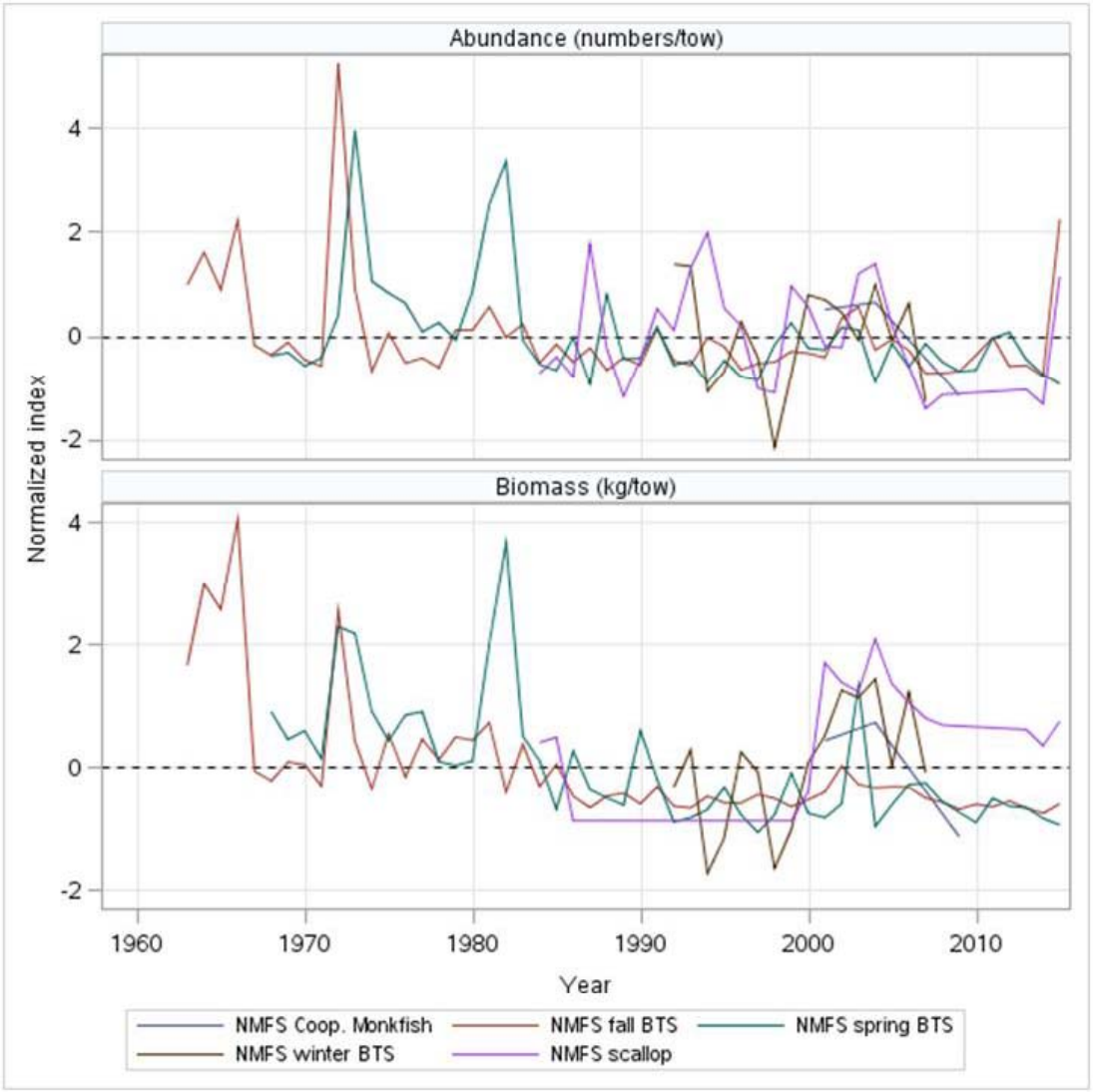
- *Bigelow* time series

South



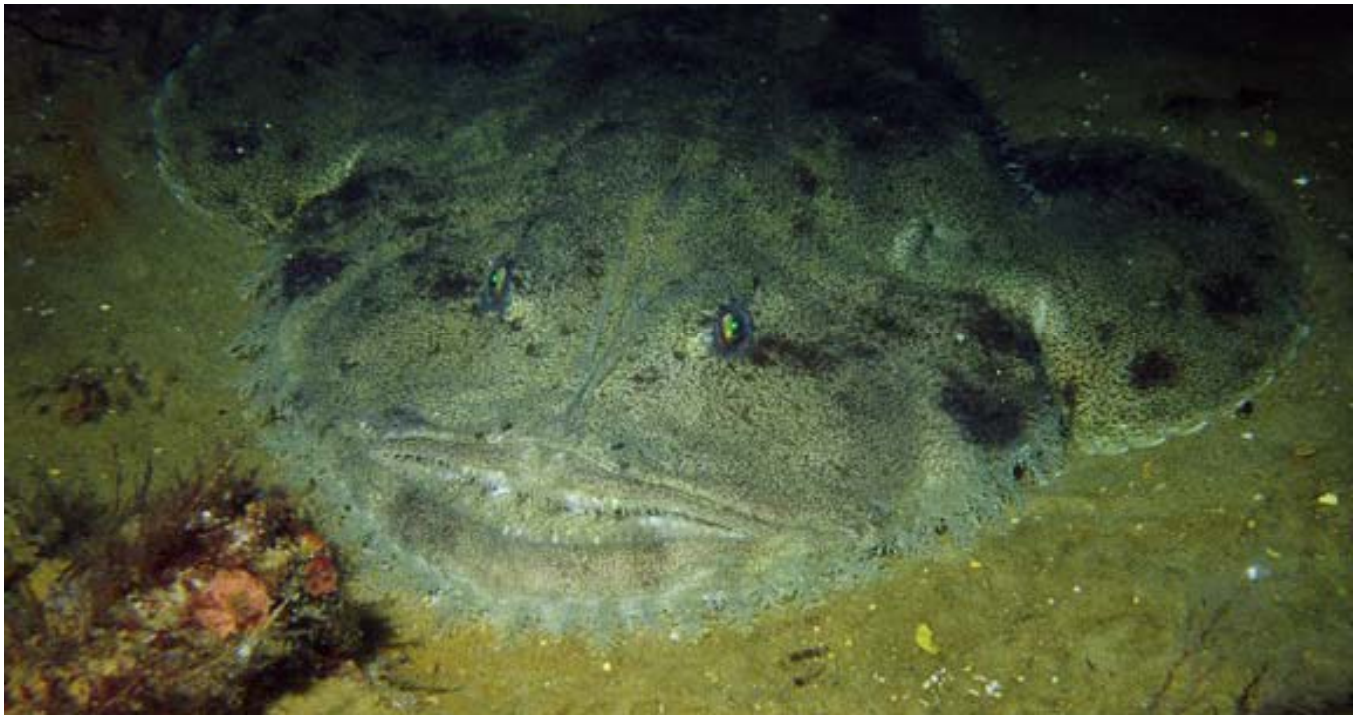
TOR 2. Survey indices - South

- All surveys



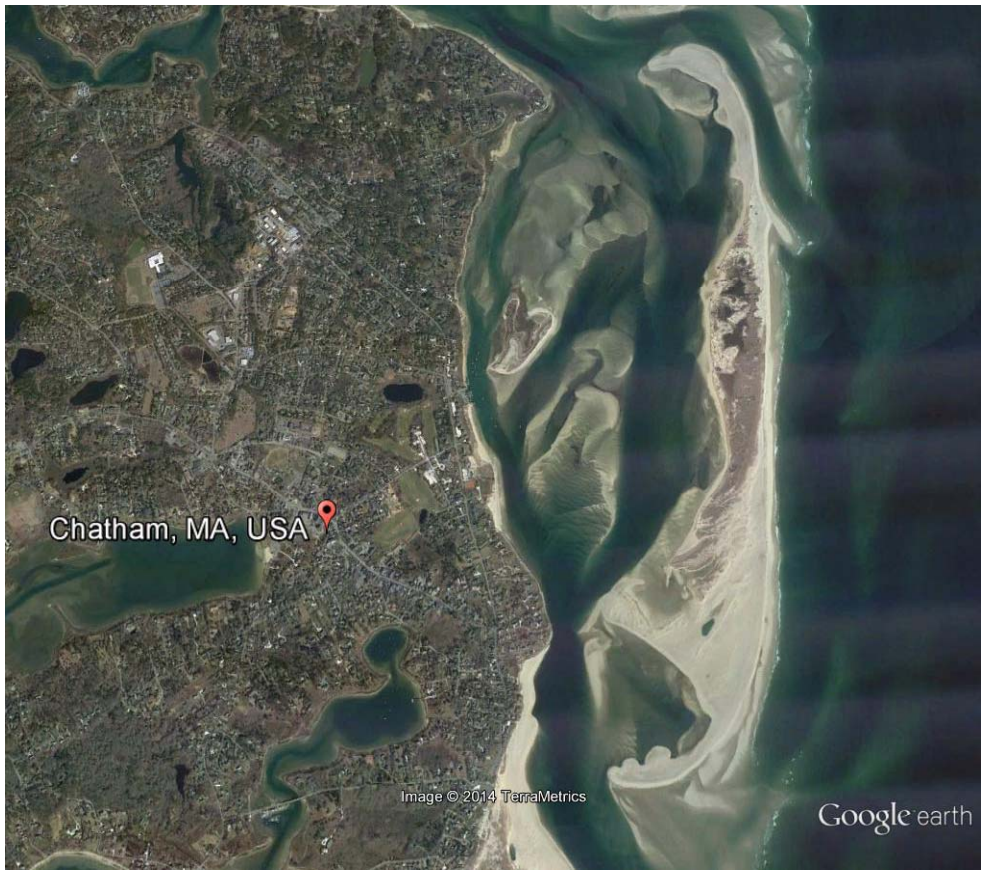
TOR 2. Fishery-independent indices

- Discussion?



TOR 3. Biological Changes?

- Distribution changes
  - Movies
  - Temperature
  - Depth
- Condition factors



TOR 3. Biological Changes?

- Distribution changes
  - Movies
  - Temperature
  - Depth
- Condition factors

TOR 3. Distribution Changes?

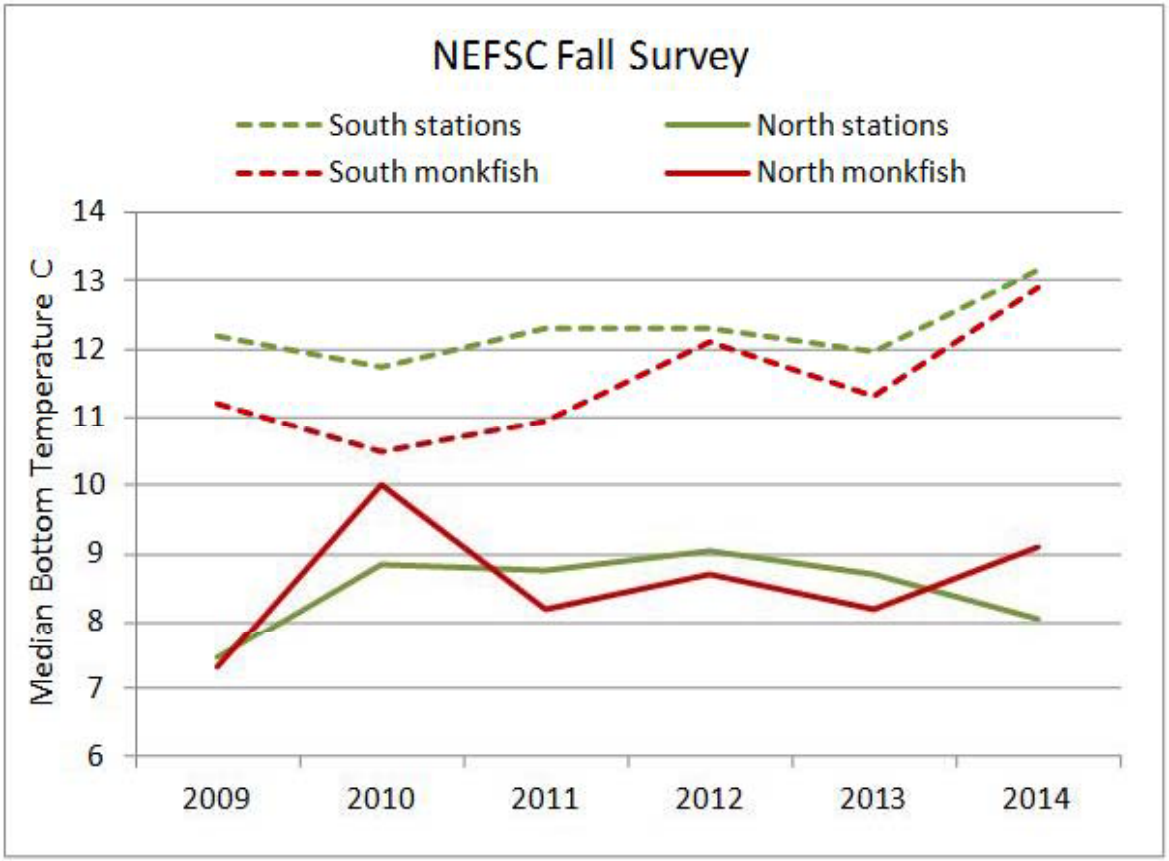
- Spring
- http://www.nefsc.noaa.gov/ecosys/spatial-analyses/demersal/monkfish.html

TOR 3. Distribution Changes?

- Fall
- http://www.nefsc.noaa.gov/ecosys/spatial-analyses/demersal/monkfish.html

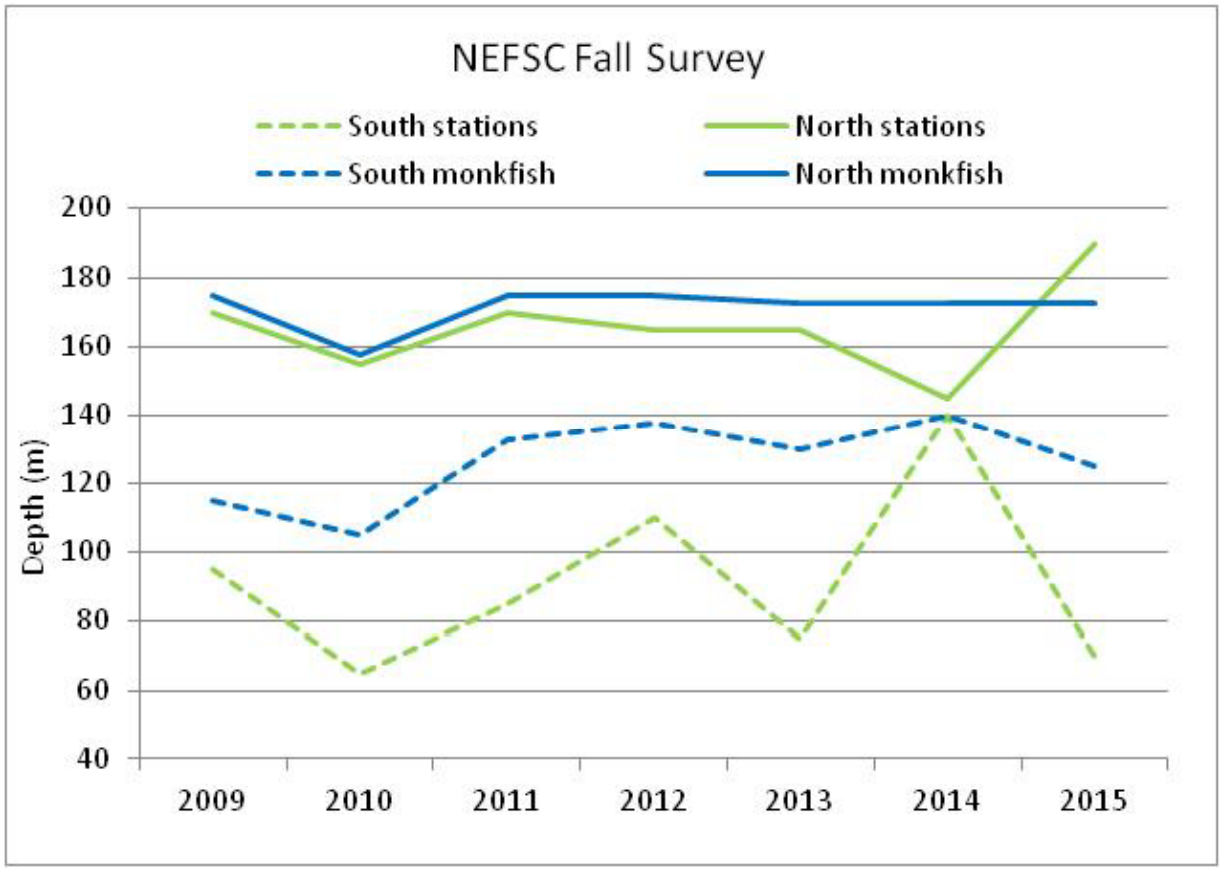
TOR 3. Distribution Changes?

- Temperature selection



TOR 3. Distribution Changes?

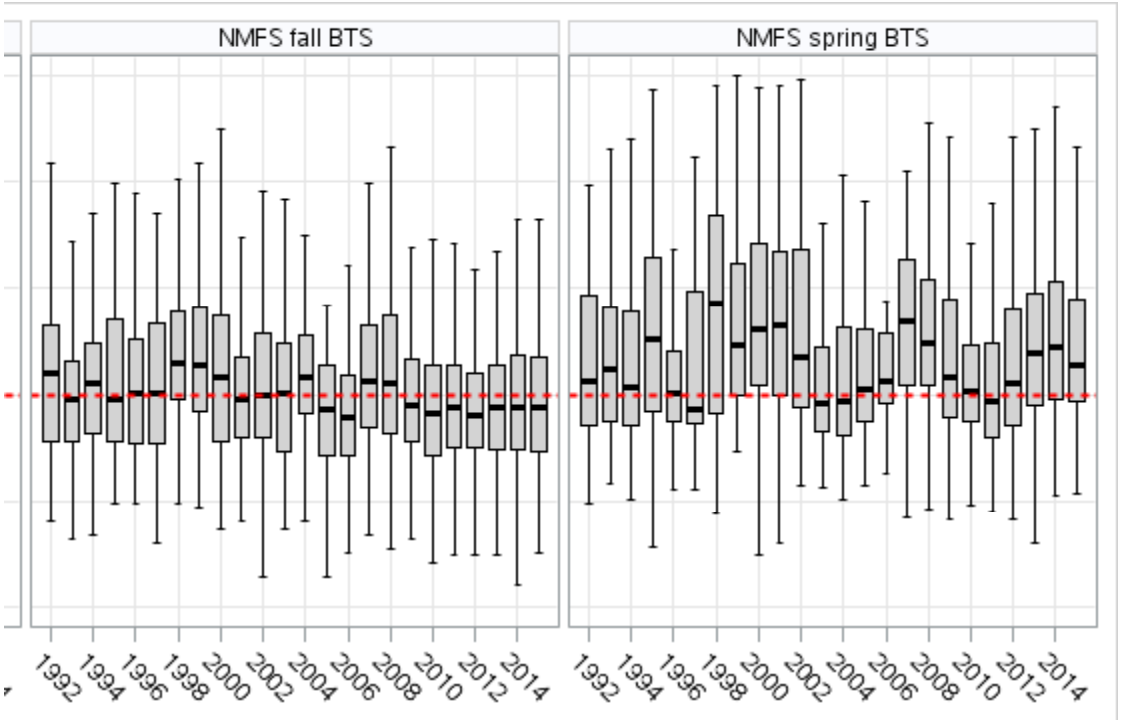
- Depth selection



TOR 3. Condition Factors

- North

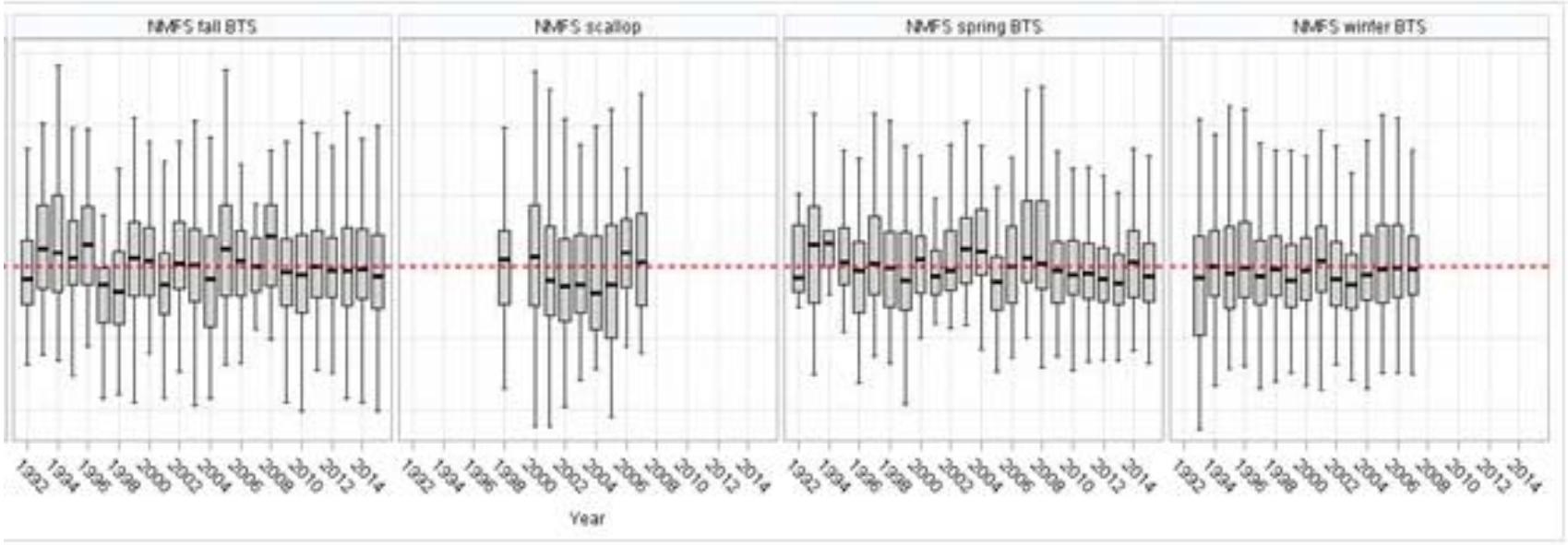
  Ratio of observed to predicted weight



TOR 3. Condition Factors

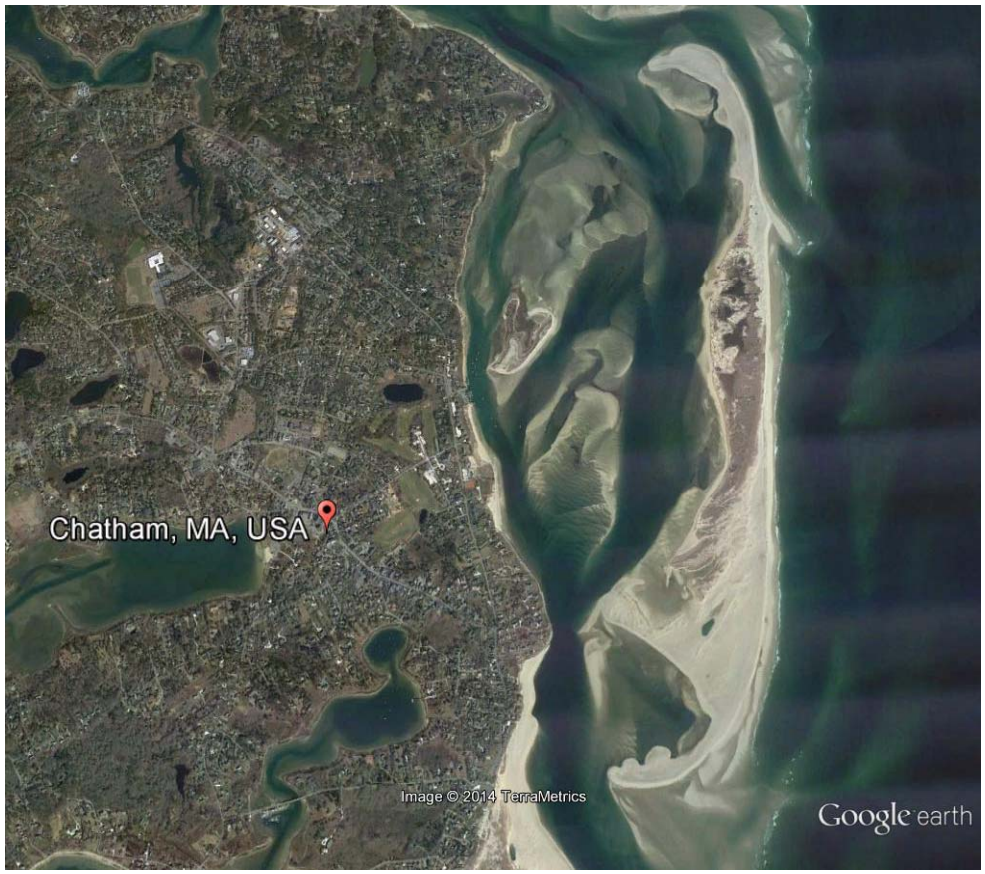
- South

  Ratio of observed to predicted weight



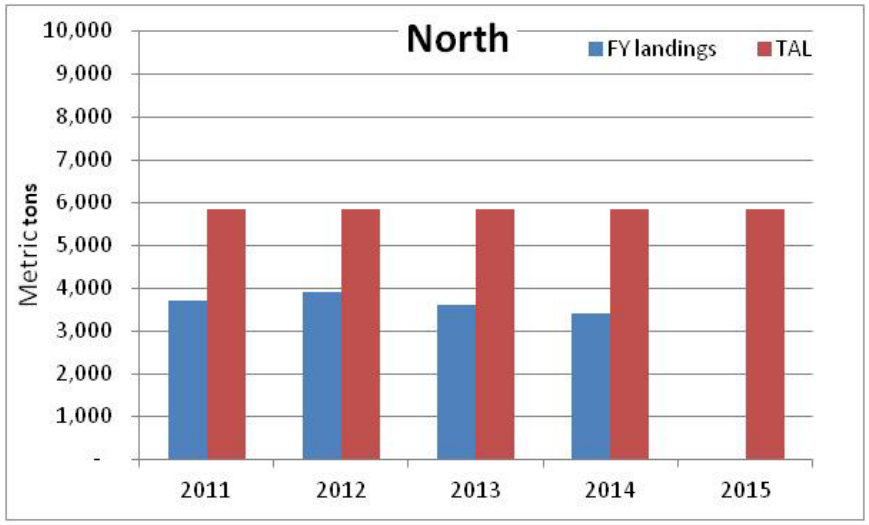
TOR 3. Biological Changes?

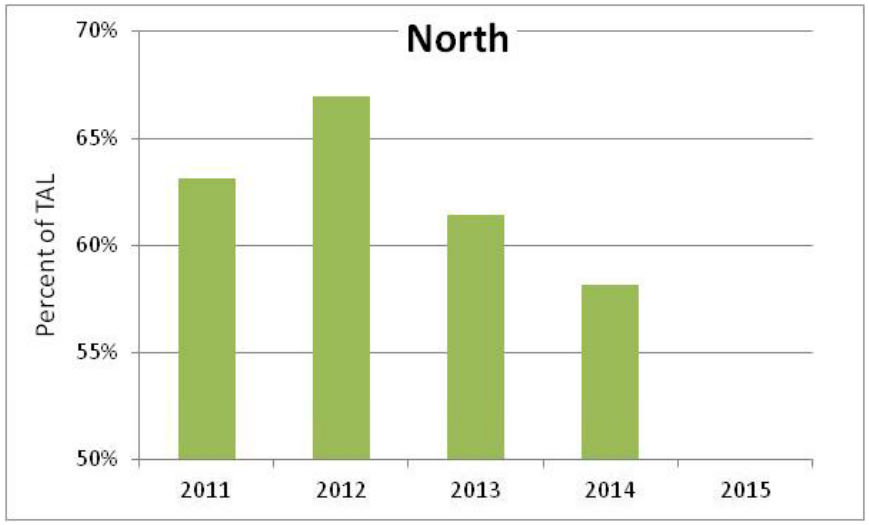
- Discussion?



TOR 4: Compare ACLs with catches

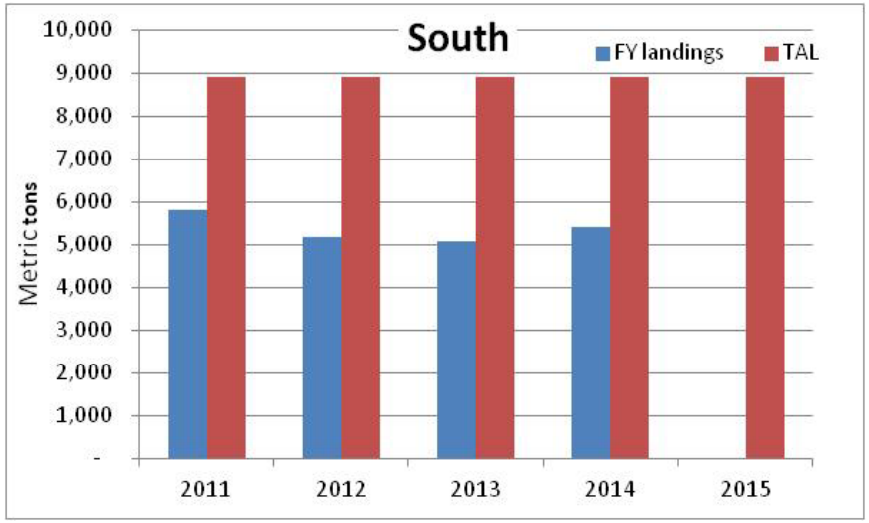
- North - By fishing year – TAL vs. landings

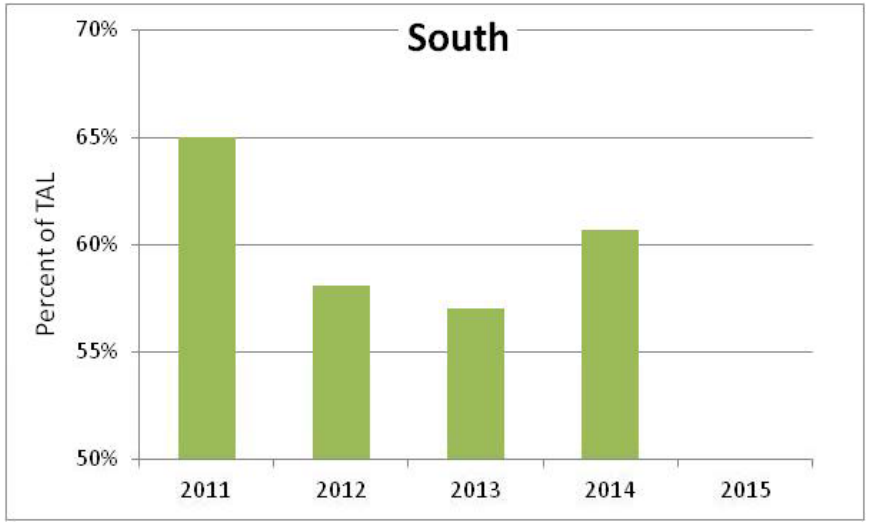




TOR 4: Compare ACLs with catches

- South - By fishing year – TAL vs. landings



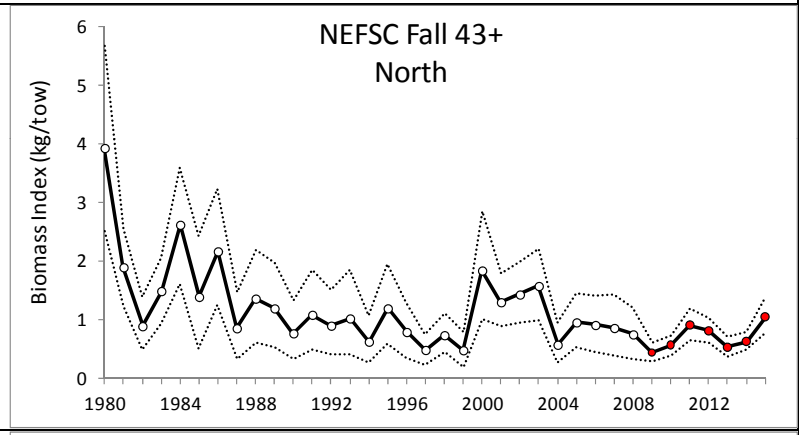
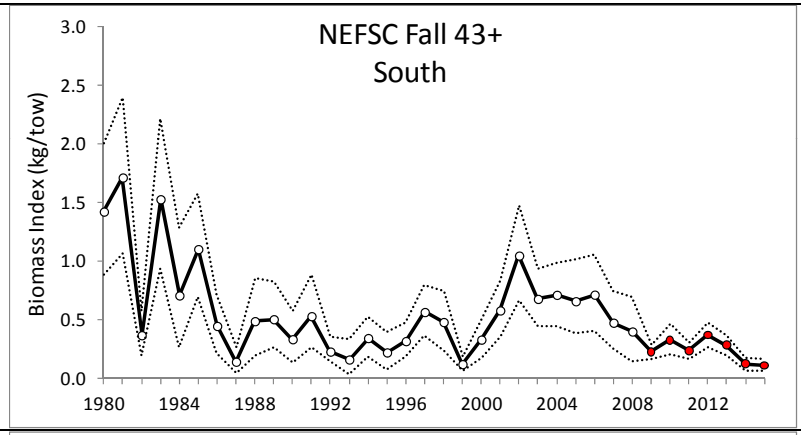


TOR 4: Compare ACLs with catches

- Discussion?

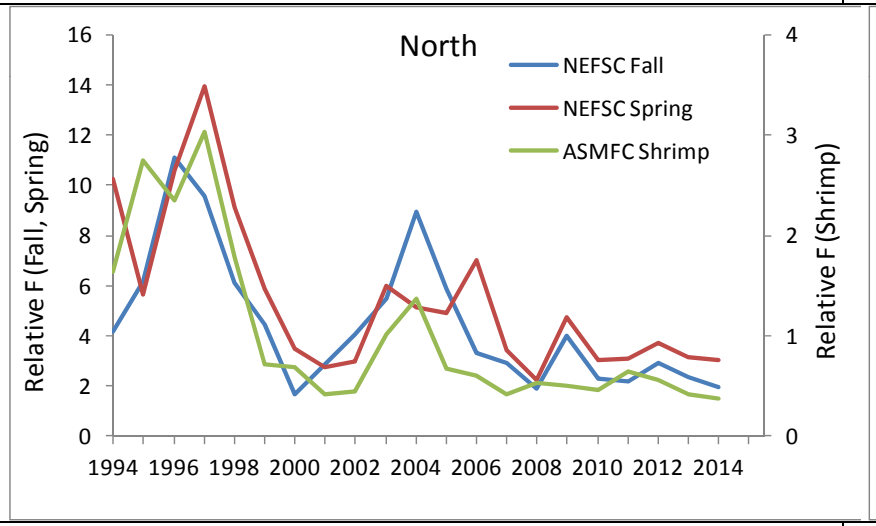
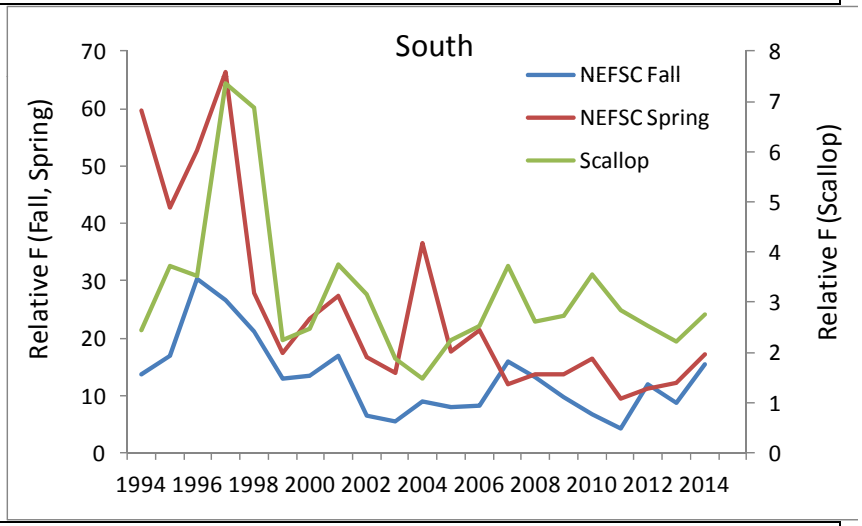
TOR 5. Provide analysis for SSC

- Trends in exploitable biomass

	North	South
A.		

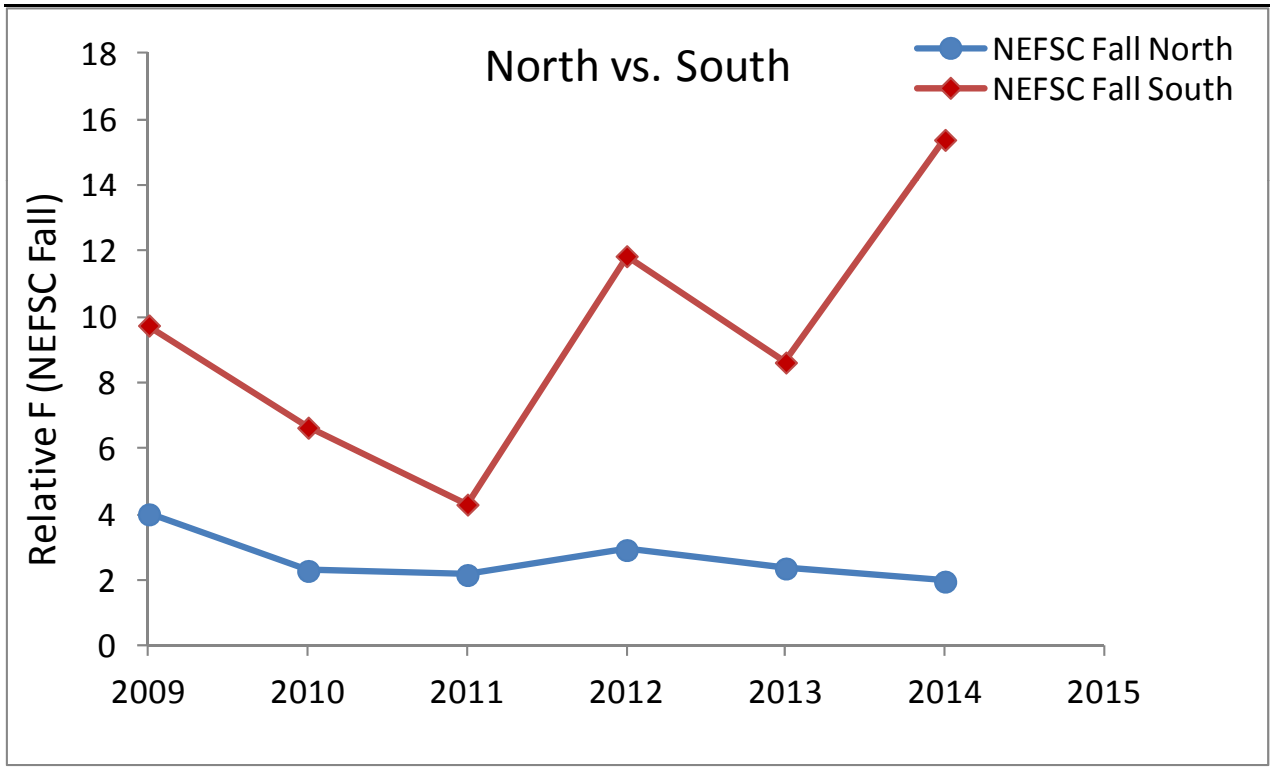
TOR 5. Provide analysis for SSC

- Relative exploitation indices (catch/abundance index)

North	South
	

TOR 5. Provide analysis for SSC

- Relative exploitation indices (catch/abundance index)

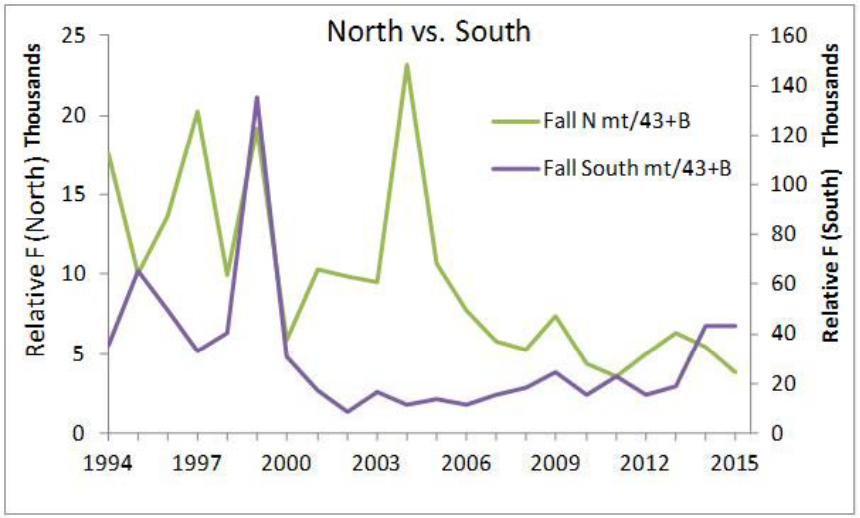


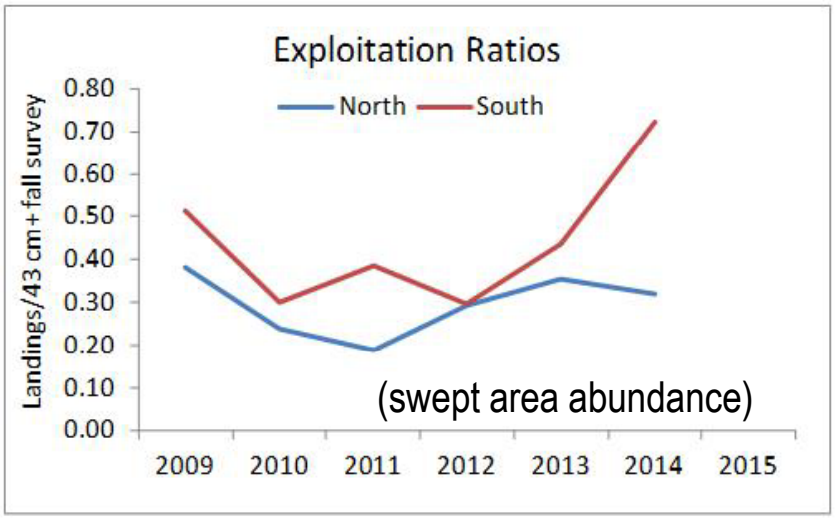
NEFSC fall survey

TOR 5. Provide analysis for SSC

- Relative exploitation indices (ldgs/43+ index)

NEFSC fall survey



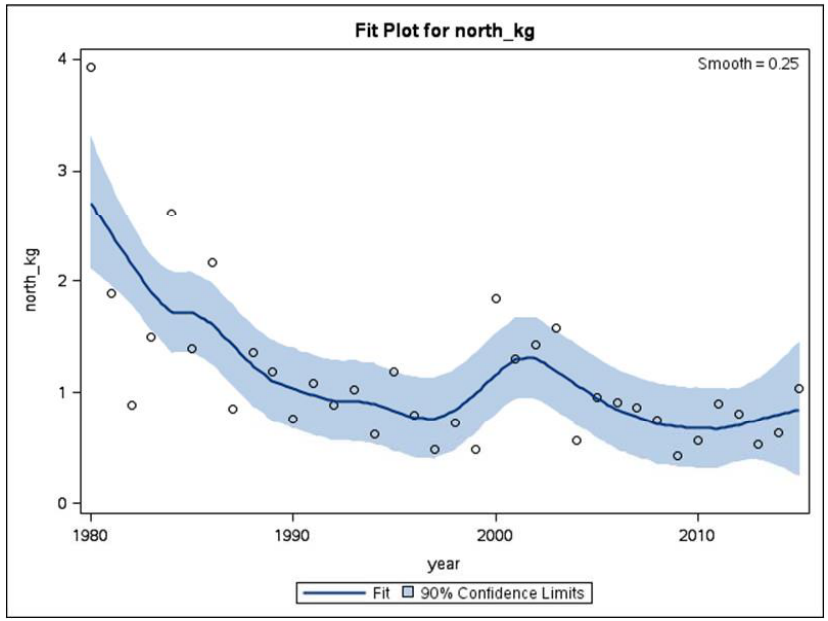


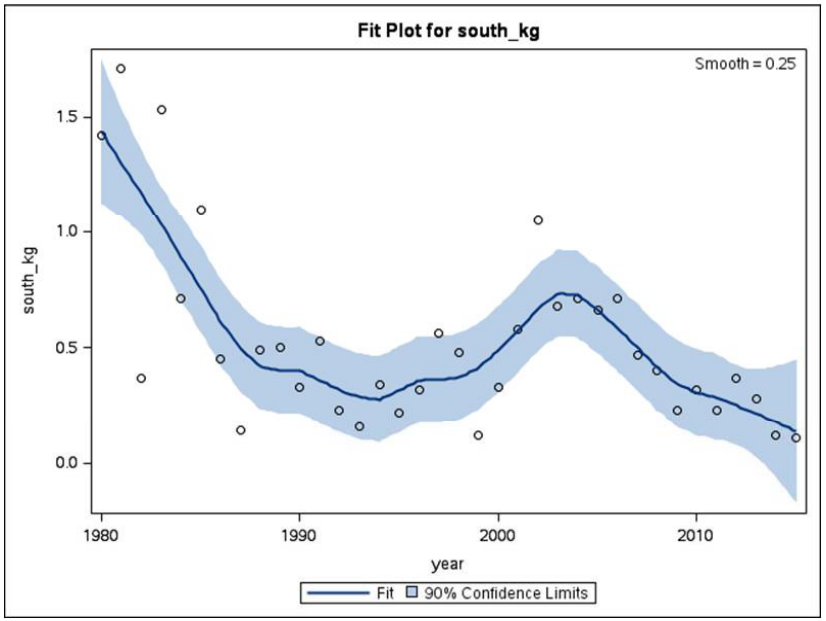
TOR 5. Provide analysis for SSC

- Method for TAL adjustment (GB cod)
  - Smooth indices (Loess, α=0.25)
  - Log-linear regression to estimate slope over last 3 years
  - Percent change =exp(slope)
  - Apply percent change to existing TAL to estimate new TAL

TOR 5. Provide analysis for SSC

- Loess smoothed indices

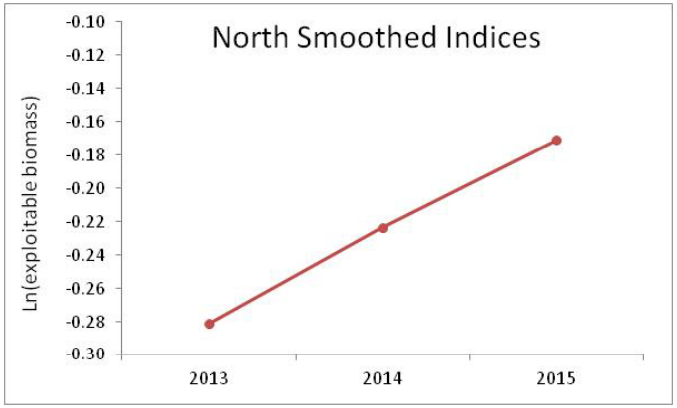




Exploitable biomass (43+cm)

TOR 5. Provide analysis for SSC

North	TAL (mt)	Landings (mt)	Ln(smoothed index)
2013	5,854	3,332	-0.28
2014	5,854	3,402	-0.22
2015	5,854	4,016	-0.17
Slope			1.06

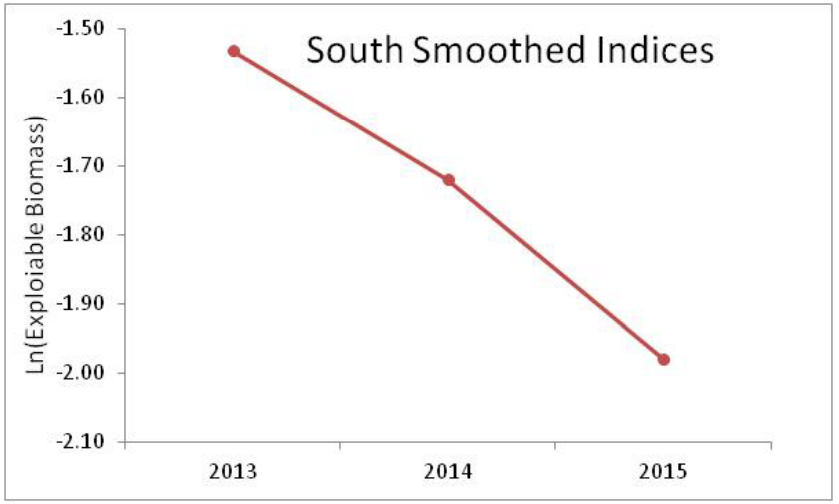


Exploitable biomass (43+cm)

TOR 5. Provide analysis for SSC

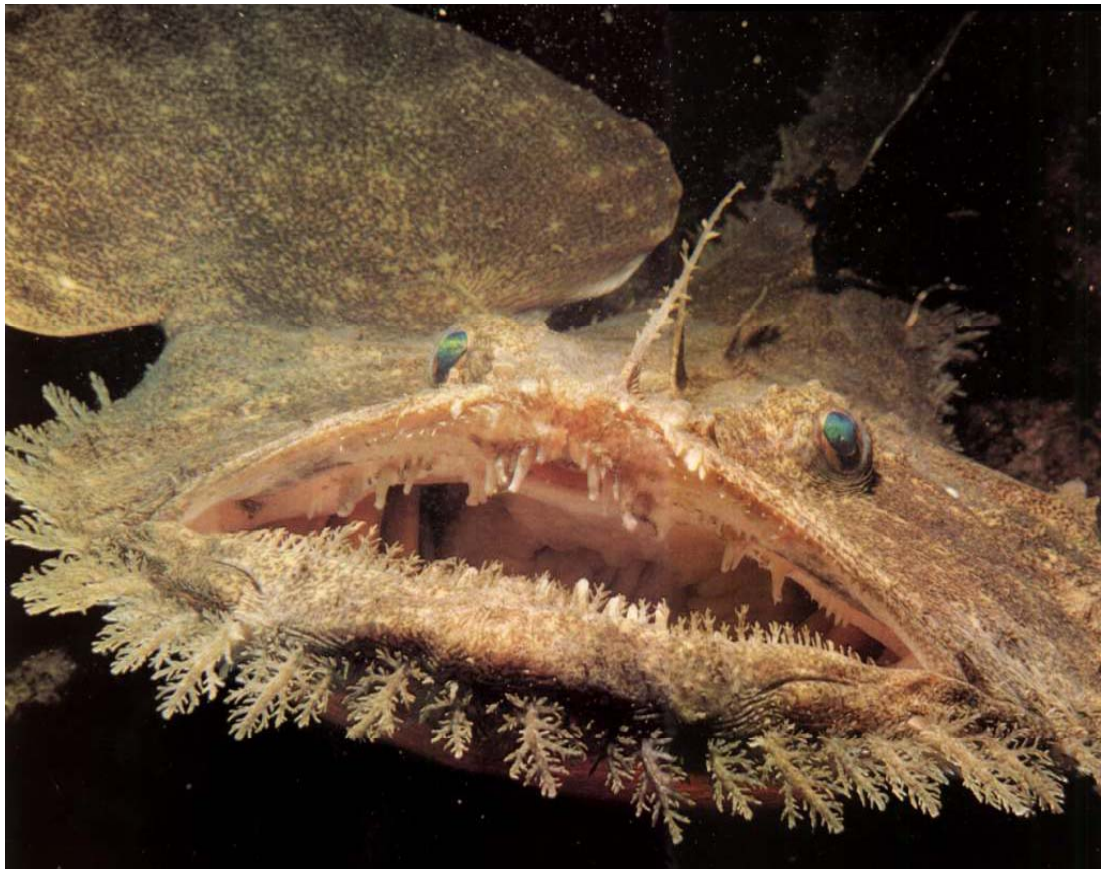
- South

South	TAL (mt)	Landings (mt)	Ln(smoothed index)
2013	8,925	5,253	-1.53
2014	8,925	5,135	-1.72
2015	8,925	4,678	-1.98
Slope			0.80



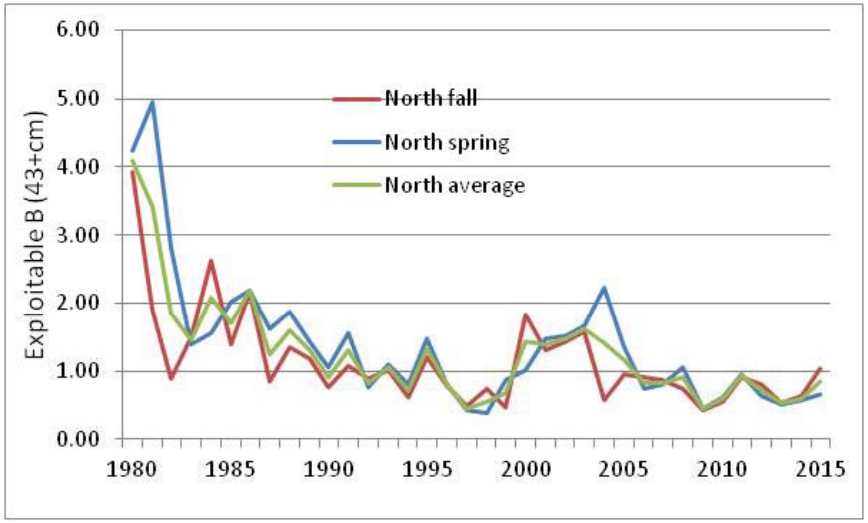
TOR 5. Provide analysis for SSC

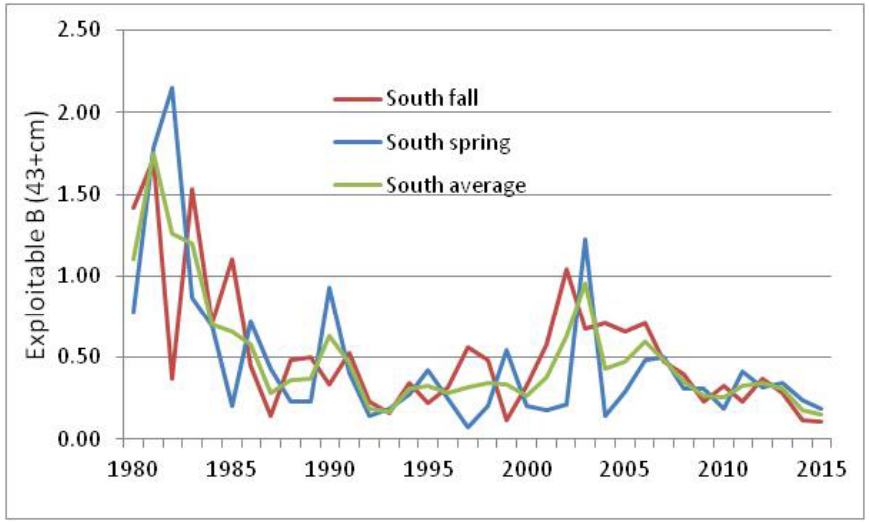
- Discussion?



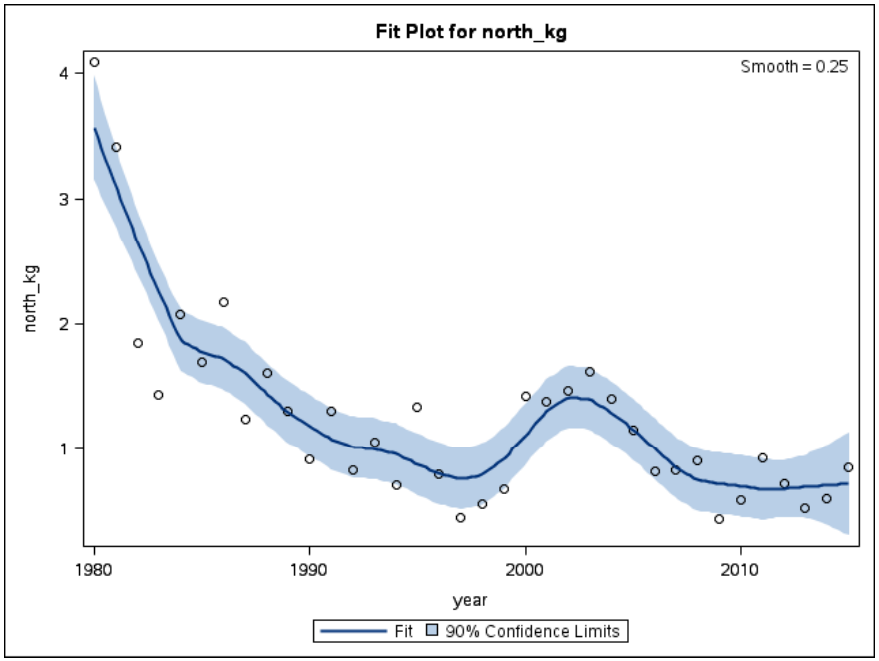
Spring and Fall Exploitable Biomass Indices

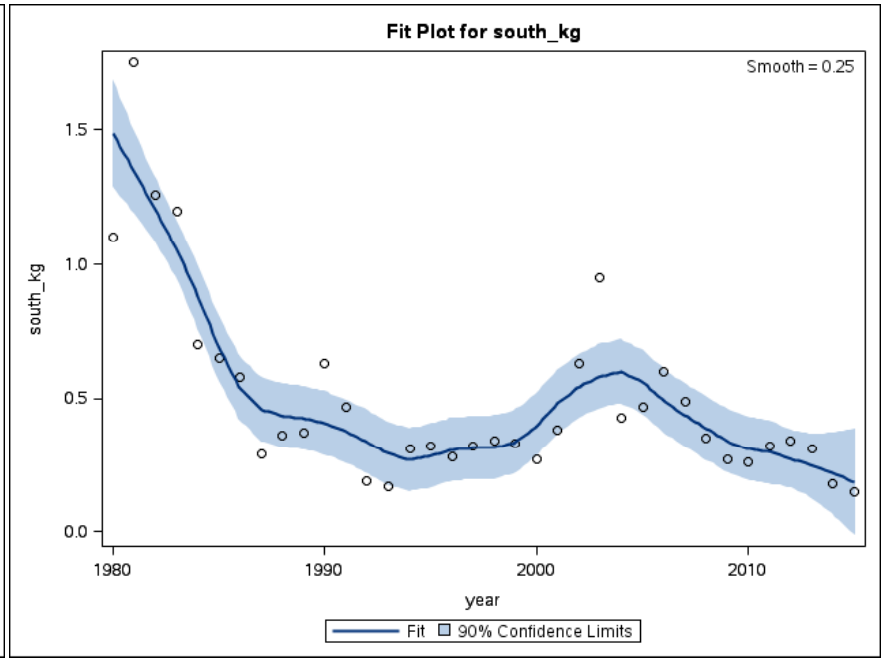
- Raw arithmetic indices (not smoothed)
- North South



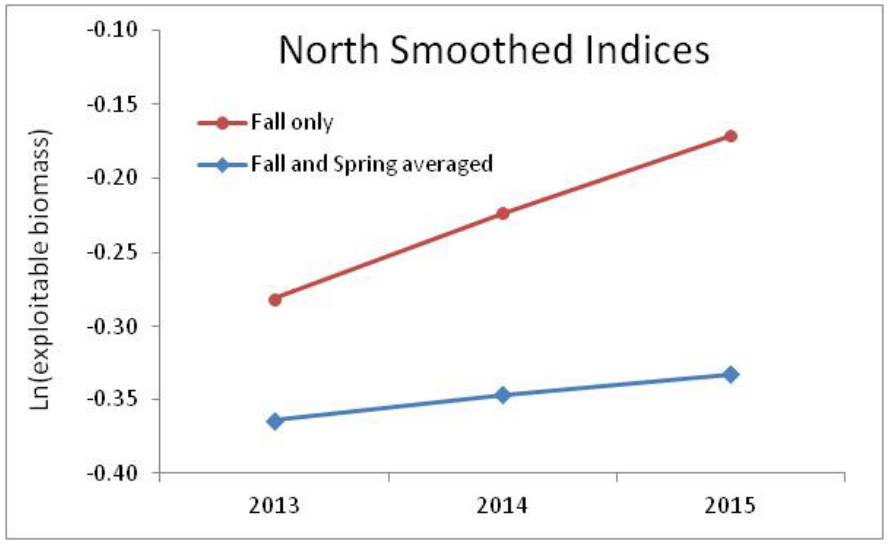


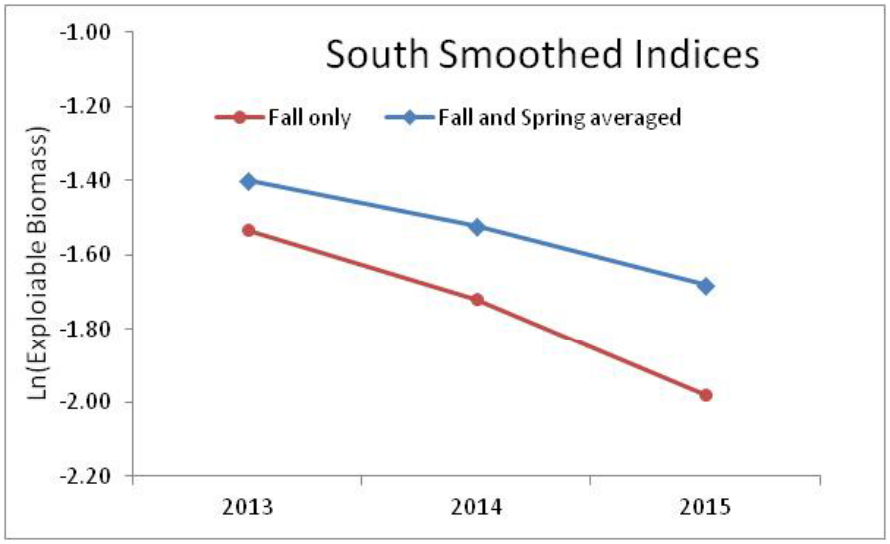
Loess-smoothed spring-fall average 43+ indices





Ln(smoothed indices)





Proportional Change

	ln(avg spr fall 43+ idx)	
	North	South
2013	-0.36	-1.40
2014	-0.35	-1.52
2015	-0.33	-1.68
slope	0.02	-0.14
pct change spring and fall averaged	102%	87%
pct change fall only	106%	80%