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Overview of Stock Assessment Process and Portfolio of Products

TOR II Assessment Process

By

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NOAA FISHERIES

TOR II Assessment Process

Is the assessment process efficient, effective and clearly described, including terms of reference for assessment reports?

Overview

The Variable Annual Schedule

Differences among approaches

Types of Products

- SARC
- TRAC
- Special events (GARM, Data Poor WG)
- Operational Assessments
- Updates

Responsiveness to new challenges

Portfolio of Assessment Products

Data Updates—survey, landings, catch & application of simple statistical models:

- Mackerel, squid (2 sp), skates (7 sp), tilefish, butterfish, black sea bass, scup

Updates—Run existing model with updated data, SSC review

- TRAC—E. Georges Bank Cod, E. GB haddock, GB yellowtail
- MAFMC—Bluefish, Spiny Dogfish, Ocean quahogs

Operational Assessments—Run existing model with external review + SSC

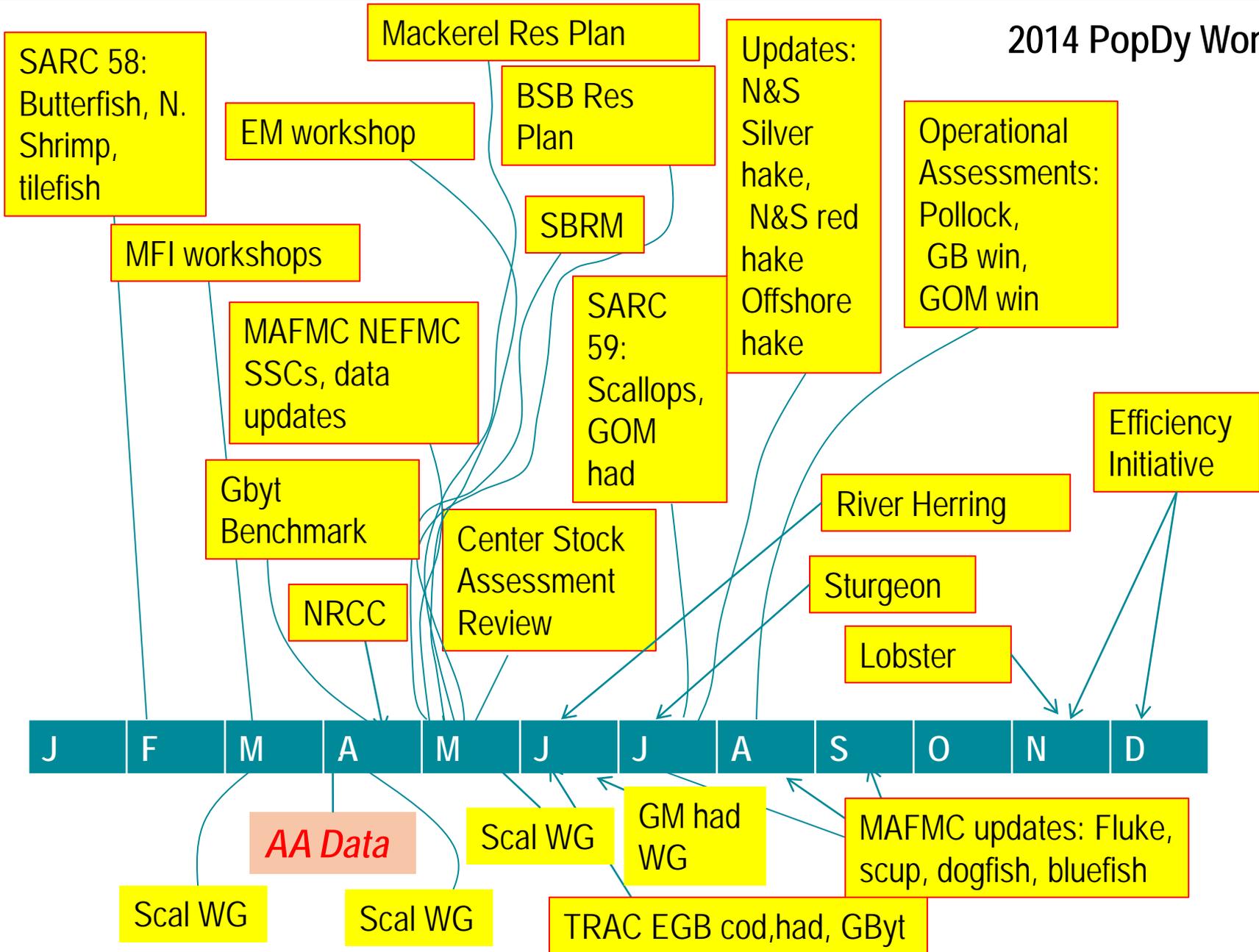
- Monkfish (2 stocks)

Benchmarks: Complete Review—data, model, Ref Pts; Independent External Review + SSC

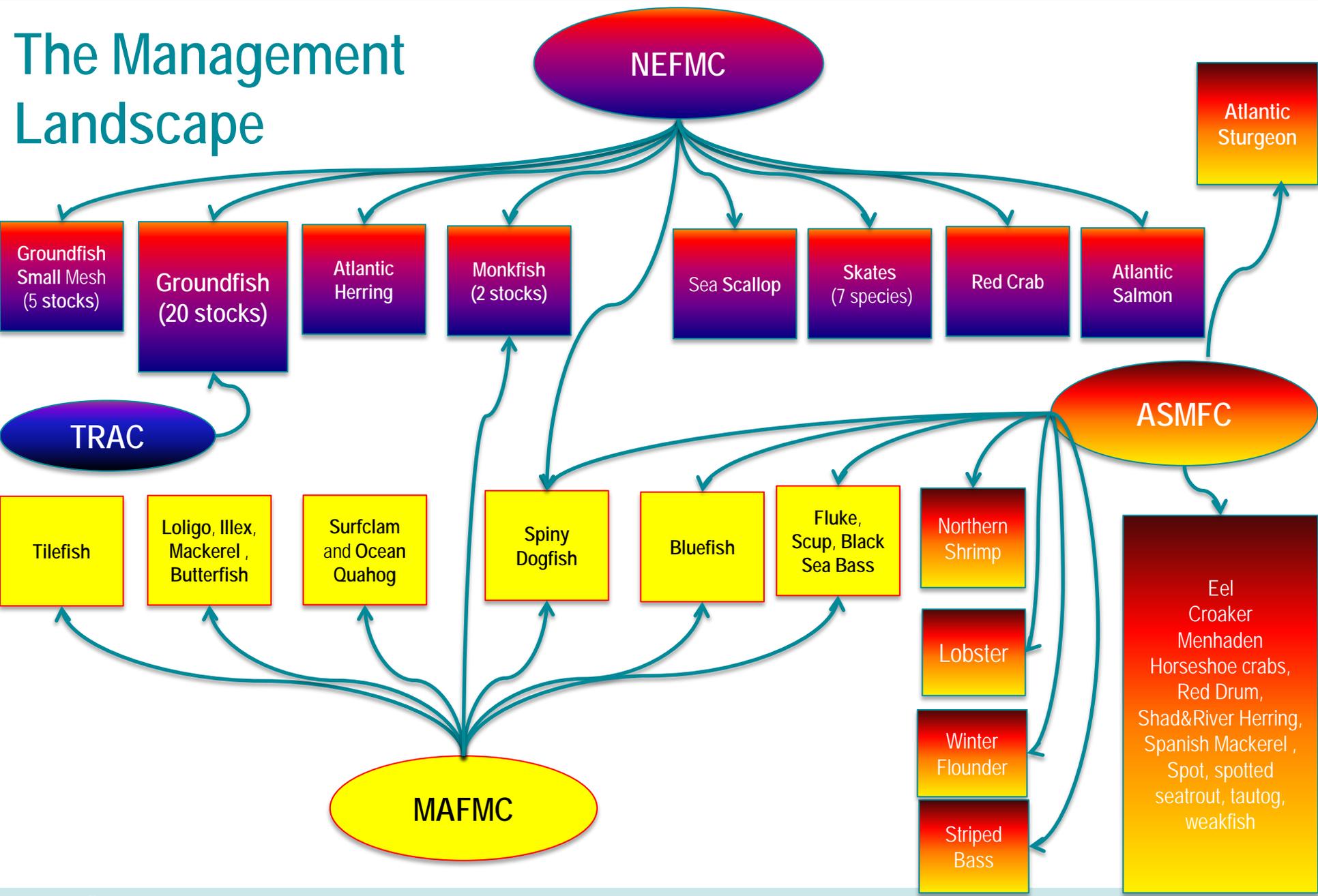
- E. Georges Bank cod (via TRAC)
- White Hake
- Surfclam
- Striped bass
- Summer flounder

2013—a
typical year
>25 products

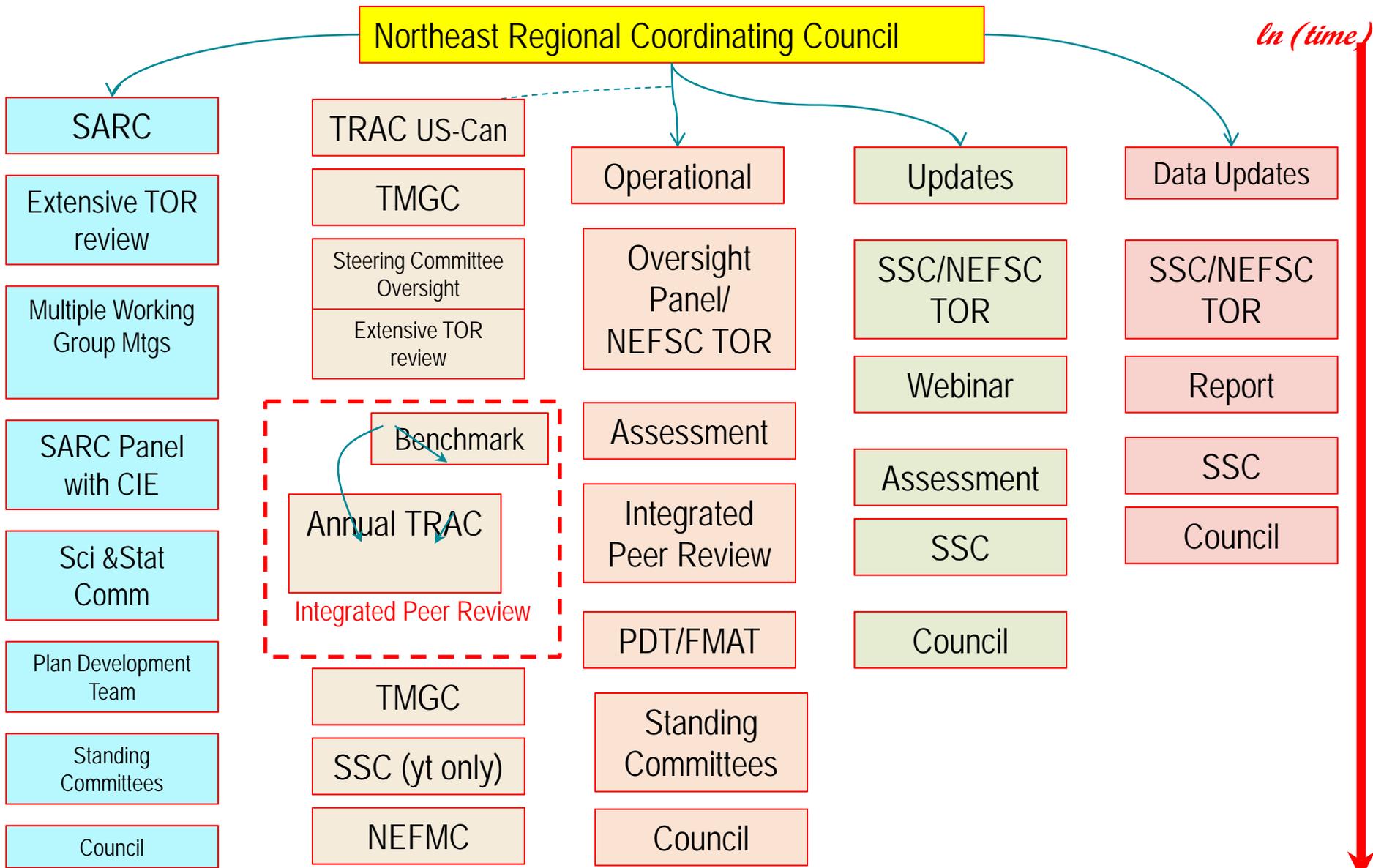
2014 PopDy Workplan



The Management Landscape



Stock Assessment Processes: Multiple Paths to Catch Advice



Summary of model type for NEFSC stocks assessed

Number of stocks	61
Age-based	24
Length-based	9
Delay Difference	1
Aggregate Biomass	2
Index & Catch	15
Index only	7
No Assessment	5

Total	63
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* total > number of stocks
because >1 model for some
stocks

Multiple Approaches and Multiple Models—Why so many?

- An adaptation to the varying needs and timing of assessment products.
- Transboundary management issues
- Timing of management needs for rebuilding, implementation of amendments and framework adjustments
- Experimental implementation of alternative approaches, e.g., “Operational Assessments”
- Variations in life history and data affect ability to support and update models.
- Improvements in methods, benchmarks, new lead scientists

Additional Assessment Products

- Groundfish Assessment Review Meeting (GARM)
 - 2001 GARM I—Benchmark all stocks
 - 2005 GARM II—Update all stocks
 - 2008 GARM III Benchmark for all 19 stocks
- Data Poor Workshop 2009
 - 2007 Monkfish
 - 2008 Eight stocks assessed
- Empirical Approach for Georges Bank yellowtail flounder
- Vessel calibration (R/V Albatross to Bigelow)
- New methods for butterfish

The GARM Process: 2008 (19 stocks)

Meeting	# Working Papers	# Authors	# Pages	# Participants	# Reviewers
Data Methods	34	94	1,022	52	3 SSC 4 External
Models	21	42	84	45	3 CIE 3 External
Biological Reference Points	42	76	1,534	45	3 CIE 2 External
Assessment	43	68	1,773	49	1 SSC 3 External
Total	140	280 (72 unique)	5,177	191	22

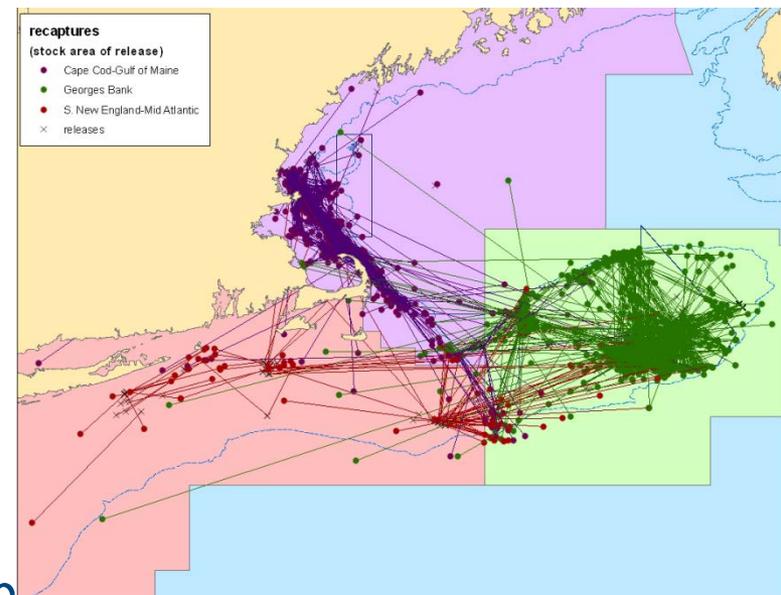
Empirical Approach to Stock Assessments: Georges Bank Yellowtail Flounder Addressing Retrospective Patterns

- A Benchmark conducted via the TRAC
- Center-wide effort to examine catchability, natural mortality, missing catch at process level
 - 46 papers
 - 105 authors (56 unique)
 - 10 organizations
 - CFF, DFO, EDF, NEFMC, NEFSC (5 branches), Roger Williams, SMAST, Univ. Malaya, VIMS, WHOI
 - 1,032 pages of working papers

GB Yellowtail Flounder

Factors Examined

- Movement and Distribution
 - No indication of problems
- Missing catch
 - No indication this is a major problem
- Life History
- Catchability of Trawl Nets
- Use of Cooperative Research Projects
- Biomass Estimates from Surveys
- Reference Points
 - Challenging when natural mortality changes within assessment



GB yellowtail flounder --Key Results

M changed from 0.2 to 0.4 based on life history characteristics

Indications M may be even higher recently

- Ichthyophonous?

Expand the three bottom trawl surveys to estimate biomass (use $q=0.37$)

Average the previous fall with current DFO and spring survey biomasses

Catch advice = 25% of the average biomass

Responding to New Challenges

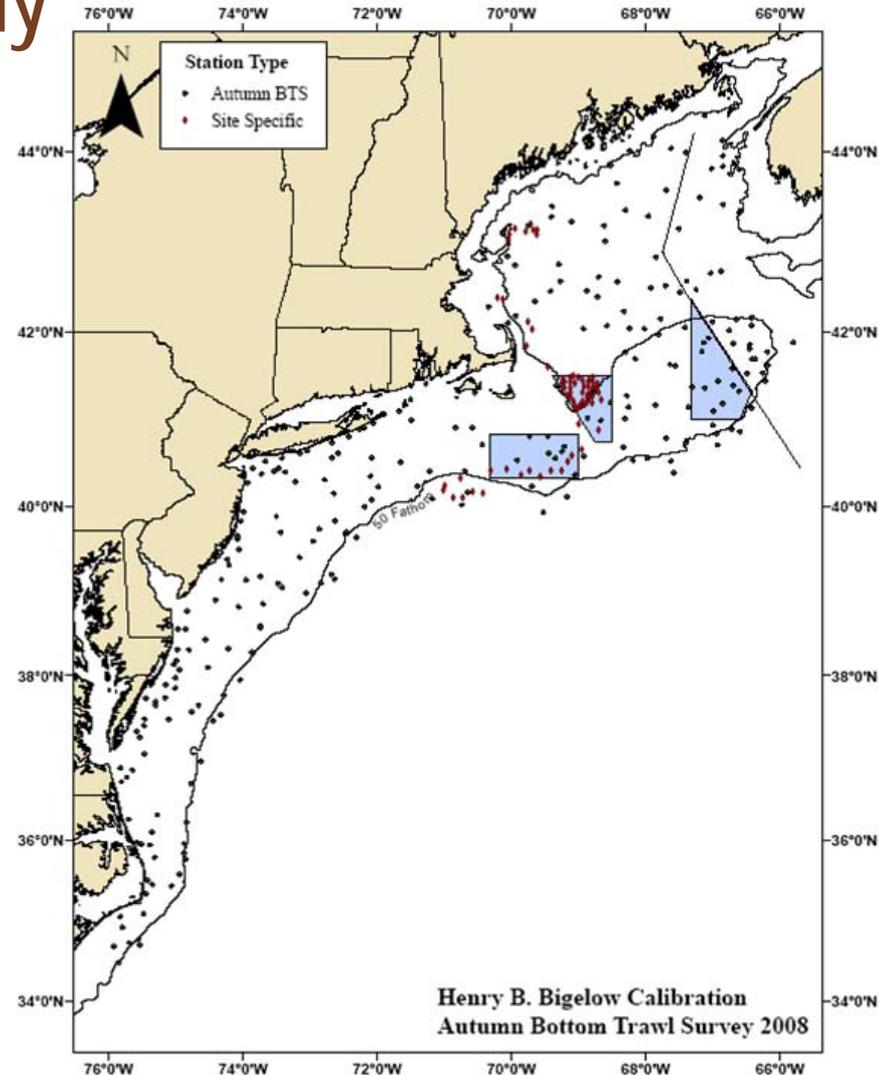
- **Discard estimation**, ~2005+—Standardized Bycatch Reporting Methodology (SBRM)
 - Output based (precision) allocation of sampling effort
 - 60 fleets, 14 FMPs (60 stocks)
 - Constraints based on magnitude of discards (no chasing after ghosts)
 - Application of common ratio estimator across assessments
 - Annual reports to Councils and GARFO
- **Sector Implementation** ~2010+
 - Developed methods for real-time discard estimation
 - Developed Pre-Trip Notification System (PTNS) for observer allocation
 - Prototype electronic Vessel Trip Report (eVTR) system
 - Evaluation of Electronic Monitoring and implications for discard monitoring

Responding to New Challenges

Albatross IV: Bigelow Study

- In 2008 over 600 paired tows were conducted during the spring and fall survey periods and also during the summer months between. 300+ species
- Peer-reviewed report produced on methodology for estimating relative catch efficiencies (scalar calibration factors) by species. Estimates provided for almost 50 species.

Miller TJ, Das C, Miller AS, Lucey SM, Legault CM, Brown RW, Rago PJ. 2010. Estimation of Albatross IV to Henry B. Bigelow calibration factors. NEFSC RD 10-05



Size-effects on relative catch efficiency

- Size effects are important because changes in size composition of the population over time could provide incorrect calibration when unaccounted for.
- Development of methods progressed over time
 - Cod, haddock, yellowtail (TRAC, 2010), Betabinomial segmented regression
 - Loligo squid, red/silver/white/offshore hakes (2010 SARCs), Skates (PDT), Betabinomial with functional relationships to length
 - Herring, scup, winter flounder, black sea bass (2011 SARCs) Betabinomial with orthogonal polynomial regression
 - Fluke, lobster (2011 SARCs), Betabinomial spline smoothers
- Work culminated in 2013 with new hierarchical beta-binomial model with random spline smoothers applied to 16 species (CJFAS 70:1306-1316)

Responding to New Challenges

Augmented ASAP Model for Atlantic Butterfish (SARC 58)

- Reparameterized catchability as product of availability and efficiency components and as function of covariates
 - Allowed incorporation of bottom temperature based estimates of stock availability to the bottom trawl survey
 - Also incorporated estimates of efficiency based on Bigelow day/night differences in efficiency
- Internal estimation of length-based calibration factor for Bigelow/Albatross IV vessels.
- Estimation of natural mortality
- Estimation of new biological reference points

Strengths

- Highly responsive, motivated and talented colleagues
- Ability to address major stock assessment issues and management needs as they arise
- Production of high quality assessment products for management
- Ability to respond, while maintaining high throughput of assessments, to major needs (e.g., SBRM, Sectors, Georges Bank yellowtail flounder, butterfish catchability)

Challenges

- Complexity and timing of tasks
- An “update only” approach reduces ability to develop new modeling and statistical methods, incorporate scientific breakthroughs, and include new technologies.
- Common problems across multiple species require research time for synoptic solutions

Solutions

- Improve timing of data streams
- Reduce complexity of routine assessments in favor of more focused research efforts on common problems
- Improve efficiency of Stock Assessment Process to allow more research on key factors

Questions?

Where's salmo?

