

FMP Policy Overview: Defining Success (draft)

Marine Fisheries Commission
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Overview

- Federal mandate (Magnuson-Stevens Act)
- Relevant caselaw for “50% success” criteria
- State mandate (Fisheries Reform Act)
- Evaluation of management measures and role of stock assessment
- Quantitative examples
- Options for future FMP amendments



MSA Mandate

National Standard 1

“Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.”



MSY vs. OY

Maximum Sustainable Yield >> Optimum Yield

$MSY = OY - (\text{economics} + \text{social} + \text{biology})$

MSY only considers biological capacity



Legal Precedent: Summer Flounder

- 60/40 coastwide quota split (comm/rec)
- 1993: quotas/harvest limits implemented
- Assessments: TALs calculated to meet target F
- Controversy regarding assessment results



Photo: D. Flescher



Legal Precedent, cont'd.

- 1998, 1999: TALs have 3 % and 18 % likelihood of meeting target F, respectively
- 1999: Conservation groups sue NMFS for violating MSA and NEPA in setting TAL
- 2000: Court of Appeals remanded 1999 TAL to NMFS, concluding that the TAL did not satisfy the MSA
- Set minimum standard for quotas to comply w/SFA by requiring at least 50% likelihood of achieving target F



1997 NC Fisheries Reform Act

Sustainable Harvest

“The amount of fish that can be taken from a fishery on a continuing basis without reducing the stock biomass of the fishery or causing the fishery to become overfished”



photo: NCDMF



1997 NC Fisheries Reform Act

- FMPs required to end overfishing and achieve sustainable harvest within 10 years**
- overfished: spawning stock biomass below level required for recruitment class to replace spawning class
- overfishing: fishing mortality rate that prevents fishery from producing sustainable harvest



Evaluating Management Measures

- What is the role of the stock assessment in evaluating proposed management measures?
- What measures can we quantify?
- How do we determine the likelihood of success for a measure?

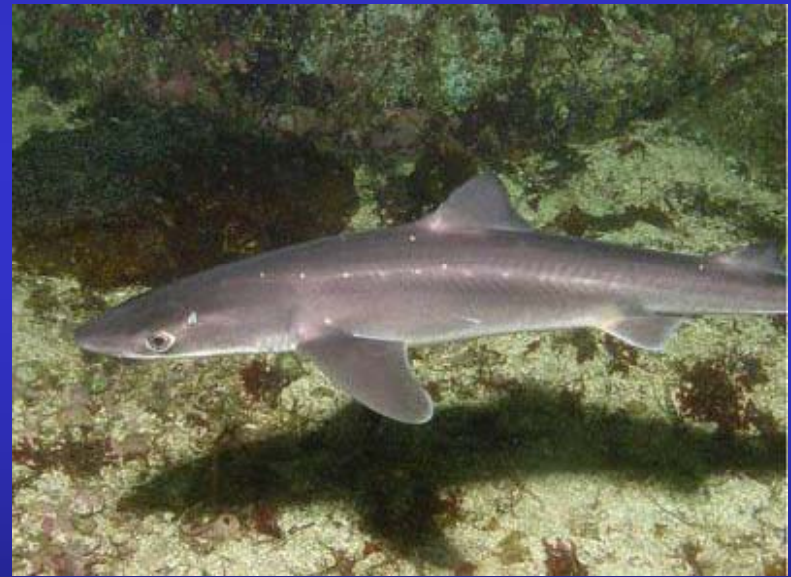


photo: SharkPics.com



Stock Assessment

- Biological info: age structure, length, weight, age at maturity, fecundity, natural mortality, other life history characteristics
- Fishery info: catch, landings, effort, gear used, water body, market size, seasonality
- Result: report on health of the stock (i.e., SSB, F)
- Uncertainty in report is related to quality of data



Understanding Uncertainty

- Biological uncertainty: lack of information about the species (spawning behavior, age at maturity, etc.)
- Management uncertainty: unanticipated changes in behavior/reaction of fishermen OR of stock to management measures
- Model uncertainty: assumptions made regarding **stock-recruit relationship** in order to run model

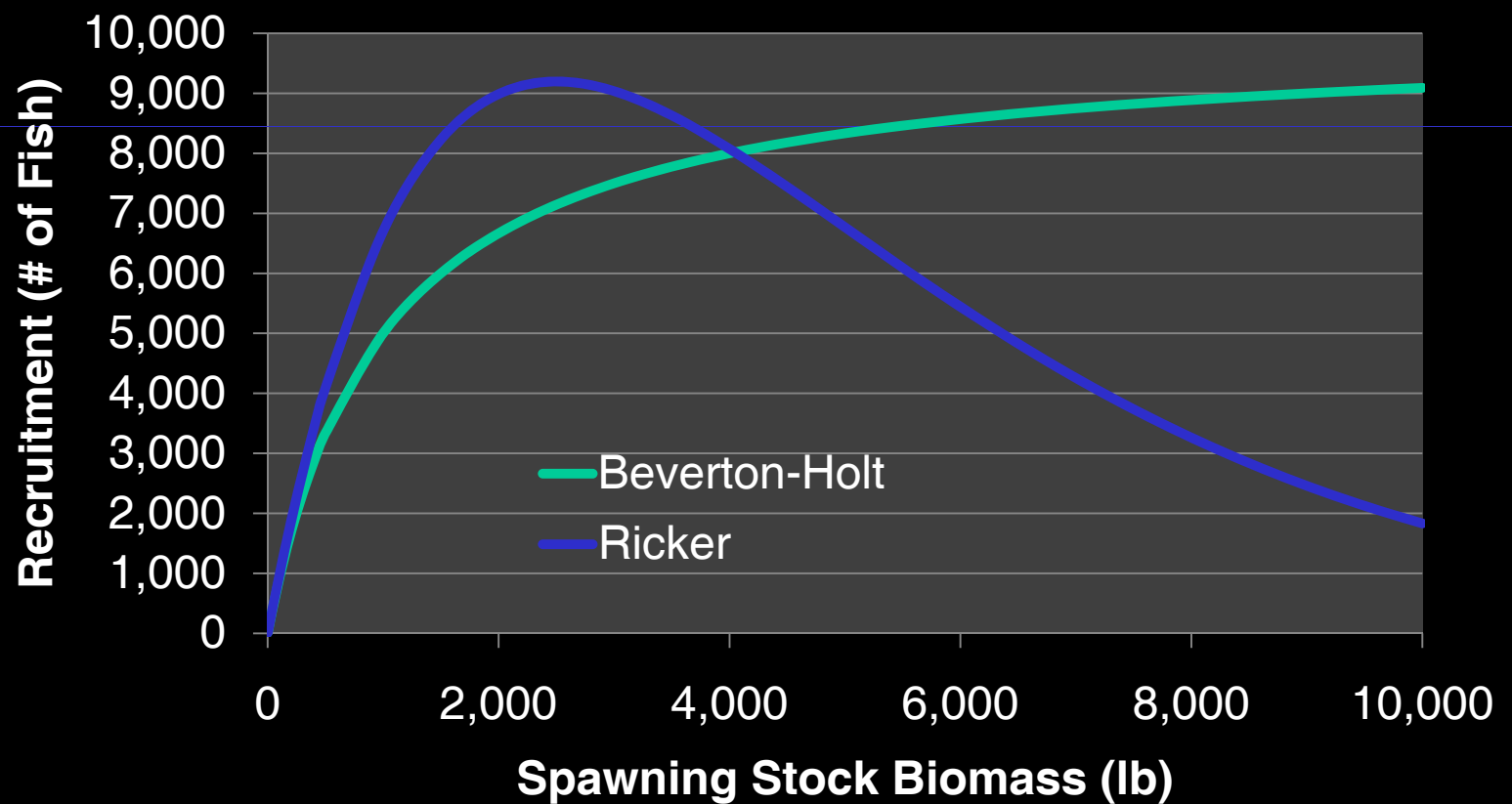


Recruitment Uncertainty

- How does recruitment respond to changes in spawning stock biomass?
- Several models used to try and estimate this relationship
 - Beverton-Holt, Ricker, etc.



Types of Models



Understanding Recruitment Uncertainty

- Projections based on assumptions of SRR
- Become increasingly uncertain the more dependent they become on the SRR
- Uncertainty increases as projections go further out in time
- Short-term projections are generally fairly reliable
 - based on estimated initial abundances at age
- Longer-term projections become increasingly dominated by assumed SRR and therefore increasingly uncertain

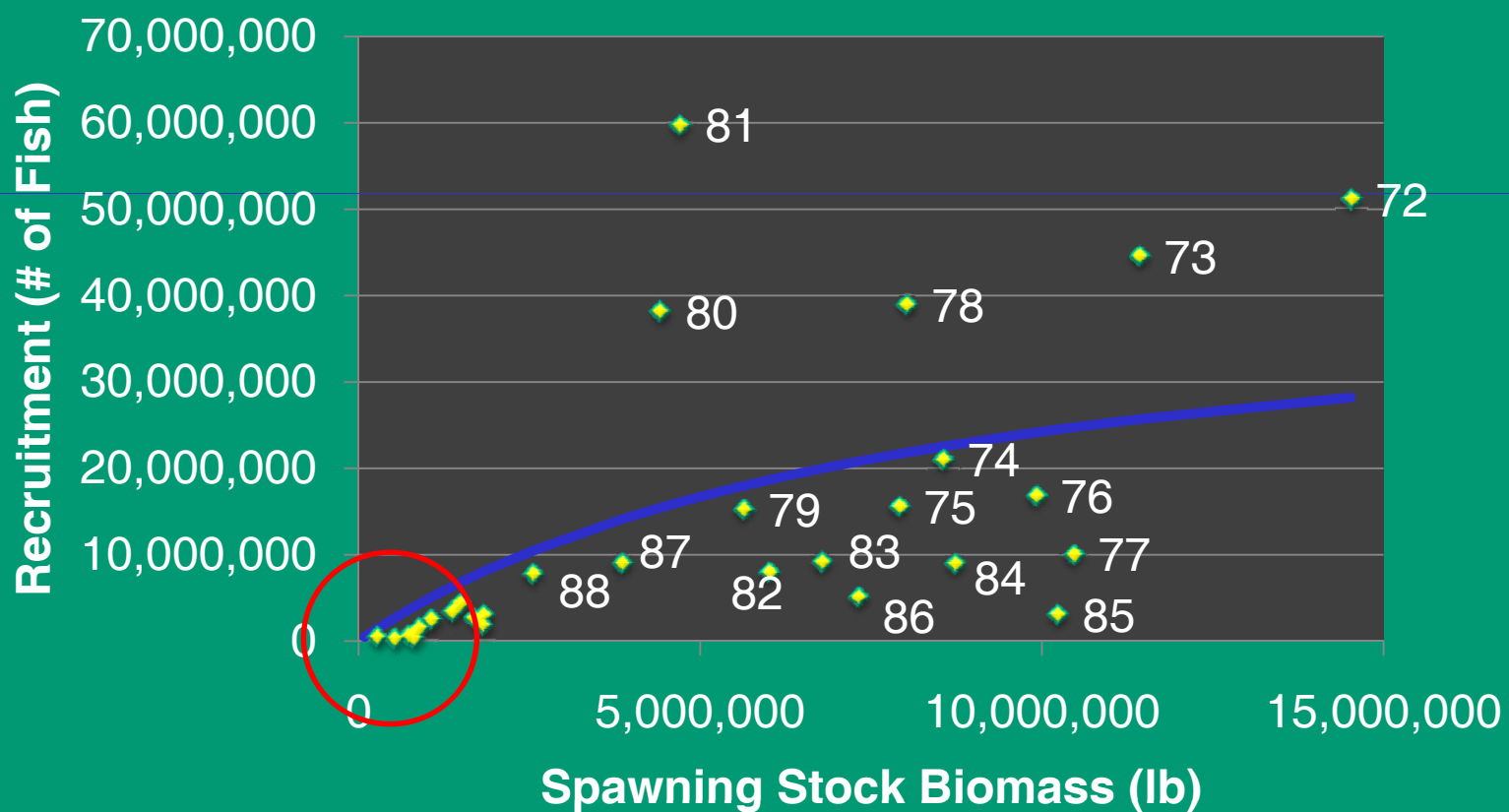


Uncertainty in Stock Recruitment Relationship

- Increased uncertainty
 - Short-lived species
 - Highly variable recruitment
 - Recruitment dependent on environmental factors
 - Recruitment only estimated over a narrow SSB range
 - (estuarine species, river herring, spotted seatrout, etc.)
- Decreased uncertainty
 - Longer-lived species
 - More consistent recruitment
 - More stable environment
 - Recruitment estimated over a wide range of SSB
 - (pelagic species, snapper, groupers, etc.)



Blueback Herring



Blueback Herring

- 2003 is last year of assessment
- Subsequent years depend on stock-recruit relationship

Proj Year	Year	Age 3	Age 4	Age 5	Age 6	Age 7+
0	2003	Obs	Obs	Obs	Obs	Obs
1	2004	Est	Obs	Obs	Obs	Obs
2	2005	Est	Est	Obs	Obs	Obs
3	2006	Est	Est	Est	Obs	Obs
4	2007	Est	Est	Est	Est	Obs
5	2008	Est	Est	Est	Est	Est
6	2009	Est	Est	Est	Est	Est
7	2010	Est	Est	Est	Est	Est
8	2011	Est	Est	Est	Est	Est
9	2012	Est	Est	Est	Est	Est
10	2013	Est	Est	Est	Est	Est



Blueback Herring

By 3rd year of projection, abundance of dominant ages (4 & 5) are directly dependent on SRR

Proj Year	Year	Age 3	Age 4	Age 5	Age 6	Age 7+
0	2003	Obs	Obs	Obs	Obs	Obs
1	2004	Est	Obs	Obs	Obs	Obs
2	2005	Est	Est	Obs	Obs	Obs
3	2006	Est	Est	Est	Obs	Obs
4	2007	Est	Est	Est	Est	Obs
5	2008	Est	Est	Est	Est	Est
6	2009	Est	Est	Est	Est	Est
7	2010	Est	Est	Est	Est	Est
8	2011	Est	Est	Est	Est	Est
9	2012	Est	Est	Est	Est	Est
10	2013	Est	Est	Est	Est	Est



Quantifying Management Measures



- Quantifiable: size limits, bag limits, trip limits
- Non-quantifiable: Gear attendance, distance between gears, use of circle hooks, distance off the bank, net length, trawling closures, etc.
- Behavioral changes difficult to predict



Example: Red Drum

Bag Limit	Decreasing maximum size limit (minimum size = 18")						
	21"	22"	23"	24"	25"	26"	27"
	Static SPR						
1	54.9	50.9	47.9	43.7	40.2	36.6	32.1
2	54.1	49.8	46.2	41.5	38.1	34.4	29.8
3	53.8	49.4	45.4	40.6	36.9	33.2	28.6
4	53.8	49.2	45.2	40.4	36.3	32.5	27.9
5	53.8	49.2	45.2	40.2	36.1	32.2	27.6

Adapted from Vaughn and Carmichael, 2001

- Static SPR for a range of bag limits with decreasing maximum size limit
- Values at or above target (40% static SPR) in bold
- Threshold = 30% static SPR



Example: Summer Flounder

Probability of achieving F at specific TAL	2009 TAL based on F-rebuild=0.274	2009 TAL based on F-40%=0.255
50%	20.31	19.02
75%	19.08	17.87
90%	17.98	16.84
95%	17.30	16.20
99%	15.92	14.91

Probabilities associated with achieving target F rate at various levels of TALs (includes both commercial and recreational harvest)



Future Decisions

- The MFC makes final decisions regarding management measures
- Currently, DMF staff provides a wide range of options
- Options:
 - Staff can include only those measures which are quantifiable and have 50% likelihood of achieving objective
 - Staff can include full range of proposed measures for each mgmt issue, but “group” measures into suites that would have high likelihood of meeting goal
- “Likelihood of success” provides another filter through which to view management options

