

YELLOWFIN SOLE

BY

WILDERBUER, NICHOL AND IANELLI



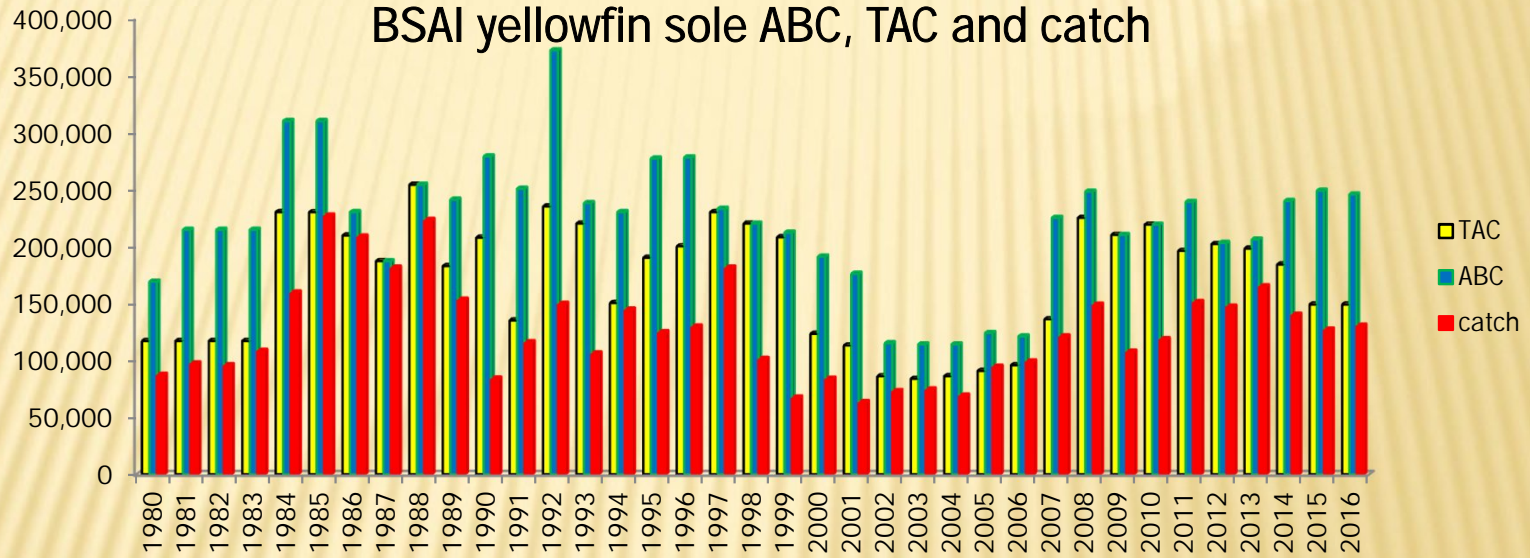


CHANGES TO THE INPUT DATA

- 2015 fishery age composition.
- 2015 survey age composition.
- 2016 trawl survey biomass point estimate and standard error.
- Estimate of catch (t) made through the end of 2016.
- Estimate of retained and discarded portions of the 2015 catch.



BSAI yellowfin sole ABC, TAC and catch





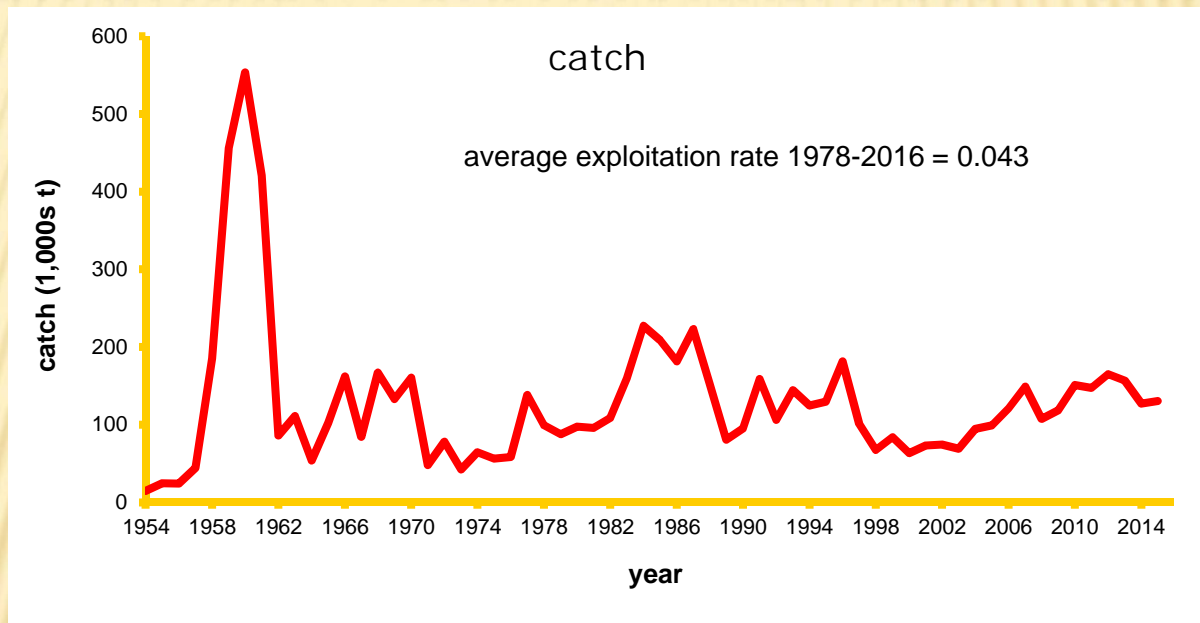
BSAI YELLOWFIN SOLE



	As estimated or specified last year for:		As estimated or recommended this year for:	
	2016	2017	2017	2018
Quantity				
M (natural mortality rate)	0.12	0.12	0.12	0.12
Tier	1a	1a	1a	1a
Projected total (age 6+) biomass (t)	2,170,000	2,086,200	2,290,100	2,202,300
Female spawning biomass (t)				
Projected	587,300			
B ₀	702,200	696,200	778,600	770,900
B _{MSY}	1,107,000		1,202,700	
F _{OFL}	435,000		424,000	
maxF _{ABC}	0.105	0.105	0.125	0.125
F _{ABC}	0.098	0.098	0.114	0.114
OFL (t)	0.098	0.098	0.114	0.114
maxABC (t)	228,100	219,200	287,000	276,000
ABC (t)	211,700	203,500	260,800	250,800
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	As determined last year for:		As determined this year for:	
Status	2014	2015	2015	2016
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

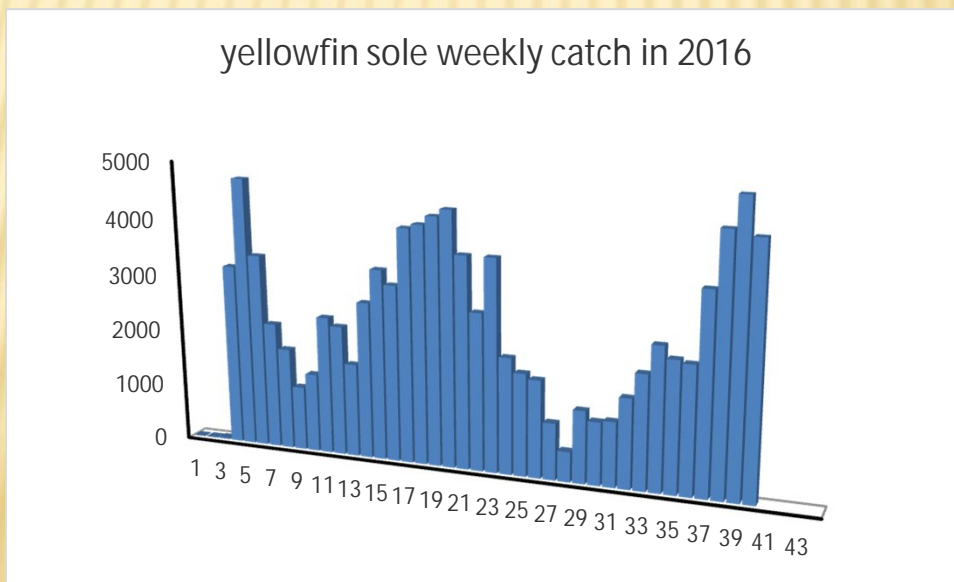
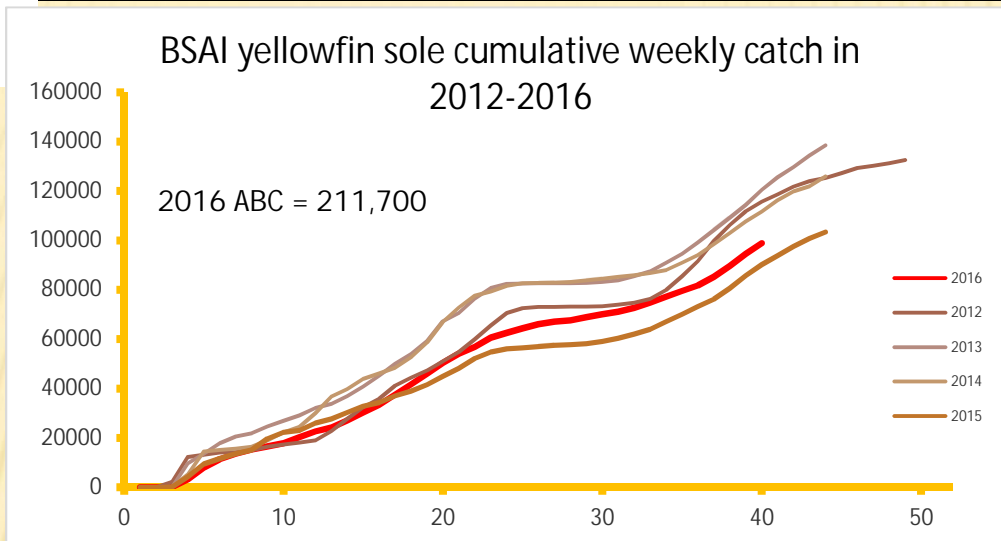
2016 CATCH = 128,000 T

AVERAGE 1978-2016 EXPLOITATION RATE = 0.043





Cumulative and weekly catch

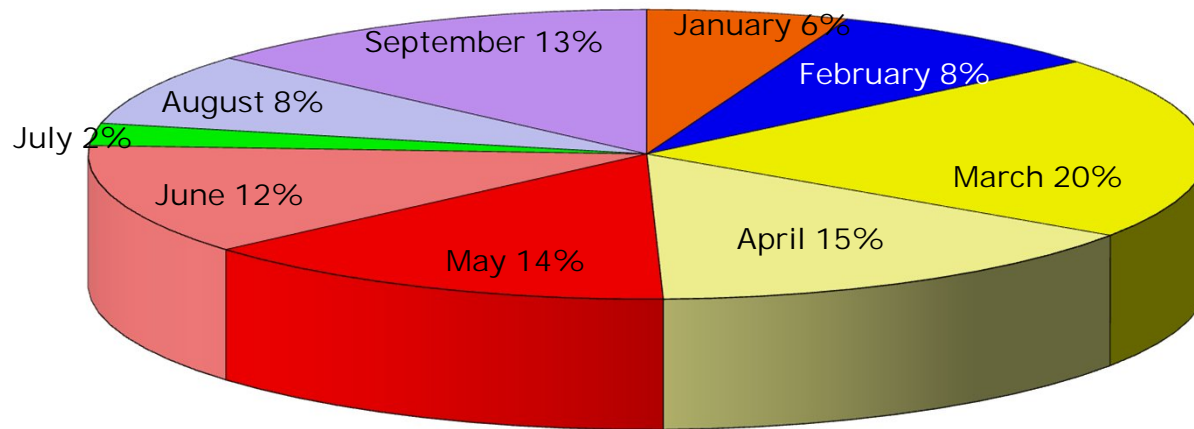




CATCH BY MONTH



yellowfin sole catch by month in 2016 through
September 9

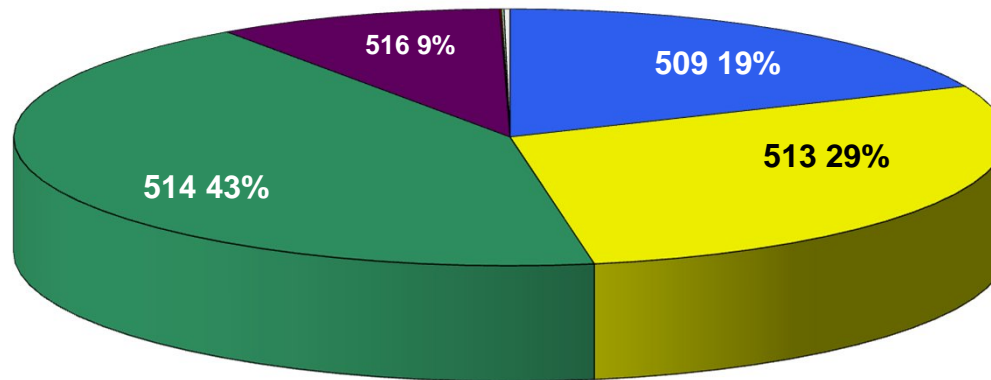


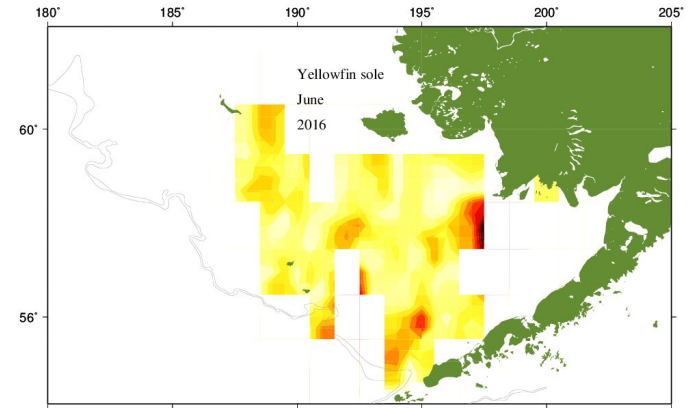
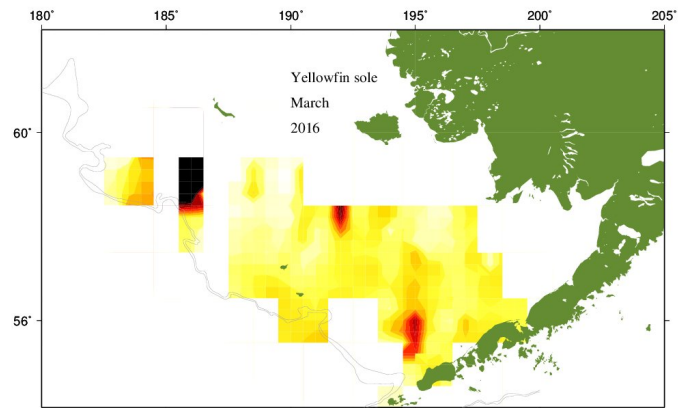
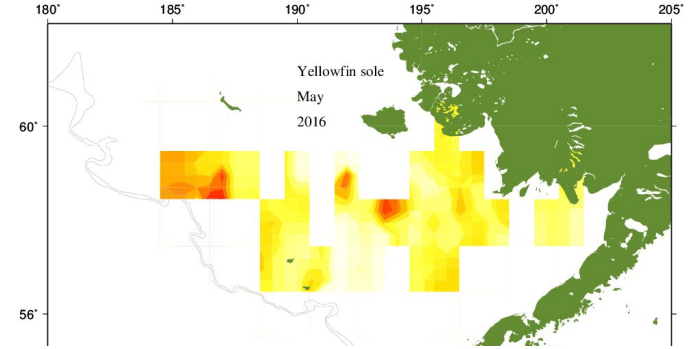
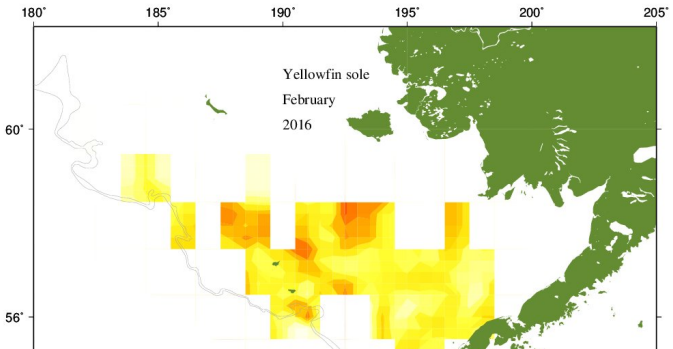
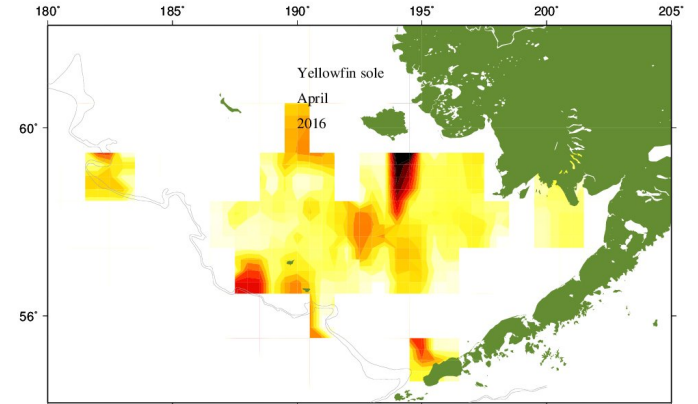
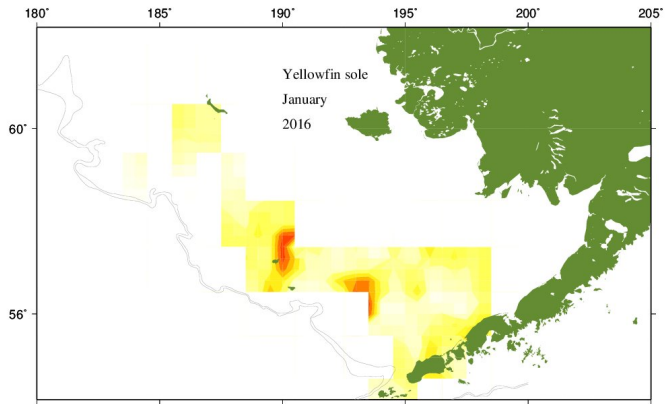


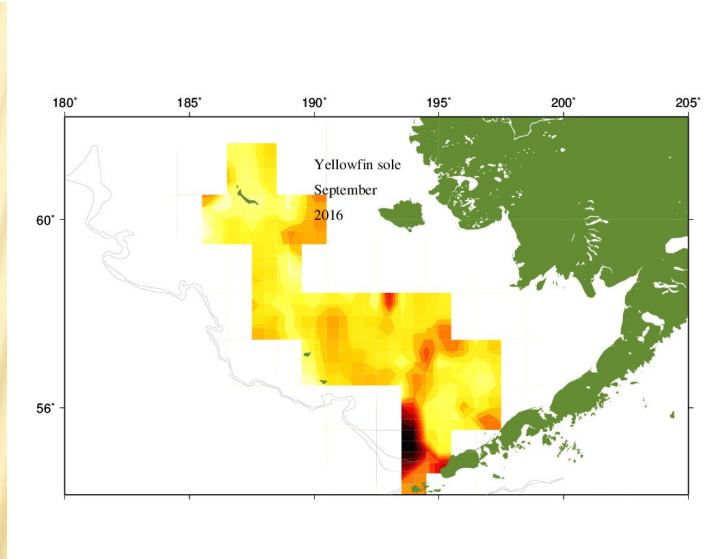
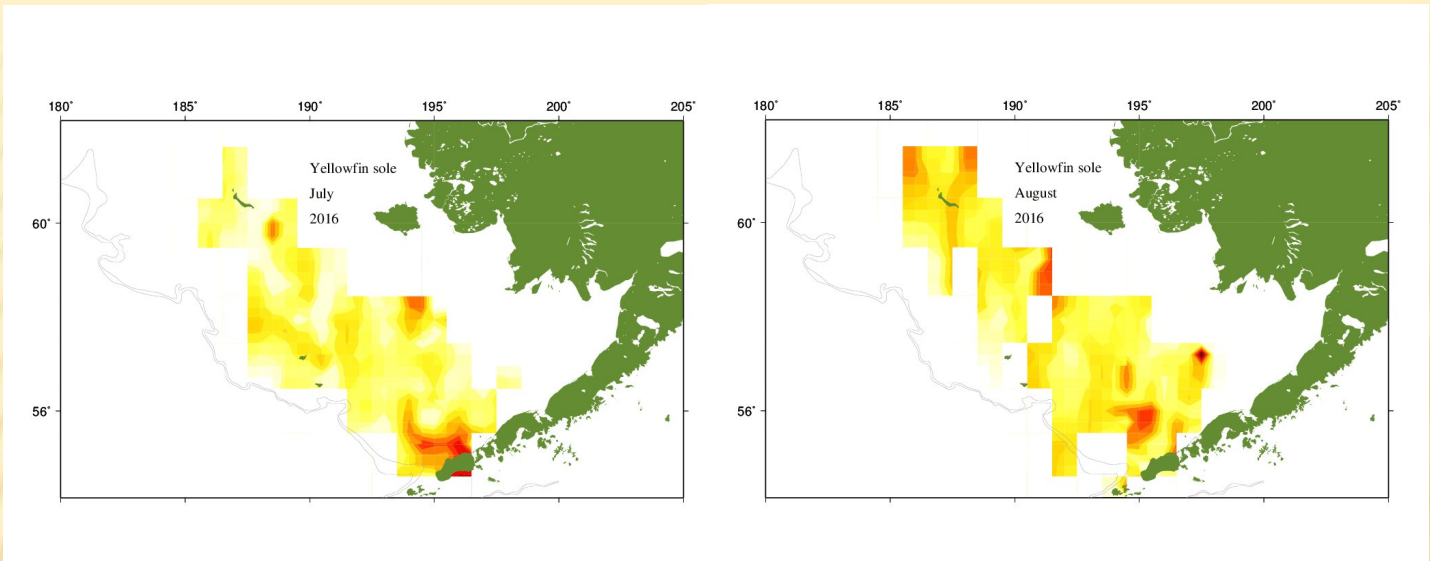
CATCH BY AREA



yellowfin sole catch by area in 2016 (through September 9)

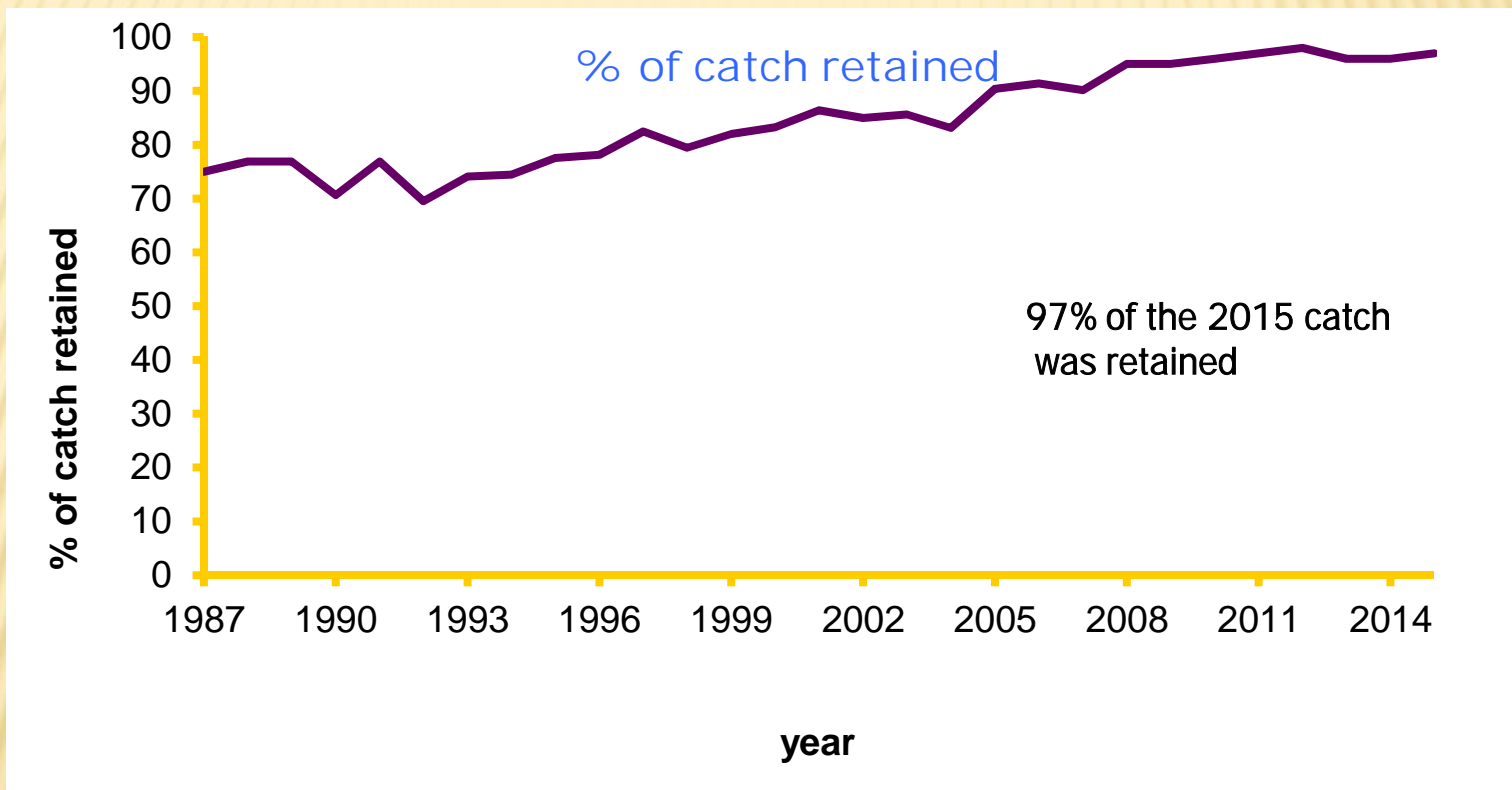








ANNUAL ESTIMATE OF RETAINED CATCH (%)



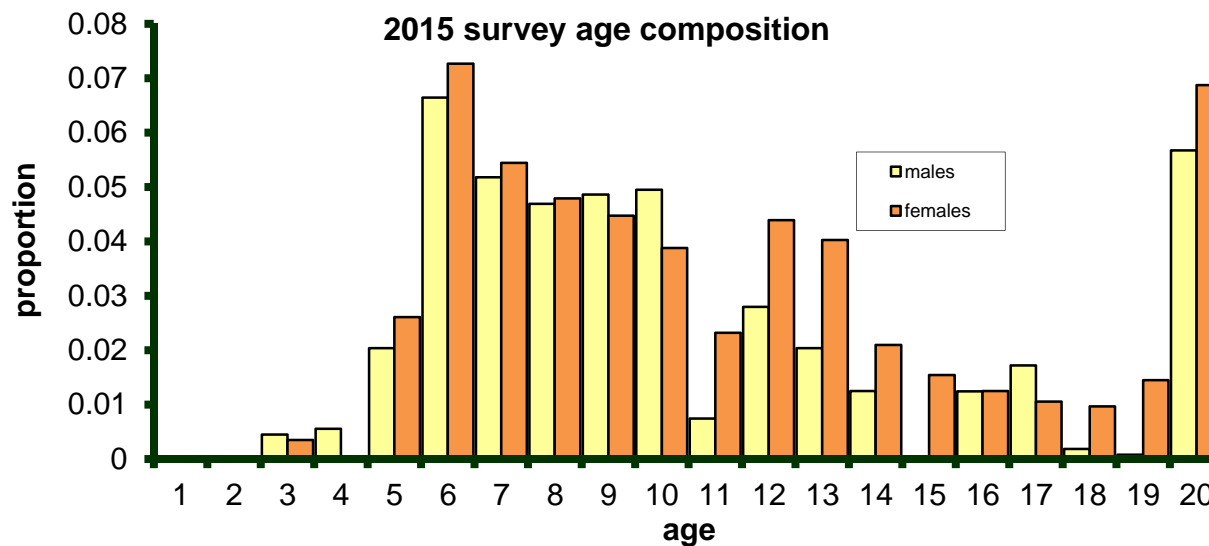
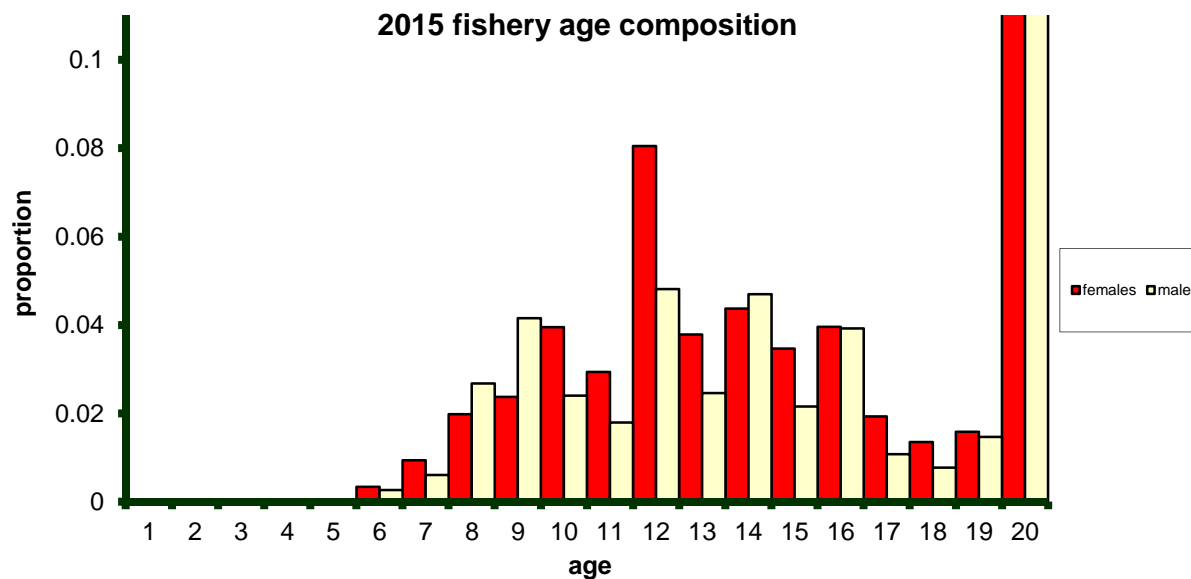


NEW DATA FOR 2016

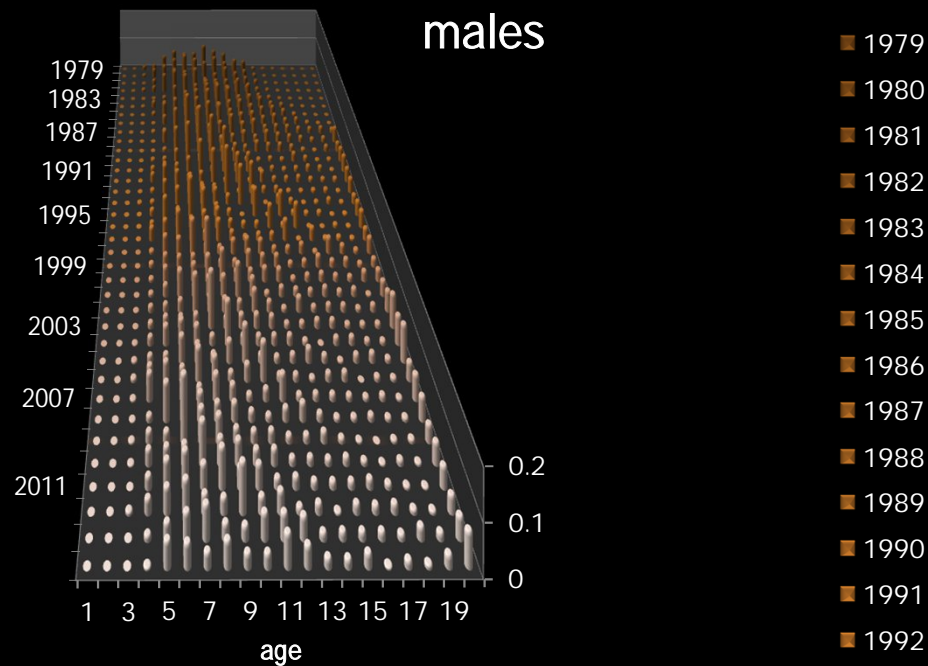
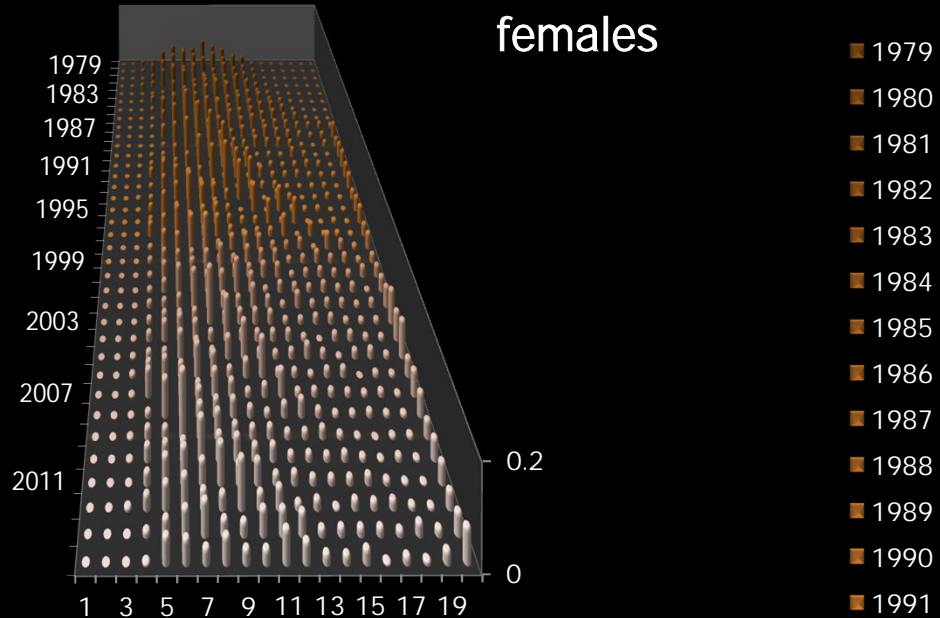


Avg. age =
12.6 years

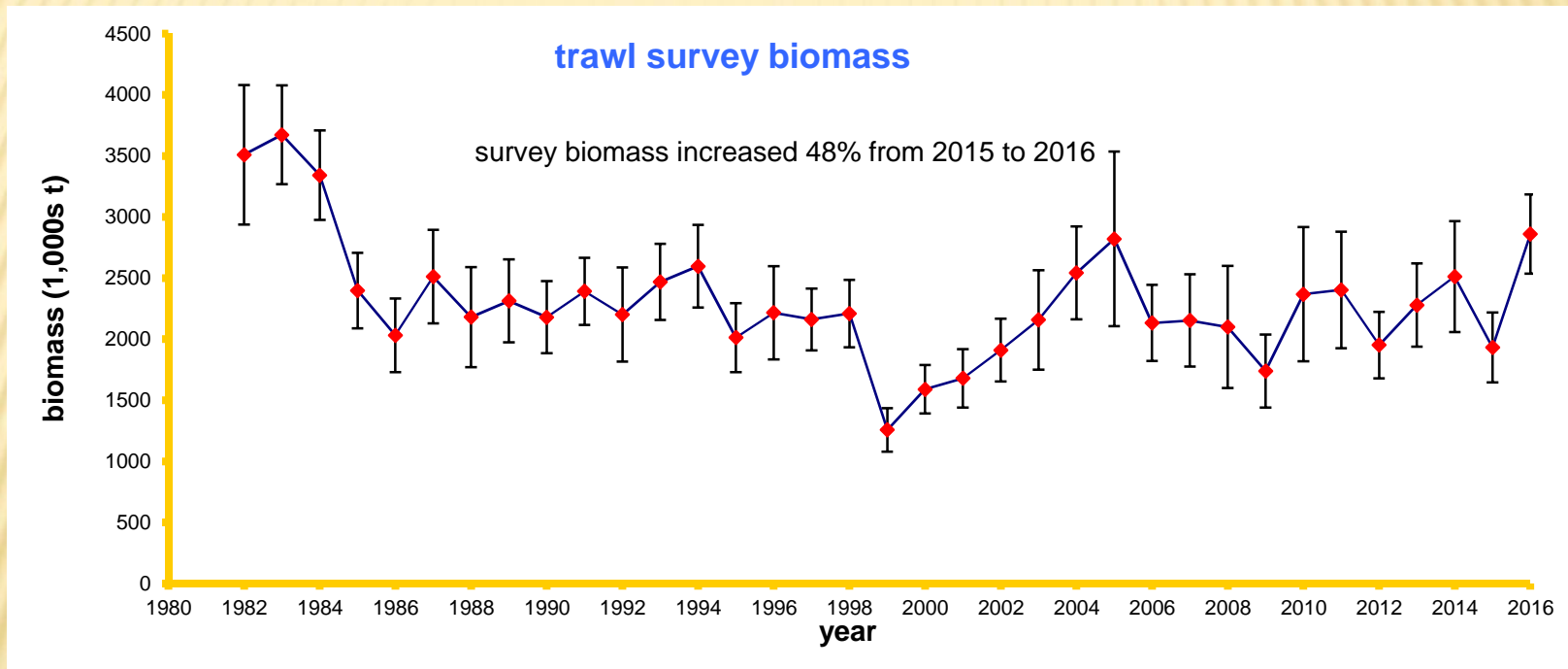
Model
estimate of
population
Avg. age =
6.7 years

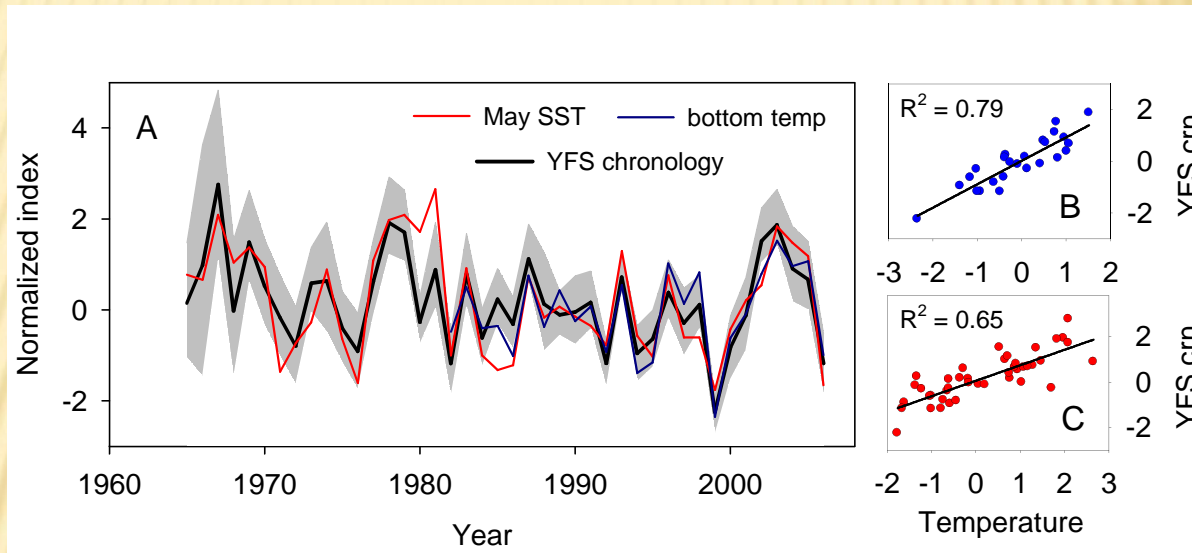


Survey age composition

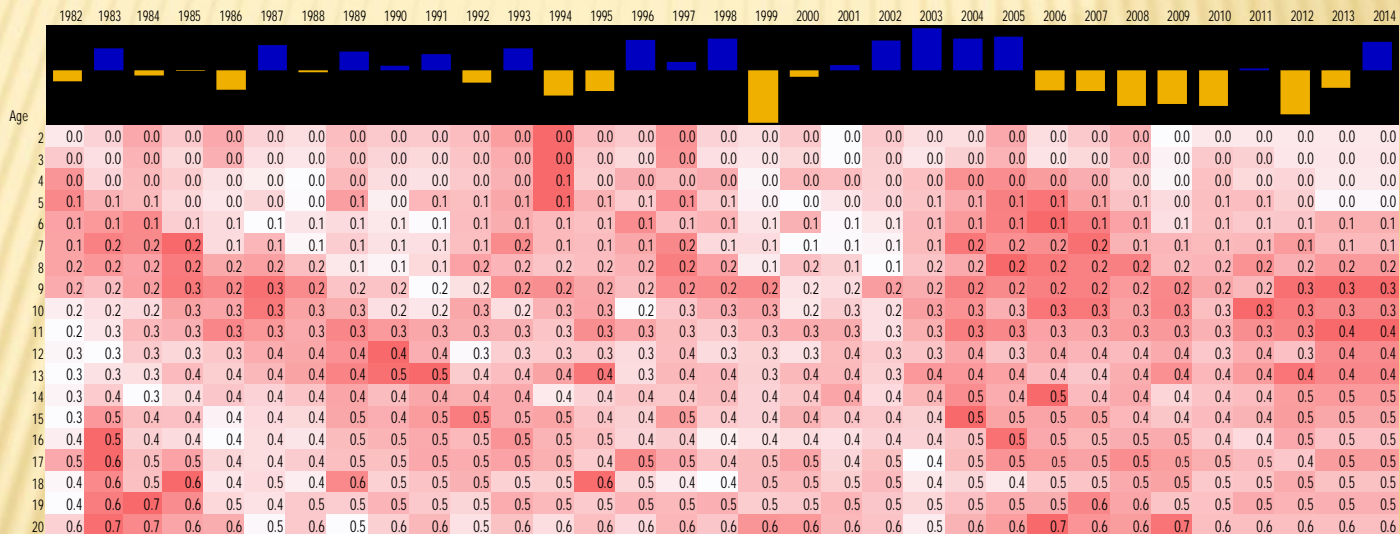


2016 SHELF SURVEY BIOMASS ESTIMATE = 2,859,800 T





Assessment uses empirical data from annual survey length at age estimates



Expected annual growth increment

Age effect on growth





FLATFISH SPLIT-SEX MODEL



Input:

sex-specific estimates of fishery and survey age composition and weight at age, survey biomass, maturity

Output:

Sex-specific estimates of population number, fishing mortality, selectivity, fishery and survey age composition.

Allows for estimation of sex-specific natural mortality

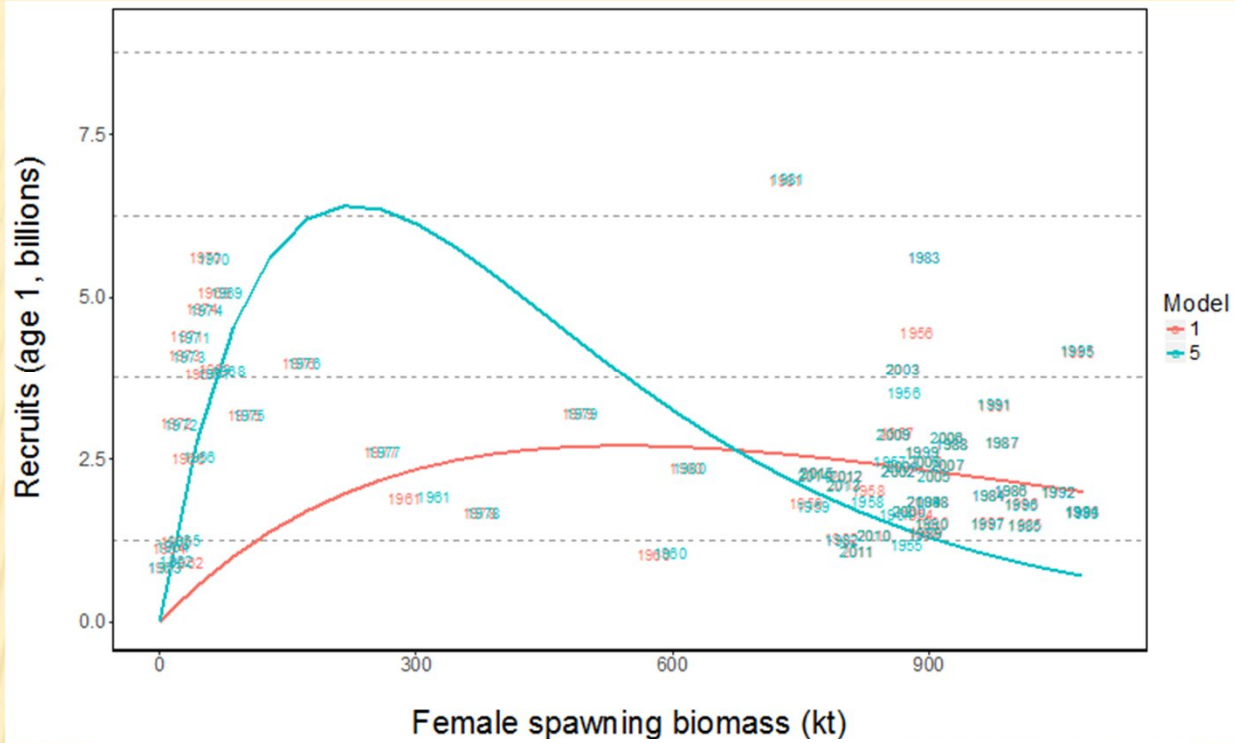


STOCK ASSESSMENT MODEL

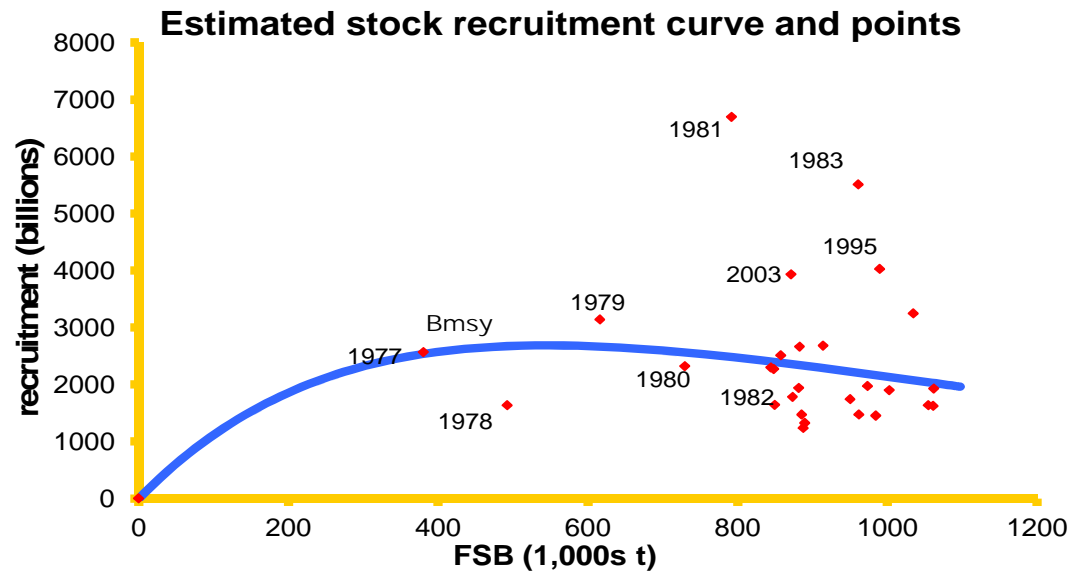
- × Data components include fishery and trawl survey age compositions and survey biomass and standard error
- × Selectivity is fixed asymptotic for older fish
- × Runs made with natural mortality fixed at 0.12 and estimated
- × Ricker spawner-recruit curve estimated inside the model
- × Fishery selectivity is estimated for each year and gender
- × Catchability (q) is estimated for each year in the model by considering the relationship to annual bottom water temperature

$$q = e^{\alpha + \beta T}$$

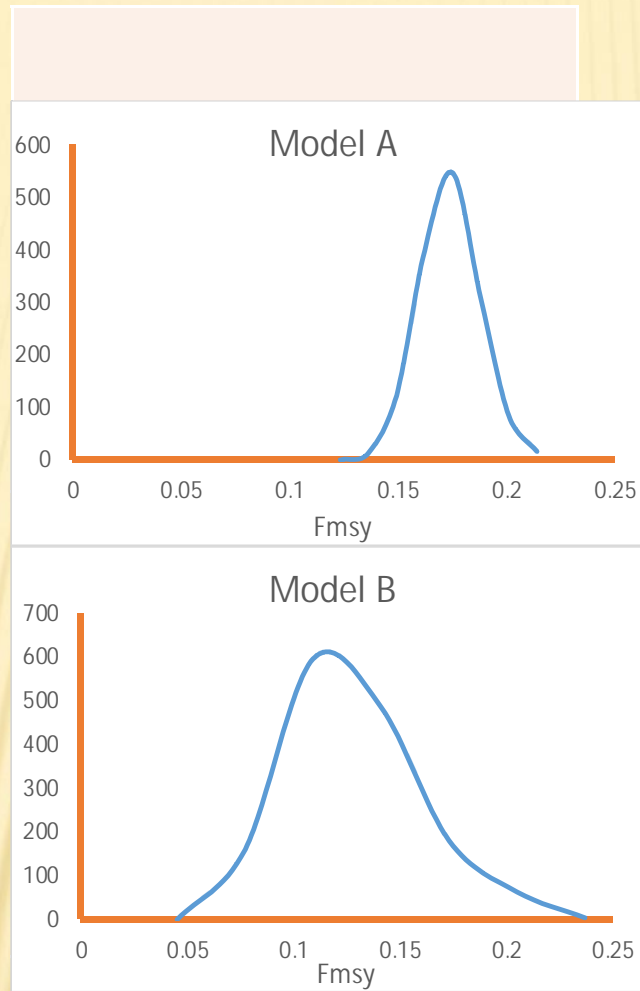
$B_{msy} = 336,000 \text{ t}$



$B_{msy} = 424,000 \text{ t}$



Distribution of pdf F_{msy} from mcmc runs



1955-2010

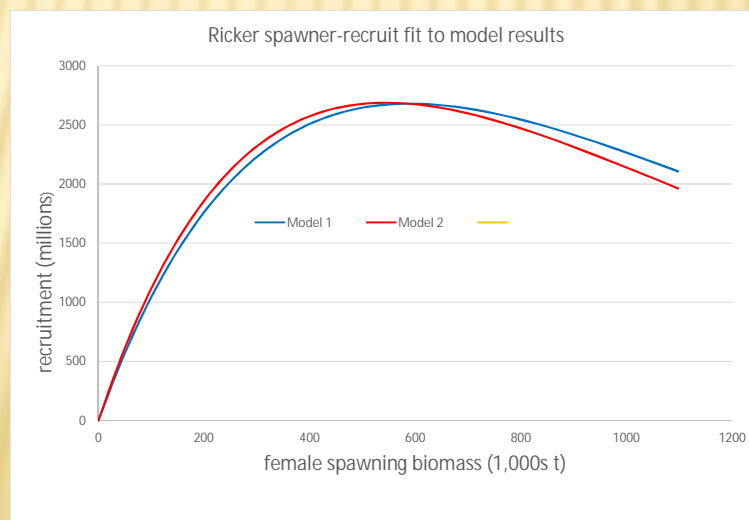
1978-2010



EFFECT OF 2016 DATA AND FISHERY WT AT AGE SMOOTHING ON MODEL ESTIMATES

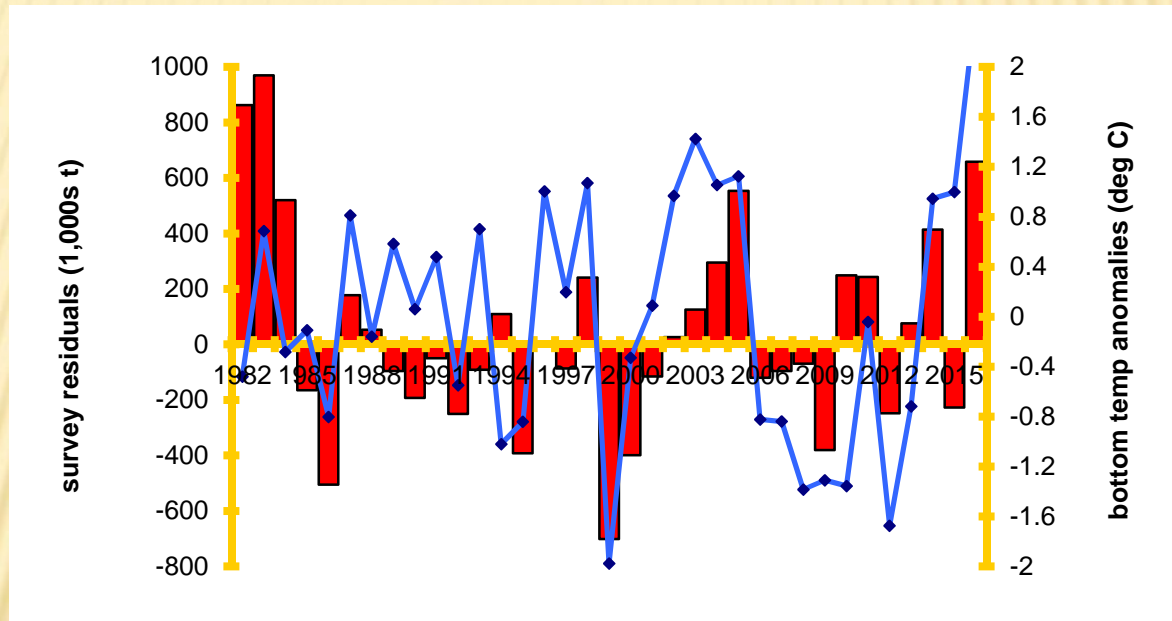


	Model 0	Model 1	Model 2
Fabc	0.10	0.10	0.11
FOFL	0.11	0.11	0.13
6+ biomass	2,169,70	2,333,450	2,290,140
ABC	211,694	226,278	260,826
OFL	228,053	248,423	287,051
FSB	702,179	791,479	778,569





TRAWL SURVEY RESIDUALS (RED BARS) AND BOTTOM TEMPERATURE ANOMALIES (BLUE LINE)

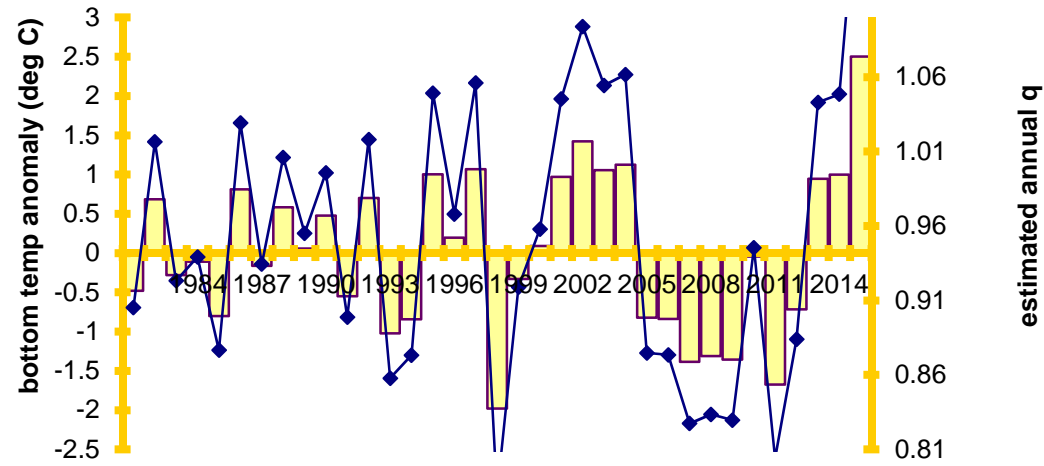




TIME-VARYING SURVEY CATCHABILITY

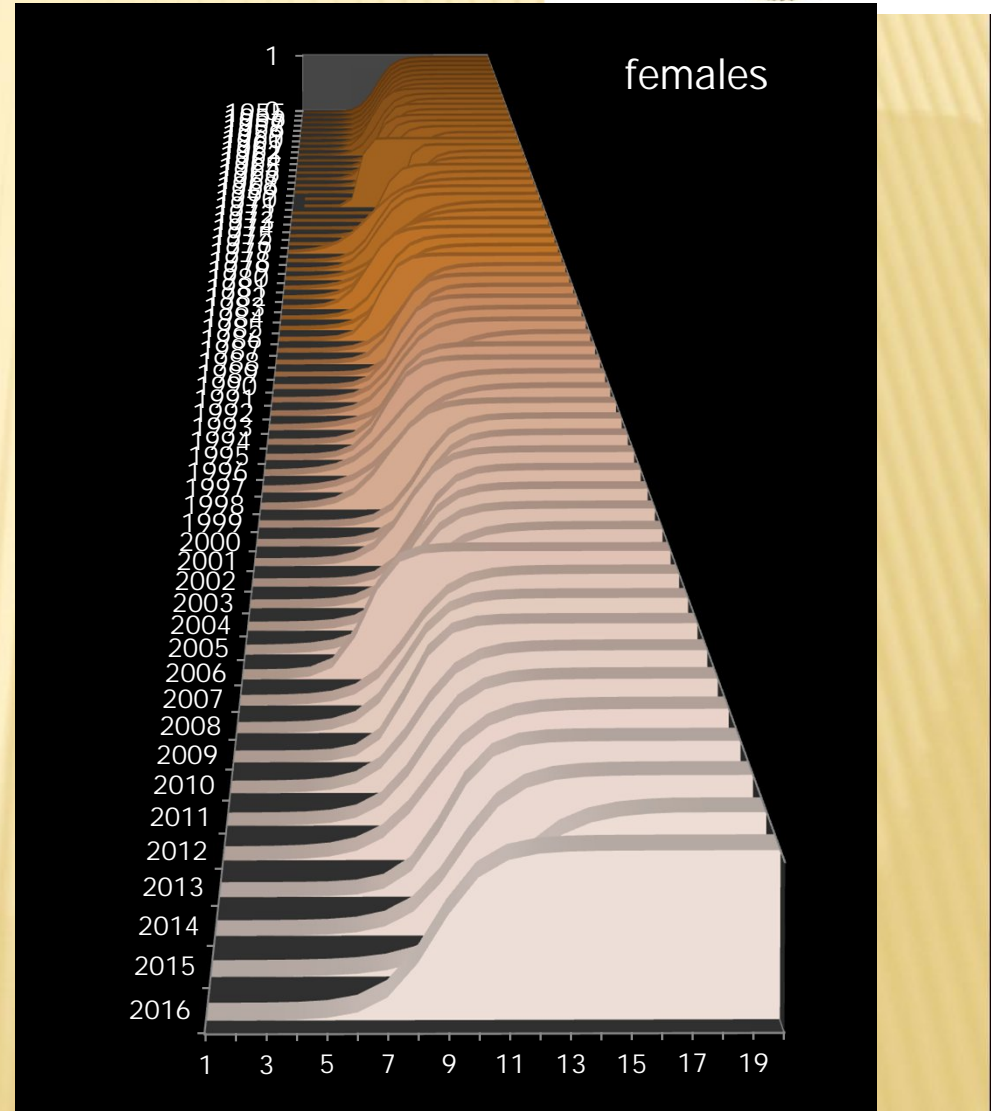
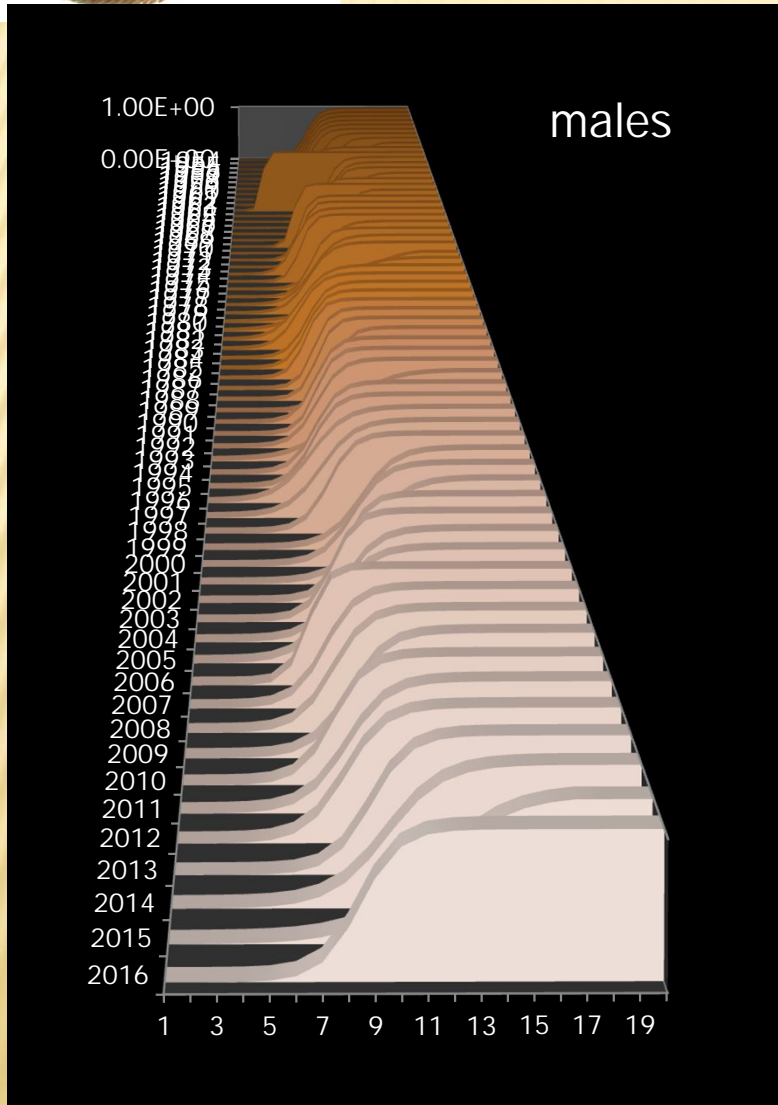
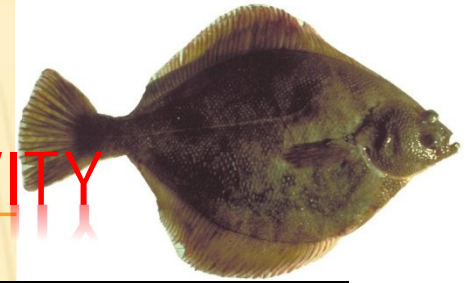


temperature-catchability model result



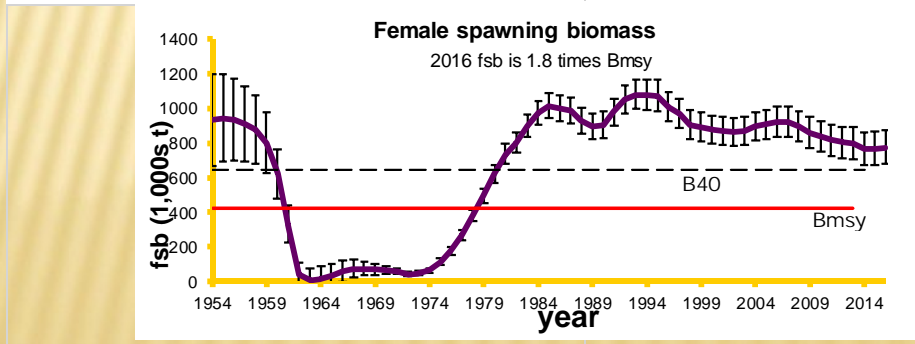
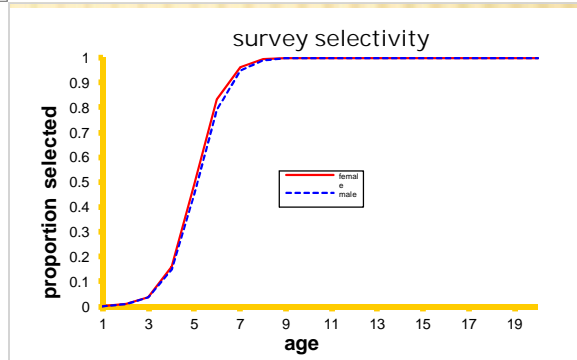
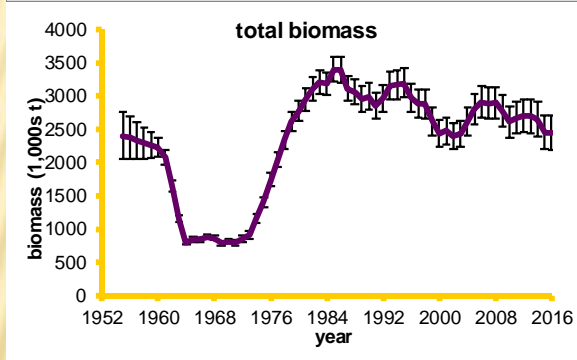
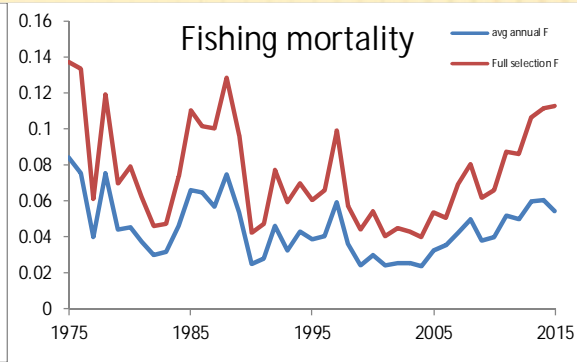
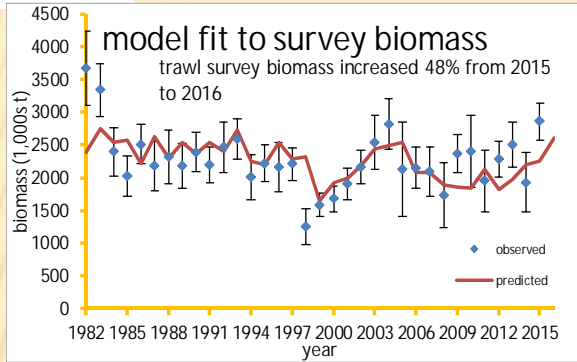


TIME-VARYING FISHERY SELECTIVITY



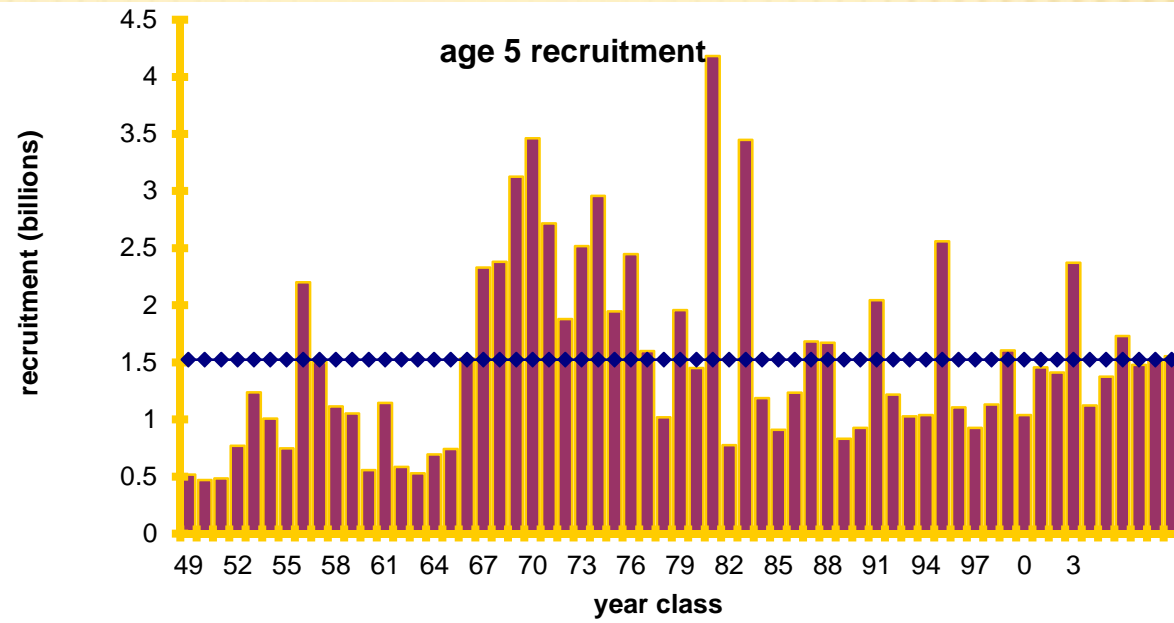


MODEL RESULTS





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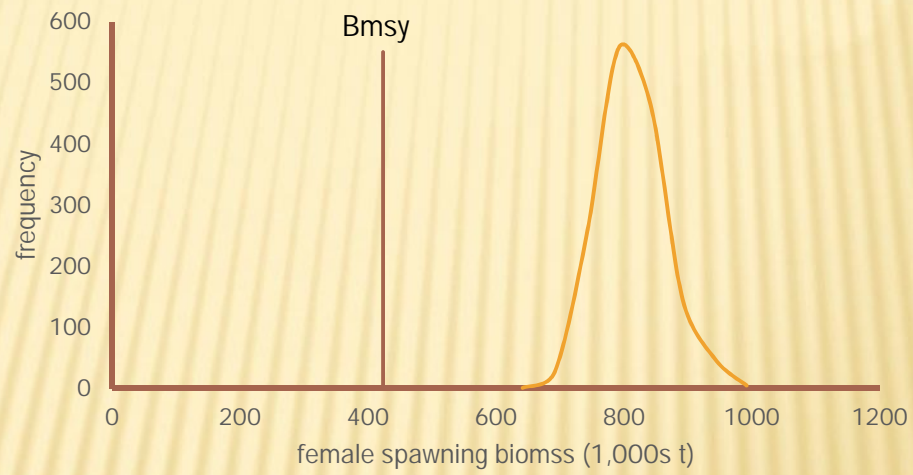




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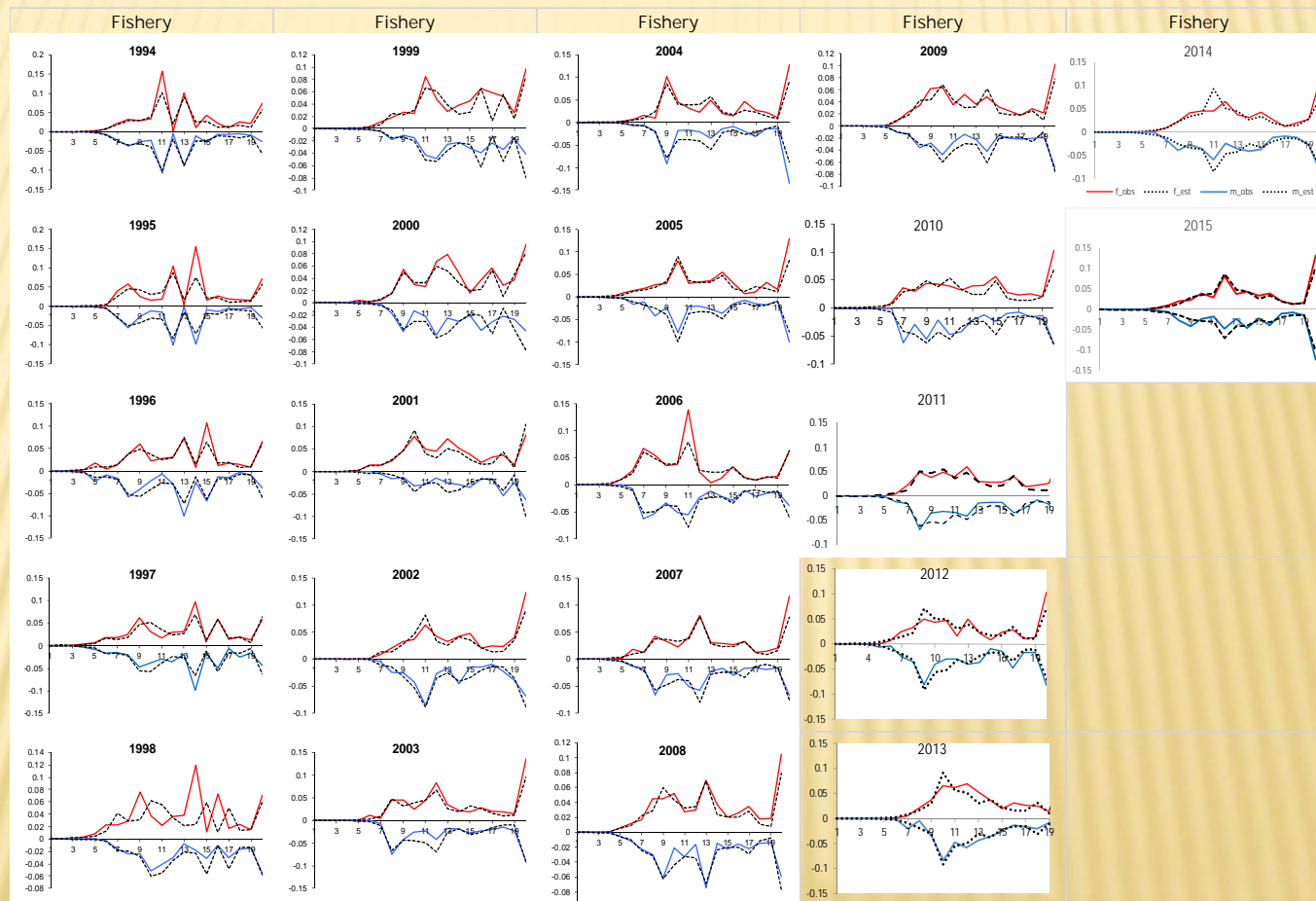


2016 female spawning biomass



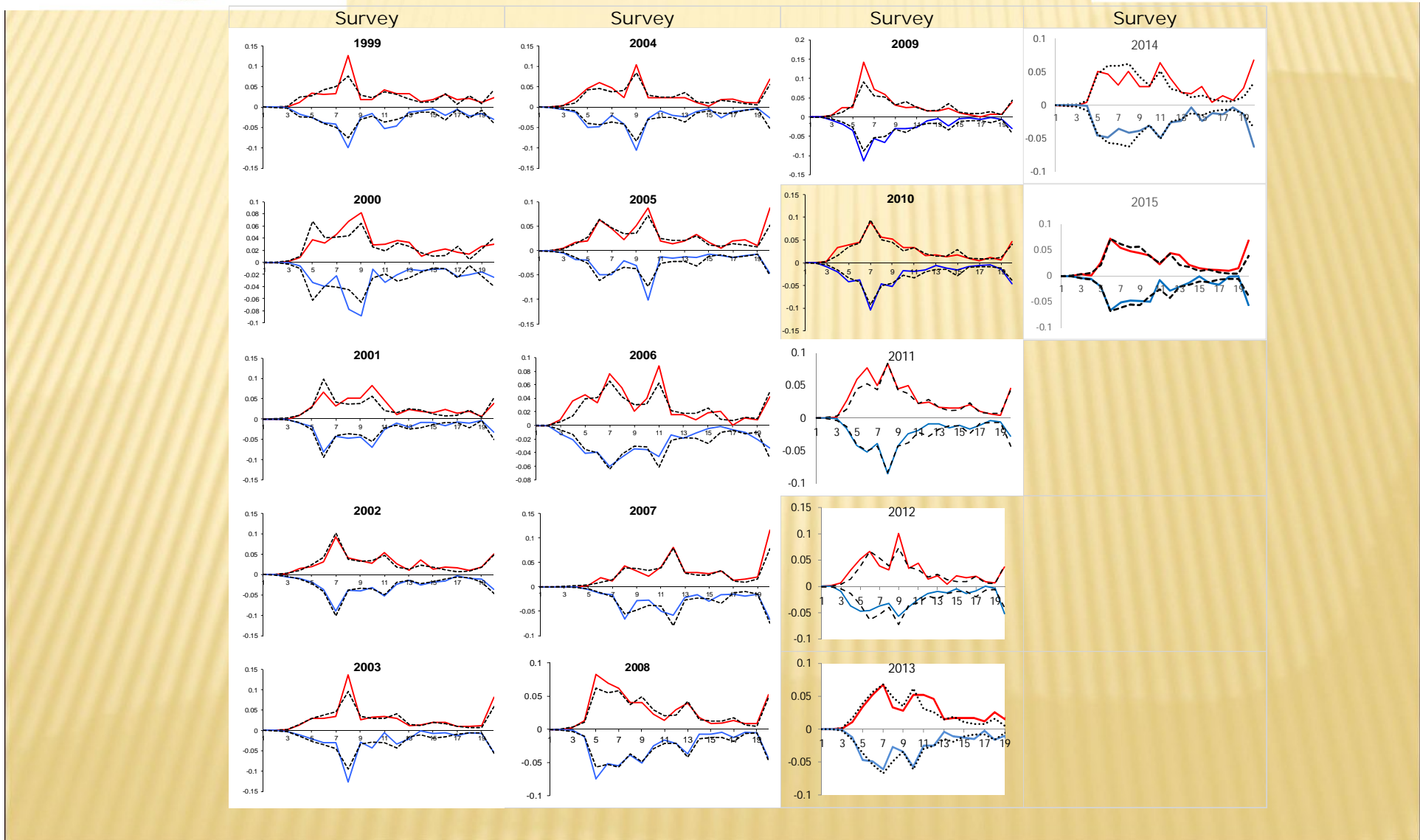


MODEL FIT TO FISHERY AGE COMPOSITION



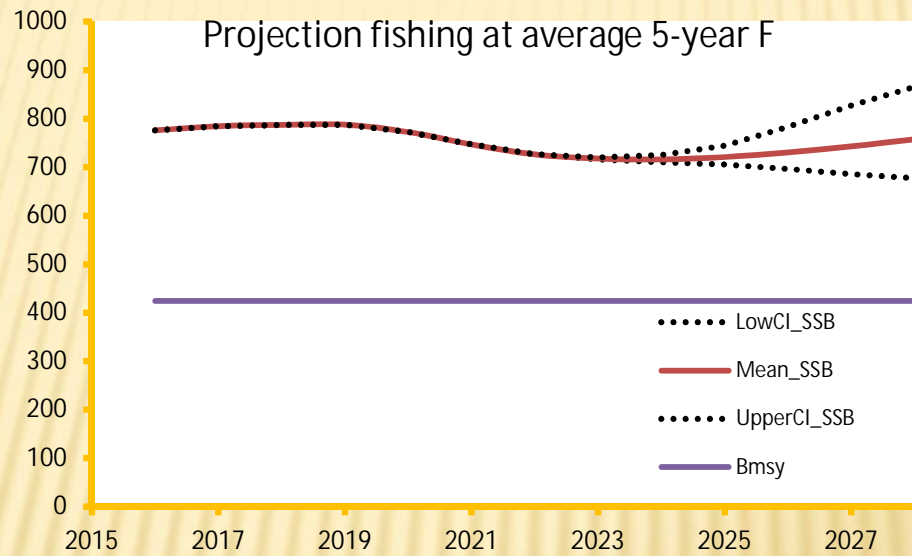


MODEL FIT TO SURVEY AGE COMPOSITION



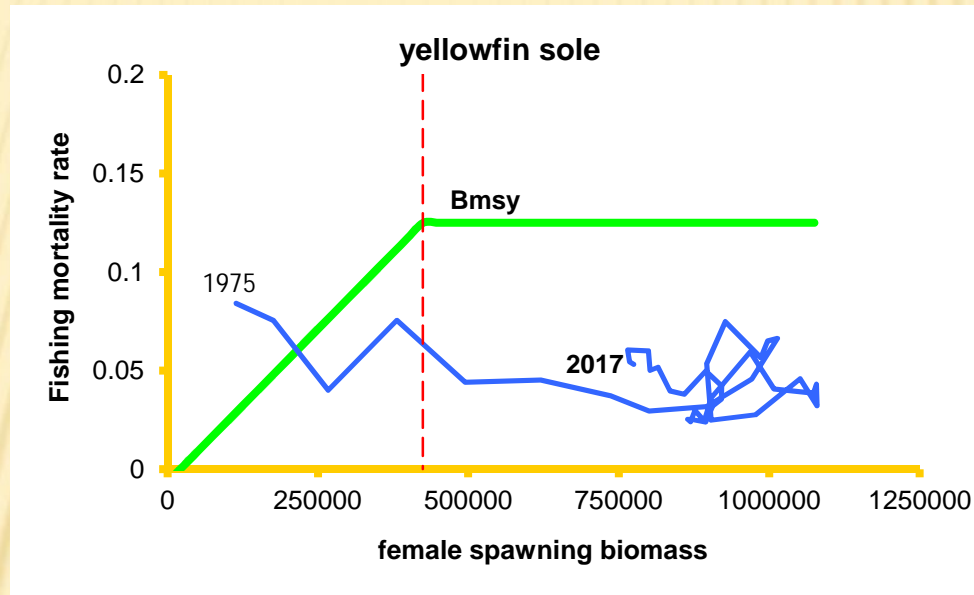


PROJECTED FEMALE SPAWNING BIOMASS



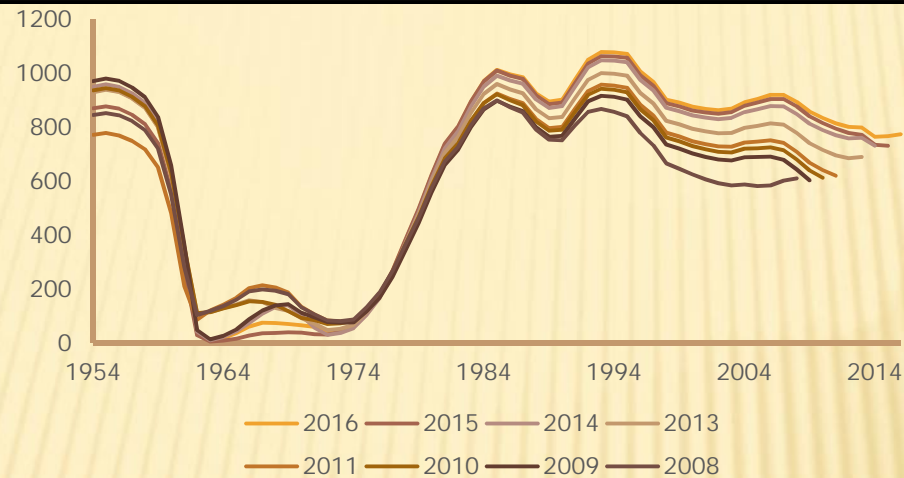


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retrospective model results



Trials:

Increased survey standard error by 10%, 20% and 30% over the actual value.

Up-weighted survey age comps (200 to 500) and down-weighted survey SE (increased 30%)

Down-weighted survey age comps, base st. dev values



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Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

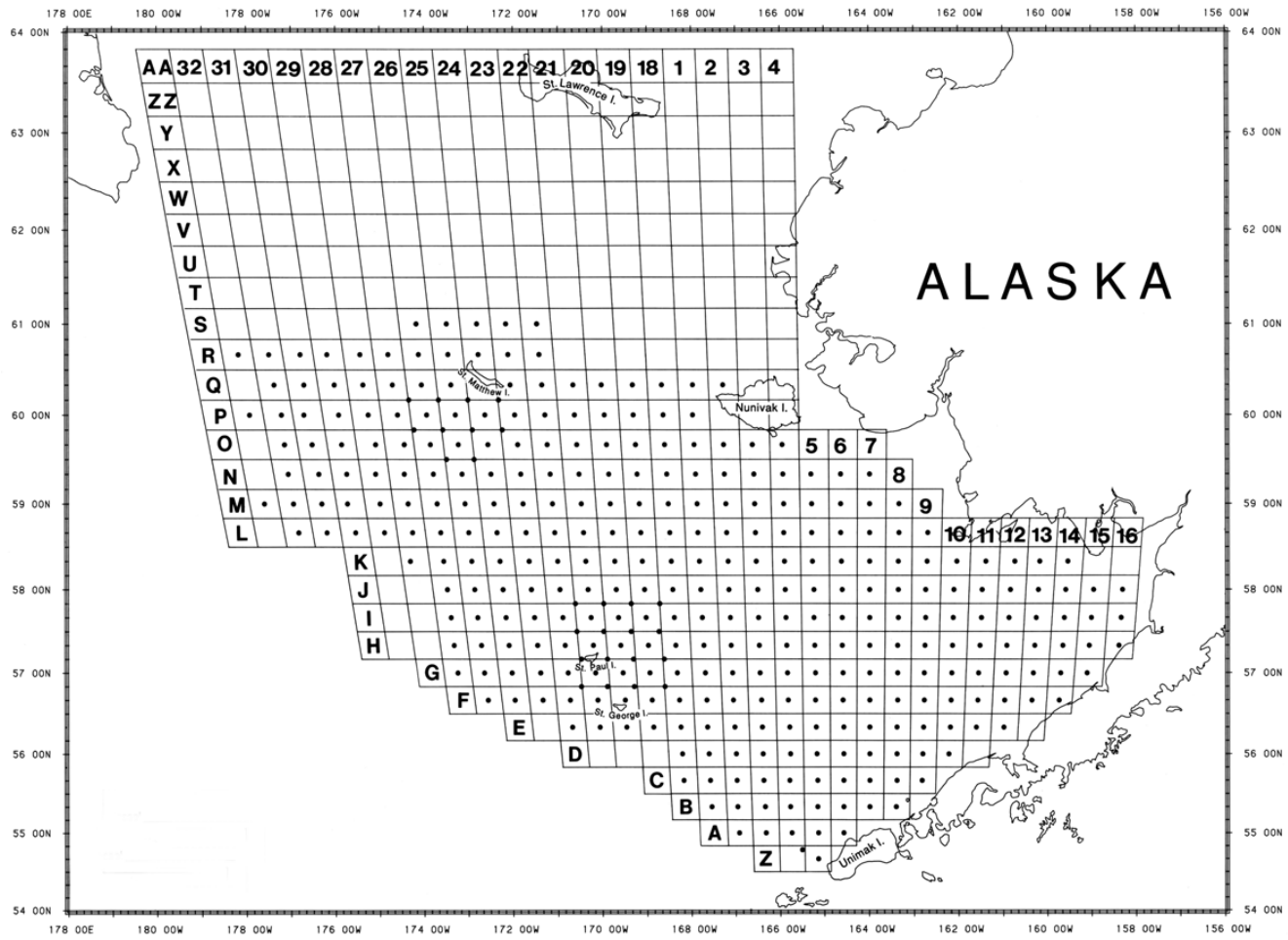


Figure 1. -- Eastern Bering Sea survey grid map of sampled stations.