



BSAI Atka Mackerel

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BSAI Atka Mackerel



★ Tier 3a ★

➤ Data and Model:

- ❑ 2013 fishery age compositions added
 - 2013 fishery & 2012 survey age data dominated by 2006 and 2007 yc's, large numbers of 2009 yc
- ❑ 2014 survey biomass -- ↑ 161%, increases in all areas of the Aleutian Islands
- ❑ No changes to assessment model

➤ Key Results

- ❑ Magnitude of 1999-2001 yc's incr. 12-15%, 2006-2007 yc's incr. 16% (2006 yc above avg)
- ❑ 2015 spawning biomass (167,100 t) ↑ 43% and is **above** $B_{40\%}$ ($B_{50\%}$), Tier 3a
- ❑ 2015 age 1+ biomass up 19% compared to last year's projection for 2015 age 1+ biomass
- ❑ 2015 projections:
 - Yield at $F_{40\%}$ up ~65% from 2014 ABC and proj. 2015 ABC
 - 2015 ABC = 106,000 t
 - 2015 OFL = 125,300 t

Changes in the Input Data



- Fishery catch data updated
- Total 2014 year end catch est. based on ave. 25% catch after Oct 1
- 2013 fishery age composition added
- 2014 survey biomass estimates included
- The est. average selectivity for 2010-2014 used for projections
- Assume 80% of the BSAI-wide ABC to be taken under revised SSL RPAs; % applied to 2015 maxABC for 2016 projections

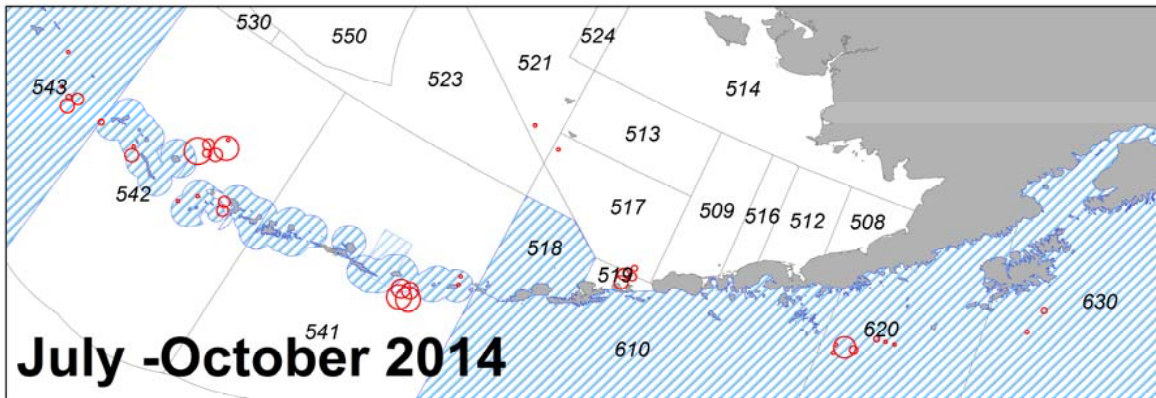
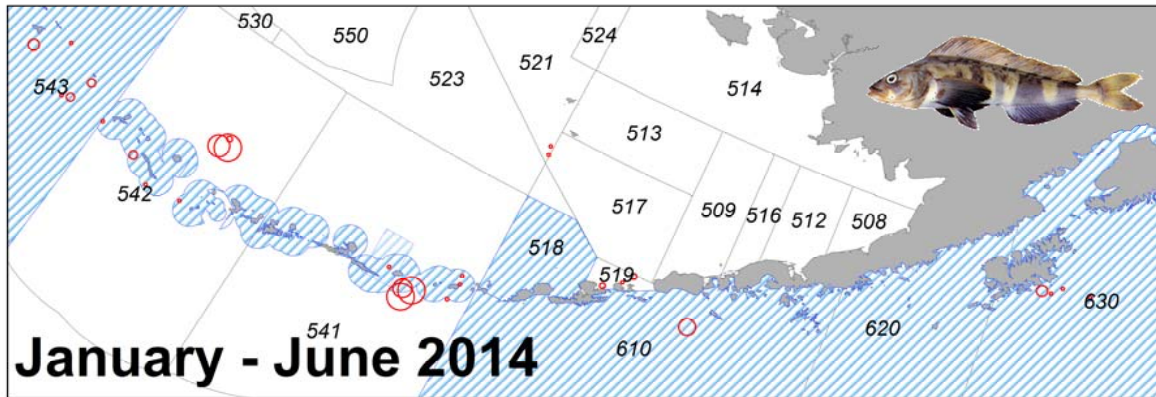
Changes in the Assessment Methodology

No changes to assessment methodology

CIE review July 29-31, 2014

- Model reasonable , consistent with BAS, w/o serious gaps or consistencies in the pop. dynamics modeling or logic
- No immediate, high priority changes to model configuration identified
- Explore estimation of M and q directly in the model (SSC, CIE)
- Explore options for implementing time-varying selectivity for the fishery and survey
- Examine role of survey data, specifically biomass index, one of the important CIE topics
- Account for spatial variability in survey and fishery data

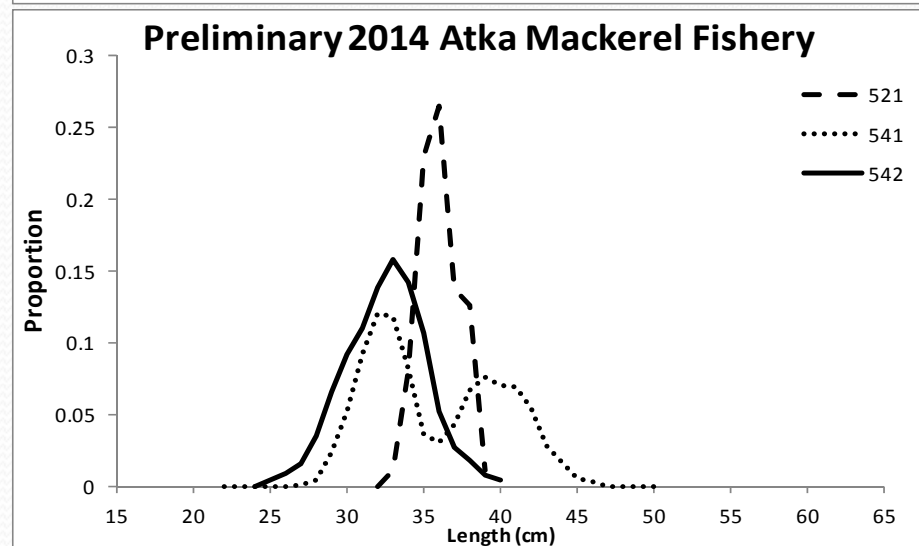
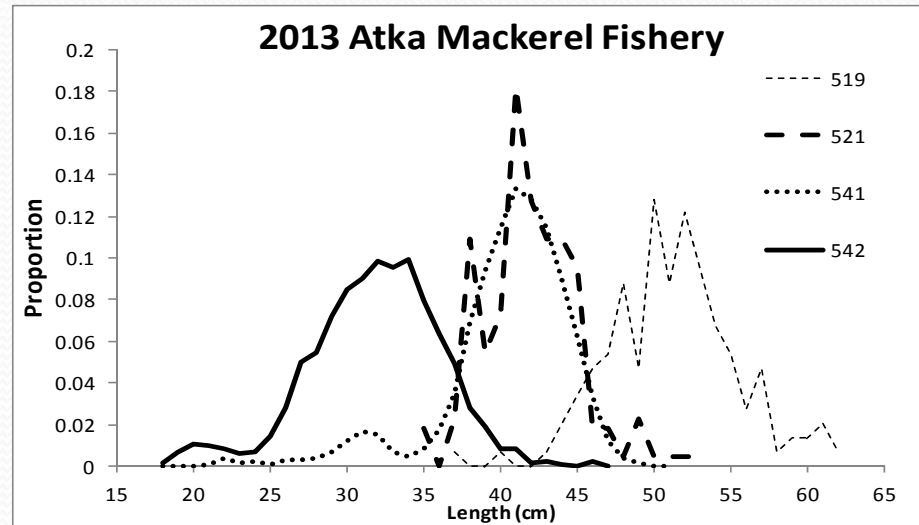




Observed catch (Tons)

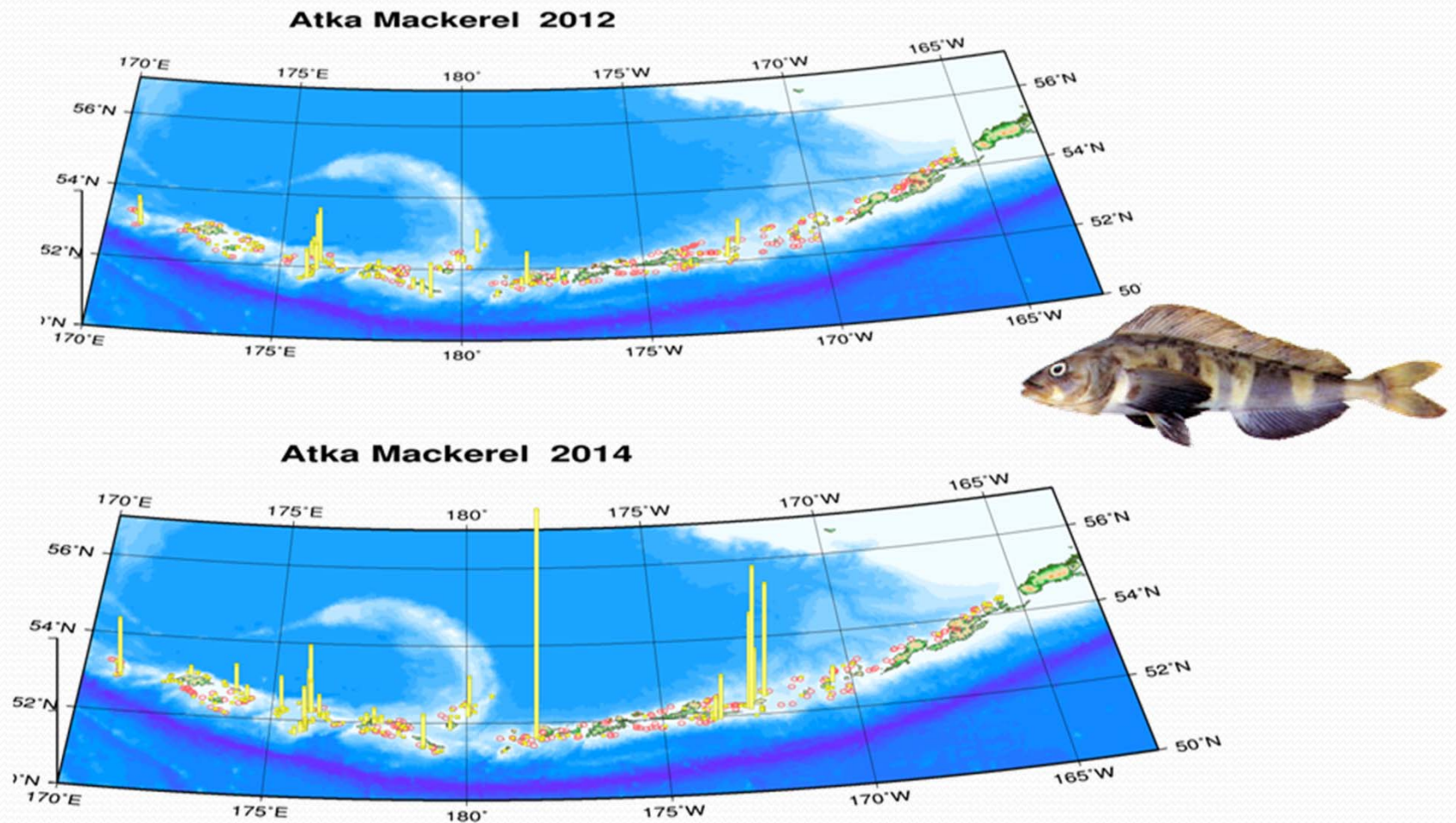
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 40
- 41 - 80
- 81 - 100
- 101 - 200
- 201 - 400
- 401 - 800
- > 800

2014 Atka mackerel fishery locations



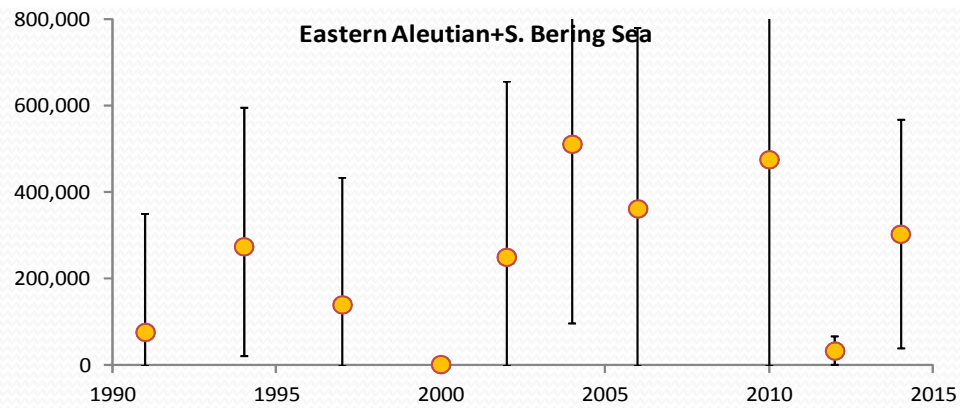
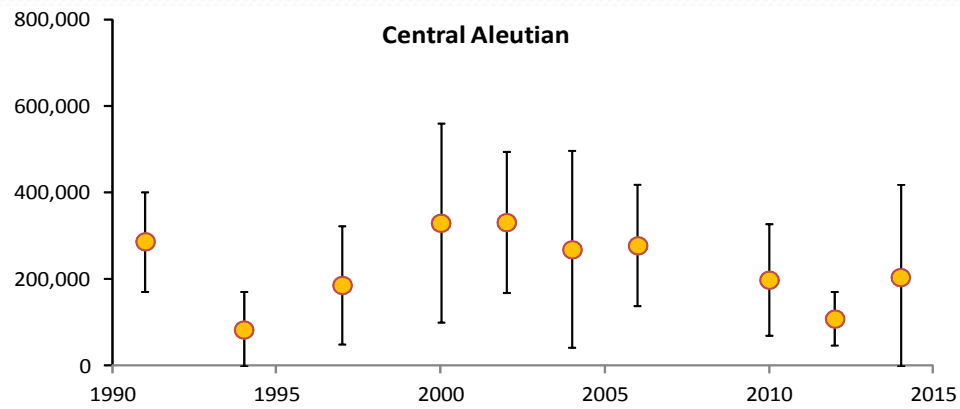
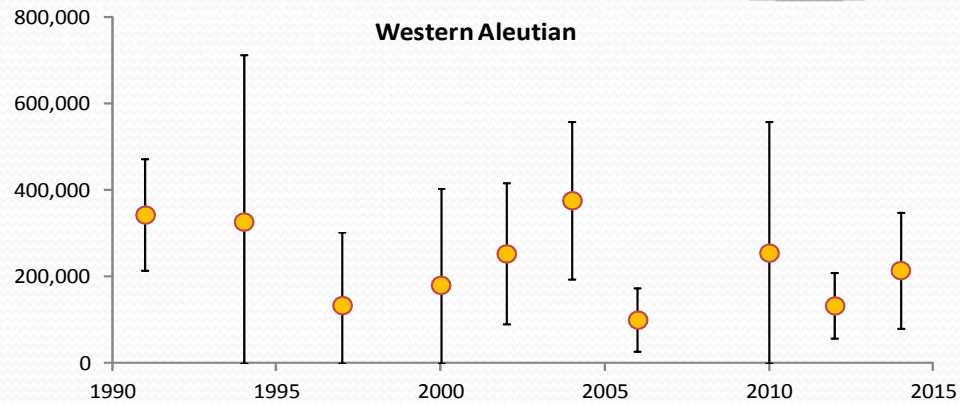
Atka mackerel fishery length-frequency data by area fished

Bottom trawl survey CPUE distributions of Atka mackerel catches



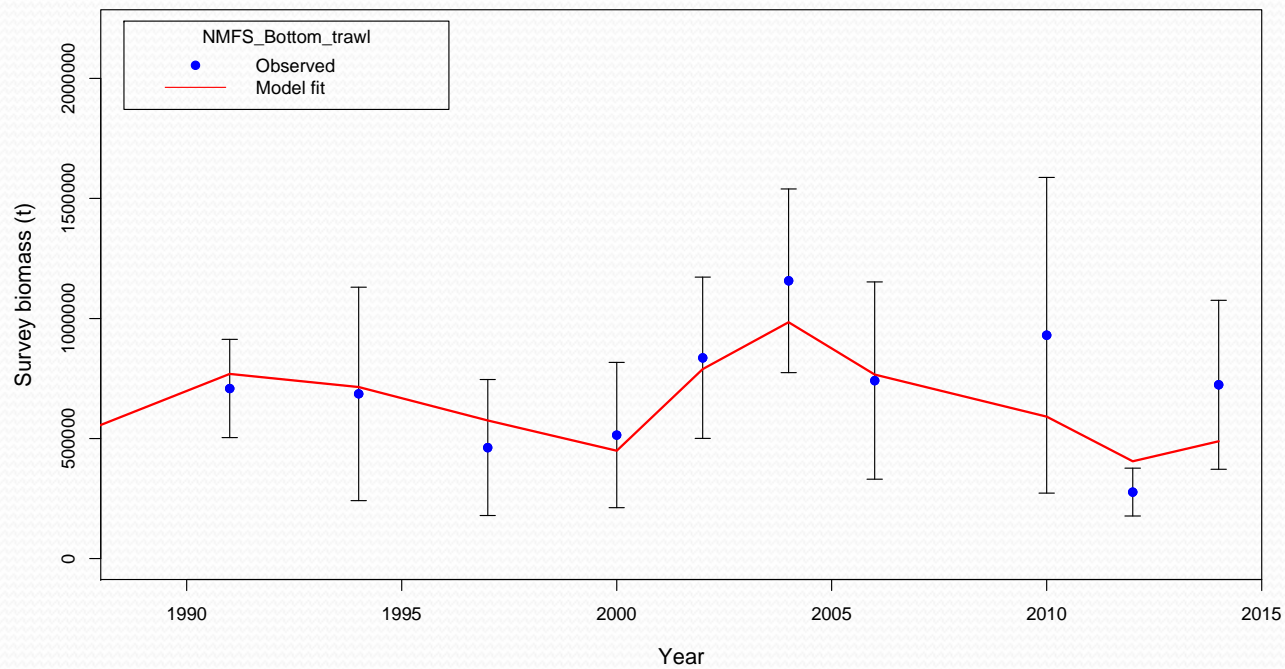
161% decrease, CV 24%

Survey biomass (t)



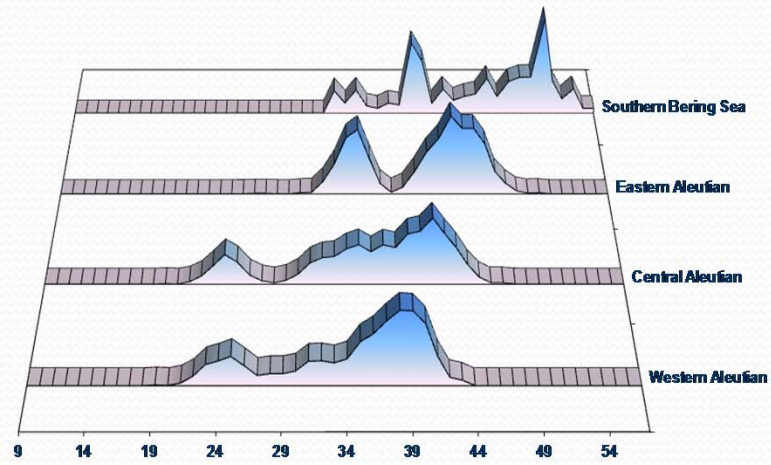


Model 1

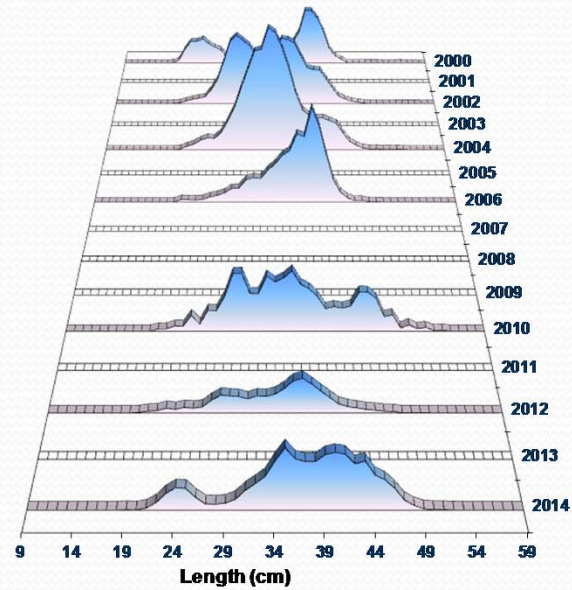


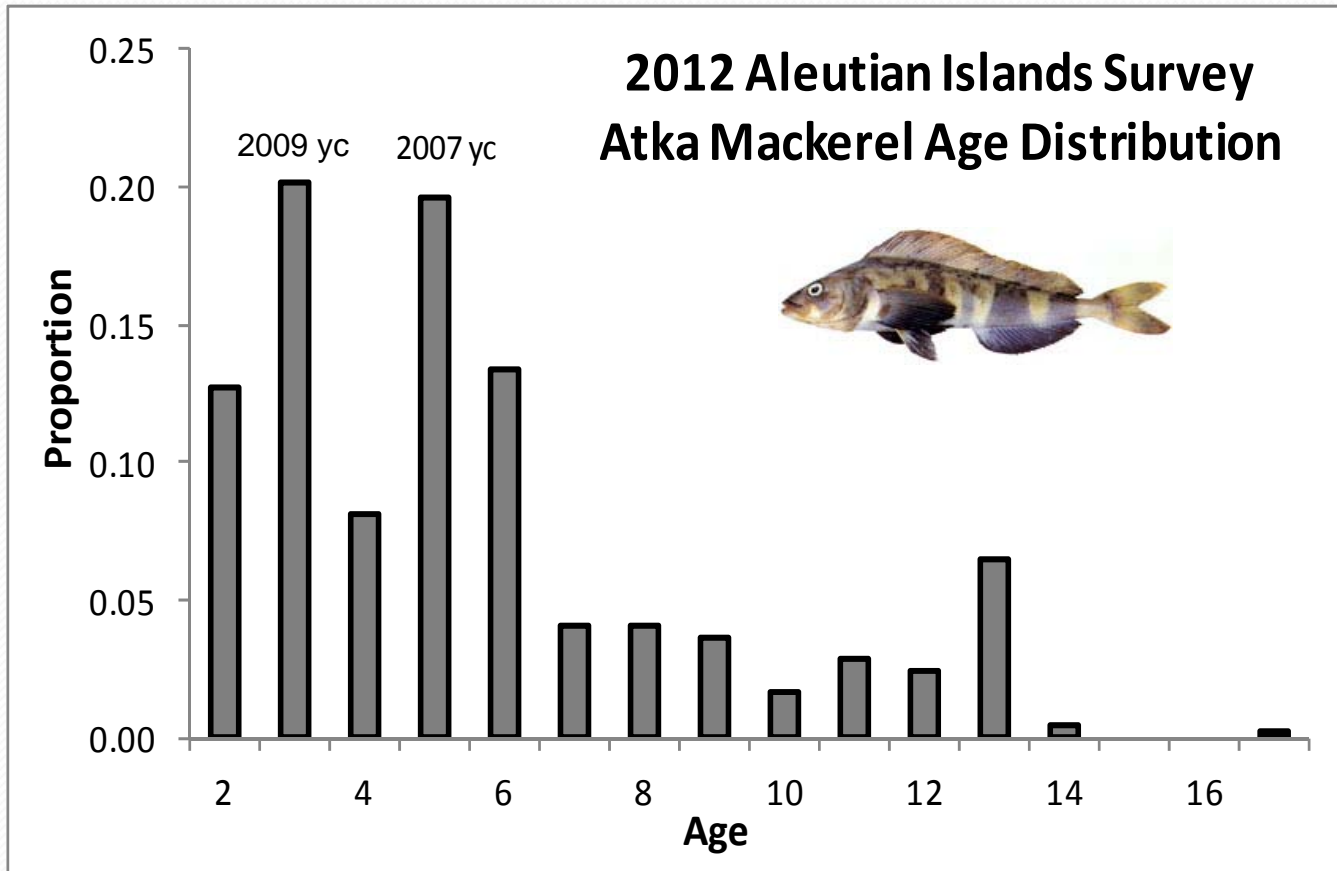
Observed (dots) and predicted (trend line) survey biomass estimates in t for Bering Sea/Aleutian Islands Atka mackerel. Error bars represent two standard errors (based on sampling) from the survey estimates

2014 Atka mackerel survey population at length by area

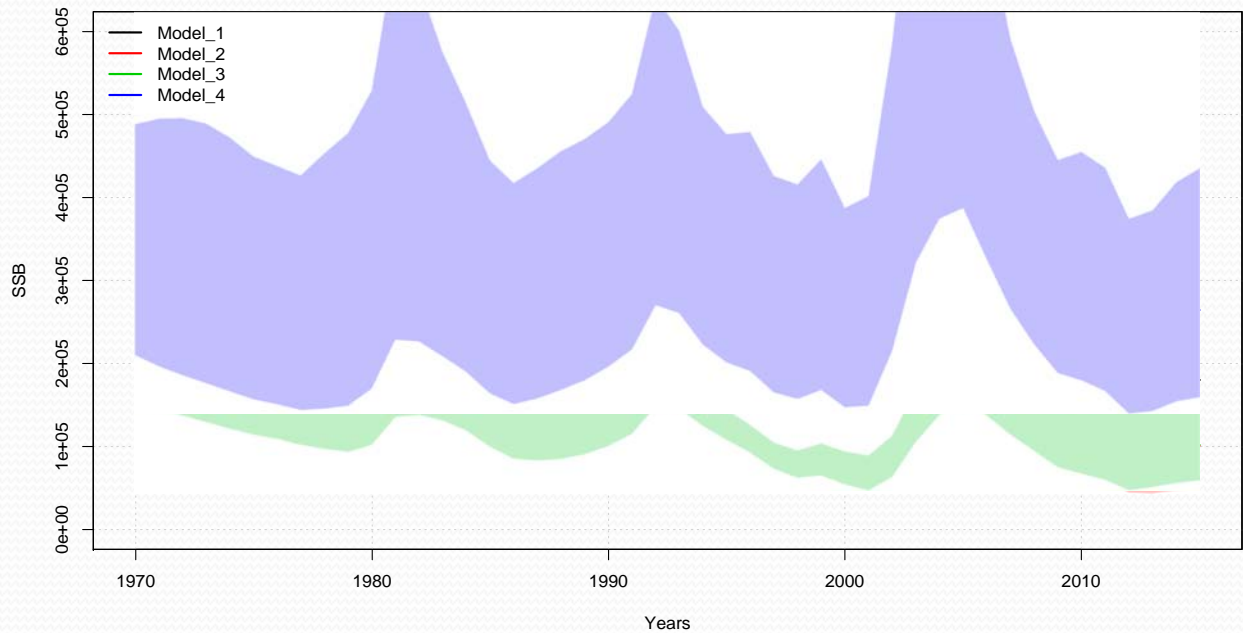


Atka mackerel survey population-at-length Length (cm)



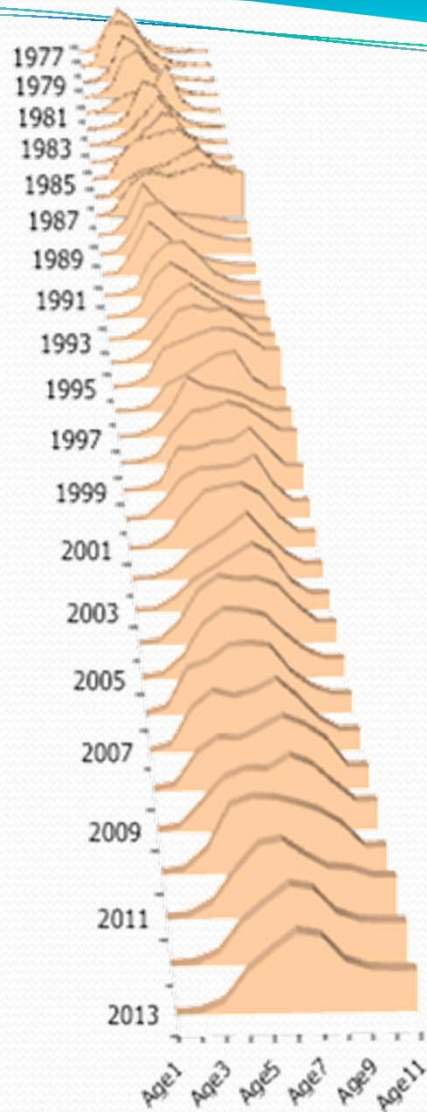


A total of 417 otoliths were aged; mean age from the 2012 survey is 5.6 years

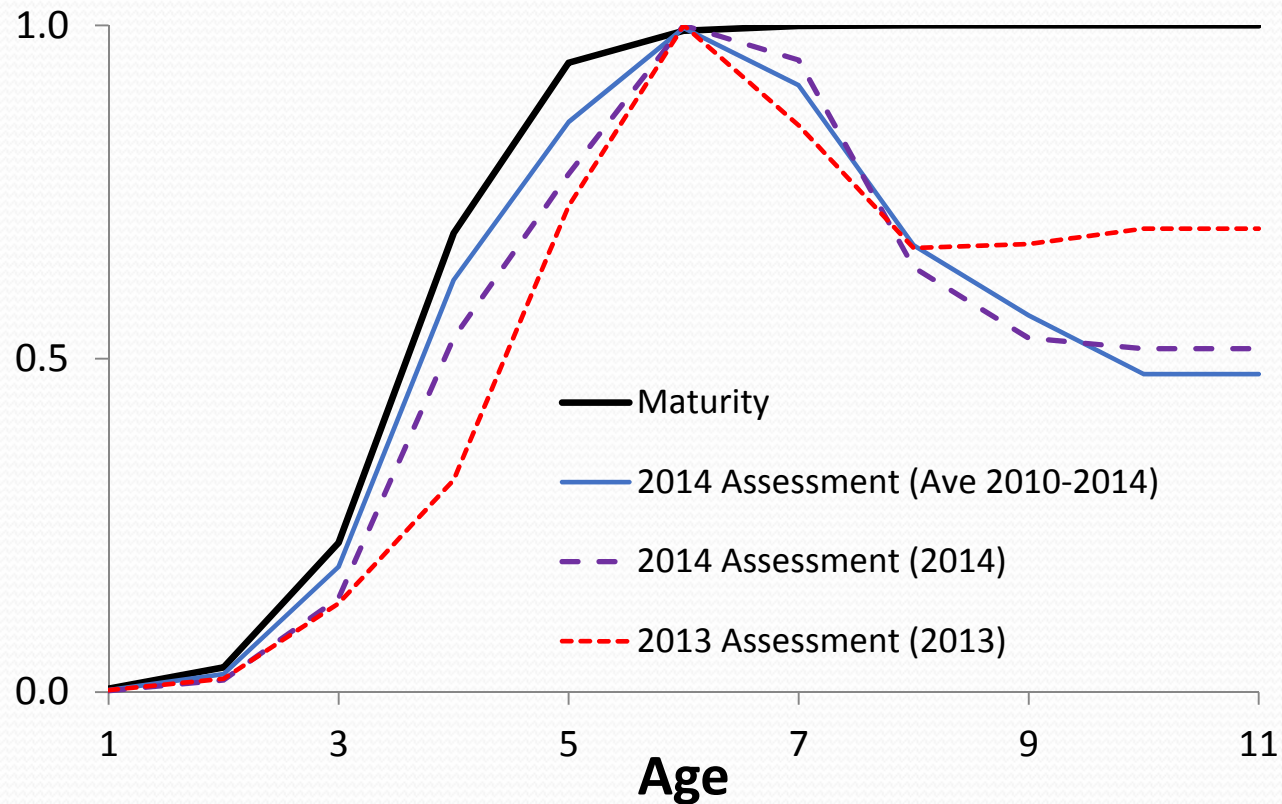


Spawning biomass trends and approximate 90% confidence bands for Model 1 (black line) compared to the sensitivity runs (Models 2-4)

- Model 1 baseline model with updated data
- Model 2 down-weighted survey indices
- Model 3 down-weighted survey indices and ages
- Model 4, Model 1 with moderate priors on both M and q

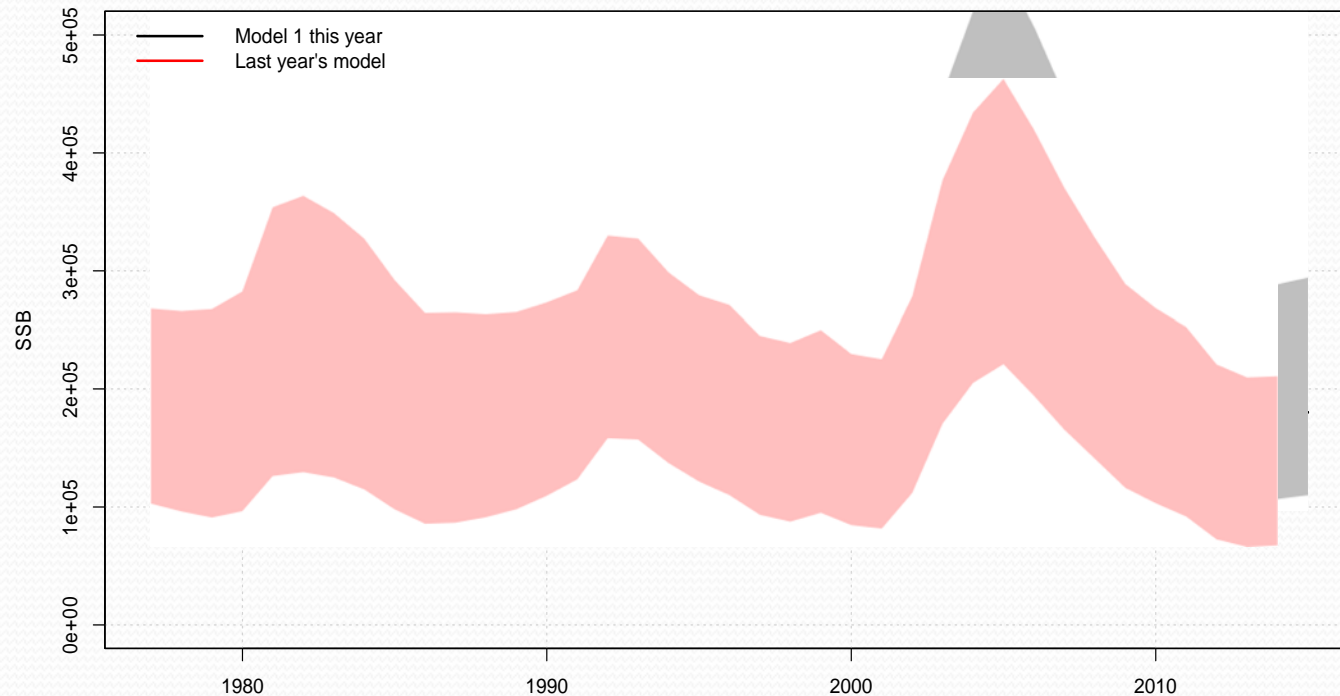


Fishery selectivity pattern from the BSAI Atka mackerel assessment Model 1



Estimated fishery selectivity patterns in the current assessment with a) the 2014 assessment terminal year (2014, Model 1), b) the 2014 assessment average selectivity for 2010-2014 (used for projections), and c) last year's assessment terminal year (2013, 2013 assessment) compared with the maturity-at-age estimates for BSAI Atka mackerel

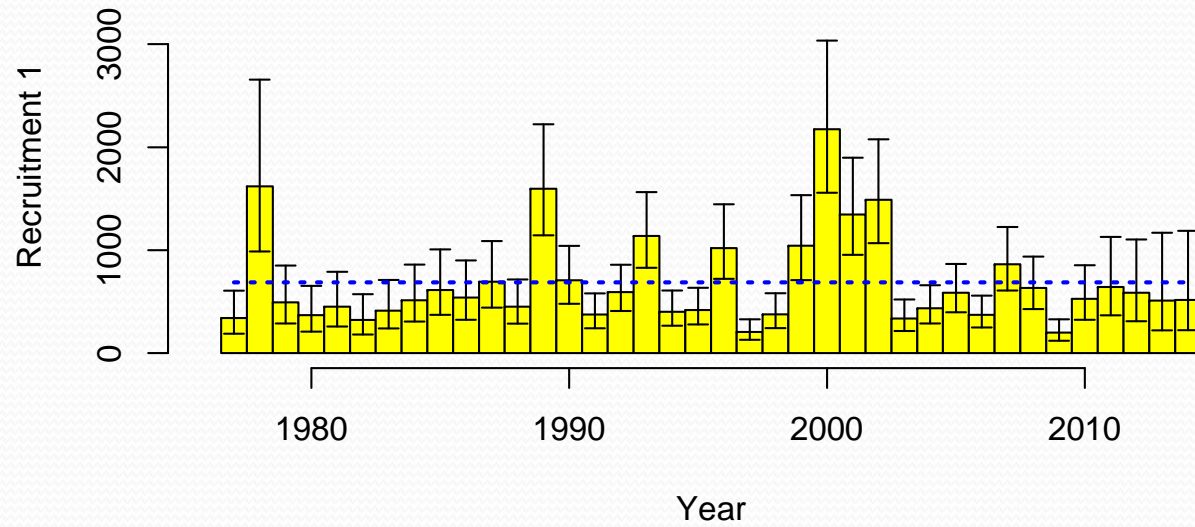
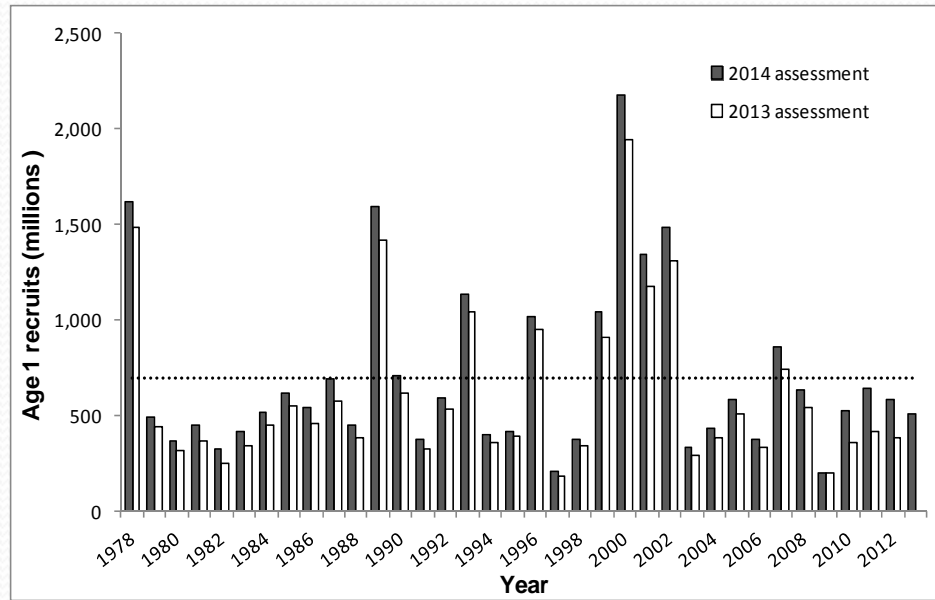
BSAI Atka Mackerel Female Spawning Biomass



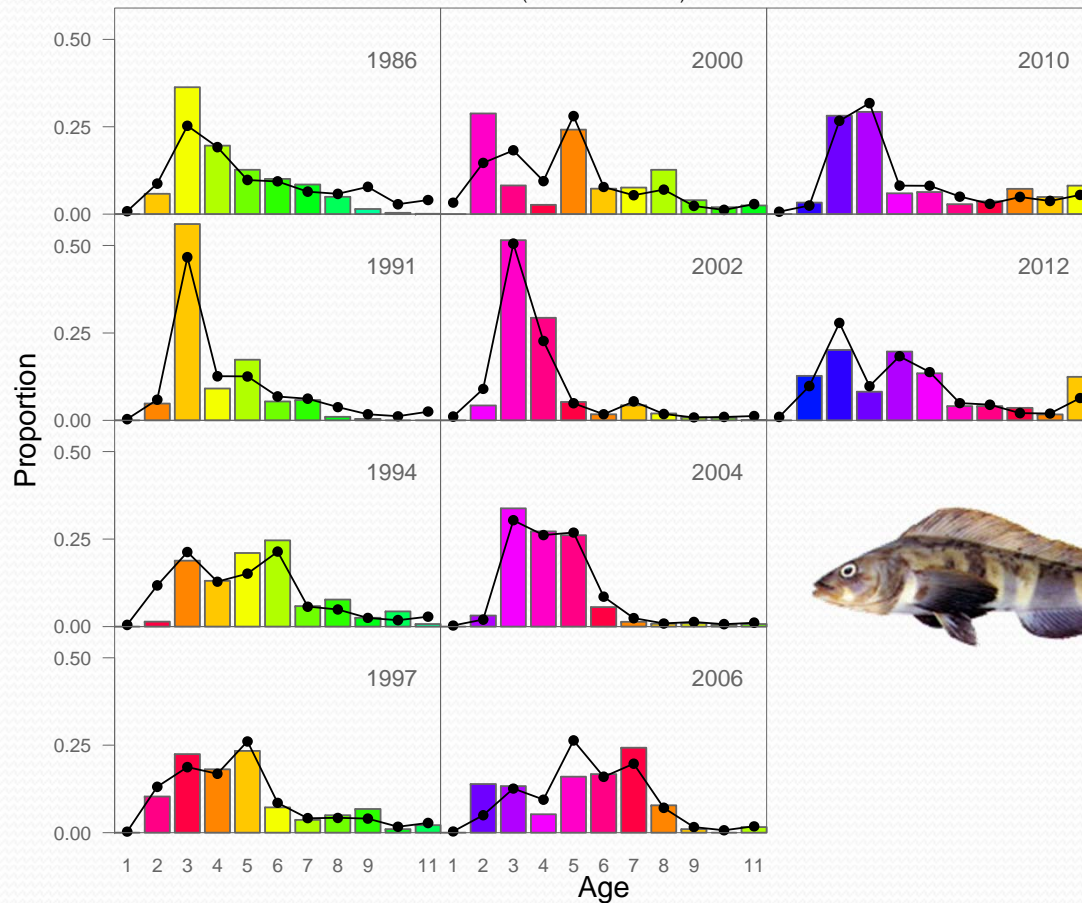
Time series of estimated Aleutian Islands Atka mackerel spawning biomass with approximate 95% confidence bounds from Model 1 compared with last year's (2013 assessment) selected model



BSAI Atka Mackerel Recruitment (Millions)

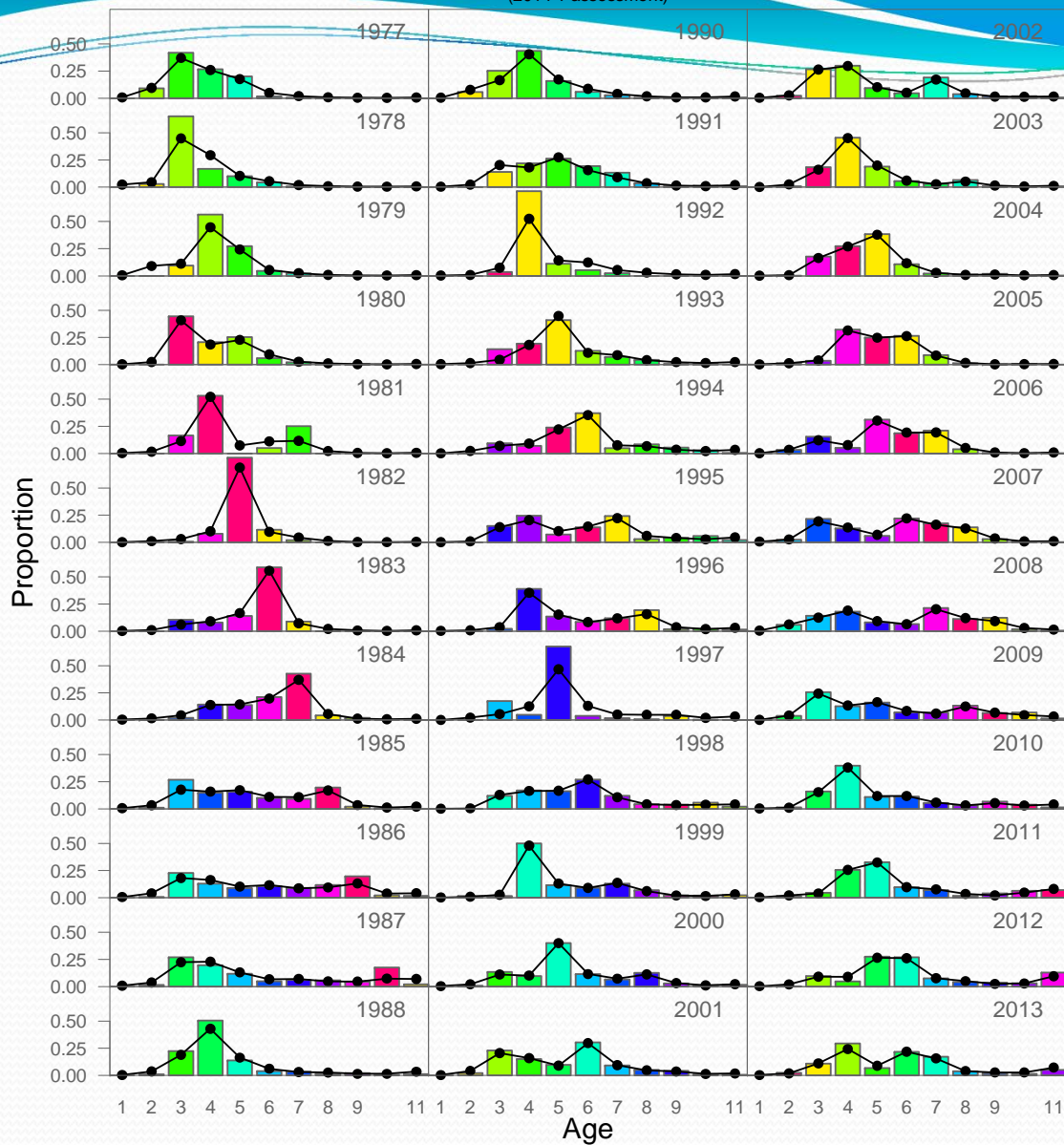


NMFS_Bottom_trawl index age composition data
(2014 1 assessment)



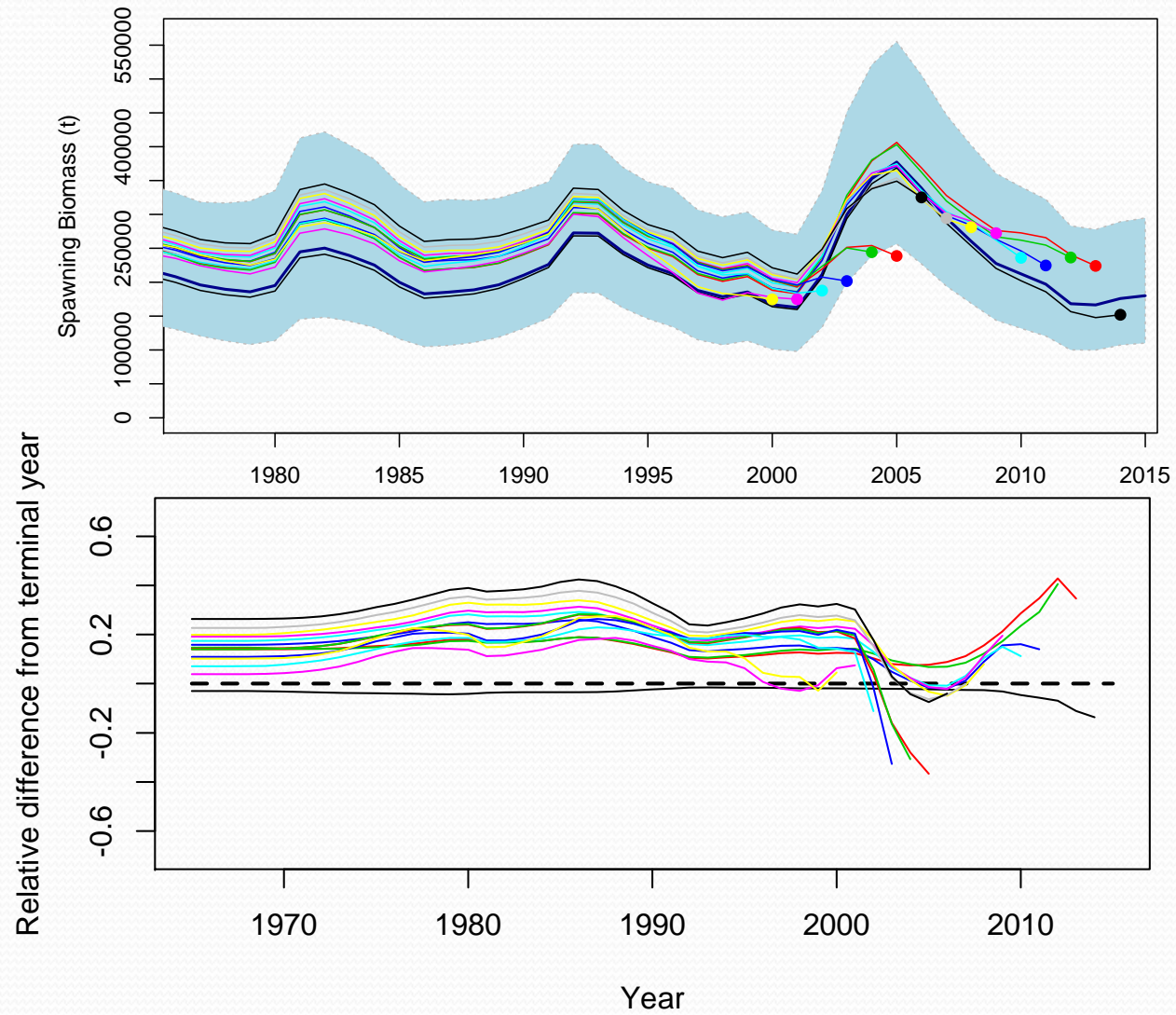
Observed and predicted **survey** proportions-at-age for BSAI Atka mackerel. Lines with “•” symbol are the model predictions and columns are the observed proportions at age for Model 1

Atka_mackerel fishery age composition data (2014 1 assessment)

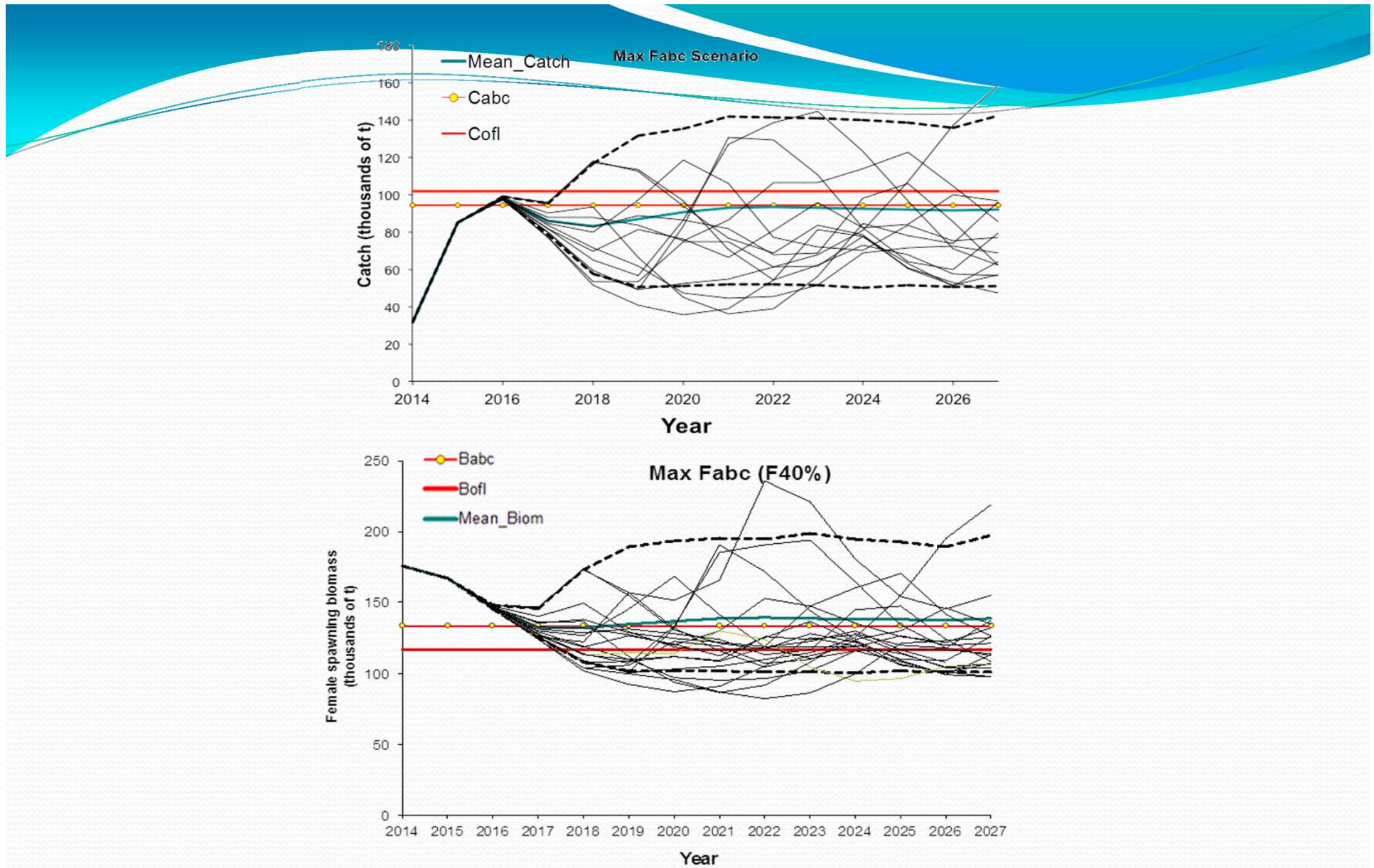


Observed and predicted Atka mackerel **fishery** proportions-at-age for BSAI Atka mackerel. Lines with “•” symbol are the model predictions and columns are the observed proportions at age (with colors corresponding to cohorts) for Model 1

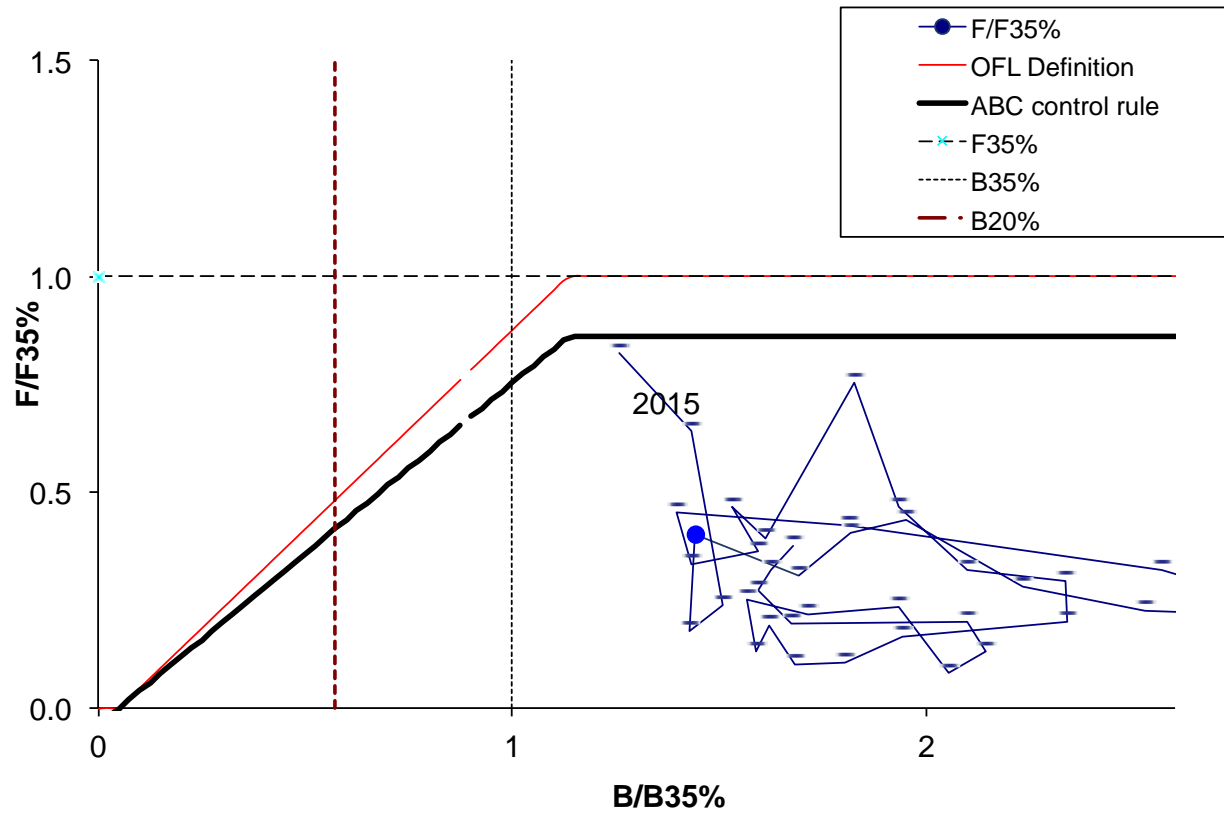
Model 1



Retrospective patterns for BSAI Atka mackerel spawning biomass for Model 1 (top) and Model 2 (bottom).



Projected Atka mackerel catch (assuming 80% of ABC taken in 2015; top) and spawning biomass (bottom) in 1000s of metric tons under maximum permissible Tier 3a harvest levels for Model 1. The individual thin lines represent samples of simulated trajectories



BSAI Atka mackerel spawning biomass relative to $B_{35\%}$ and fishing mortality relative to F_{OFL} (1977-2016)

BSAI Atka Mackerel

Overfishing Level and Maximum Permissible ABC

Catch assumptions:

- Total 2014 year end catch estimated (31,670 t) for ABC/OFL specification purposes
- For 2015 and 2016 assume that 80% of the BSAI-wide ABC would be taken
 - ❑ Due to revised SSL RPAs
 - ❑ Affects ABC and OFL values



Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2014	2015	2015*	2016
M (natural mortality rate)	0.30	0.30	0.30	0.30
Tier	3a	3b	3a	3a
Projected total (age 1+) biomass (t)	456,620	584,500	694,421	673,327
Female spawning biomass (t)				
Projected	117,171	115,640	167,136	146,682
$B_{100\%}$	291,028	291,028	333,237	333,237
$B_{40\%}$	116,411	116,411	133,295	133,295
$B_{35\%}$	101,860	101,860	116,633	116,633
F_{OFL}	0.514	0.514	0.489	0.489
$maxF_{ABC}$	0.421	0.421	0.403	0.403
F_{ABC}	0.421	0.421	0.403	0.403
OFL (t)	74,492	74,898 ¹	125,297	115,908 ¹
maxABC (t)	64,131	64,477 ¹	106,000	98,137 ¹
ABC (t)	64,131	64,477 ¹	106,000	98,137 ¹
Status	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
	2012	2013	2013	2014
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

*Projections are based on estimated total 2014 catch of 31,670 t.

¹These values were calculated assuming reduced catch levels under SSL RPAs.

Apportionment

	2006	2010	2012	2014	Recommended 2015 & 2016 Apportionment	2014 Apportionment
541 ¹	48.90%	51.16%	12.34%	41.97%	36.31%	33.76%
542	37.52%	21.38%	39.41%	28.30%	31.23%	32.08%
543	13.58%	27.46%	48.25%	29.73%	31.45%	34.16%
Weights	8	12	18	27		

¹Includes eastern Aleutian Islands and southern Bering Sea areas.

Apportionments of the 2015 and 2016 recommended ABCs based on the most recent 4-survey weighted average:

	2015 (t)	2016 (t)
Eastern (541+S.BSea)	38,492	35,637
Central (542)	33,108	30,652
Western (543)	34,400	31,848
Total	106,000	98,127

