



Alaska Sablefish

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Outline

- New data
- Model results
- Projections
- Apportionment
- Future



New stuff



- Model
 - No changes for 2014
- Data
 - Catch: updated catch from 2005-2013, new 2014-2016 ests
 - Relative abundance: 2014 Longline survey, 2013 Longline fishery
 - Ages: 2013 Longline survey, 2013 fixed gear fishery
 - Lengths: 2014 Longline survey, 2013 fixed gear fishery, and 2013 trawl fishery
- [Appendix 3C: More details on whale depredation estimation on the survey](#)

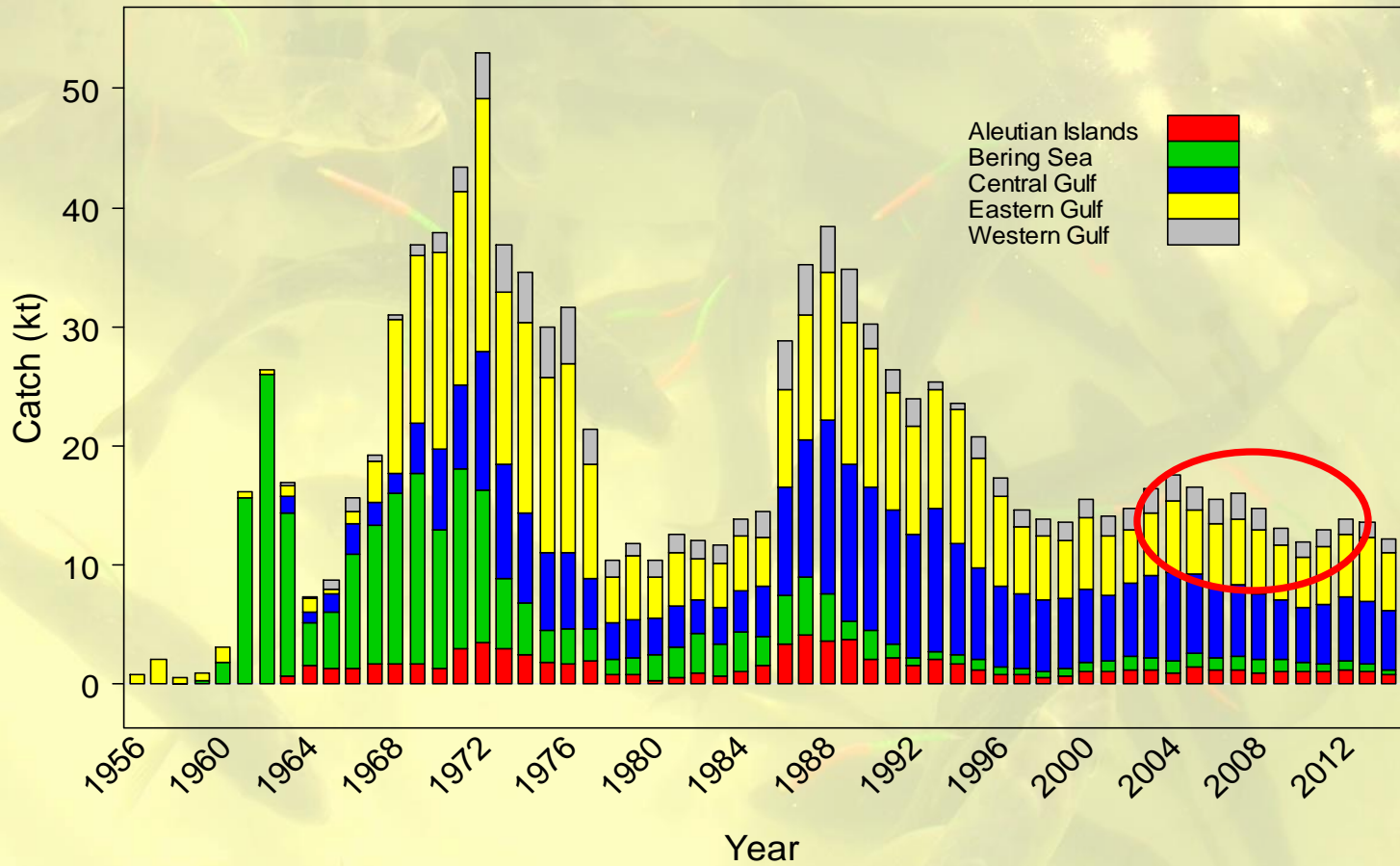
SSC and PT comments



- Best estimates of catches
- 2 years of projections on phase-plane
- “...investigate time-varying selectivity in relation to some of the issues seen in the retrospective pattern”
- “... development of a spatial assessment model”
- “... re-examining the method for spatially allocating the sablefish ABC in the next year... try to include preliminary results of the spatial MSE”
- “... further exploration of the factors underlying ... retrospective pattern”

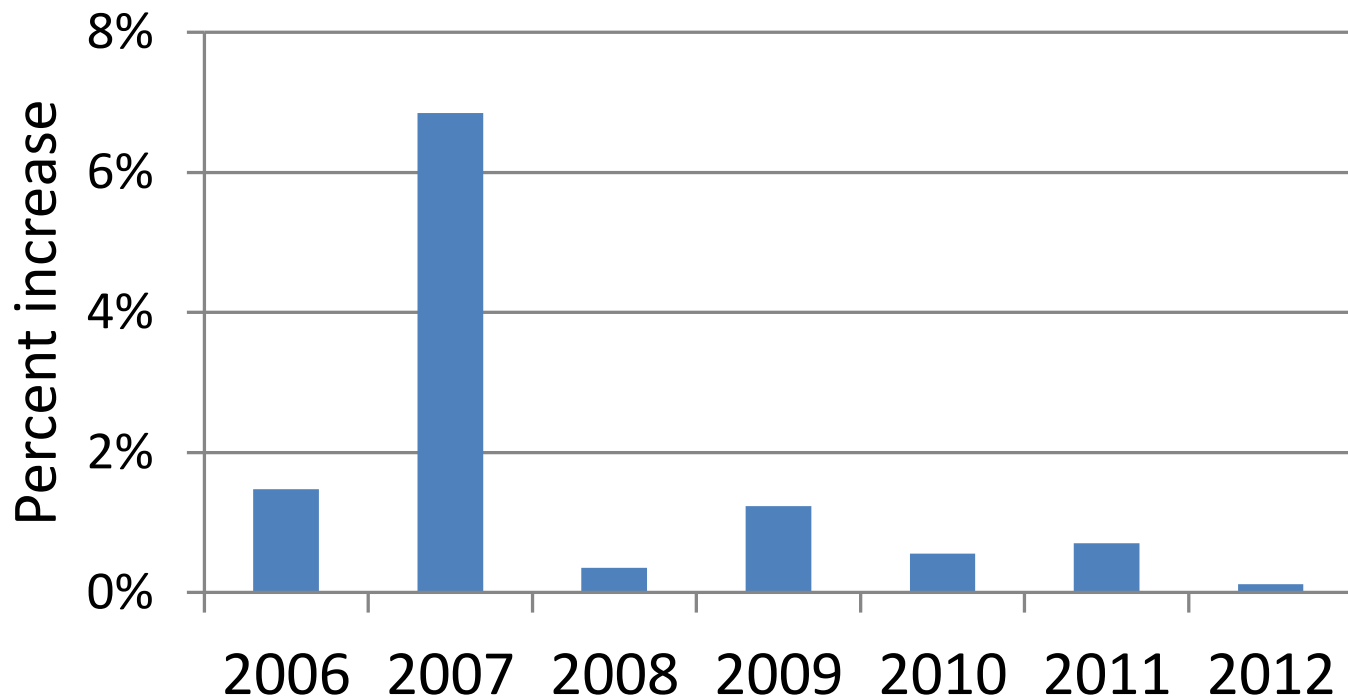
Catch

Catch by FMP management area

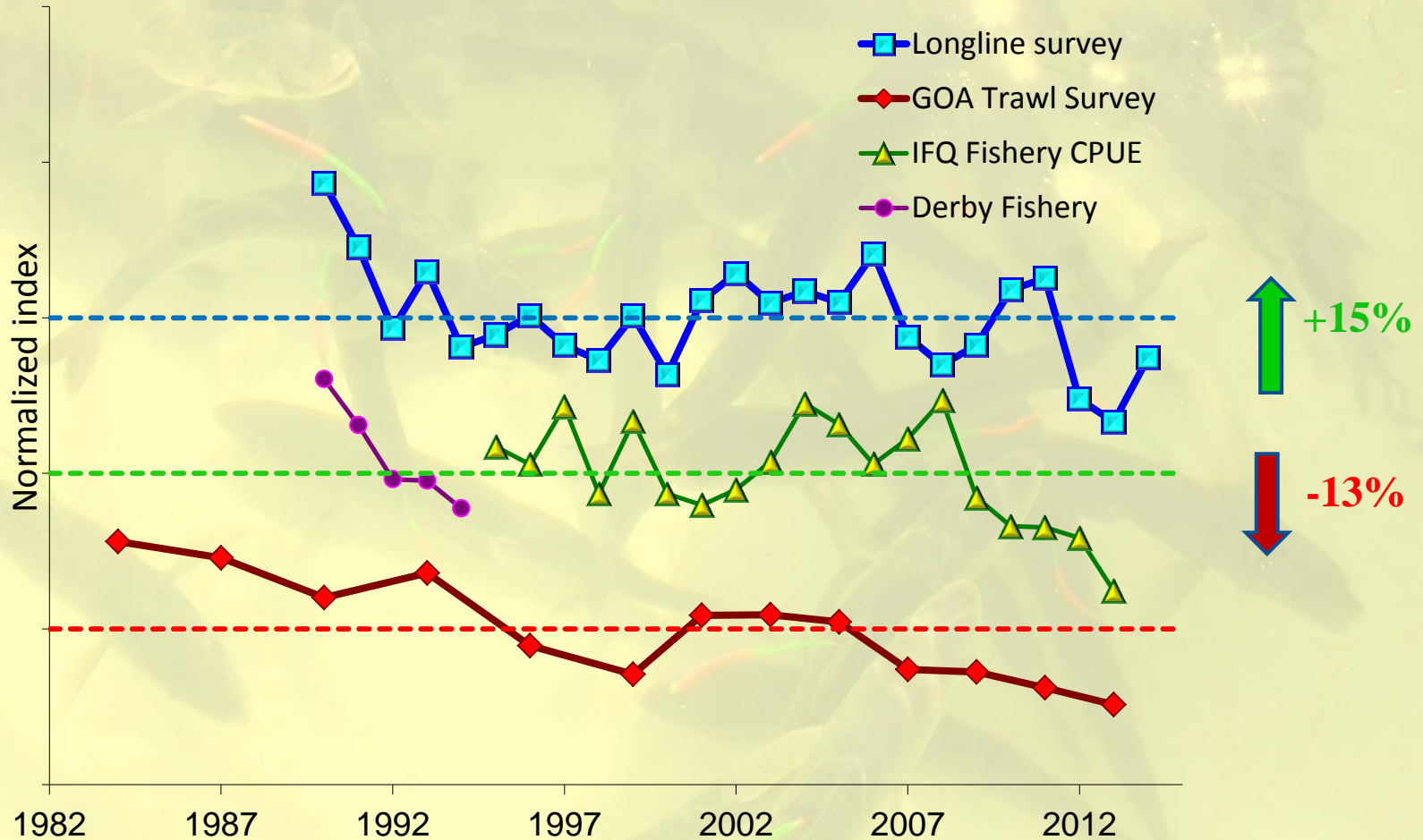


Some changes in catch

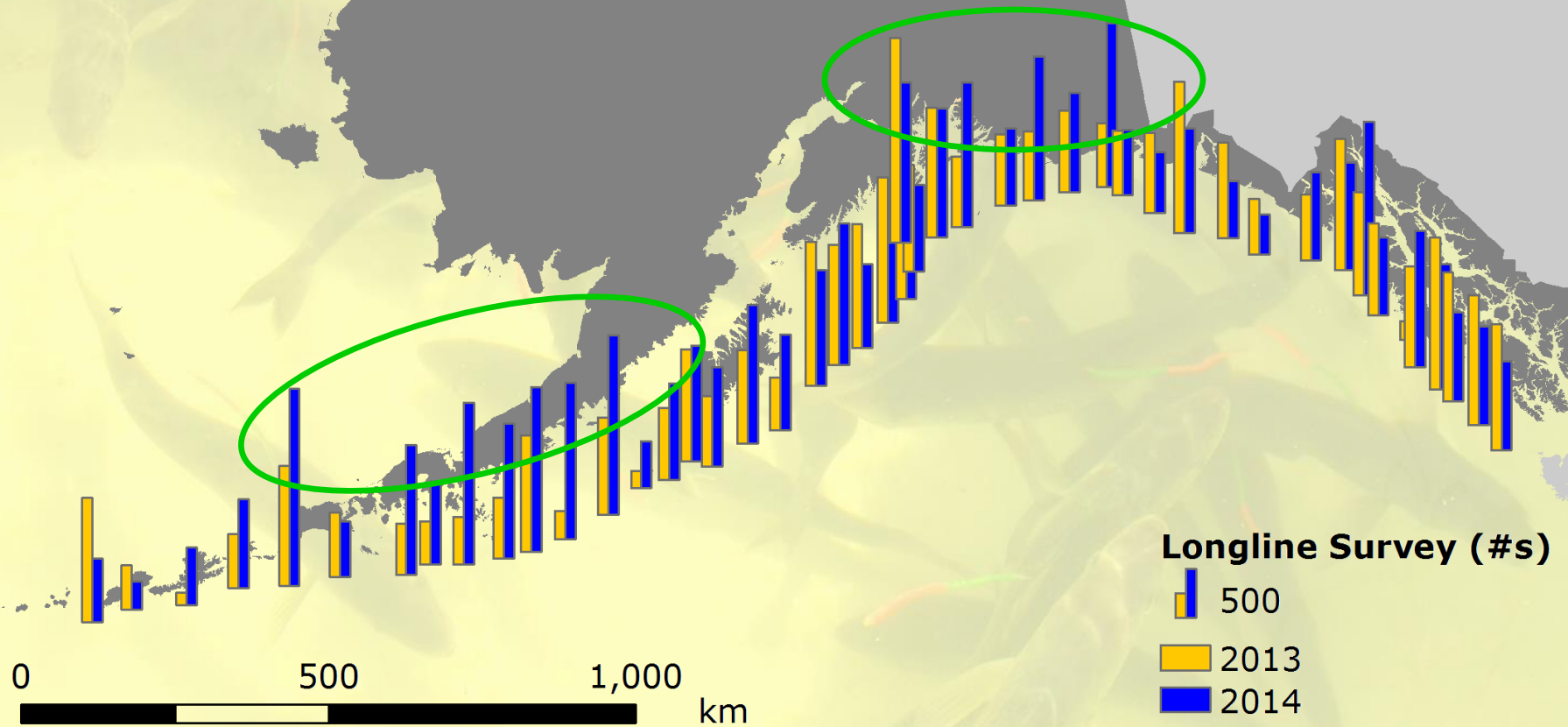
**Relative increase in fixed gear catch
from 2013 to 2014 catch data**



Abundance indices



Gulf of Alaska longline survey

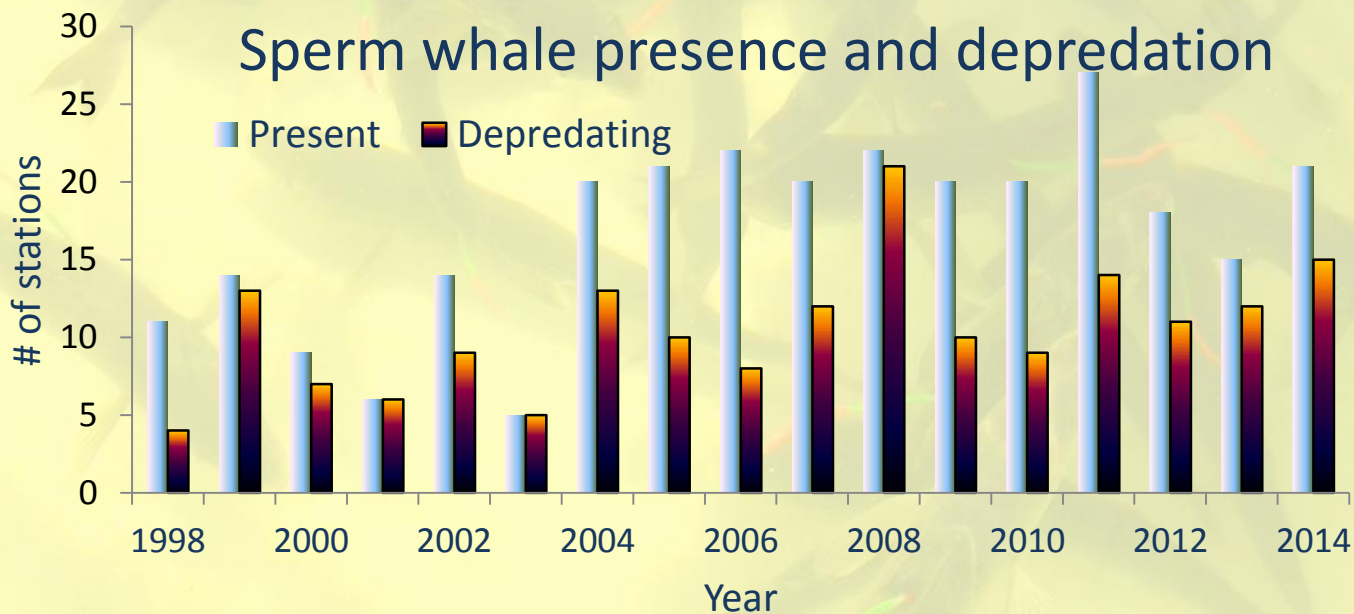
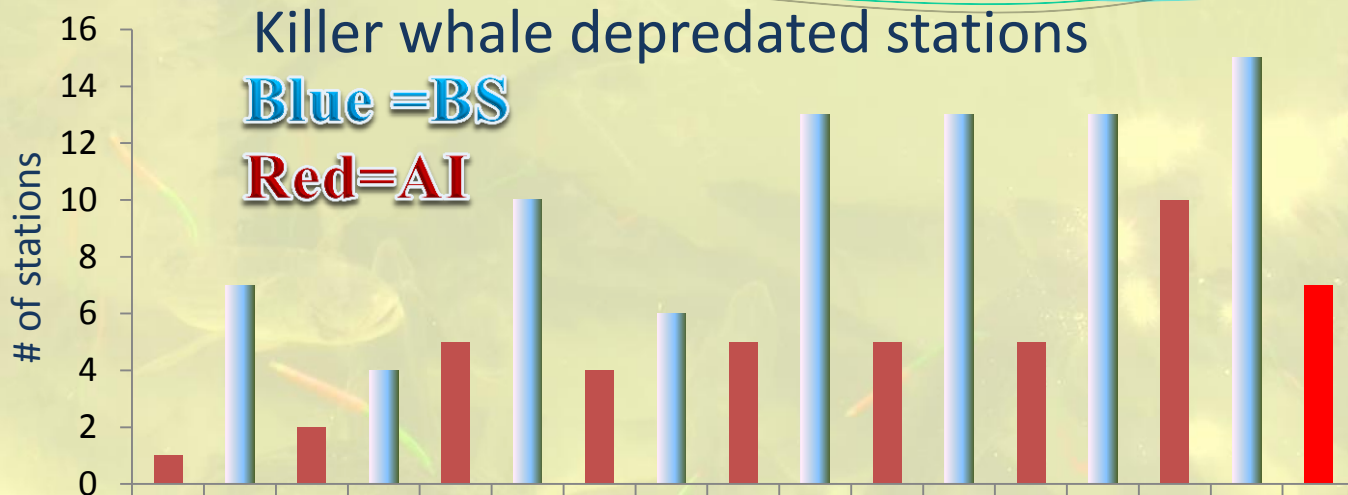


Whales on surveys



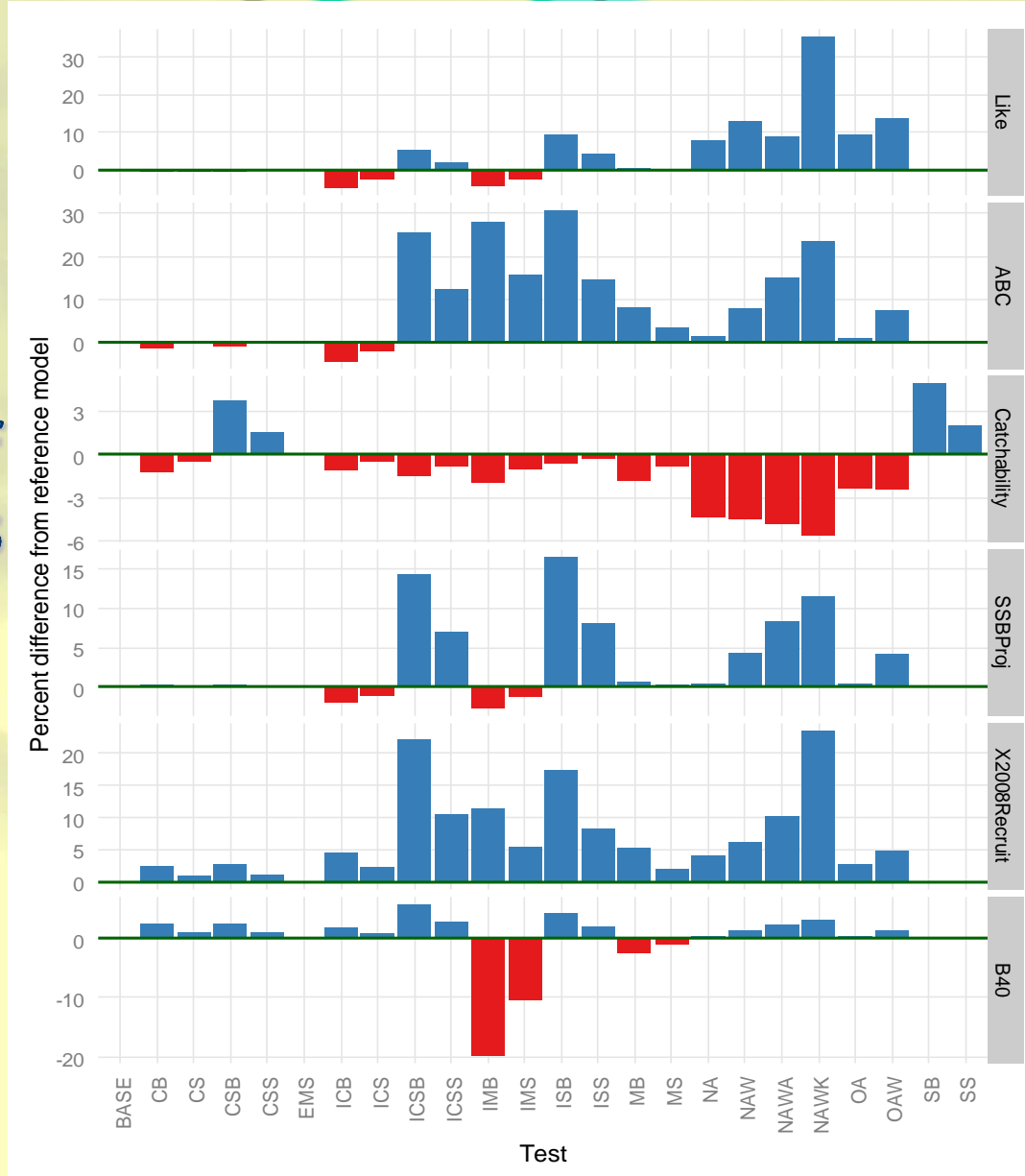
Whales over
grad students

- Better listeners
- Eat less
- Very attentive to target species



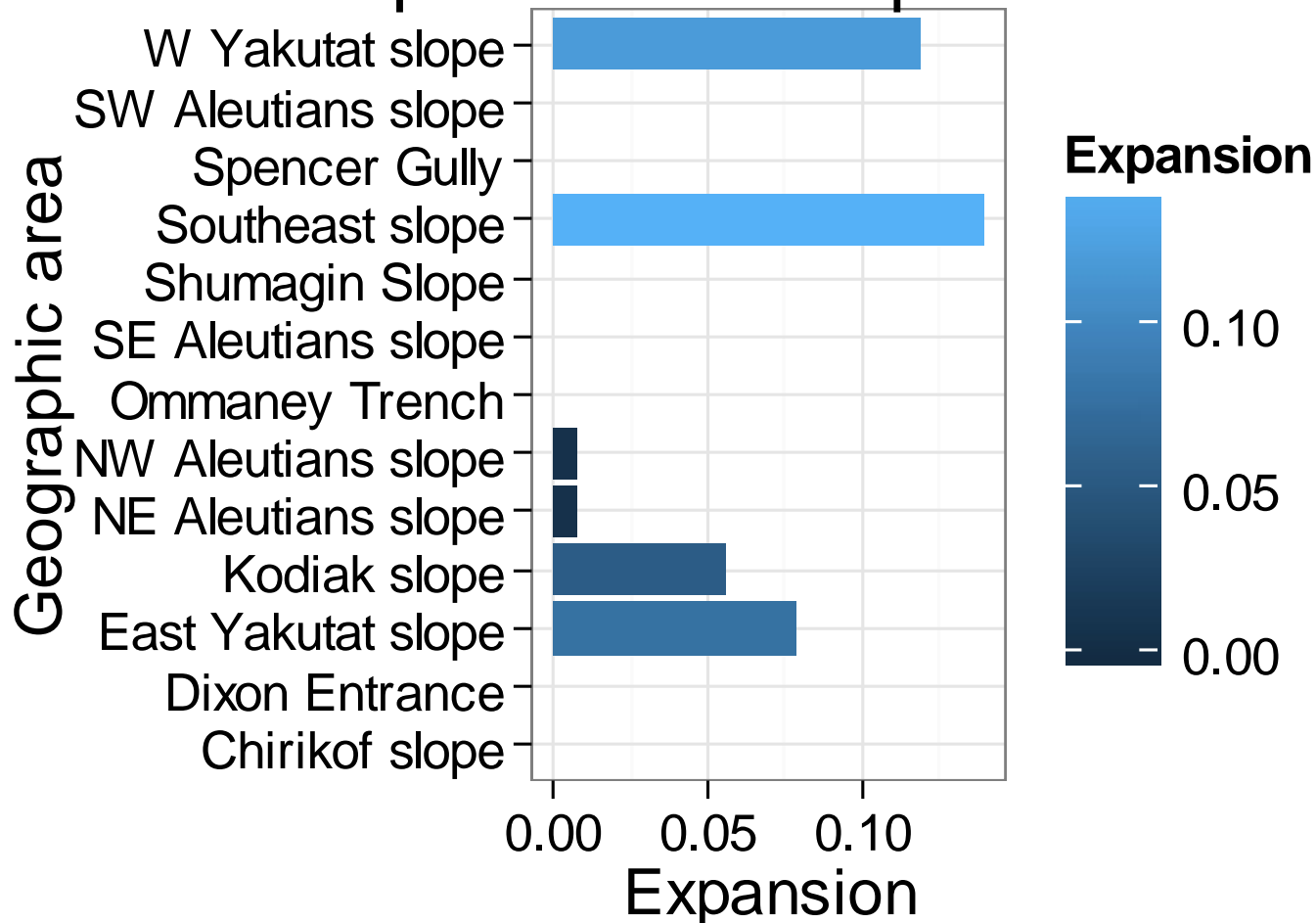
Appendix 3C

- Sablefish research update
- Sensitivity analysis of assessment to whales
- Sperm whale estimates on index
- Maturity
- Movement

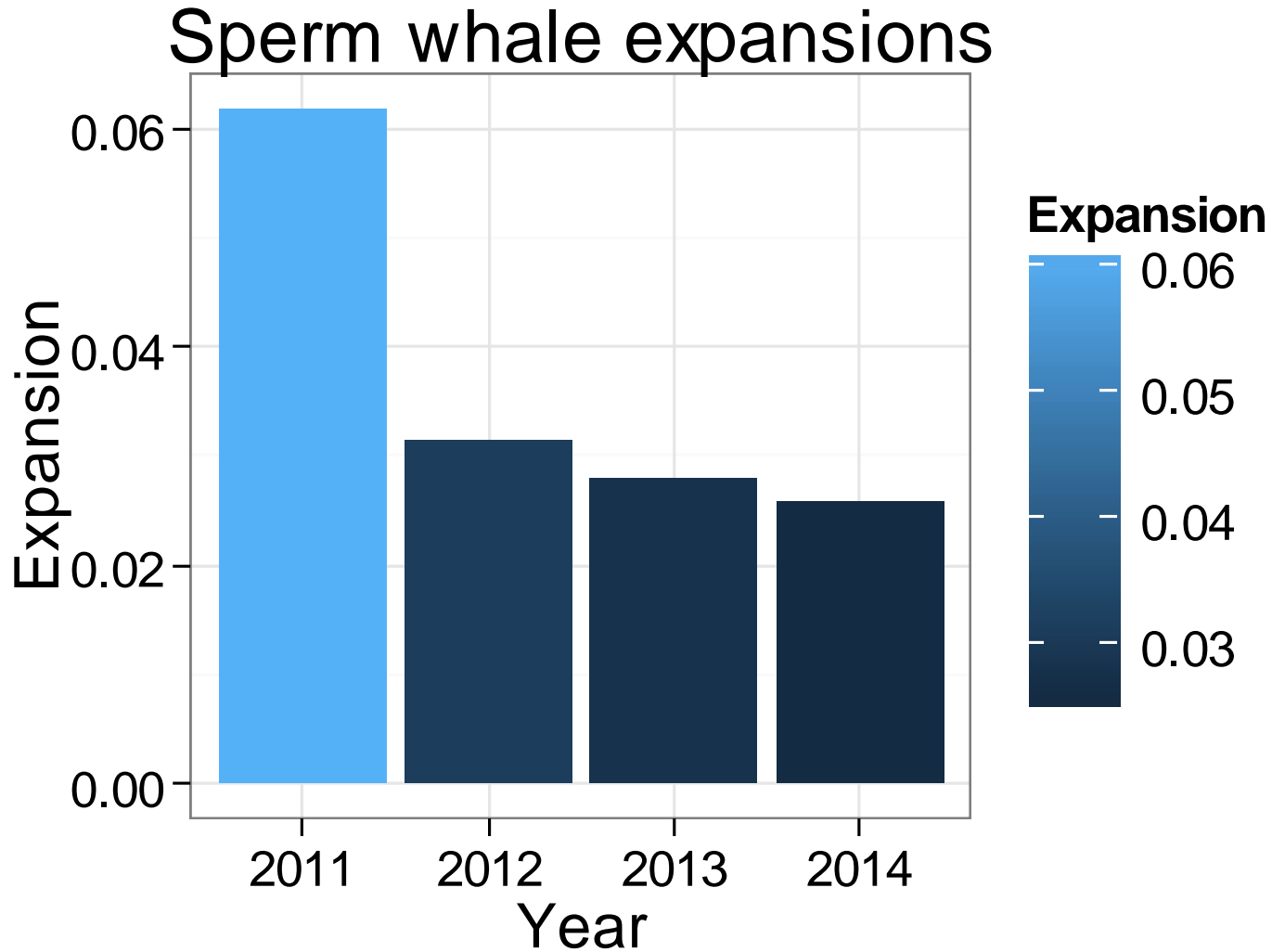


Whales on surveys (2014)

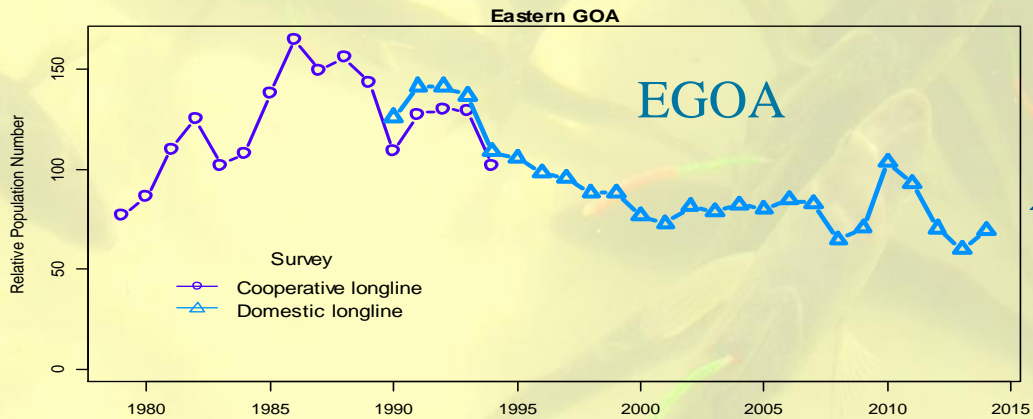
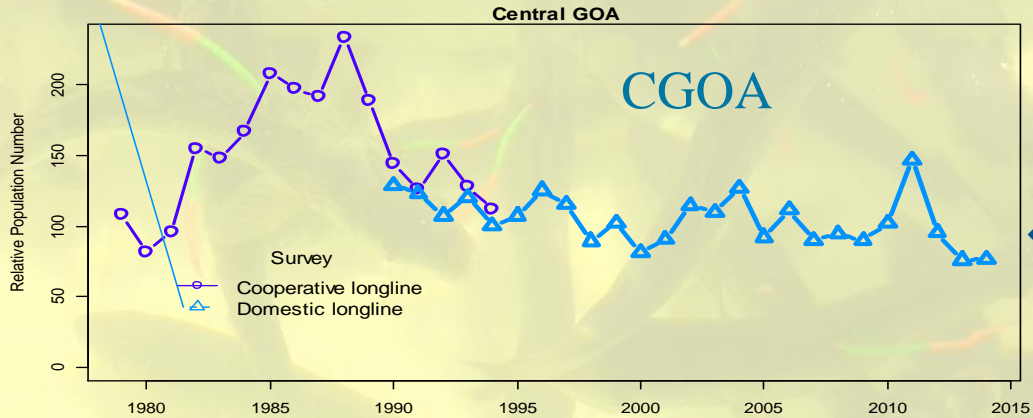
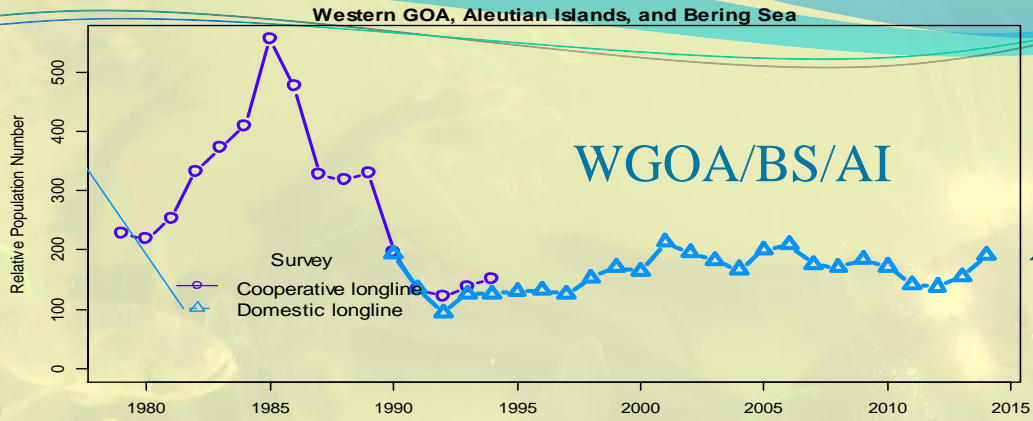
Sperm whale expansions



Whales on surveys

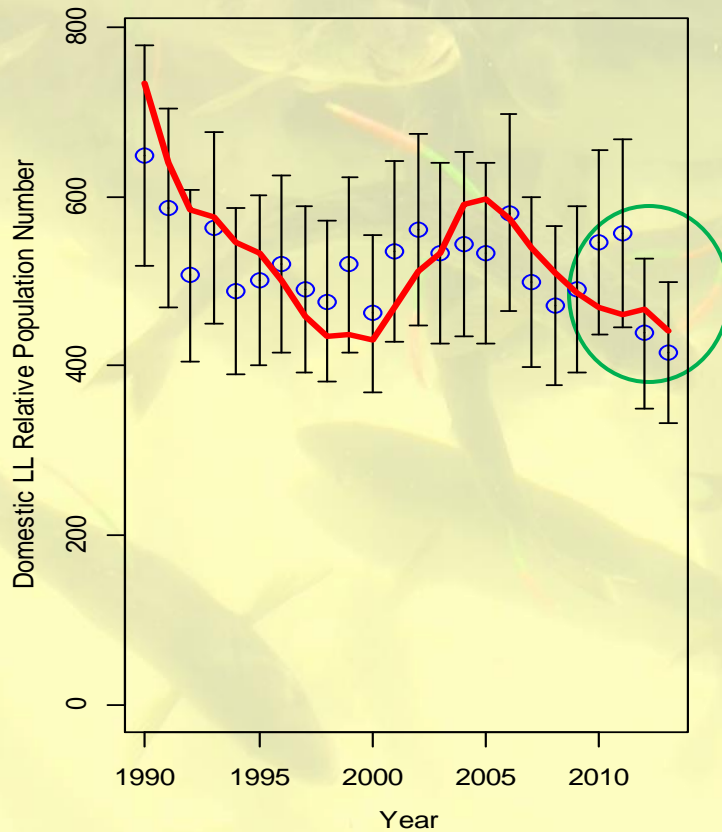


LL Survey RPNs

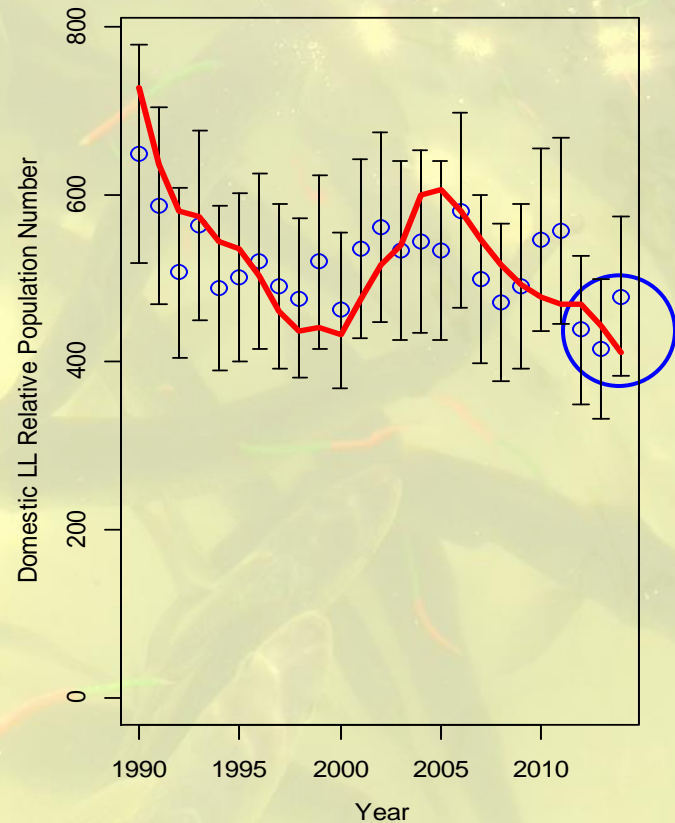


Model fit to LL Survey RPN

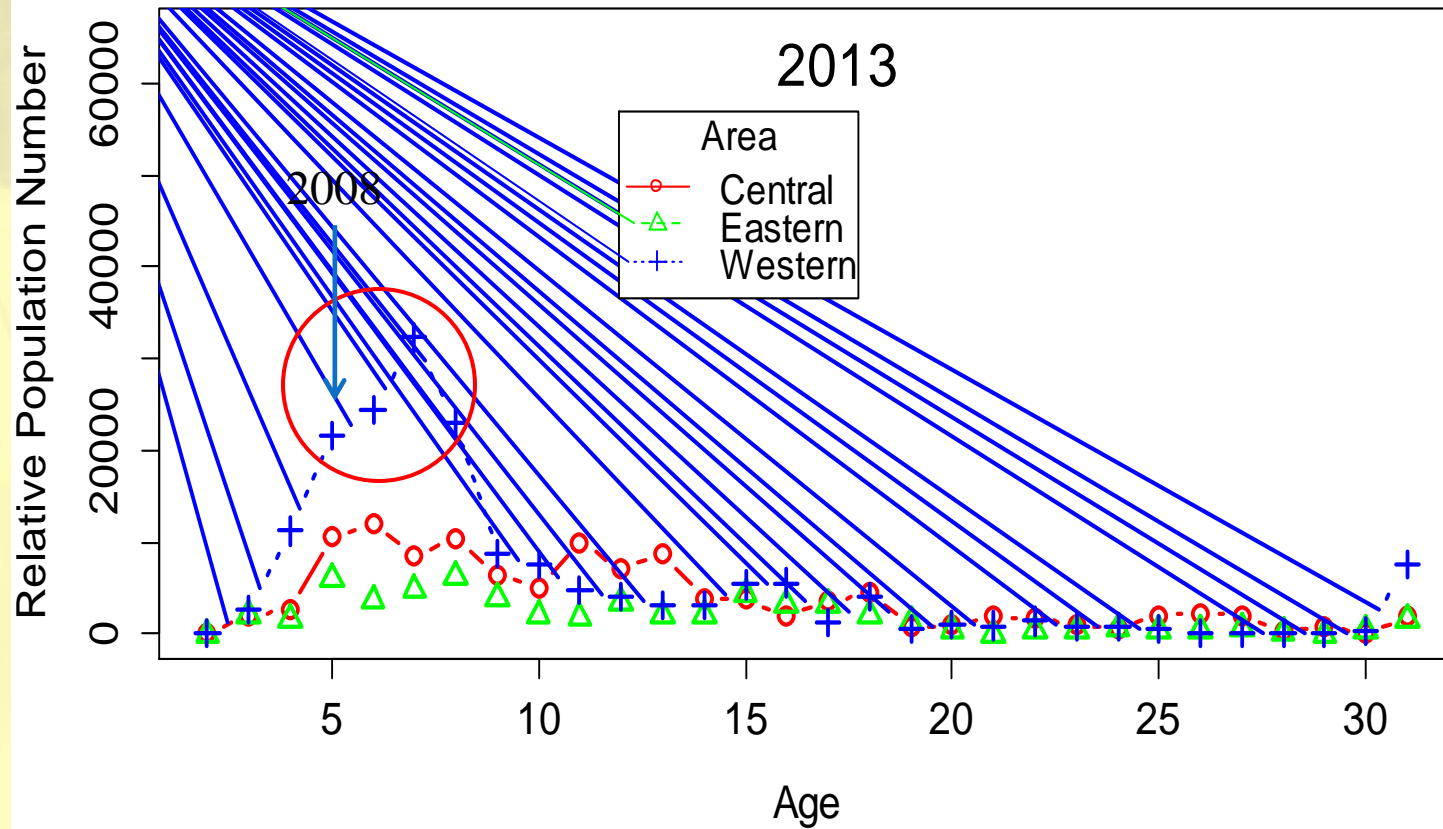
2013



2014

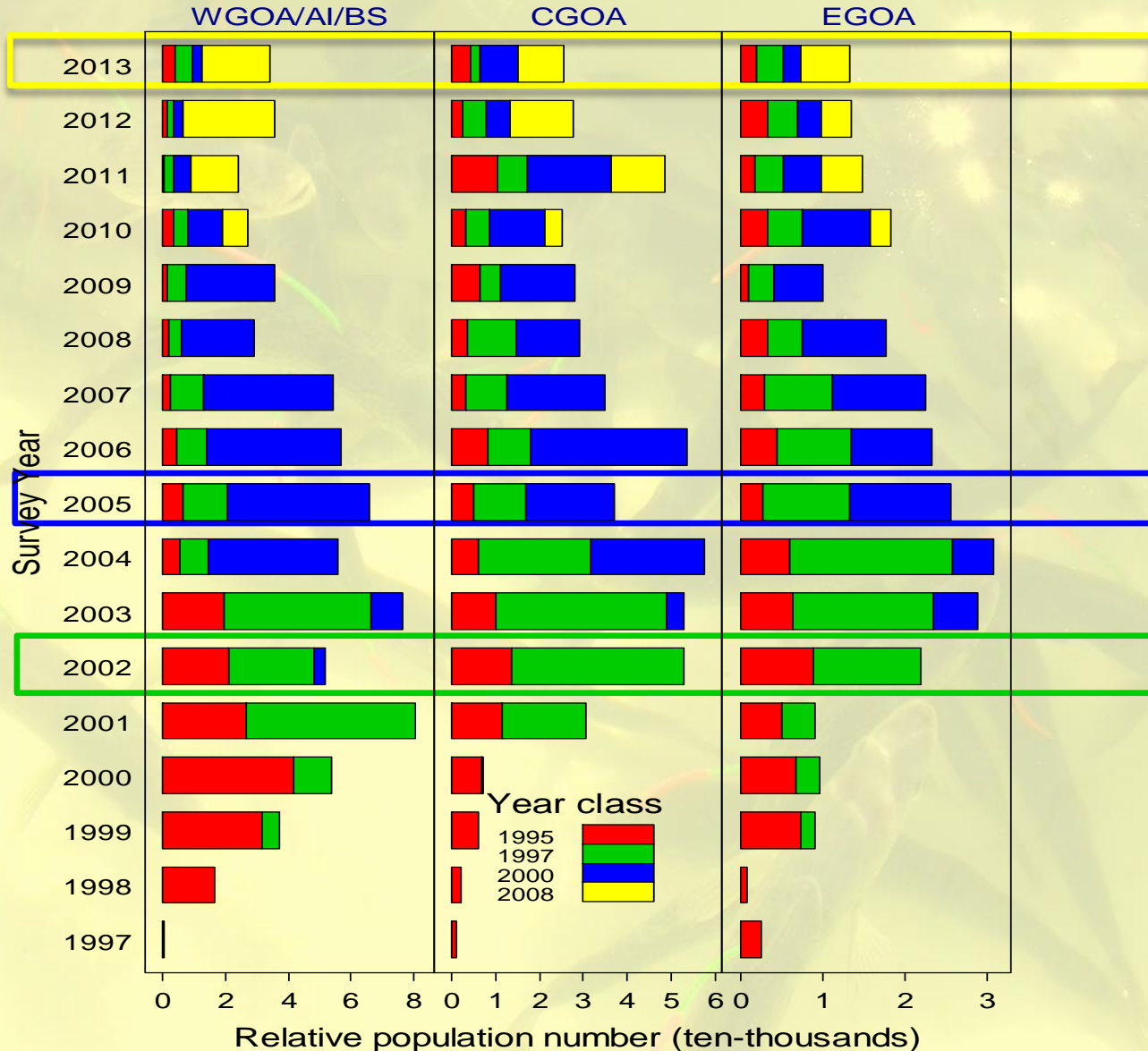


Longline survey ages

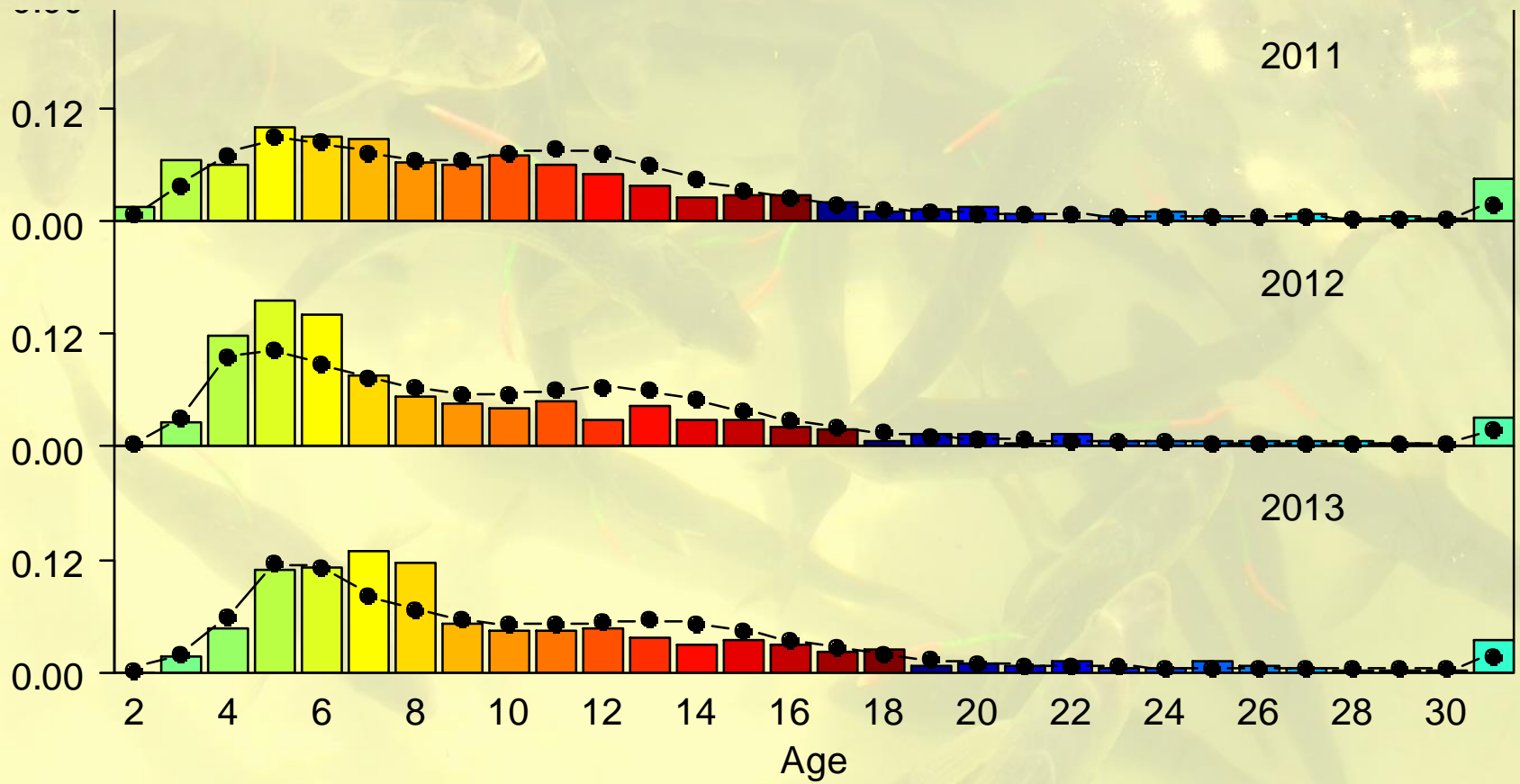


Recent year classes

Top 4 year classes by Survey and Area

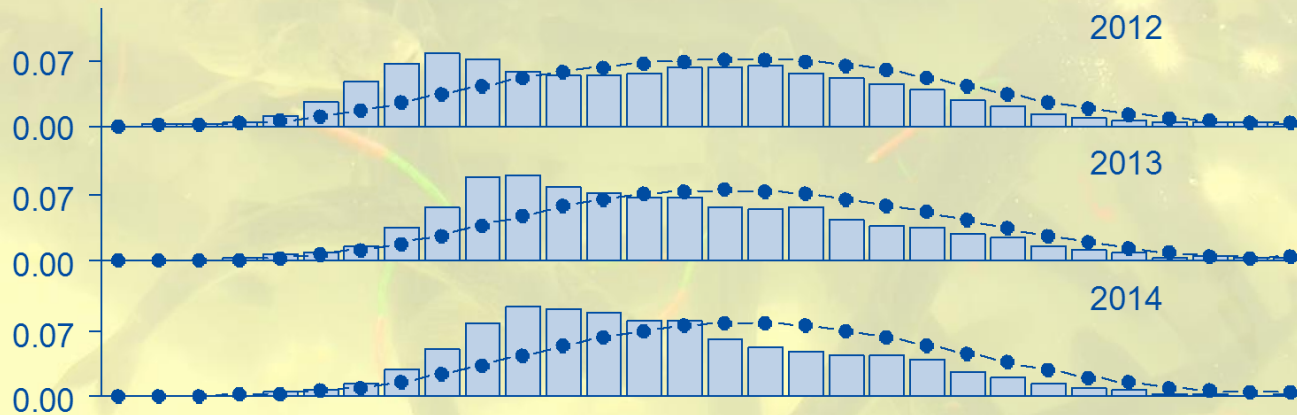


Survey Ages (all areas)

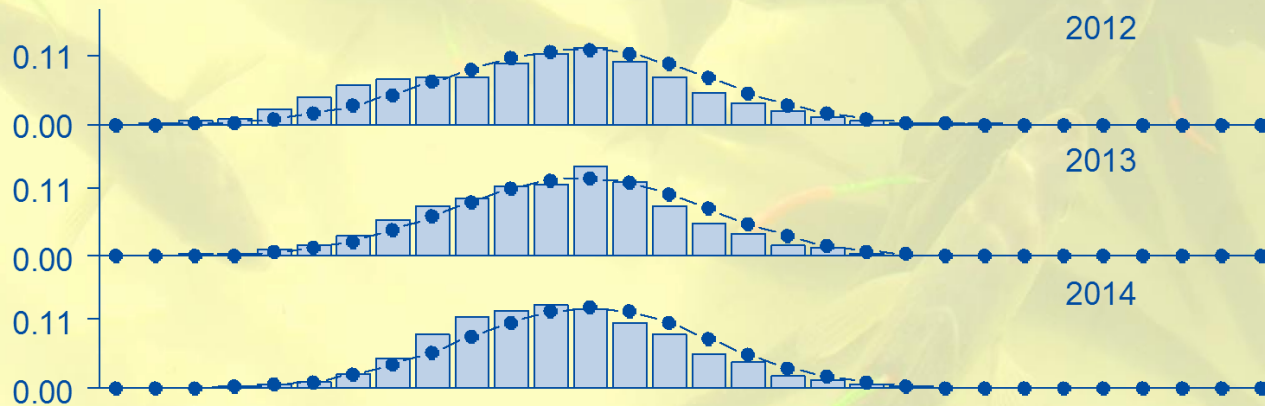


LL Survey lengths

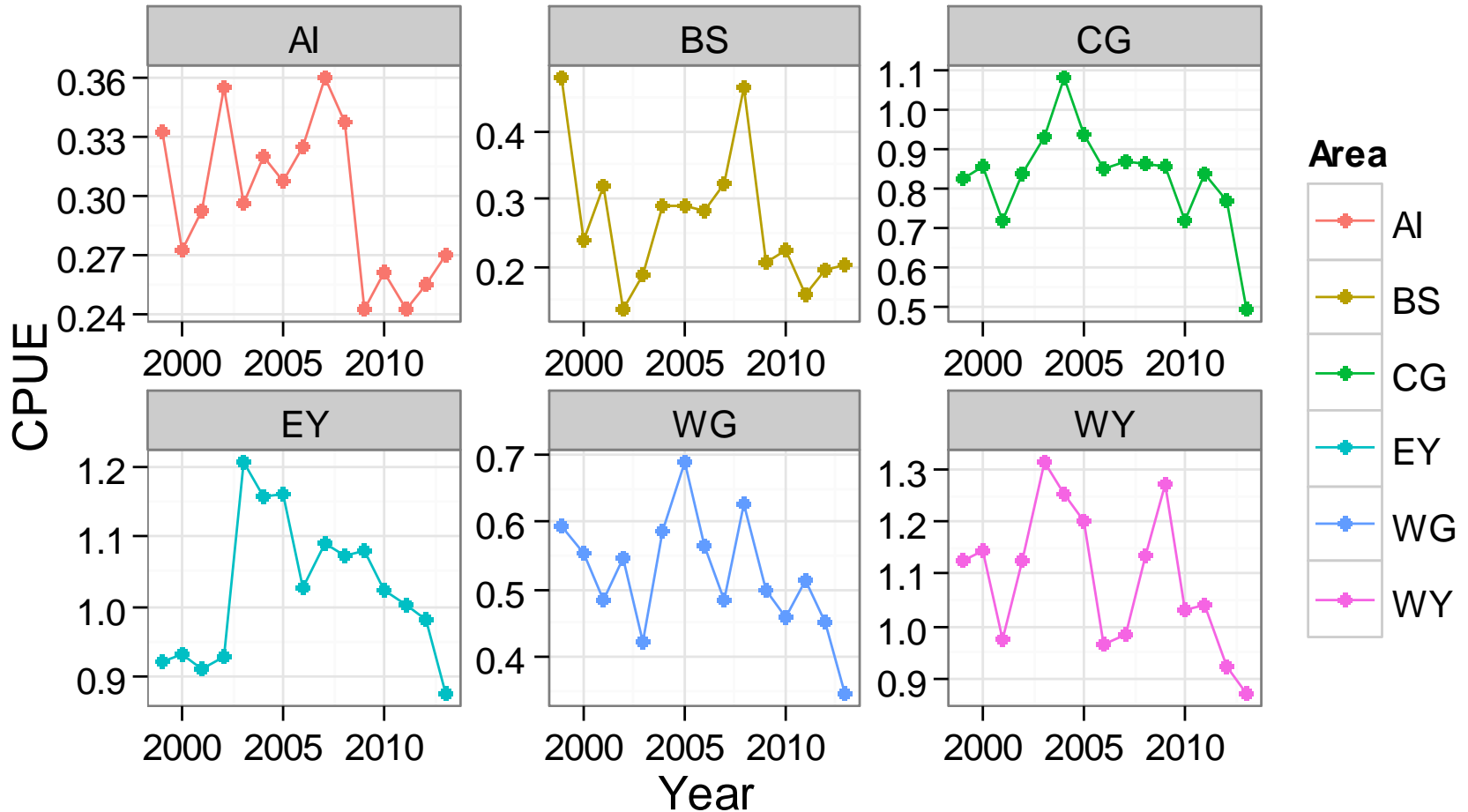
Females



Males

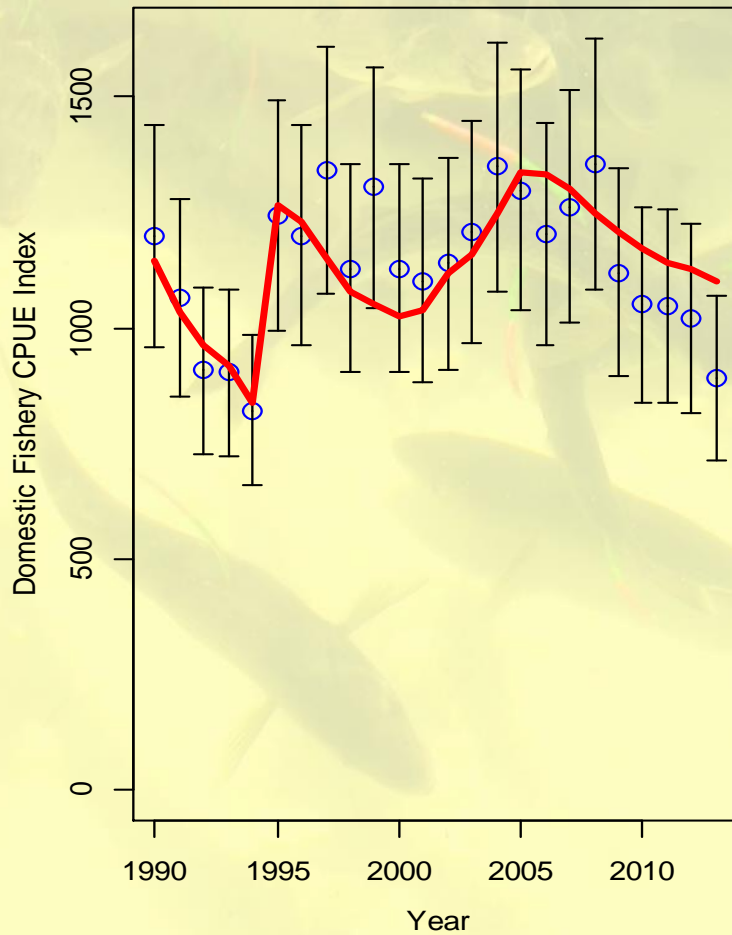


Weighted average by area

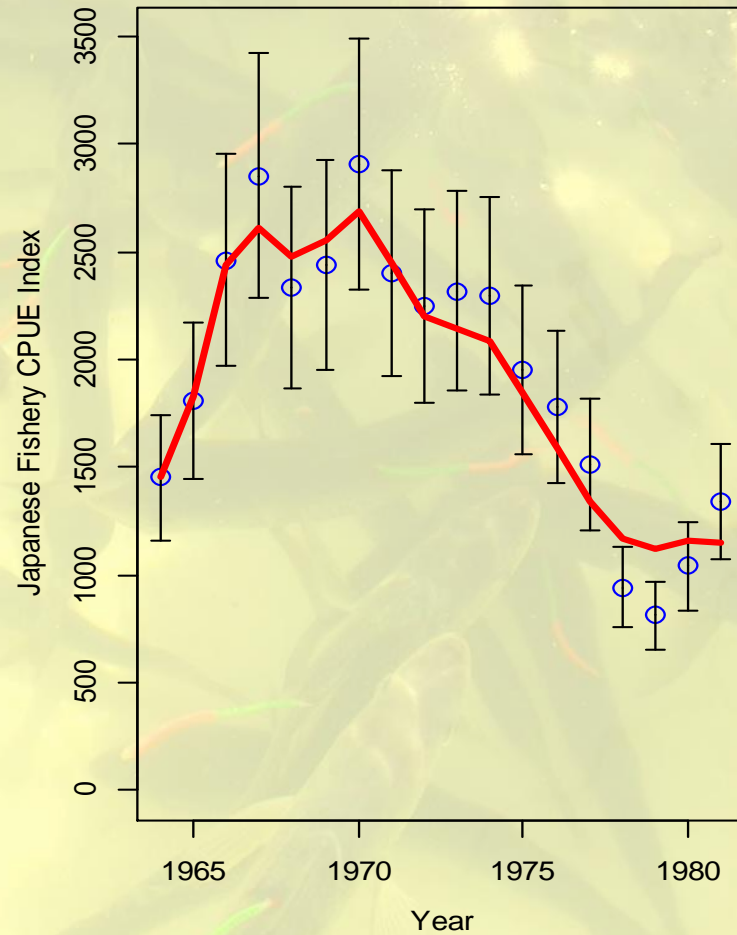


Model fit to Fishery RPW

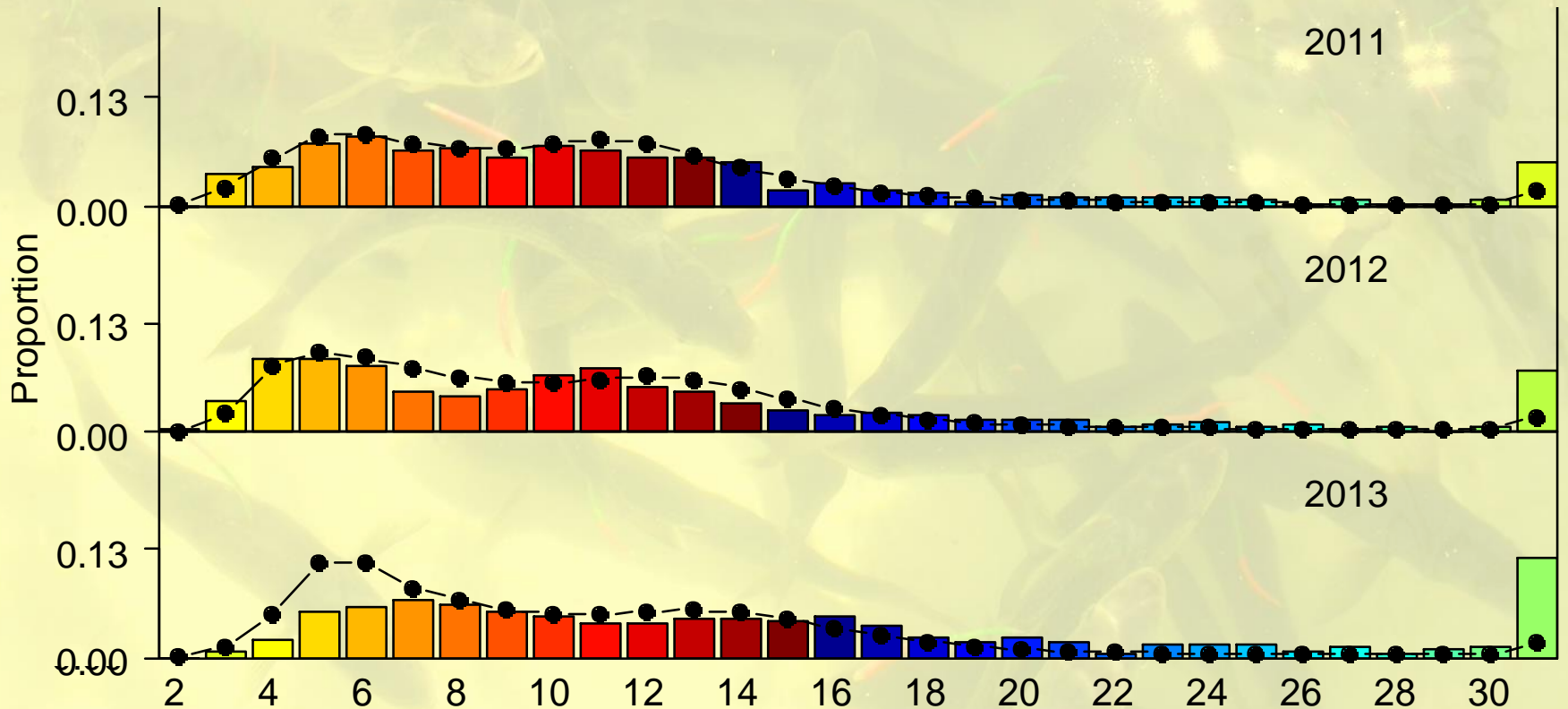
Domestic



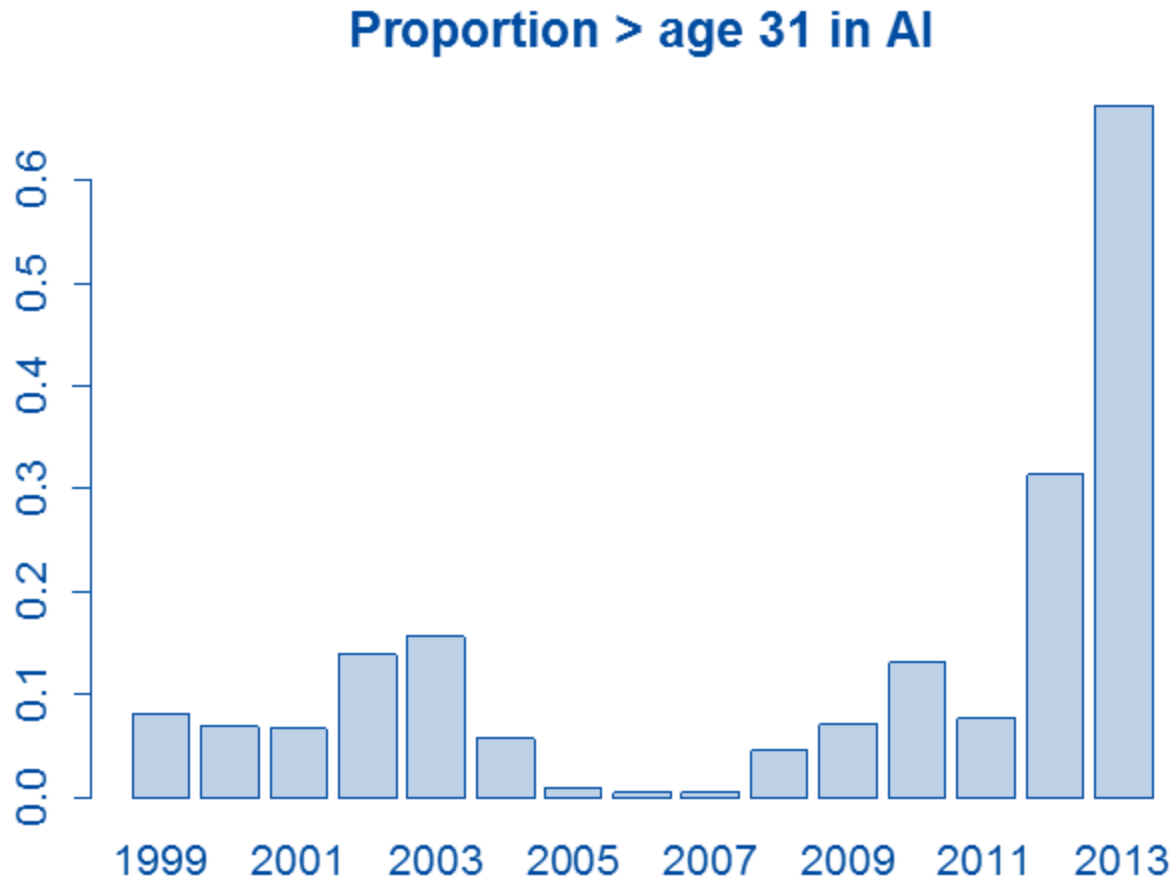
Japanese



Fishery Ages



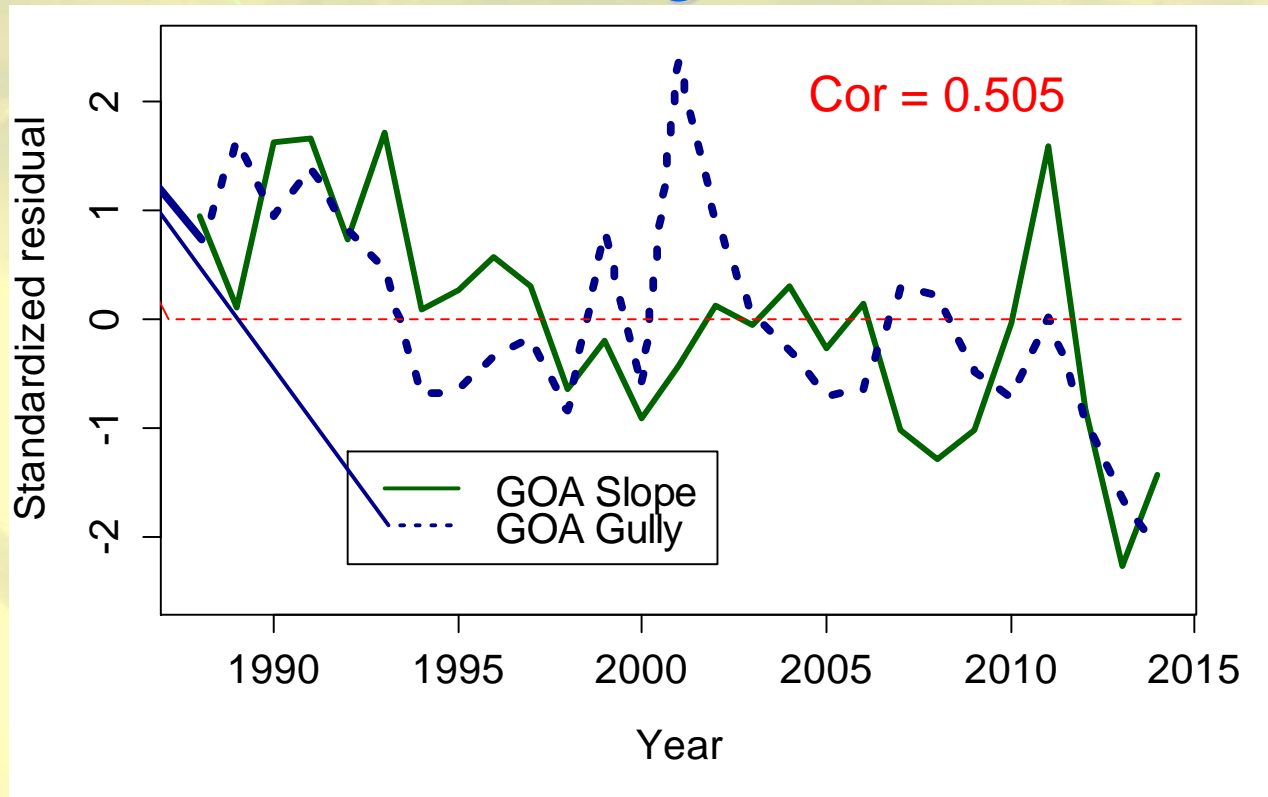
Old fish in the AI



Good reason to explore spatial models, OR perhaps (sigh) time-varying selectivity?

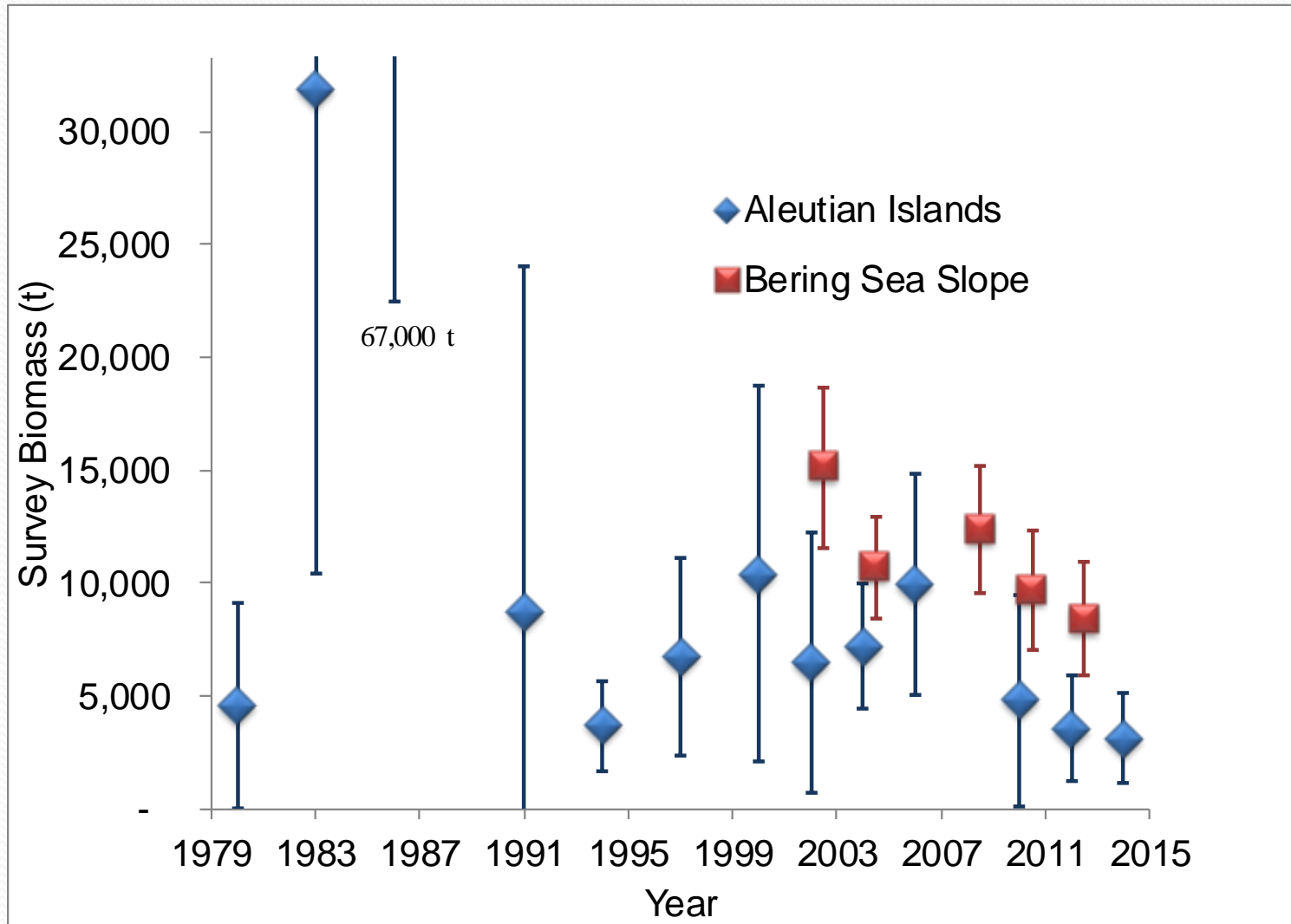
Other indices (Gullies)

- Trends in same direction, gullies more variable



- Will follow, and consider for new index

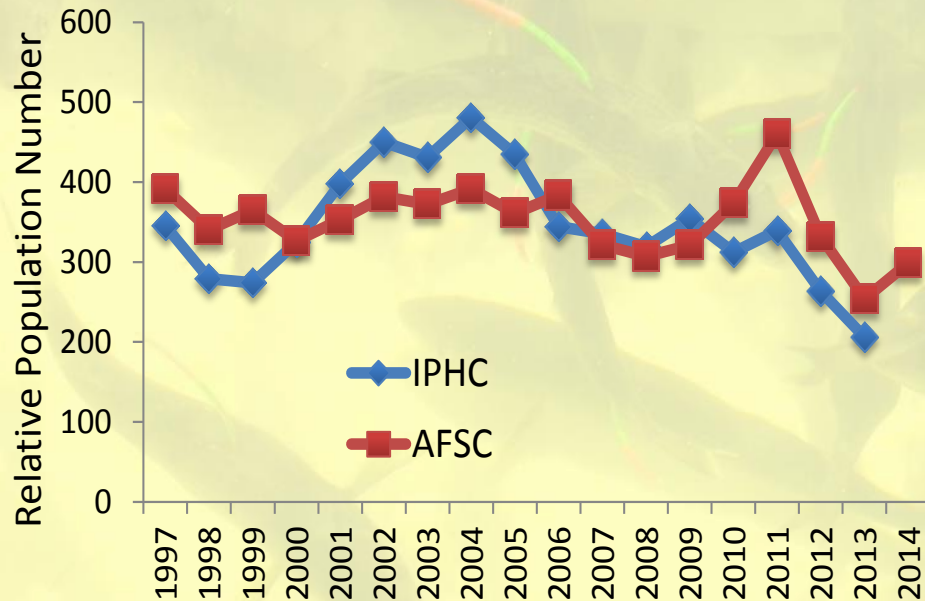
NMFS BS/AI trawl surveys



IPHC Survey

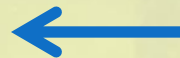
Gulf of Alaska

- Showed some uptick in 2011 (possibly also 2008 year class)
- Decrease from 2012 to 2013 (-21%)



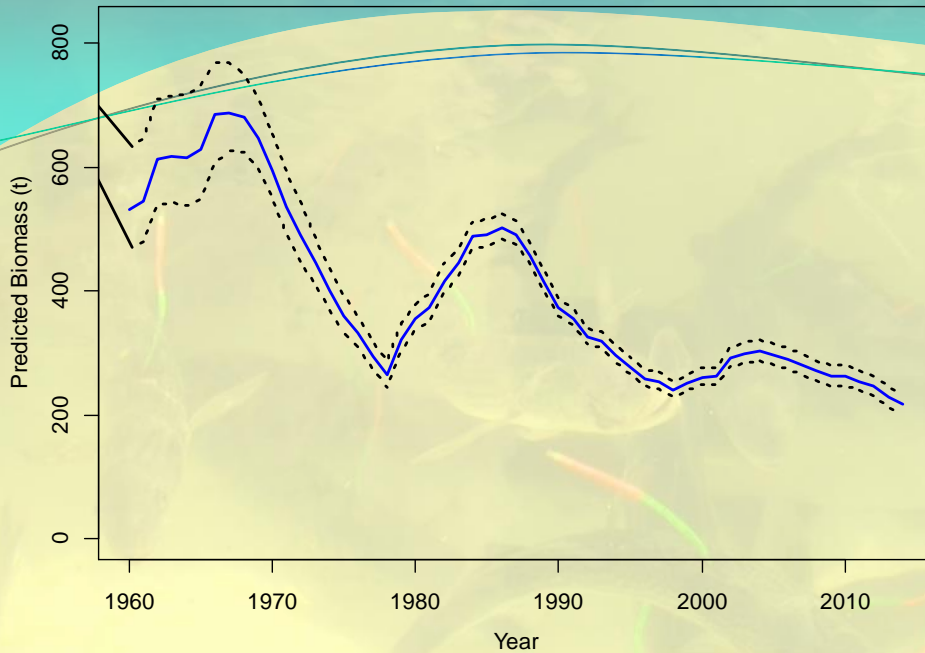
Model results

Model	2013	2014
Likelihood Components (Data)		
Catch	8	7
Domestic LL survey RPN	46	47
Japanese LL survey RPN	18	18
Domestic LL fishery RPW	7	10
Japanese LL fishery RPW	12	13
NMFS GOA trawl survey	19	19
Domestic LL survey ages	169	180
Domestic LL fishery ages	192	238
Domestic LL survey lengths	55	59
Japanese LL survey ages	144	144
Japanese LL survey lengths	46	46
NMFS trawl survey lengths	290	286
Domestic LL fishery lengths	198	207
Domestic trawl fishery lengths	186	194
Data likelihood	1391	1469
Total objective function value	1415	1489
Key parameters		
Number of parameters	216	219
$B_{next\ year}$ (Female spawning (kt) biomass for next year)	91	92
$B_{40\%}$ (Female spawning biomass (kt))	106	105
B_{1960} (Female spawning biomass (kt))	161	161
$B_{0\%}$ (Female spawning biomass (kt))	266	262
$SPR\%$ current	34.3%	35.1%
$F_{40\%}$	0.094	0.094
$F_{40\%}$ (Tier 3b adjusted)	0.080	0.082
$ABC(kt)$	13.7	13.7
$q_{Domestic\ LL\ survey}$	7.7	7.6
$q_{Japanese\ LL\ survey}$	6.3	6.2
$q_{Domestic\ LL\ fishery}$	4.1	4.0
$q_{Trawl\ Survey}$	1.4	1.3
$a_{50\%}$ (domestic LL survey selectivity)	3.8	3.8
$a_{50\%}$ (LL fishery selectivity)	3.9	3.9
μ_r (average recruitment)	17.8	18.0
σ_r (recruitment variability)	1.20	1.20

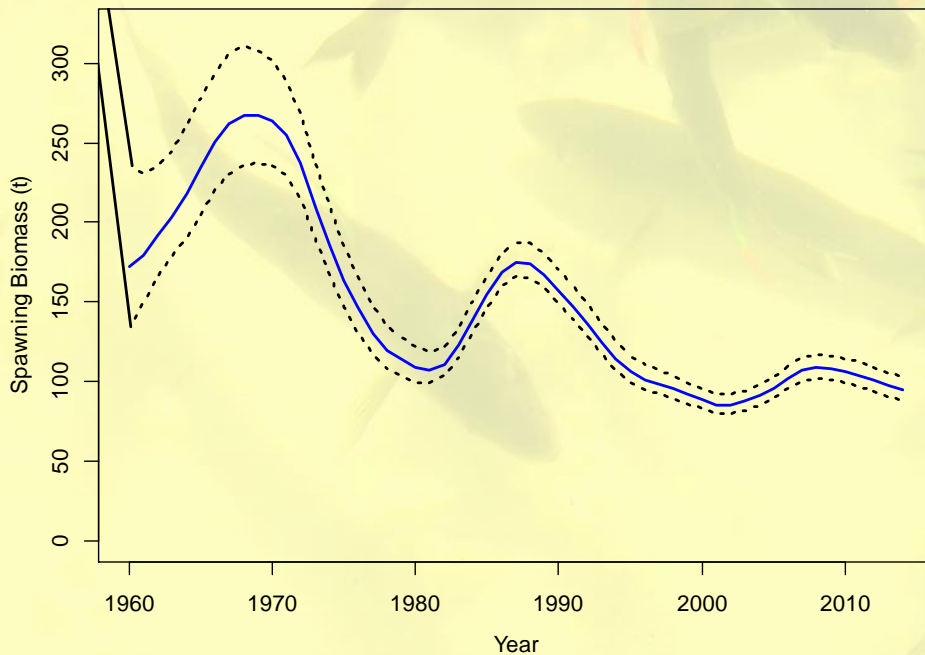


- LL fishery ages increased likelihood the most
- Everything else about the same

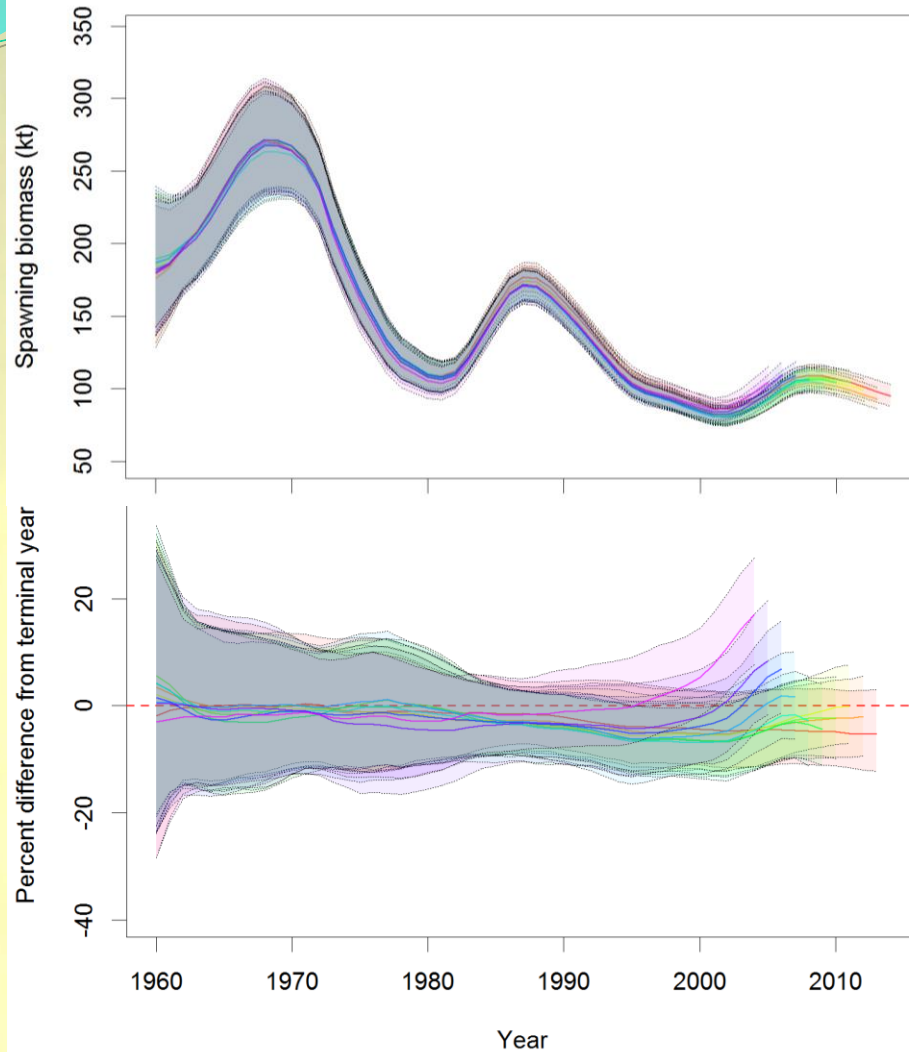
Trends



- Total biomass has been slowly decreasing since 2003



- Spawning biomass leveled and trending down



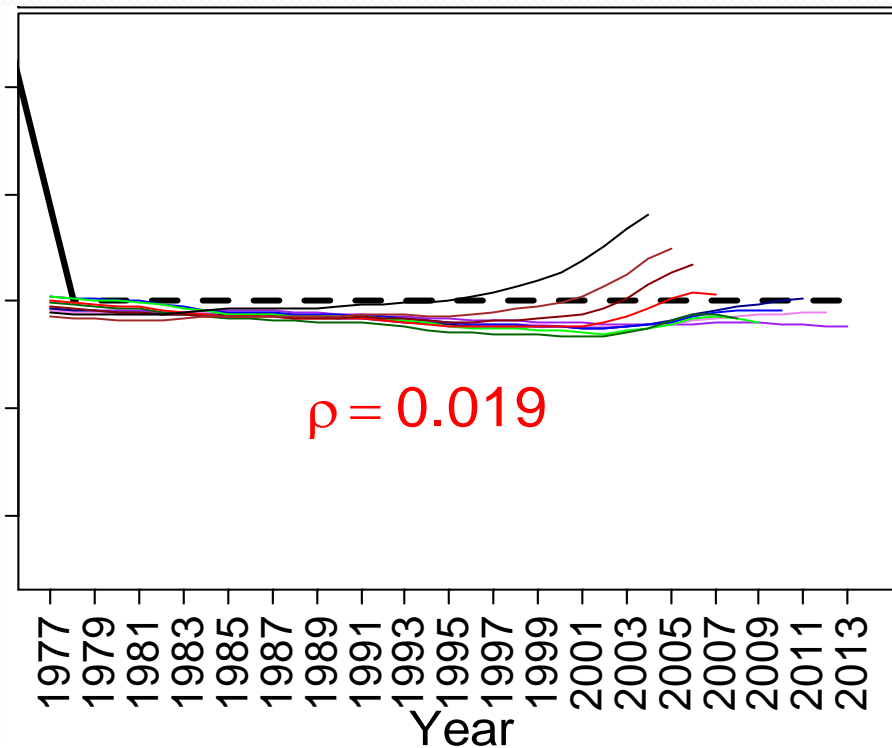
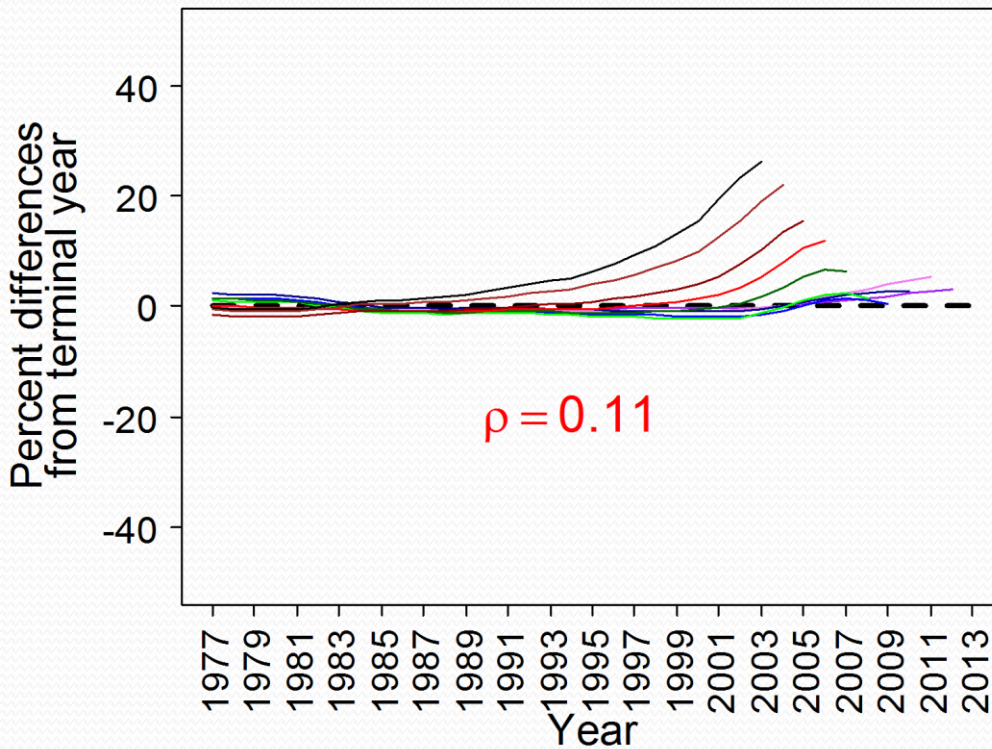
Retrospective

- Retrospective pattern dissipated starting in 2008
- Retrospective pattern ranked 17th of 20 in RIG report in 2013
- Lower now because:
 - 2003 out
 - Catch estimates changed

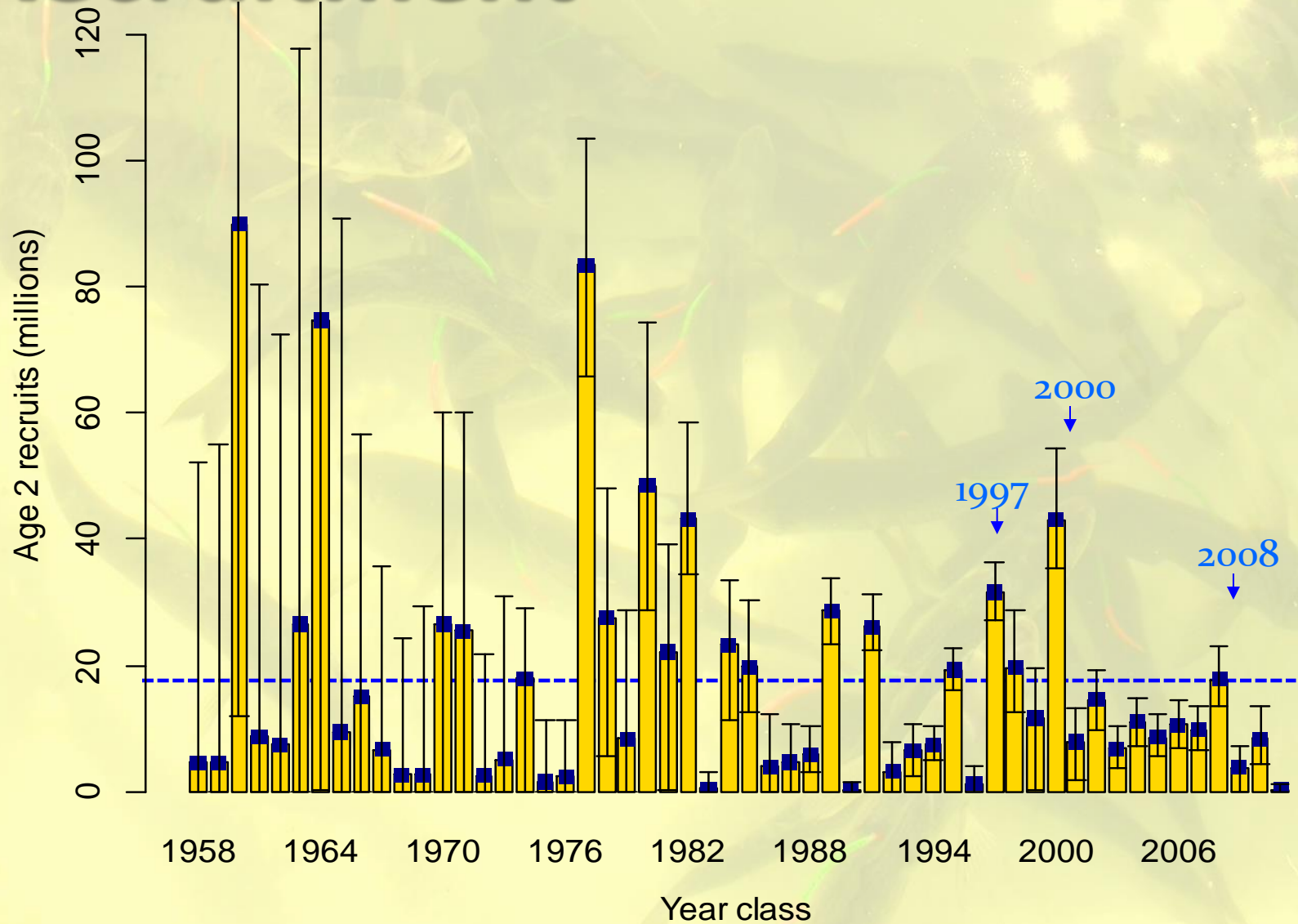
Retrospective comparison

2013 assessment

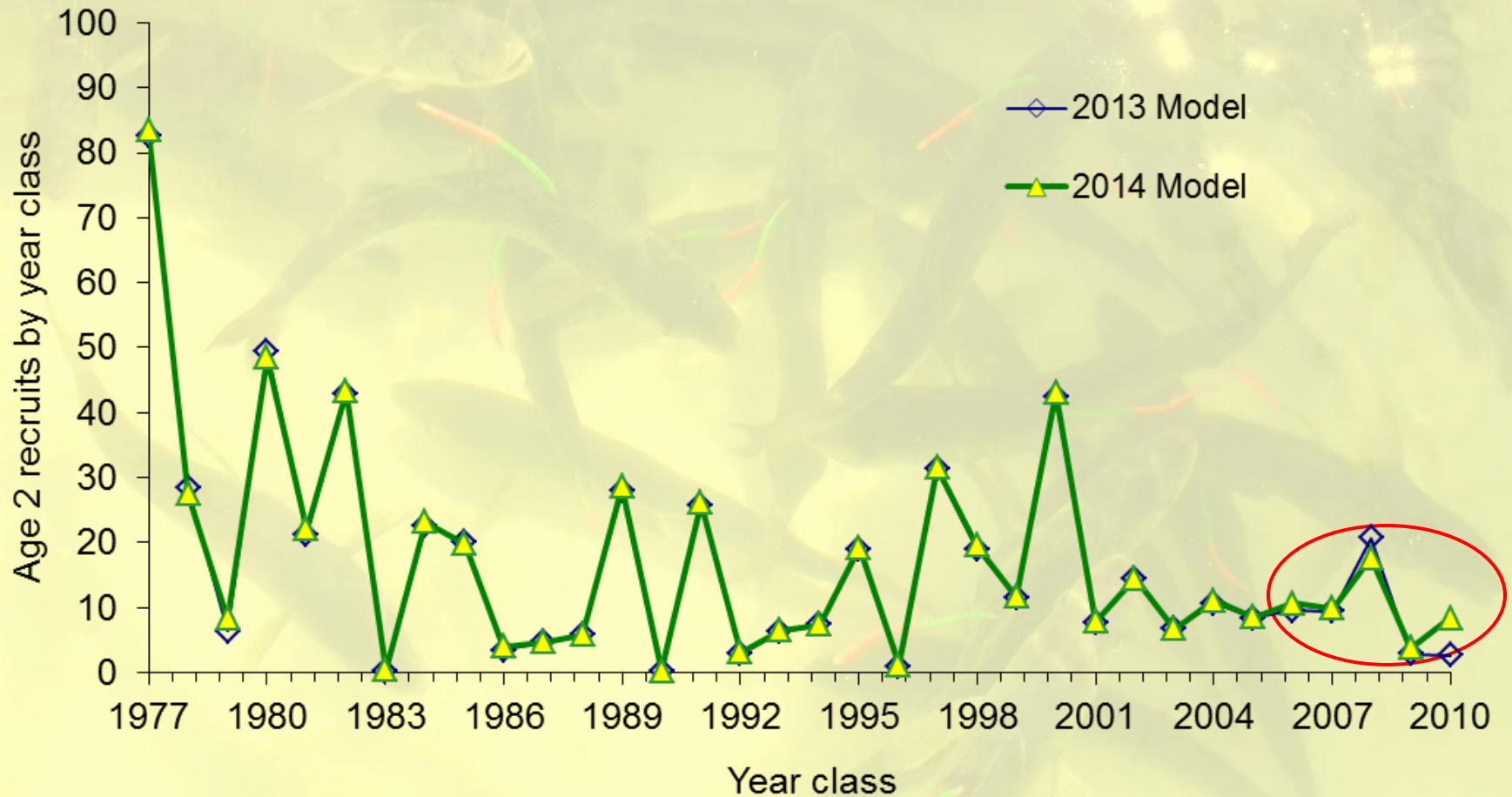
2014 assessment



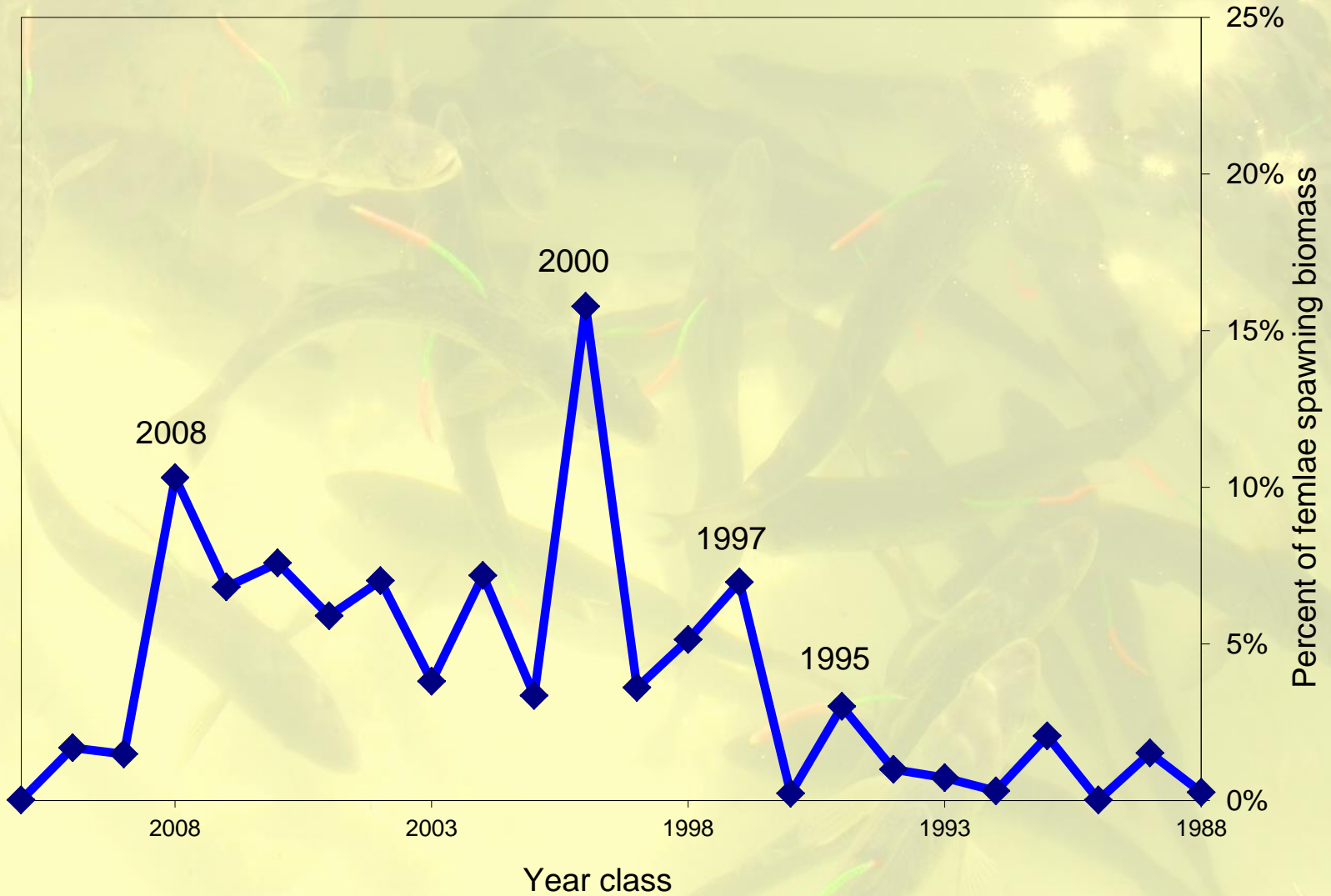
Recruitment



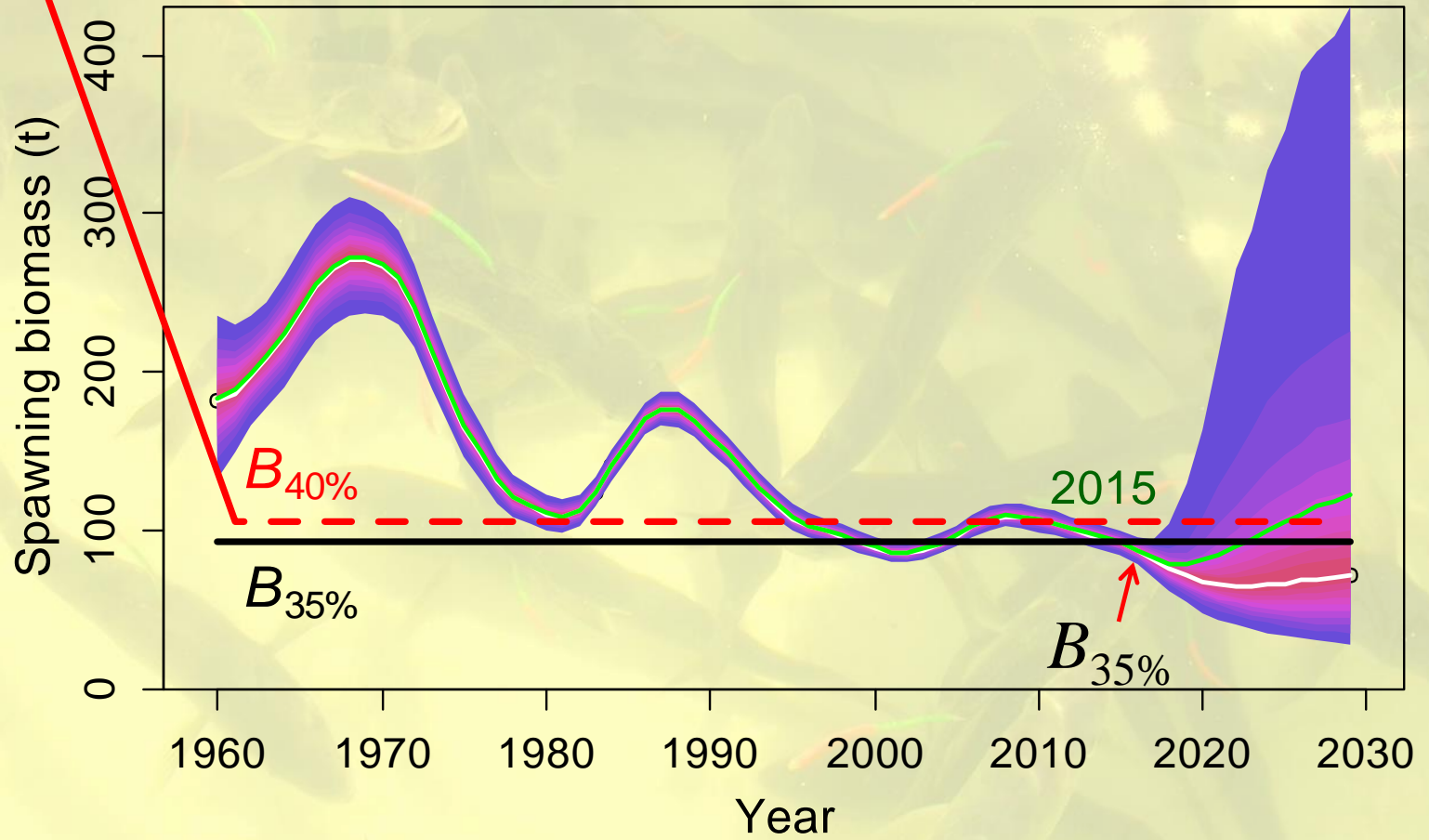
Recruitment



2014 spawners by year class



Projection

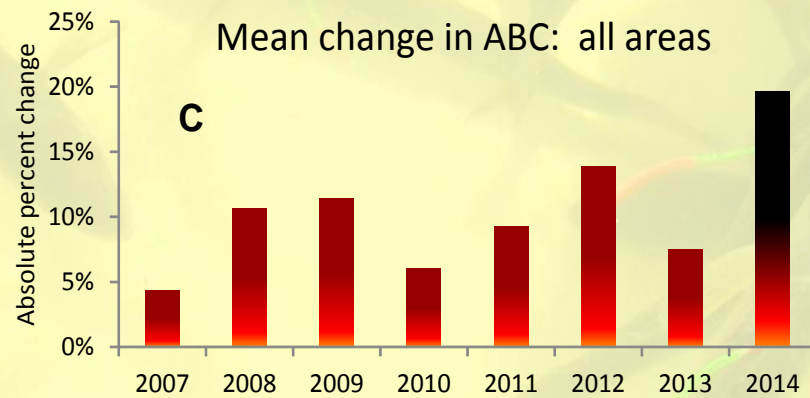
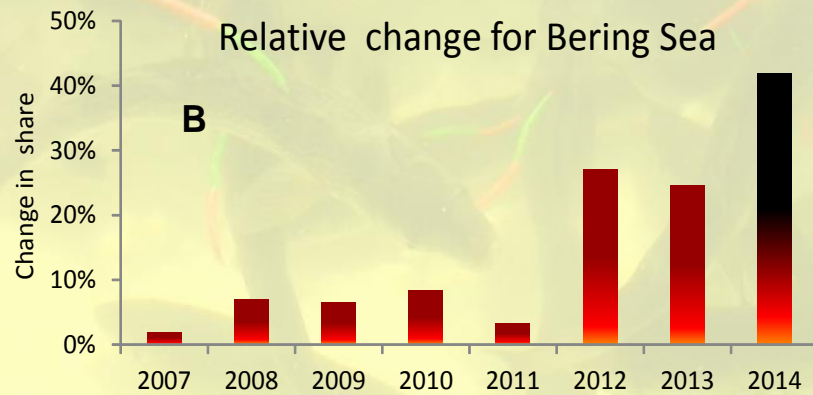
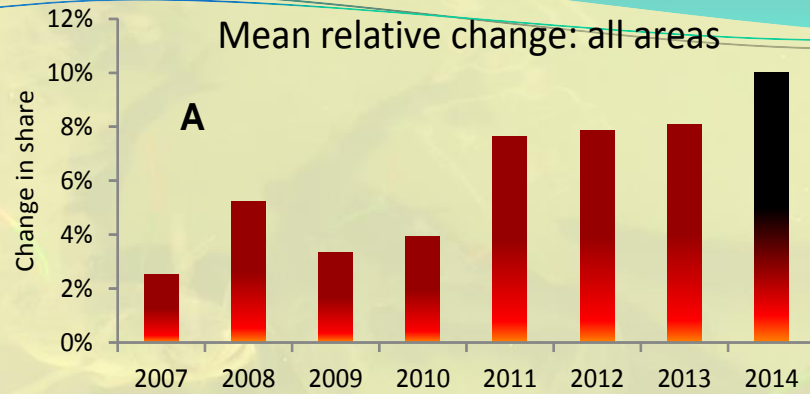


ABC summary

- LL survey had a small rebound from time series low in 2013
- Fishery CPUE index at time series low in 2013
- 35% unfished spawning biomass
- ABC 2014: 13,722 t
- ABC 2015: 13,657 t (vs. 12,400 t projected)
 - 0.5 % **decrease** from 2014 (versus 10% projection)
- Future: Projection is declining for several years
- Model doing its job, but what about apportionment?

Apportionment review

- Goal 1: Take in to account actual changes in the distribution of the population
- Solution 1: Use most recent survey and fishery CPUE distribution
- Goal 2: Reduce interannual variability in area ABCs
- Solution 2: Use 5 year exponential (esque) average



Apportionment problems

- Has become too volatile
- Changes in apportionment are probably too large to reflect actual distributional shifts
- Apportionment approach does not take into account measurement error
 - Example: BS estimates can be based on only 1 or 2 vessels for the fishery, and reduced amount of skates for the survey
- Leads to very rapid changes in some area estimates, which leads to large swings in apportionments

Standard apportionment

- Option 1: Go with the model, standard apportionment

Apportionments are based on survey and fishery information	2014 ABC Percent	2014 Survey RPW	2013 Fishery RPW	2015 ABC Percent	2014 ABC	2015 ABC	Change
Total					13,722	13,657	0%
Bering Sea	10%	21%	14%	10%	1,339	2,210	39%
Aleutians	13%	13%	17%	13%	1,811	1,840	2%
Gulf of Alaska	77%	66%	69%	77%	10,572	9,607	-10%
Western	14%	19%	12%	14%	1,480	1,444	-2%
Central	44%	40%	33%	44%	4,681	3,975	-18%
W. Yakutat*	15%	13%	19%	15%	1,574	1,428	-10%
E. Yakutat / Southeast*	27%	28%	35%	27%	2,837	2,759	-3%

Recommending...

- Option 2: Use model ABC, continuing with the fixed apportionment from 2014 fishery

Area	2014 ABC	Standard apportionment for 2015 ABC	Recommended fixed apportionment for 2015 ABC*	Difference from 2014
Total	13,722	13,657	13,657	-0.5%
Bering Sea	1,339	2,210	1,333	-0.5%
Aleutians	1,811	1,840	1,802	-0.5%
Gulf of Alaska (subtotal)	10,572	9,607	10,522	-0.5%
Western	1,480	1,445	1,473	-0.5%
Central	4,681	3,975	4,658	-0.5%
W. Yakutat**	1,574	1,428	1,567	-0.5%
E. Yak. / Southeast**	2,837	2,759	2,823	-0.5%

Recommending...

- This is an interim measure to smooth out ABC variability
- Apportionment for sablefish is not a biological model like the stock assessment
- We have a Ph.D. project with UAF working on a sablefish spatial model to evaluate apportionment strategies to:
 - Maximize spawning biomass
 - Minimize volatility
 - Consider economic yield
- Will give guidance on apportionment research in September 2016

Future

- Continue with current model while analyses are conducted
- Conduct MSEs evaluating apportionment (with spatial sablefish model)
- Estimate mortality of depredation in the fishery (NRC post-doc)
- Continue investigating recruitment processes (GOA IERP) and species specific ecosystem considerations section (report card)

