GOA Rougheye & Blackspotted Rockfish

Shotwell, Hanselman, Heifetz

Outline

- Full assessment for RE/BS rockfish
- PT/SSC comments specific to RE/BS
- Data and trends
- Model results
- Harvest recommendations
- New research and priorities

RE/BS (Rougheye/Blackspotted)

- Tier 3a species – 2017 full assessment
  - Uses two surveys (bottom trawl & longline)
  - Updated research on 2-species genetic project
- Summary of Changes:
  - Data: new/updated catch, new trawl/longline survey, new fishery/survey age/size compositions
  - Trends: increase in both surveys, population trajectory very flat, stronger 2010 year class
  - No model changes from 2015 full assessment

SSC Comments

"The Team recommends exploring apportionment methods (such as the random effects model) for the next full assessment."

- We include both random effects and weighted survey average for comparison and discuss results
- We plan to use guidelines from Survey Average Working Group on options for two surveys and consider two species adjustment

"The retrospective pattern for M4a is poor (Mohn's ρ = -0.371) and the SSC requests that the author explores the reason for this result."

- Further inspection of retrospective model revealed coding error and correction results in much reduced Mohn's ρ = 0.009 for 2017.

"The Team recommends evaluating a Tier 5 approach by species with "worst-case" scenarios that consider total catch comprised of one species."

- Evaluated simple T5 comparing total catch to what an individual OFL would be for each species in the complex.
- Compared at-sea results with genetically corrected results

RE/BS Genetic Study

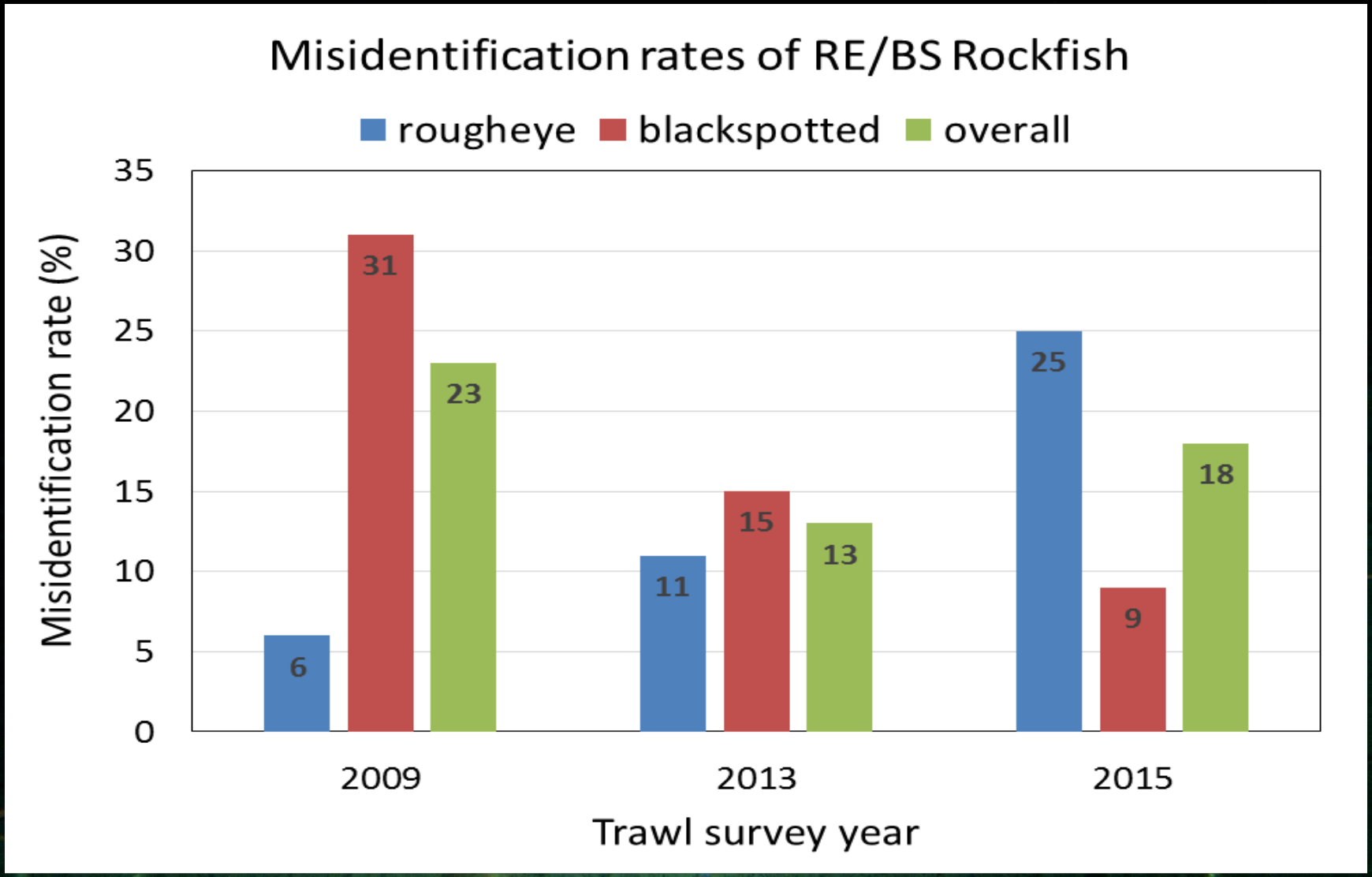
- Summarized available data on two species

Source	Project Data	Years Available
Fisheries	Otolith metrics*	1990, 2004, 2009, 2012, 2013, 2014
	Maturity	2008-2012 (Conrath 2017)
AFSC bottom trawl survey	Genetic ID*	2009, 2013, 2015
	Biomass Index	2007, 2009, 2011, 2013, 2015, 2017
	Age	2007, 2009, 2011, 2013, 2015, 2017
	Length	2007, 2009, 2011, 2013, 2015, 2017
	Otolith metrics*	1990, 1999
	Maturity	2008-2012 (Conrath 2017)

* Analysis is in progress

- Genetics
  - Mis-ID rate 13-23% overall and shifted from higher BS mis-ID in 2009 to higher RE mis-ID in 2015
  - RE younger on average than BS (15 vs 20 years) and grow faster with slightly greater max size (prelim.)

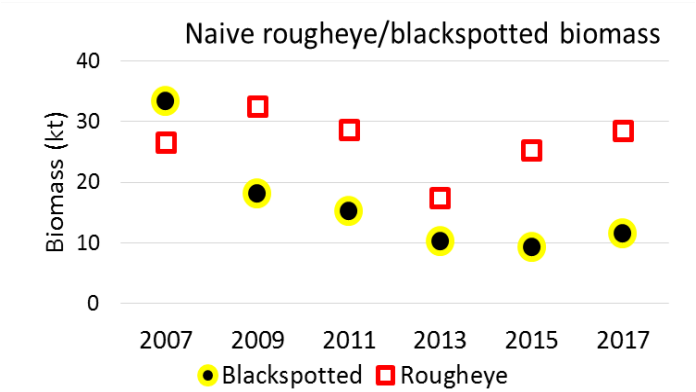
RE/BS Genetic Study

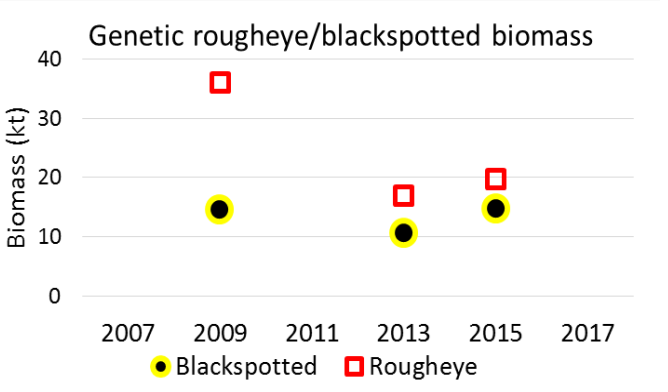


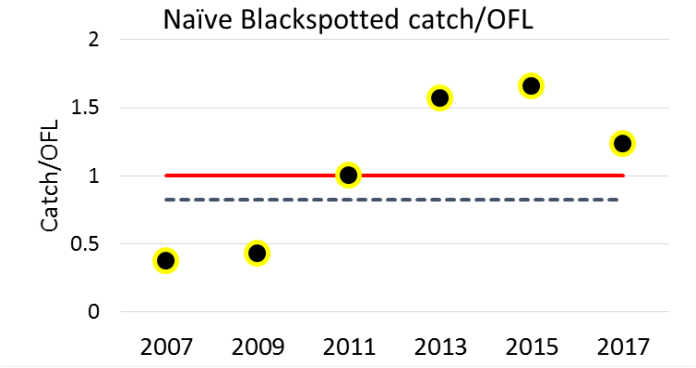
RE/BS Tier 5

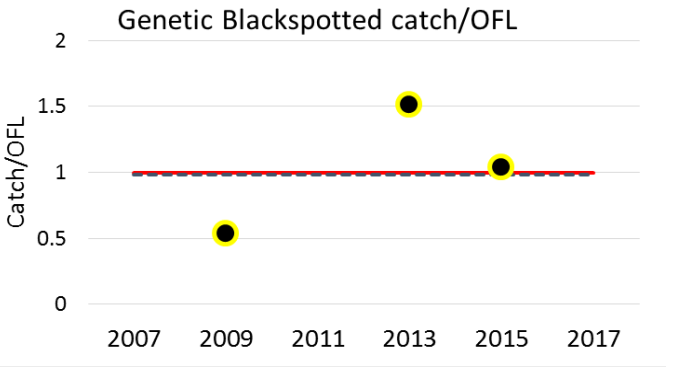
- Requested by Plan Team for “worst-case”
  - Evaluated Tier 5 approach at extreme by comparing total catch to OFL for each species
  - Evaluated for at-sea time series (2007 to present) and genetic ID data (2009, 2013, 2015)
- Results
  - If all catch from BS hypothetical OFL would have been exceeded in some years, but none for RE

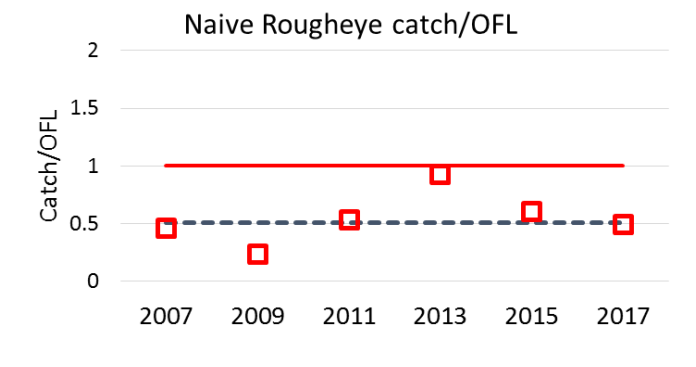
RE/BS Tier 5 Naïve vs Genetic

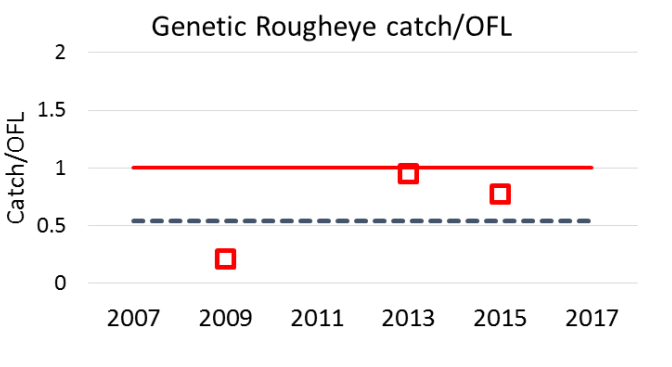












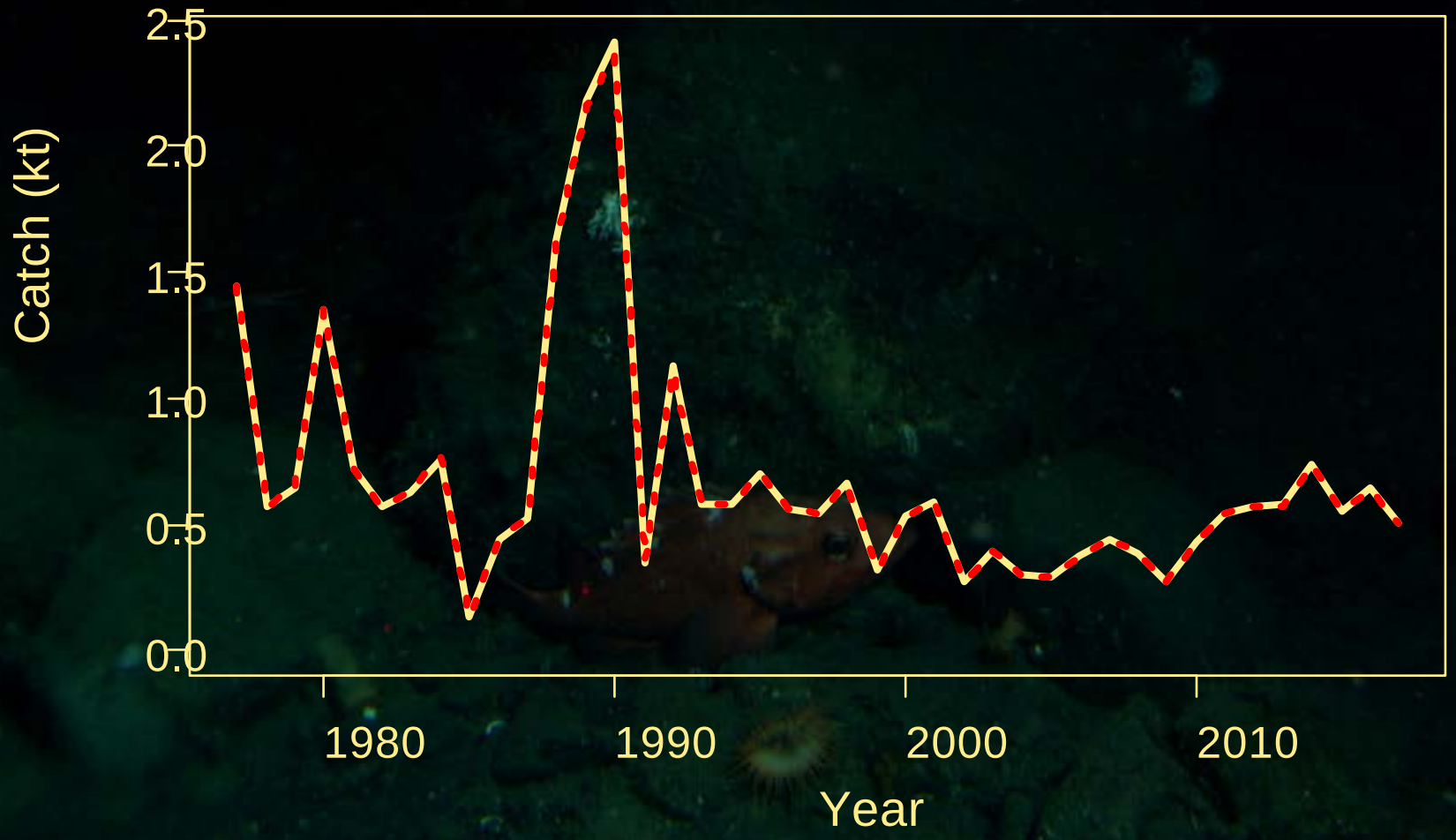
RE/BS Data Table

Source	Data	Years
Fisheries	Catch	1977-2015, **2016**, **2017**
	Age	1990, 2004, 2006, 2008, 2009, 2010, 2012, **2014, 2016**
	Length	1991-1992, 2002-2003, 2005, 2007, 2011, 2013, **2015**
NMFS trawl survey	Biomass index	1984, 1987, 1990, 1993, 1996, 1999, 2003, 2005, 2007, 2009, 2011, 2013, 2015 **2017**
	Age	1984, 1987, 1990, 1993, 1996, 1999, 2003, 2005, 2007, 2009, 2011, 2013, **2015**
AFSC longline survey	Relative Population Number (RPN)	1993-2015, **2016, 2017**
	Length	1993-2015, **2016, 2017**

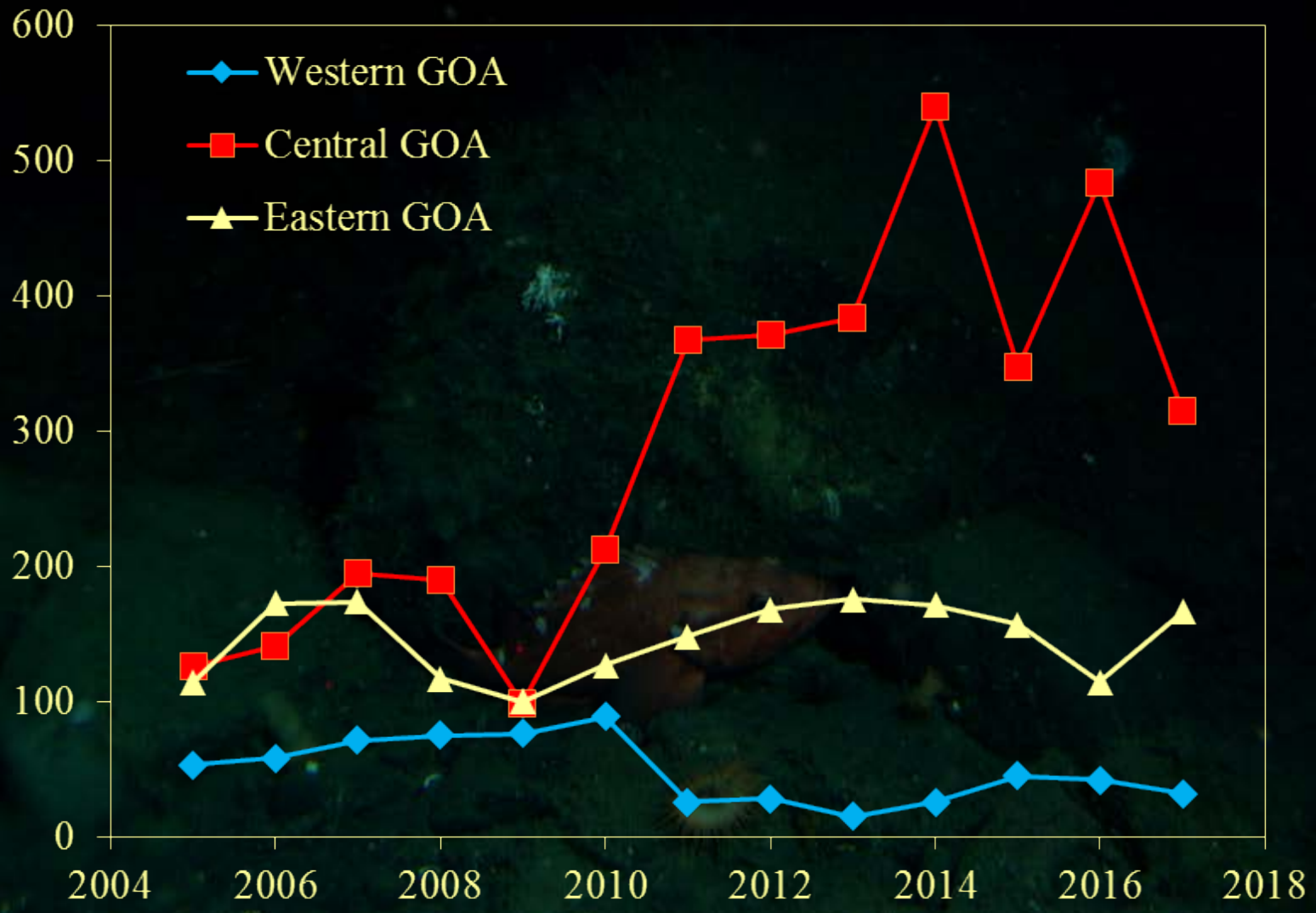
RE/BS Fishery

- Gulfwide catch has been relatively stable since 2010, around 570 t on average since then
- Increased in 2016 by 12% from average, back down to average in 2017
- Generally 20%-60% of TAC
  - WGOA steady decrease, CGOA variable, EGOA mostly stable with dip in 2016, no overages
  - Most changes due to rockfish fishery, decrease in longline fisheries

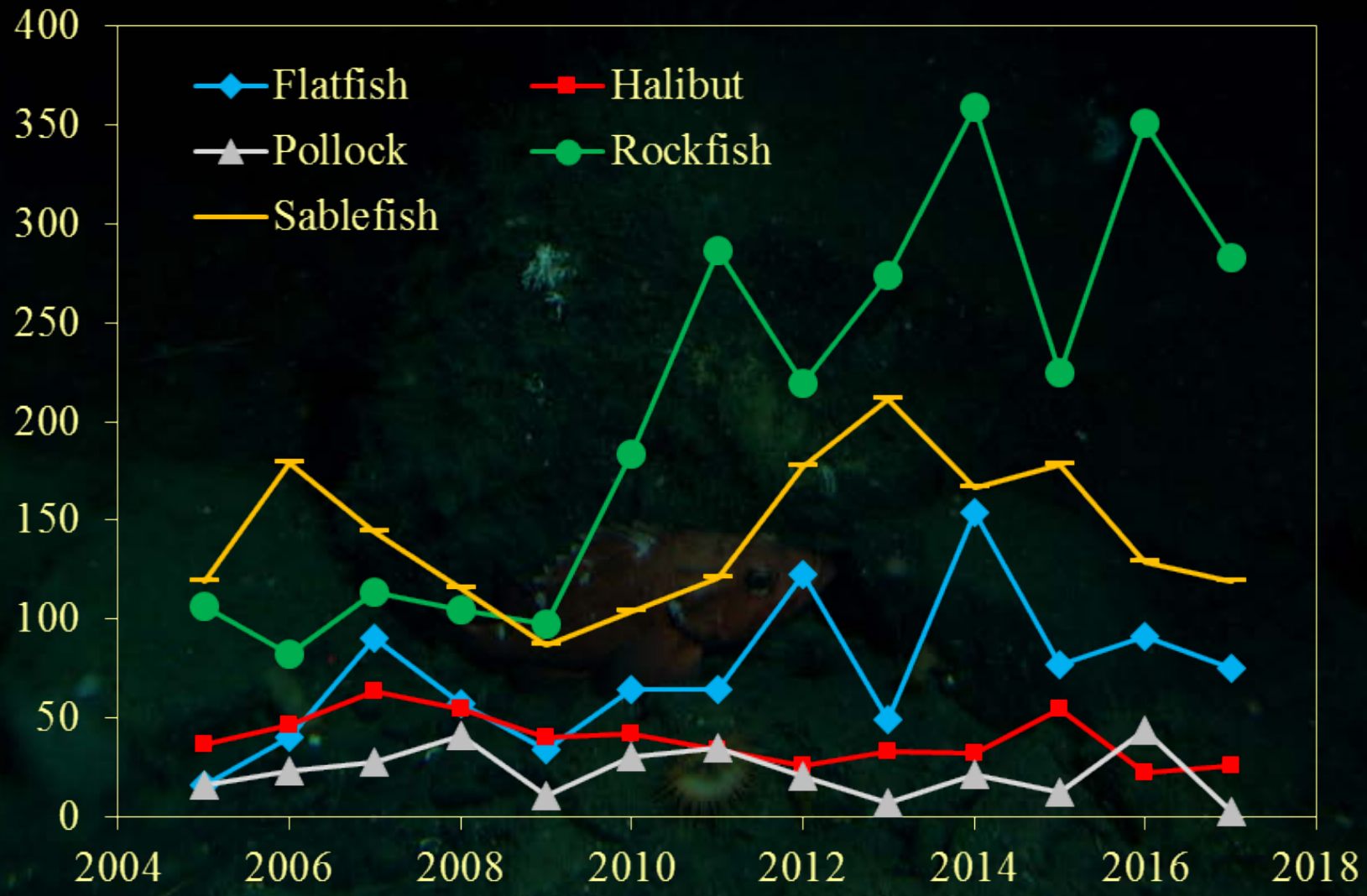
RE/BS Catch



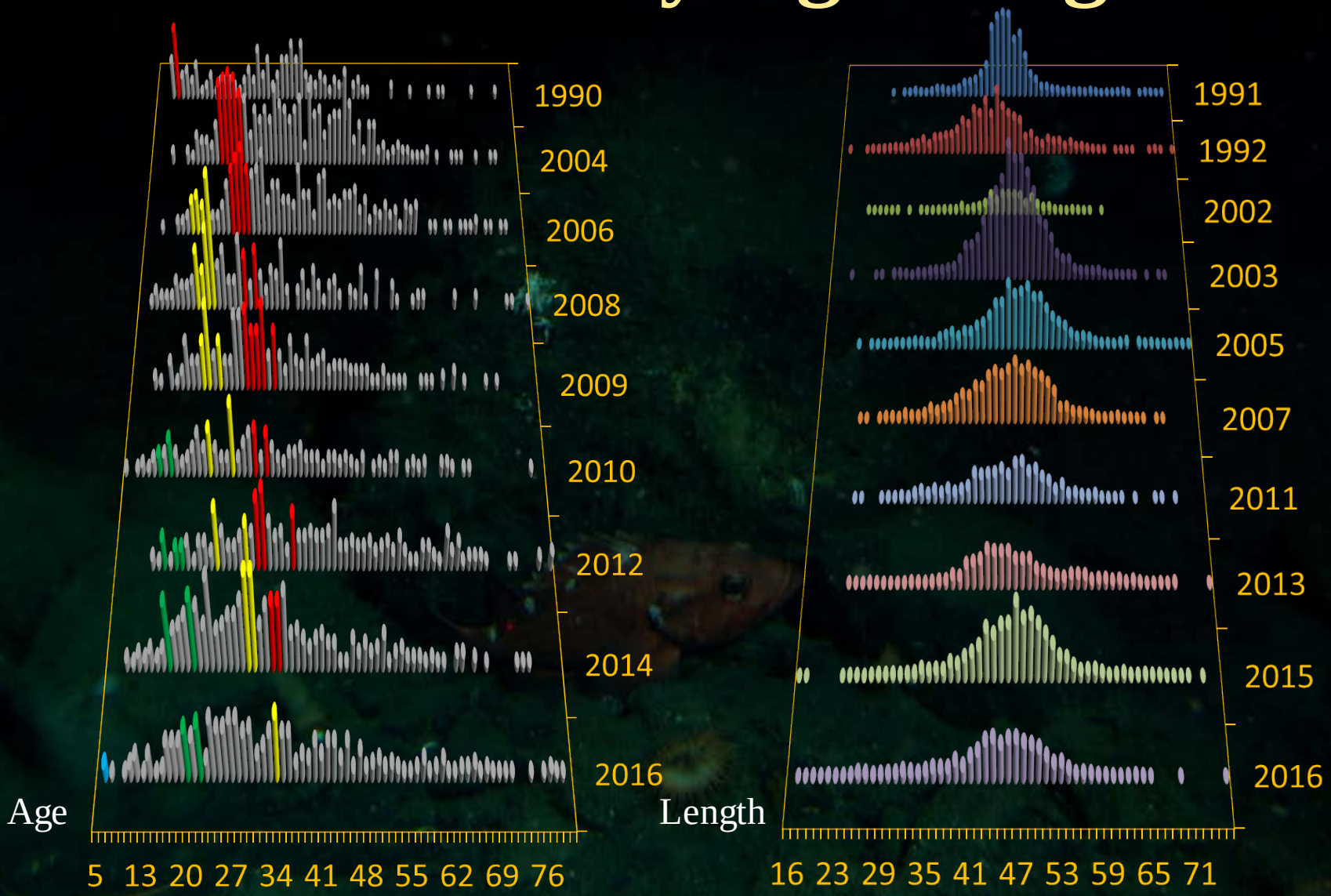
RE/BS Catch by Region



RE/BS Catch by Fishery



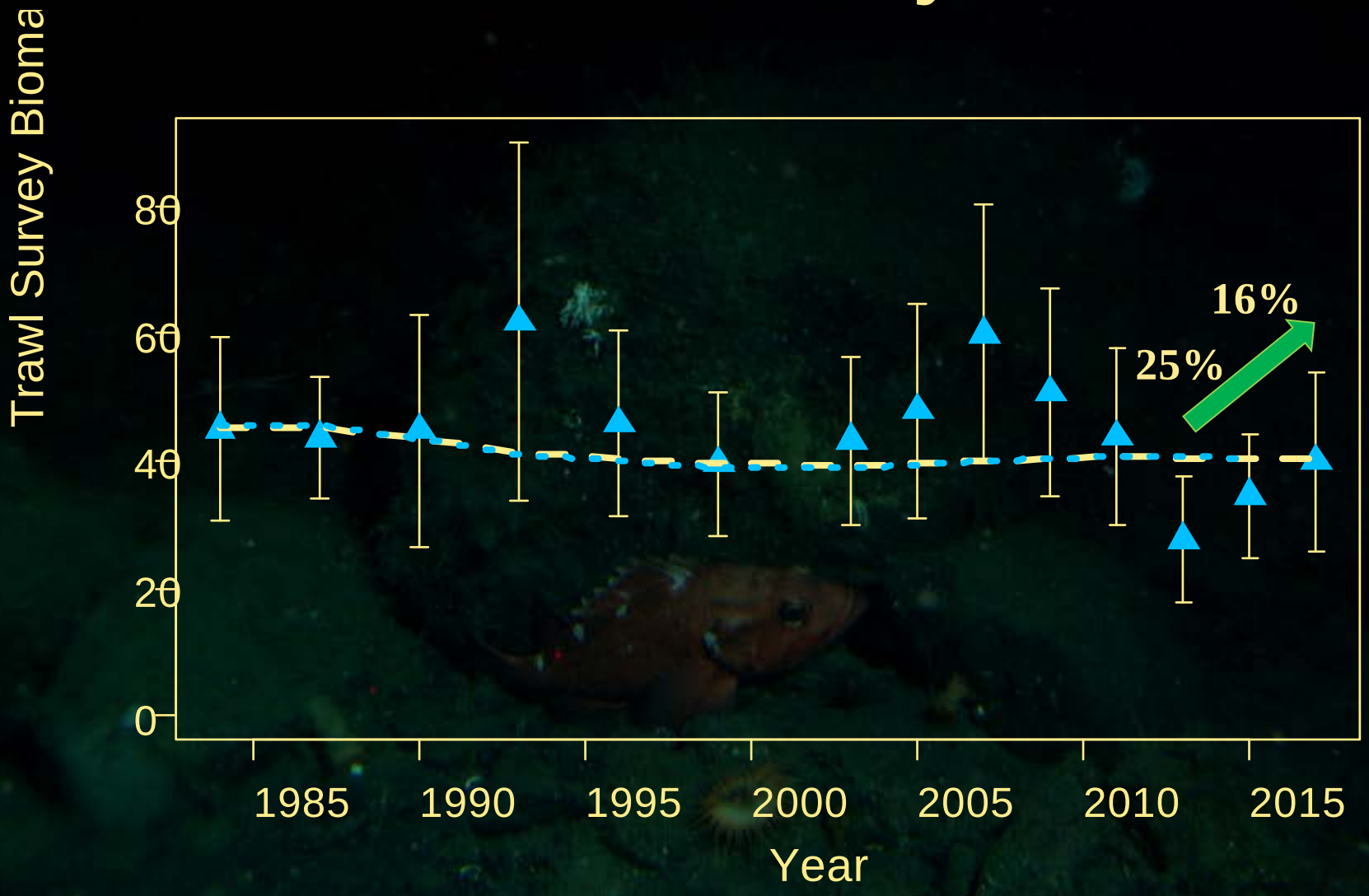
RE/BS Fishery Age/Length



RE/BS Surveys – Bottom Trawl

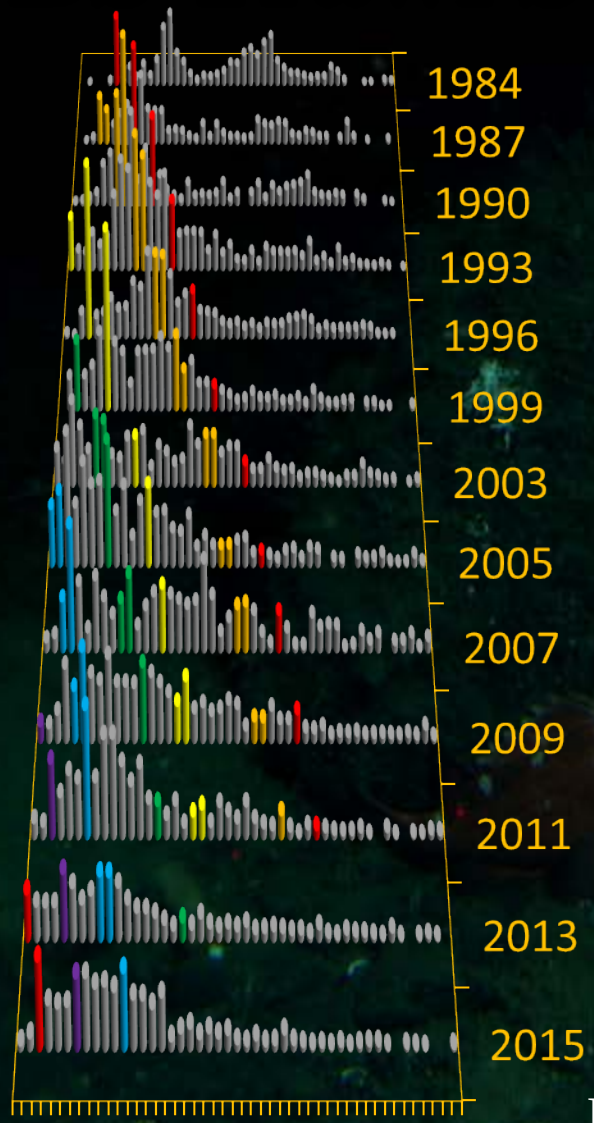
- Overall fairly low contrast (CIs overlap)
  - Main decrease in CGOA, up in WGOA and EGOA
  - Distribution of hauls usually fairly evenly distributed but more on shelf in CGOA
- 2017 survey estimate up by 16% from 2015
  - Decreases in CGOA, large increase in EGOA and moderate increase in WGOA
  - Spatial distribution of hauls different than 2015, larger catches in EGOA

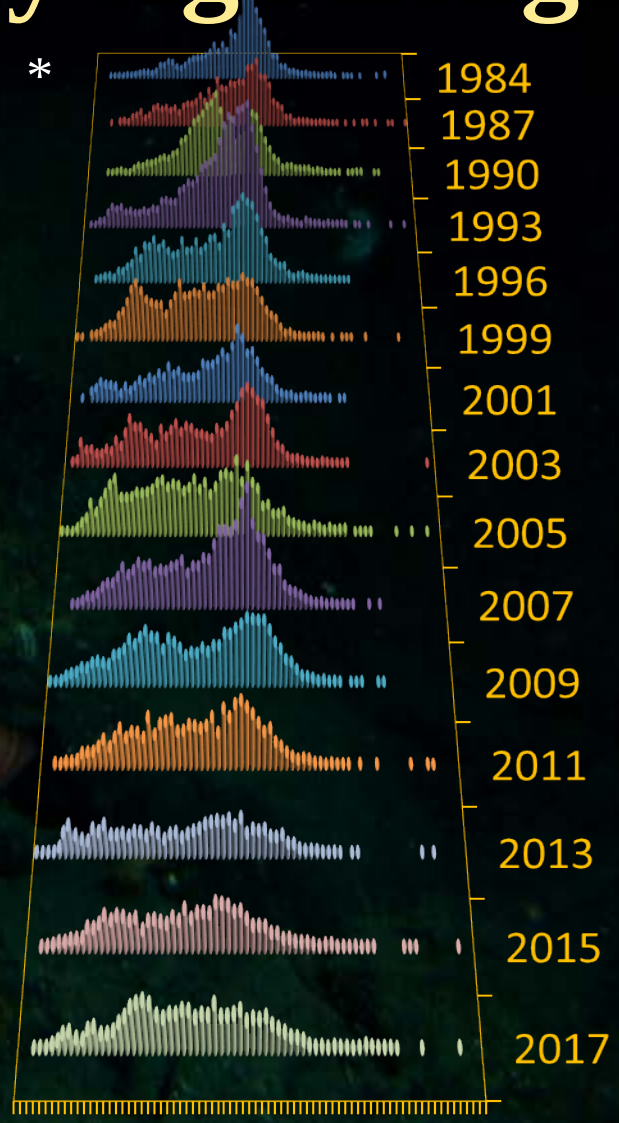
RE/BS Trawl Survey Biomass



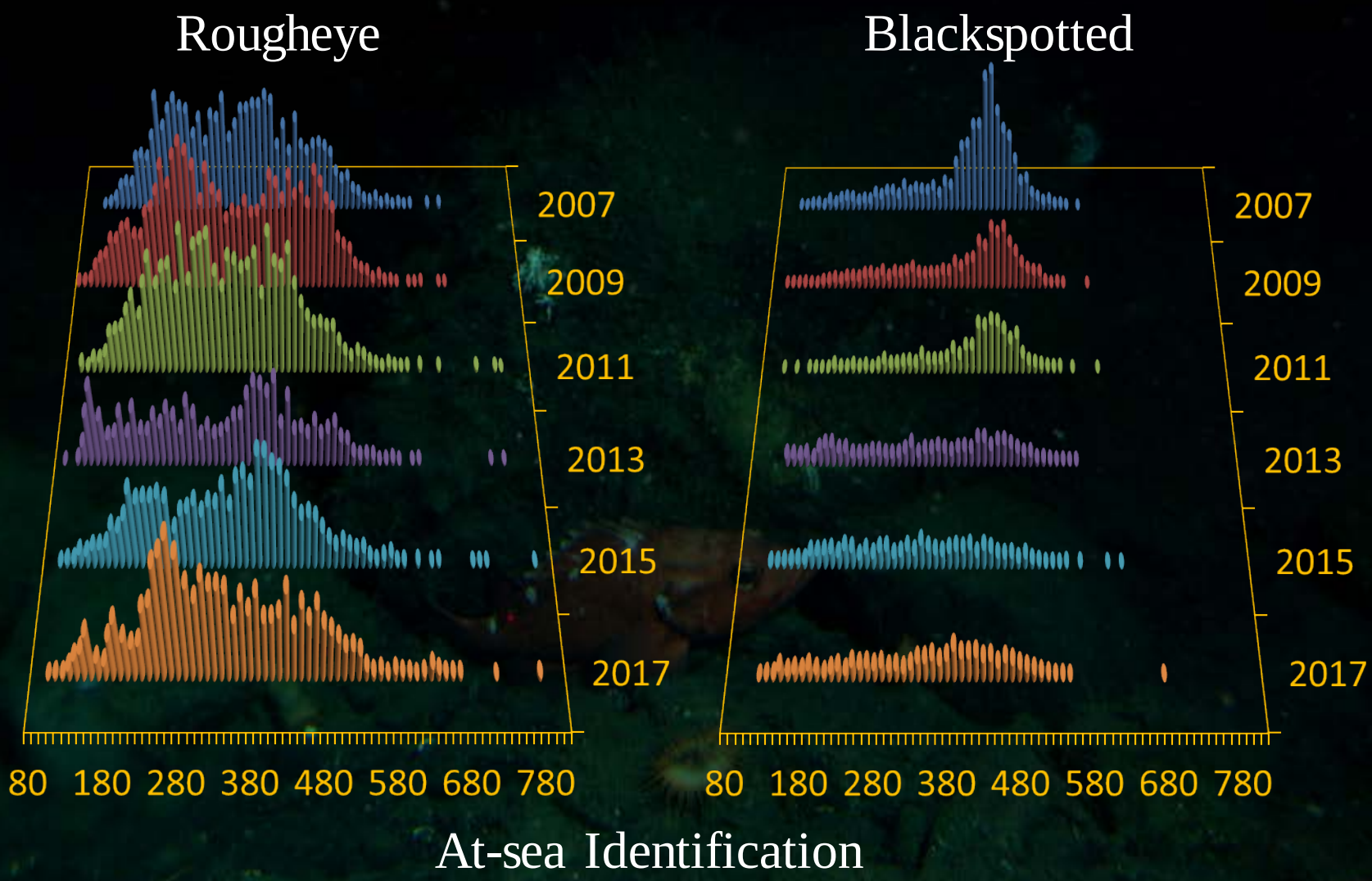
* Not fit in model

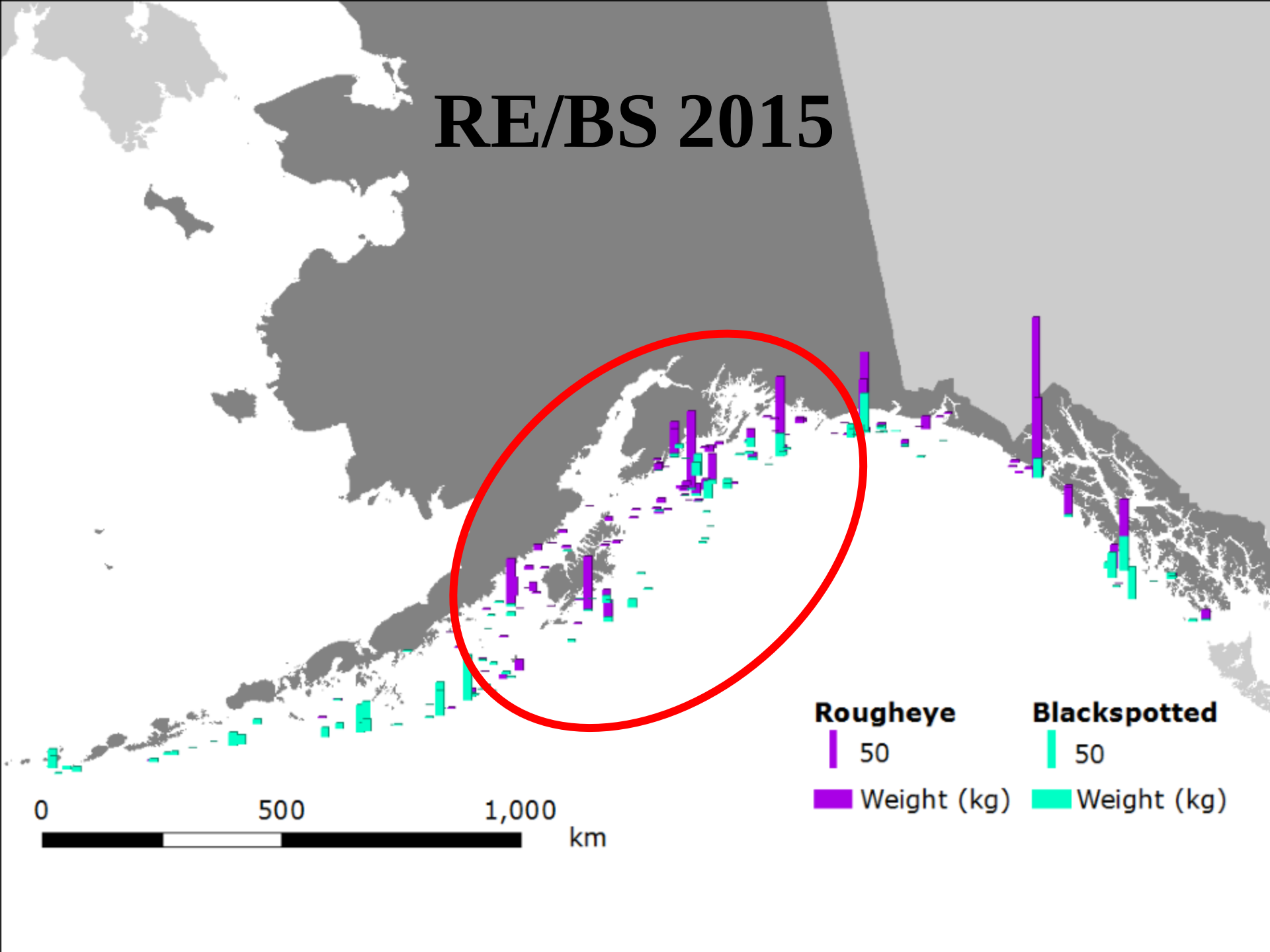
RE/BS Trawl Survey Age/Length

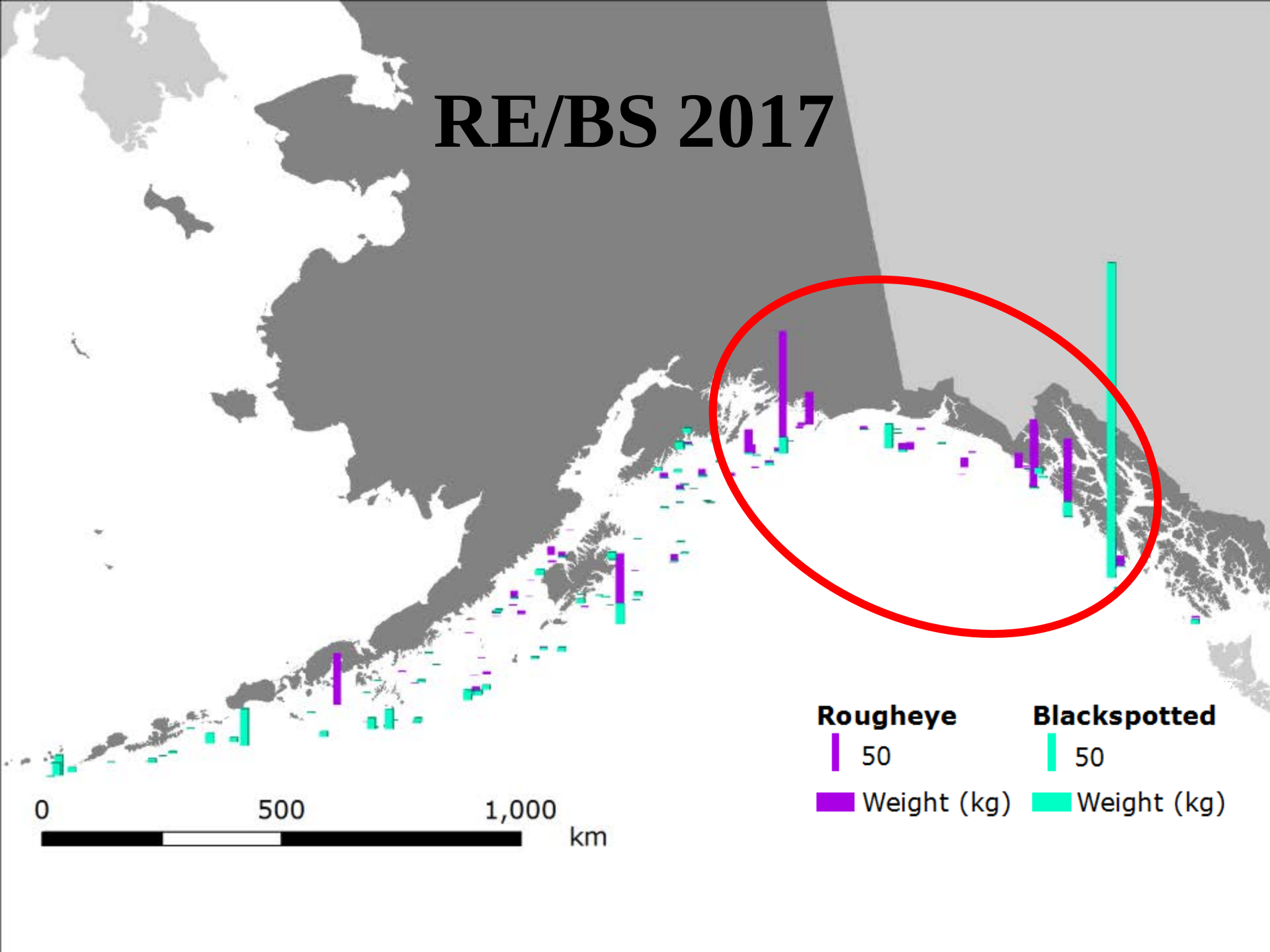




RE/BS Trawl Survey Length



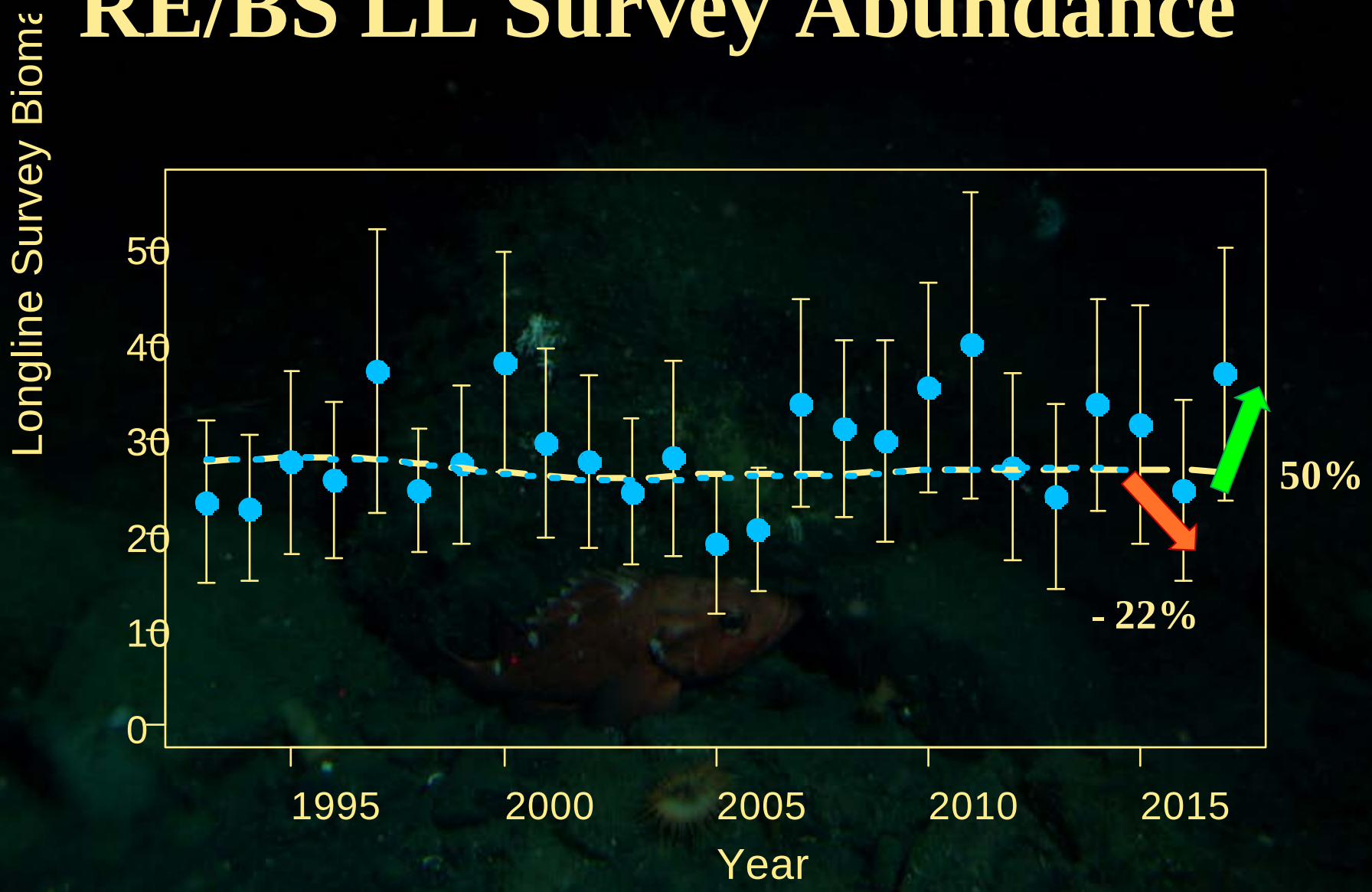

RE/BS 2015
Rougheye
50
Weight (kg)
Blackspotted
50
Weight (kg)
0
500
1,000
km


RE/BS 2017
Rougheye
50
Weight (kg)
Blackspotted
50
Weight (kg)
0
500
1,000
km

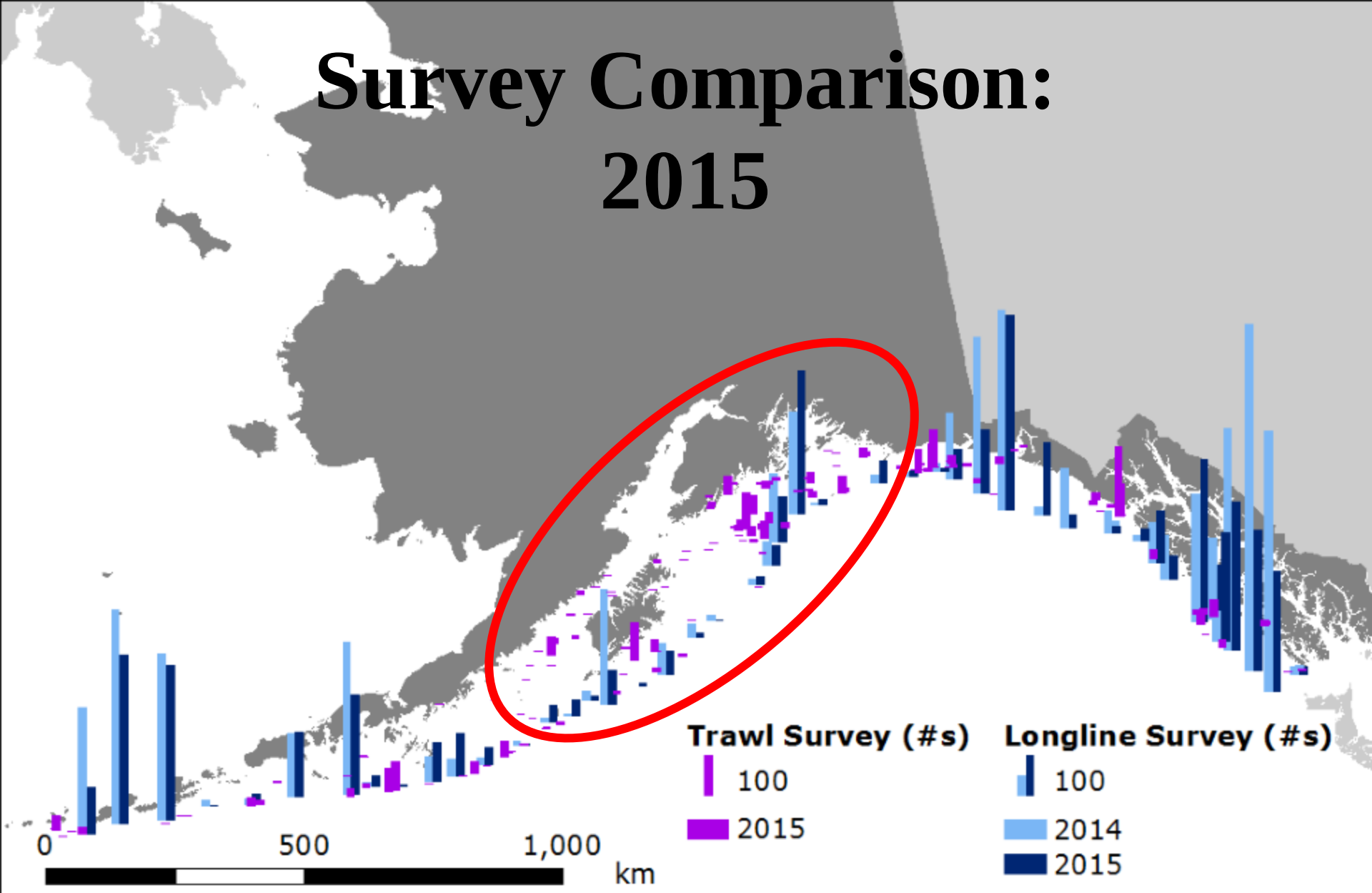
RE/BS Surveys – Longline

- Fully revised RPN index (1993-2017)
  - Uses new area sizes, RPN, new error estimates
  - Overall low contrast (all CI's overlap)
  - Generally samples slope environment
- 2016 survey down (22%), 2017 up (50%)
  - Large increases in time series do not match trawl, but recent decline 2012-2013 similar to trawl
  - Pattern reflected in all areas in both years
  - Currently 27% above long-term average

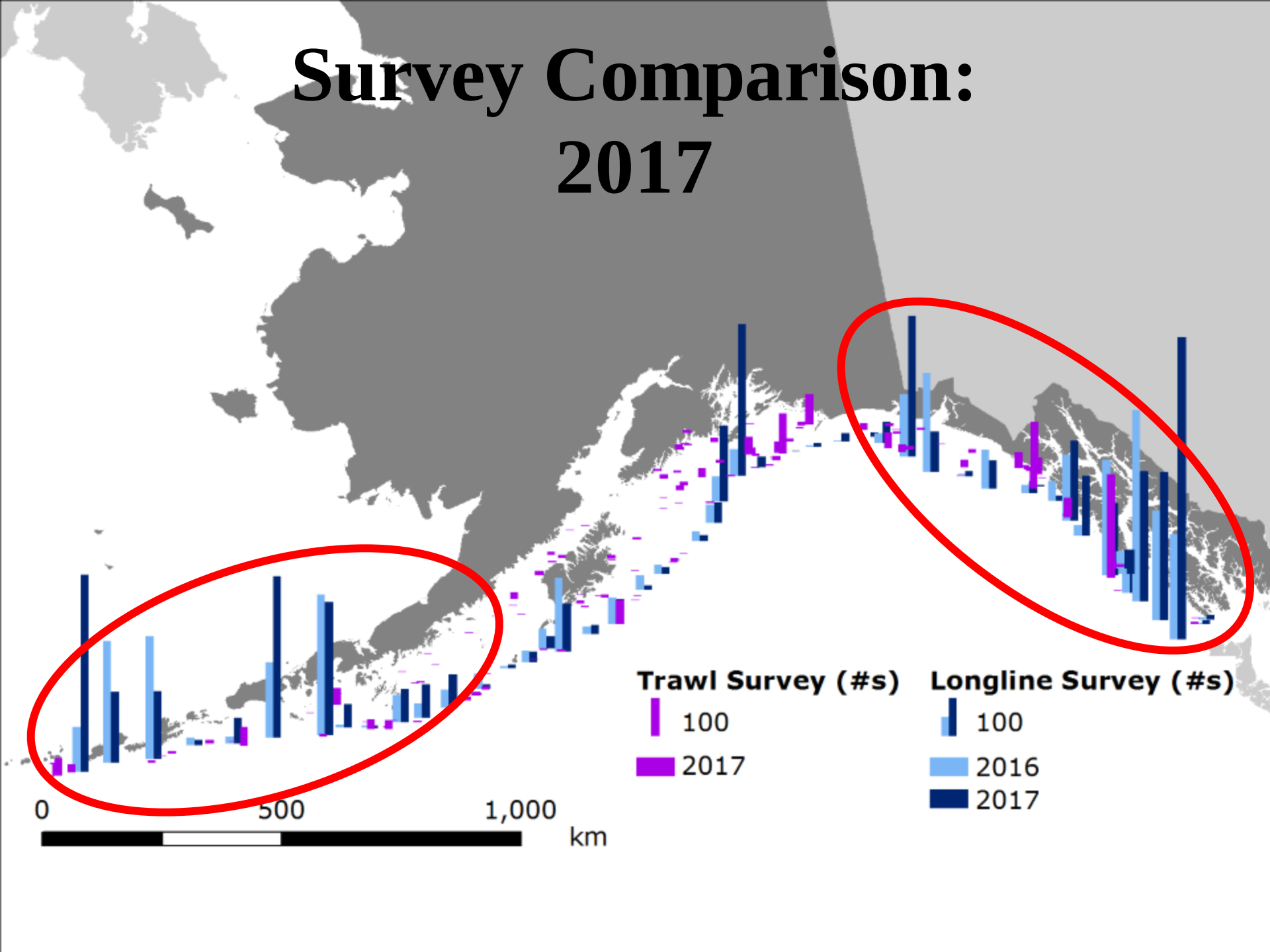
RE/BS LL Survey Abundance



Survey Comparison: 2015



Survey Comparison: 2017



RE/BS – Biological Data Update

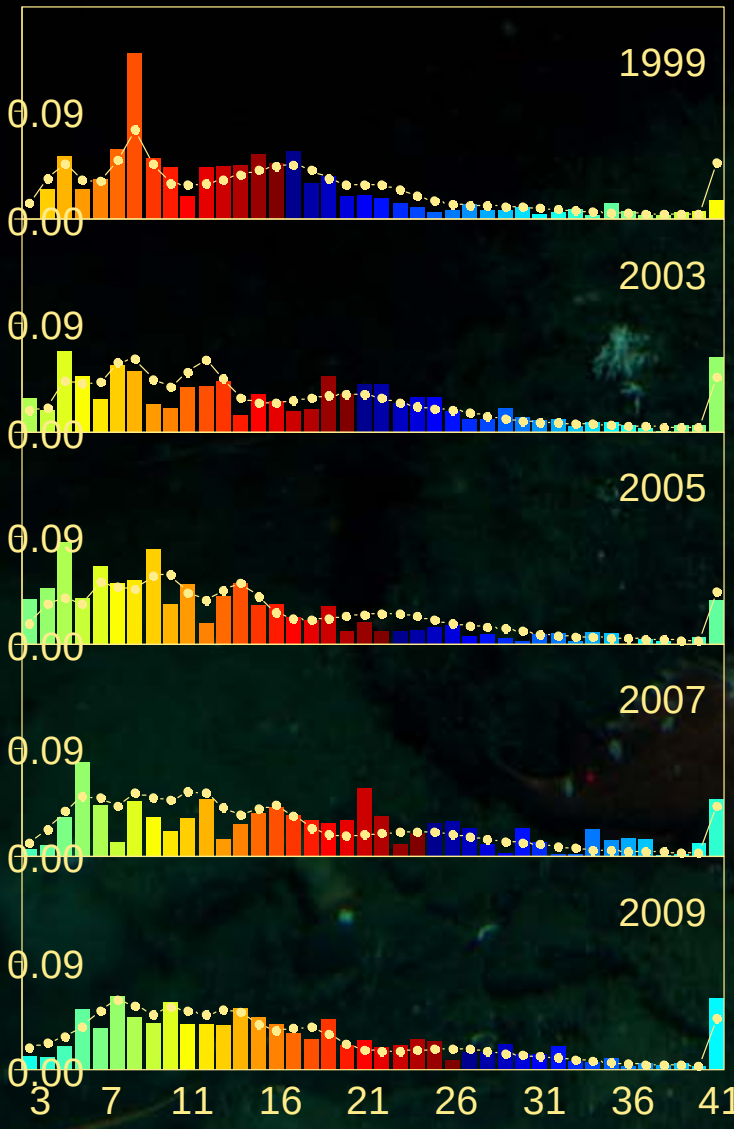
- Conrath (2017) maturity study
  - Data collected in survey and fishery (2008-2012)
  - Fork length at 50% maturity similar between the two species (45 cm RE, 44 cm BS)
  - Age at 50% maturity younger for RE at 19.6 years than BS at 27.4 years
- Otolith morphology (preliminary)
  - Application of method to RE/BS 2009 fishery ages found 43% RE and 57% BS in catch

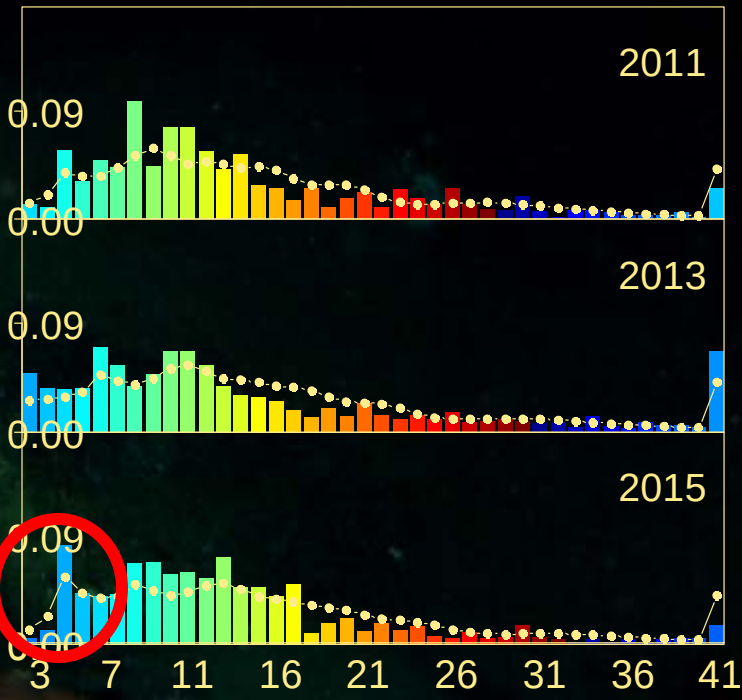
RE/BS – Results

- No changes in assessment methods
  - Same as 2015 (15.4): plus age group to 42
- Parameters – similar to 2015 model
  - Slightly lower survey catchabilities
  - Slightly higher mean recruitment (1.9 vs 1.8 mil)
- Model fit – similar to 2015 model
  - Good fit to survey ages, moderate fit fishery ages
  - Flattening of peaks in size comps

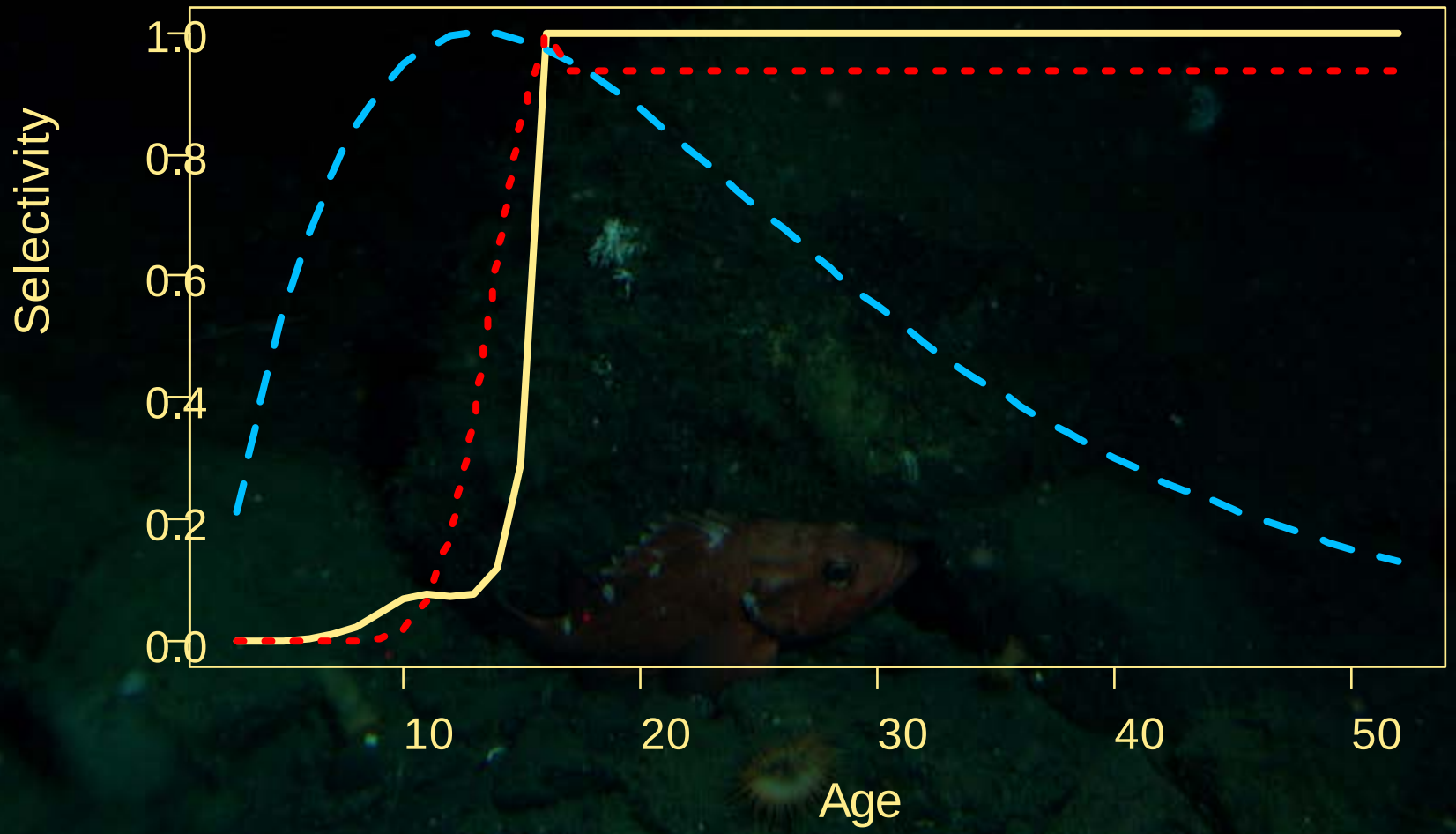
RE/BS Fishery Age

RE/BS Trawl Survey Age



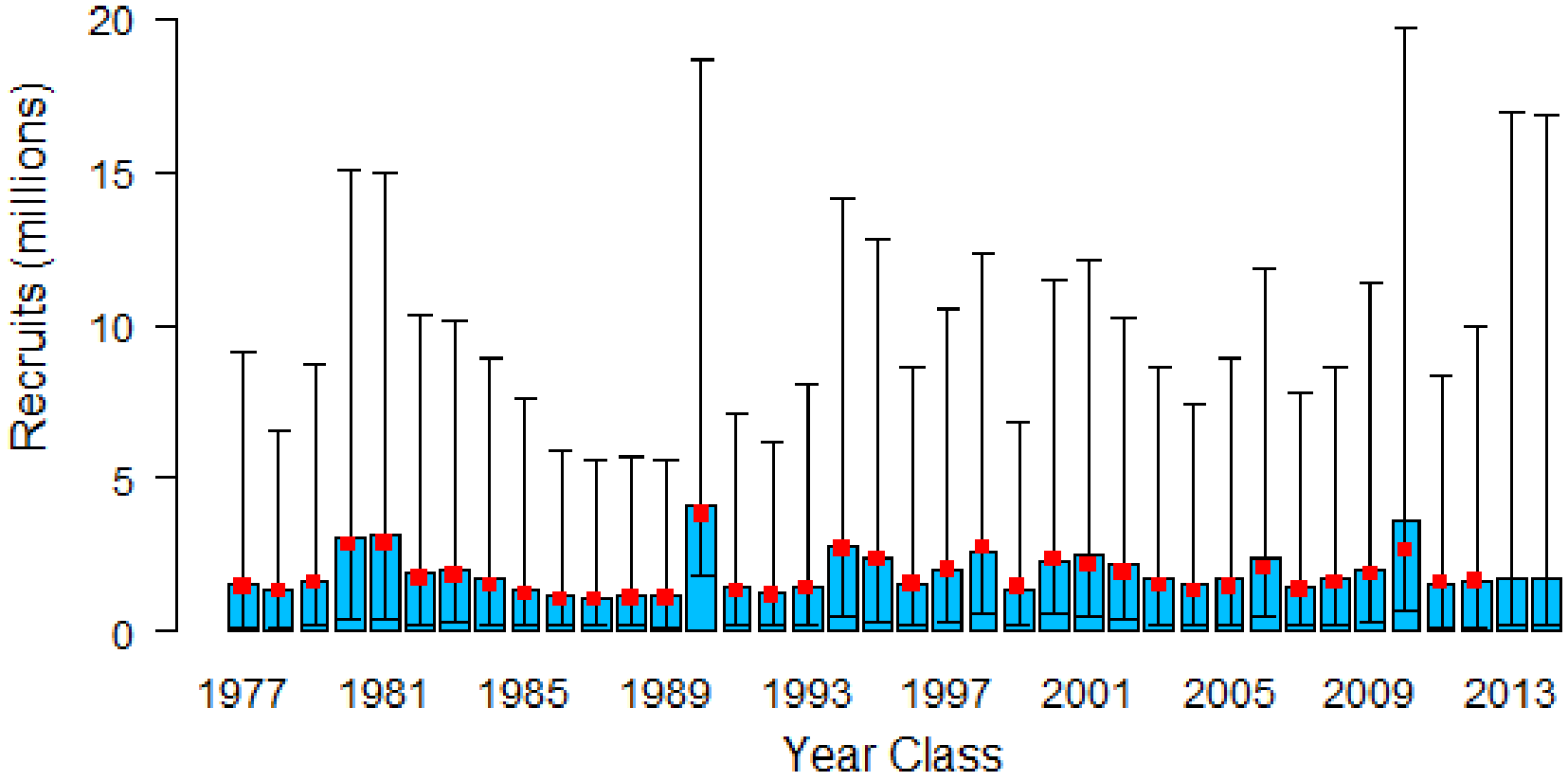


RE/BS Selectivity



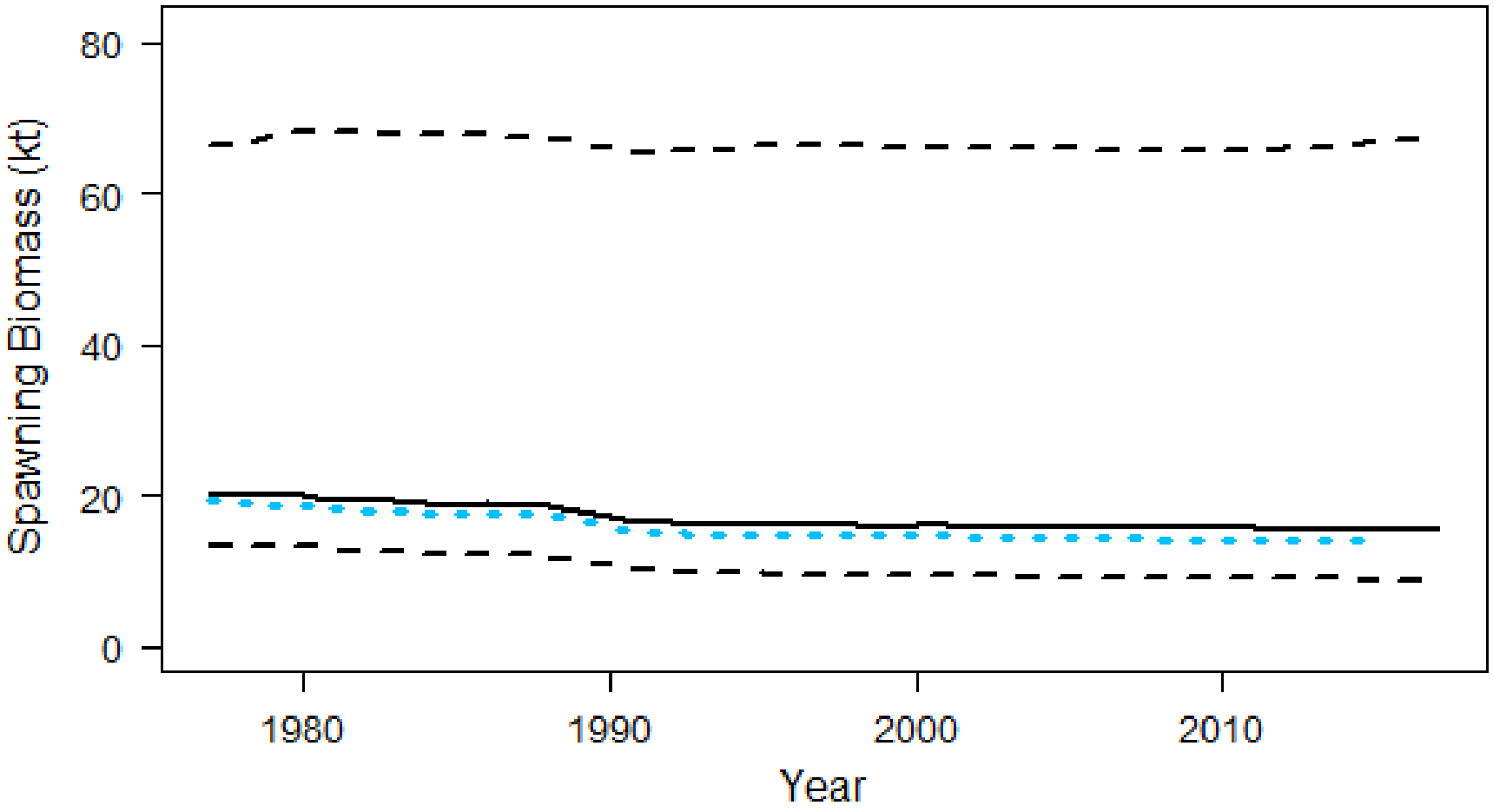
Blue line = Trawl Survey, Red line = Longline Survey, Yellow line = Fishery

RE/BS Recruitment



Red square = 2015, Blue bar = 2017

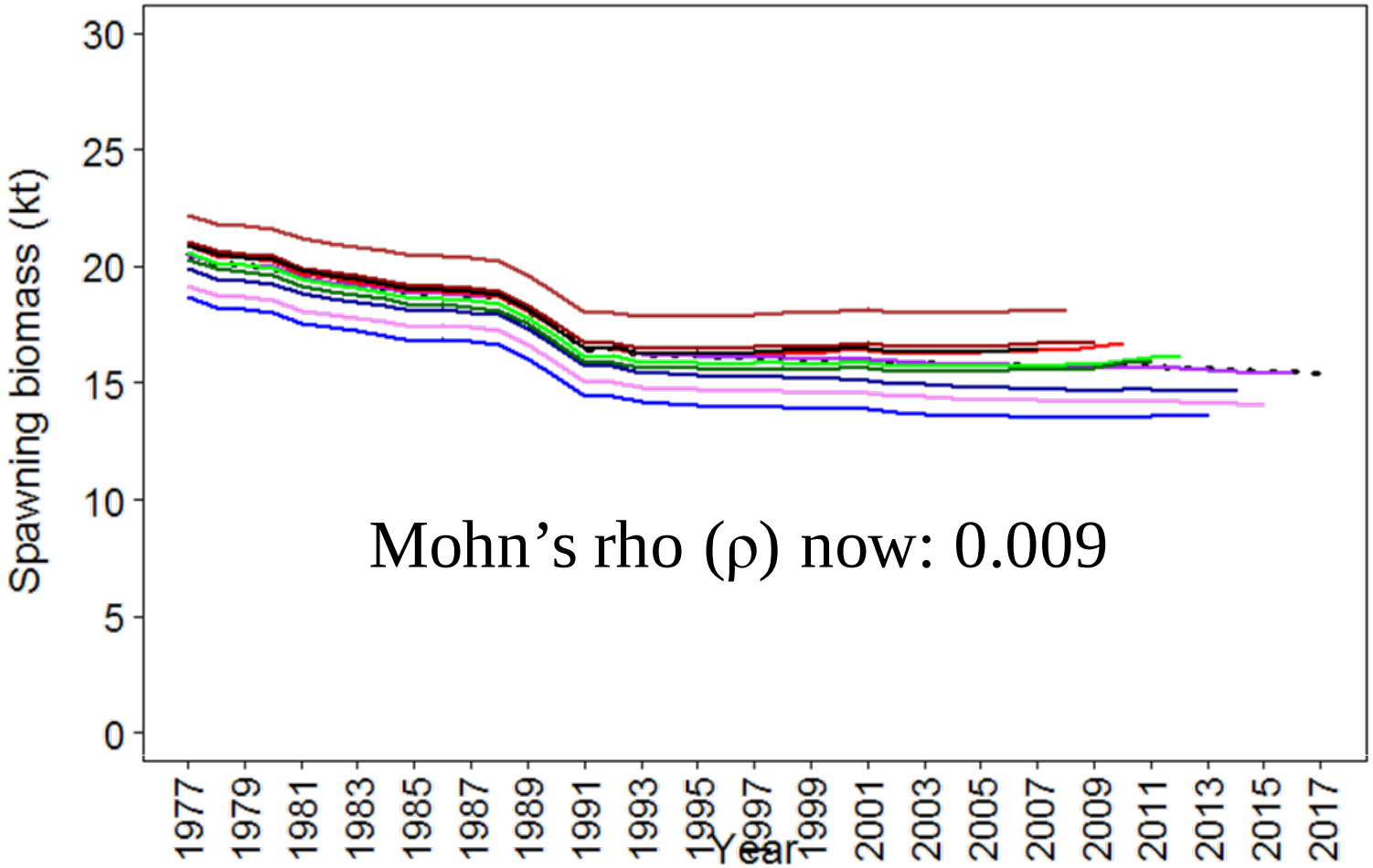
RE/BS Spawning Biomass



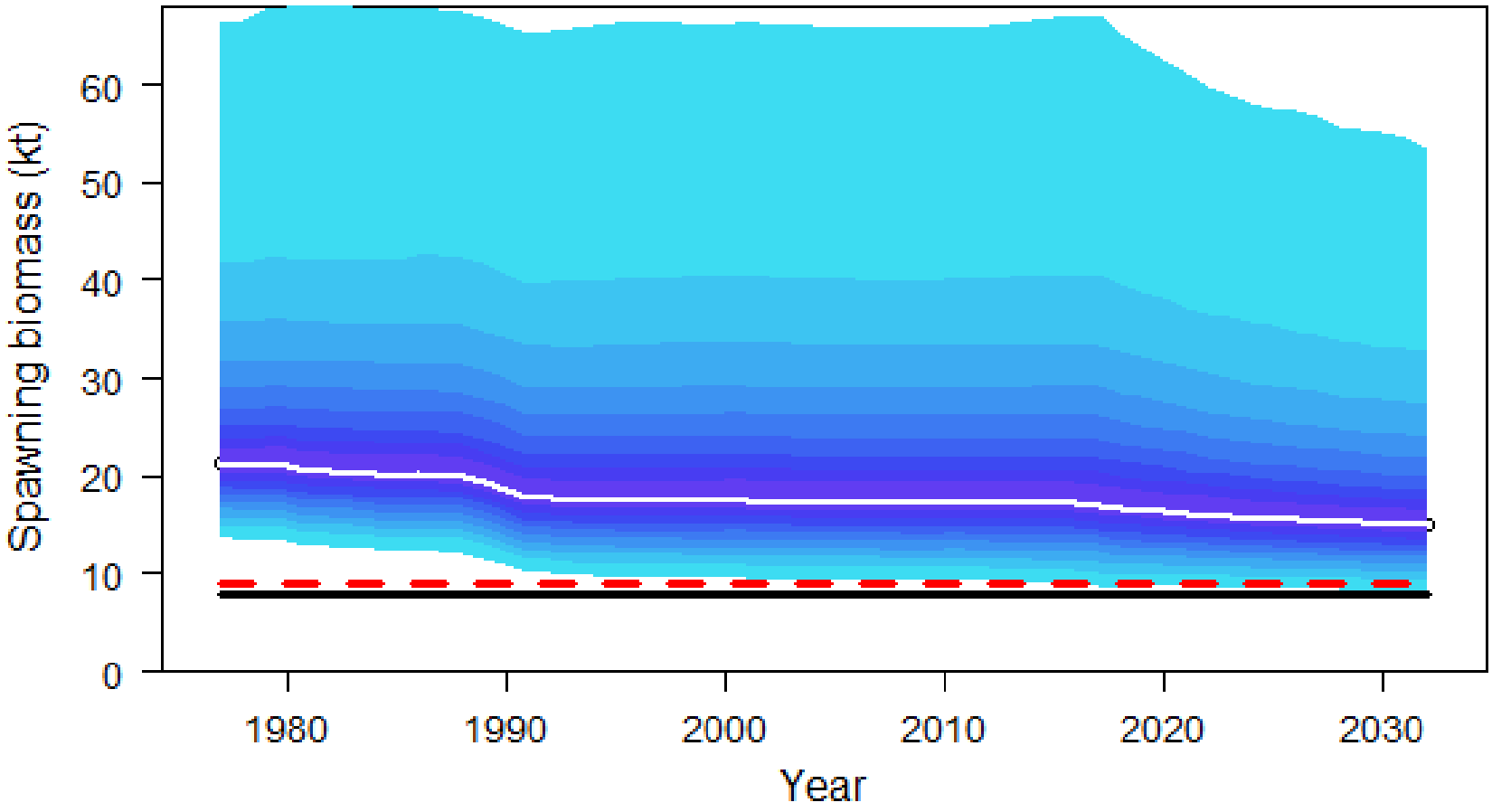
Blue dotted line = 2015, Black solid line = 2017

RE/BS Retrospective

Statistic	2015 (M15.4)	2015 (M15.4) Updated	2017 (M15.4)
Mohn's revised ρ	-0.371	0.105	0.009



RE/BS Projection



RE/BS Recommendation

- Recommended 2018 ABC: **1,444 t**
  - 9% increase from last year's ABC of 1,327 t
- Summary
  - Both survey estimates up from previous years
  - Potential distribution changes in both surveys
  - More evidence of strong 2010 year class
  - Retrospective pattern is no more

RE/BS Apportionment

	Western	Central	Eastern	Total
2017 ABC	105	706	516	1,327
2018 ABC	**176**	**556**	**712**	**1,444**
2018 OFL				**1,735**
2018 RE	124	554	766	1,444
2019 ABC	174	550	703	1,427
2019 OFL				1,715

Weighted Average

WGOA 12.2%

CGOA 38.5%

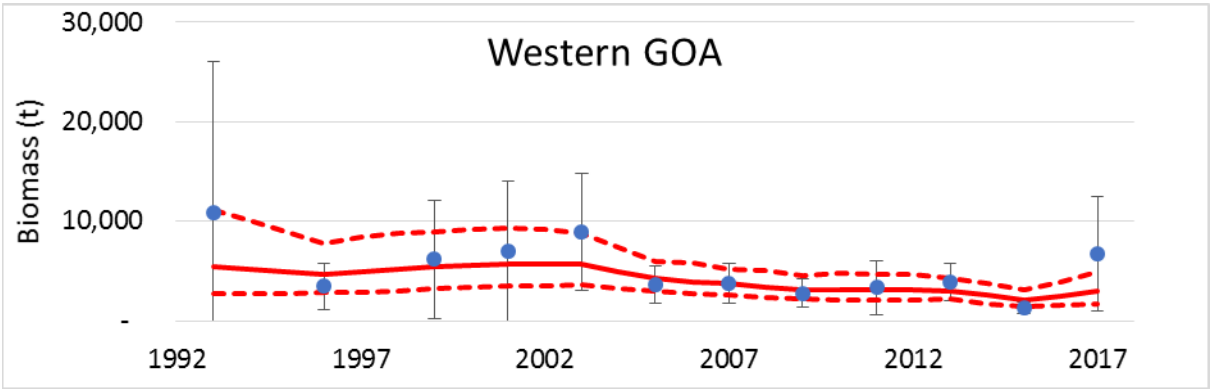
EGOA 49.3%

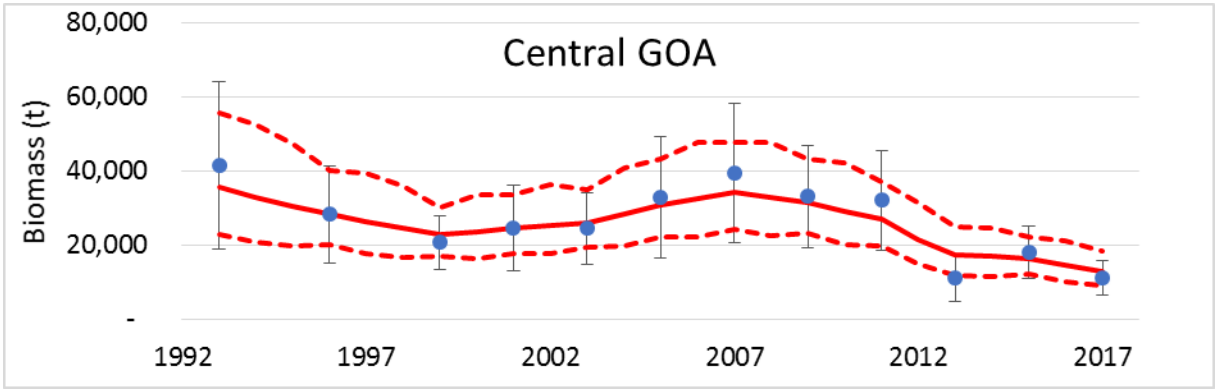
RE Model

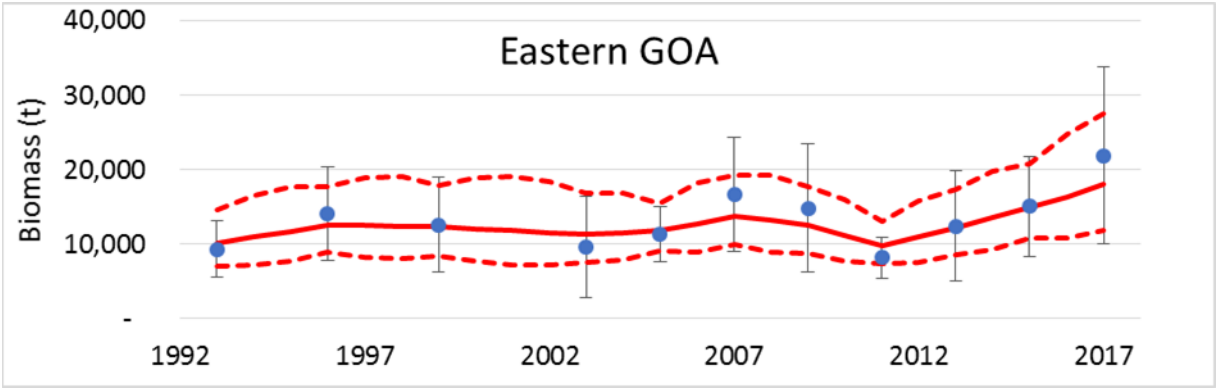
WGOA 8.6%

CGOA 38.4%

EGOA 53.0%







Research Priorities

- Assess RE/BS rockfish density between untrawlable and trawlable grounds
- Examine potential age, growth, maturity differences between RE & BS rockfish
- Incorporate ESP when available