BSAI squid complex

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BSAI Plan Team meeting * November 2016

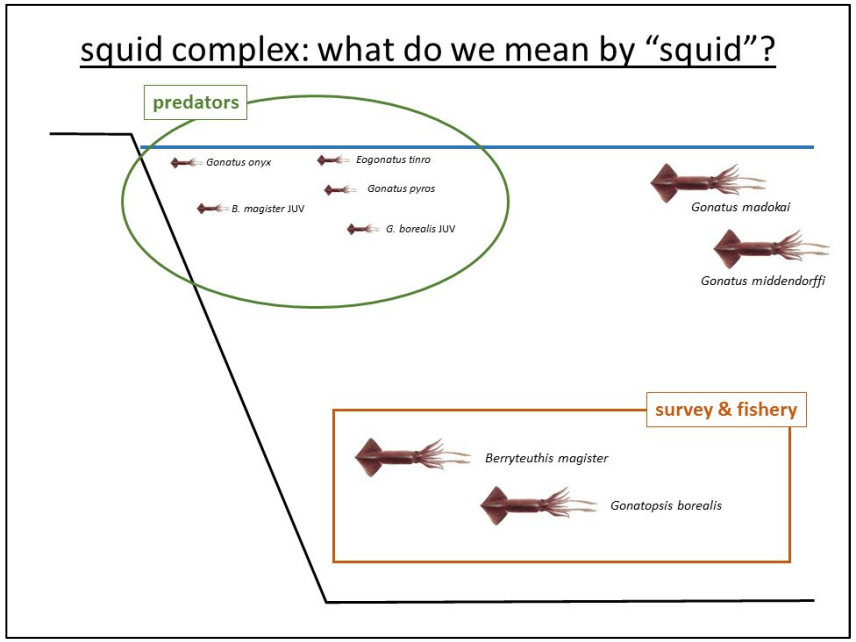
overview

- changes to the SAFE
- squid complex information
- squid catch patterns
- environmental effects on squid
- harvest recommendations

changes to the SAFE

- The introduction contains expanded information regarding the ecology of the different species in the complex.
- The fishery section includes a discussion of fishing effort during the early part of the catch history and the implications for basing catch limits on historical catch.
- The analytical approach section includes a discussion of alternative approaches to harvest recommendations that have been considered for BSAI squids.
- A brief discussion of environmental influences on squid has been added to the introduction.

differentiation among squid species

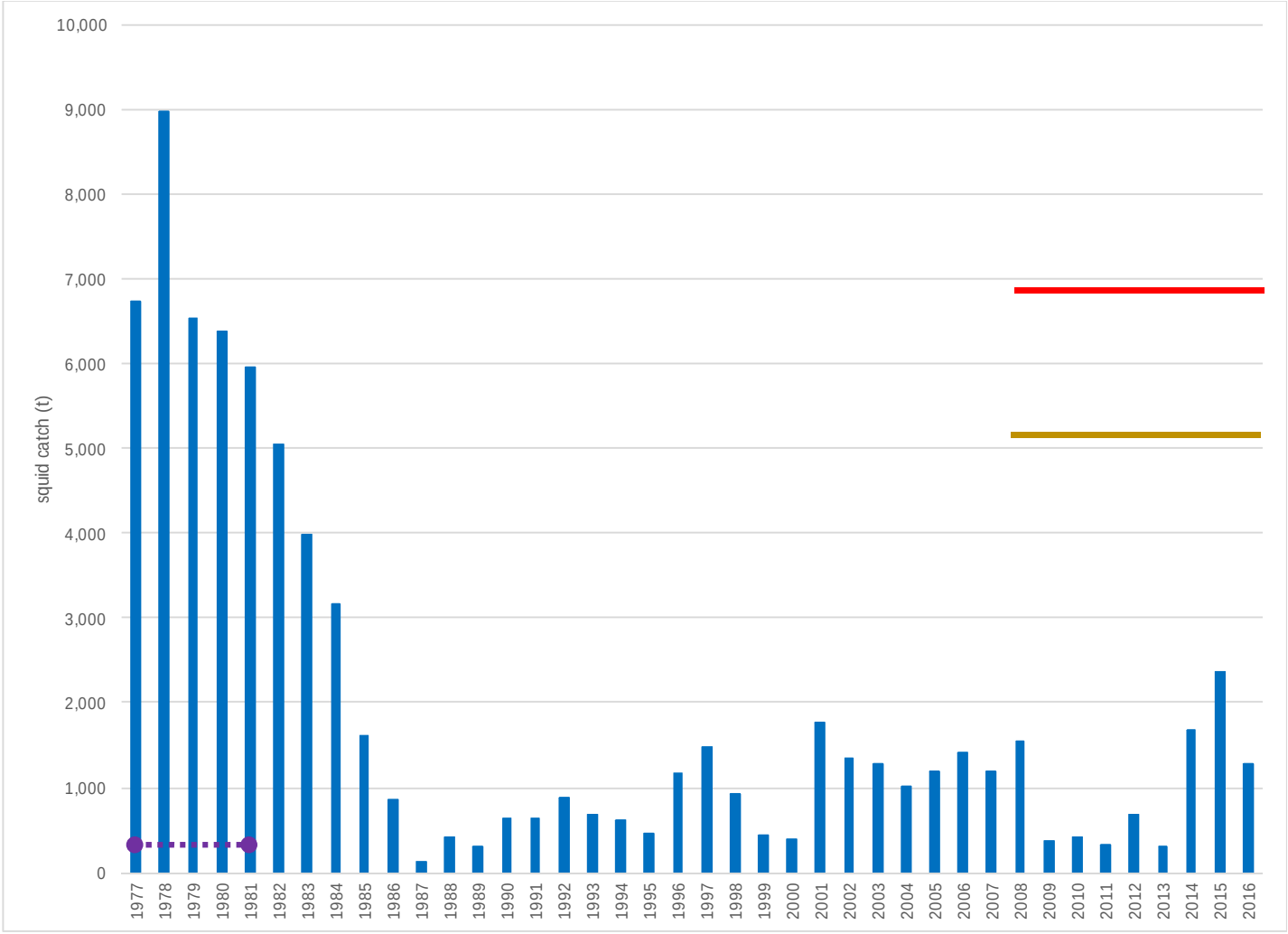


taxonomic group	maximum size (cm)	habitat	2016 EBS slope survey biomass estimate (t)
squid unID			2.1
Rossia pacifica	10	benthic	29.4
Gonatidae unID			31.8
Gonatus sp			7.8
Gonatus onyx	13.5	pelagic, > 500 m	1.8
Gonatus berryi	19	pelagic, > 500 m	0.9
Gonatus pyros	12.5	pelagic, > 500 m	0.3
Gonatus madokai	39	pelagic, > 500 m	
Eogonatus tinro	12	pelagic, > 500 m	0.3
Gonatus middendorffi	35	pelagic, > 500 m	
Berryteuthis magister	34	demersal, 50-750 m	1,127
Gonatopsis sp			0.9
Gonatopsis borealis	20	demersal, 100-1000 m	6.8
Moroteuthis robusta	200	pelagic, > 500 m	
Galiteuthis phyllura	76	meso-, bathypelagic	0.4
Chiroteuthis calyx	24	epi- to bathypelagic	1.3
Cranchiidae		meso-, bathypelagic	
Belonella borealis		meso-, bathypelagic	

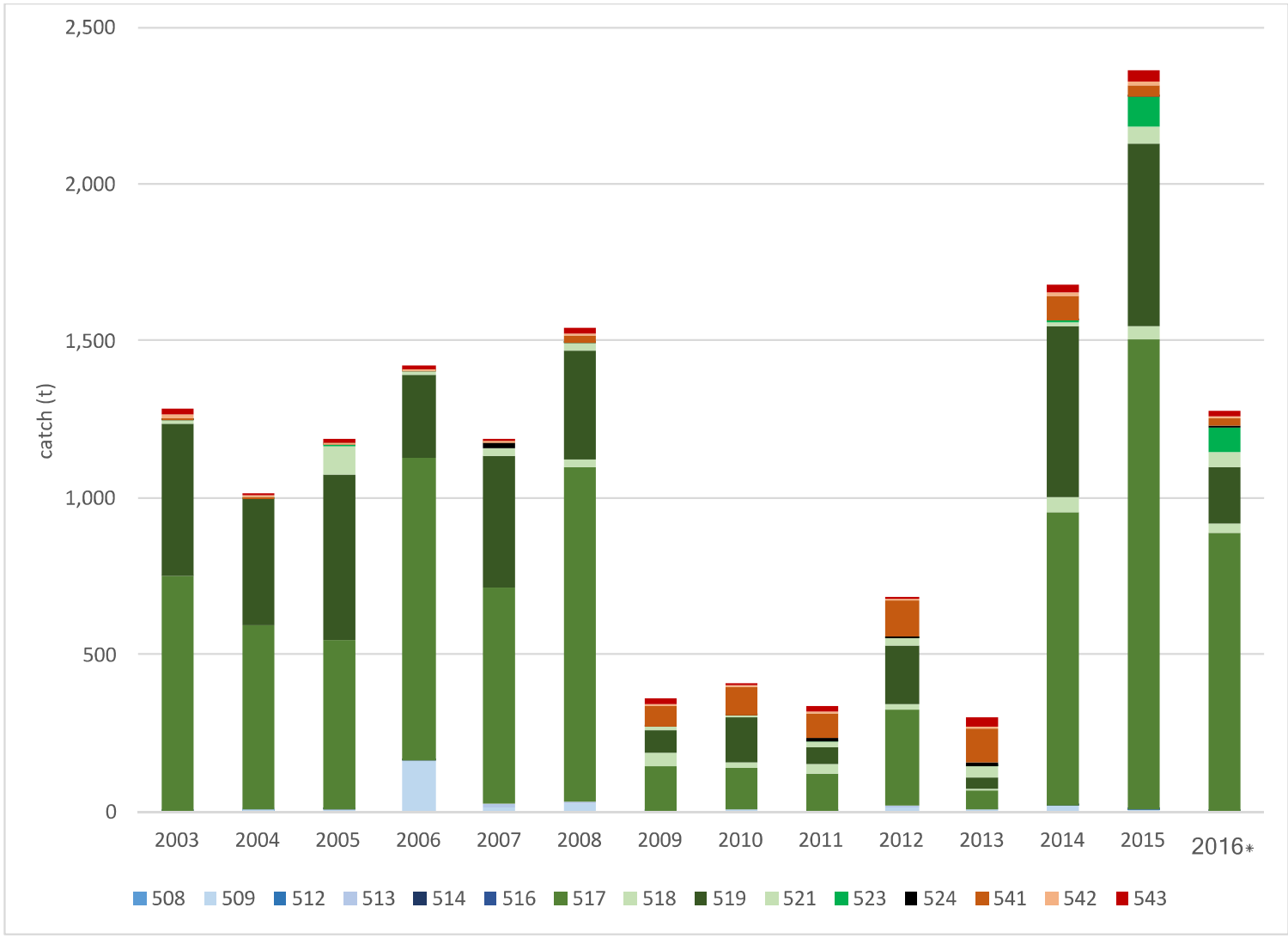
squid survey biomass

	EBS shelf				**EBS slope**								**AI**	
	R. pacifica		*B. magister*		*R. pacifica*		*B. magister*		*G. borealis*		misc. squids		*B magister*	
	bio	CV	bio	CV	bio	CV	bio	CV	bio	CV	bio	CV	bio	CV
2002	33	0.39	0	-	52	0.18	1,197	0.12	2	0.74	18	0.27	2,088	0.14
2003	27	0.37	16	1.00										
2004	6	0.82	0	-	58	0.19	1,418	0.14	52	0.37	114	0.78	3,250	0.37
2005	13	0.67	0	-										
2006	9	0.74	47	1.00									1,467	0.14
2007	11	0.71	0	-										
2008	8	0.52	0	-	35	0.33	1,675	0.10	52	0.41	22	0.26		
2009	19	0.41	623	1.00										
2010	42	0.60	9	1.00	67	0.25	1,831	0.10	8	0.32	17	0.36	2,444	0.22
2011	25	0.51	1	1.00										
2012	25	0.43	43	1.00	42	0.23	1,284	0.09	13	0.40	7	0.33	4,011	0.28
2013	146	0.84	28	1.00										
2014	21	0.49	0	-									6,178	0.30
2015	91	0.40	61	0.66										
2016	41	0.52	7	1.00	29	0.30	1,127	0.20	7	0.30	48	0.14	3,808	0.38

squid catch history and specs



squid catch patterns



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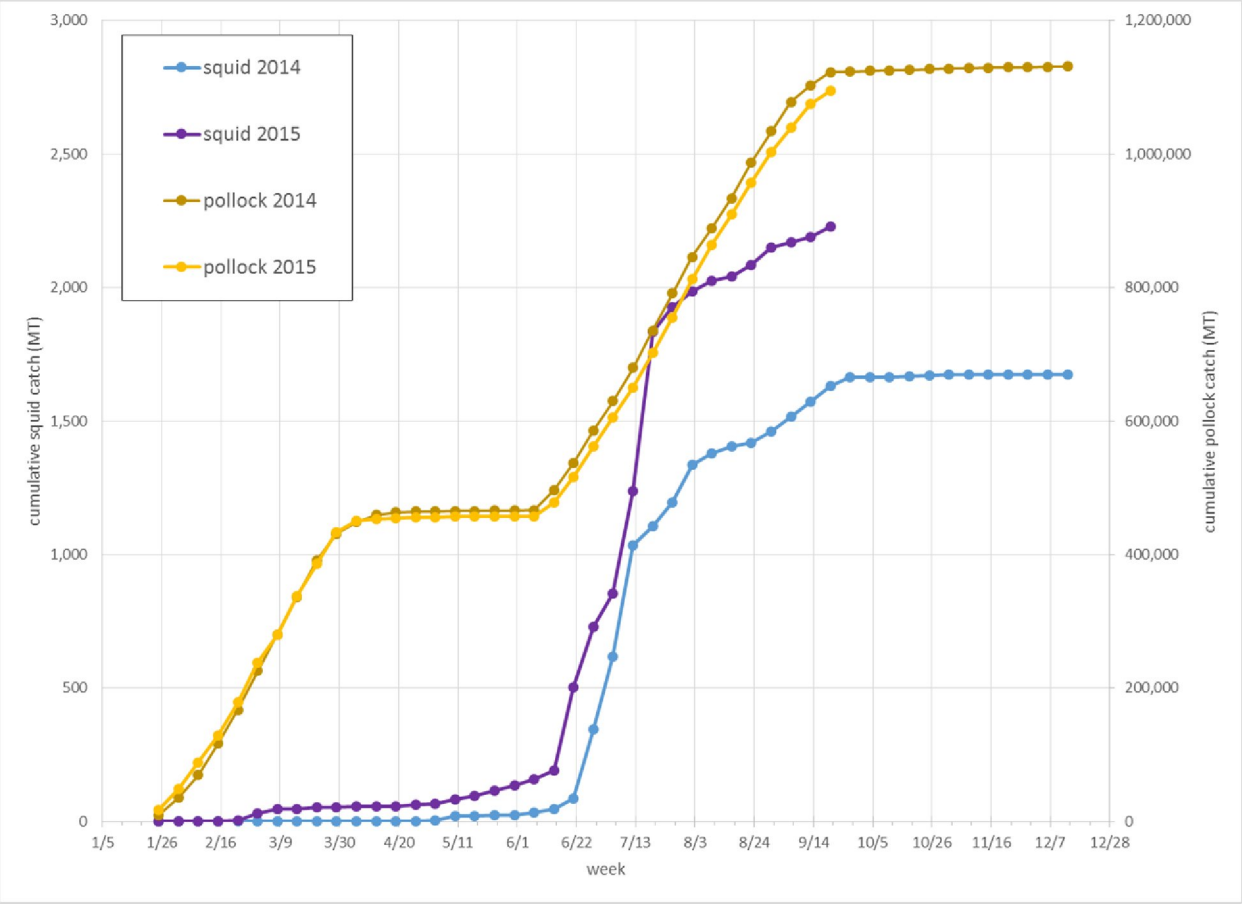
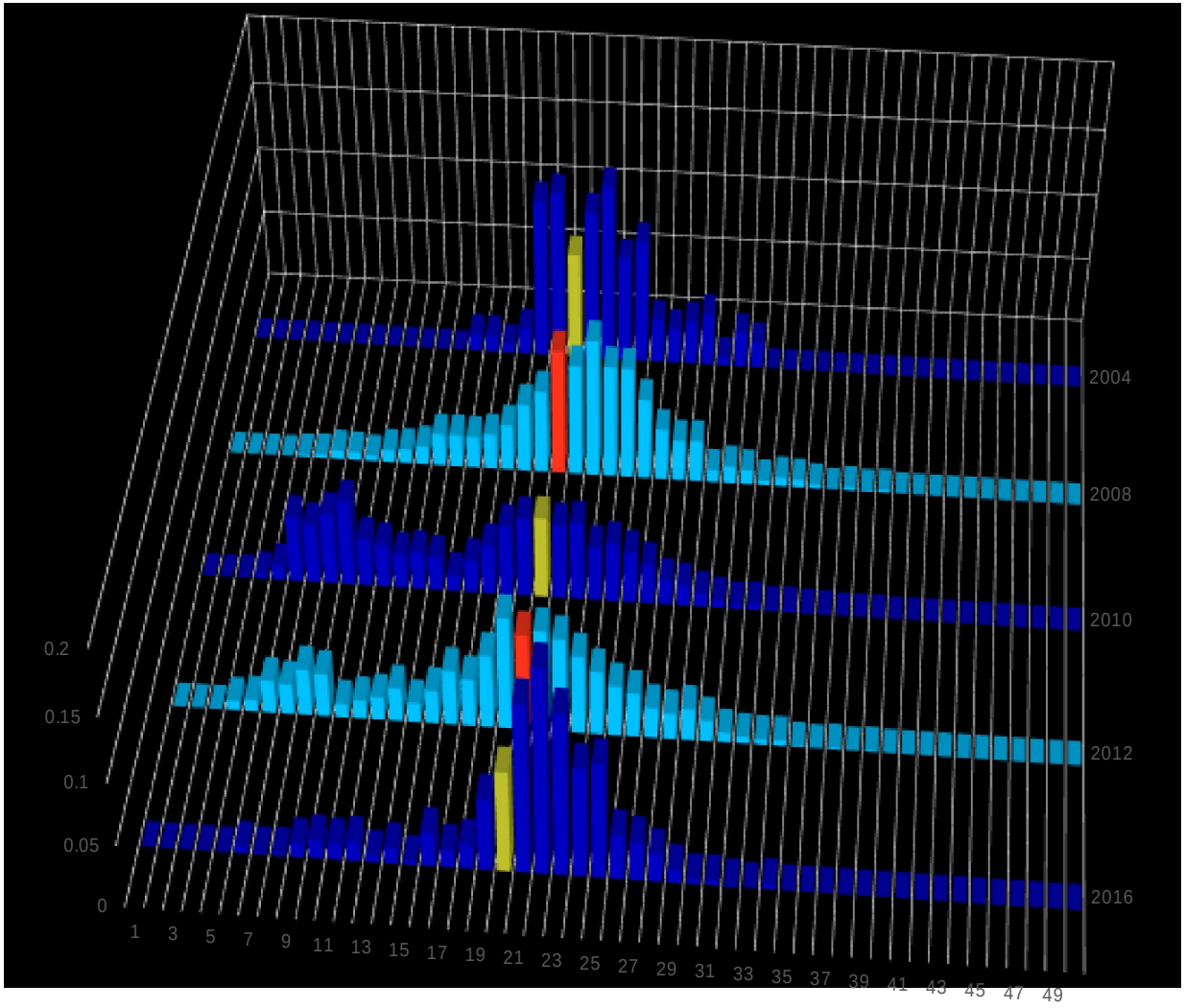


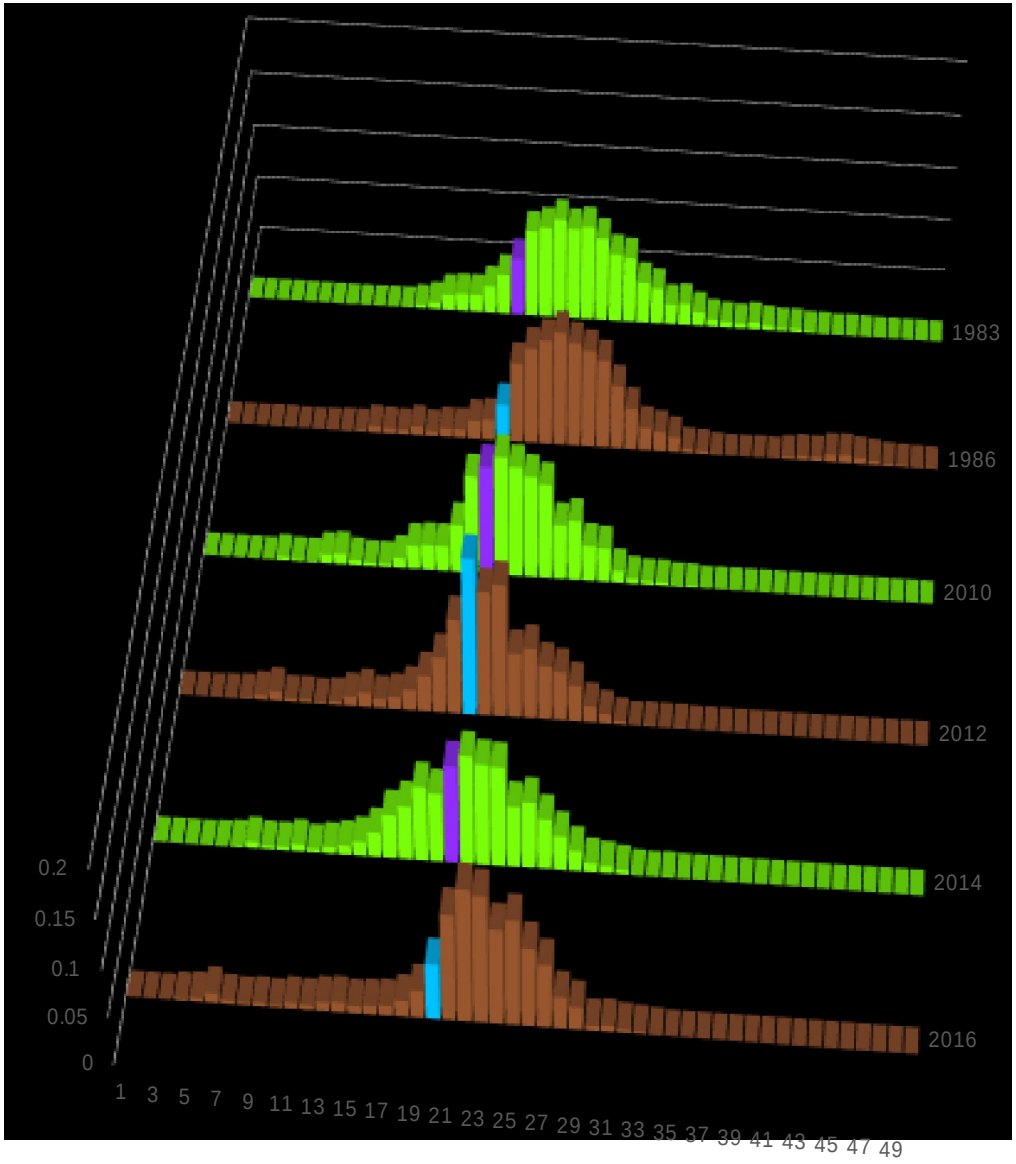
squid catch patterns

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	***2016****
pollock	1,226	977	1,150	1,399	1,169	1,452	209	277	178	495	118	1,478	2,206	*1,160*
ATF	7	6	10	4	3	46	96	104	67	60	68	69	24	*29*
rockfish	12	6	7	6	8	25	18	12	37	33	60	56	66	*24*
Kamchatka	-	-	-	-	-	-	-	-	48	76	36	42	52	*22*
FHS	0.15	3.94	1.13	0.17	0.16	0.47	0.03	0.17	0.11	0.29	0.86	0.20	1.26	*17*
Atka	21	7	9	9	5	12	14	16	5	23	15	31	13	*15*
Other flatfish	2.89	1.76	6.05	0	2.09	0.85	0.45	0.09	0	0.18	1.16	0.43	1.09	*5.12*
Greenland turbot	3.46	6.05	0.42	0	0	4.18	22.66	0.88	0.00	0	0.06	0.60	0.00	*3.06*
Pacific cod	8.59	5.52	2.50	0.98	0.79	0.20	0.12	0.26	0.08	0.21	0.07	0.67	0.64	*1.66*
sablefish	0.01	0.11	0.12	0.02	0.10	0.96	0.11	0.00	0.00	0	0.07	0.23	0	*0.57*
YFS	1.40	0	0.01	0	0.01	0.28	0.01	0.06	0.24	0.05	0.43	0.07	0.25	*0.10*
Rock sole	0.02	0.26	0.03	0	0.37	0.04	0	0	0.13	0.02	0.16	0.00	0.04	*0.03*
total	**1,282**	**1,014**	**1,186**	**1,418**	**1,188**	**1,542**	**360**	**410**	**336**	**688**	**299**	**1,678**	**2,364**	***1,277***

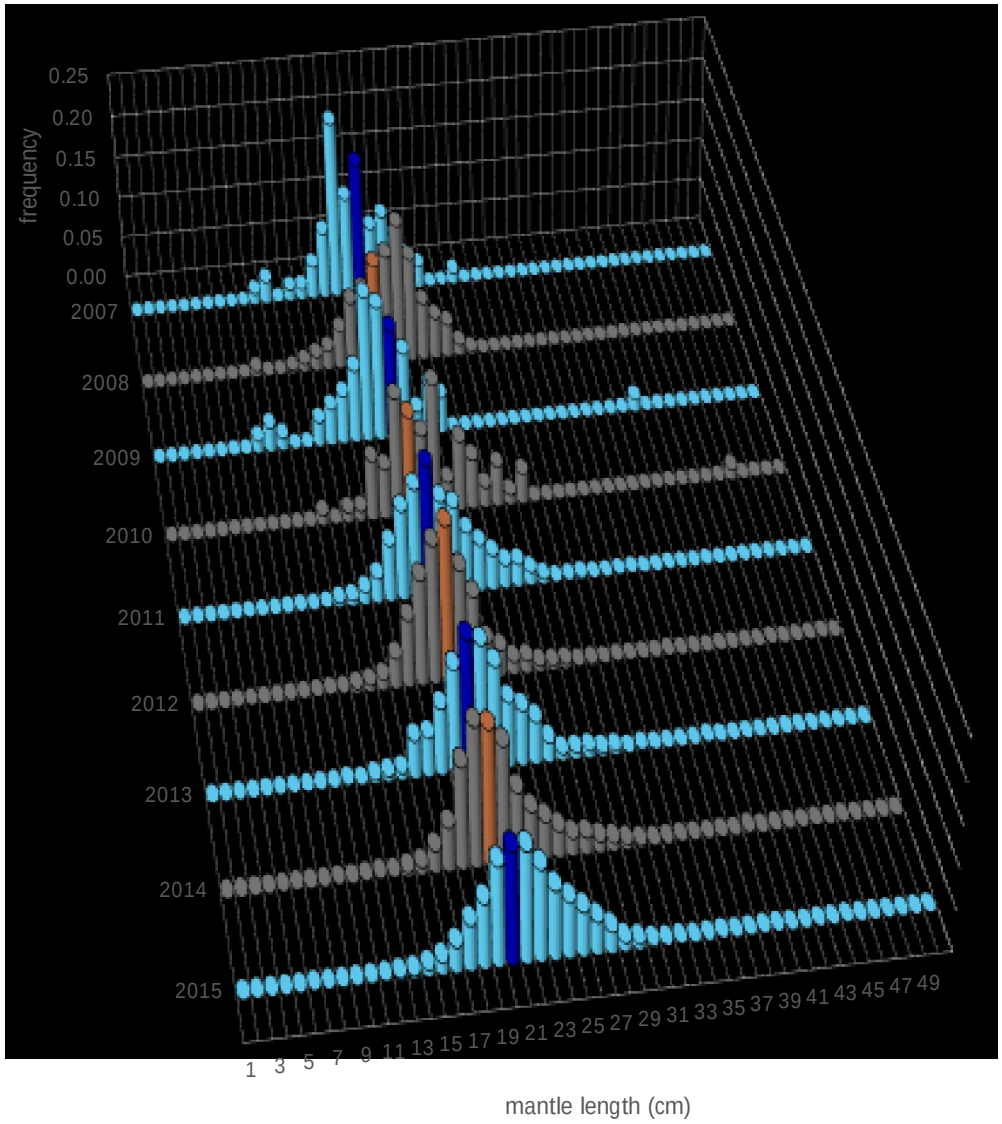
size composition – EBS slope survey



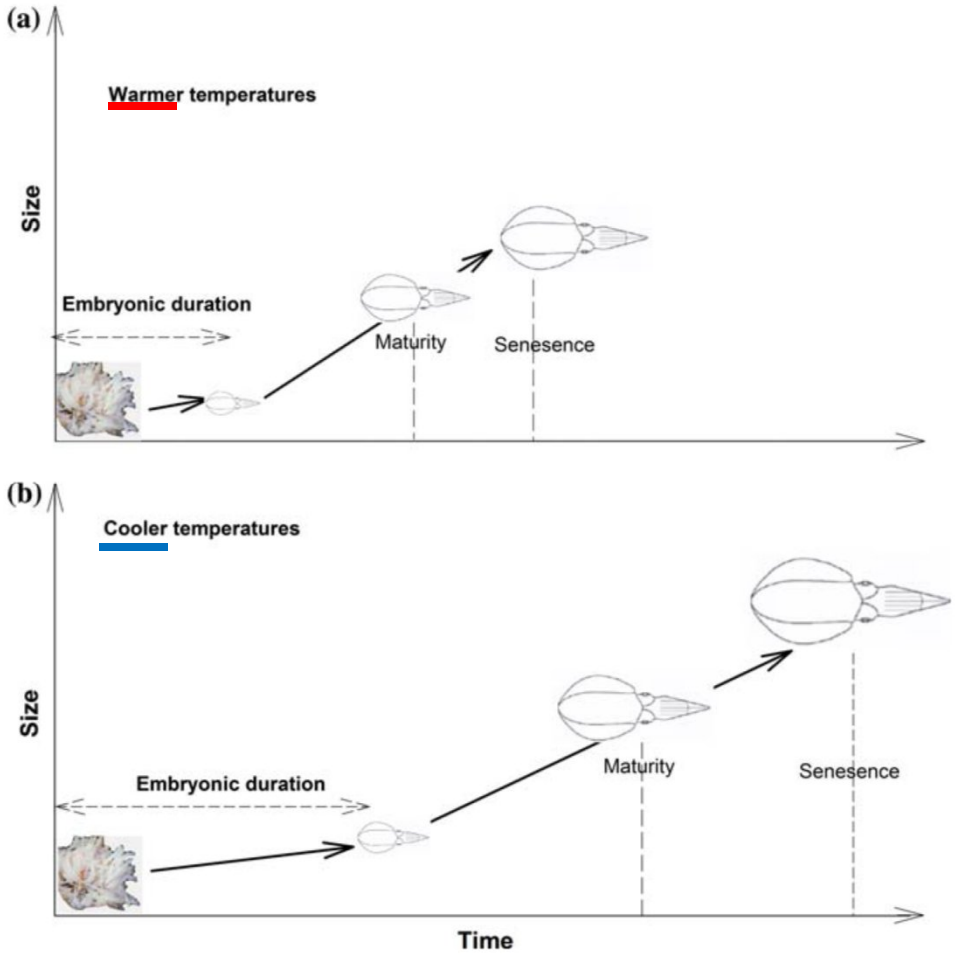
size composition – AI survey



size composition - fishery



environmental effects on squid (briefly)

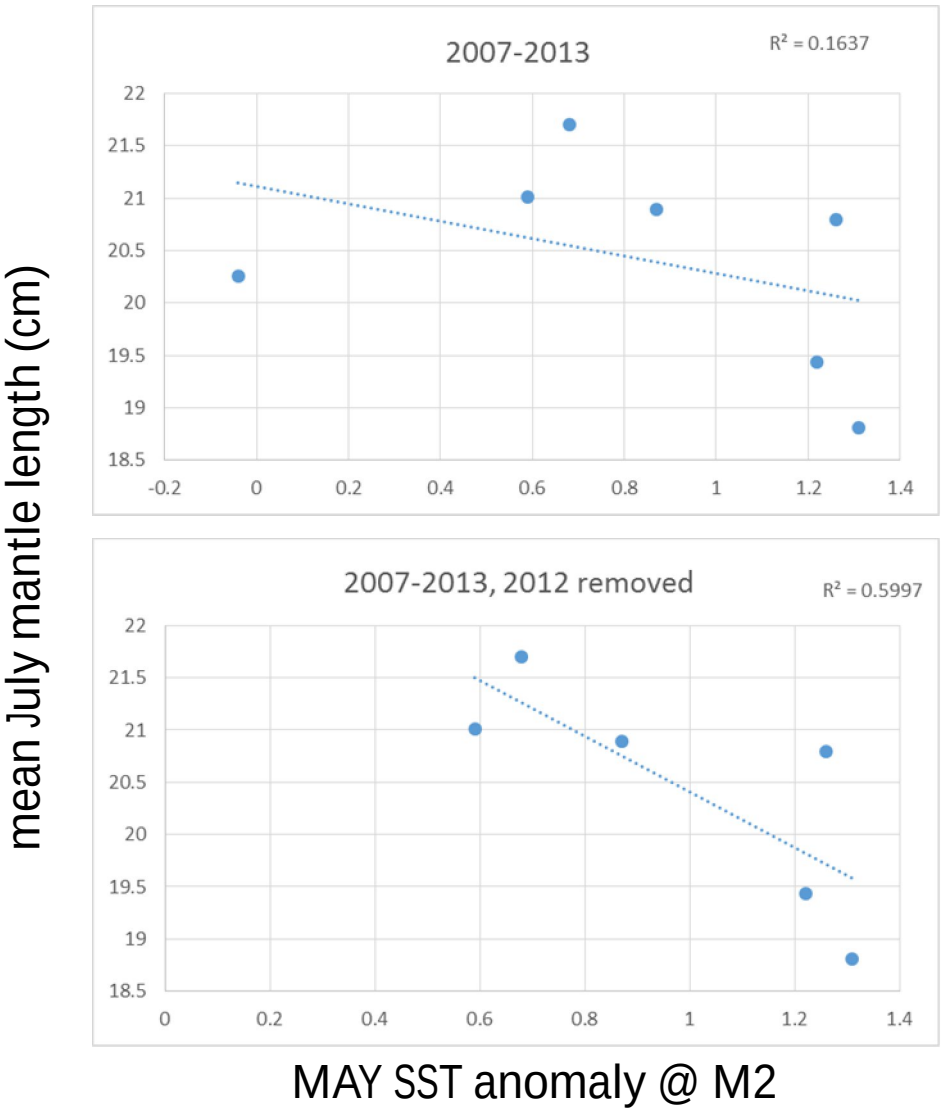


Pecl and Jackson 2008, Rev Fish Biol Fisheries 18: 373-385

environmental effects on squid (briefly)

- warmer temperatures = faster growth
- growth effects depend on prey availability, oxygen
- less ability to survive poor conditions due to increased metabolic rate
- maturation at smaller size, smaller offspring
- increases in multiple cohorts, changes in annual patterns

mantle length vs. temperature, 2007-2013 (fishery)



harvest recommendations

Quantity	As estimated or *specified last* year for: *2016*	*2017*	As estimated or *recommended this* year for: **2017**	2018
Tier	6	6	6	6
OFL (t)	6,912	6,912	**6,912**	6,912
maxABC (t)	5,184	5,184	**5,184**	5,184
ABC (t)	5,184	5,184	**5,184**	5,184
Status	As determined *last* year for: 2013	2014	As determined *this* year for: 2014	2015
Overfishing	no	n/a	no	n/a