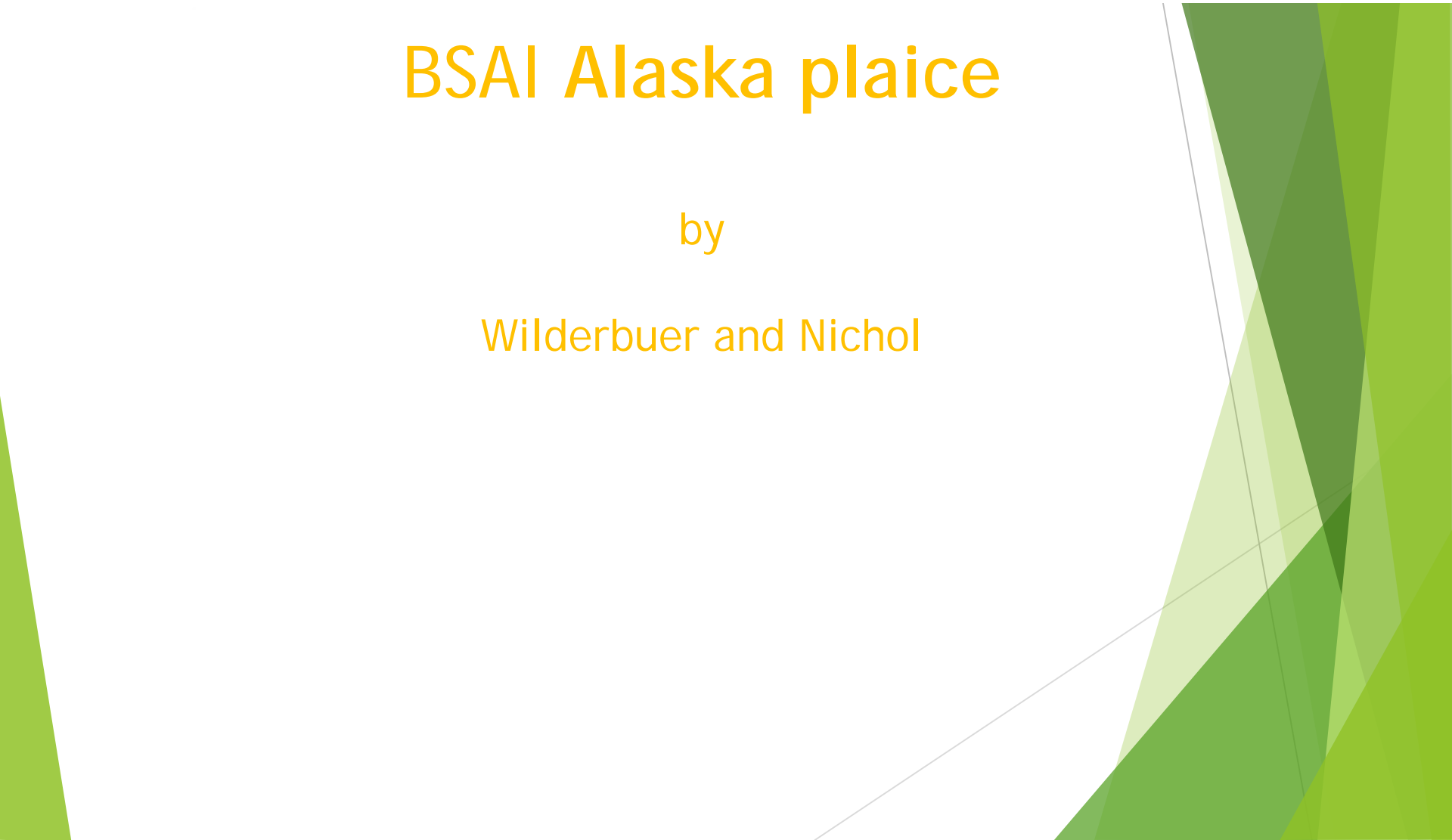
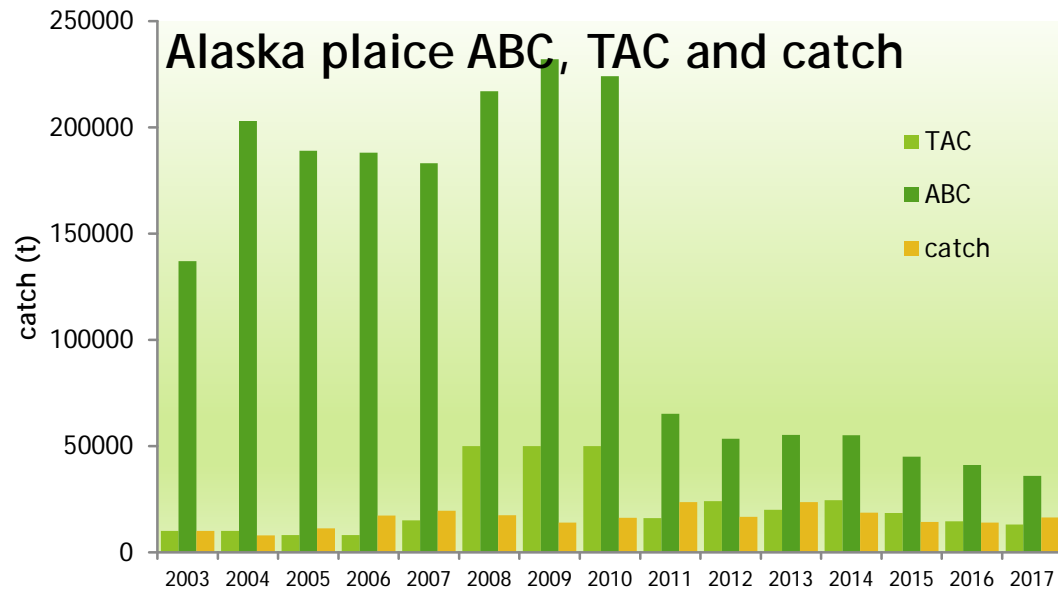
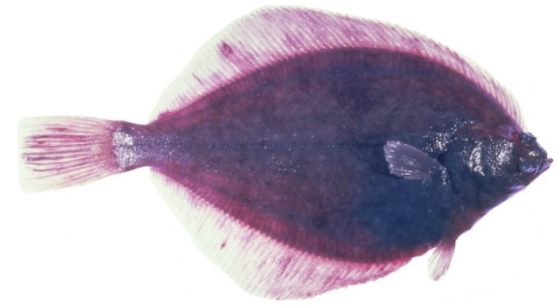
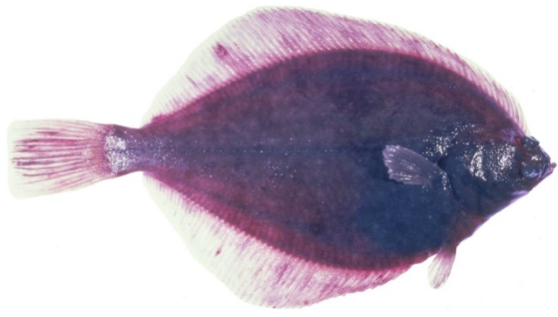


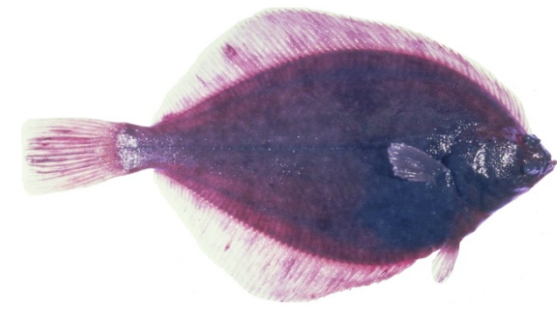
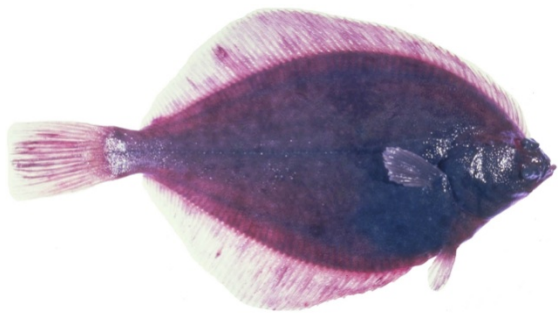
BSAI Alaska plaice

by

Wilderbuer and Nichol

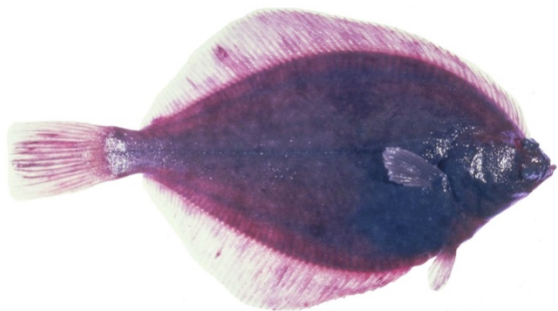




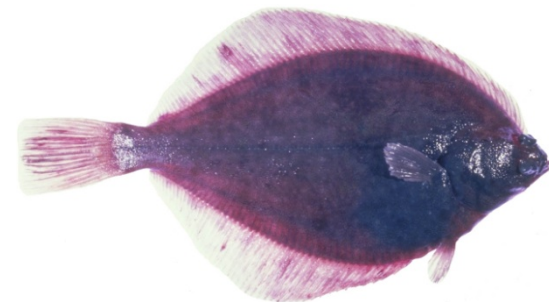


Changes to the input data

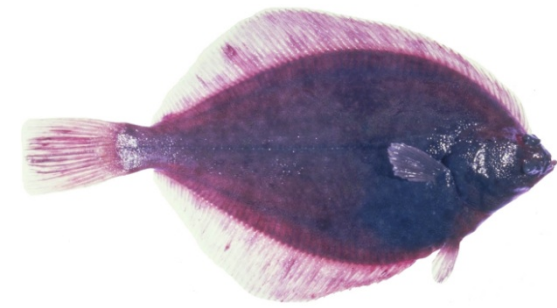
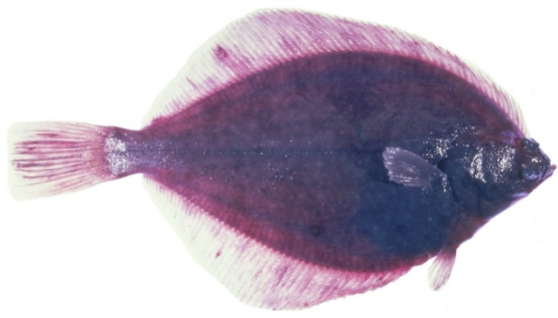
- **2017 shelf survey size composition**
- **2017 shelf survey biomass point estimates and standard errors**
- **Estimate of catch (t) and discards for 2016 and 2017**
- **Estimate of retained and discarded portions of the 2016 catch**
- **2016 shelf survey age composition**



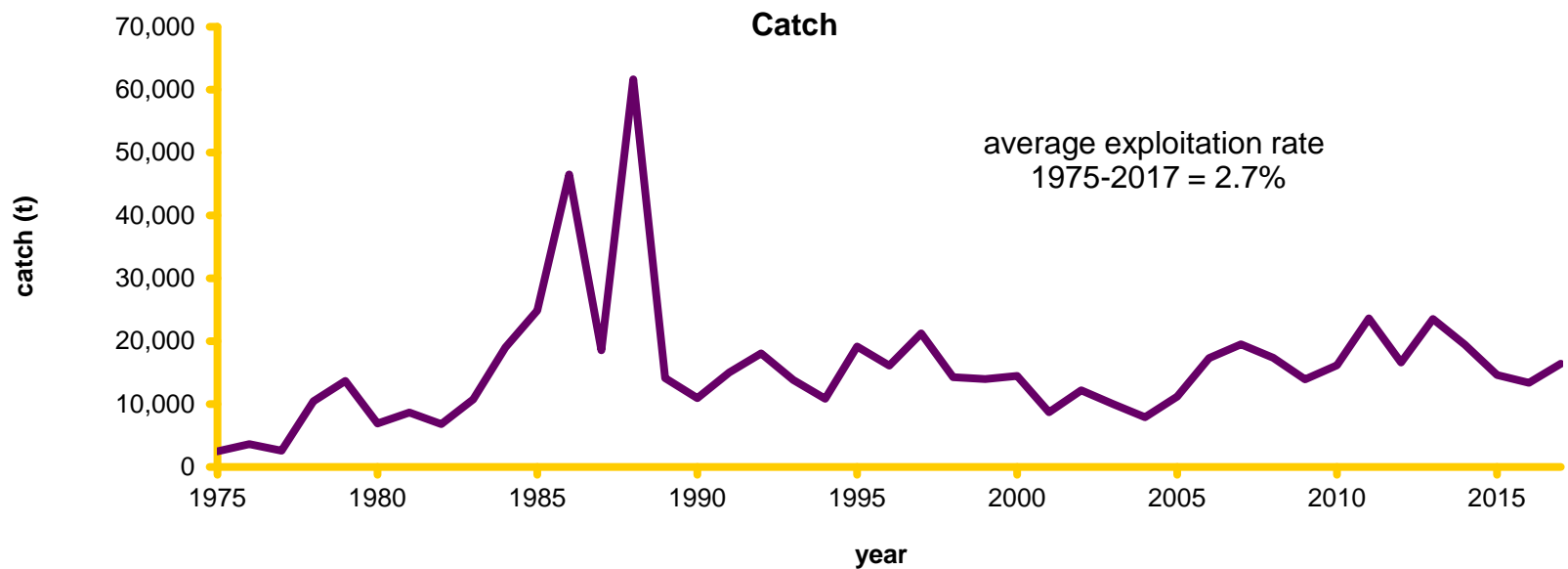
Alaska plaice

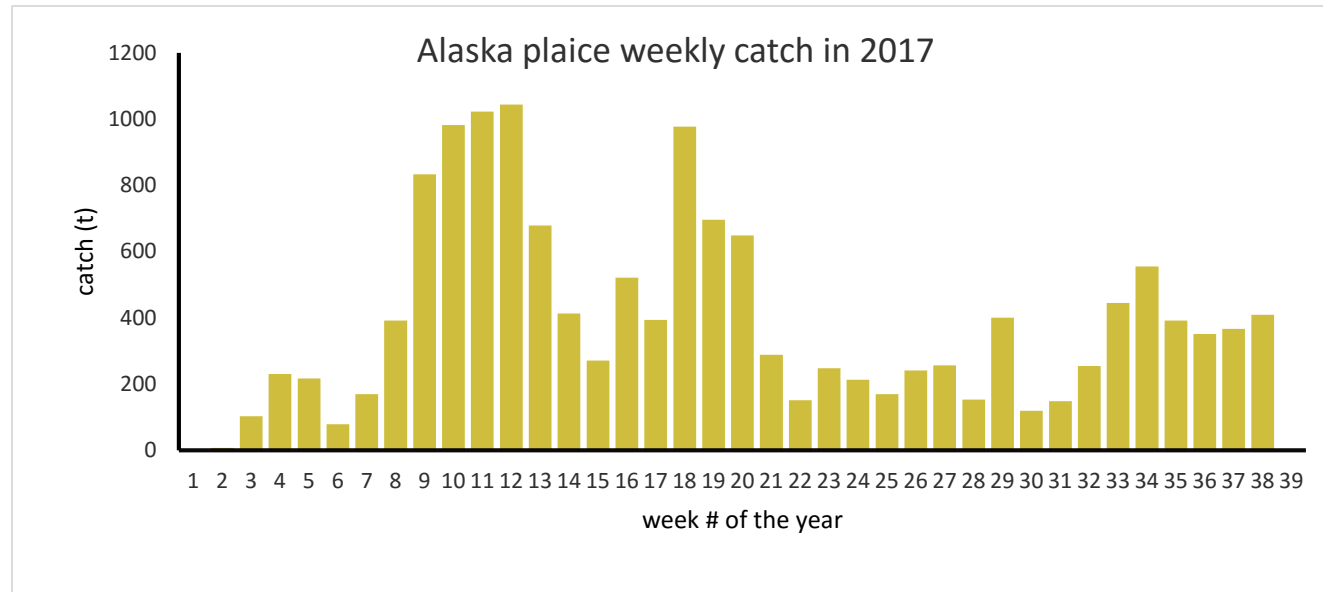
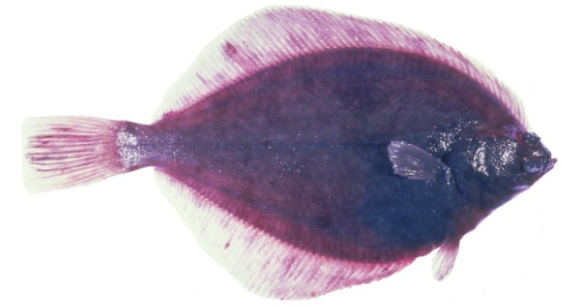
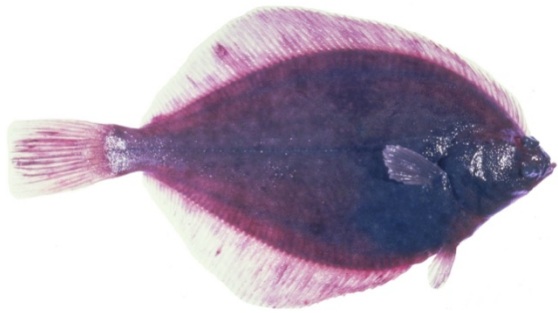


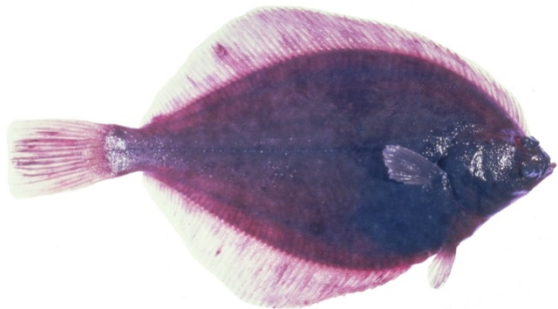
Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2017	2018	2018	2019
M (natural mortality rate)	0.13	0.13	0.13	0.13
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	412,600	407,300	417,300	412,000
Female spawning biomass (t)	186,300	177,500	191,460	181,730
B _{100%}	276,250	276,500	317,360	317,360
B _{40%}	110,500	110,500	126,900	126,900
B _{35%}	96,700	96,700	111,100	111,100
F _{OFL}	0.154	0.154	0.149	0.149
maxF _{ABC}	0.128	0.128	0.124	0.124
F _{ABC}	0.128	0.128	0.124	0.124
OFL (t)	42,800	36,900	41,170	38,800
maxABC (t)	36,000	32,100	34,590	32,700
ABC (t)				
Status	As determined last year for:		As determined this year for:	
	2015	2016	2016	2017
Overfishing	no	n/a	No	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no



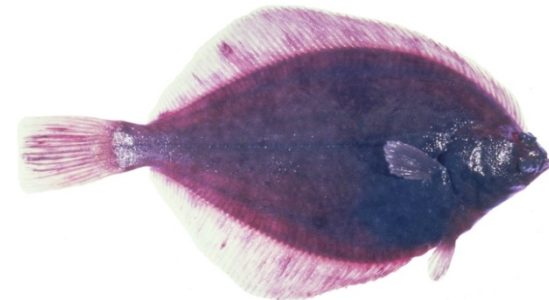
2017 catch = 16,400 t
average 1975-2017 exploitation rate = 2.7%



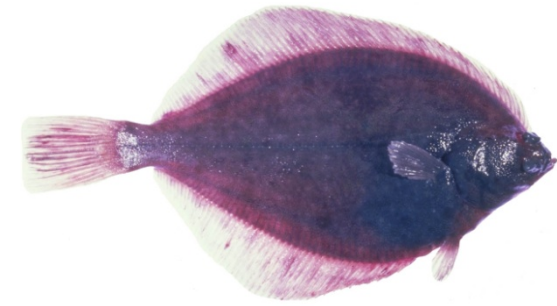
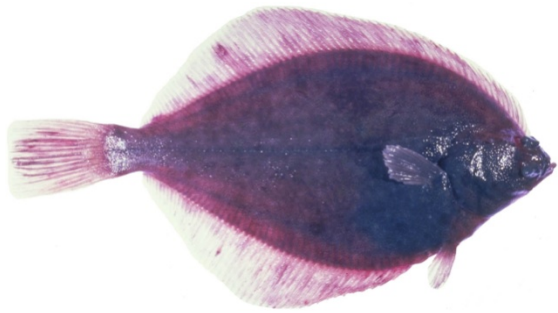




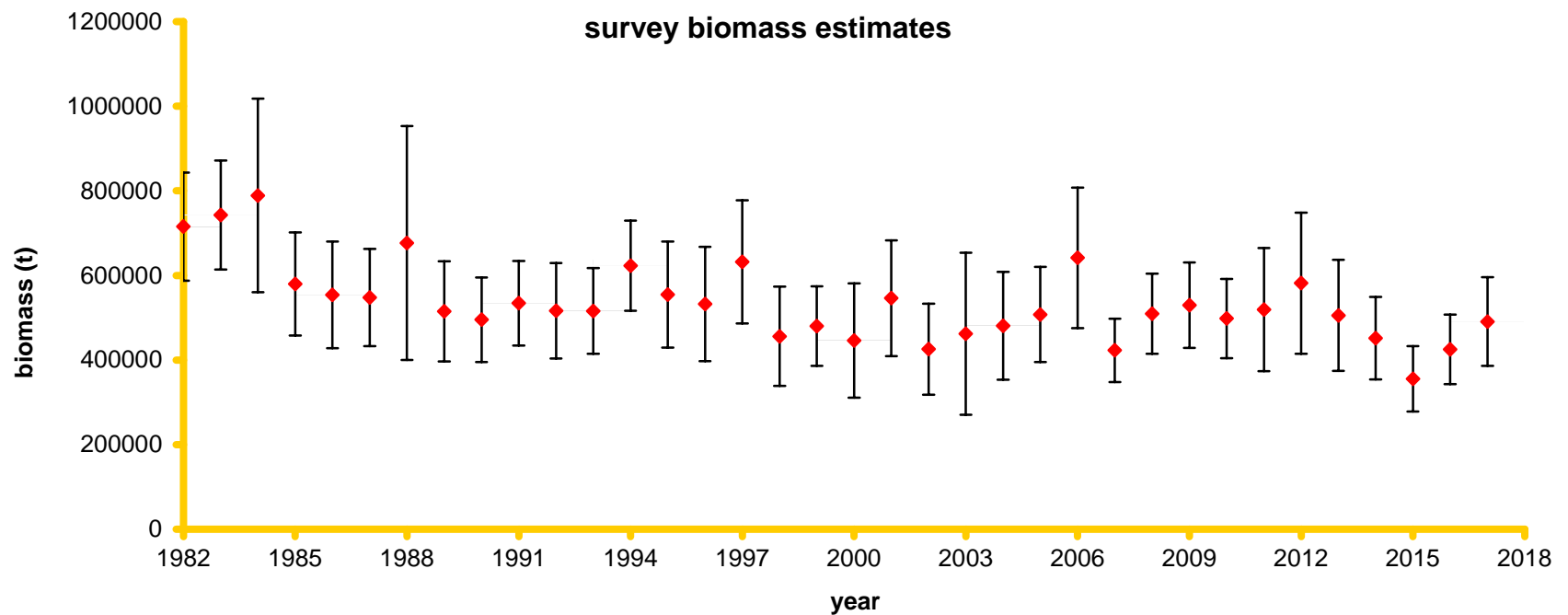
Alaska plaice

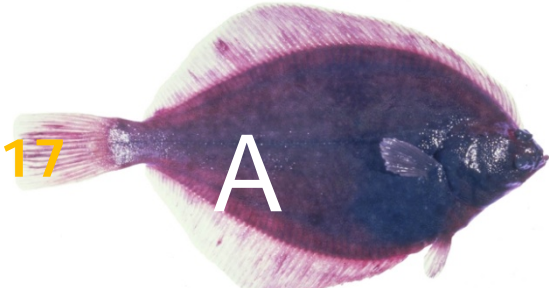


year	Discard	Retained	Total	Proportion discarded
2002	11,806	370	12,176	0.97
2003	9,428	350	9,778	0.96
2004	7,193	379	7,572	0.95
2005	10,293	786	11,079	0.93
2006	14,746	2,564	17,310	0.85
2007	15,481	3,946	19,427	0.8
2008	9,330	8,046	17,376	0.54
2009	5,061	8,882	13,945	0.36
2010	5,845	10,322	16,166	0.36
2011	7,197	16,459	23,656	0.30
2012	3,589	13,023	16,611	0.22
2013	9,053	14,470	23,523	0.38
2014	3,702	15,747	19,449	0.19
2015	1,231	13,382	14,614	0.08
2016	2,070	11,315	13,385	0.15

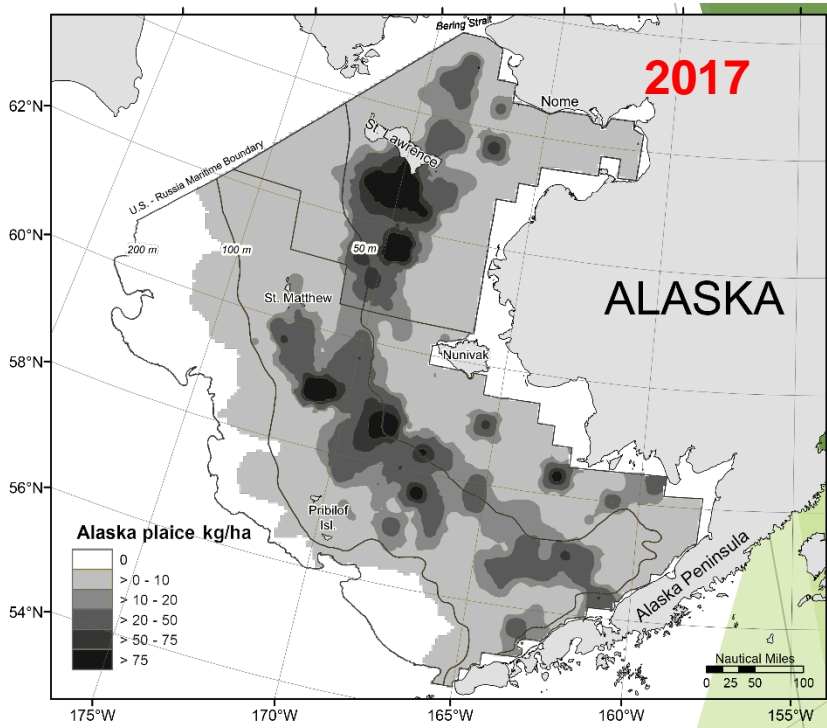
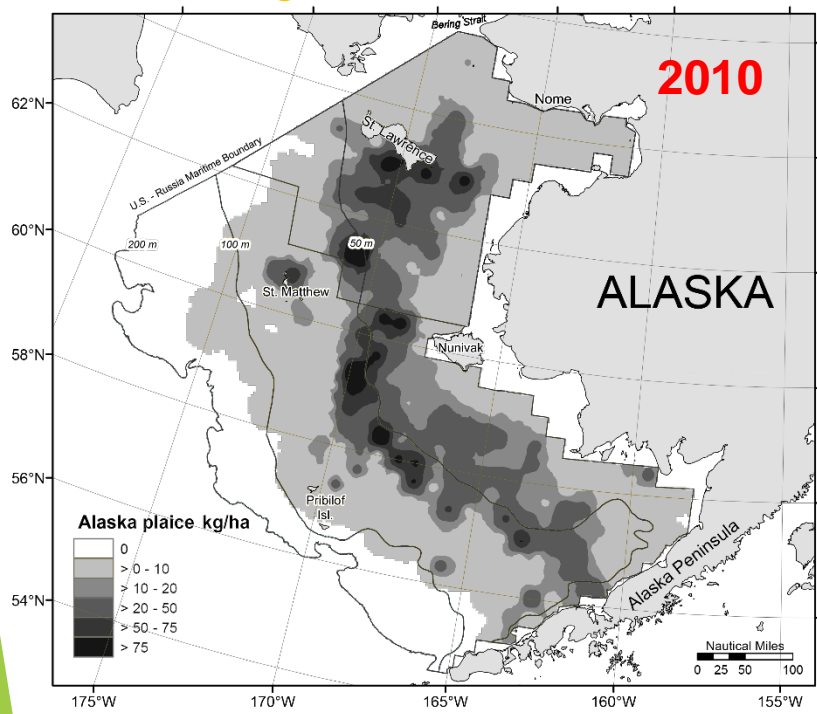


2017 shelf survey biomass estimate = 491,050 t
15% increase from 2016 to 2017

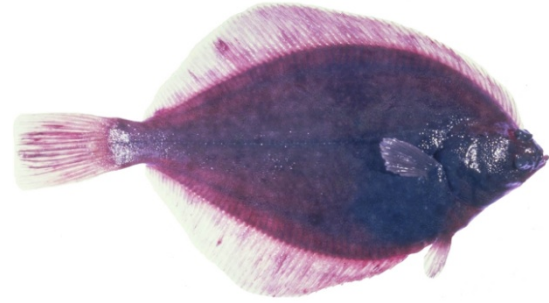




Alaska plaice distribution in the 2010 and 2017 Bering Sea and northern Bering Sea trawl survey



- ▶ 38% of the 2010 total biomass was found in the northern Bering Sea.
- ▶ 40% of the 2017 total biomass was found in the northern Bering Sea



Alaska plaice split-sex model

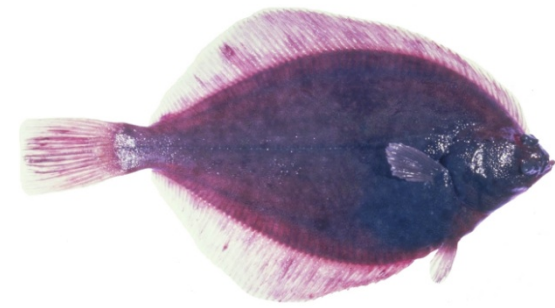
uses:

sex-specific estimates of fishery and survey age composition and length composition and weight at age

Estimates:

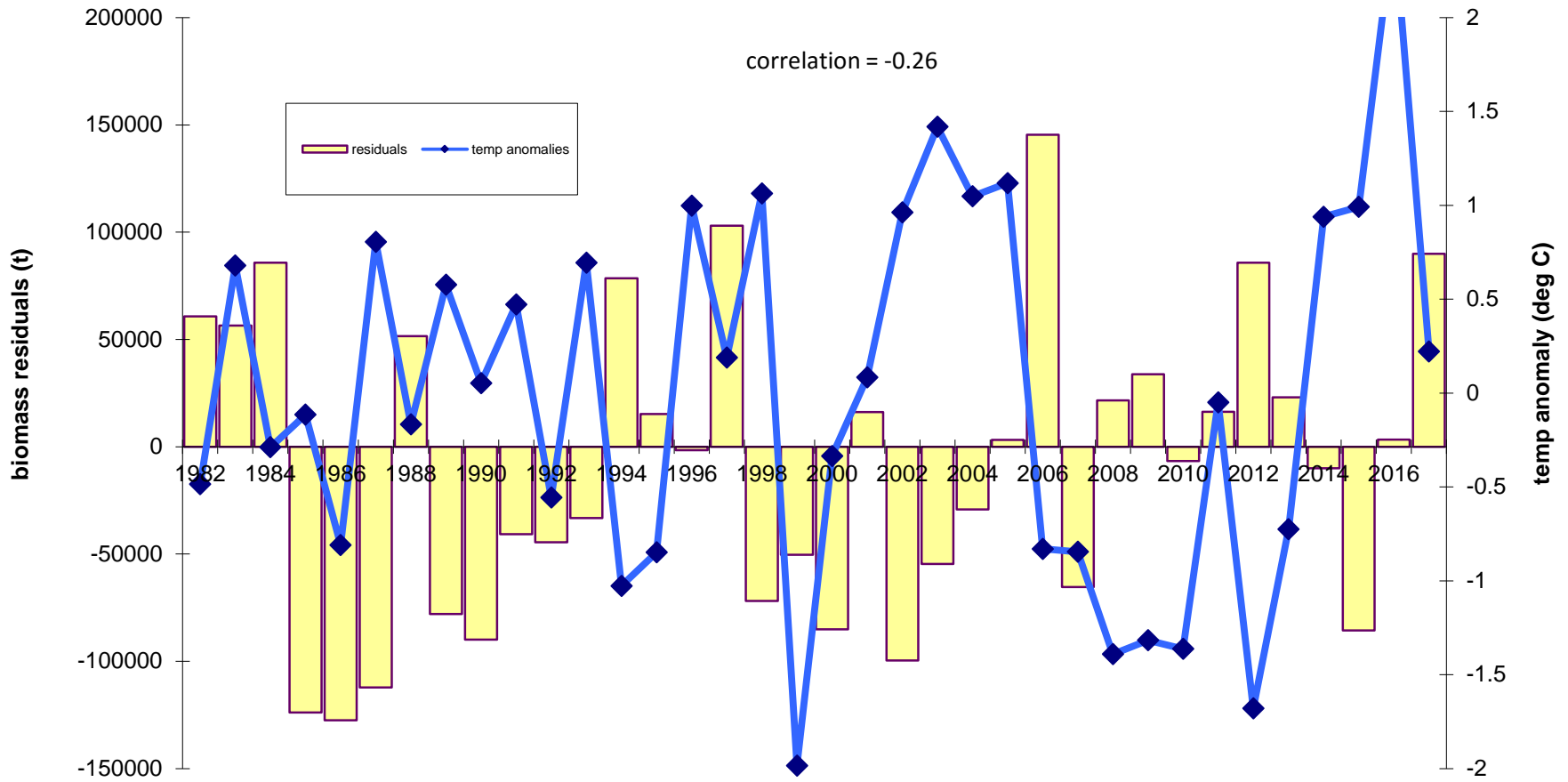
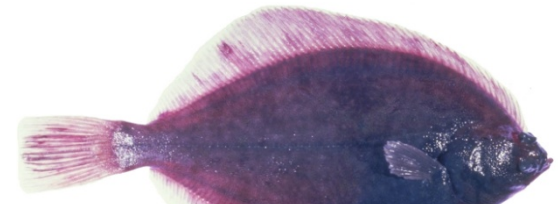
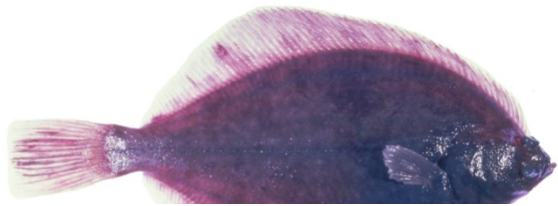
Sex-specific estimates of population number, fishing mortality, selectivity, fishery and survey age composition.

Allows for estimation of sex-specific natural mortality



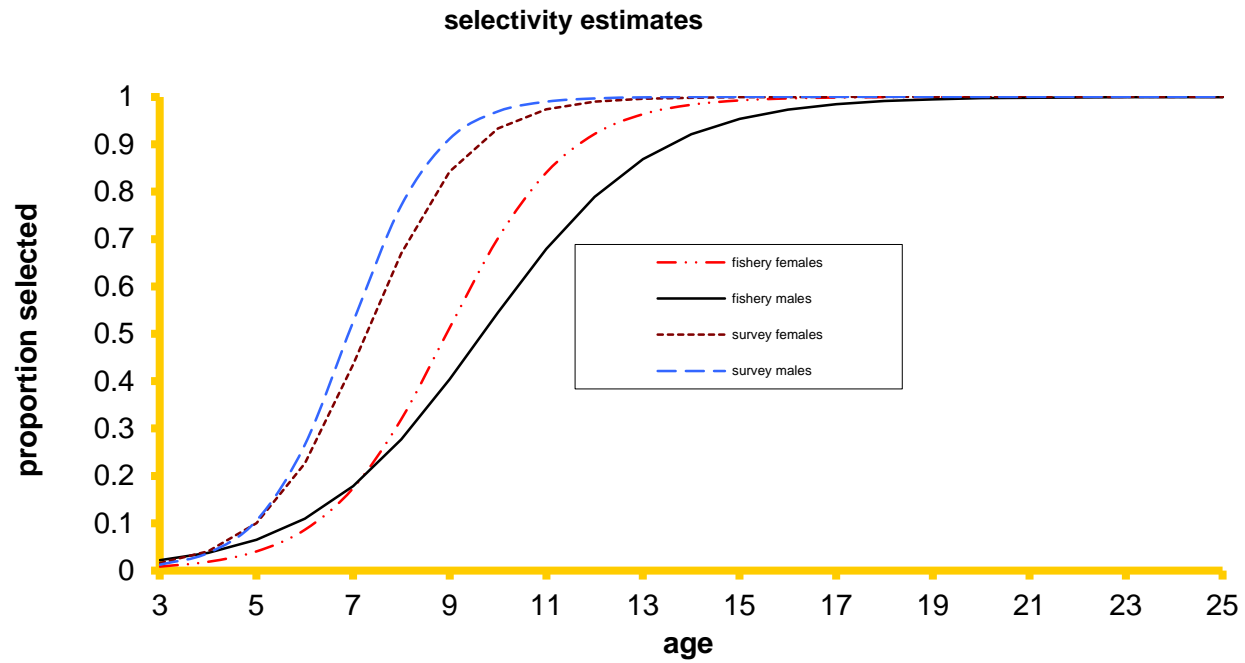
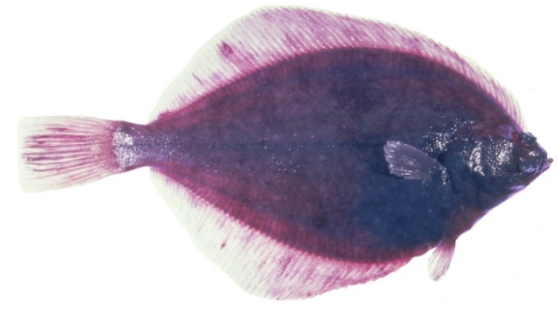
Stock assessment model

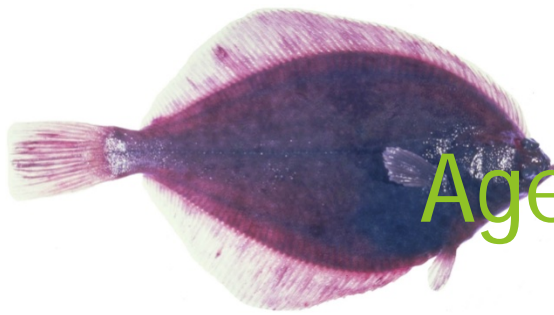
- Data components include:
- fishery size comps 1983-87, 1989-91, 1996-1997, 1999, 2003-2005, 2008-2016
- fishery age comps 2000, 2002-2003
- Survey biomass 1982-2017
- Survey age comps 1982, 1988, 1992-1995, 1998, 2000-2002, 2005-2014, 2016
- Survey length comps 1983-1987, 1989-91, 1996-97, 1999, 2003-2004, 2015, 2017
- selectivity is fixed asymptotic for older fish.
- natural mortality was fixed at 0.13 for males and females
- Catchability was fixed at 1.2 and was found not to be related to temperature in a past assessment (Spencer et al. 2004)



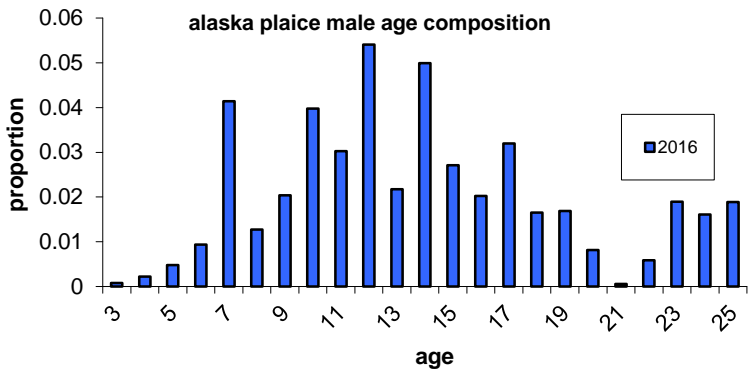
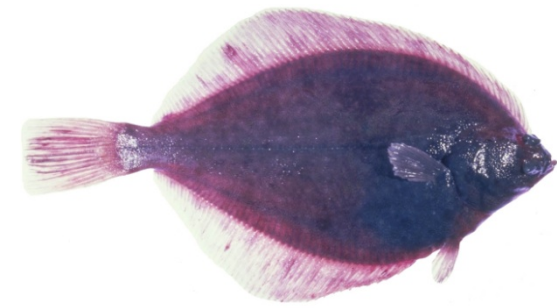


Alaska plaice

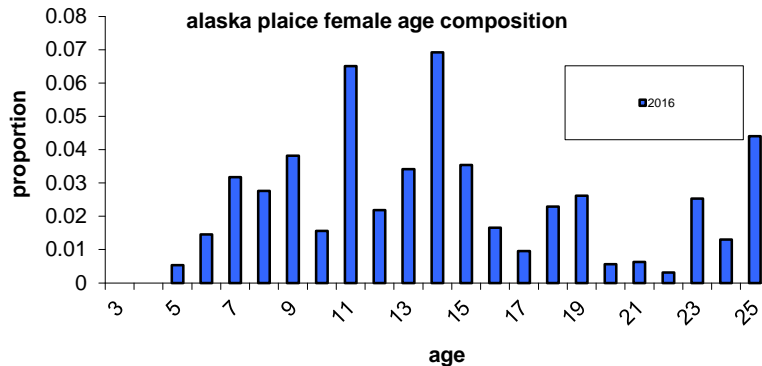




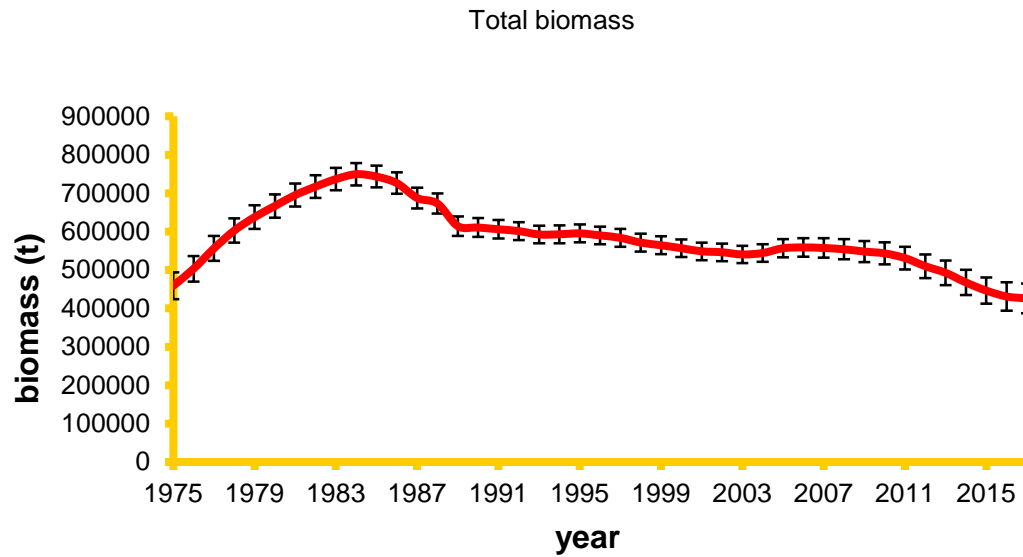
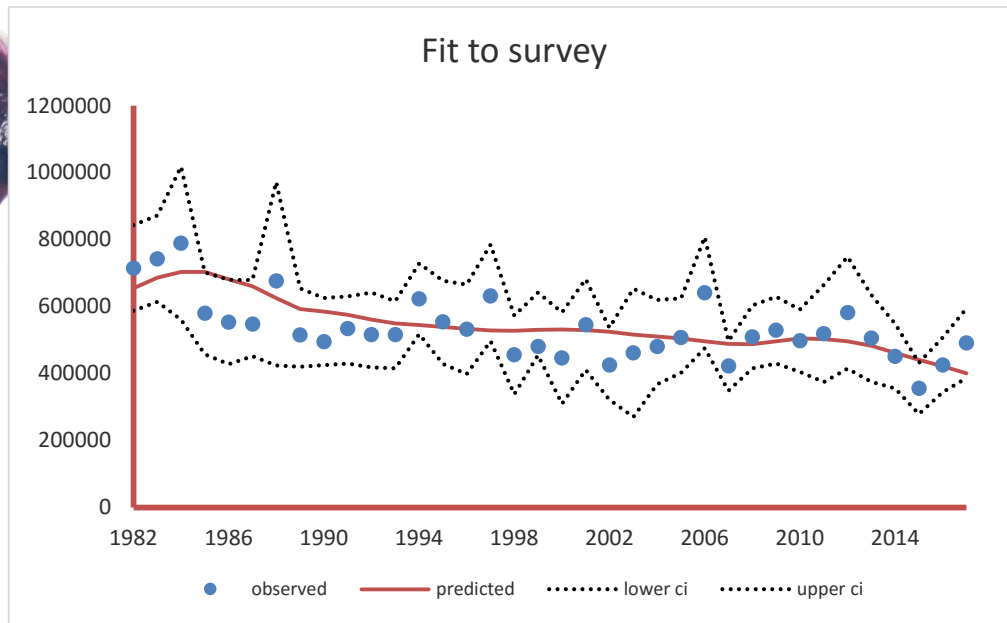
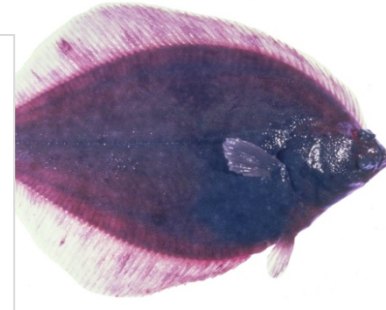
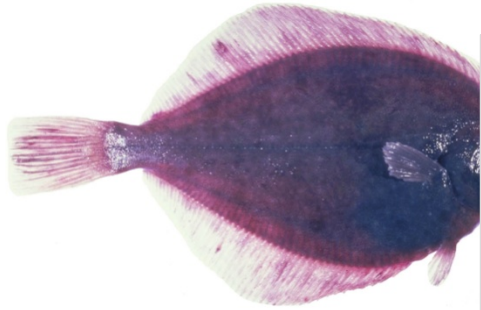
Age composition



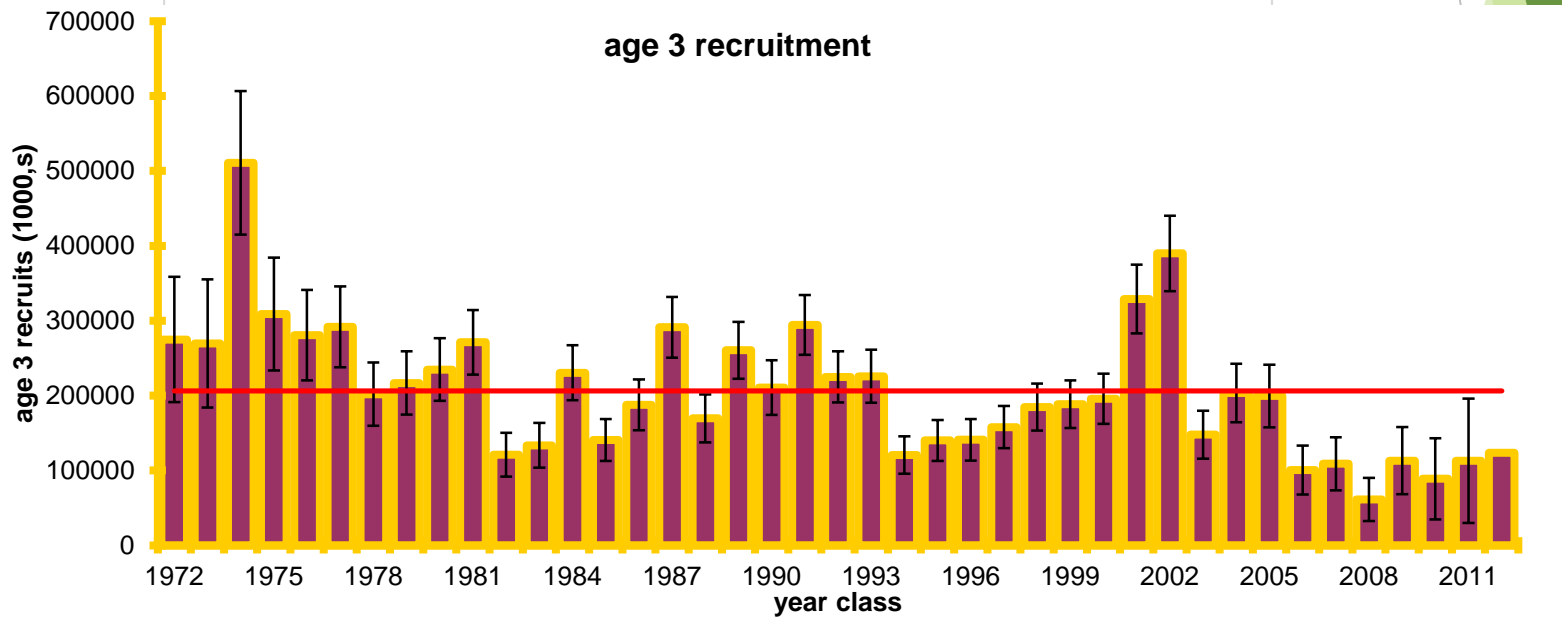
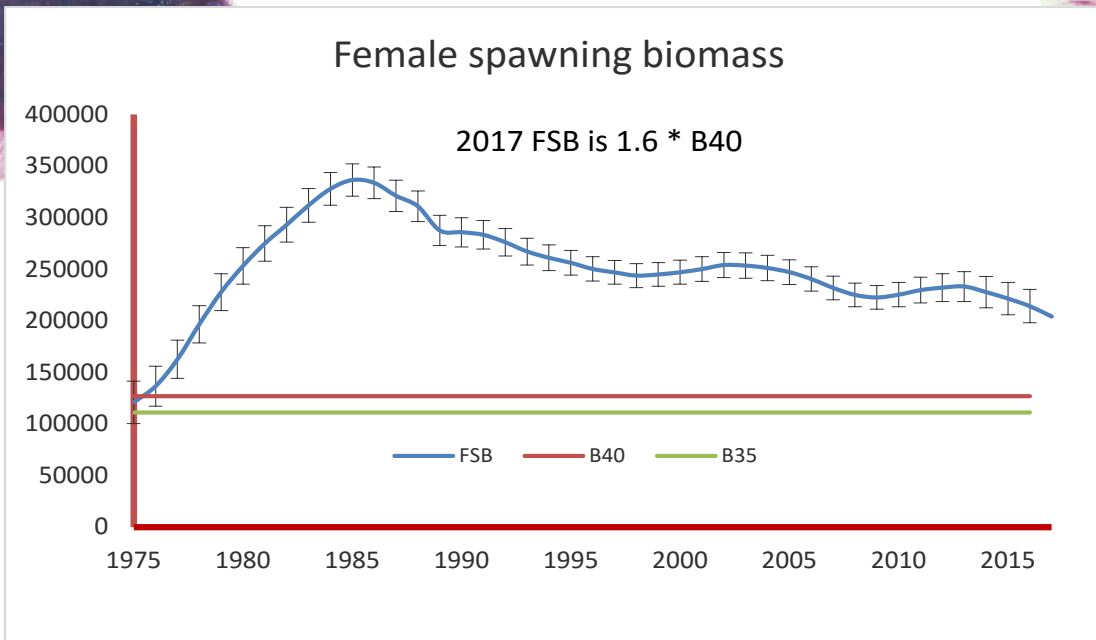
- ▶ Average age in the population (from model) is 8.7 for males and females

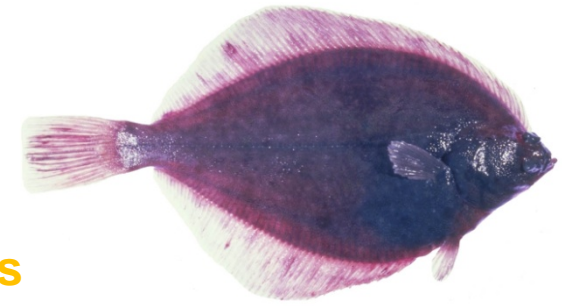
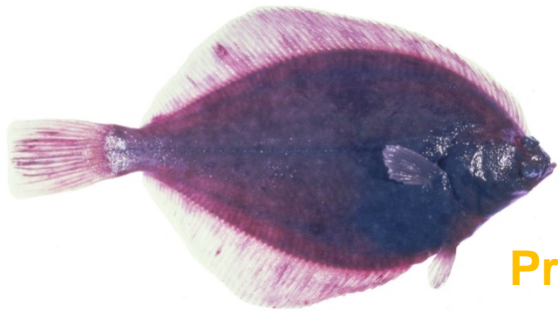


- ▶ Model estimate of average age in the catch is 14.8 for males and females

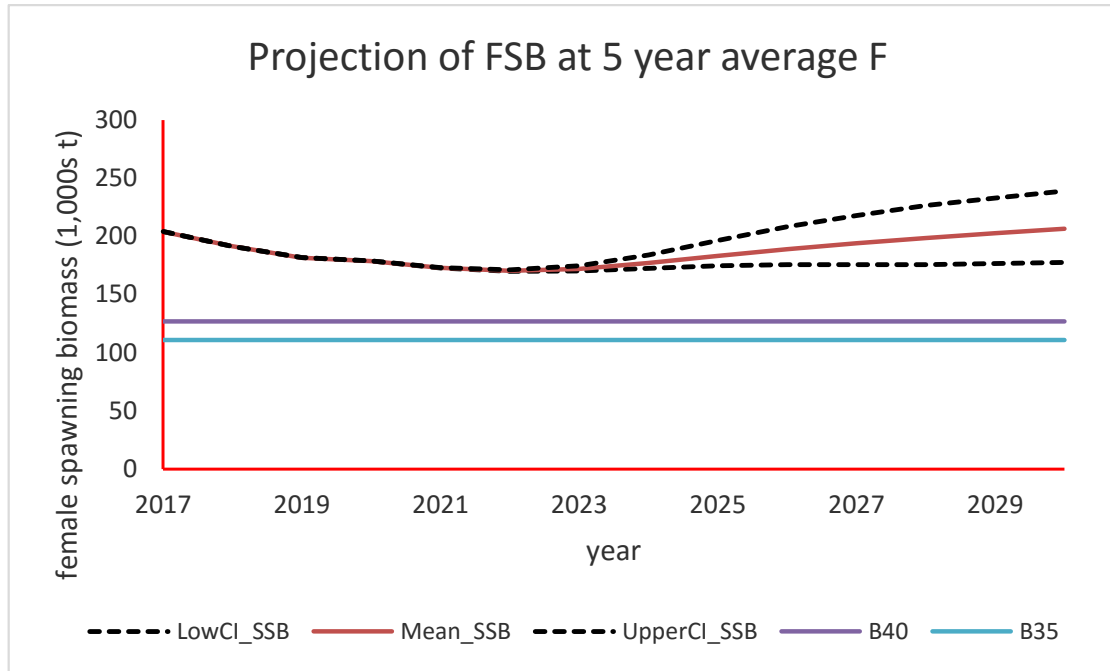


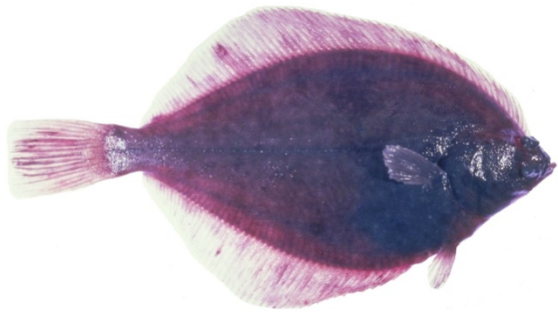
Model results





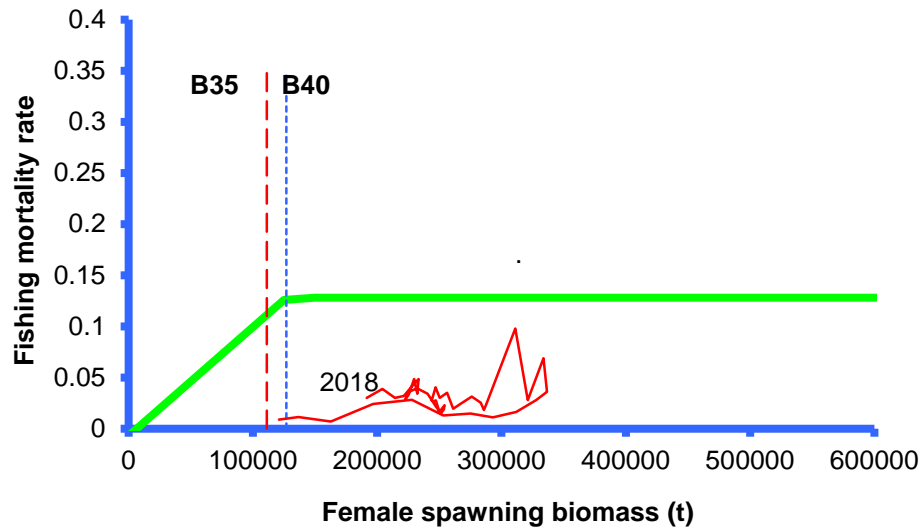
Projected female spawning biomass

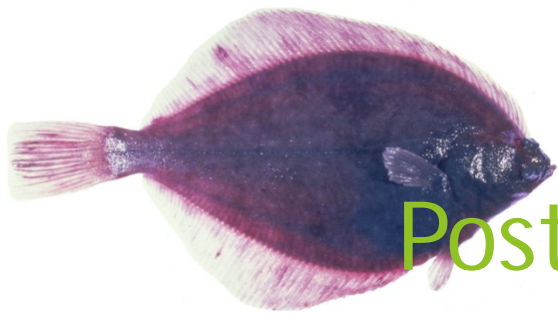




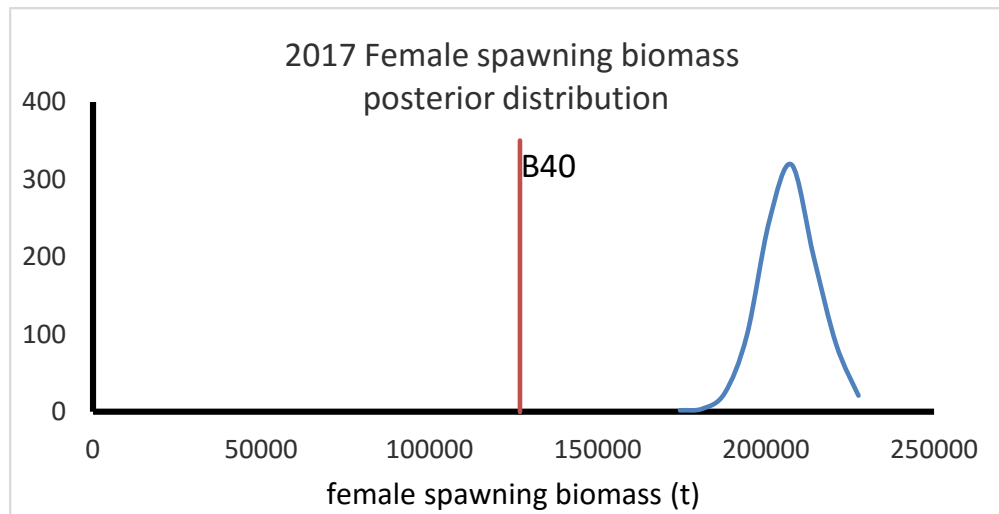
Historical relationship between Fishing mortality and female spawning biomass and the biological reference points.

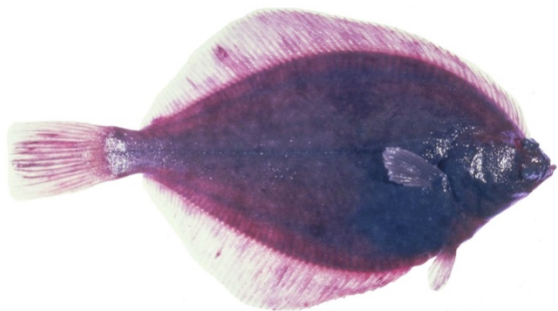
BSAI Alaska plaice



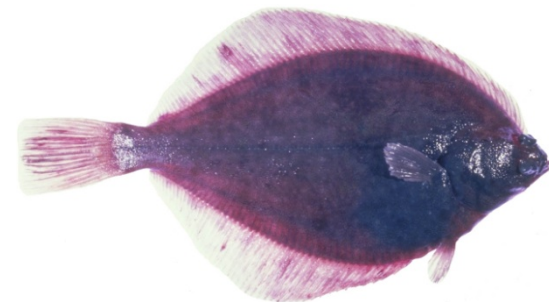


Posterior distribution of female spawning biomass





Alaska plaice



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Projected total (3+) biomass (t)	412,600	407,300	417,300	412,000
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$B_{100\%}$	276,250	276,500	317,360	317,360
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F_{OFL}	0.154	0.154	0.149	0.149
$maxF_{ABC}$	0.128	0.128	0.124	0.124
F_{ABC}	0.128	0.128	0.124	0.124
OFL (t)	42,800	36,900	41,170	38,800
maxABC (t)	36,000	32,100	34,590	32,700
ABC (t)				
Status	As determined last year for:		As determined this year for:	
	2015	2016	2016	2017
Overfishing	no	n/a	No	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no