Eastern Bering Sea pollock Update

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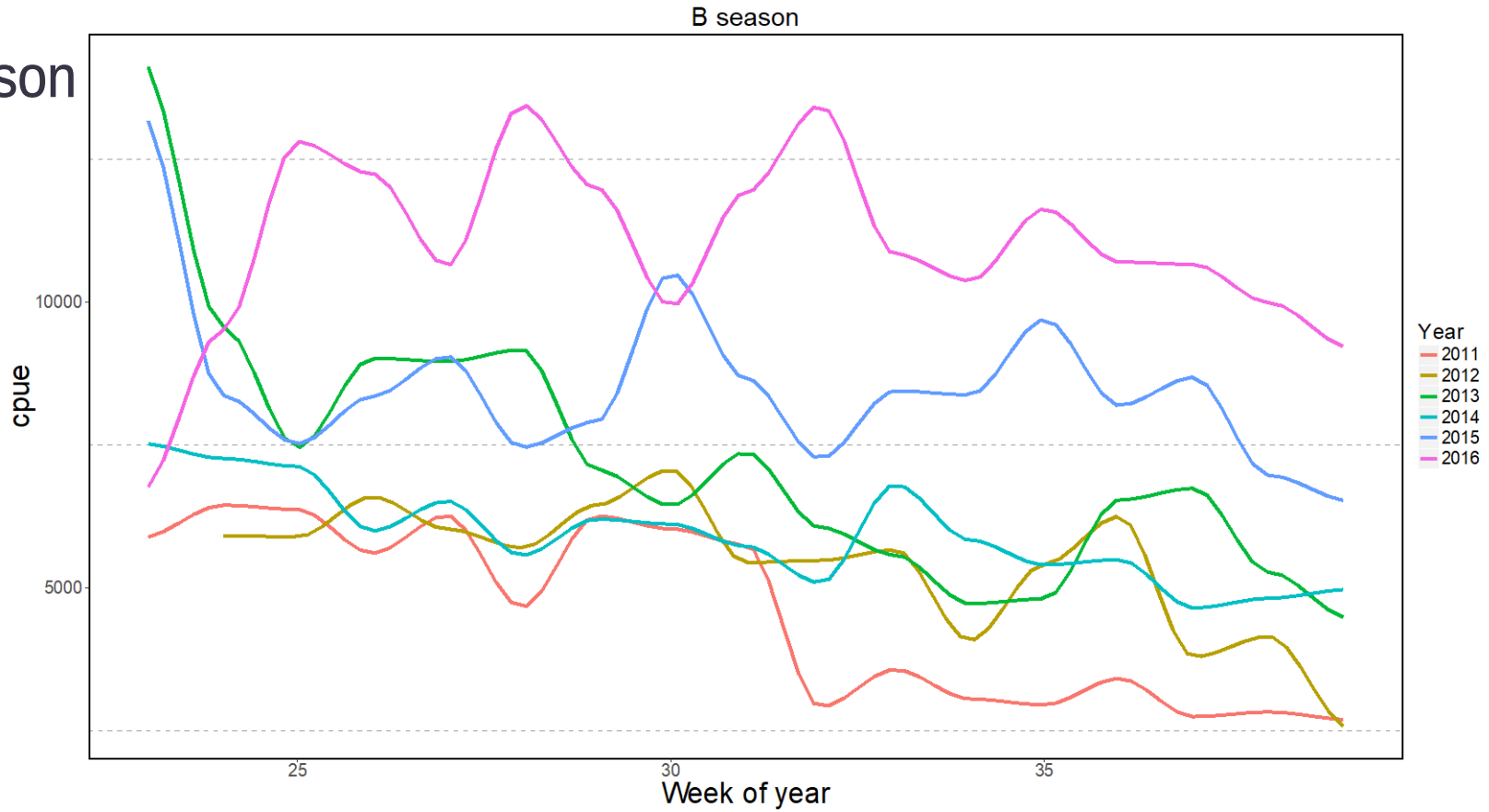
NMFS/NOAA

Fishing conditions

B-Season catch rates

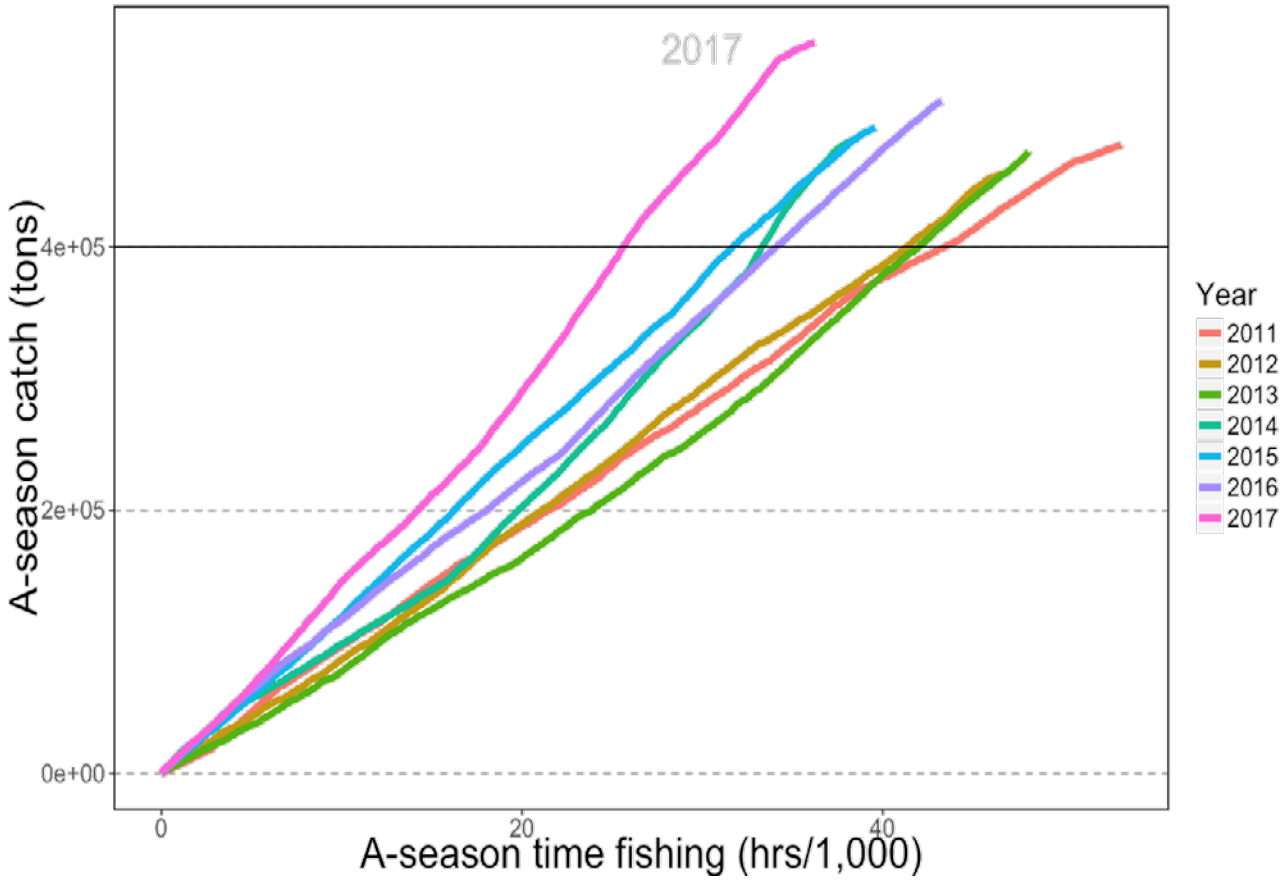


Fishing conditions

B-season

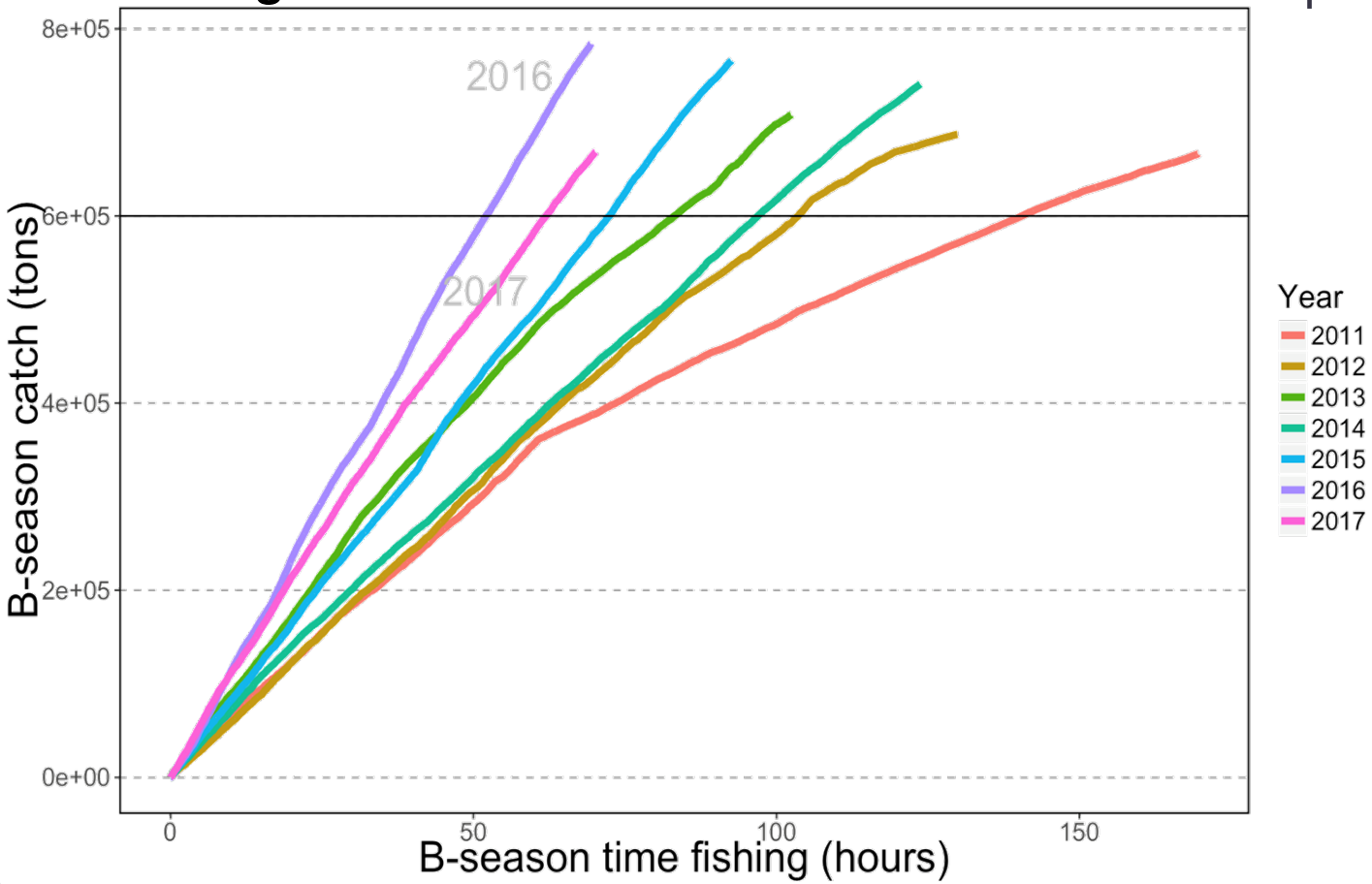
Fishing conditions

A-season



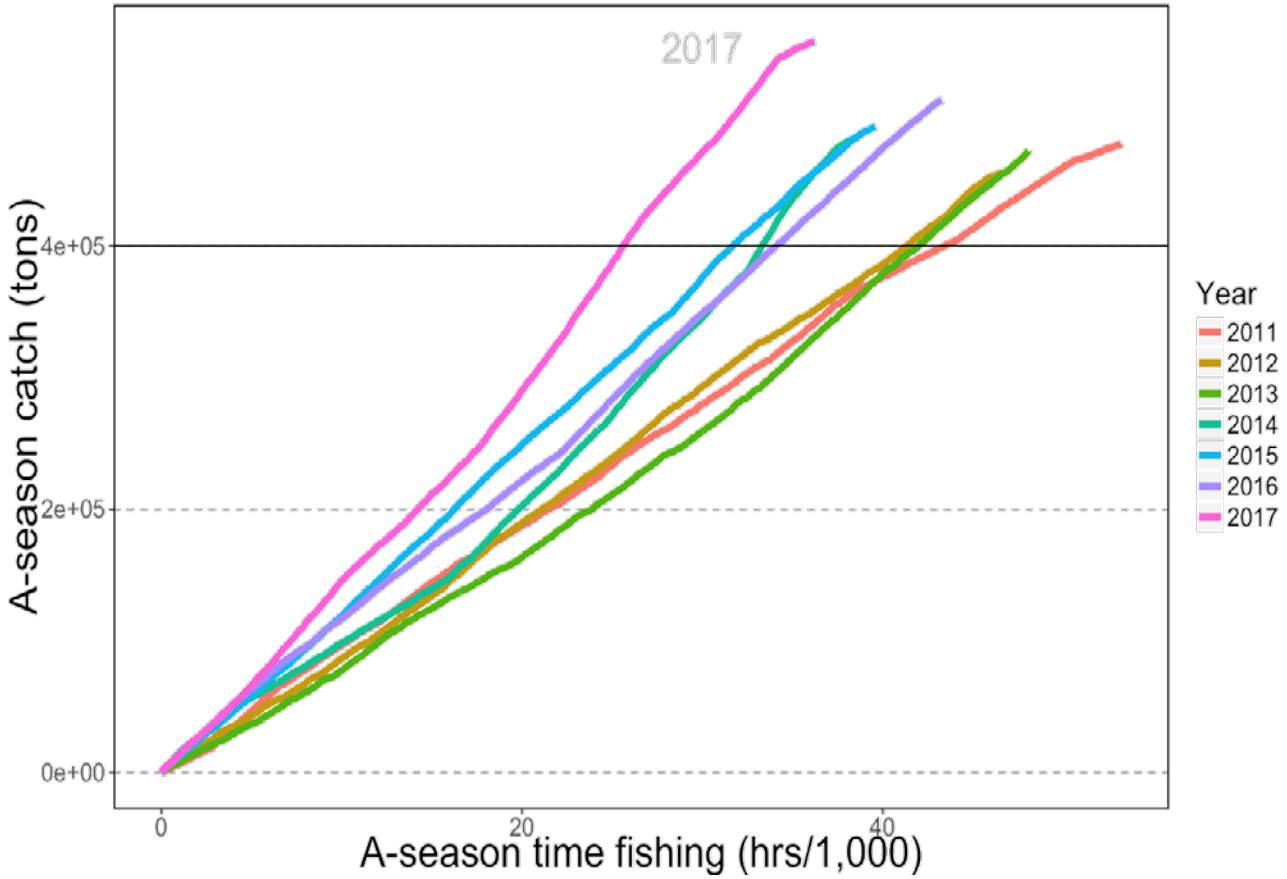
Fishing conditions

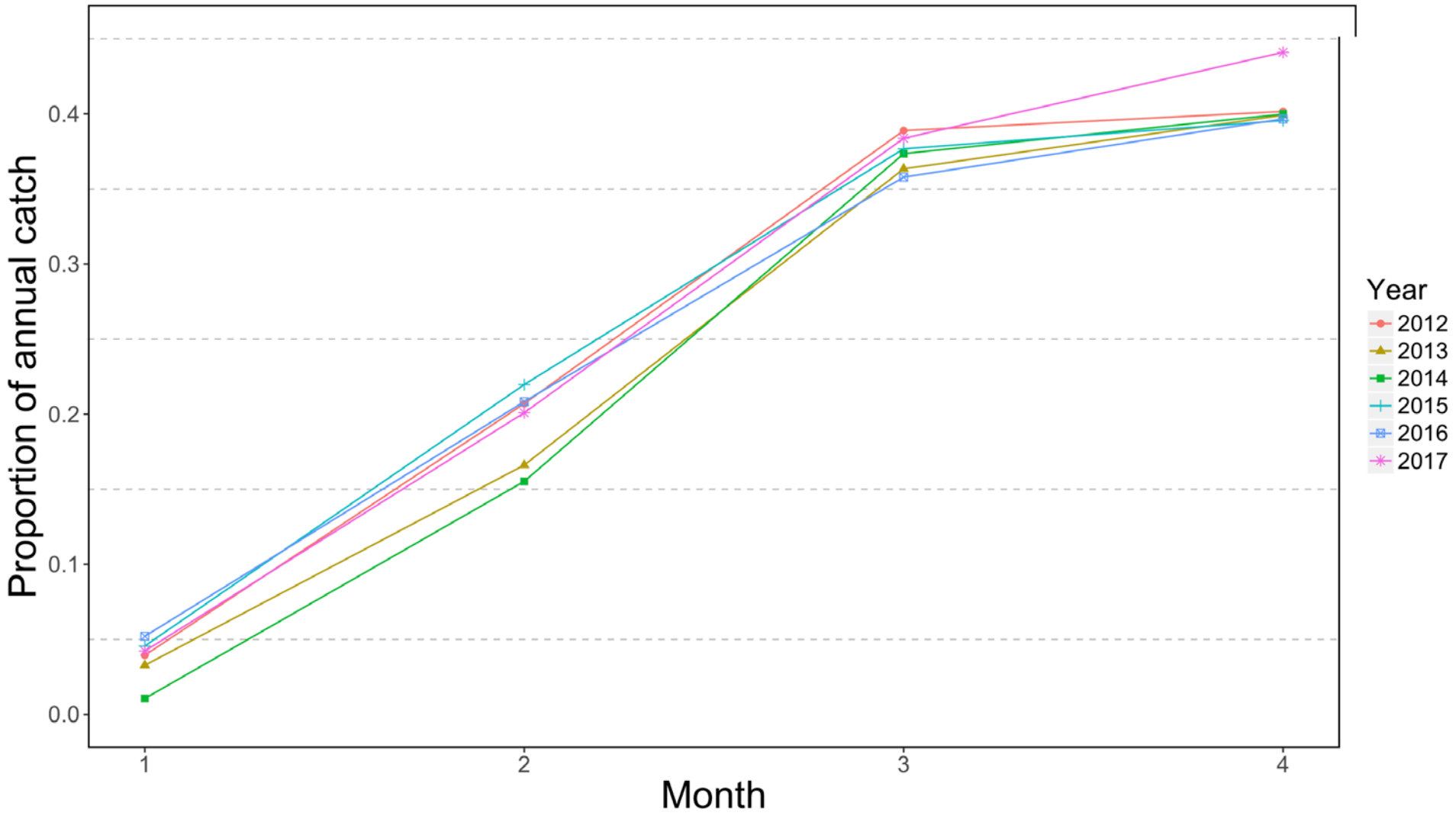
B-season…updated



Fishing conditions

A-season…



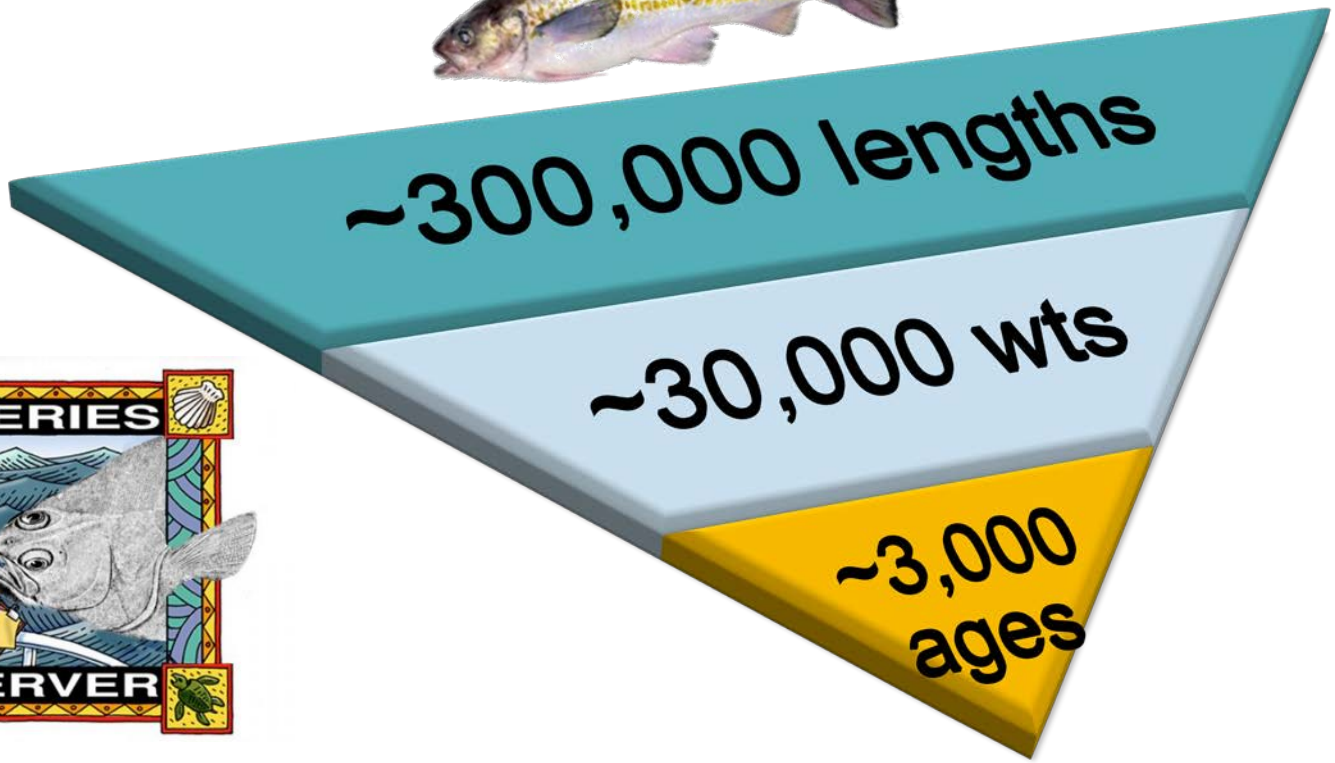

Proportion of annual catch
0.0
0.1
0.2
0.3
0.4
1
2
3
4
Month
Year
2012
2013
2014
2015
2016
2017

Sizes of pollock

Questions:

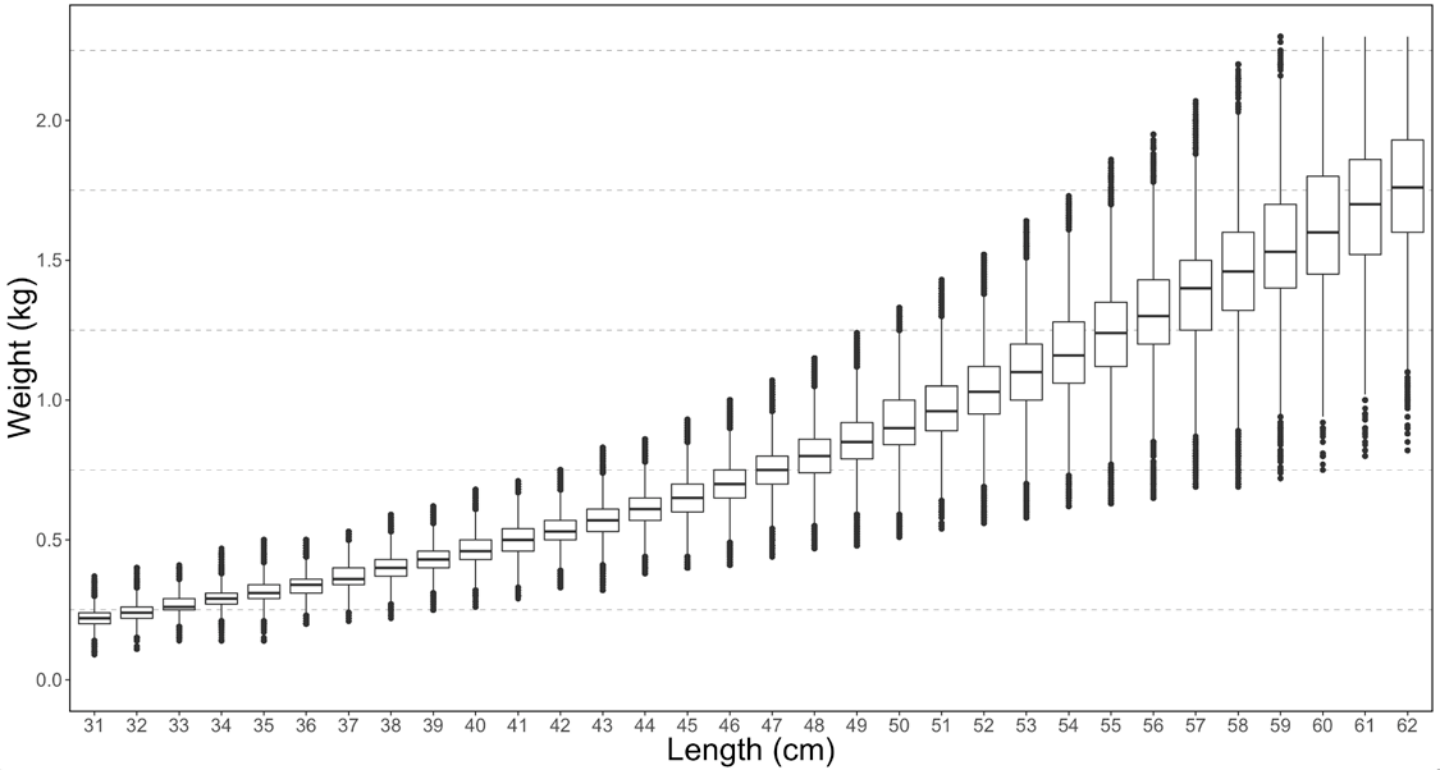
- How do sizes differ in regions and over the season?
- Where they smaller (lighter) at length than normal?

Fishery data from scientific observers

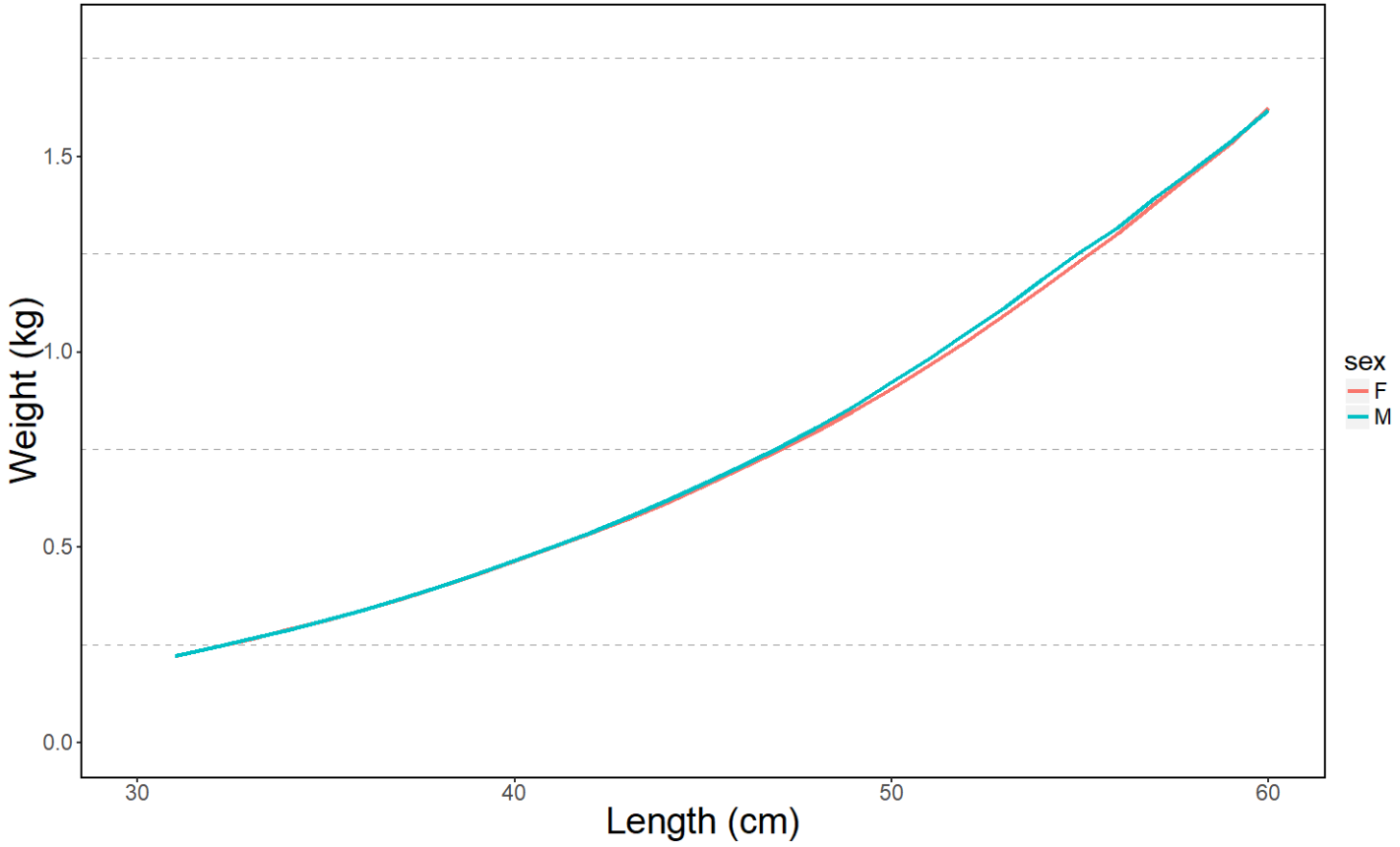


Bigger fish weigh more....

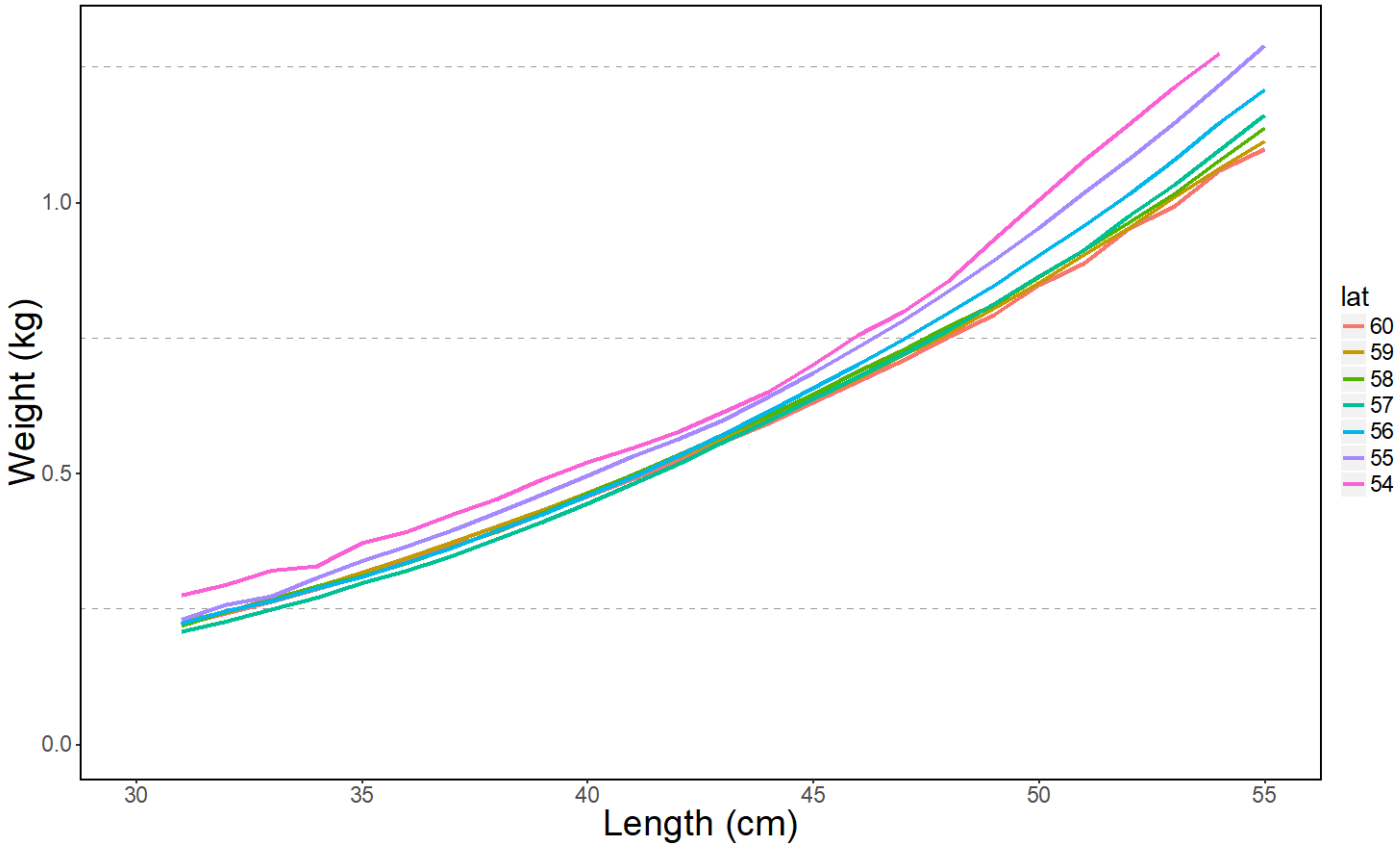
But lots of individual variability...



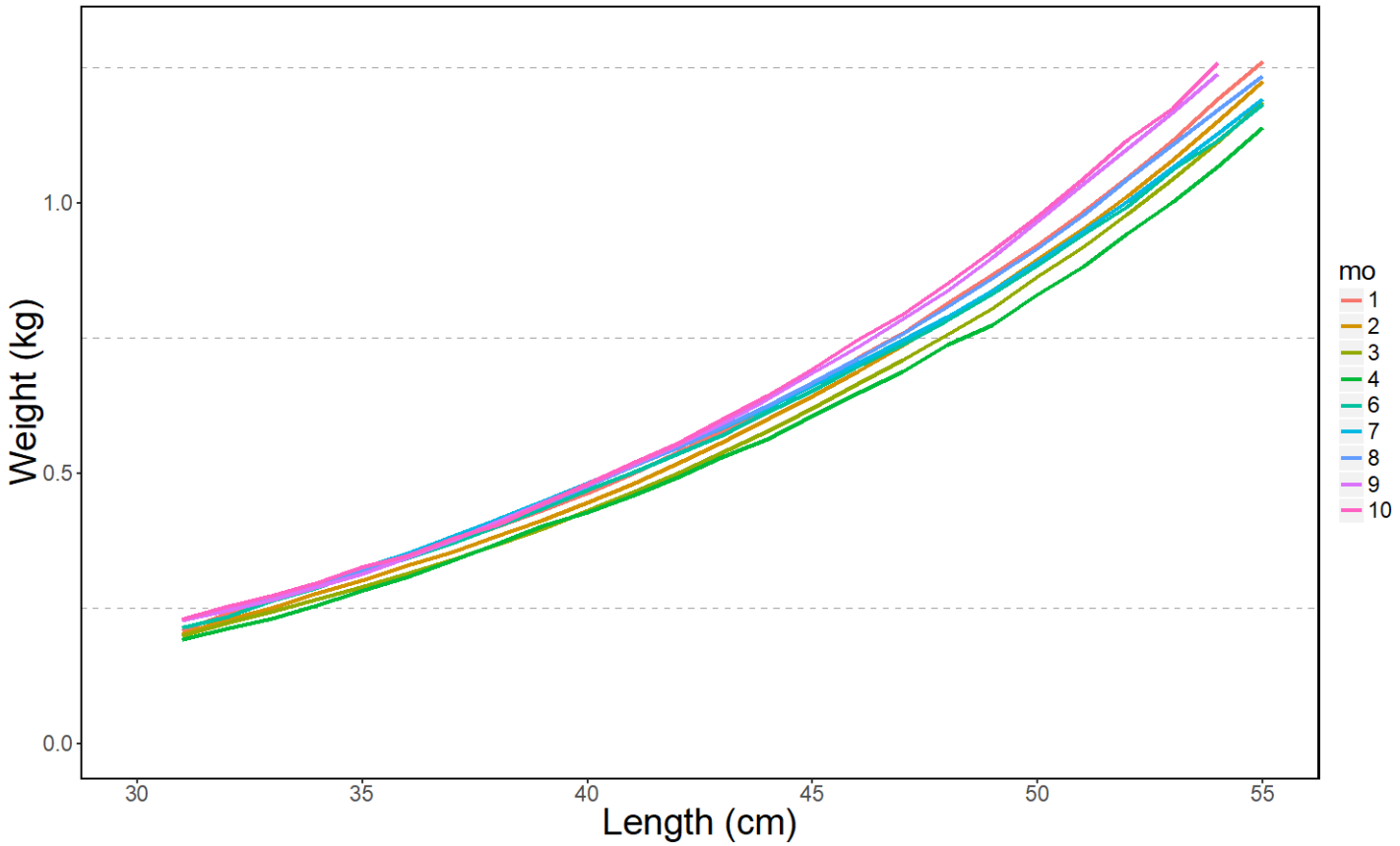
Given length, avg wt about same by sex

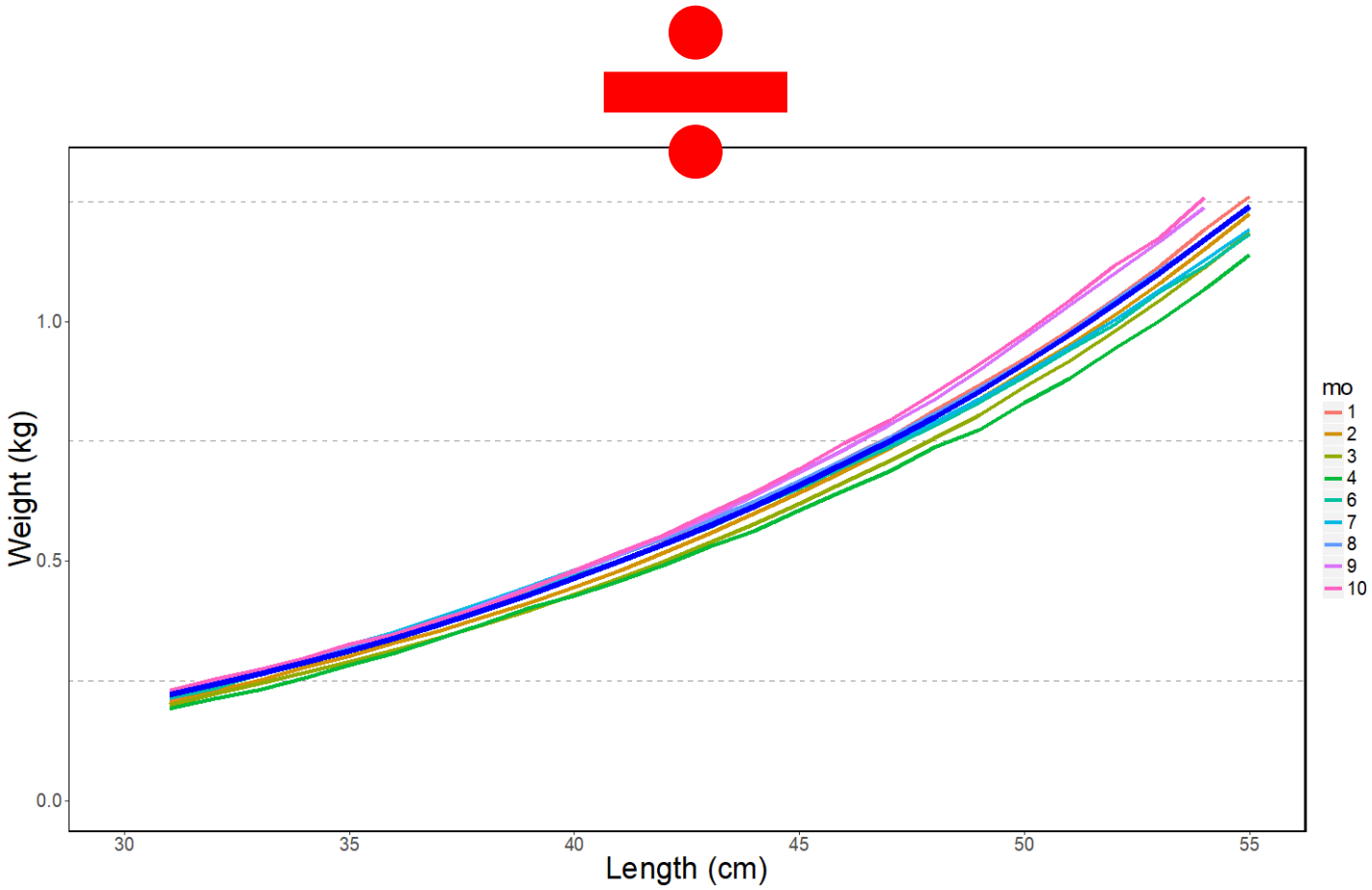


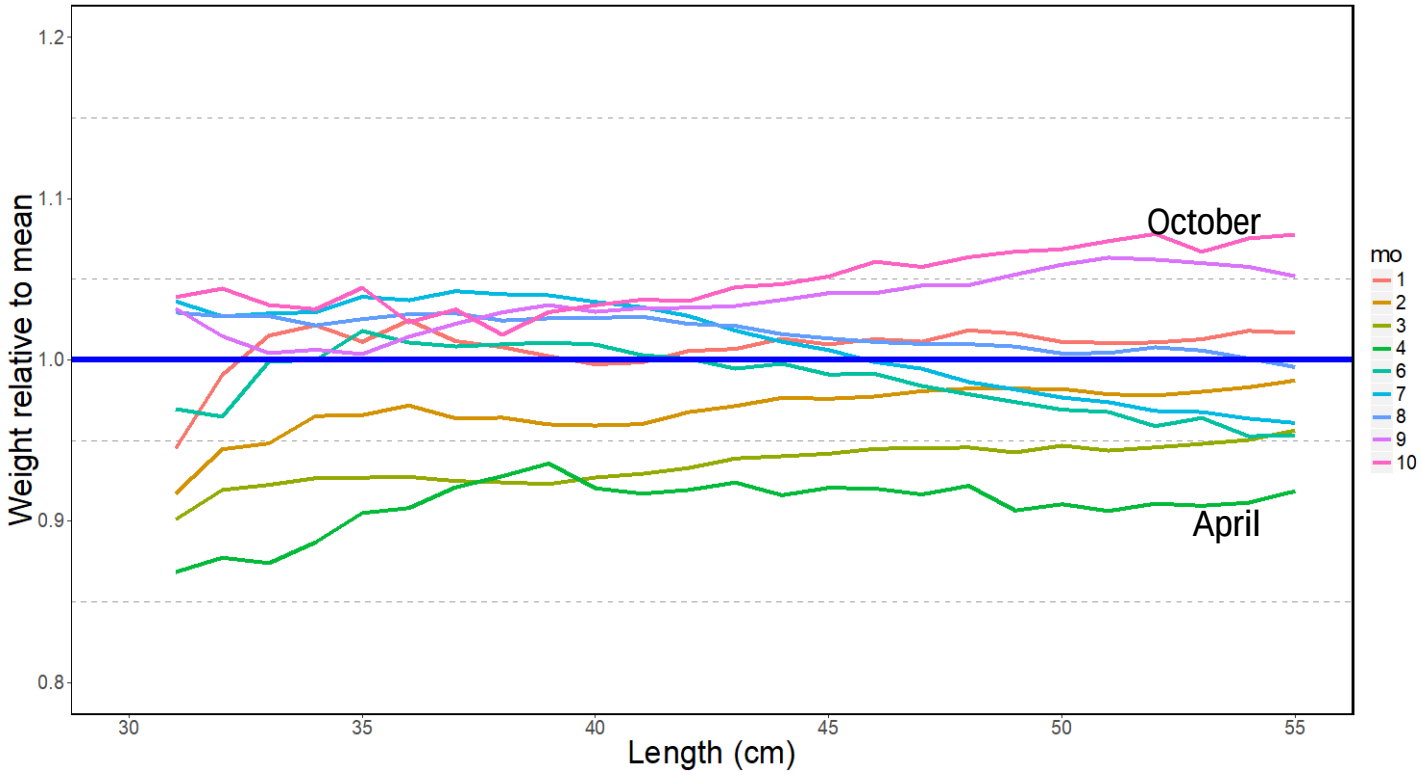
But varies by latitude...



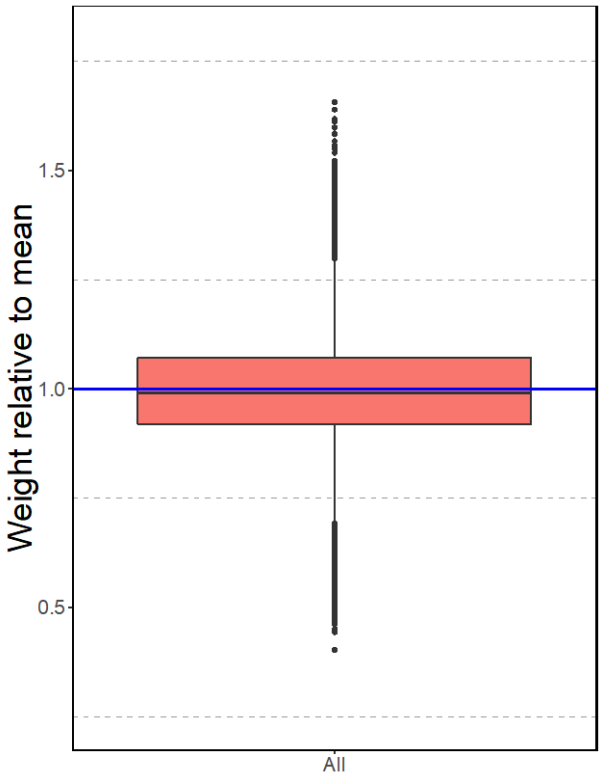
And month...



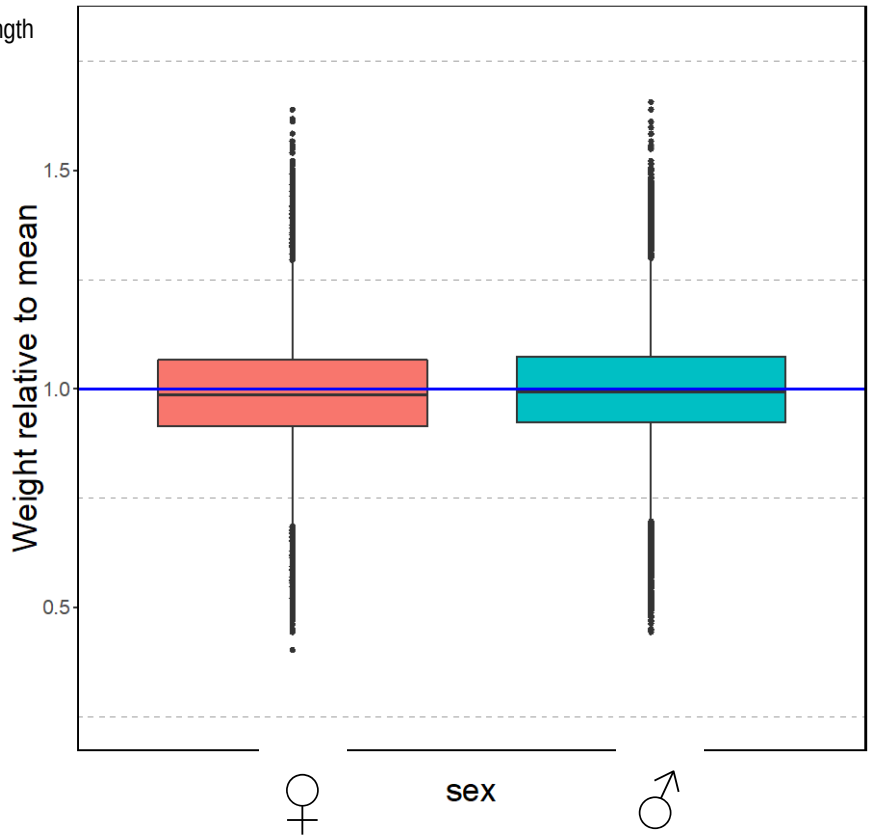

Weight (kg)
1.0
0.5
0.0
30
35
40
45
50
55
Length (cm)
mo
1
2
3
4
6
7
8
9
10

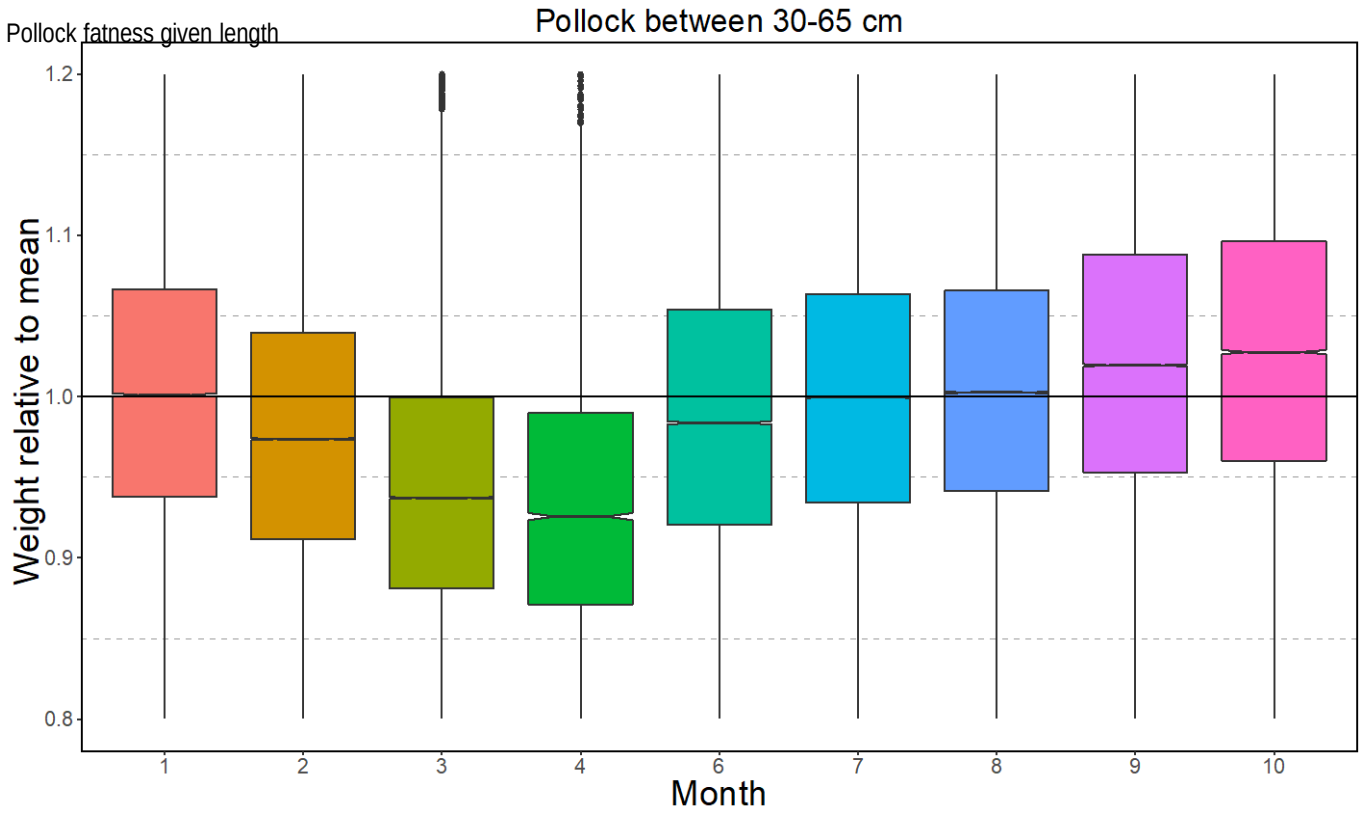

Weight relative to mean
1.2
1.1
1.0
0.9
0.8
30
35
40
45
50
55
Length (cm)
October
April
mo
1
2
3
4
6
7
8
9
10

- Based on ~760 thousand lengths and weights measured by observers

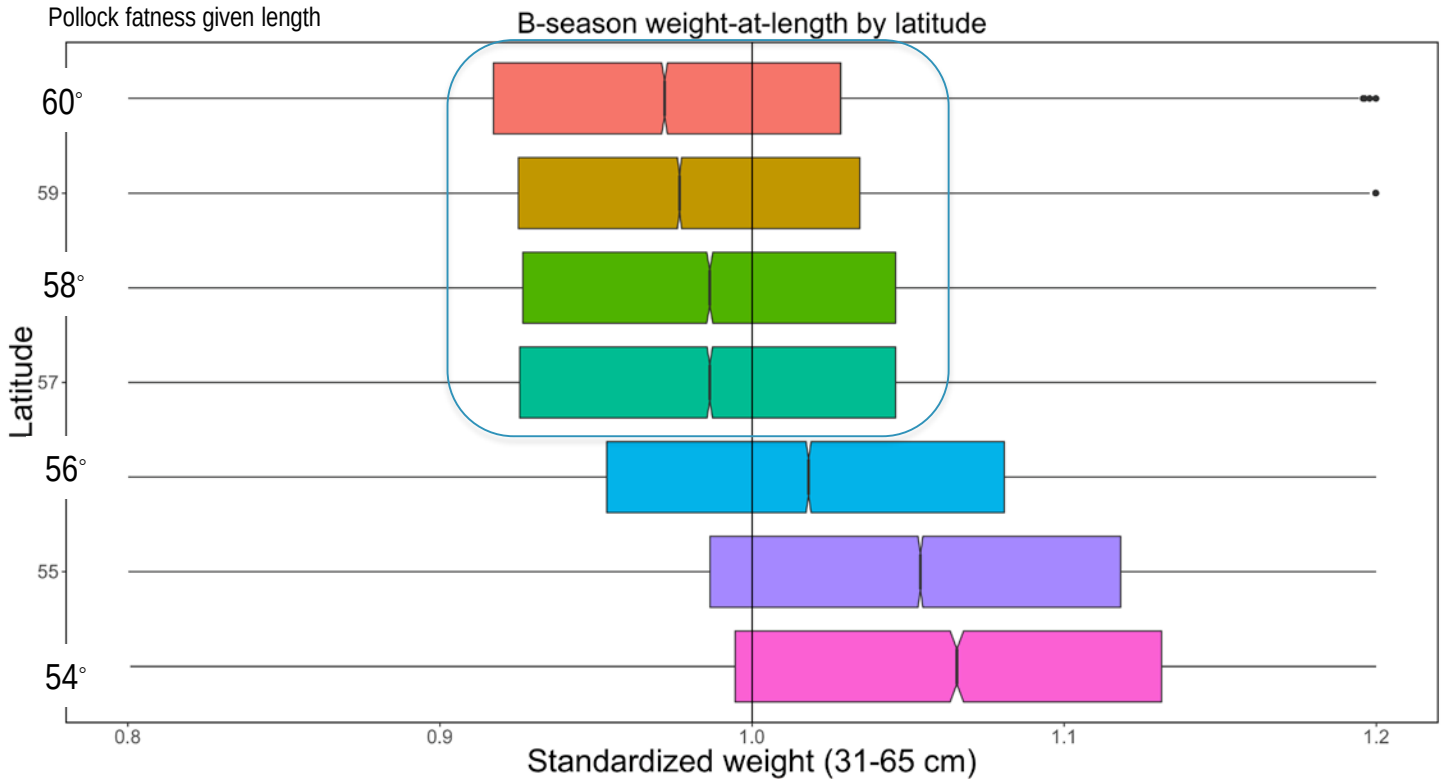


Pollock fatness given length

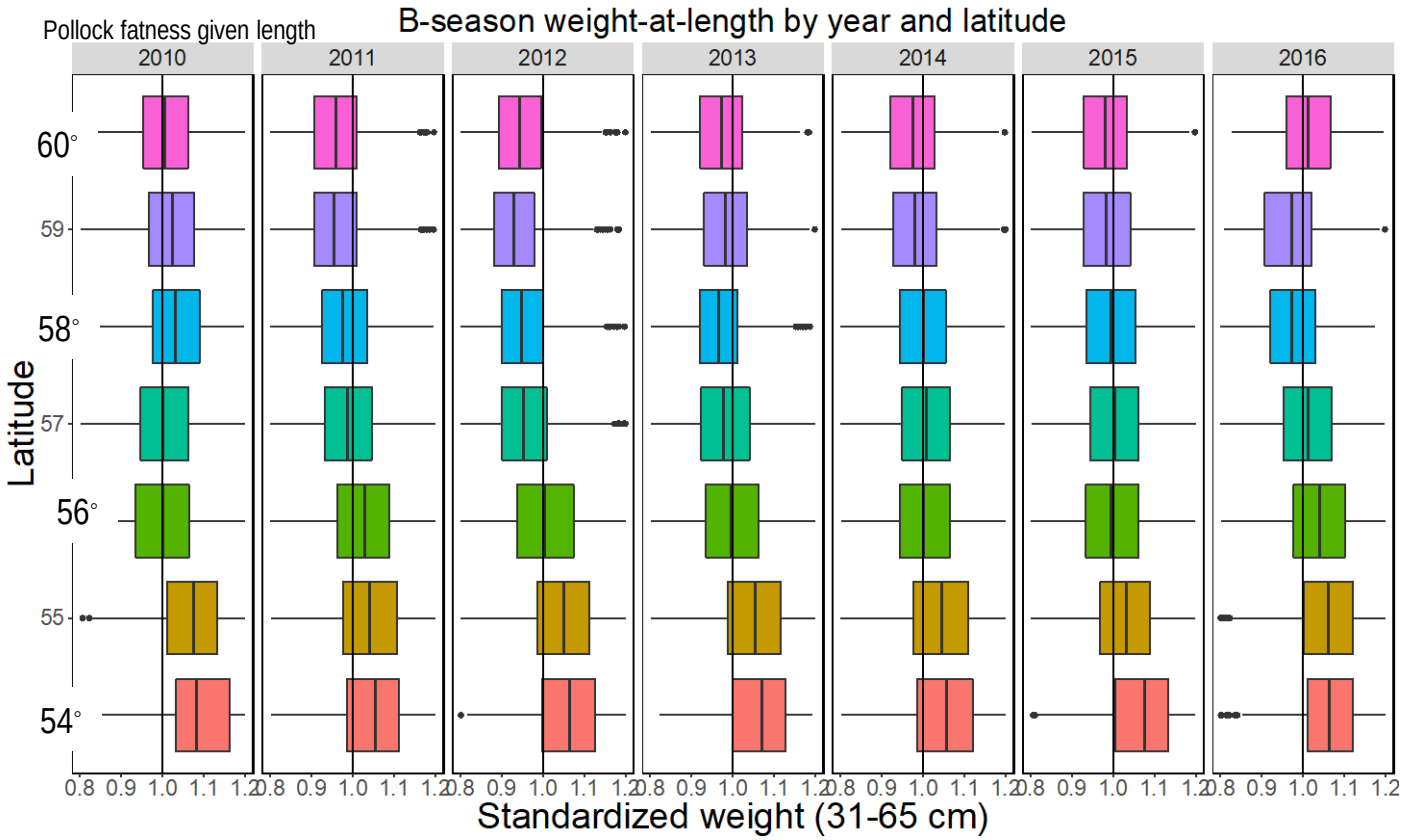



Pollock fatness given length
Pollock between 30-65 cm
Weight relative to mean
1.2
1.1
1.0
0.9
0.8
1
2
3
4
6
7
8
9
10
Month

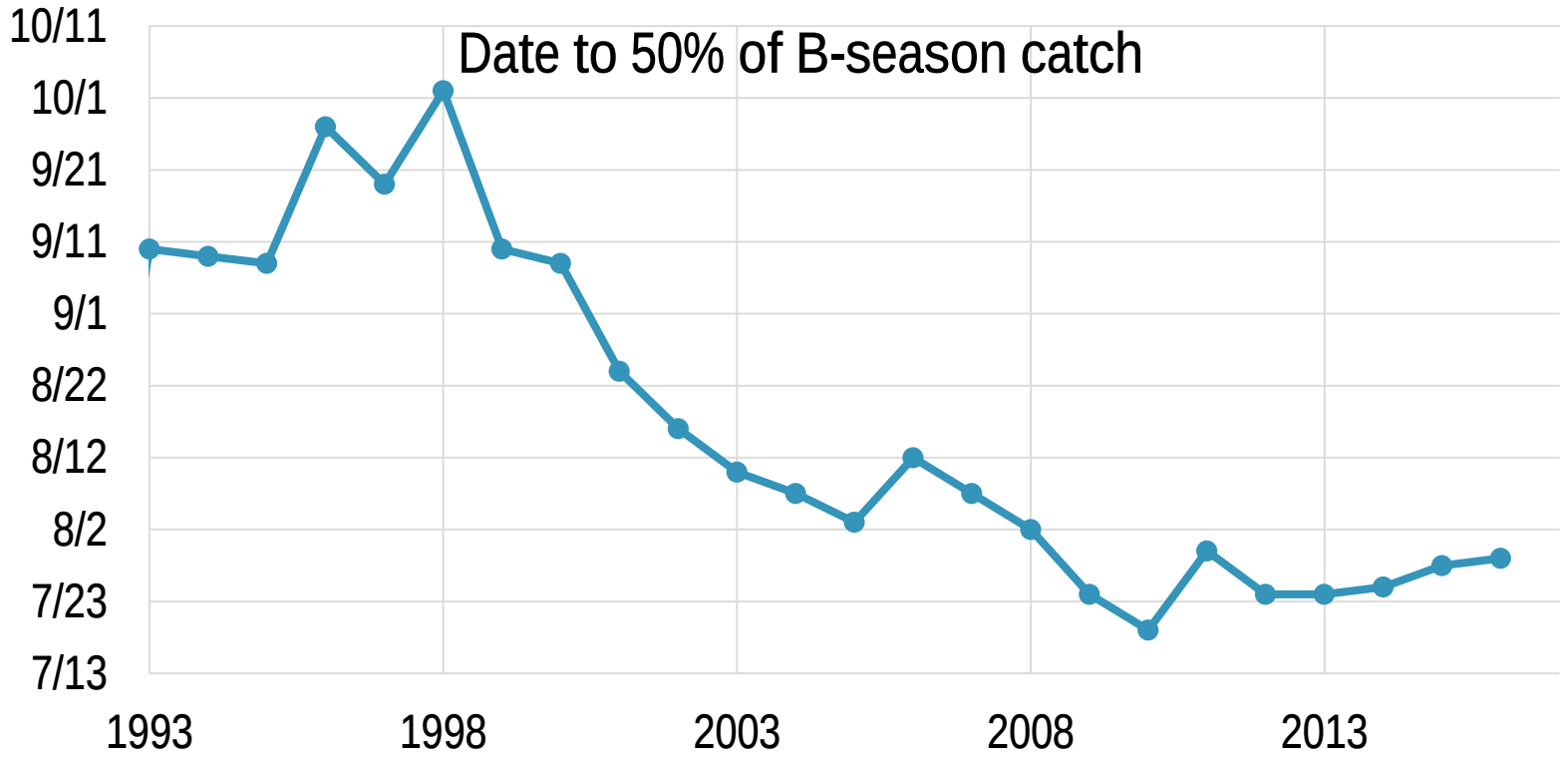
Pollock fatness given length



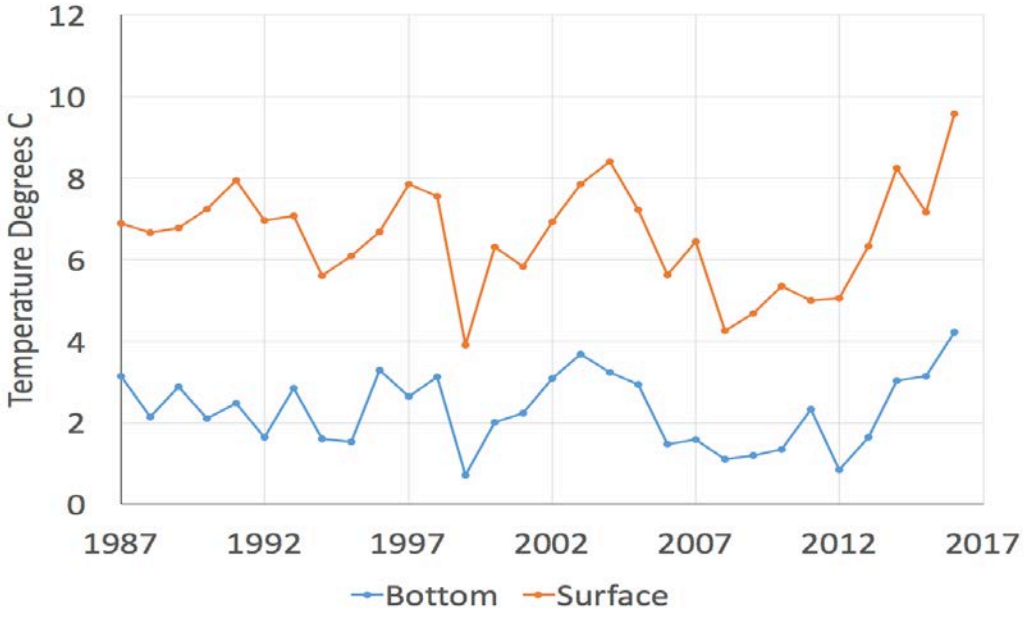
Latitude by year

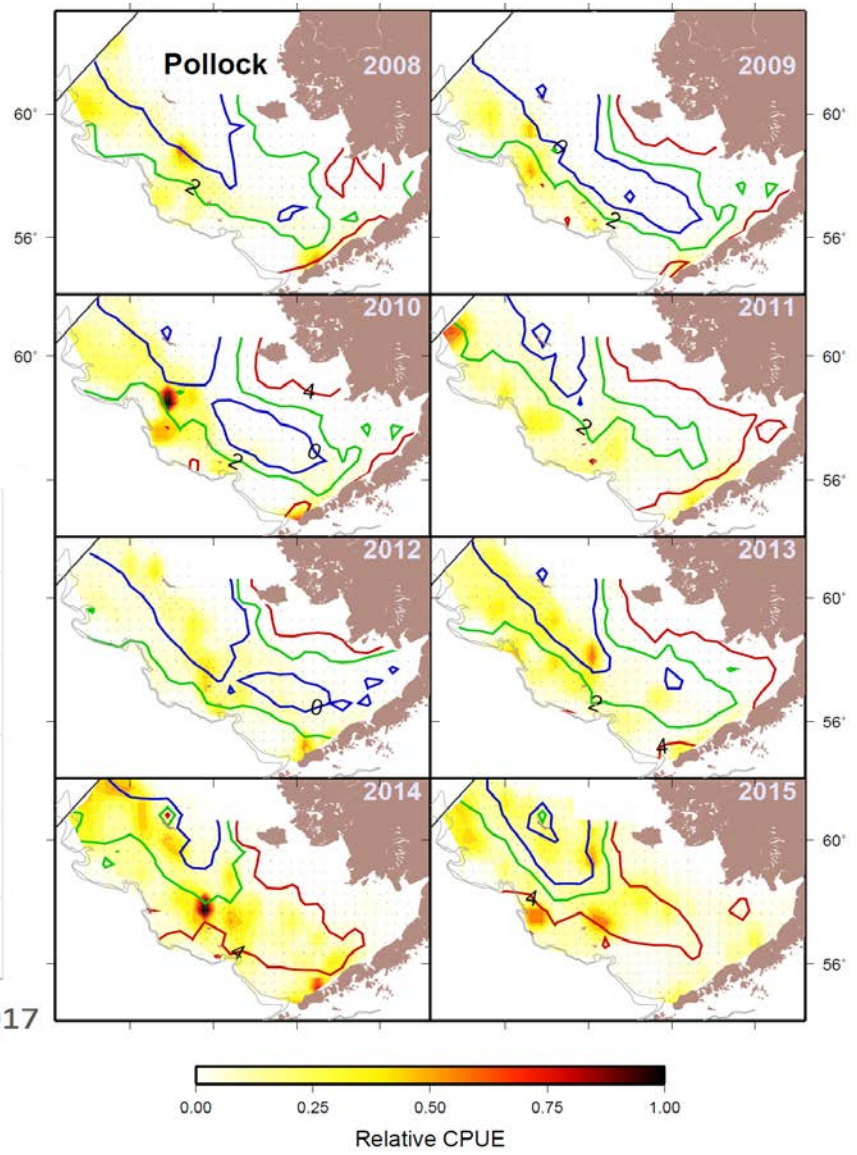


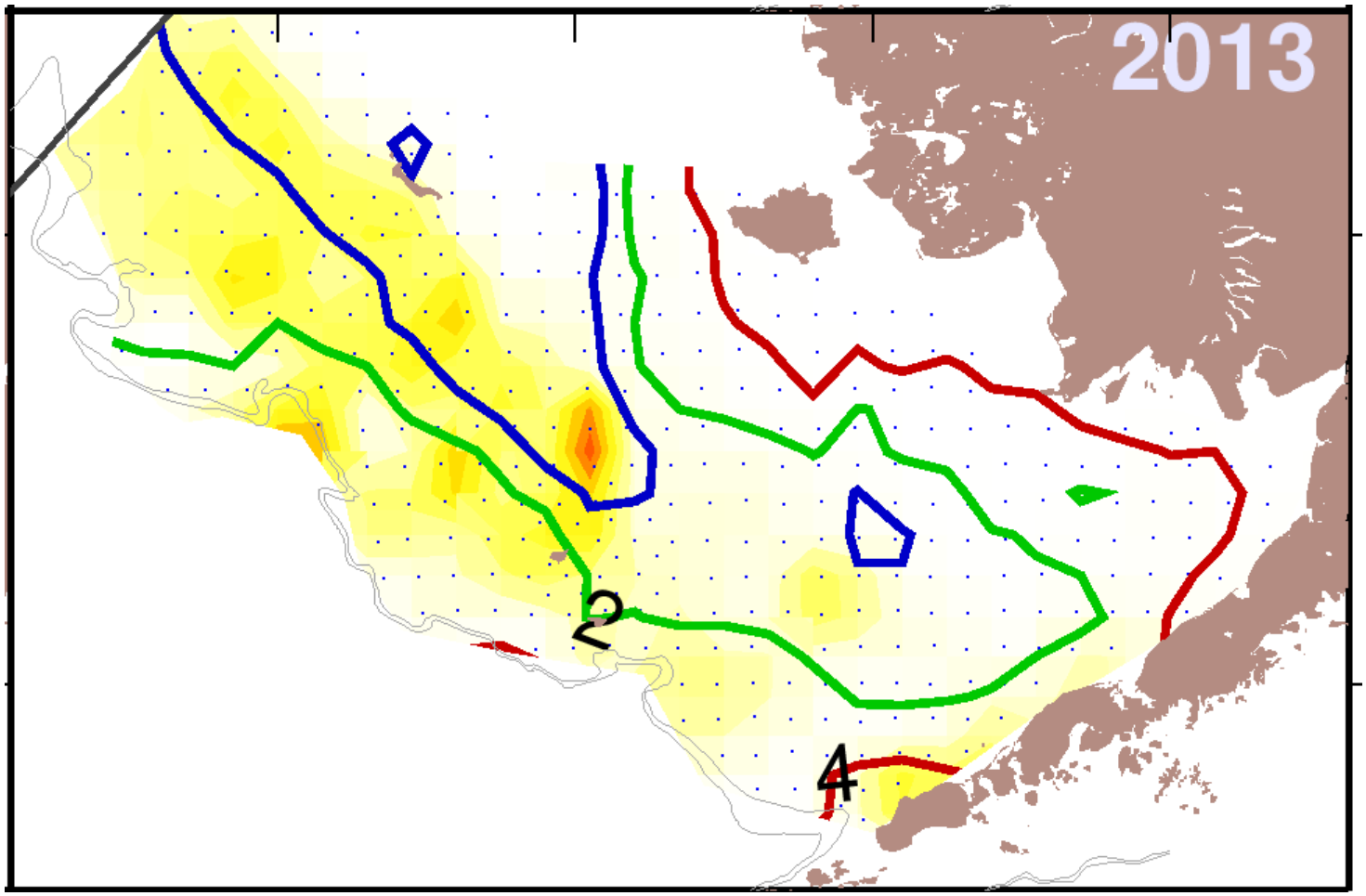
Within season fishing patterns



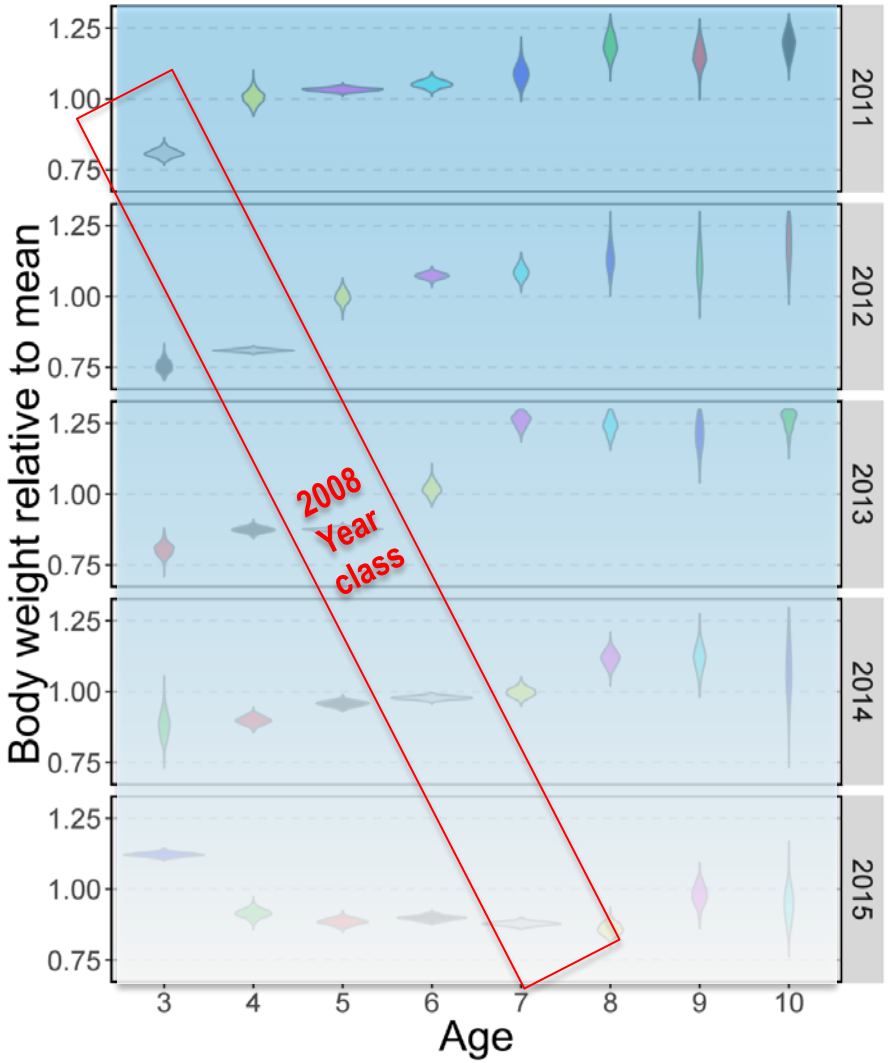
Pollock density and environment



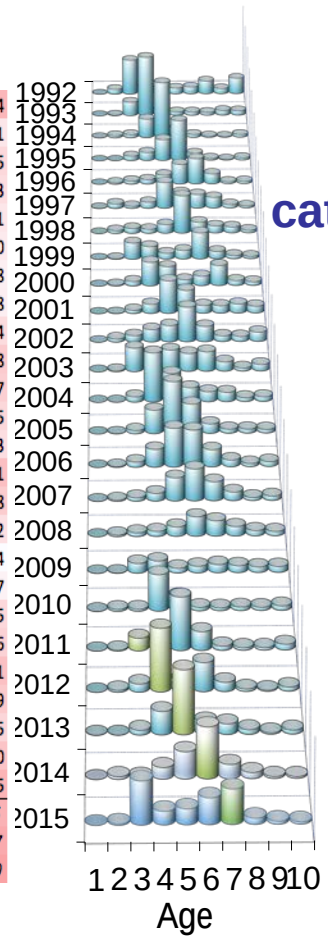



2013
2
4

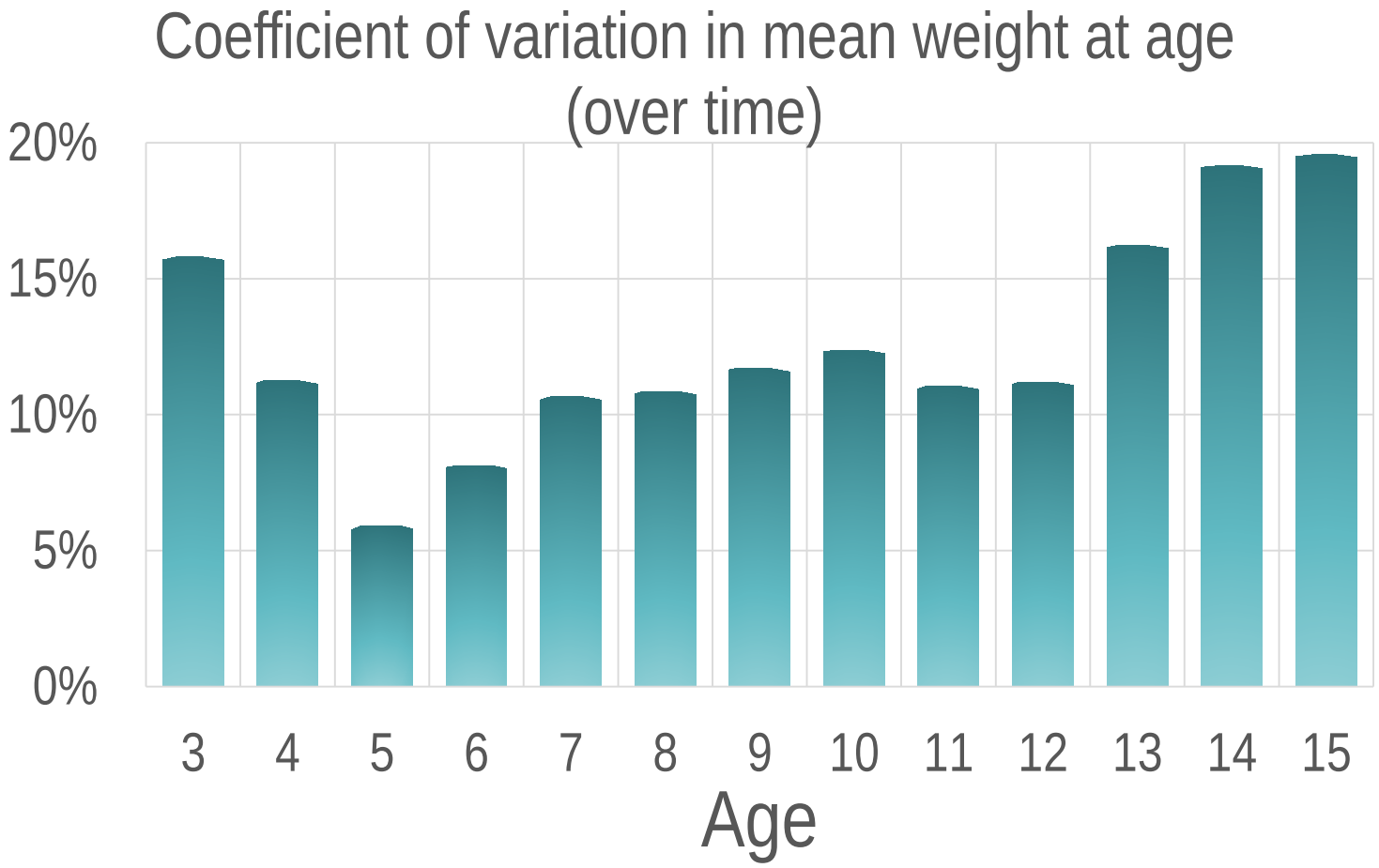
Average weight at age anomalies



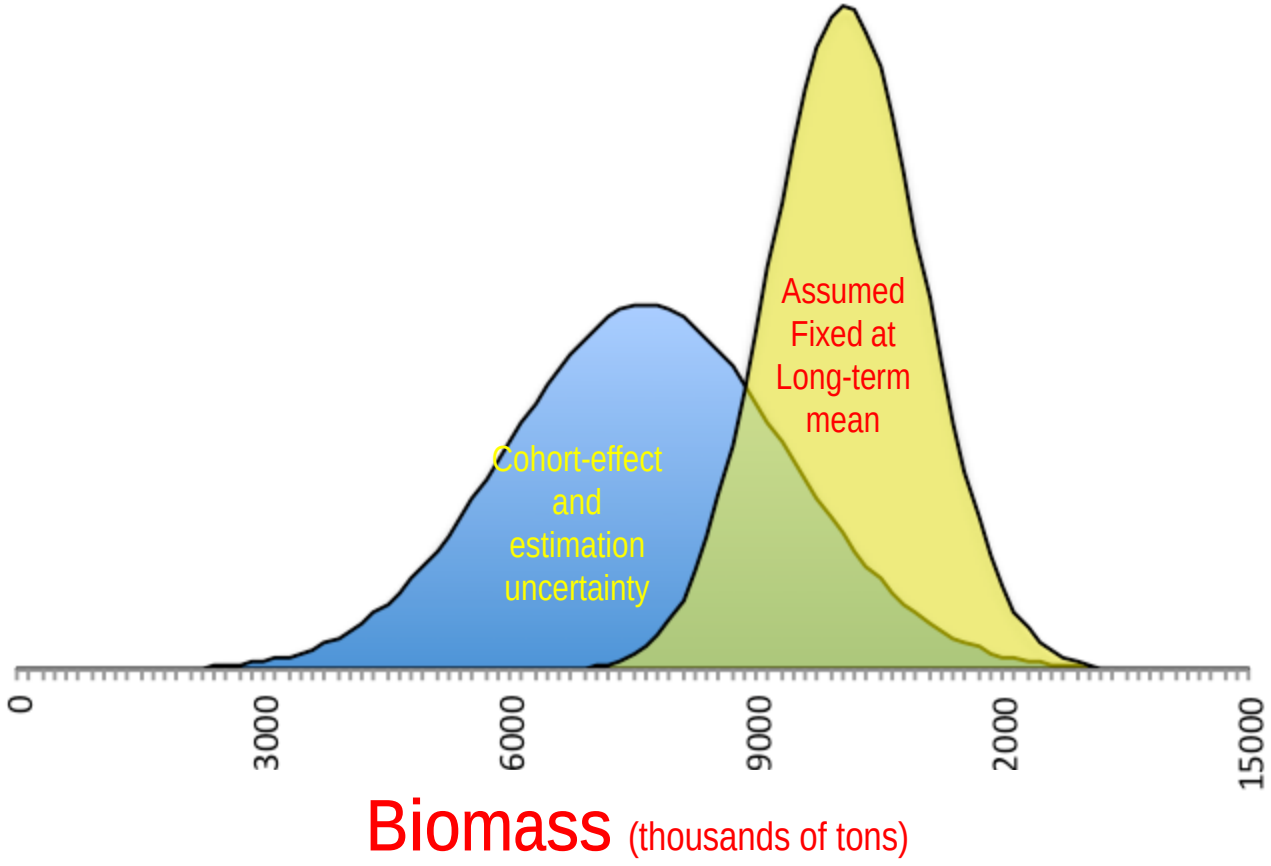
Year	Age 1	2	3	4	5	6	7	8	9	10
1991	0.26	0.44	0.62	0.78	0.86	0.91	0.98	1.06	1.11	1.17	1.21	1.19	1.34
1992	0.39	0.45	0.62	0.79	0.92	0.97	1.00	1.05	1.11	1.15	1.20	1.23	1.21
1993	0.41	0.59	0.65	0.81	0.94	1.05	1.07	1.07	1.10	1.15	1.18	1.22	1.25
1994	0.35	0.56	0.75	0.79	0.92	1.04	1.12	1.12	1.11	1.13	1.17	1.20	1.23
1995	0.21	0.45	0.66	0.84	0.87	0.98	1.09	1.15	1.15	1.13	1.15	1.18	1.21
1996	0.23	0.35	0.59	0.79	0.95	0.96	1.05	1.14	1.19	1.18	1.15	1.17	1.20
1997	0.33	0.43	0.56	0.78	0.95	1.07	1.05	1.13	1.19	1.24	1.21	1.18	1.18
1998	0.27	0.42	0.52	0.64	0.84	1.00	1.11	1.08	1.15	1.21	1.25	1.22	1.18
1999	0.34	0.45	0.61	0.69	0.78	0.96	1.09	1.18	1.14	1.19	1.24	1.27	1.24
2000	0.30	0.49	0.61	0.74	0.80	0.87	1.03	1.14	1.22	1.17	1.21	1.26	1.28
2001	0.26	0.45	0.64	0.74	0.86	0.89	0.94	1.08	1.18	1.25	1.19	1.23	1.27
2002	0.37	0.48	0.67	0.84	0.91	0.99	1.00	1.02	1.14	1.23	1.28	1.21	1.25
2003	0.41	0.53	0.64	0.82	0.96	1.01	1.07	1.05	1.07	1.18	1.25	1.30	1.23
2004	0.39	0.56	0.69	0.78	0.94	1.06	1.08	1.12	1.10	1.10	1.20	1.27	1.31
2005	0.33	0.49	0.66	0.78	0.86	1.00	1.11	1.12	1.15	1.12	1.11	1.21	1.28
2006	0.29	0.45	0.61	0.77	0.87	0.93	1.06	1.15	1.15	1.18	1.14	1.13	1.22
2007	0.38	0.52	0.68	0.82	0.94	1.01	1.04	1.14	1.21	1.20	1.21	1.16	1.14
2008	0.29	0.53	0.67	0.81	0.93	1.04	1.08	1.10	1.18	1.24	1.22	1.23	1.17
2009	0.31	0.51	0.75	0.87	0.98	1.06	1.14	1.16	1.16	1.23	1.28	1.25	1.25
2010	0.35	0.50	0.71	0.92	1.02	1.10	1.16	1.21	1.21	1.20	1.25	1.30	1.26
2011	0.28	0.53	0.67	0.86	1.05	1.12	1.18	1.22	1.26	1.25	1.22	1.27	1.31
2012	0.30	0.42	0.67	0.80	0.97	1.14	1.19	1.23	1.26	1.29	1.27	1.24	1.29
2013	0.29	0.46	0.58	0.82	0.92	1.07	1.22	1.25	1.27	1.29	1.31	1.29	1.25
2014	0.29	0.46	0.64	0.74	0.95	1.03	1.15	1.28	1.29	1.31	1.32	1.33	1.30
2015	0.36	0.48	0.66	0.81	0.89	1.06	1.12	1.22	1.33	1.33	1.34	1.34	1.35
2016	*0.34*	*0.52*	*0.64*	*0.80*	*0.93*	*0.99*	*1.14*	*1.18*	*1.26*	*1.36*	*1.36*	*1.36*	*1.35*
2017	*0.21*	*0.53*	*0.71*	*0.81*	*0.95*	*1.05*	*1.07*	*1.21*	*1.23*	*1.30*	*1.39*	*1.38*	*1.37*
2018	*0.21*	*0.39*	*0.72*	*0.88*	*0.95*	*1.06*	*1.14*	*1.14*	*1.26*	*1.27*	*1.33*	*1.41*	*1.39*



Fishery catch-at-age


Coefficient of variation in mean weight at age (over time)
20%
15%
10%
5%
0%
3
4
5
6
7
8
9
10
11
12
13
14
15
Age

Impact on biomass estimate



Procedure

1. Run a separate random effects model with observation errors for mean weights at age (from two-stage sample bootstrapping)
   - Estimate the process error variances:
     - Year and cohort effects
2. Use same estimation procedure in full assessment model
   - With weights-at-age from cohort and year effects **treated as fixed effect**
   - Uses variances from step 1

Status of assessment activities

- New 2016 fishery wt-at-age and age composition
  - Same plan for fishery weight-age estimation
- CIE response planned for an appendix
- ACLIM work
  - Growth and recruitment for EBS pollock and some for flatfish