

C-6 BSAI Halibut ABM

October 2018 Council meeting

Actions to date by Council on BSAI Halibut ABM PSC limits and projected future timeline

2015-2016

- Council initiates iterative discussion papers evaluating a range of potential indices to index BSAI halibut PSC

2017-2018

- Council begins to draft a suite of Alternatives for analysis, note this is an iterative process with multiple discussion papers on aspects of the alternatives (Control rules, Indices)
- Council selects two indices for indexing abundance: NMFS EBS Bottom Trawl survey and IPHC Setline survey in 4ABCDE
- NMFS determines the analysis will be an EIS and conducts scoping; Scoping report presented to Council April 2018

October 2018

- Review of draft Alternatives for analysis; revise alternatives as needed

October 2019

- Review of draft EIS/RIR and recommends for public release
- Council may select a preliminary preferred alternative (PPA) at that time

April 2020

- Council takes final action on EIS/RIR

Alternatives

Alternative 1 (Status Quo)	Current PSC limit
Amendment 80 cooperatives	1,745 t
BSAI trawl limited access fisheries	745 t
Longline fisheries	710 t
CDQ fisheries	315 t
TOTAL	3,515 t

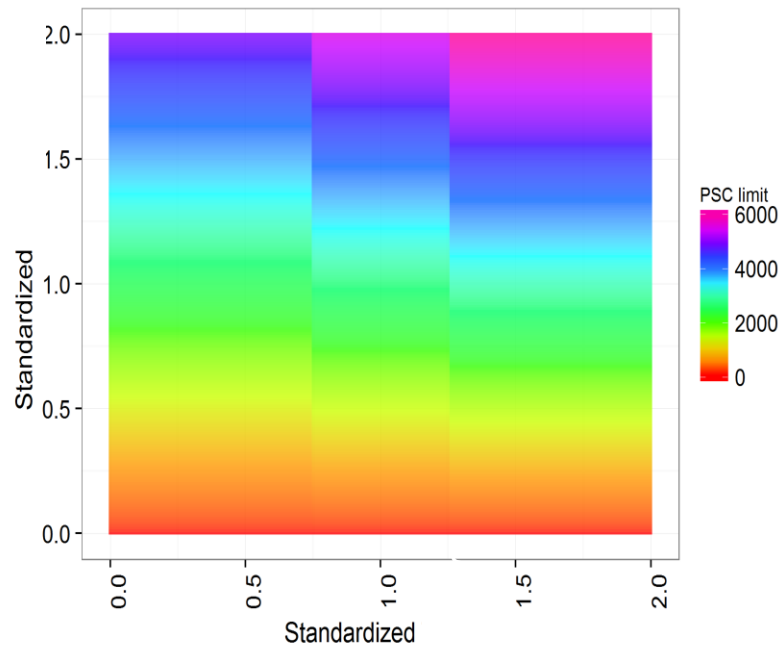
Alternative 2:

**Index trawl PSC limit to EBS trawl survey biomass. Index
longline PSC limit to setline survey biomass.**

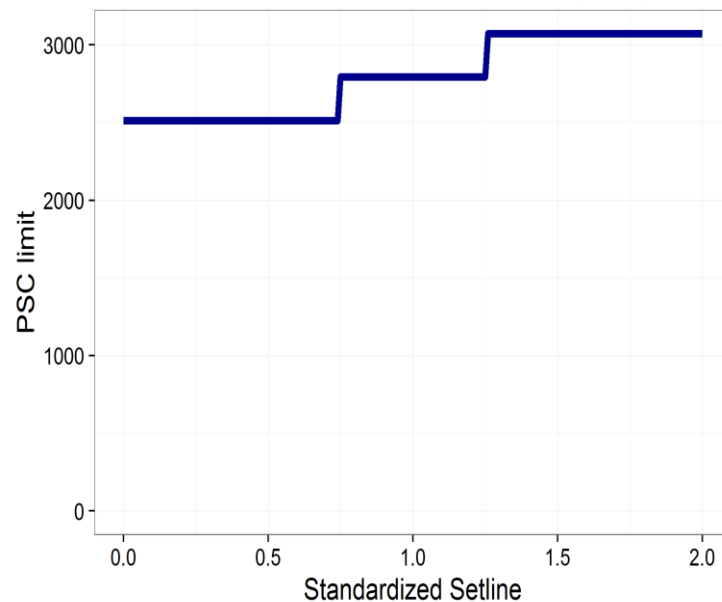
Alternatives 3, 4, 6

Index trawl gear PSC limit and fixed gear PSC limit to both EBS trawl survey (primary index for trawl, secondary index for longline) and setline survey (primary index for longline, secondary index for trawl).

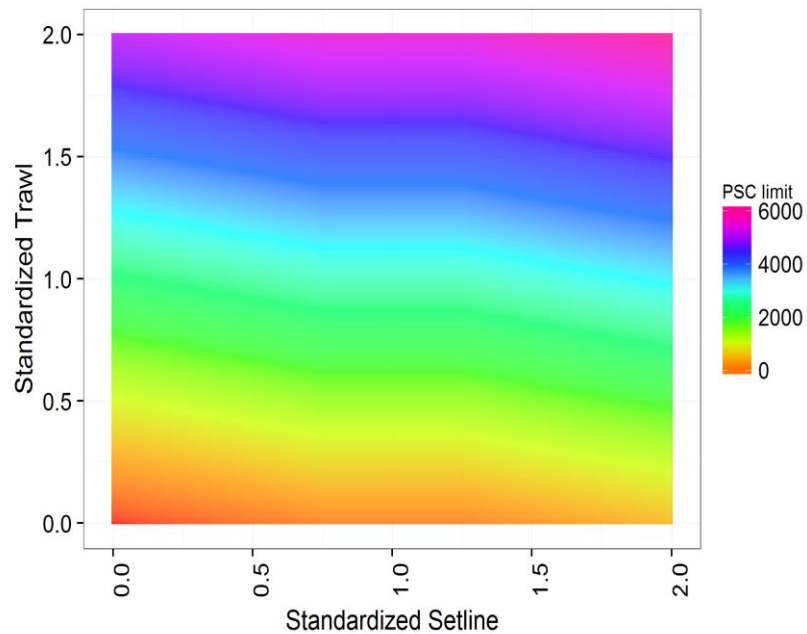
Trawl PSC Alternative 4



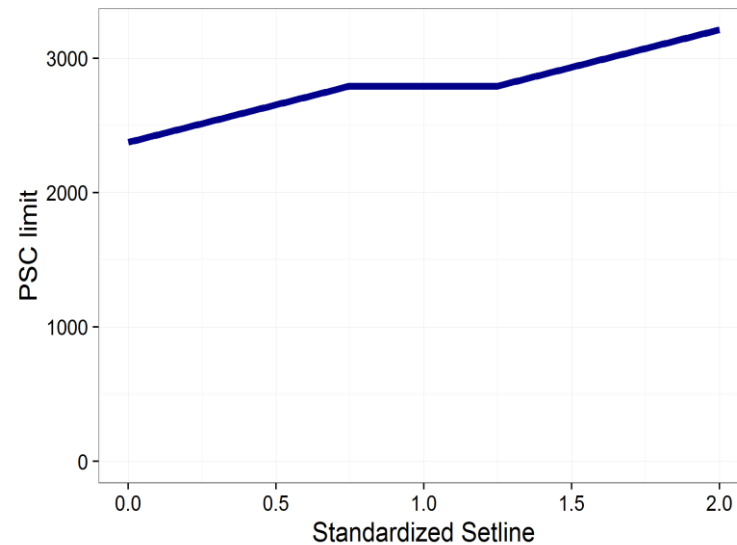
Cross-section at trawl index = 1 (Alt 4)



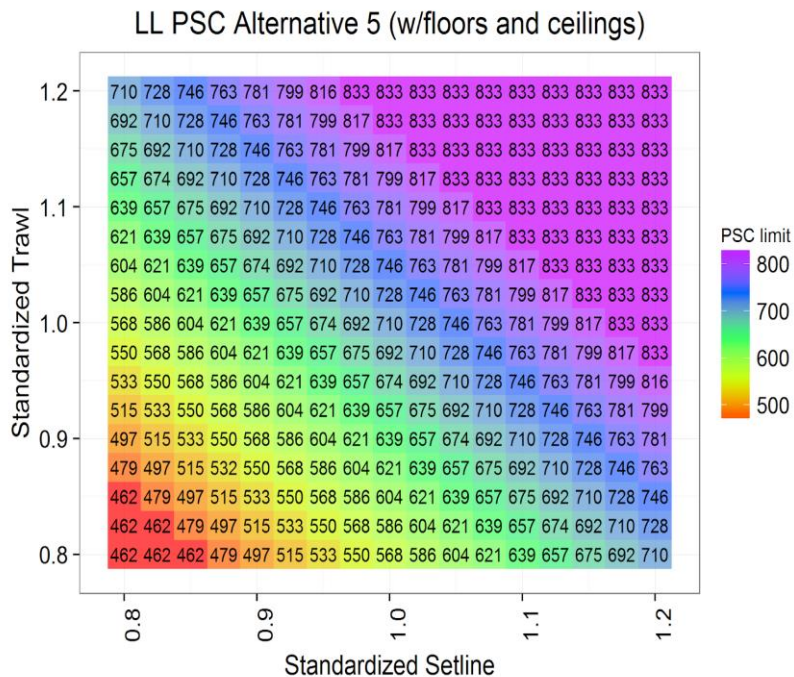
Trawl PSC Alternative 6



Cross-section at trawl index = 1 (Alt 6)



Alternative 5 (Fixed gear only):
Index fixed gear PSC to combination of IPHC
Area 4 all sizes survey and EBS shelf trawl
survey.



Standardized IPHC All Sizes Setline Survey

Standardized EBS Shelf Trawl Survey

	Standardized EBS Shelf Trawl Survey		
	<1.1 and >= 0.5		
	>1.1	= 0.5	<0.5
			Does PSC limit equal the Ceiling or the Floor?
> 1.1	PSC limit = Ceiling	PSC limit = Ceiling	
<1.1 and >= 0.5	PSC limit = Ceiling	PSC limit = Starting Point	PSC limit = Floor
<0.5	Does PSC limit equal the Ceiling or the Floor?	PSC limit = Floor	PSC limit = Floor

Historical Examples of Alternatives 2, 4, and 6

SSC Meeting, October 2018

Background to understand the historical examples

- Examples shown only for Alt 4 because Alt 3 and Alt 4 are equivalent under our conditions
- It is impossible to make scenarios to directly compare Alt 4 and Alt 6, but we show what we did to standardize the scenarios to the extent possible
- Alternative 5 is not included in examples: further clarification needed

Alternative 3 and Alternative 4

Both: Index trawl gear PSC and fixed gear PSC to both EBS trawl survey (primary index for trawl, secondary index for longline) and setline survey (primary index for longline, secondary index for trawl).

Alternative 3:

The secondary index modifies a multiplier on the starting point of the control rule when the secondary index is in a “high state” or a “low state” (e.g., the PSC is multiplied by 1.1 when the secondary index is at a “high” value and by 0.9 when the secondary index is a “low” value).

Alternative 4: The secondary index modifies the multiplier on the final PSC limit after the primary index is applied when the secondary index is in a “high state” or a “low state”

Alternatives 3 and 4 are the same under our conditions, which are:

- 1:1 % change in index: % change in PSC limit (a slope of 1)
- The primary index is standardized to its 2016 value and the starting point is the 2016 PSC limit.

Alternatives 3 and 4 are the same under our conditions

- 1:1 % change in index: % change in PSC limit (a slope of 1)
- The primary index is standardized to its 2016 value and the starting point is the 2016 PSC limit.

Therefore, Alternative 2 is a linear control rule passing through the point

$$\left(I_y, \frac{PSC_{y+1}}{X}\right) = (1, 1)$$

Index in year y

PSC in year y+1

Starting point

Note that the y-axis scale here is relative to the starting point

Alternatives 3 and 4 are the same under our conditions

So we have: $(I_y, \frac{PSC_{y+1}}{X}) = (1, 1)$

Alternatives 3 and 4 are the same under our conditions

So we have: $(I_y, \frac{PSC_{y+1}}{X}) = (1, 1)$

- Stating Alternative 2 using point-slope form for a line $(y - y_1) = a(x - x_1)$:

$$\frac{PSC_{y+1}}{X} - 1 = a(I_y - 1)$$

Alternatives 3 and 4 are the same under our conditions

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- Stating Alternative 2 using point-slope form for a line $(y - y_1) = a(x - x_1)$:

$$\frac{PSC_{y+1}}{X} - 1 = a(I_y - 1)$$

- Rearranging into slope-intercept form $(y = ax + b)$:

$$\frac{PSC_{y+1}}{X} = aI_y + (1 - a)$$

Alternatives 3 and 4 are the same under our conditions

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$$\frac{PSC_{y+1}}{X} - 1 = a(I_y - 1)$$

- Rearranging into slope-intercept form $(y = ax + b)$:

$$\frac{PSC_{y+1}}{X} = aI_y + (1 - a)$$

$a = 1$, and $b = 1 - a = 0$ and so Alternative 2 is:

$$\frac{PSC_{y+1}}{X} = I_y$$

Alternatives 3 and 4 are the same under our conditions

Alternative 2 is:

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Alternatives 3 and 4 are the same under our conditions

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$$\frac{PSC_{y+1}}{X} = I_y$$

Alternative 3 is like Alt 2, but applies a multiplier to the starting point:

$$PSC_{y+1} = I_y(mX)$$

Alternatives 3 and 4 are the same under our conditions

Alternative 2 is:

$$\frac{PSC_{y+1}}{X} = I_y$$

Alternative 3 is like Alt 2, but applies a multiplier to the starting point:

$$PSC_{y+1} = I_y(mX)$$

Alternative 4 is like Alt 2, but applies a multiplier to the PSC:

$$PSC_{y+1} = m(I_y X)$$

And Alternative 3 = Alternative 4.

Multipliers in our examples were chosen such that:

- A particular percent difference between the secondary index value and its breakpoint (whether above the upper breakpoint H or below the lower breakpoint L) would lead to the same percent difference (positive or negative) in the PSC limit from what it would have been without the application of a multiplier effect applied. The math is in the appendix to show that for Alt 6 this means:

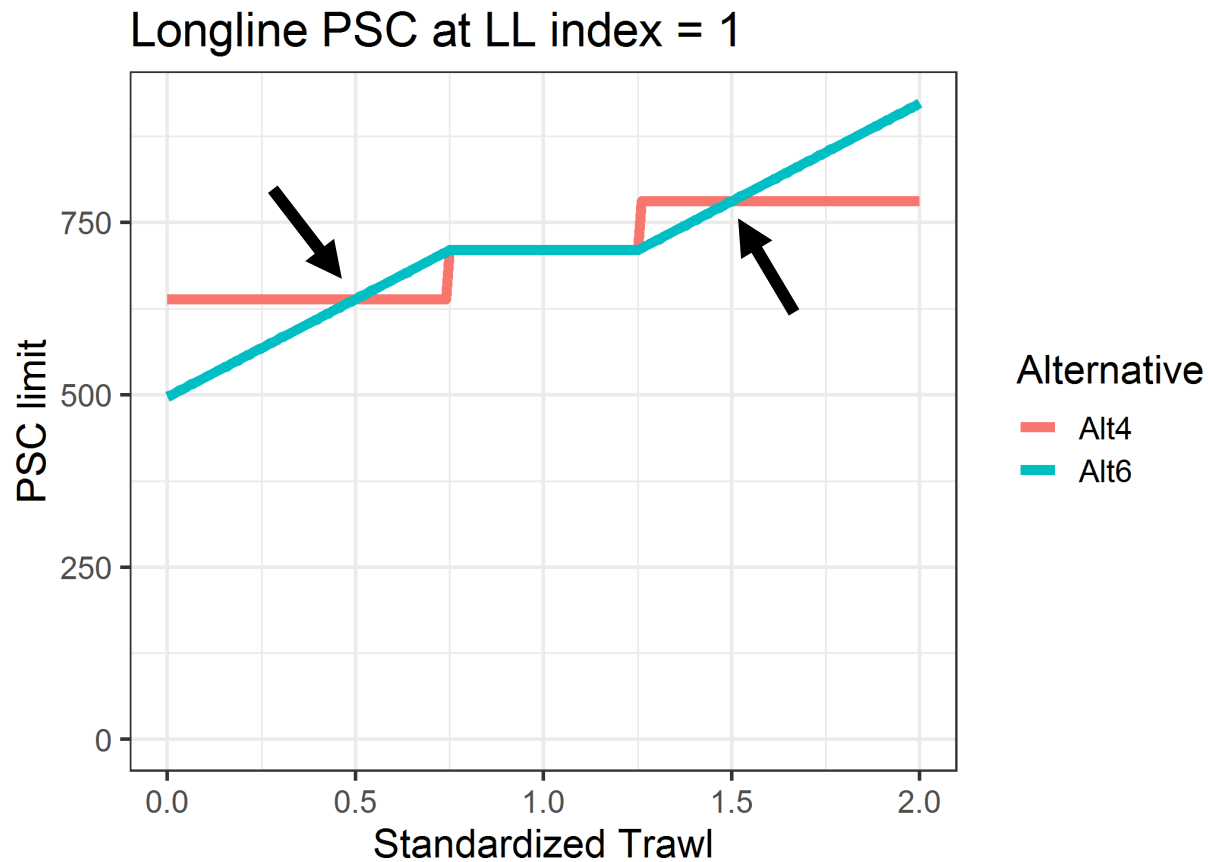
For Alt 4: low multiplier = $1-x$, high multiplier = $1+x$ (e.g. 0.75 and 1.25)

For Alt 6: High multiplier = Low multiplier

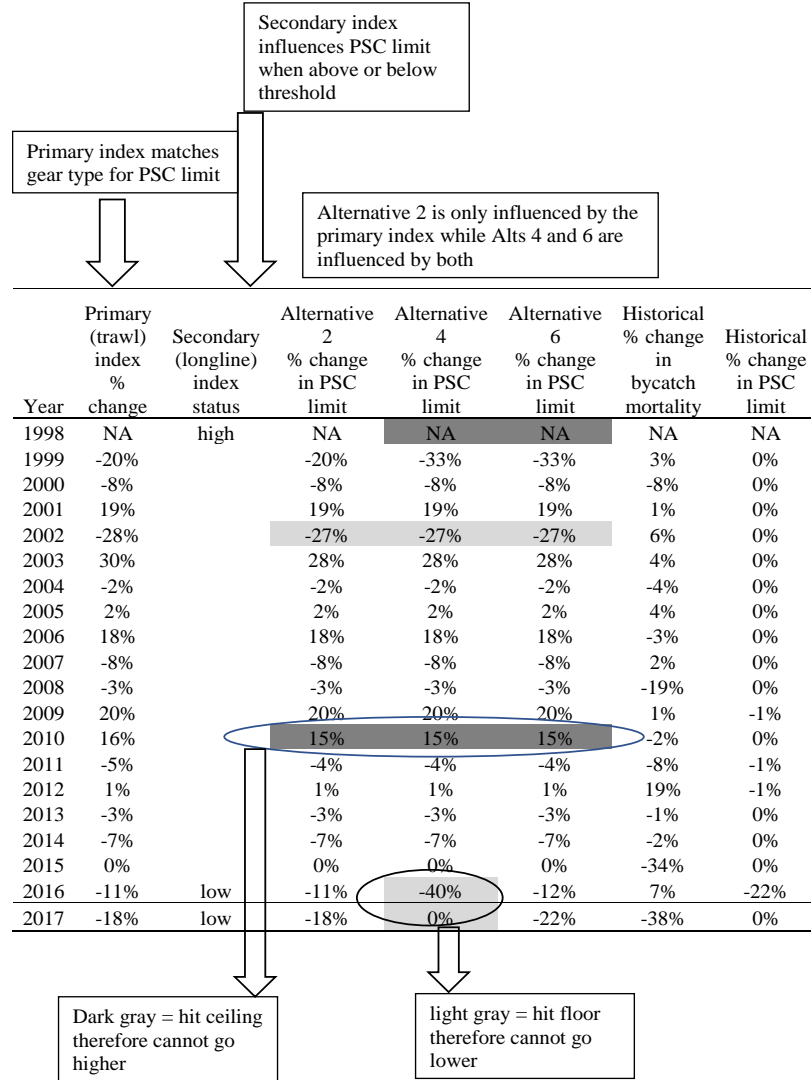
Comparing Alternatives 4 and 6 (arbitrary choices required):

- Alternative 4 and 6 multipliers cannot be directly compared
- When the secondary index is in a “low” or “high” state, we chose for Alternative 6 PSC limits to equal those for Alternative 4 when:
 - (1) the secondary index was 50% above or below its average value,
 - (2) the low and high breakpoints used are 25% below and above the average value for the secondary index, respectively, and
 - (3) the primary index is equal to 1 (its 2016 value).

Comparing Alternatives 4 and 6



Historical Examples



Base case: trawl, comparing Alts 2, 4, and 6

Year	Primary	Secondary				Historical	Historical
	(trawl)	(longline)	Alternative 2	Alternative 4	Alternative 6	% change	
	index %	index	% change in	% change in	% change in	in	% change
	change	status	PSC limit	PSC limit	PSC limit	bycatch	in PSC
						mortality	limit
1998	NA	high	NA	NA	NA	NA	NA
1999	-20%		-20%	-33%	-33%	3%	0%
2000	-8%		-8%	-8%	-8%	-8%	0%
2001	19%		19%	19%	19%	1%	0%
2002	-28%		-27%	-27%	-27%	6%	0%
2003	30%		28%	28%	28%	4%	0%
2004	-2%		-2%	-2%	-2%	-4%	0%
2005	2%		2%	2%	2%	4%	0%
2006	18%		18%	18%	18%	-3%	0%
2007	-8%		-8%	-8%	-8%	2%	0%
2008	-3%		-3%	-3%	-3%	-19%	0%
2009	20%		20%	20%	20%	1%	-1%
2010	16%		15%	15%	15%	-2%	0%
2011	-5%		-4%	-4%	-4%	-8%	-1%
2012	1%		1%	1%	1%	19%	-1%
2013	-3%		-3%	-3%	-3%	-1%	0%
2014	-7%		-7%	-7%	-7%	-2%	0%
2015	0%		0%	0%	0%	-34%	0%
2016	-11%	low	-11%	-40%	-14%	7%	-22%
2017	-18%	low	-18%	0%	-30%	-17%	0%

Year	Primary	Secondary				Historical	
	(trawl)	(longline)	Alternative 2	Alternative 4	Alternative 6	bycatch	Historical
	index	index	PSC limit	PSC limit	PSC limit	mortality	PSC limit
1998	161,256	18,179	2,943	3,532	3,532	3,379	3,734
1999	129,116	15,850	2,356	2,356	2,356	3,481	3,734
2000	118,677	15,867	2,166	2,166	2,166	3,208	3,734
2001	141,219	13,441	2,577	2,577	2,577	3,245	3,734
2002	101,706	11,815	1,879	1,879	1,879	3,423	3,734
2003	132,151	10,609	2,412	2,412	2,412	3,545	3,734
2004	130,075	9,773	2,374	2,374	2,374	3,402	3,734
2005	132,518	9,344	2,418	2,418	2,418	3,552	3,734
2006	155,964	9,643	2,846	2,846	2,846	3,457	3,734
2007	143,903	9,525	2,626	2,626	2,626	3,526	3,734
2008	140,247	10,109	2,559	2,559	2,559	2,843	3,734
2009	168,102	9,700	3,068	3,068	3,068	2,885	3,693
2010	195,535	9,009	3,532	3,532	3,532	2,823	3,684
2011	186,666	8,561	3,407	3,407	3,407	2,611	3,634
2012	189,000	8,267	3,449	3,449	3,449	3,117	3,593
2013	183,989	7,868	3,358	3,358	3,358	3,080	3,593
2014	171,427	7,872	3,128	3,128	3,128	3,029	3,593
2015	172,237	8,021	3,143	3,143	3,143	1,999	3,593
2016	153,704	7,665	2,805	1,879	2,697	2,132	2,805
2017	126,684	6,976	2,312	1,879	1,879	1,324	2,805

Base case: trawl, comparing Alts 2, 4, and 6

Year	Primary	Secondary				Historical	Historical % change in PSC limit
	(trawl) index % change	(longline) index status	Alternative 2 % change in PSC limit	Alternative 4 % change in PSC limit	Alternative 6 % change in PSC limit	% change in bycatch mortality	
1998	NA	high	NA	NA	NA	NA	NA
1999	-20%		-20%	-33%	-33%	3%	0%
2000	-8%		-8%	-8%	-8%	-8%	0%
2001	19%		19%	19%	19%	1%	0%
2002	-28%		-27%	-27%	-27%	6%	0%
2003	30%		28%	28%	28%	4%	0%
2004	-2%		-2%	-2%	-2%	-4%	0%
2005	2%		2%	2%	2%	4%	0%
2006	18%		18%	18%	18%	-3%	0%
2007	-8%		-8%	-8%	-8%	2%	0%
2008	-3%		-3%	-3%	-3%	-19%	0%
2009	20%		20%	20%	20%	1%	-1%
2010	16%		15%	15%	15%	-2%	0%
2011	-5%		-4%	-4%	-4%	-8%	-1%
2012	1%		1%	1%	1%	19%	-1%
2013	-3%		-3%	-3%	-3%	-1%	0%
2014	-7%		-7%	-7%	-7%	2%	0%
2015	0%		0%	0%	0%	-34%	0%
2016	-11%	low	-11%	-40%	-14%	7%	-22%
2017	-18%	low	-18%	0%	-30%	-17%	0%

Year	Primary	Secondary				Historical	
	(trawl) index	(longline) index	Alternative 2 PSC limit	Alternative 4 PSC limit	Alternative 6 PSC limit	bycatch mortality	Historical PSC limit
1998	161,256	18,179	2,943	3,532	3,532	3,379	3,734
1999	129,116	15,850	2,356	2,356	2,356	3,481	3,734
2000	118,677	15,867	2,166	2,166	2,166	3,208	3,734
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2017	126,684	6,976	2,312	1,879	1,879	1,324	2,805

Base case: trawl, comparing Alts 2, 4, and 6

Year	Primary (trawl) index % change	Secondary (longline) index status	Alternative 2 % change in PSC limit	Alternative 4 % change in PSC limit	Alternative 6 % change in PSC limit	Historical % change in bycatch mortality	Historical % change in PSC limit
2015	0%		0%	0%	0%	-34%	0%
2016	-11%	low	-11%	-40%	-14%	7%	-22%
2017	-18%	low	-18%	0%	-30%	-17%	0%

Year	Primary (trawl) index	Secondary (longline) index	Alternative 2 PSC limit	Alternative 4 PSC limit	Alternative 6 PSC limit	Historical bycatch mortality	Historical PSC limit
2015	172,237	8,021	3,143	3,143	3,143	1,999	3,593
2016	153,704	7,665	2,805	1,879	2,697	2,132	2,805
2017	126,684	6,976	2,312	1,879	1,879	1,324	2,805

Base case: longline, comparing Alts 2, 4, and 6

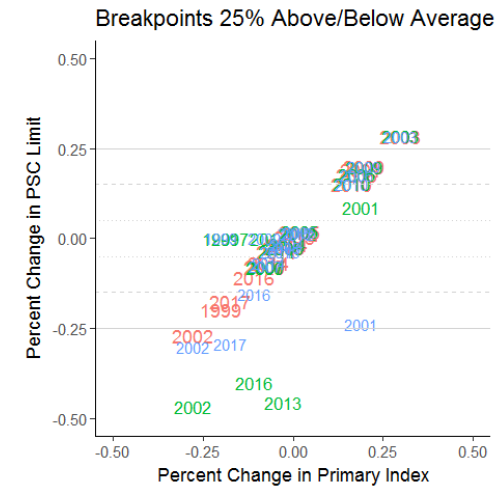
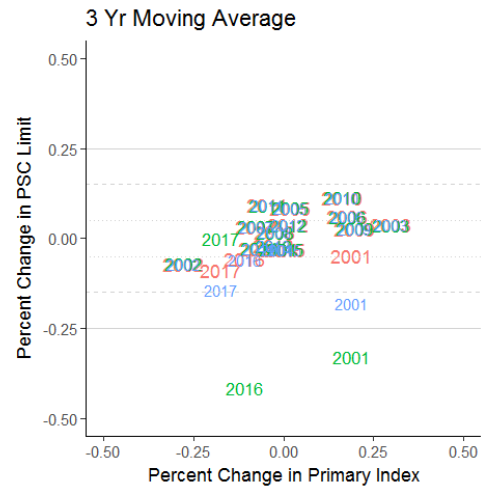
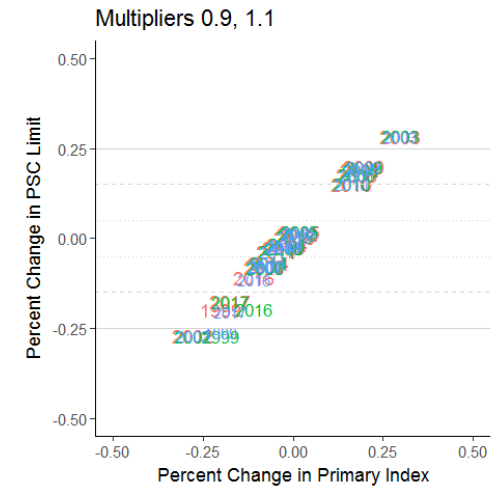
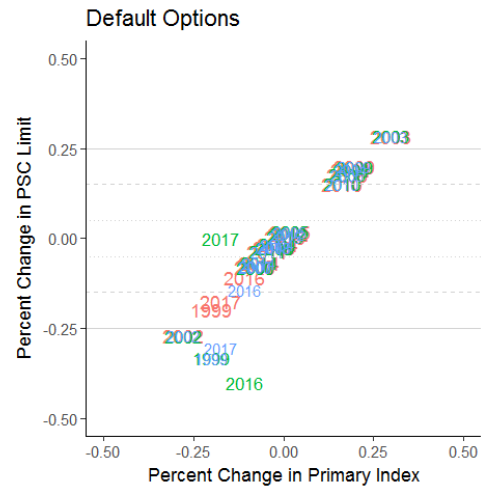
Year	Primary	Secondary	Historical			Historical	
	(longline)	(trawl)	Alternative 2	Alternative 4	Alternative 6	% change in bycatch mortality	% change in PSC limit
	index % change	index status	% change in PSC limit	% change in PSC limit	% change in PSC limit		
1998	NA		NA	NA	NA	NA	NA
1999	-13%		0%	0%	0%	-25%	0%
2000	0%		0%	0%	0%	43%	0%
2001	-15%		0%	0%	0%	0%	0%
2002	-12%	low	0%	-39%	0%	-23%	0%
2003	-10%		0%	63%	0%	3%	0%
2004	-8%		0%	0%	0%	-20%	0%
2005	-4%		-3%	-3%	-3%	21%	0%
2006	3%		3%	3%	3%	-24%	0%
2007	-1%		-1%	-1%	-1%	8%	0%
2008	6%		1%	1%	1%	27%	0%
2009	-4%		0%	0%	0%	0%	0%
2010	-7%	high	-7%	0%	0%	-11%	0%
2011	-5%		-5%	-11%	-11%	-6%	0%
2012	-3%		-3%	-3%	-3%	11%	0%
2013	-5%		-5%	-5%	-5%	-15%	0%
2014	0%		0%	0%	0%	-16%	0%
2015	2%		2%	2%	2%	-28%	0%
2016	-4%		-4%	-4%	-4%	-30%	-15%
2017	-9%		-9%	-9%	-9%	-14%	0%

Primary	Secondary	Historical			bycatch mortality	Historical PSC limit
(longline)	(trawl)	Alternative 2	Alternative 4	Alternative 6		
index	index	PSC limit	PSC limit	PSC limit		
18,179	161,256	894	894	894	777	833
15,850	129,116	894	894	894	582	832
15,867	118,677	894	894	894	834	833
13,441	141,219	894	894	894	834	833
11,815	101,706	894	547	894	640	833
10,609	132,151	894	894	894	657	833
9,773	130,075	894	894	894	524	833
9,344	132,518	866	866	866	635	833
9,643	155,964	893	893	893	484	833
9,525	143,903	882	882	882	525	833
10,109	140,247	894	894	894	668	833
9,700	168,102	894	894	894	667	832
9,009	195,535	835	894	894	595	832
8,561	186,666	793	793	793	561	832
8,267	189,000	766	766	766	623	832
7,868	183,989	729	729	729	527	832
7,872	171,427	729	729	729	442	832
8,021	172,237	743	743	743	318	832
7,665	153,704	710	710	710	222	710
6,976	126,684	646	646	646	191	710

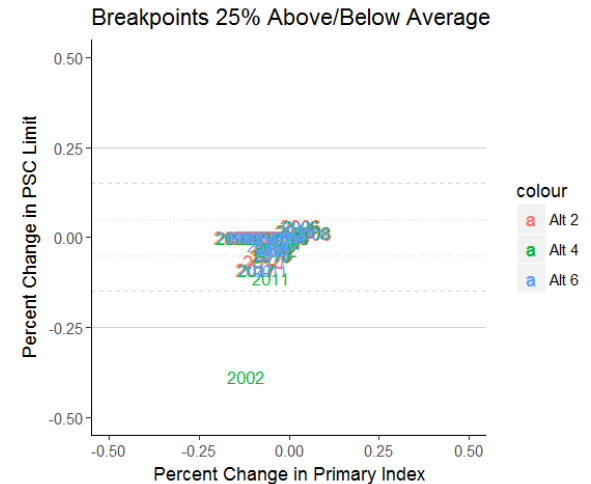
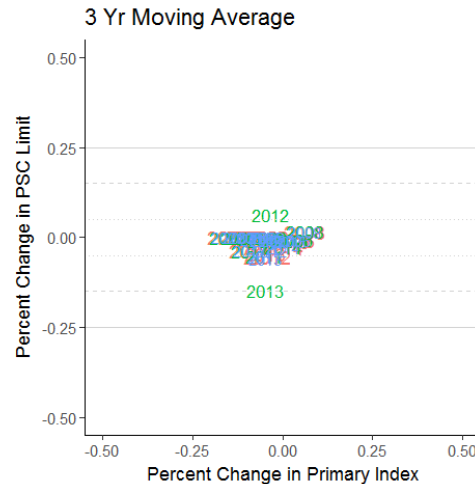
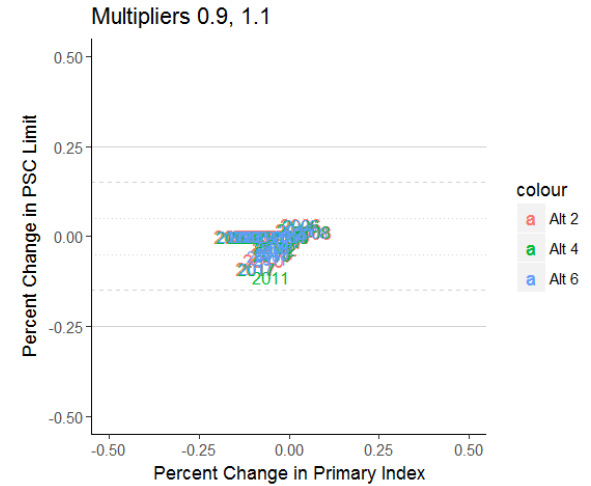
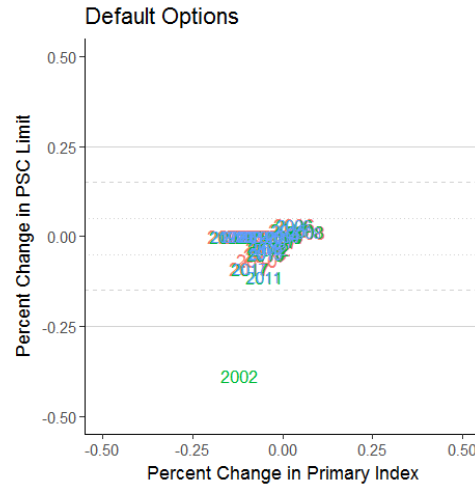
Exploring additional scenarios:

- A 3-year moving average used for the indices
- Multipliers when secondary index is in a high or low state are 0.9 and 1.1 (instead of 0.5 and 1.5)
- Breakpoints defining when the secondary index is in a low or high state are 25% above or below the average value for the index (instead of the 2nd highest and lowest values of the index)

Percent change from the previous year in the trawl index vs percent change from the previous year in PSC limit for trawl sector



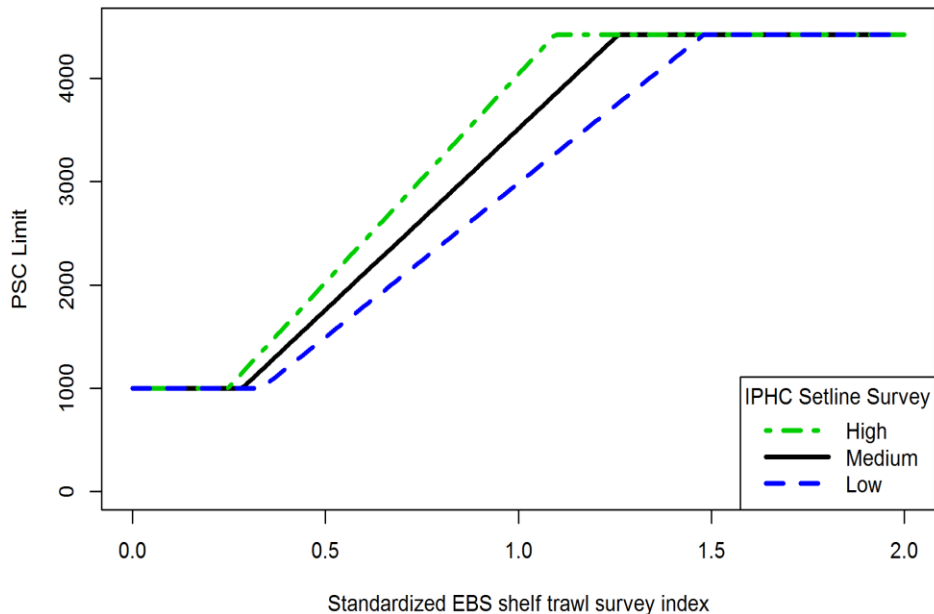
Percent change from the previous year in the longline index vs percent change from the previous year in PSC limit for longline sector



End

Alternative 3 and Alternative 4

Multiplier influences the starting point and slope (final PSC limit)



Multiplier influences the starting point only

