

# NORTHERN ROCK SOLE

BY

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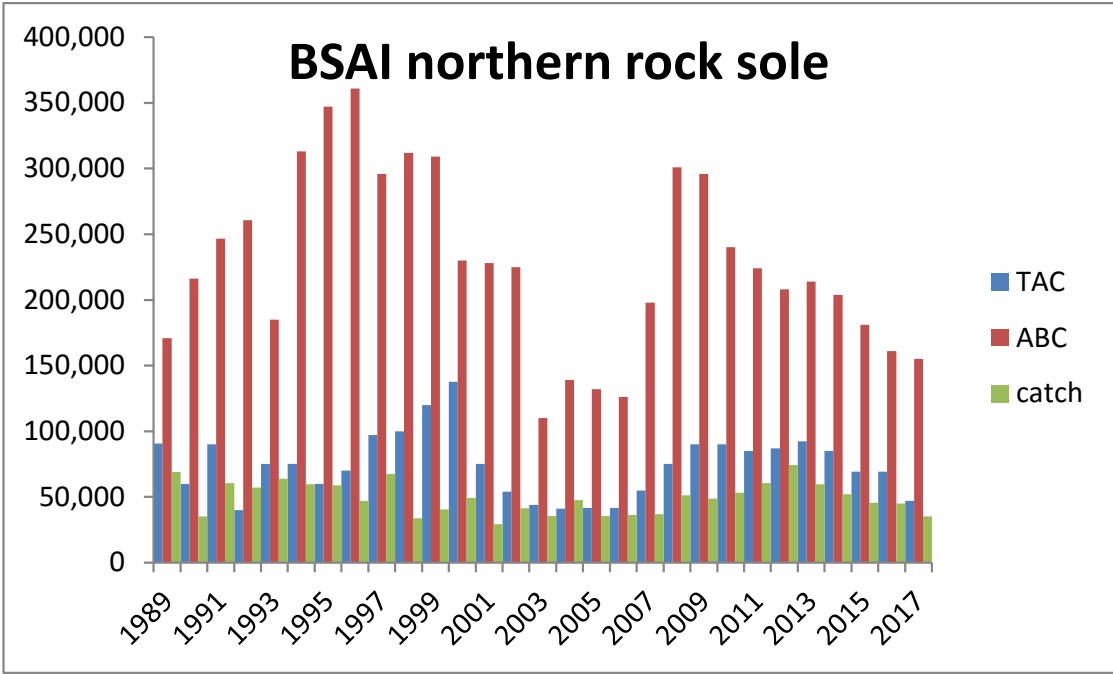


# CHANGES IN THE ASSESSMENT BETWEEN 2016 AND 2017

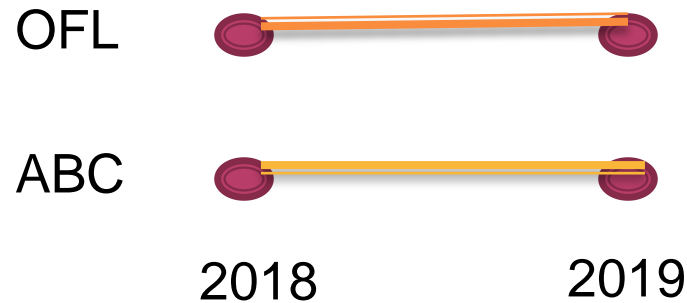
Partial assessment for 2017, the assessment model was not run to include the new 2017 survey biomass and 2016 age composition information from the survey and fishery.

Only change in the methodology was to introduce a Tier 1 partial assessment projection rule to get 2019 ABC and OFL.

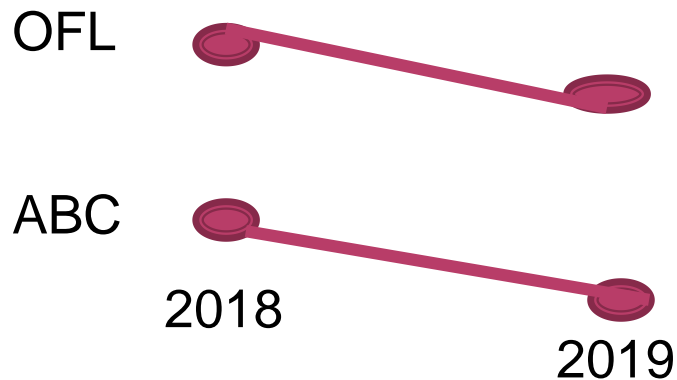
2016 assessment estimated northern rock sole in a declining trend.



# Tier 1 partial assessment projection rule



If values are the same or increasing between years: roll over for 2019

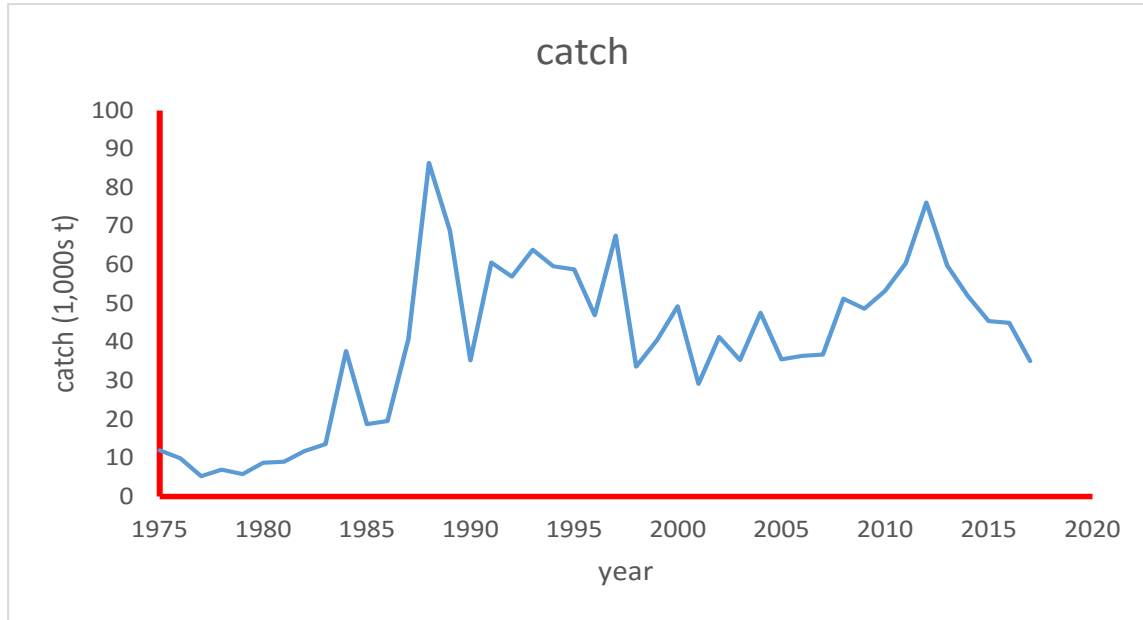


If declining, apply proportional decrease from 2017 to 2018 to 2018 to get 2019

# SUMMARY

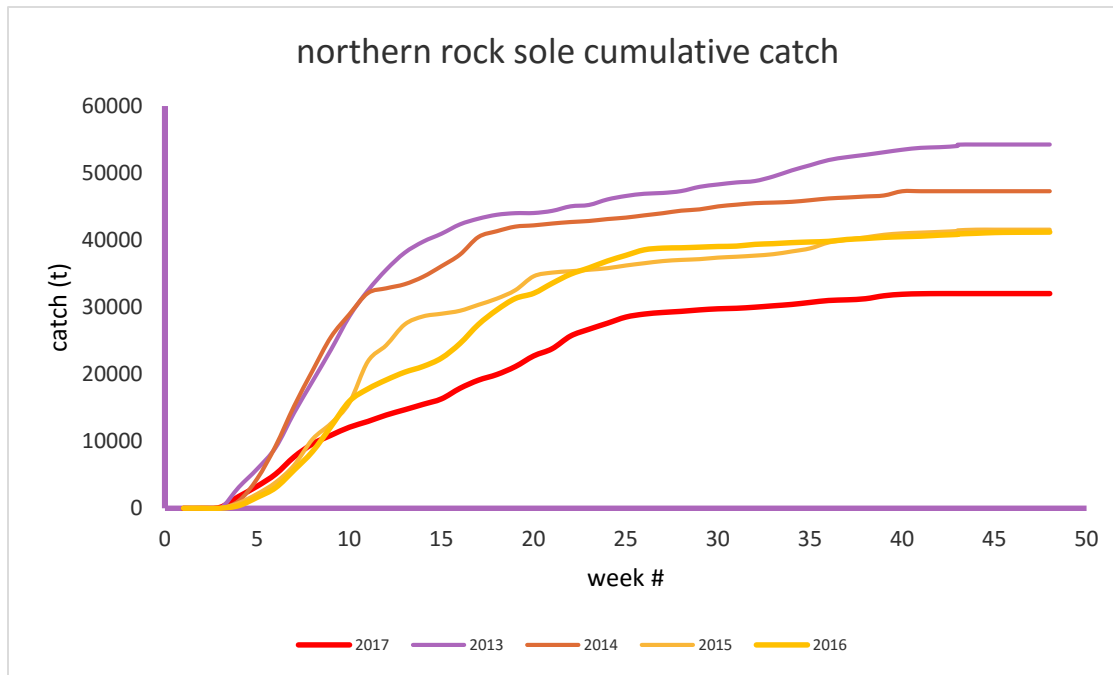
Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year</i> for:	
	2017	2018	2018	2019
$M$ (natural mortality rate)	0.15	0.15	0.15	0.15
Tier	1a	1a	1a	1a
Projected total (age 6+)	1,000,600	923,200	923,200	846,000
Female spawning biomass (t)	539,500	472,200	472,200	404,900
Projected				
$B_0$	678,310		678,310	
$B_{MSY}$	257,000	257,000	257,000	257,000
$F_{OFL}$	0.160	0.160	0.160	0.160
$maxF_{ABC}$	0.155	0.155	0.155	0.155
$F_{ABC}$	0.155	0.155	0.155	0.155
OFL (t)	159,700	147,300	<b>147,300</b>	134,900
maxABC (t)	155,100	143,100	<b>143,100</b>	131,100
ABC (t)	155,100	143,100	<b>143,100</b>	131,100
Status	As determined <i>last year for:</i>		As determined <i>this year</i>	
	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

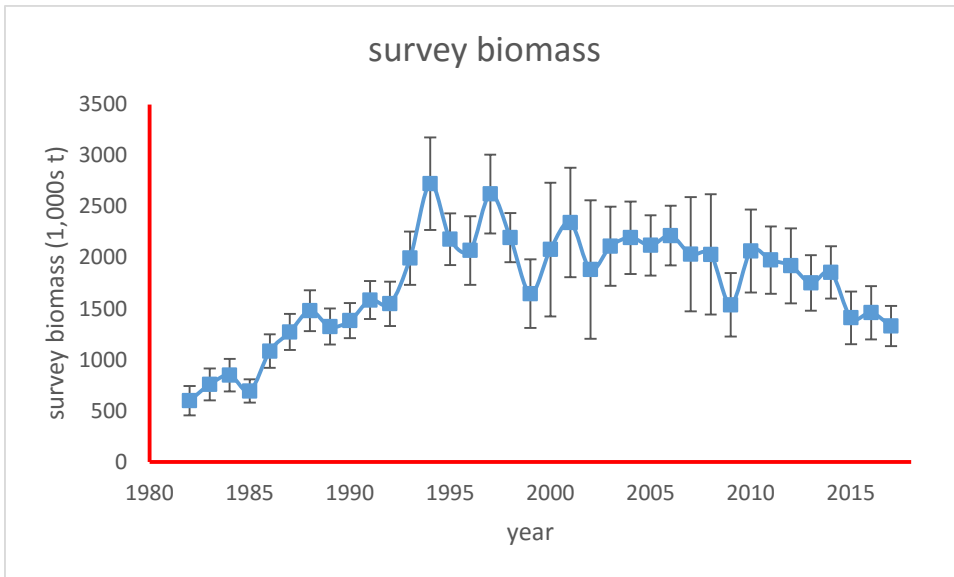
# 2017 CATCH = 35,069 T (AVERAGE 1975-2016 EXPLOITATION RATE = 3.3%)



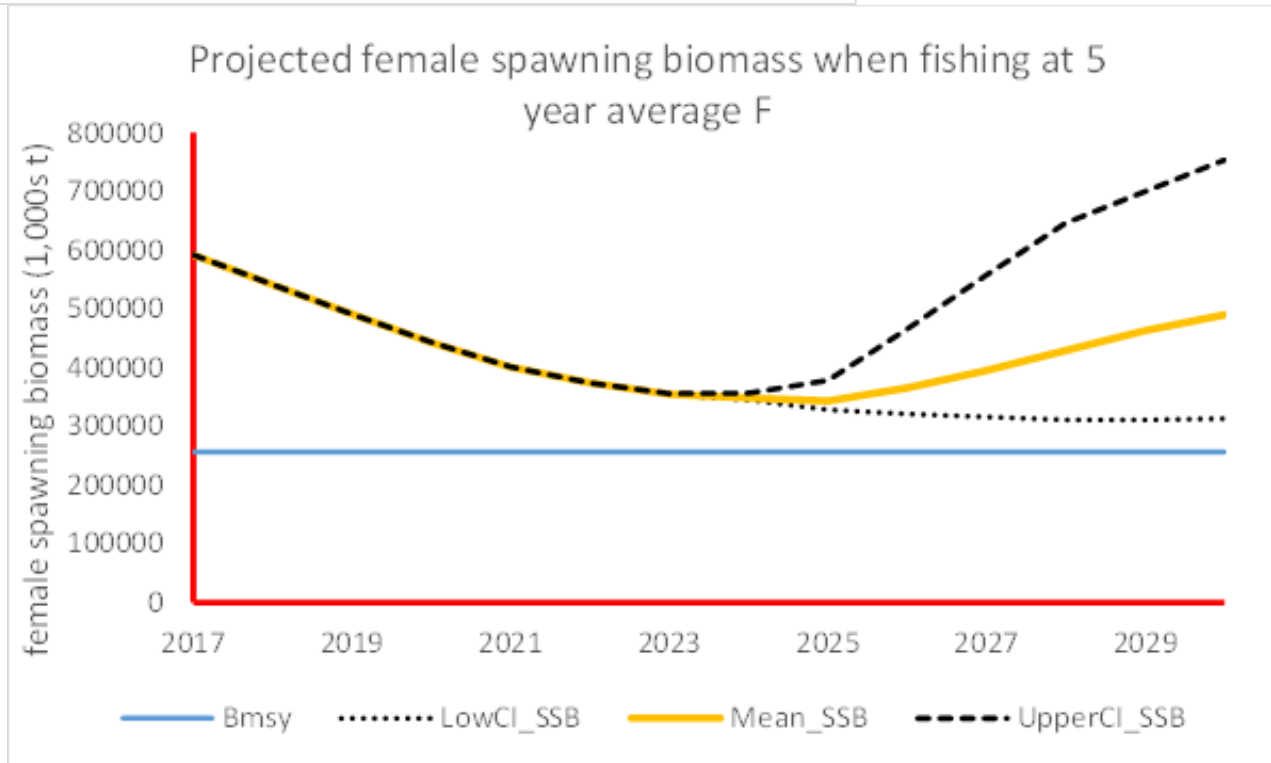
Long-term average is 40,000 t. Retention rates was 96% in 2016.

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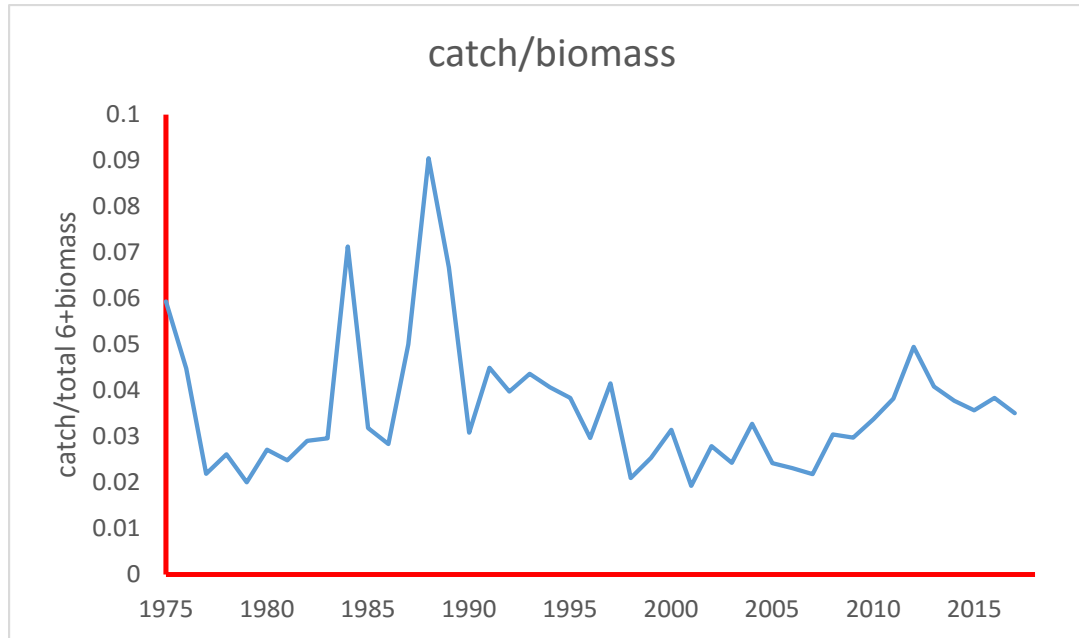


2017 survey biomass is down 11%. Assessment model in 2016 estimated a downward trend since 2008.





# Annual catch/model estimate of total biomass



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	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

# MODELS FOR PREDICTING RECRUITMENT

	Model	df	AICc	MSE (LOYO, log-scale)	MSE (1 step ahead, log-scale)	MSE (LOYO, real scale)	MSE (1 step ahead, real scale)
1	Ricker	3	67.8	0.69	0.85	725	635
2	Ricker + coldpool	4	66.5	0.73	0.86	678	539
3	Ricker + wind	4	67.9	0.67	0.81	703	625
4	Ricker + coldpool + wind	5	63.9	0.66	0.78	635	509
5	Ricker + coldpool*wind	6	65.0	0.64	0.85	622	514
6	Ricker + coldpool*wind (slope=0)	5	66.0	0.69	0.81	655	536
7	coldpool	3	57.8	0.60	0.69	545	600
8	wind	3	60.9	0.58	0.69	585	631
9	coldpool + wind	4	54.9	0.55	0.61	531	504
10	coldpool*wind	5	55.7	0.53	0.71	522	570
11	coldpool*wind (slope=0)	4	57.2	0.58	0.64	552	533
12	Categorical	4	45.5	0.41	0.47	456	412
13	Previous Year	NA	NA	0.46	0.45	533	382
14	Running Mean	NA	NA	0.62	0.74	637	638