

Southern Red Hake Conceptual Approaches to Rebuilding

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Whiting PDT Chair

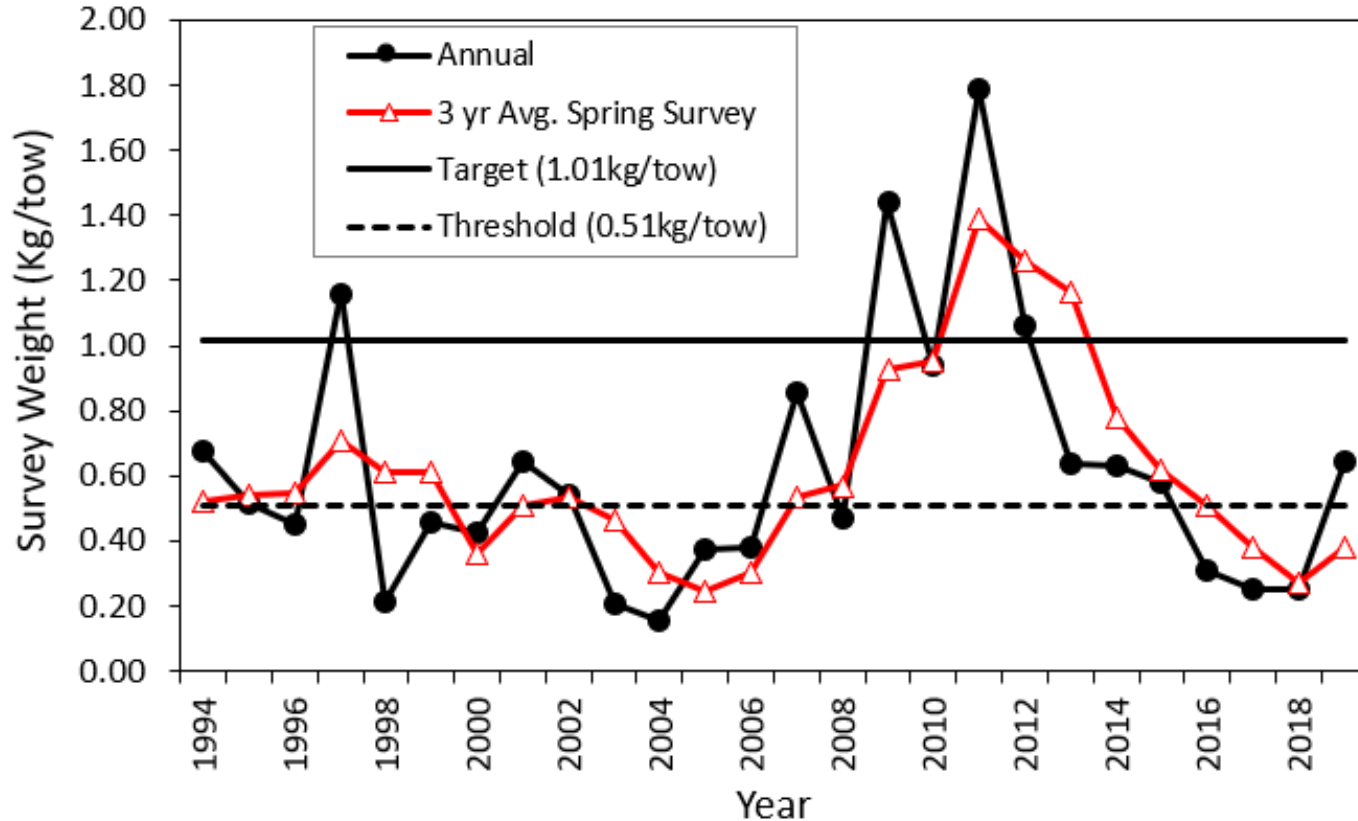
Council meeting
December 5, 2019



New England
Fishery Management Council

Southern red hake

Survey biomass



2010

2011

2012

2.4
2
1.6
1.2
0.8
0

2.4
2
1.6
1.2
0.8
0

2.4
2
1.6
1.2
0.8
0

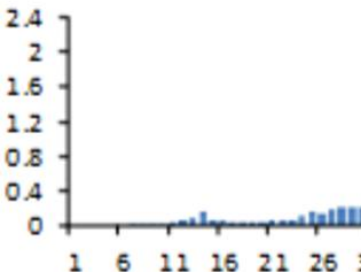
$\mu\text{m}/\text{Tow}$

2019

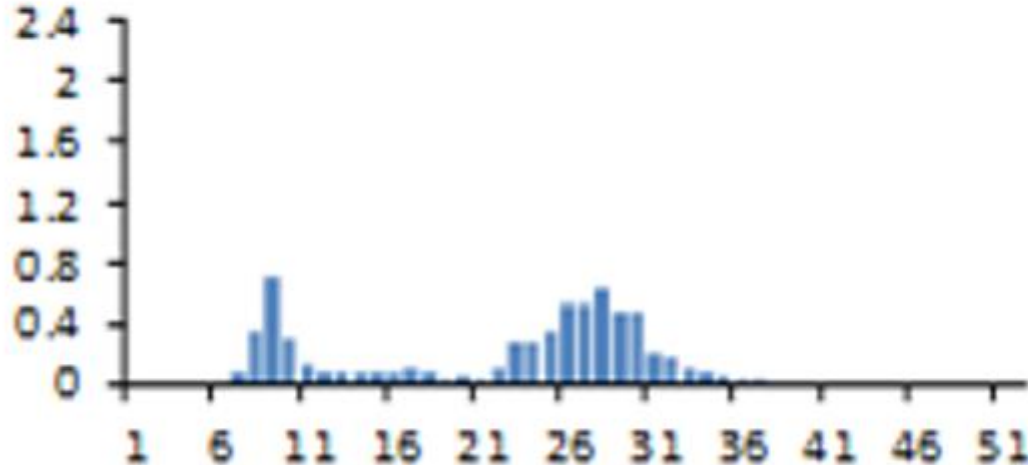
46 51

2016

2018

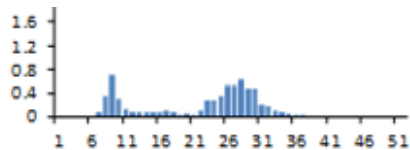


Str



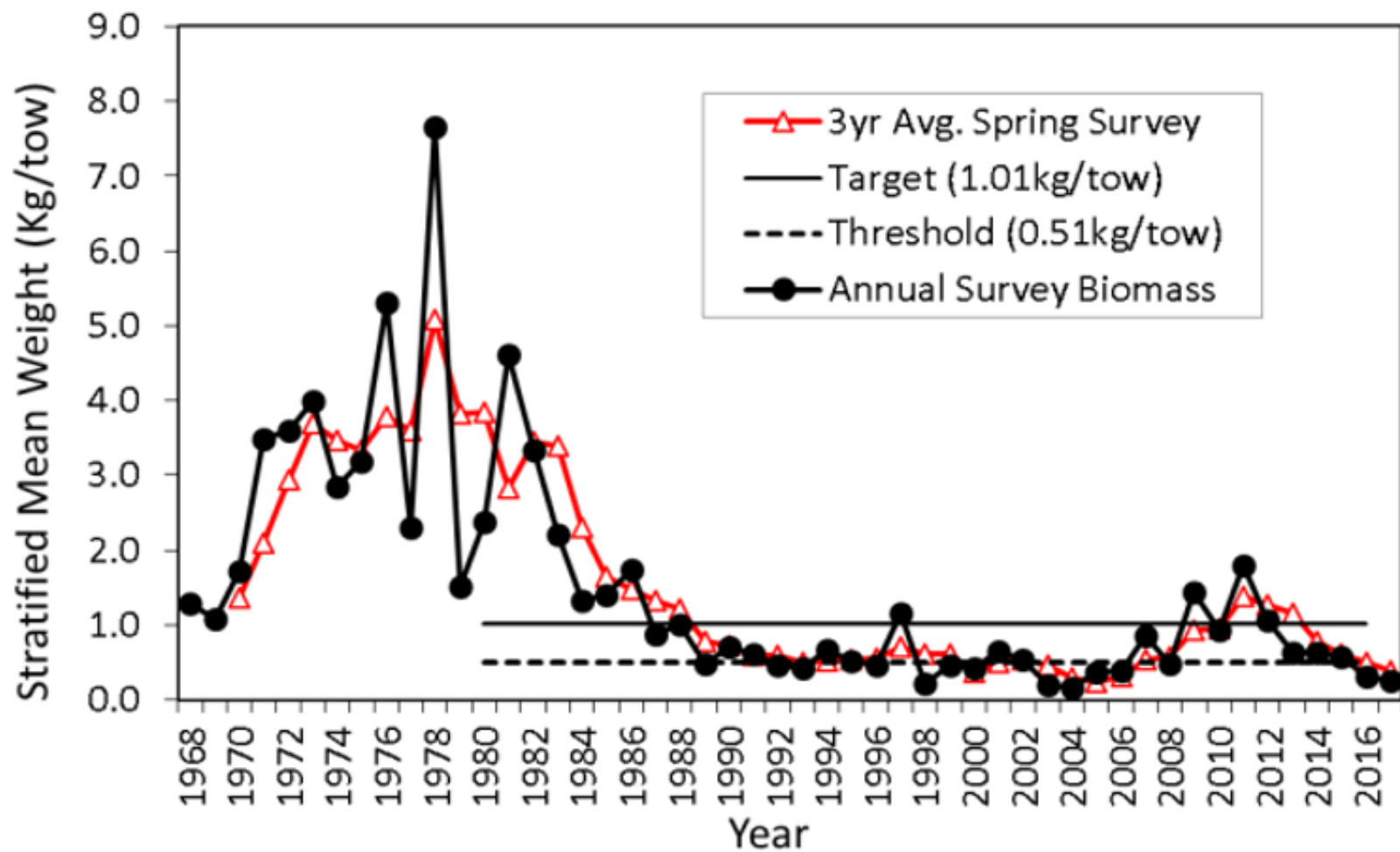
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2



Length (cm)





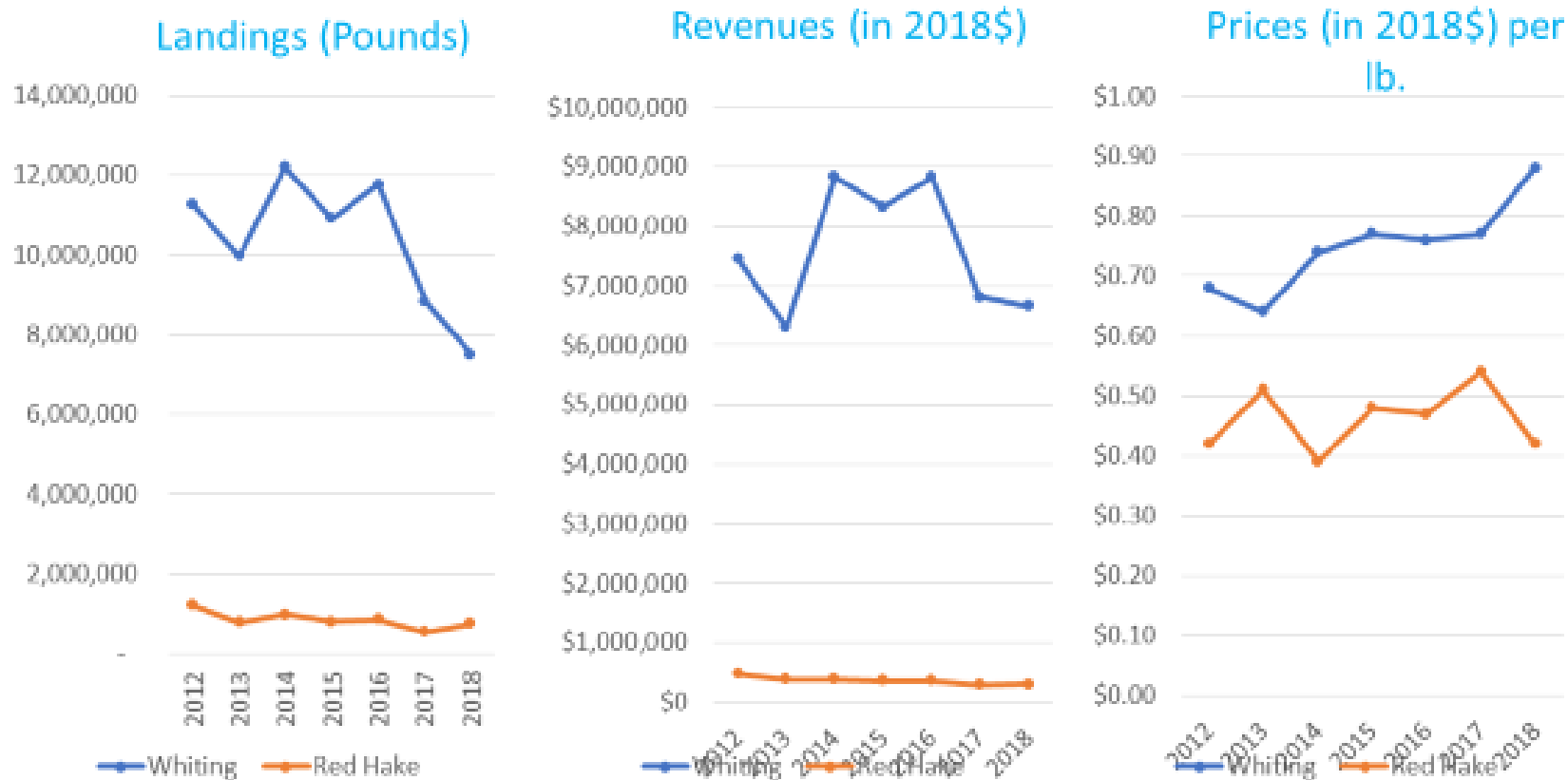
2018 Red hake Catch

Table 7. Fishing year 2018 red hake landings and discards by stock area⁶.

	Pounds	Metric tons	Percent of ACL (685 mt)	Percent of total catch
Northern red hake commercial landings	232,923	106	15.4%	36.7%
Northern red hake state-permitted only vessel landings	599	0	0%	0%
Northern red hake research catch outside of Magnuson	333	0	0%	0%
Northern red hake estimated discard	401,015	182	26.6%	63.2%
Northern red hake recreational catch (MRIP)	8,634	3.9	n/a	n/a
Northern red hake catch*	634,869	288	42.0%	100.0%
	Pounds	Metric tons	Percent of ACL (1,007 mt)	Percent of total catch
Southern red hake landings	762,178	346	34.3%	22.9%
Southern red hake state-permitted only vessel landings	23,026	10	1.0%	0.7%
Southern red hake research catch outside of Magnuson	303	0	0.0%	0.0%
Southern red hake estimated discard	2,535,990	1,150	114.2%	76.4%
Southern red hake recreational catch (MRIP)	340,891	155	n/a	n/a
Southern red hake catch*	3,321,497	1,507	149.6%	100.0%



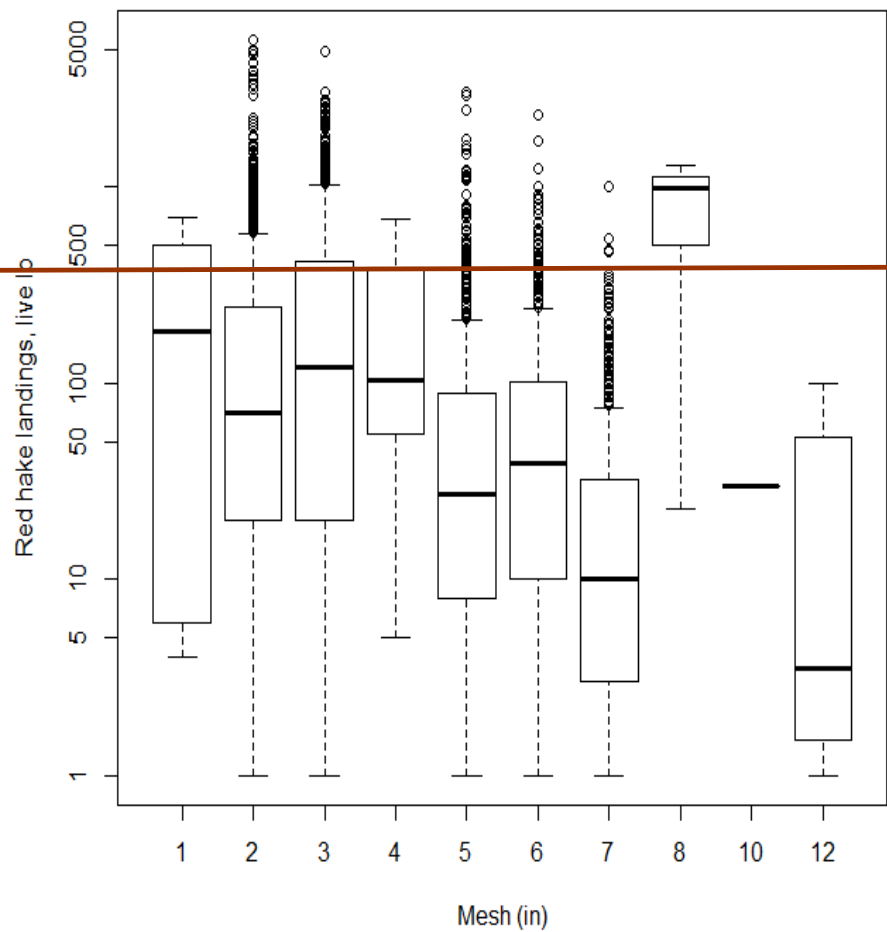
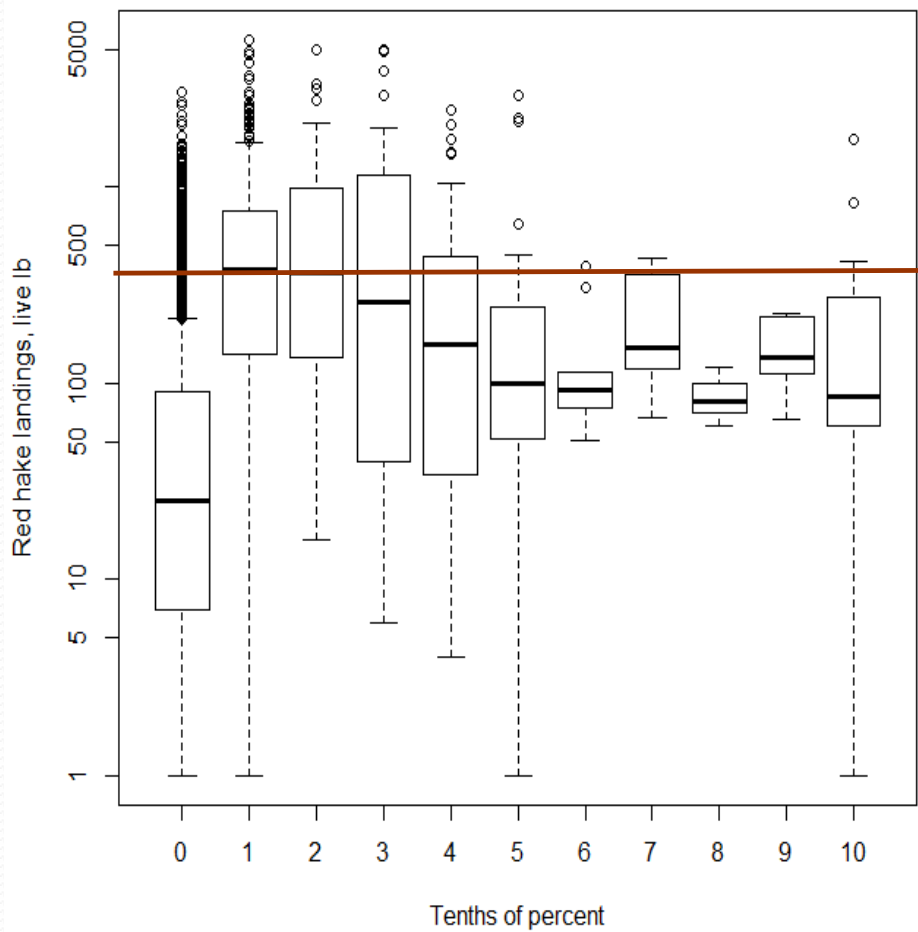
Fig 6.2 Whiting and Red Hake Landings, Revenues and Prices (Directed 2000/400)



Conceptual approaches

1. Post-season AM (5000 → 400 lbs. possession limit)
 - Large increase in bycatch (squid and scallop)
 - Reduced trigger to 41% of TAL – first year
2. 400 lbs. possession limit year-round

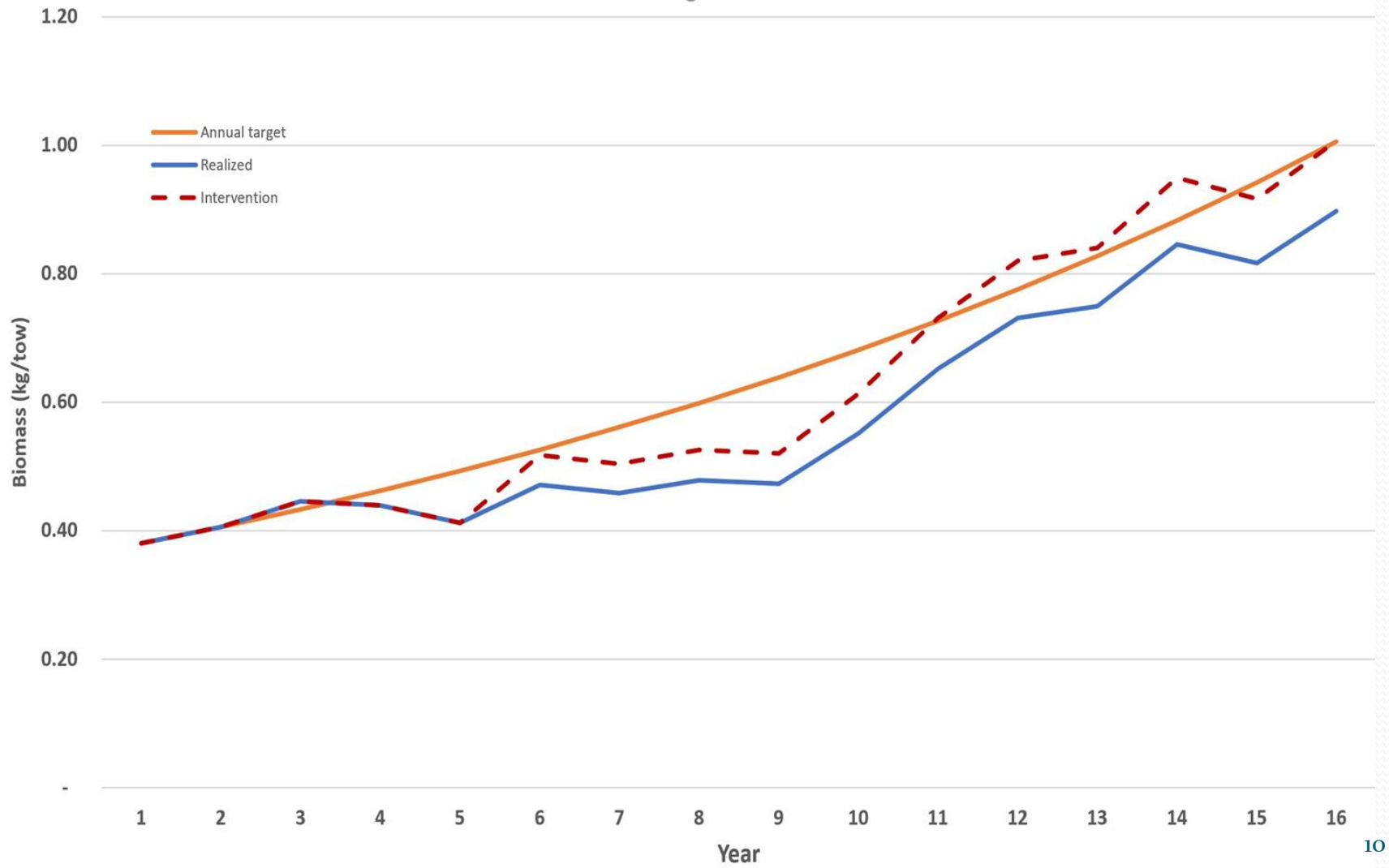


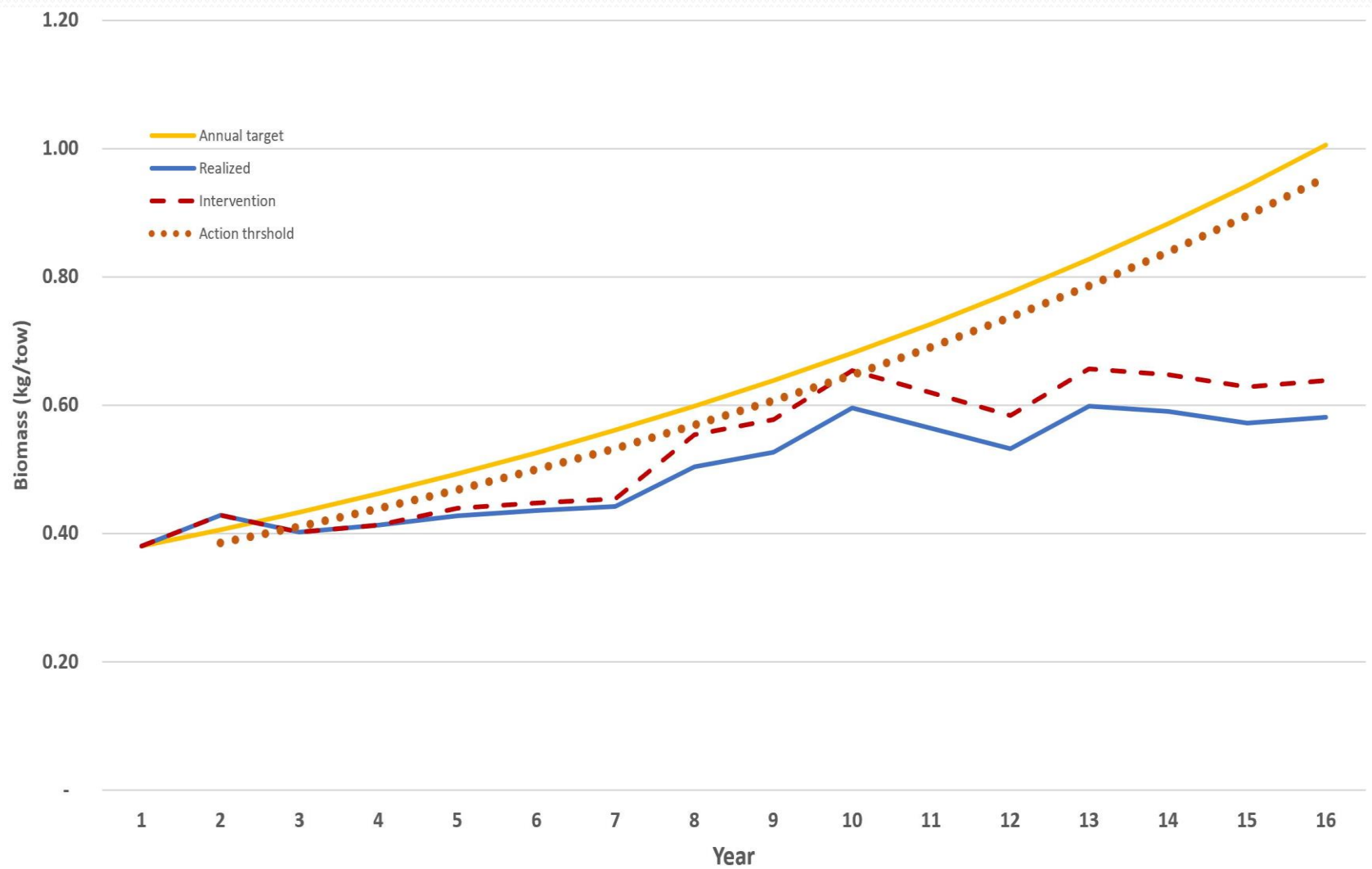


Conceptual approaches

1. Post-season AM (5000 → 400 lbs. possession limit)
 - Large increase in bycatch (squid and scallop)
 - Reduced trigger to 41% of TAL – first year
2. 400 lbs. possession limit year-round
3. Adaptive control rule based on observed changes in biomass
 - T_{max}
 - Expected rate of change (6.7%)
 - Maximum negative deviation/Intervention frequency
 - Proportion of ACL







Conceptual approaches

1. Post-season AM (5000 → 400 lbs. possession limit)
2. 400 lbs. possession limit year-round
3. Adaptive control rule
4. Biomass based control rule
 - No analytic assessment
5. Witch-flounder approach based on life history estimates



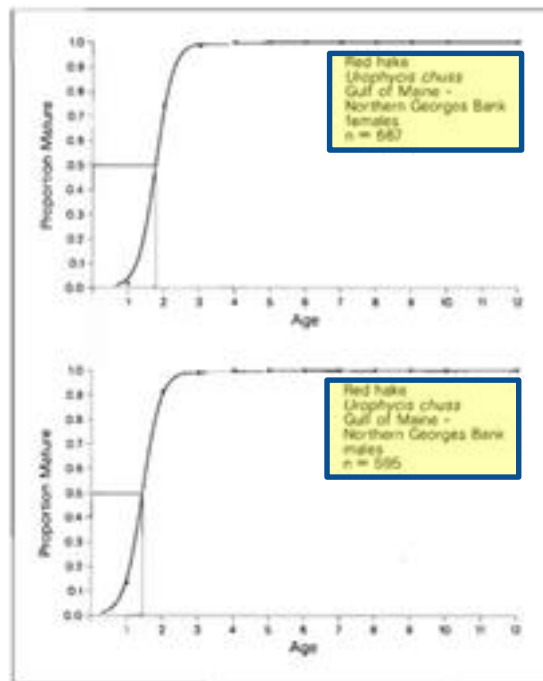


Figure 16

Calculated and observed (-) proportion mature at age based on macroscopic observations of whole gonads of female (n=667) and male (n=595) red hake, *Urophycis chuss*, from the Gulf of Maine-northern Georges Bank region sampled during Northeast Fisheries Science Center spring bottom trawl surveys, 1982-1985.

Table 18

Calculated proportion mature at age with approximate 95% confidence intervals based on macroscopic observations of whole gonads of female (n=667) and male (n=595) red hake *Urophycis chuss* from the Gulf of Maine-northern Georges Bank region sampled during Northeast Fisheries Science Center spring bottom trawl surveys*, 1982-1985.

Proportion mature	Age	95% Confidence interval	
		Lower	Upper
Females			
0.04	1.0	0.7	1.3
0.75	2.0	1.9	2.1
0.99	3.0	2.7	3.3
1.00	4.0	3.4	4.6
1.00	5.0	4.2	5.8
1.00	6.0	4.9	7.1
1.00	7.0	5.6	8.4
1.00	8.0	6.3	9.7
1.00	9.0	7.1	10.9
1.00	10.0	7.8	12.2
1.00	11.0	8.5	13.5
1.00	12.0	9.2	14.8
Males			
0.15	1.0	0.8	1.2
0.91	2.0	1.9	2.1
1.00	3.0	2.7	3.3
1.00	4.0	3.5	4.5
1.00	5.0	4.2	5.8
1.00	6.0	5.0	7.0
1.00	7.0	5.8	8.2
1.00	8.0	6.5	9.5
1.00	9.0	7.3	10.7
1.00	10.0	8.1	11.9
1.00	11.0	8.8	13.2
1.00	12.0	9.6	14.4

* Offshore strata 20-30, 36-40.

Table 4

Median age (yrs) at maturity (A_{50}), parameter values a and b from the logistic regression, standard error (SE) of a and b , and the number of females (F) and males (M) of fourteen species of finfish sampled off the northeast coast of the United States.

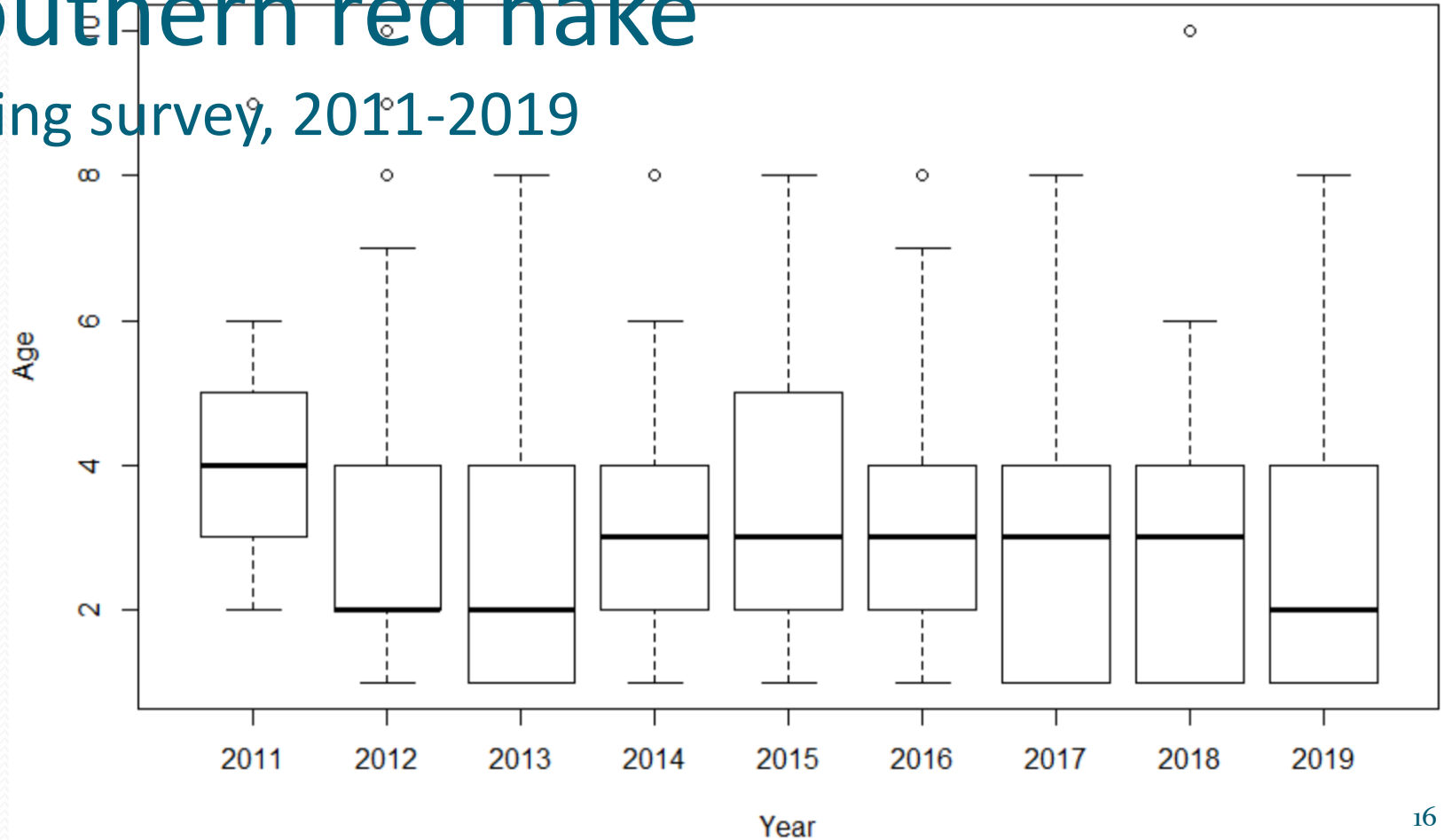
Species	Sex	a	SE a	b	SE b	A_{50}	n
<i>Atlantic cod, Gadus morhua</i>							
1985-1990							
Georges Bank	F	-2.842	0.301	1.626	0.151	1.7	970
	M	-3.258	0.306	1.725	0.129	1.9	1021
Gulf of Maine	F	-4.690	0.571	2.325	0.233	2.1	409
	M	-3.828	0.451	1.651	0.173	2.3	392
<i>Haddock, Melanogrammus aeglefinus</i>							
1985-1989							
Georges Bank	F	-3.283	0.482	2.233	0.250	1.5	589
	M	-2.784	0.494	2.189	0.275	1.3	478
Gulf of Maine	F	-4.423	1.096	2.504	0.792	1.8	69
	M	-4.190	1.915	1.963	0.698	2.1	49
<i>Pollock, Pollachius virens</i>							
1986-1988							
	F	-2.346	0.554	1.173	0.221	2.0	154
	M	-4.415	0.823	1.897	0.347	2.3	143
<i>White hake, Urophycis tenuis</i>							
1987-1989							
	F	-2.441	0.324	1.751	0.180	1.4	455
	M	-3.304	0.418	2.400	0.262	1.4	346
<i>Red hake, Urophycis chuss</i>							
1982-1985							
Gulf of Maine - Northern	F	-7.342	1.167	4.166	0.587	1.8	667
Georges Bank	M	-5.725	0.846	3.994	0.473	1.4	595
Southern Georges Bank-Middle	F	-5.534	0.485	3.205	0.251	1.7	1020
Atlantic	M	-4.957	0.452	2.799	0.235	1.8	753

Table 2. Biological reference points derived from simple production models and Groundfish Assessment Review Meeting (GARM) assessment results (NEFSC 2008). MSY: maximum sustainable yield, F_{MSY} : fishing mortality at MSY, B_{MSY} : biomass at MSY

Species	Production model reference points		
	F_{MSY}	MSY (kt)	B_{MSY} (kt)
Cod	0.27	18.842	69.329
Haddock	0.17	0.862	5.065
Silver hake	0.45	31.551	69.886
White hake	0.13	5.115	38.905
Red hake	0.44	3.687	8.437
Pollock	0.23	13.987	58.986
Yellowtail flounder	0.60	1.341	2.216
Winter flounder	0.36	2.557	7.040
American plaice	0.06	3.296	54.986
Witch flounder	0.02	3.045	15.237
Monkfish	0.15	4.367	27.977
Redfish	0.04	5.830	154.72
Sum		94.497	650.030
Aggregate model	0.16	73.846	509.746

Southern red hake

Spring survey, 2011-2019



Southern red hake

Spring survey, 2011-2019

