

Forage fish control population dynamics of North Sea whiting *Merlangius merlangus*

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Marine Ecology Progress Series 594: 213–230 (2018)

TABLE S1. Results of the analysis of the length-at-age of North Sea *Merlangius merlangus*. The length-at-age were compared between the periods 1990-1999, 2000-2007 and 2008-2014 using Kruskal-Wallis rank sum tests. Annual mean length-at-age by Roundfish Area and year was used for statistical comparisons.

Age	Sex	Period	MEAN length (cm)	SD length (cm)	N	χ^2 - value	df	P
1	F	1990-1999	17.2	1.2	70	14.75	2	<0.001
		2000-2007	16.6	1.5	55			
		2008-2014	16.4	1.4	49			
2	F	1990-1999	24.6	2.1	70	12.24	2	<0.01
		2000-2007	23.1	2.5	56			
		2008-2014	24.0	2.1	49			
3	F	1990-1999	30.0	1.7	69	20.95	2	<0.001
		2000-2007	28.5	1.7	56			
		2008-2014	30.1	1.9	49			
4	F	1990-1999	33.2	2.7	70	21.75	2	<0.001
		2000-2007	31.9	2.2	55			
		2008-2014	34.3	2.6	49			
5	F	1990-1999	35.6	2.5	62	25.84	2	<0.001
		2000-2007	33.6	2.6	50			
		2008-2014	37.4	3.4	47			
6	F	1990-1999	37.5	3.4	53	22.69	2	<0.001
		2000-2007	35.1	2.6	48			
		2008-2014	39.4	4.1	43			
1	M	1990-1999	16.8	1.3	70	12.22	2	<0.01
		2000-2007	16.3	1.1	55			
		2008-2014	16.3	1.3	49			
2	M	1990-1999	22.8	1.3	70	24.52	2	<0.001
		2000-2007	21.4	1.7	56			
		2008-2014	22.4	1.8	49			
3	M	1990-1999	26.8	1.5	70	17.44	2	<0.001
		2000-2007	25.7	1.4	56			
		2008-2014	26.9	1.6	49			
4	M	1990-1999	29.5	1.9	68	16.3	2	<0.001
		2000-2007	27.9	2.1	54			
		2008-2014	29.8	2.2	48			
5	M	1990-1999	31.1	2.2	64	21.78	2	<0.001
		2000-2007	29.7	2.4	48			
		2008-2014	32.3	2.6	48			
6	M	1990-1999	32.4	2.3	59	16.23	2	<0.001
		2000-2007	30.9	2.5	48			
		2008-2014	33.6	2.9	42			

TABLE S2. Results of the Wilcoxon rank sum test of the length-at-age data of female (f) and male (m) whiting sampled in different periods. *P*-values of the pairwise comparisons were adjusted using the Bonferroni correction. Annual mean length-at-age by Roundfish Area and year was used for statistical comparisons.

Sex-age	<i>W</i> -value			<i>P</i>	
		1990-1999	2000-2007	1990-1999	2000-2007
f-1					
	2000-2007	2403.5		2000-2007	<0.05
	2008-2014	2414	1537	2008-2014	<0.001
f-2					
	2000-2007	1254		2000-2007	<0.01
	2008-2014	1439	1660	2008-2014	0.41
f-3					
	2000-2007	1097		2000-2007	<0.001
	2008-2014	1689	1958	2008-2014	1
f-4					
	2000-2007	1116.5		2000-2007	<0.001
	2008-2014	1821	1971	2008-2014	1
f-5					
	2000-2007	781.5		2000-2007	<0.001
	2008-2014	1611	1765	2008-2014	1
f-6					
	2000-2007	820		2000-2007	<0.01
	2008-2014	1405.5	1612	2008-2014	0.15
m-1					
	2000-2007	1312		2000-2007	<0.01
	2008-2014	1193	1411.5	2008-2014	<0.05
m-2					
	2000-2007	2974		2000-2007	<0.001
	2008-2014	1248	1677	2008-2014	<0.05
m-3					
	2000-2007	1140.5		2000-2007	<0.001
	2008-2014	1568	1835	2008-2014	1
m-4					
	2000-2007	1125		2000-2007	<0.001
	2008-2014	1662.5	1791	2008-2014	1
m-5					
	2000-2007	809		2000-2007	<0.001
	2008-2014	1616.5	1676	2008-2014	1
m-6					
	2000-2007	1000		2000-2007	<0.05
	2008-2014	1521	1479.5	2008-2014	0.16

TABLE S3. Analysis of North Sea *M. merlangus* stomach contents in different years. Average stomach content per hauls was used for the statistical comparison. Results of the Kruskal-Wallis rank sum test for interannual differences of North Sea whiting stomach content masses per quarter (Q) and Roundfish Area (RA).

Q RA		W-value				P					
1	1	1991				1991					
		2012	228			2012	<0.05				
1	3	1991				1991					
		2012	149			2012	<0.05				
1	4	1991				1991					
		2012	59			2012	0.56				
1	6	1990	1991			1990	1991				
		1991	207			1991	0.99				
		2012	6	40			2012	<0.01 <0.05			
1	4	1991	2004	2005			1991	2004	2005		
		2004	1361			2004	<0.001				
		2005	1765	1205.5			2005	<0.001 <0.05			
		2006	1364	798.5	1931			2006	0.08 <0.001 0.36		
3	1	1991				1991					
		2007	2501			2007	<0.001				
3	2	1991				1991					
		2006	1450			2006	<0.001				
3	3	1991	1996	1997			1991	1996	1997		
		1996	1548			1996	<0.001				
		1997	1840	641			1997	<0.001 1			
		2007	614	312	426			2007	<0.001 <0.05 <0.01		
3	4	1991	1996	1997	2004			1991	1996	1997	2004
		1996	388			1996	1				
		1997	818	906			1997	<0.001 <0.001			
		2004	477	504	630			2004	<0.001 <0.001 <0.001		
		2006	1288.5	1368	1608	369			2006	<0.001 <0.001 <0.001 0.57	
4	2	1991				1991					
		2006	825			2006	<0.001				
4	4	1991	2005			1991	2005				
		2005	136			2005	1				
		2006	359	1550			2006	<0.001 <0.001			