

Compatibility of the hake model with the longline CPUE data

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Summary

CPUE data for the longline fishery for hake (which are not used in the model-fitting) are superimposed on the corresponding Reference case model-predicted values. Though agreement is reasonable in many instances, it is a concern that the most recent data are much lower than the model predicted values in a number of cases. Explanations for this need to be sought.

Keywords: South African hake, longline CPUE

Introduction

Hake longline CPUE data from Somhlaba *et al.* (2016) are superimposed onto the hake Reference case assessment estimates of longline exploitable biomass, given by Equation (1) below.

$$B_{y,f}^{exp} = \sum_g \sum_a N_{y,s,g,a} S_{s,g,y,f,a} \tilde{W}_{s,g,y,f,a} e^{-Z_{s,g,y,a}/2} \quad (1)$$

where

$B_{y,f}^{exp}$ is the mid-year model estimated exploitable biomass available to the longline fishery,
 $N_{y,s,g,a}$ is the number of fish of species s , gender g , and age a in year y ,
 $S_{s,g,y,f,a}$ is the longline selectivity-at-age for species s , gender g in year y ,
 $\tilde{W}_{s,g,y,f,a}$ is the longline selectivity-weighted weight-at-age function for species s , gender g in year y , and
 $Z_{s,g,y,a}$ is the total mortality-at-age vector for species s , gender g in year y .

Table 1 lists the nominal and standardised CPUE data from Somhlaba *et al.* (2016).

Results and Discussion

Figure 1 and Figure 2 show the plots of the CPUE data superimposed onto the model estimated exploitable biomass. Though agreement is reasonable in many instances, it is a concern that the most recent data are much lower than the model predicted values in a number of cases.

References

Somhlaba, S., Leslie, R.W. and Butterworth, D.S. 2016. Preliminary results of the revised catch per unit effort CPUE for the hake long line fishery of South Africa. DEFF Fisheries document FISHERIES/2016/AUG/SWG-DEM/34, 10pp.

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Table 1: Standardised and nominal CPUE series underlying Figure 4-7 of Somhlaba *et al.* (2016), as provided by Somhlaba (*pers. comm.*).

Year	West Coast longline				South Coast longline			
	<i>M. capensis</i>		<i>M. paradoxus</i>		<i>M. capensis</i>		<i>M. paradoxus</i>	
	Stand.	Nom.	Stand.	Nom.	Stand.	Nom.	Stand.	Nom.
1994	349.34	112.20	113.26	376.94	287.50	300.85	445.84	252.87
1995	289.18	171.43	164.17	516.59	250.94	351.92	347.57	272.55
1996	219.63	102.19	99.84	325.65	288.94	335.51	419.04	286.71
1997	230.34	68.34	74.49	260.58	246.22	257.11	352.47	208.92
1998	397.05	128.10	141.85	355.43	213.20	240.43	285.70	214.59
1999	232.07	151.28	146.99	345.29	222.79	262.51	287.42	215.40
2000	208.96	206.26	178.75	282.35	188.90	211.25	234.15	181.08
2001	178.16	176.32	131.93	238.99	170.24	201.24	194.41	164.72
2002	195.46	149.63	126.10	255.86	139.66	165.85	142.30	167.44
2003	112.65	113.15	81.02	167.87	128.92	161.95	142.59	144.12
2004	92.29	102.15	71.24	152.24	120.81	143.28	129.02	135.32
2005	83.04	92.68	62.70	137.24	111.97	139.80	130.58	100.60
2006	74.91	92.62	64.49	170.71	66.37	90.31	79.60	68.54
2007	61.13	85.31	61.03	129.50	64.47	93.24	74.96	70.74
2008	83.54	88.22	71.49	170.13	74.09	92.16	84.43	79.00
2009	116.82	158.99	111.76	203.31	92.96	109.59	111.60	96.44
2010	144.38	164.47	124.61	244.06	104.82	118.56	145.18	102.56
2011	126.73	249.02	20.92	193.59	203.41	237.68	0.05	11.00
2012	36.46	154.45	41.65	275.83	120.93	184.40	0.04	15.77
2013	16.10	104.09	34.34	229.19	98.81	157.87	0.03	4.66
2014	6.35	64.20	31.13	186.18	78.82	128.25	0.02	2.21
2015	8.20	79.10	18.26	127.72	59.28	116.14	0.01	29.58

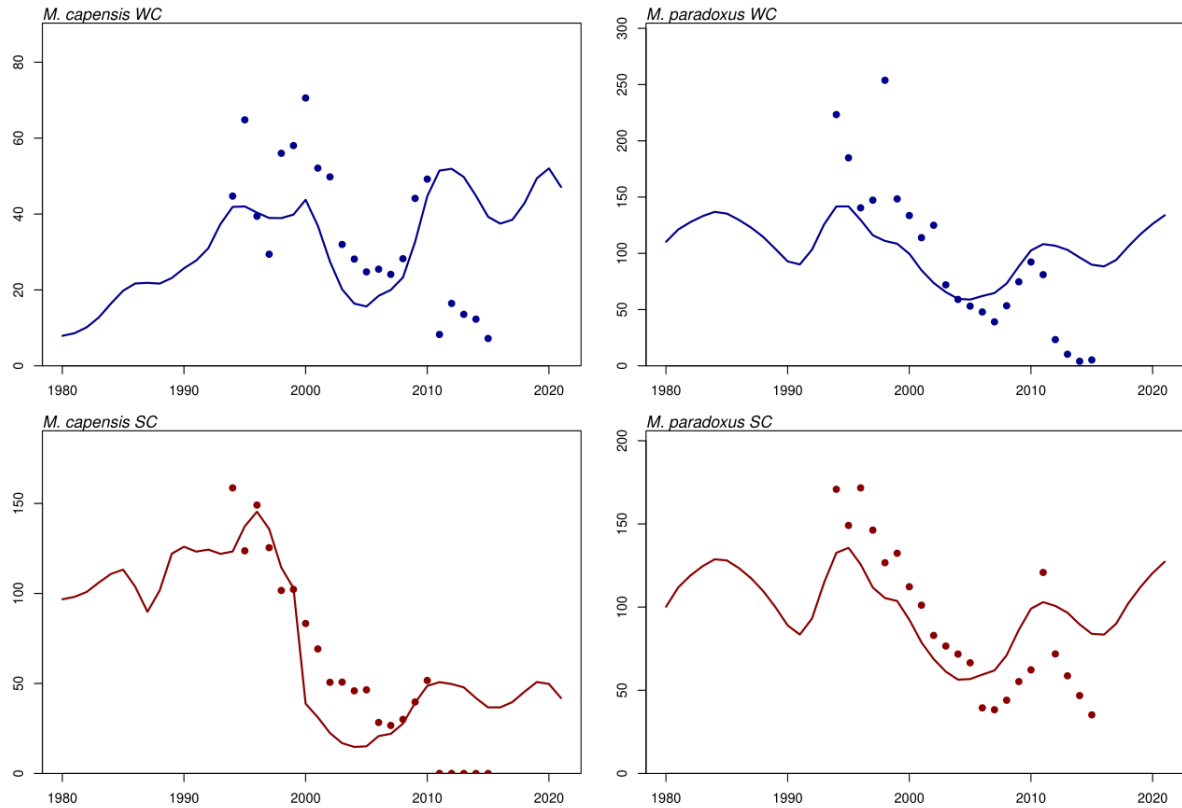


Figure 3: Longline **standardised** CPUE overlaid with the hake RC assessment model output. Each CPUE series has been normalised so that its mean is the same as the mean of the model output from 1980-2021.

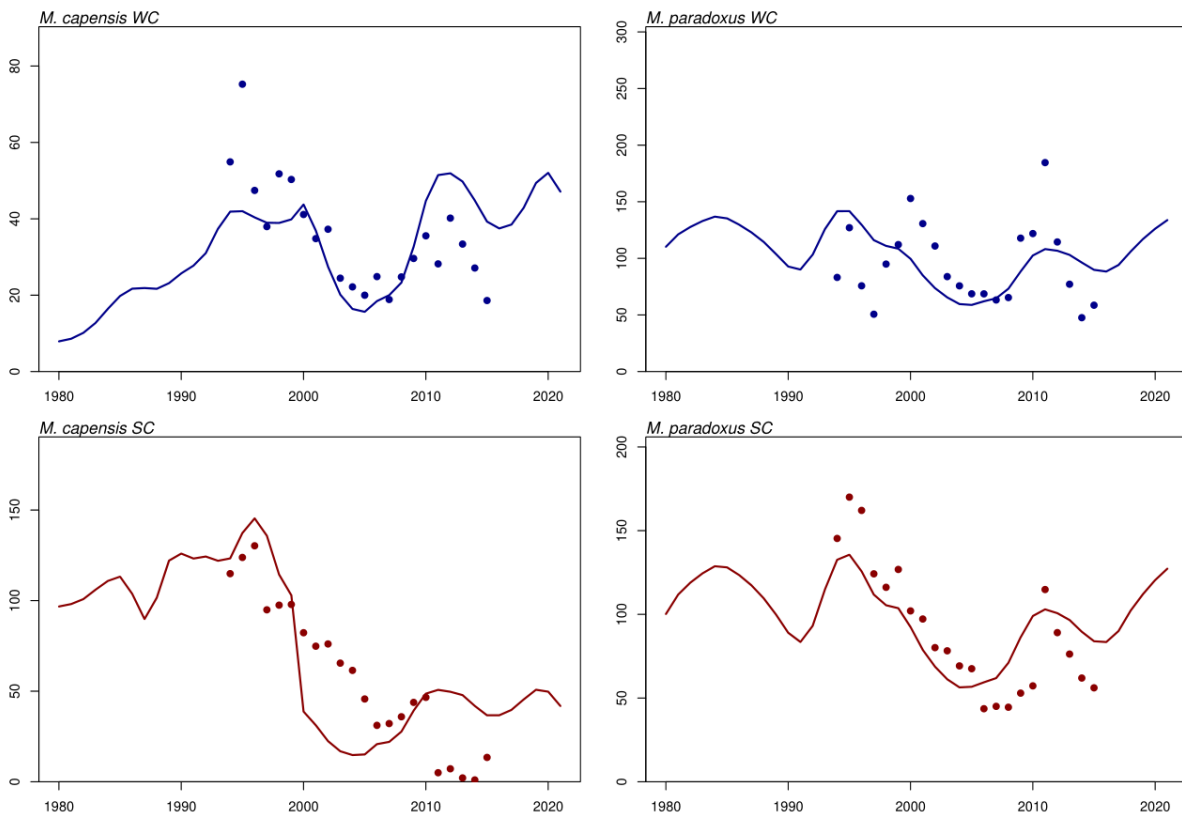


Figure 4: Longline **nominal** CPUE overlaid with the hake RC assessment model output. Each CPUE series has been normalised so that its mean is the same as the mean of the model output from 1980-2021.