AN INDIRECT INVESTIGATION OF THE POSSIBLE INFLUENCE OF PORT ON THE ESTIMASTION OF OBSERVER EFFECTS ON CATCH RATES IN THE PELAGIC FISHERY

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Introduction

Earlier GLM analyses of catch per hour data for sardine and anchovy to determine observer effects have suggested statistically significant increases in this catch rate with observers on the vessels over January-to June for the sardine fishery, and over May to October for the anchovy fishery (Somhlaba *et al*. 2006). This in turn has raised the possibility that this may reflect (and provide quantification of the extent of) slippage in the catching operations conducted without observers present.

In a presentation of these earlier results to Industry, concerns were raised about the absence of a port factor in the GLMs used to estimate these observer effects. The example quoted was that for a port such as Hout Bay, vessels take shorter times to steam to the fishing grounds, so that use of catch per hour at sea as an intended comparable measure of fish density would be confounded.

The port factor was not included in the GLM analyses because this information is not routinely recorded by inspectors. Use of the port of registry for the vessel was considered, but rejected because it was clear from the observer data that in many cases vessels leave from one port but return to another.

As a first attempt to investigate whether omission of a port effect is compromising the analysis, an indirect method has been used. Trips of less than a certain duration are omitted from the analysis and this limit is successively incremented to exclude trips of increased durations. The aim is to see whether the estimated size of the observer effect is changed as the limit is increased. The expectation is that the results from analyses of longer trips only would less biased by any port effect, because for those the proportion of the total time spent at sea which is devoted to steaming from the port to the shoals and later back again would be smaller. However, such an approach has the disadvantage that the size of any observer effect might be less precisely estimated due to smaller sample sizes as the minimum duration limit is increased, so that the power to detect an effect is diminished.

Results

Results are given in Table 1; the first column shows the results that were presented previously (Somhlaba *et al.* 2006) when no trip duration limits are imposed on the data. The limits of 4, 6, 8, 10, 12 and 16 hours were imposed and the observer effect

estimated in each case is shown together with the associated standard error. Table 2 reports the percentage of the data that is excluded in each case as the corresponding limit is imposed. The last column of Table 2 gives the total number of trips with and without observer coverage for each year.

Discussion

There is no appreciable effect on the estimates of observer factor that arises from the exclusion of trips of up to 10 hours for both species. When trips of less than 12 hours duration are excluded, positive effects for anchovy remain relatively unchanged, but there is a marked reduction of the Jan-Jun effect for sardine, though this remains statistically significant. When the limit is increased to 16 hours, significant positive observer effects remain only for the Poisson model for sardine.

In broad summary, these indirect computations to not give any major indication of unreliability of earlier estimates of positive observer effects in the anchovy fishery as a result of neglect of port factors, but there is a suggestion that the effect as estimated earlier for sardine may be too high.

Areas for further work

Although Port information is not recorded for trips, the times of hauls are recorded in addition to those of leaving and returning to port. Some measure of travelling time to and from the fishing grounds can thus be generated for each trip using the times recorded for the first and the last haul. This allows computation (by subtraction) of the time spent between hauls which provides a better basis to calculate catch per hour measures more likely to index fish density. Work is in progress to refine existing analyses taking this further information into account.

Reference

Somhlaba, S. …… 2006. Please add

Table 1: The proportional effect on catch per hour, aggregating over January to June and July to December for sardine, and over May to October and November to April for anchovy. Results reported earlier (Somhlaba *et al*. 2006) are shown ("No limit"), together with those when trips that are less than a certain duration are excluded (these limits are 4, 6, 8, 10, 12 and 16 hours).

MODEL			**SARDINE**						
logCPUE		No limits	Time limits						
			>4 hours	>6 hours	> 8 hours	> 10 hours	>12 hours	> 16 hours	
	Jan-Jun	**0.45**(0.073)	**0.46**(0.077)	**0.40**(0.083)	**0.48**(0.090)	**0.49**(0.096)	**0.25**(0.11)	0.24(0.14)	
	July-Dec	0.030(0.068)	0.029(0.068)	0.023(0.071)	0.039(0.074)	0.037(0.079)	0.074(0.049)	0.043(0.10)	
Catch (Poisson)									
	Jan-Jun	**0.50**(0.055)	**0.49**(0.057)	**0.42**(0.061)	**0.41**(0.065)	**0.40**(0.068)	**0.34**(0.075)	**0.34**(0.084)	
	July-Dec	0.020(0.044)	0.016(0.044)	0.010(0.045)	-0.0070(0.046)	-0.041(0.049)	-0.036(0.052)	**-0.17**(0.062)	
			ANCHOVY						
logCPUE									
	May-Oct	**0.10**(0.010)	**0.097**(0.020)	**0.11**(0.019)	**0.11**(0.020)	**0.12**(0.076)	**0.080**(0.024)	0.038(0.035)	
	Nov-Apr	-0.0056(0.010)	-0.017(0.063)	-0.0077(0.06)	**-0.21**(0.072)	**-0.19**(0.076)	**-0.33**(0.092)	**-0.43**(0.11)	
Catch (Poisson)									
	May-Oct	**0.19**(0.022)	**0.13**(0.022)	**0.14**(0.022)	**0.14(**0.023)	**0.13**(0.025)	**0.11**(0.027)	0.039(0.038)	
	Nov-Apr	**-0.22**(0.11)	**-0.22**(0.11)	**-0.24**(0.022)	**-0.53**(0.15)	**-0.50**(0.15)	**-0.90**(0.23)	**-1.04**(0.29)	

Table 2: The percentage of data that are lost with observers present (denoted by yes) and in cases where there are no observers (denoted by no), with the successive exclusion of trips that are less than a certain duration. The last column provides the total number of trips with and without observer coverage for each year.

	Sardine													
	> 4 hours		> 6 hours		>8 hours		>10 hours		> 12 hours		> 16 hours		**Year coverage**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
1999	0.0	3.3	0.0	7.9	7.1	13.1	9.5	19.9	16.7	27.3	33.3	43.1	**42**	**4541**
2000	0.0	1.3	7.7	5.2	23.1	12.5	30.8	20.5	53.8	30.2	69.2	45.5	**13**	**4264**
2001	1.2	3.0	1.6	8.3	3.3	14.9	7.7	23.1	12.1	31.6	18.9	50.4	**428**	**5637**
2002	0.0	7.0	5.8	16.3	5.7	25.3	9.4	33.9	17.0	41.7	18.9	56.1	**53**	**6293**
2003	0.8	2.9	3.7	7.4	6.6	10.7	8.3	13.8	10.2	16.4	16.6	20.0	**727**	**15935**
2004	8.1	11.6	17.8	20.8	28.6	27.9	33.0	33.8	43.2	39.4	47.6	47.2	**185**	**5021**
Total	**1.8**	**4.5**	**4.8**	**10.3**	**8.6**	**16.0**	**11.5**	**21.9**	**15.8**	**27.6**	**22.3**	**38.0**	**1448**	**41691**
	Anchovy													
1999	2.6	1.9	2.6	5.1	6.4	10.1	9.0	16.9	19.2	25.9	33.3	46.8	**78**	**2297**
2000	0.0	1.0	4.9	6.2	19.4	15.9	43.7	27.3	61.2	39.5	15.5	59.3	**103**	**2858**
2001	1.7	2.1	2.6	7.7	3.4	16.6	9.1	28.2	12.7	40.0	19.4	62.7	**464**	**3876**
2002	0.0	1.9	3.6	6.1	7.1	15.1	17.9	25.6	32.1	37.1	35.7	61.9	**28**	**2743**
2003	0.2	0.4	2.4	1.5	4.4	3.2	7.8	5.7	10.8	8.3	18.2	12.9	**632**	**8494**
2004	2.3	2.2	7.7	8.4	25.4	16.1	36.2	26.1	51.5	38.2	68.5	58.6	**130**	**2359**
Total	**1.0**	**1.3**	**3.1**	**4.8**	**7.2**	**10.6**	**13.6**	**17.9**	**19.9**	**26.1**	**24.1**	**41.4**	**1435**	**22627**