

Reconciliation of data from the lobster fisheries on Inaccessible, Nightingale and Gough Islands

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Introduction

For the years between 1997 and the present, a number of different data sources exist for the Tristan lobster (*Jasus tristani*) fisheries on the islands surrounding Tristan da Cunha . In an accompanying document (MARAM/Tristan/07/Dec/05), the sources of fisheries related data for Inaccessible, Nightingale and Gough, and the limitations of that data are described in detail. Catch and effort values from these sources had been shown previously to exhibit major differences. Here we relate progress made on reconciling these differences.

Data

Vessel factory reports containing details of the total packed weight are sent to the Natural Resource Department (NRD) on Tristan da Cunha every week and are used to keep track of the quota allocation for each season. The second source of data is the vessel logsheets that are submitted to the NRD at the end of each fishing trip. The logsheets contain information on the live weight of lobster caught and the number of traps used. The logsheets and factory reports are combined into a summary sheet containing the longline and powerboat catch (live weight) and effort (traps hauled) and the total packed weight for each

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trip. The summary sheets do not contain information on catering packs (holding processed lobster of lower quality), although this information is included in the factory reports and used for the TAC reconciliation. For the purposes of this report the packed weight included in catering packs was calculated independently for each season year and added to the packed weight given in the summary sheets.

The vessel logsheets were independently examined by MARAM to produce catch and effort statistics for each year. These are referred to as the logsheet records. Logsheets data was only available from 2000 to 2005 for Nightingale and Gough, but extended back to 1997 for Inaccessible.

Seasons

The Total Allowable Catch (TAC) is set according to a company season, which since 1997 has run from 1st September to 31st August with minor adjustments in recent years. However the previous company season ran from 1st of May until 31st April. To ensure consistency this company season is retained for calculations of the catch and Catch per Unit Effort (CPUE) and is referred to as a season year. Because fishing at Inaccessible and Nightingale generally finishes early in the calendar year, fishing for a particular company season falls within the same season year. At Gough however, fishing continues until August. This means that fishing in one company year will fall into different season years.

The last season for the previous concession holder (Tristan Investments) ran from 1st May to 31st December 1996. The first season for the current concession holder (Ovenstone) ran from 1st January to 31st August 1997. For purposes of the TAC reconciliations presented here we have assumed that the 1997 company season begins on 1st September 1997. For the CPUE calculations, the packed weights from each trip in the first Ovenstone season are allocated to the appropriate season year (either 1996 or 1997).

Reconciliation

The packed weight recorded on weekly factory reports is the most reliable figure in the fishery. To reconcile the data sets we first establish that packed weights from the summary sheets match those given by the TAC reconciliations tracked independently by the NRD and Ovenstone fisheries. This indicates whether summary sheets have been misplaced. We next compare the logsheet record of catch with the catch recorded on the summary sheets, with catches in this case referring to live weight. Provided that these figures match, we can then use the logsheet record of effort to validate the effort recorded on the summary sheets.

Calculation of the CPUE

The longline catch recorded on the vessel logsheets (and therefore the summary sheets) is unreliable, as is the powerboat effort. To estimate the longline catch we therefore subtract the powerboat catch, which is more reliable than the longline catch, from the total packed weight. Because the packed weight is an underestimate of the live weight, we first increase the total packed weight by 2%. Dividing the total estimated longline catch by the total number of longline traps gives the nominal CPUE. No attempt has been made to account for different traps used in the longline fishery although this would only be relevant for 1997 and 1998, when beehive traps were used sporadically instead of the usual monster traps. Although the CPUE does not relate directly to issues of data reconciliation it is presented here for illustrative purposes.

Inaccessible Island

Data from Inaccessible is given in Tables 1, 4 and 7. For one trip in 1997, longline catch had been recorded in the vessel logsheet as numbers caught rather than kilograms. We therefore multiplied this figure by the average weight of a single lobster (0.24kg - obtained from the total packed weight over the total number packed) when calculating the logsheet record of catch.

Figure 1 illustrates that the match between different data sources is good. Importantly, information provided by the summary sheets appears to be accurate. Missing logsheets are a probable explanation for the catch and effort discrepancies between the summary sheets and logsheet records. Furthermore, logsheet data could also be missing from 2006 so that the high CPUE value estimated for that year should be viewed with caution.

Nightingale

Data from Nightingale is given in Tables 2, 5 and 8. Figure 2 shows that the total packed weight recorded on the summary sheets is accurate, with a minor discrepancy in 1997. It is also clear that a number of logsheets were likely missing when they were examined by MARAM. Nevertheless, there is sufficient evidence to suggest that the summary sheets are accurate.

One week of logsheet data was misplaced before the summary sheet for 2006 was prepared. This means that the CPUE calculated for that year is likely to be an overestimate.

Gough

Data from Gough is given in Tables 3, 6 and 9. Because fishing at this island falls into different company and season years, the packed weights given in Table 6 differ from the other tables. The catering pack information was only available for each season year (not company year) and could therefore not be added to the summary sheet packed weight when comparing with packed weights from Ovenstone and the NRD TAC reconciliation. This accounts for some (but not all) of the discrepancy seen in Figure 3. Nevertheless there is still an approximate match. The logsheet records also validate the effort recorded on the summary sheets.

When calculating the CPUE it was necessary to take into account the fact that one trip in 2000 fell across the boundary of the 2000 and 2001 season year. Because logsheet data is missing (as can be seen from the figure) so that effort could not be split accurately between the seasons, with only summary sheets available, it was necessary to exclude that trip from CPUE calculations.

Conclusion

We have demonstrated that the different sources of data, if not identical, are at least consistent. This reconciliation process suggests that the summary sheet data between 1997 and 2006 could be used to calculate the CPUE in future assessments of the resource. As a means of data recording however, the summary sheets themselves are inadequate, containing frequent typographical errors, insufficient detail and being unwieldy to analyse. Indeed, they required extensive revision before they could be included in the work presented here. It is important that proper data logging protocols are put into place if this reconciliation procedure is not to be repeated.

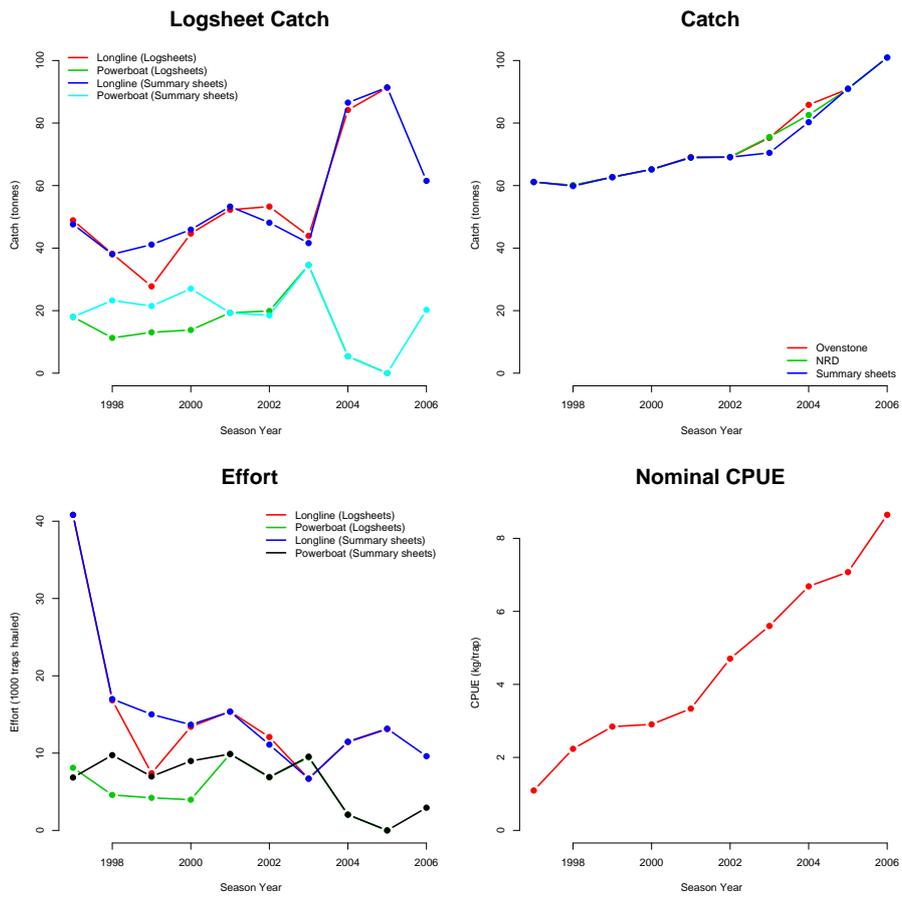


Figure 1: Summary of data available from **Inaccessible** Island. Logsheet catch and effort are obtained from Table 1, Catch from Table 4 and CPUE from Table 7

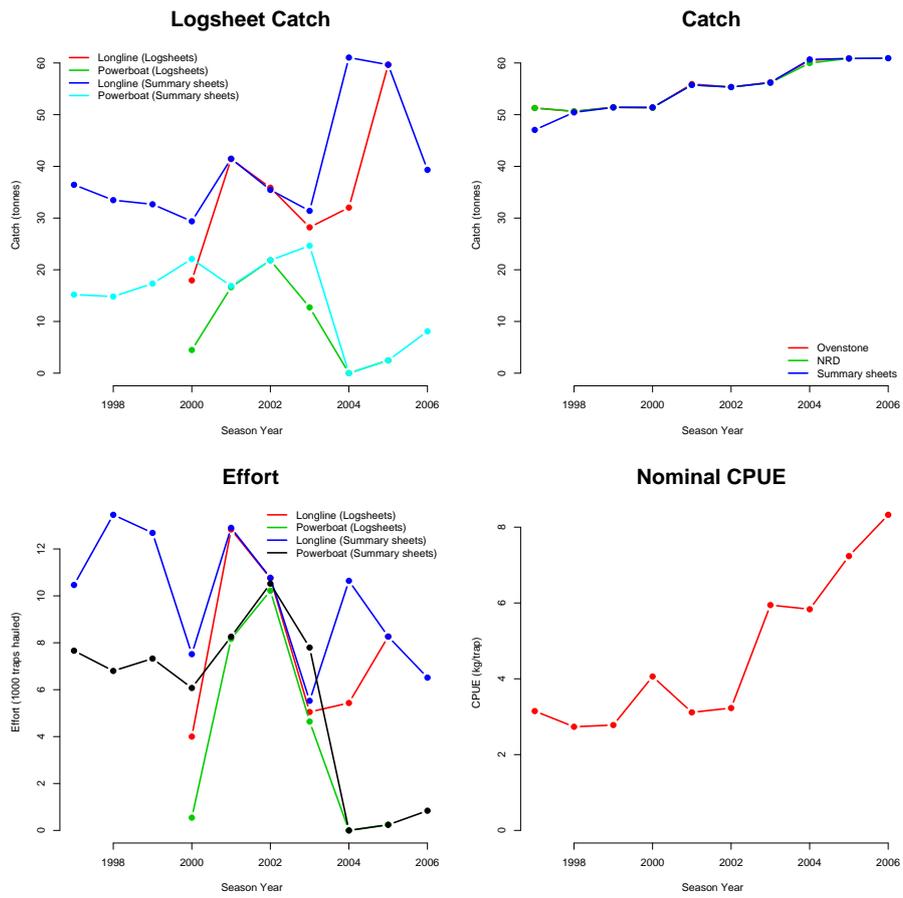


Figure 2: Summary of data available from **Nightingale** Island. Logsheet catch and effort are obtained from Table 2, Catch from Table 5 and CPUE from Table 8

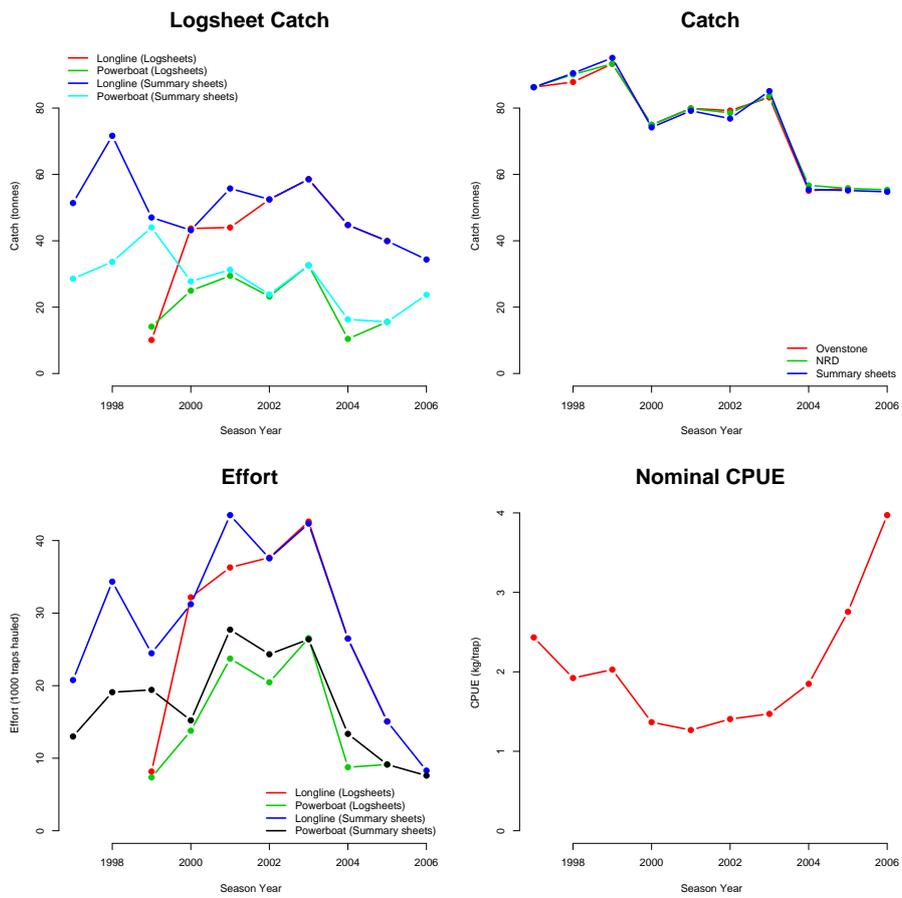


Figure 3: Summary of data available from **Gough** Island. Logsheet catch and effort are obtained from Table 3, Catch from Table 6 and CPUE from Table 9

Table 1: Summary of data available from **Inaccessible** Island. A season years is from 1st May until 31st April. Packed weight refers to the total catch after processing, including catering packs, and is given in kilograms. Longline and powerboat catches are given in kilograms of live weight and effort in the number of traps hauled

Season Year	Catch			Effort			
	Packed weight	Summary sheets Longline	Powerboat	Logsheets Longline	Powerboat	Summary sheets Longline	Powerboat
1997	61190	47610	17996	48894	17990	40814	8101
1998	59836	38027	23238	38205	11288	16994	4588
1999	62686	41121	21469	27768	13055	15008	4215
2000	65203	45907	26992	44655	13808	13674	3974
2001	68953	53289	19316	52254	19316	15358	9882
2002	69088	48133	18471	53278	19881	11098	6854
2003	70467	41609	34589	43909	34584	6697	9431
2004	80271	86525	5374	84170	5374	11479	2035
2005	91020	91400	0	91300	0	13162	0
2006	100942	61510	20270			9601	2935

Table 2: Summary of data available from **Nightingale** Island. Units are as for Table 1

Season Year	Packed weight	Catch			Logsheets			Effort		
		Summary sheets Longline	Powerboat	Longline	Summary sheets Longline	Powerboat	Longline	Summary sheets Powerboat	Longline	Powerboat
1997	47052	36440	15197		10464	7661				
1998	50443	33466	14821		13455	6799				
1999	51402	32663	17330		12685	7326				
2000	51412	29372	22087	17955	4485	6073	4000	544		
2001	55747	41490	16862	41409	16627	8259	12831	8167		
2002	55336	35448	21839	35876	21839	10519	10750	10219		
2003	56199	31395	24652	28207	12726	7796	5049	4640		
2004	60685	61046	0	32025	0	0	5433	0		
2005	60868	59660	2470	59660	2470	240	8264	240		
2006	60922	39325	8095		6514	840				

Table 3: Summary of data available from **Gough** Island. Units are as for Table 1

Season Year	Packed weight	Catch			Effort		
		Summary sheets Longline	Powerboat	Logsheets Longline	Summary sheets Longline	Powerboat	Logsheets Longline
1997	77309	51380	28567		20767	12989	
1998	97376	71639	33641		34334	19098	
1999	91530	47023	44034	10098	14104	19416	8163
2000	71953	43187	27781	43700	24971	15212	32182
2001	88095	55763	31248	44008	29438	27712	36287
2002	74876	52484	23842	52438	23221	24327	37651
2003	92723	58514	32596	58618	32586	26378	26549
2004	63770	44781	16299	44728	10436	13355	26495
2005	55781	39920	15565	39950	15565	9130	15063
2006	55365	34355	23715		8291	7600	

Table 4: TAC reconciliation **Inaccessible** Island. A company year refers to the financial year of the concession holder. Units are kilograms of packed weight.

Company Year	TAC	NRD	Ovenstone	Summary sheets
1997	60000	61108	61108	61190
1998	60000	60102	60102	59836
1999	60000	62725	62725	62686
2000	65000	65131	65131	65203
2001	68000	68918	69134	68953
2002	68000	69175	69062	69088
2003	75000	75536	75281	70467
2004	85000	82574	85829	80271
2005	90000	90844	90876	91020
2006	100000	100946		100942

Table 5: TAC reconciliation **Nightingale** Island. Units are as for Table 4

Company Year	TAC	NRD	Ovenstone	Summary sheets
1997	51000	51288	51288	47052
1998	51000	50641	50641	50443
1999	51000	51433	51433	51402
2000	51000	51348	51348	51412
2001	55000	55748	55927	55747
2002	55000	55334	55340	55336
2003	55000	56173	56250	56199
2004	60000	59981	60515	60685
2005	60000	60868	60871	60868
2006	60000	60924		60922

Table 6: TAC reconciliation **Gough** Island. Units are as for Table 4. Note that the packed weight obtained from the summary sheets differs from the packed weight given in Table 3. This is because catches fall into different company and season years, which are disjoint. Catering packs are excluded for the same reason.

Company Year	TAC	NRD	Ovenstone	Summary sheets
1997	100000	86304	86304	86291
1998	100000	90137	87850	90509
1999	100000	93359	93359	95128
2000	90000	74941	74941	74183
2001	80000	79876	79906	79181
2002	80000	78558	79237	76830
2003	88000	83704	83215	85117
2004	55000	56708	55083	55455
2005	55000	55780	55784	55161
2006	55000	55368		54765

Table 7: Nominal CPUE series from **Inaccessible** Island. The packed weight, powerboat catch and longline effort are as recorded in Table 1. Packed weight is adjusted to compensate for weight lost due to processing and overpacking. Estimated longline catch in kilograms of live weight is obtained from the difference between the adjusted packed weight and the powerboat catch. This is divided by the longline effort to obtain the nominal CPUE. Note that the CPUE for 2006 may be an overestimate due to missing logsheet data and should be viewed with caution.

Season Year	Packed Weight	Adj. Packed Weight	Powerboat Catch	Est. Longline Catch	Longline Effort	Nominal CPUE
1997	61190	62605.32	17996	44609.32	40814	1.09
1998	59836	61220.01	23238	37982.01	16994	2.24
1999	62686	64135.93	21469	42666.93	15008	2.84
2000	65203	66711.15	26992	39719.15	13674	2.90
2001	68953	70547.88	19316	51231.88	15358	3.34
2002	69088	70686.01	18471	52215.01	11098	4.70
2003	70467	72096.90	34589	37507.90	6697	5.60
2004	80271	82127.67	5374	76753.67	11479	6.69
2005	91020	93125.29	0	93125.29	13162	7.08
2006	100942	103276.79	20270	83006.79	9601	8.65

Table 8: Nominal CPUE series from **Nightingale** Island. The packed weight, powerboat catch and longline effort are as recorded in Table 2. Calculation of the CPUE is the same as for Table 7. Note that the CPUE for 2006 is an overestimate due to missing logsheet data and should be viewed with caution.

Season Year	Packed Weight	Adj. Packed Weight	Powerboat Catch	Est. Longline Catch	Longline Effort	Nominal CPUE
1997	47052	48140.31	15197	32943.31	10464	3.15
1998	50443	51609.75	14821	36788.75	13455	2.73
1999	51402	52590.93	17330	35260.93	12685	2.78
2000	51412	52601.16	22087	30514.16	7514	4.06
2001	55747	57036.43	16862	40174.43	12900	3.11
2002	55336	56615.92	21839	34776.92	10772	3.23
2003	56199	57498.88	24652	32846.88	5525	5.95
2004	60685	62088.64	0	62088.64	10641	5.83
2005	60868	62275.88	2470	59805.88	8264	7.24
2006	60922	62331.13	8095	54236.13	6514	8.33

Table 9: Nominal CPUE series from **Gough** Island. Powerboat catch and longline effort are as recorded in Table 3. Packed weights are as for Table 3 except for 2000 and 2001, which have been recalculated to account for missing powerboat data. Calculation of the CPUE is the same as for Table 7

Season Year	Packed Weight	Adj. Packed Weight	Powerboat Catch	Est. Longline Catch	Longline Effort	Nominal CPUE
1997	77309	79097.16	28567	50530.16	20767	2.43
1998	97376	99628.31	33641	65987.31	34334	1.92
1999	91530	93647.09	44034	49613.09	24466	2.03
2000	68851	70443.52	27781	42662.52	31224	1.37
2001	84403	86355.24	31248	55107.24	43502	1.27
2002	74876	76607.79	23842	52765.79	37542	1.41
2003	92723	94868.06	32596	62272.06	42336	1.47
2004	63770	65244.81	16299	48945.81	26480	1.85
2005	55781	57071.21	15565	41506.21	15063	2.76
2006	55365	56645.59	23715	32930.59	8291	3.97