Hake Data: problems, solutions and GLM CPUE sensitivity to alternate scenarios

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Executive Summary

The checks carried out on the hake offshore trawl catch and effort data, which provide the basis to split the catches by species and to obtain GLM-standardised CPUE indices of abundance by species, have focused on two separate steps. The first was a re-extract of the data from the original files to check for possible errors in the earlier extracts (this applies to the subset of the data for which size composition information can be unambiguously extracted). The second step was to increase the proportion of the data utilised (and at the same time to check for possible selection biases in the existing sample) by assigning size composition to drags for which this information was not directly available, on the basis of the average for other vessels for which this was available for the area and time at which the fishing concerned took place. The first step revealed a problem with extractions over the last few years which at times for certain vessels had linked the accumulated catch for the day with only the effort for the last trawl of the day, rather than for all trawls that day combined. This means that over these recent years, CPUE has been overestimated. Compared to previous perceptions, CPUE fell more rapidly from 2003, but subsequently has been increasing faster since 2006 for M. paradoxus than previously thought (see Figure 1 of the document). Including information for trawls not previously sampled at step 2 adds a further 20% of the total number of hake targeted fishing vessel-days to the analysis, but makes little difference to the resulting CPUE trends (except for M. capensis for the first few years of the Century). For this extended data analysis, the proportion of hake targeted fishing vessel days included in the GLM-standardisation of the CPUE series drops from about 80% in the early years of the Century to about 50% presently. The primary reason for this decrease is the past decision, for comparability reasons, to restrict the data considered in the CPUE standardisation to those offshore companies which have been operating since 1994, so that new companies operating since the recent rights reallocation exercise are not considered.

1. The hake database

A key input into the hake OMP (in order to produce a TAC recommendation), is the CPUE data series that are produced from applying a GLM to an input data set of hake catch and effort data.

Hake catches are reported in two ways:

i) Fine scale data: On the vessel the skipper estimates the catch for each drag, as well as recording important information on depth, longitude and latitude, time and effort [called the "drag" data].
ii) Onshore when the vessel is offloaded (called a landing), catches are more accurately measured for each product category [called the "landing" data]. Each landing is associated with a number of drags made at sea.

Essentially, the input data set that are used in the CPUE GLM analysis are based on the drag data which are modified in such a way so that the catches (by tonnage) are scaled to reflect the more accurate measures of catch contained in the landing data. Full details of the various steps involved in this process are found in Appendix 1. Importantly, these steps separate hake catches into small, medium and large categories, as different algorithms apply to each of these when splitting the catch by species dependent of its position.

2. The current problems & solutions

The drag data currently used as input into the GLM CPUE analysis for hake has several problems:

a) Currently, the input drag data is missing a large proportion of data available in the full database as some of the landing records could not be matched perfectly with the associated drag files [due to mismatched product codes]. If this problem occurred, then all drag records associated with that landing are excluded from the GLM input drag data. There are also a number of further exclusions that result from the GLM exclusion process detailed in Appendix 1. These two processes result on average 54% of the data being excluded from the input database (see Table 1 for more details).

b) As described in detail in Appendix 1 (see Table A1.1), not all category codes were included in the original GLM extract. However, the majority of the codes that were omitted are in fillet categories which are lumped and then spread across the size categories in the species-splitting algorithm. However, for this exercise all possible codes were included and the results compared to the original extract are given in Appendix 1.

c) The GLM input drag data often in recent years has excluded drags which had no catch associated with them. In large part this reflects the freezer vessels which generally report what is referred to as "daily tallies" where they report all the catch for one day against the last drag of the day. These drag records are flagged as daily tallies in the database to distinguish from drag tally records. As these fishing trips usually last 30 days with at least 3/4 trawls per day the number of drags without catch (see Appendix 1 Table A1.2 zerocatch drag_ID n) can be appreciable. How this came to pass is unclear as not all drags without catch were omitted from the previous GLM input drag data when compared with the full database.

<u>SOLUTION: The "quick" method</u>

In order to improve the percentage of data included in the GLM input the following was done:

- A file containing all the drags that are omitted from the final input to the GLM was created (called non-input drag file)
- A file containing all the landings that could not be matched to drag files was created (called non-input landing file – extracted from "drag no effort" table in database – see Appendix 1)
- At the non-input landing level, sum hake to get the total hake catch for that landing (Lhake) (Appendix 1 Table A1.1)
- In the non-input drag file, at the drag level, sum hake to get the total hake per drag (Appendix 1 Table A1.1)
- Apportion Lhake across the drags of the non-input drag file in a pro-rata basis to create a new total hake per drag
- Use the size structure information per season/area/depth (see Table 2b) to split the total hake catch per drag into small, medium and large hake as explained below.

Glazer's size structure proportions

The "quick" method applied was intended to use two different sets of size structure proportions (Glazer 2009). The Reference Case scenario set of proportions were generated using the existing GLM strata. The sensitivity set of proportions would have been generated using strata at a finer depth scale; however the various authors' impression after working with the data was that such additional stratification would have made little difference to the results, and since it would have required considerable extra time to conduct the extra analyses, a decision was made to omit them. These proportions were derived from the data that are currently included in the GLM analyses (after all exclusions have been applied), and are simply the proportions of small, medium and large hake within a given cell which, for each year, is defined by a depth range, latitude range (for the West Coast) or longitude range (for the South Coast), and quarter (Jan-Mar, Apr-Jun, July-Sept and Oct-Dec). The reason for defining cells at a quarterly level rather than a monthly level was to avoid getting cells which had no or very few samples in them. Even at the quarterly level there was a need to aggregate across lat (or long) within some depth ranges to ensure sample sizes in each cell greater than or equal to 5. Table 2a provides a breakdown of the sample sizes per cell, and Table 2b presents the proportions per cell after the amalgamation of cells to eliminate small sample sizes.

3. GLM CPUE output associated with various input data scenarios

The three GLM options reported in this document are as follows (refer to Appendix 1):

- GLM1: as per the standard extracts for the GLM that were supplied to Jean Glazer in the past
- GLM2: using an extract from the ACCESS database developed independently by Tracey Fairweather from the original data; this includes all product categories and zero catch drags, but excludes landings where the mapping of products between landings and drags was problematic; this is distinguished from GLM1 because of the finding that for reasons that are not clear, in recent years the extracts provided to Jean Glazer did not include a fair proportion of the matched data because of the problem described in 2c) above.
- GLM3: using an extract from the ACCESS database, which includes all product categories and zero catch drags and with the "quick" application so that the non-mapped landings can now also be included in the analyses.

The proportion of the overall offshore trawl drags included in each of these GLMs is given in Table 1, as is the number of days after the accumulation process, and the number of days that contribute to the standardized indices after the application of the standard exclusions for the GLM, namely:

- . Both Coasts:
  - Records (vessel-days) on which effort = 0 (erroneous) - relevant to the pre-2000 data.
  - Vessel-days where total catch (i.e. for all species) = 0, but effort > 0 (assumed to reflect an aborted drag for some reason or another).
  - Non hake-directed vessel-days (reflected by the target code) since the analyses are concerned with modelling the hake stocks.
  - Twin trawlers (these vessels can chose to deploy a single or twin trawl on any particular tow, and the CPUE for twin trawls is generally higher than for single trawls. However, the database currently does not include a field to indicate the gear deployed, therefore all data for the twin trawlers had to be excluded.).

- West Coast:
    - Vessel-days where effort > 1090 minutes (~18 hours) – considered a reasonable cut-off for daily drag duration and used to objectively exclude potentially erroneous records.
    - Vessel-days where hake CPUE > 99% quantile of hake CPUE (these are year-specific and are considered a reasonable method to exclude potentially erroneous records).
    - Vessel-days where bycatch CPUE > 99% quantile of bycatch CPUE (these are year-specific and are considered a reasonable method to exclude potentially erroneous records).
- South Coast:
    - Vessel-days where effort > 865 minutes (~14 hours) – considered a reasonable cut-off for daily drag duration and used to objectively exclude potentially erroneous records.
    - Vessel-days where hake CPUE > 99% quantile of hake CPUE (these are year-specific and are considered a reasonable method to exclude potentially erroneous records).
    - Vessel-days where bycatch CPUE > 99% quantile of bycatch CPUE (these are year-specific and are considered a reasonable method to exclude potentially erroneous records).

Once the above exclusions have been applied the sample sizes of the year/depth/lat(long) cells are determined, and data from those cells where $n \leq 5$ are excluded from the analyses given that the inclusion of these data may lead to very imprecise results because of small sample size.

It should be noted that the calculation of the 99% quantiles for hake CPUE and bycatch CPUE are specific to the datasets being analysed (i.e. these differ for GLM1, GLM2 and GLM3 for the period 2000-2008), as are the exclusions related to cells with $n \leq 5$.

Table 4 lists the selected companies used in the GLM. These were the offshore company complement in 1994, when these analyses were first conducted. The GLM has continued to be restricted to this set only for comparability purposes.

4. Results

OLRAC vs MARAM

Both Gaylard *pers. commn* (from OLRAC) and De Decker and Johnston (from MARAM) produced final output files (to be used as input to the GLM) which were cross checked (for 2006) to ensure no mistakes had been made in this process. Table 3 reports the results of this cross-checking, which indicate scarcely any differences.

The standardized CPUE indices for *M. capensis* and *M. paradoxus* for the respective GLMs are shown in Figures 1-2. Plots of the nominal CPUE vs the standardized indices for GLM3 are shown in Figures 3 and 4.

5. Conclusions

GLM3 is considered to be the best series to use for TAC evaluation as it takes account of the greatest extent of data. The proportion is initially high, but drops in recent years with the introduction of new companies (Table 1).

The most obvious difference in the CPUE series brought about by the data revisions is that for *M. paradoxus*, Figure 2 shows that GLM2 and GLM3 drop much lower than GLM1 over the 2004-2007 period. The primary reason for this is the error detected under 2c). Previously for a number of vessels in recent years, the total daily catch was linked only to the effort expended for the final drag of the day, thus inflating the CPUE.

Acknowledgements
James Gaylard from OLRAC is thanked for his contribution in cross-checking the results for 2006 produced by MARAM in this document.

Table 1: Number of hake targeted days for ALL offshore companies, and for the select offshore companies after the GLM exclusions for GLM1, GLM2 and GLM3. The percentage increase in the number of days analyzed from GLM1 to GLM3 is also shown.

Year	All offshore companies, Hake target days only	Select offshore companies: post-GLM exclusions			Select offshore GLM companies post-exclusions as a percentage of A1			days % increase from GLM1 to GLM3
	A1	GLM1 (E1)	GLM2 (E2)	GLM3 (E3)	E1/A1	E2/A1	E3/A1	
2000	10705	7108	8232	9147	0.66	0.77	0.85	0.19
2001	11793	6698	6825	9766	0.57	0.58	0.83	0.26
2002	12320	6668	7196	9687	0.54	0.58	0.79	0.25
2003	13372	6402	6565	9037	0.48	0.49	0.68	0.20
2004	15127	6442	6085	8433	0.43	0.40	0.56	0.13
2005	14993	6482	6274	7686	0.43	0.42	0.51	0.08
2006	14278	5589	5359	7716	0.39	0.38	0.54	0.15
2007	12950	4626	4576	6826	0.36	0.35	0.53	0.17
2008	10239	3268	3168	5331	0.32	0.31	0.52	0.20

Table 2a: Sample sizes per year, depth, lat (long) and quarter. Cells within a depth stratum that have been shaded have been amalgamated.

		W ?100m			W101-200m		W201-300m				W301-400m				W >400m				S ?100m	S101-200m		S >200m	
year	quart	3100-3300	3300-3420	>3420	3300-3420	>3420	<=3100	3100-3300	3300-3420	>3420	<=3100	3100-3300	3300-3420	<3420	<=3100	3100-3300	3300-3420	>3420	GE22	<22	GE22	<22	GE22
2000	Jan-Mar				12	17	2	9	70	151	1	21	150	350	26	186	115	420		7	81	19	190
	Apr-Jun				22	14	12	20	113	113	8	33	329	280	30	161	267	207		8	123	9	91
	Jul-Sep				13	5	14	18	158	231	6	40	226	199	28	241	142	138		4	50	9	115
	Oct-Dec				1	2		18	27	396	13	29	81	229	18	280	259	177		27	51	35	161
2001	Jan-Mar				10	14	2	13	59	242	3	10	77	291	6	118	223	284		39	28	34	91
	Apr-Jun				17	5	5	4	83	149	2	46	239	269	12	268	233	350		27	10	12	48
	Jul-Sep				17		9	6	48	89	19	14	134	183	22	321	332	395		6	32	12	20
	Oct-Dec				17	1		7	28	196	1	25	133	307	17	223	283	308		24	35	20	91
2002	Jan-Mar				16	13	1	14	37	128	8	12	104	225	19	177	125	322		4	18	25	185
	Apr-Jun				22	1	2	7	123	92	3	44	233	230	7	159	220	415			3	47	6
	Jul-Sep				28	2	3	6	40	235	15	66	146	445	16	243	222	218		2		20	65
	Oct-Dec				21	2	2	1	19	203	18	10	139	278	8	125	452	303		42	5	28	193
2003	Jan-Mar				20	4	6	34	51	80	23	9	141	195	1	227	149	382		32	27	33	359
	Apr-Jun				22	5	20	18	62	191	11	33	317	278	4	110	292	352		6	3	93	74
	Jul-Sep				16	4	1	8	26	189	14	14	131	348	15	291	164	189		3		26	73
	Oct-Dec				10	1		2	18	142	2	8	144	191	15	93	228	260		24		13	75
2004	Jan-Mar		3	9	8	4		4	16	33		28	31	108	4	50	102	397	9	11	19	47	269
	Apr-Jun				24	9	8	17	48	179	4	33	239	205	4	101	495	264		10	6	16	73
	Jul-Sep		5	38	5	14	4	3	28	172	6	15	208	392	26	98	326	243	5	7	7	13	112
	Oct-Dec		4	33	10	27	14	4	27	239	13	39	87	204	11	258	238	296	2	30	11	38	243
2005	Jan-Mar		1	1	8	15	8	6	41	178	14	49	152	250	22	62	183	472		33	46	32	305
	Apr-Jun		2	1	18	9	16	10	49	125	17	60	226	251	12	128	318	355		21	31	25	111
	Jul-Sep	39	46	2	6	5	4	3	13	103	2	65	91	194	17	253	392	374		6	17	10	96
	Oct-Dec	15	5	2	2	2	3	1	5	58	10	2	26	92	41	122	163	225		8	30	12	257
2006	Jan-Mar		5	6	4	37		1	46	120	5	4	139	214	4	69	165	437		36	33	32	141
	Apr-Jun		2	3	11	6		3	15	70	1	51	146	169	29	99	273	400		6	22	13	55
	Jul-Sep		6	2	4	2		5	10	136	3	10	98	258	5	120	271	309		9	16	101	83
	Oct-Dec		4	4	2	23		2	12	164	1	10	77	218		75	143	297		5	14	52	166
2007	Jan-Mar		3	4	4	3	5		29	117	12	50	144	357	10	130	70	218		7	21	18	125
	Apr-Jun		1	4	10	3	1		53	92	4	32	207	235	10	156	142	240		1	17	23	44
	Jul-Sep		5	1	9	12	2		29	129	3	19	107	252		59	92	171		3	29	11	53
	Oct-Dec					22			32	293	2	3	104	187	1	25	124	104		1	19	26	95
2008	Jan-Mar				11	22			40	98		3	44	330	4	21	82	281			9	4	90
	Apr-Jun				7	8			56	66		11	163	131		38	163	148			15	12	33
	Jul-Sep				2				24	71		5	78	201	2	60	140	122			23	4	28
	Oct-Dec				1	1			5	93			47	182		19	80	130			1	10	49

Table 2b: Proportions of small (S), medium (M) and large (L) hake in each year, quarter, depth and lat(long) stratum. n denotes the sample size of the cell.

			WEST COAST										SOUTH COAST			
year	quart	Size	<=100m all	101-200m all	201-300m <=3420S	201-300m >3420S	301-400m <=3300S	301-400m 3300-3420S	301-400m >3420S	>400m <=3300S	>400m 3300-3420S	>400m >3420S	<=100m GE 22E	101-200m	>200m <22E	>200m GE 22E
2000	Jan-Mar	S		0.23	0.43	0.27	0.29	0.49	0.39	0.39	0.39	0.40		0.15	0.38	0.50
		M		0.39	0.32	0.42	0.46	0.31	0.41	0.39	0.41	0.44		0.58	0.31	0.31
		L		0.38	0.25	0.31	0.25	0.21	0.21	0.22	0.19	0.16		0.27	0.31	0.20
		n		29	81	151	22	150	350	212	115	420		88	19	190
	Apr-Jun	S		0.39	0.29	0.22	0.33	0.49	0.28	0.39	0.38	0.25		0.18	0.37	0.52
		M		0.31	0.43	0.39	0.40	0.35	0.46	0.41	0.44	0.55		0.53	0.27	0.35
		L		0.29	0.28	0.40	0.27	0.16	0.26	0.20	0.18	0.20		0.29	0.36	0.13
		n		36	145	113	41	329	280	191	267	207		131	9	91
	Jul-Sep	S		0.46	0.23	0.28	0.44	0.42	0.28	0.47	0.44	0.21		0.11	0.16	0.30
		M		0.32	0.31	0.38	0.39	0.37	0.47	0.40	0.40	0.58		0.40	0.27	0.33
		L		0.22	0.46	0.34	0.17	0.21	0.25	0.12	0.16	0.21		0.49	0.57	0.37
		n		18	190	231	46	226	199	269	142	138		54	9	115
	Oct-Dec	S		0.20	0.37	0.33	0.27	0.46	0.43	0.57	0.55	0.32		0.30	0.26	0.49
		M		0.53	0.35	0.33	0.24	0.33	0.36	0.30	0.33	0.47		0.53	0.27	0.35
		L		0.27	0.27	0.34	0.49	0.21	0.22	0.13	0.12	0.20		0.17	0.47	0.17
		n		3	45	396	42	81	229	298	259	177		78	35	161
2001	Jan-Mar	S		0.17	0.47	0.27	0.42	0.49	0.35	0.41	0.47	0.31		0.51	0.33	0.42
		M		0.41	0.32	0.48	0.38	0.34	0.45	0.41	0.40	0.50		0.34	0.33	0.42
		L		0.42	0.21	0.25	0.19	0.17	0.21	0.18	0.13	0.19		0.16	0.34	0.16
		n		24	74	242	13	77	291	124	223	284		67	34	91
	Apr-Jun	S		0.34	0.37	0.24	0.39	0.41	0.25	0.47	0.39	0.22		0.49	0.25	0.41
		M		0.40	0.40	0.49	0.36	0.37	0.50	0.36	0.46	0.59		0.36	0.31	0.40
		L		0.26	0.23	0.27	0.26	0.22	0.25	0.17	0.15	0.19		0.14	0.44	0.19
		n		22	92	149	48	239	269	280	233	350		37	12	48
	Jul-Sep	S		0.29	0.22	0.20	0.46	0.37	0.24	0.38	0.42	0.28		0.48	0.11	0.30
		M		0.49	0.47	0.46	0.37	0.40	0.46	0.44	0.43	0.53		0.34	0.39	0.36
		L		0.22	0.30	0.34	0.17	0.23	0.29	0.18	0.15	0.18		0.19	0.50	0.34
		n		17	63	89	33	134	183	343	332	395		38	12	20
	Oct-Dec	S		0.42	0.50	0.16	0.42	0.53	0.30	0.45	0.50	0.38		0.52	0.59	0.50
		M		0.49	0.33	0.37	0.43	0.28	0.37	0.39	0.34	0.45		0.33	0.21	0.28
		L		0.09	0.17	0.47	0.15	0.19	0.32	0.16	0.16	0.18		0.15	0.20	0.22
		n		18	35	196	26	133	307	240	283	308		59	20	91
2002	Jan-Mar	S		0.28	0.38	0.28	0.31	0.50	0.31	0.57	0.41	0.34		0.36	0.56	0.38
		M		0.40	0.41	0.42	0.45	0.36	0.49	0.33	0.45	0.51		0.46	0.22	0.51
		L		0.32	0.21	0.30	0.25	0.14	0.20	0.10	0.15	0.15		0.18	0.22	0.11
		n		29	52	128	20	104	225	196	125	322		22	25	185
	Apr-Jun	S		0.42	0.20	0.11	0.27	0.40	0.25	0.36	0.34	0.23		0.00	0.20	0.06
		M		0.42	0.49	0.45	0.52	0.38	0.46	0.47	0.50	0.56		1.00	0.49	0.89
		L		0.16	0.31	0.45	0.21	0.23	0.30	0.17	0.16	0.22		0.00	0.31	0.06
		n		23	132	92	47	233	230	166	220	415		3	47	6
	Jul-Sep	S		0.25	0.15	0.15	0.53	0.22	0.23	0.57	0.30	0.24		0.57	0.11	0.36
		M		0.54	0.53	0.44	0.37	0.48	0.45	0.32	0.52	0.53		0.25	0.48	0.44
		L		0.21	0.33	0.42	0.10	0.31	0.32	0.11	0.18	0.23		0.18	0.41	0.20
		n		30	49	235	81	146	445	259	222	218		2	20	65
	Oct-Dec	S		0.20	0.38	0.23	0.43	0.50	0.42	0.61	0.56	0.38		0.39	0.35	0.32
		M		0.44	0.45	0.41	0.38	0.35	0.37	0.29	0.35	0.47		0.40	0.29	0.43
		L		0.36	0.17	0.36	0.19	0.15	0.20	0.10	0.09	0.16		0.21	0.37	0.24
		n		23	22	203	28	139	278	133	452	303		47	28	193

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			WEST COAST										SOUTH COAST			
year	quart	Size	<=100m all	101-200m all	201-300m <=3420S	201-300m >3420S	301-400m <=3300S	301-400m 3300-3420S	301-400m >3420S	>400m <=3300S	>400m 3300-3420S	>400m >3420S	<=100m GE 22E	101-200m	>200m <22E	>200m GE 22E
2003	Jan-Mar	S		0.29	0.47	0.25	0.29	0.67	0.50	0.42	0.42	0.38		0.36	0.45	0.36
		M		0.58	0.34	0.38	0.52	0.24	0.32	0.47	0.42	0.51		0.49	0.33	0.52
		L		0.13	0.19	0.37	0.20	0.09	0.17	0.11	0.15	0.12		0.15	0.22	0.12
		n		24	91	80	32	141	195	228	149	382		59	33	359
	Apr-Jun	S		0.33	0.55	0.31	0.24	0.65	0.41	0.53	0.50	0.37		0.42	0.41	0.44
		M		0.43	0.31	0.36	0.51	0.24	0.33	0.34	0.36	0.46		0.41	0.36	0.42
		L		0.24	0.14	0.33	0.24	0.12	0.26	0.12	0.13	0.17		0.17	0.23	0.14
		n		27	100	191	44	317	278	114	292	352		9	93	74
	Jul-Sep	S		0.27	0.19	0.22	0.64	0.54	0.34	0.68	0.54	0.38		0.44	0.29	0.21
		M		0.37	0.26	0.34	0.26	0.25	0.38	0.25	0.32	0.45		0.34	0.38	0.54
		L		0.36	0.55	0.43	0.10	0.21	0.28	0.07	0.14	0.17		0.23	0.33	0.25
		n		20	35	189	28	131	348	306	164	189		3	26	73
	Oct-Dec	S		0.81	0.28	0.24	0.74	0.74	0.52	0.72	0.63	0.47		0.36	0.46	0.33
		M		0.05	0.34	0.32	0.19	0.17	0.28	0.22	0.29	0.42		0.45	0.29	0.56
		L		0.14	0.39	0.44	0.07	0.09	0.20	0.07	0.08	0.10		0.19	0.24	0.11
		n		11	20	142	10	144	191	108	228	260		24	13	75
2004	Jan-Mar	S	0.04	0.39	0.53	0.33	0.49	0.67	0.38	0.54	0.43	0.35	0.00	0.48	0.59	0.32
		M	0.08	0.40	0.34	0.35	0.34	0.23	0.39	0.38	0.40	0.46	0.00	0.28	0.28	0.51
		L	0.88	0.21	0.14	0.32	0.17	0.10	0.23	0.09	0.17	0.19	1.00	0.24	0.13	0.18
		n	12	12	20	33	28	31	108	54	102	397	9	30	47	269
	Apr-Jun	S		0.49	0.52	0.23	0.55	0.65	0.43	0.57	0.58	0.33		0.15	0.41	0.40
		M		0.37	0.37	0.36	0.35	0.25	0.29	0.32	0.30	0.40		0.62	0.28	0.35
		L		0.14	0.11	0.42	0.10	0.10	0.27	0.10	0.11	0.27		0.22	0.30	0.25
		n		33	73	179	37	239	205	105	495	264		16	16	73
	Jul-Sep	S	0.45	0.14	0.44	0.27	0.48	0.56	0.49	0.64	0.64	0.46	0.36	0.21	0.55	0.28
		M	0.16	0.39	0.37	0.33	0.38	0.30	0.32	0.29	0.28	0.32	0.13	0.53	0.18	0.21
		L	0.39	0.47	0.18	0.40	0.15	0.15	0.19	0.07	0.08	0.22	0.51	0.26	0.27	0.51
		n	43	19	35	172	21	208	392	124	326	243	5	14	13	112
	Oct-Dec	S	0.50	0.27	0.30	0.35	0.54	0.75	0.55	0.73	0.64	0.47	0.49	0.20	0.66	0.42
		M	0.34	0.40	0.44	0.31	0.35	0.19	0.27	0.22	0.26	0.39	0.00	0.42	0.20	0.25
		L	0.16	0.32	0.26	0.34	0.12	0.06	0.18	0.05	0.09	0.14	0.51	0.38	0.14	0.33
		n	37	37	45	239	52	87	204	269	238	296	2	41	38	243
2005	Jan-Mar	S	0.45	0.22	0.49	0.29	0.43	0.73	0.52	0.56	0.59	0.52		0.47	0.68	0.45
		M	0.31	0.41	0.34	0.43	0.44	0.22	0.32	0.34	0.30	0.37		0.33	0.20	0.31
		L	0.24	0.37	0.18	0.29	0.13	0.06	0.16	0.10	0.11	0.11		0.20	0.12	0.24
		n	2	23	55	178	63	152	250	84	183	472		79	32	305
	Apr-Jun	S	0.42	0.41	0.57	0.26	0.54	0.69	0.41	0.58	0.65	0.36		0.25	0.59	0.51
		M	0.44	0.35	0.33	0.45	0.36	0.24	0.37	0.35	0.27	0.45		0.35	0.23	0.21
		L	0.14	0.24	0.10	0.29	0.10	0.07	0.22	0.07	0.09	0.19		0.40	0.18	0.28
		n	3	27	75	125	77	226	251	140	318	355		52	25	111
	Jul-Sep	S	0.76	0.21	0.36	0.33	0.62	0.67	0.40	0.67	0.61	0.37		0.39	0.34	0.33
		M	0.20	0.34	0.50	0.38	0.33	0.27	0.36	0.27	0.31	0.42		0.29	0.14	0.11
		L	0.03	0.46	0.14	0.29	0.05	0.06	0.24	0.06	0.08	0.22		0.32	0.52	0.57
		n	87	11	20	103	67	91	194	270	392	374		23	10	96
	Oct-Dec	S	0.73	0.22	0.35	0.30	0.51	0.72	0.56	0.62	0.58	0.48		0.44	0.57	0.29
		M	0.21	0.54	0.47	0.41	0.31	0.20	0.28	0.31	0.34	0.38		0.31	0.10	0.48
		L	0.06	0.24	0.18	0.29	0.18	0.09	0.15	0.08	0.08	0.14		0.25	0.33	0.23
		n	22	4	9	58	12	26	92	163	163	225		38	12	257

Table 2b continued: Proportions of small (S), medium (M) and large (L) hake in each year, quarter, depth and lat(long) stratum. n denotes the sample size of the cell.

			WEST COAST										SOUTH COAST			
year	quart	Size	<=100m all	101-200m all	201-300m <=3420S	201-300m >3420S	301-400m <=3300S	301-400m 3300-3420S	301-400m >3420S	>400m <=3300S	>400m 3300-3420S	>400m >3420S	<=100m GE 22E	101-200m	>200m <22E	>200m GE 22E
2006	Jan-Mar	S	0.64	0.31	0.74	0.66	0.70	0.79	0.62	0.52	0.54	0.49		0.43	0.71	0.51
		M	0.30	0.47	0.21	0.22	0.17	0.16	0.26	0.38	0.36	0.38		0.33	0.16	0.31
		L	0.06	0.22	0.06	0.12	0.13	0.05	0.12	0.09	0.10	0.14		0.24	0.13	0.17
		n	11	41	47	120	9	139	214	73	165	437		69	32	141
	Apr-Jun	S	0.45	0.57	0.47	0.27	0.54	0.76	0.63	0.54	0.57	0.39		0.37	0.65	0.44
		M	0.05	0.28	0.34	0.33	0.28	0.17	0.20	0.35	0.30	0.39		0.46	0.16	0.39
		L	0.50	0.15	0.19	0.39	0.18	0.08	0.17	0.11	0.13	0.22		0.17	0.19	0.16
		n	5	17	18	70	52	146	169	128	273	400		28	13	55
	Jul-Sep	S	0.10	0.39	0.26	0.45	0.76	0.70	0.53	0.74	0.73	0.52		0.32	0.51	0.43
		M	0.61	0.22	0.45	0.32	0.17	0.21	0.29	0.18	0.18	0.26		0.21	0.12	0.12
		L	0.28	0.40	0.28	0.24	0.07	0.09	0.18	0.08	0.09	0.22		0.46	0.37	0.45
		n	8	6	15	136	13	98	258	125	271	309		25	101	83
	Oct-Dec	S	0.44	0.37	0.66	0.62	0.88	0.85	0.63	0.85	0.71	0.54		0.40	0.73	0.66
		M	0.25	0.45	0.14	0.19	0.08	0.10	0.19	0.12	0.17	0.26		0.22	0.07	0.10
		L	0.30	0.18	0.19	0.19	0.04	0.05	0.18	0.03	0.12	0.20		0.39	0.20	0.24
		n	8	25	14	164	11	77	218	75	143	297		19	52	166
2007	Jan-Mar	S	0.75	0.43	0.81	0.78	0.76	0.84	0.80	0.71	0.61	0.67		0.65	0.88	0.47
		M	0.19	0.41	0.13	0.12	0.17	0.12	0.11	0.21	0.23	0.19		0.20	0.05	0.33
		L	0.06	0.17	0.07	0.09	0.07	0.04	0.09	0.08	0.16	0.15		0.15	0.07	0.20
		n	7	7	34	117	62	144	357	140	70	218		28	18	125
	Apr-Jun	S	0.52	0.68	0.82	0.55	0.75	0.78	0.72	0.71	0.72	0.54		0.35	0.66	0.35
		M	0.02	0.25	0.14	0.20	0.19	0.16	0.15	0.24	0.20	0.27		0.17	0.03	0.12
		L	0.46	0.07	0.04	0.25	0.06	0.06	0.14	0.05	0.08	0.20		0.48	0.30	0.53
		n	5	13	54	92	36	207	235	166	142	240		18	23	44
	Jul-Sep	S	0.85	0.42	0.65	0.37	0.71	0.75	0.52	0.74	0.65	0.52		0.48	0.44	0.43
		M	0.11	0.34	0.24	0.29	0.23	0.21	0.30	0.20	0.25	0.34		0.12	0.28	0.27
		L	0.04	0.24	0.10	0.34	0.06	0.05	0.18	0.07	0.10	0.14		0.40	0.28	0.30
		n	6	21	31	129	22	107	252	59	92	171		32	11	53
	Oct-Dec	S		0.60	0.62	0.49	0.81	0.66	0.48	0.75	0.69	0.63		0.47	0.47	0.65
		M		0.29	0.35	0.31	0.17	0.30	0.26	0.21	0.17	0.22		0.20	0.17	0.13
		L		0.11	0.04	0.20	0.02	0.04	0.26	0.04	0.15	0.14		0.33	0.36	0.22
		n		22	32	293	5	104	187	26	124	104		20	26	95
2008	Jan-Mar	S		0.36	0.47	0.68	0.79	0.75	0.64	0.68	0.65	0.56		0.56	0.80	0.53
		M		0.49	0.45	0.22	0.15	0.18	0.24	0.24	0.27	0.27		0.17	0.11	0.13
		L		0.16	0.09	0.11	0.06	0.07	0.12	0.08	0.08	0.16		0.27	0.08	0.34
		n		33	40	98	3	44	330	25	82	281		9	4	90
	Apr-Jun	S		0.33	0.62	0.35	0.57	0.71	0.54	0.64	0.65	0.39		0.26	0.37	0.45
		M		0.52	0.31	0.44	0.36	0.23	0.29	0.28	0.27	0.44		0.39	0.16	0.23
		L		0.15	0.08	0.21	0.07	0.06	0.17	0.08	0.08	0.17		0.35	0.47	0.32
		n		15	56	66	11	163	131	38	163	148		15	12	33
	Jul-Sep	S		0.60	0.24	0.25	0.17	0.59	0.51	0.58	0.65	0.50		0.37	0.62	0.63
		M		0.40	0.62	0.43	0.75	0.34	0.32	0.33	0.27	0.36		0.41	0.13	0.22
		L		0.00	0.14	0.32	0.08	0.08	0.17	0.09	0.08	0.14		0.21	0.25	0.15
		n		2	24	71	5	78	201	62	140	122		23	4	28
	Oct-Dec	S		0.41	0.47	0.51		0.66	0.63	0.51	0.71	0.63		0.33	0.41	0.62
		M		0.07	0.46	0.25		0.26	0.19	0.35	0.22	0.24		0.36	0.22	0.26
		L		0.52	0.07	0.24		0.08	0.18	0.15	0.07	0.14		0.31	0.37	0.12
		n		2	5	93		47	182	19	80	130		1	10	49

Table 3: Comparison between MARAM and OLRAC summary values for the 2006 test case [units are kgs]

	MARAM	OLRAC
Total Hake	55 466 755	55 126 898
Small hake total	32 005 178	31 982 627
Medium hake total	12 532 354	12 414 155
Large hake total	10 887 933	10 730 067

Table 4: Companies currently included in the GLM analyses.

I&J (OFFSHORE)
ATLANTIC TRAWLING (OFFSHORE)
SEA HARVEST (OFFSHORE)
FERNPAR FISHING CO PTY
VIKING FISHING (Offshore)
MARINE PRODUCTS
ATLANTIC FISHING ENTERPR
DROMEDARIS VISSERYE LTD
PORT NOLLOTH WHITE FISH
SNOEK WHOLESALERS PTY
ATLANTIC FISH ENT MIDWAT
VIKING FISHING (MIDWATER)
MARINE PRODUCTS MIDWATER
EYETHU FISHING/OOSTERLIG VISSERYE
NATAL OCEAN TRAWLING
SEA HARVEST CORPORATION
SULPESCA FISHING INV
INDEPENDENT WHITE FISH
I&J MOCAMBIQUE
LAMBERTSBAAI KREEF PRODU
SURMON FISHING CC
NEW SOUTH AFRICA FISHING
I&J COMMUNITY QUOTA
SISTRO FISHING
SIYALOBA (PTY) LTD
LUZIZI (exTRACHURUS FISHING)
CATO FISHING
SUIDOR FISHING PTY LTD
BLUE CONTINENT PRODUCTS
OVERBERG FISHING 3/99
VUNA FISHING COMPANY (ex Phambili Vuna)
SELECTA SEA PRODUCTS
HOUTBAY FISHING

Figure 1: Standardized *M. capensis* CPUE for GLM1, GLM2 and GLM3 respectively. Each index has been normalized to its mean.

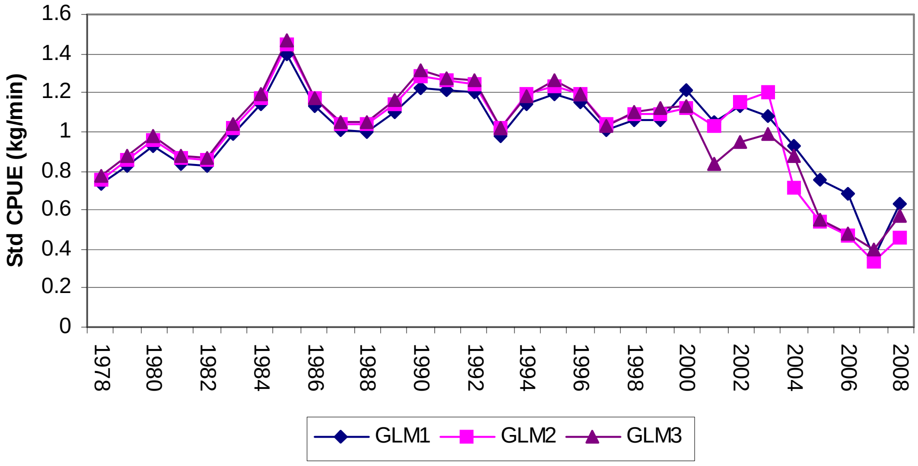


Figure 2: Standardized *M. paradoxus* CPUE for GLM1, GLM2 and GLM3 respectively. Each index has been normalized to its mean.

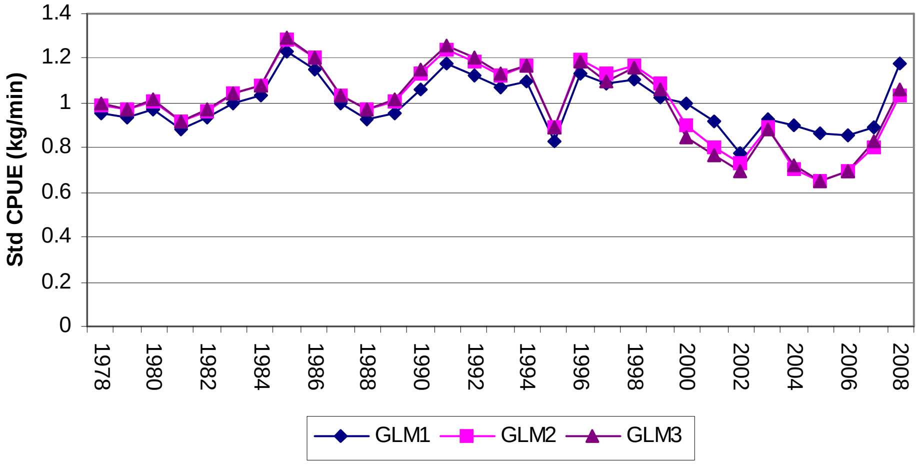


Figure 3: Nominal and standardized *M. capensis* CPUE for GLM3. Each index has been normalized to its mean.

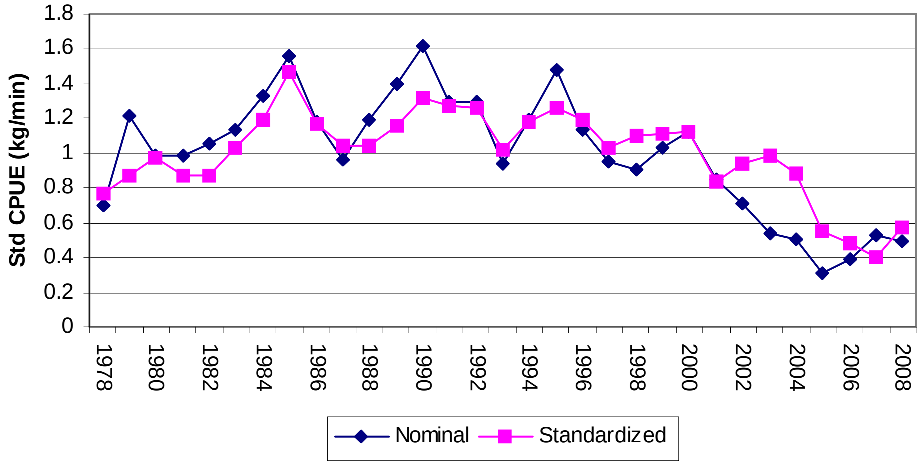
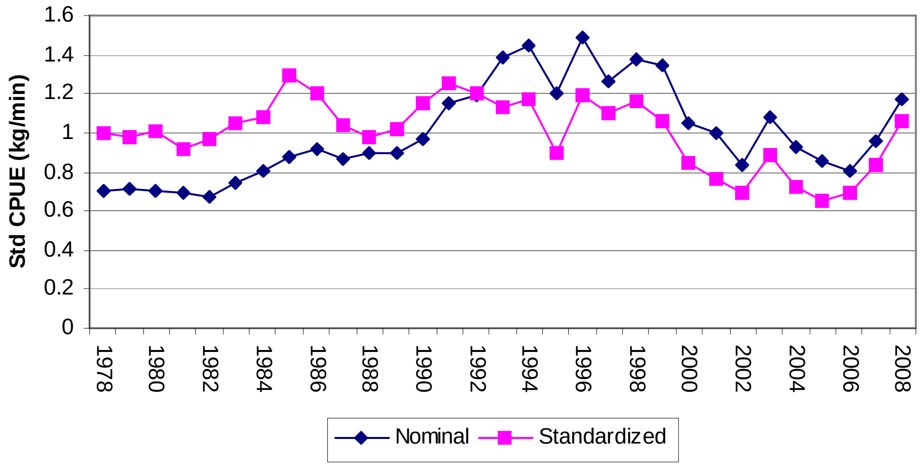


Figure 4: Nominal and standardized *M. paradoxus* CPUE for GLM3. Each index has been normalized to its mean.



Appendix 1: Details of the hake database

When a hake vessel returns from a fishing trip the vessel lands and the catch is discharged to a shore-based processing establishment. The discharged catch for some product categories is graded by size (weight) into product size categories. The catch per product size category is weighed and the total mass (landed_mass) is recorded on the **Landing sheet**. A landing consists of more than one drag (trawl) and the catch estimates per drag are derived from a skipper's estimate made while at sea. At MCM the landing is captured first in order to keep track of how much of the TAC has been caught. The captured landing data are then proof-read before the drags are captured. There are 242 species and category codes used in the database of which 59 are for hake alone (see Table A1.4). A procedure called *Convert to Real Mass* (CRM) is run at the close of each day and when a landing is updated. This procedure (detailed below) essentially scales actual landed_mass values to correspond with cleaned_mass estimates (for the trip) and then calculates a nominal_mass using a raising factor for each species and category code. If a species and category code exists in the landing but not in any of the drags (e.g. skipper only estimates for catch of large hake but factory produces large and medium) then that category is assigned to a table known as drags_no_effort (dne) as it is essentially fish that was landed but not caught. Thus the database is made up of the following tables (Figure A1.1):

landings	the specifics of the trip information particular to that company and vessel
drags	all effort data recorded for a trawl – generally all trawls are recorded but not all trawls have catches allocated to them
landing_catches	the actual landed_mass (kg) weighed at offload point or from factory
drag_catches	the estimated cleaned_mass (kg) as well as the calculated nominal_mass (kg)
drags_no_effort	"**dne**" is catch which was landed but not recorded in any drag estimate. Therefore this catch cannot be allocated a drag and thus has no effort value

Should there be drag_catch for a category but no corresponding landing_catch then that record remains in the drag_catch table but is allocated a nominal_mass value of zero. It is important to note that the cleaned_mass estimates are reported as "bins" which vary in size and level of grading across the companies. Scaling up of these estimates to actual kg values is also computed within CRM. These mis-matches are a result of incomplete or incorrect data recorded in log books and input of un-reconciled drag_catch data.

Convert to Real Mass (CRM)

The description given here is directly from Sybase code (& the full text given in Appendix 2):
For the new-comer the convert to real mass store procedure is one of the central store procedures in the demersal system. Its function is to raise/lower the drag catch estimates to that of the weight as measured at landing. It will later also be responsible to move the '7' product categories on the landings back to the '3' categories on the drags. To move the cleaned_mass that is on the drag_catch table to the nominal_mass field, the following process is used.

1. Select the total weight for all the drags in the landing - group them by species/category code. Store this in a temp table. (sum(cleaned_mass) also referred to as sigma_drag)
2. Create a cursor that will select all the drag_catches for a given landing.
3. For each row in the cursor, do the following:
    a. Select the total landed mass of all the species/categories using the mapping table. (A category on the drag table can map to more that one category on the landing table). This also needs to be multiplied with the raising factor (landed_mass).
    b. Select from the temp table the total cleaned_mass for the given species and category (select sigma_drag).
    c. Multiply the cleaned_mass with the landed_mass divide by the sigma_drag and write that to the records nominal mass.
4. Update the landing and set the indicator that this landing has been processed by convert to real mass.
5. Drop the temp table that holds the sigma_drag values.

It was decided that at this stage of the process it would be more time efficient to use the data once processed by CRM for consistency and ease. However, the structure of this process must be discussed before March 2010 when MAST (the ORACLE based system replacing the current Sybase system) is scheduled to go live, particularly as the output from CRM is influenced by the sequence in which the various species-product-grade are dealt with within the CRM (see also Leslie 2009[1]).

All of the data exist as described above in both the Sybase database and Access extract replicate of Sybase database. The difference being that it is easier to query the Access version. All the data discussed below were extracted at one point in time (December 2008, with the exception of 2001, 2002 and 2008 which had to be re-extracted in September 2009) as opposed to the annual extracts from Sybase that were completed for GLM input purposes. An additional benefit to using Access is that it was possible to create a unique land_ID and drag_ID for each landing (or dne) and drag (respectively):

land_ID [country_code], [company_number], vessel_number], [docking_date_dd/mm/yy hh:mi]
drag_ID [land_ID], [start_date_dd/mm/yy hh:mi]

i.e. every drag will have a land_ID and a drag_ID but a landing and a dne record will only have a land_ID. As discussed above there are many species and category codes. In the GLM extract procedure from Sybase these codes were grouped to produce 10 hake and 9 specified bycatch species GLM_categories (specified in Table A1.4). These are described below in Table A1.1.

Table A1.1: GLM_categories, their description and the category codes of which they are composed.

GLM_category	Description	Category Codes
Hake	the sum of all hake categories	All excluding LIVERS, FISHMEAL, HEADS, ROE & BULLSH
HakeHGSml	Headed & Gutted Small hake	NOUGHTS, NO SIX, CHOPS, UNS SMALL & ROUND
HakeHGMed	Headed & Gutted Medium hake	SMALL, MEDIUM, UNS MED, PRIME, PRIMES, & MED+LAR
HakeHGLar	Headed & Gutted Large hake	LARGE, XLARGE & UNS LRG
HakeHGUng	Headed & Gutted Ungraded hake	UNFILL, UNGRADE1, UNGRADE2, UNGRADED, HGUNG, UNFILL
HakeFilSml	Filleted Small hake	DPL 3-4, DPL 4-6, SKL 1-2, SKL 2-4, SKL 3-6, SKO 1-2, SKO 2-4, SKO 3-6
HakeFilMed	Filleted Medium hake	DPL 6-8, DPL 8+, SKL 4-6, SKL 6-8. SKL 8+, SKO 4-6, SKO 6-8, SKO 8+
HakeFilUng	Filleted Ungraded hake	MINCE, FILLET, FILLETS, SKL, SKO, BRK-FILL, LOINS, DPL
HakePQ	Prime Quality hake	7-1KGS, 1-2KGS, 2-3KGS, 3-4KGS, 4+KGS, PQ4-5KG, PQ5+KG, PQREJECT, PQUNG, HEADON
HakeBroken	Broken hake	BROKEN
HmckTotal	horse mackerel (*Trachurus capensis*)	All
MonkTotal	monk (*Lophius vomerinus*)	All
KklpTotal	kingklip (*Genyperus capensis*)	All
EcsoleTotal	east coast sole (*Austroglossus pectoralis*)	All
SoleTotal	sole (?)	All
SnokTotal	snoek (*Thyrsites atun*)	All
MckrTotal	chub mackerel (*Scomber japonicus*)	All
ChokTotal	chokka (*Loligo vulgaris*)	All
OmmastTotal	red squid (*Ommasctrephid spp*)	All

The codes which are listed in grey were not included in the Sybase GLM extract code. This has been attributed to the development of codes subsequent to the design of the extract code.

In order to fully extract the data and pre-process it for use in the GLM additional categories were created:
INVALID the sum of hake codes which were excluded from the Hake category
OTHER the sum of species caught other than hake and the 9 specified bycatch species

The drag_catches table was linked to the GLM categories and a catch matrix was developed for one year at a time. This matrix was then linked to all the drag data for that year (Table A1.2)

[1] Leslie, RW 2009 - Proposed changes to the algorithm used in the “Convert to Real Mass” module. MCM/2009/MAY/SWG/DEM-38

Table A1.2: The total number of drag_ID's (i.e. unique drag events) per year is given in the first column, and the number with catch allocated against a drag in the second and the number of drags which have no catch allocated to them.

year	all drag_ID n	catch drag_ID n	zerocatch drag_ID n
2000	57,372	55,619	1,753
2001	63,205	61,268	1,937
2002	64,351	62,587	1,764
2003	67,734	61,158	6,576
2004	64,855	48,178	16,677
2005	62,122	45,443	16,679
2006	67,189	52,487	14,702
2007	62,038	47,093	14,945
2008	52,667	41,042	11,625

The current preparation of data for GLM purposes requires a number of exclusions to be applied before accumulating the catch and effort data on a daily basis before processing. These exclusions were applied in a series of queries using Access to derive as clean a set of **input data** as possible. All drag data which were excluded are referred to as **NONinput data**. Remembering that a land_ID will include several drag_IDs, the exclusions were applied in the same order as in the code originally used to prepare the data for use in the GLM:

1. Exclude all land_ID where there is only one drag.
2. Exclude all land_ID where SizedHake = ∑ (HGSml + HGMed + HGLar) = 0
3. Exclude all land_ID which have fillets in the corresponding dne records
4. Exclude all land_ID where drag∑HGLar = 0 and dnePQ > 0
5. Exclude all land_ID where dneSizedHake = 0
   (HakeFillets = FilSml + FilMed + FilUng is calculated but NOT excluded)
6. Exclude all land_ID where ∑Hake=0
7. Distribute dnePQ into the HGLar column across the drags and add the value to Hake, also add the HakePQ using the formula HGLar + dnePQ * HGLar/∑HGLar +HakePQ
8. Exclude all drags which have SizedHake = 0 and HGUng>0
9. Distribute HGUng over HG Size (e.g. HGSml + HGSml/SizedHake *HGUng)
10. Distribute dneHGUng and dneBroken over HG Size (e.g. HGSml + HGSml/SizedHake *dneHGUng +dneBroken)
11. Exclude all drag_ID where grid > 899
12. Exclude all drag_ID where effort ≤ 0

The drag_ID counts for key points in the process are given in Table A1.3.

Table A1.3: The total number of drag_ID's (i.e. unique drag events) per year is given in the first row, the dne records which correspond to the full data set in the second row, the number of drags after all land_ID based exclusions were complete, the number of drags used in the GLM input, the number of drags extracted as NONinput data and the number of dne records which correspond to the NONinput data.

year	2000	2001	2002	2003	2004	2005	2006	2007	2008
all drag_ID n	57,372	63,205	64,351	67,734	64,855	62,122	67,189	62,038	52,667
dne land_ID corresponding to data	2,418	2,530	2,486	2,938	2,927	2,925	2,645	2,435	2,156
drag_ID after exclusions 1-6	28,772	30,231	31,975	28,642	31,593	34,511	28,971	27,129	18,640
drag_ID input data (after 12)	38,576	29,791	31,804	28,410	31,429	34,400	28,695	26,685	18,341
drag_ID NONinput data	18,588	32,974	32,376	39,092	33,262	27,611	38,218	34,909	34,027
dne NONinput data	1,119	1,493	1,469	1,638	1,123	904	1,453	1,372	1,366

If the values listed for "drag_ID input data (after 12)" and "drag_ID NONinput data" are summed they will not equal "all drag_ID n" because the second half of the exclusion process removes drags within landings and the NONinput data is extracted on the basis of landings not used in the input data.

Table A1.4: Species and category codes which exist in drag_catches table.

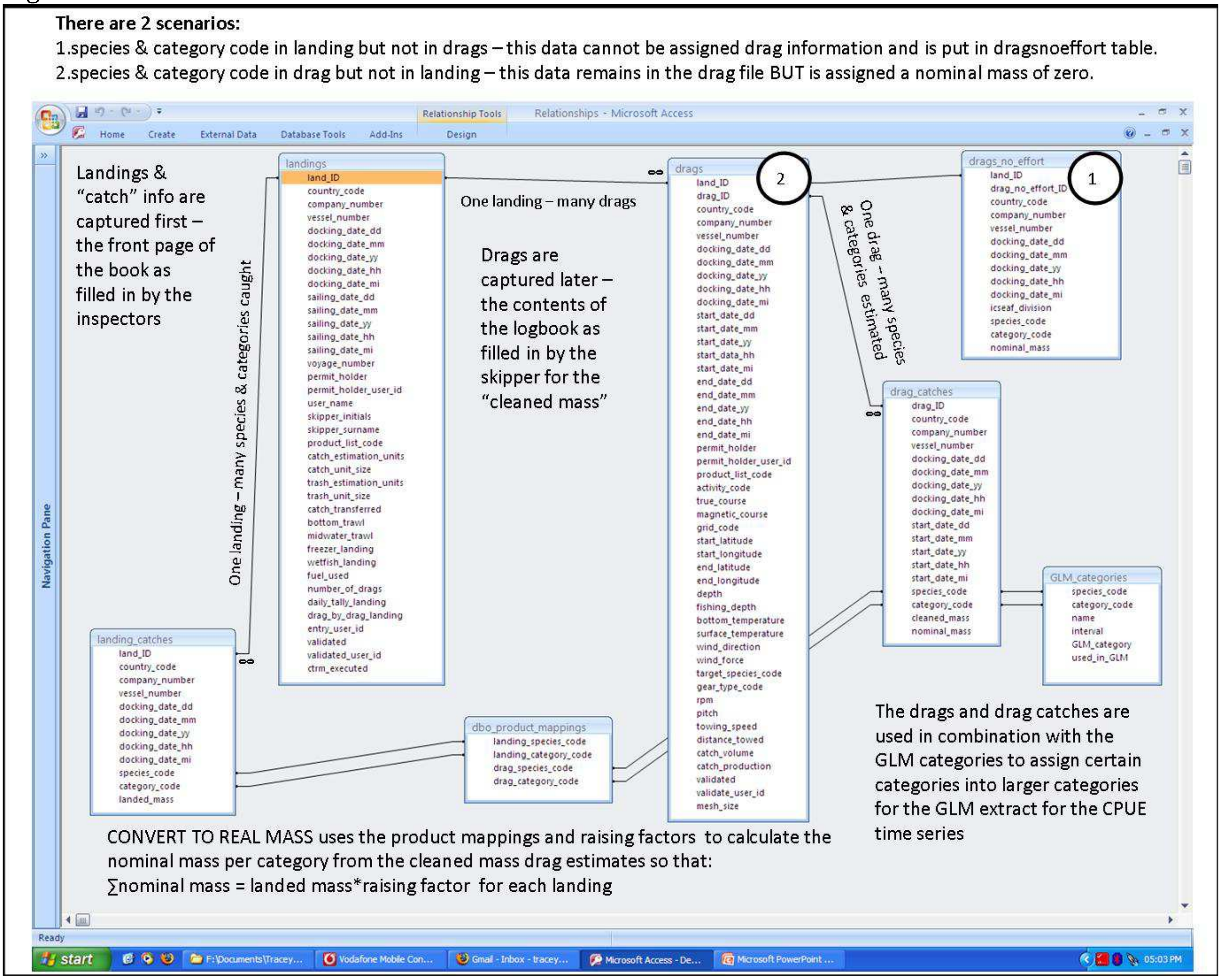
Species_code	category_code	Name	GLM_category	used_in_GLM
ALEFER	UNSORTED	(Unknown) Category created during conversion	OTHER	TRUE
APMF	FILLET	Atlantic pomfret FILLET	OTHER	TRUE
APMF	GUTTED	Atlantic pomfret GUTTED	OTHER	TRUE
APMF	H AND G	Atlantic pomfret H AND G	OTHER	TRUE
APMF	ROUND	Atlantic pomfret ROUND	OTHER	TRUE
APMF	UNGRADED	Atlantic pomfret UNGRADED	OTHER	TRUE
BERYX	H&G UNG	Alfonsino, headed and gutted – ungraded	OTHER	TRUE
BERYX	ROUND	Alfonsinos ROUND	OTHER	TRUE
BLHT	BLHT	Blue Hottentot – GUTTED	OTHER	TRUE
BNST	UNGRADED	Bank steenbras UNGRADED	OTHER	TRUE
BRDMAN	UNGRADED	Baardman UNGRADED	OTHER	TRUE
BTSN	FISHMEAL	Wet weight of ribbon fish for fishmeal	OTHER	TRUE
BTSN	H AND T	Ribbon fish H AND T	OTHER	TRUE
BTSN	ROUND	Ribbon fish ROUND	OTHER	TRUE
BTSN	TAILED	Ribbon fish TAILED	OTHER	TRUE
BTSN	UNGRADED	Ribbon fish UNGRADED	OTHER	TRUE
CARDIN	H&G UNG	Cardinals, headed and gutted - ungraded	OTHER	TRUE
CHOK	CLEANED	Chokka CLEANED	ChokTotal	TRUE
CHOK	RNDUNG	Chokka, unprocessed	ChokTotal	TRUE
CHOK	UNGRADED	CHOKKA UNGRADED	ChokTotal	TRUE
CHOK	WHITE	chokka white	ChokTotal	TRUE
CRPN	GUTTED	Carpenter GUTTED	OTHER	TRUE
CRPN	ROUND	Carpenter ROUND	OTHER	TRUE
CYNZAN	CLEANED	Sandrat CLEANED	OTHER	TRUE
CYNZAN	WHOLE	Sandrat WHOLE	OTHER	TRUE
DEMF	BAIT	DemersalBait	OTHER	TRUE
DEMF	BTSN HDS	Ribbonfish heads	OTHER	TRUE
DEMF	DEM MINC	Demersal fish Mince	OTHER	TRUE
DEMF	FISH ML	Demersal fish FISH ML	OTHER	TRUE
DEMF	HAKE	Hake Wings	OTHER	TRUE
DEMF	HEADS	Demersal fish HEADS	OTHER	TRUE
DEMF	HKE HEAD	Hake Heads	OTHER	TRUE
DEMF	HKE ROES	Hake Roes	OTHER	TRUE
DEMF	HKE TONG	Hake Tongues	OTHER	TRUE
DEMF	HKE WING	Hake Wings	OTHER	TRUE
DEMF	KK HEADS	King Klip Heads	OTHER	TRUE
DEMF	KK LIVER	King Klip Livers	OTHER	TRUE
DEMF	KK STOMA	King Klip Stomaches	OTHER	TRUE
DEMF	KK TONG	King Klip tongues	OTHER	TRUE
DEMF	KK WINGS	Kingklip Wings	OTHER	TRUE
DEMF	MCKR HDS	Mackerel heads	OTHER	TRUE
DEMF	MIX	Demersal fish MIX	OTHER	TRUE
DEMF	MNK CHEK	monk cheeks	OTHER	TRUE
DEMF	MNK HEAD	Monk Heads	OTHER	TRUE
DEMF	MNK STOM	Monk Stomaches	OTHER	TRUE
DEMF	MNK WING	Monk Wings	OTHER	TRUE
DEMF	ROES	Demersal fish ROES	OTHER	TRUE
DEMF	SML MIX	Demersal fish SML MIX	OTHER	TRUE
DEMF	SNOK HEA	Snoek Heads	OTHER	TRUE
DEMF	SNOK ROE	Snoek Roes	OTHER	TRUE
DEMF	TRASH	Demersal fish TRASH	OTHER	TRUE
DEMF	UNGRADED	Demersal fish UNGRADED	OTHER	TRUE
DEMLIN	SELNFS	SLECT LINE FISH	OTHER	TRUE
DEMLIN	SMALL	Linefish from demersal trawls SMALL	OTHER	TRUE
DEMLIN	SML MIX	Linefish from demersal trawls SML MIX	OTHER	TRUE
DEMLIN	UNGRADED	Linefish from demersal trawls UNGRADED	OTHER	TRUE
DGSH	H&G + T	Spiny dogfishes H&G + T	OTHER	TRUE
ECSOLE	LARGE	East coast sole LARGE	EcsoleTotal	TRUE
ECSOLE	MEDIUM	East coast sole MEDIUM	EcsoleTotal	TRUE

Species_code	category_code	Name	GLM_category	used_in_GLM
ECSOLE	SLIPS	East coast sole SLIPS	EcsoleTotal	TRUE
ECSOLE	UNGRADED	East Coast sole ungraded	EcsoleTotal	TRUE
ECSOLE	XLARGE	East coast sole XLARGE	EcsoleTotal	TRUE
ELF	ELF	ELF - GUTTED	OTHER	TRUE
EPIGON	ROUND	EPIGON ROUND	OTHER	TRUE
GLBK	UNGRADED	Geelbek UNGRADED	OTHER	TRUE
GURN	H AND G	Gurnards H AND G	OTHER	TRUE
GURN	ROUND	Gurnards ROUND	OTHER	TRUE
GURN	UNGRADED	Gurnard UNGRADED	OTHER	TRUE
HAKE	1-2 KGS	Hake, Head on (pq), 1-2 kg	HakePQ	TRUE
HAKE	2-3 KGS	Hake, Head on (pq), 2-3 kg	HakePQ	TRUE
HAKE	3-4 KGS	Hake, Head on (pq), 3-4 kg	HakePQ	TRUE
HAKE	4+ KGS	Hake, Head on (pq), 4+ kg	HakePQ	TRUE
HAKE	7-1KGS	Hake, Head on (pq), 7-1 kg	HakePQ	TRUE
HAKE	BRK-FILL	Hake, Fillets BROKEN	HakeFilUng	FALSE
HAKE	BROKEN	Hake, H&G BROKEN	HakeBroken	TRUE
HAKE	BULLSH	(Unknown) Category created during conversion	INVALID	FALSE
HAKE	CHOPS	Hake, H&G CHOPS	HakeHGSml	TRUE
HAKE	DPL	Hake, deepskinned - ungraded	HakeFilUng	FALSE
HAKE	DPL 3-4	Hakes DPL 3-4	HakeFilSml	FALSE
HAKE	DPL 4-6	Hakes DPL 4-6	HakeFilSml	FALSE
HAKE	DPL 6-8	Hakes DPL 6-8	HakeFilMed	FALSE
HAKE	DPL 8+	Hakes DPL 8+	HakeFilMed	FALSE
HAKE	FILLET	Hake, SKO Fillet unspecified	HakeFilUng	TRUE
HAKE	FILLETS	Hake, SKL Fillet unspecified	HakeFilUng	TRUE
HAKE	FISHMEAL	Wet weight of Hake for fishmeal	INVALID	FALSE
HAKE	HEADON	Hake HEADON	HakePQ	TRUE
HAKE	HEADS	Hake, HEADS	INVALID	FALSE
HAKE	HGUNG	Hake, H&G, ungraded	HakeHGUng	FALSE
HAKE	LARGE	Hake, H&G LARGE	HakeHGLar	TRUE
HAKE	LIVERS	Hake, Livers	INVALID	TRUE
HAKE	LOINS	Hake LOINS	HakeFilUng	FALSE
HAKE	MED+LAR	Hake, H&G medium & large	HakeHGMed	FALSE
HAKE	MEDIUM	Hake, H&G MEDIUM	HakeHGMed	TRUE
HAKE	MINCE	Hake, MINCE	HakeFilUng	TRUE
HAKE	NO SIX	Hake, H&G NO SIX	HakeHGSml	TRUE
HAKE	NOUGHTS	Hake, H&G NOUGHTS	HakeHGSml	TRUE
HAKE	PQUNG	Hake, Head on (pq), ungraded	HakePQ	TRUE
HAKE	PQ4-5KG		HakePQ	TRUE
HAKE	PQ5+KG		HakePQ	TRUE
HAKE	PQREJECT		HakePQ	TRUE
HAKE	PRIME	Hake, H&G PRIME	HakeHGMed	TRUE
HAKE	PRIMES	Hake, H&G PRIME	HakeHGMed	TRUE
HAKE	ROES	Hakes Roes	INVALID	FALSE
HAKE	ROUND	Hakes ROUND	HakeHGSml	TRUE
HAKE	SKL	Hakes skinless (ungraded)	HakeFilUng	TRUE
HAKE	SKL 1-2	Hakes SKL 1-2	HakeFilSml	FALSE
HAKE	SKL 2-4	Hakes SKL 2-4	HakeFilSml	TRUE
HAKE	SKL 3-6	Hakes SKL 3-6	HakeFilSml	FALSE
HAKE	SKL 4-6	Hakes SKL 4-6	HakeFilMed	TRUE
HAKE	SKL 6-8	Hakes SKL 6-8	HakeFilMed	TRUE
HAKE	SKL 8+	Hakes SKL 8+	HakeFilMed	TRUE
HAKE	SKO	Hakes skin on (ungraded)	HakeFilUng	TRUE
HAKE	SKO 1-2	Hakes SKO 1-2	HakeFilSml	FALSE
HAKE	SKO 2-4	Hakes SKO 2-4	HakeFilSml	TRUE
HAKE	SKO 3-6	Hakes SKO 3-6	HakeFilSml	FALSE
HAKE	SKO 4-6	Hakes SKO 4-6	HakeFilMed	TRUE
HAKE	SKO 6-8	Hakes SKO 6-8	HakeFilMed	TRUE
HAKE	SKO 8+	Hakes SKO 8+	HakeFilMed	TRUE
HAKE	SMALL	Hake, H&G SMALL	HakeHGMed	TRUE
HAKE	UNFILL	Hake HG Ungraded	HakeHGUng	FALSE
HAKE	UNGRADE1	Hakes UNGRADE1	HakeHGUng	TRUE
HAKE	UNGRADE2	Hakes UNGRADE2	HakeHGUng	TRUE

Species_code	category_code	Name	GLM_category	used_in_GLM
HAKE	UNGRADED	Hakes UNGRADED	HakeHGUng	TRUE
HAKE	UNS LRG	Hakes UNS LRG	HakeHGLar	TRUE
HAKE	UNS MED	Hakes UNS MED	HakeHGMed	TRUE
HAKE	UNS SML	Hakes UNS SML	HakeHGSml	TRUE
HAKE	XLARGE	Hake, H&G XLARGE	HakeHGLar	TRUE
HMKC	FISHMEAL	Wet weight of HM for fishmeal	HmkcTotal	TRUE
HMKC	H AND G	Cape horse mackerel H AND G	HmkcTotal	TRUE
HMKC	H&G LRG	Cape Horse mackerel H&G - large	HmkcTotal	TRUE
HMKC	H&G MED	Cape Horse mackerel H&G - medium	HmkcTotal	TRUE
HMKC	H&G UNGR	Cape Horse mackerel H&G Ungraded	HmkcTotal	TRUE
HMKC	RND LAR	Cape horse mackerel RND LAR	HmkcTotal	TRUE
HMKC	RND MED	Cape horse mackerel RND MED	HmkcTotal	TRUE
HMKC	RND S/C	Cape horse mackerel RND S/C	HmkcTotal	TRUE
HMKC	UNGRADED	Cape horse mackerel RND UNG	HmkcTotal	TRUE
HMKC	WHL GUT	Cape horse mackerel WHL GUT	HmkcTotal	TRUE
HNSH	H&G + T	Mustelus H&G + T	OTHER	TRUE
JCPV	H AND G	JCVP H AND G	OTHER	TRUE
JCPV	ROUND	JCVP ROUND	OTHER	TRUE
JCPV	SMALL	Jacopever Small	OTHER	TRUE
JCPV	UNGRADED	JCVP UNGRADED	OTHER	TRUE
JDRY	FILLETS	John Dory FILLETS	OTHER	TRUE
JDRY	GUTTED	John dory Gutted	OTHER	TRUE
JDRY	H AND G	John dory H AND G	OTHER	TRUE
JDRY	ROUND	John dory ROUND	OTHER	TRUE
JDRY	UNGRADED	John dory UNGRADED	OTHER	TRUE
KKLP	FILLETS	Kingklip FILLETS	KklpTotal	TRUE
KKLP	H AND G	Kingklip H AND G	KklpTotal	TRUE
KKLP	LAR H&G	Kingklip LAR H&G	KklpTotal	TRUE
KKLP	MED H&G	Kingklip MED H&G	KklpTotal	TRUE
KKLP	SMA H&G	Kingklip SMA H&G	KklpTotal	TRUE
KKLP	UNGRADED	Kingklip ungraded	KklpTotal	TRUE
KOB	H AND G	Kob H AND G	OTHER	TRUE
KOB	LARGE G	Kob LARGE G	OTHER	TRUE
KOB	MEDIUM G	Kob MEDIUM G	OTHER	TRUE
KOB	MEDIUM R	Kob MEDIUM ROUND	OTHER	TRUE
KOB	ROUND	Kob LARGE ROUND	OTHER	TRUE
KOB	SMALL G	Kob SMALL G	OTHER	TRUE
KOB	SMALL R	Kob SMALL ROUND	OTHER	TRUE
KOB	UNGR R	Kob UNGRADED ROUND	OTHER	TRUE
KOB	UNGRADED	Kob UNGRADED GUTTED	OTHER	TRUE
LEPIDI	H AND G	Squirrel Hake	OTHER	TRUE
MCKR	H AND G	Mackerel H AND G	MckrTotal	TRUE
MCKR	ROUND	Mackerel ROUND	MckrTotal	TRUE
MCKR	SALTED	Mackerel SALTED	MckrTotal	TRUE
MCKR	UNGRADED	Mackerel UNGRADED	MckrTotal	TRUE
MLLT	MULLET	Red Mullet	OTHER	TRUE
MLLT	UNGRADED	RED MULLET UNGRADED	OTHER	TRUE
MONK	GUTTED	Monk GUTTED	MonkTotal	TRUE
MONK	H AND G	Monk Headed and Gutted	MonkTotal	TRUE
MONK	ROUND	Monk round	MonkTotal	TRUE
MONK	TAILS	Monk TAILS	MonkTotal	TRUE
OCTOPS	WHOLE	Whole octopus	OTHER	TRUE
OCTOPU	WHOLE	Deep water octopus WHOLE	OTHER	TRUE
OLFS	OLFS	Oilfish UNGRADED	OTHER	TRUE
OMMAST	LARGE	Ommastrephid squids LARGE	OmmastTotal	TRUE
OMMAST	SMALL	Ommastrephid squids SMALL	OmmastTotal	TRUE
OMMAST	UNGRADED	Ommastrephid squids UNGRADED	OmmastTotal	TRUE
OREOS	H&G UNG	Oreo Dory, headed and gutted - ungraded	OTHER	TRUE
OREOS	ROUND	Oreo dories ROUND	OTHER	TRUE
PANG	LARGE G	Panga LARGE G	OTHER	TRUE
PANG	LARGE R	Panga LARGE ROUND	OTHER	TRUE
PANG	MEDIUM G	Panga MEDIUM G	OTHER	TRUE
PANG	MEDIUM R	Panga MEDIUM ROUND	OTHER	TRUE

Species_code	category_code	Name	GLM_category	used_in_GLM
PANG	PANGA	Panga UNGRADED ROUND	OTHER	TRUE
PANG	SMALL G	Panga SMALL G	OTHER	TRUE
PANG	SMALL R	Panga SMALL ROUND	OTHER	TRUE
PANG	UNGRADED	Panga UNGRADED GUTTED	OTHER	TRUE
PGGY	PIGGY	Piggy - ROUND	OTHER	TRUE
PILCH	ROUND	Pilchard ROUND	OTHER	TRUE
RAJIDE	WINGS	Skates WINGS	OTHER	TRUE
RDFS	GUTTED	Redfish GUTTED	OTHER	TRUE
RDFS	UNGRADED	Redfish UNGRADED	OTHER	TRUE
RDST	UNGRADED	Red steenbras UNGRADED	OTHER	TRUE
RNDH	ROUND	Red Eye ROUND	OTHER	TRUE
ROMN	UNGRADED	Roman UNGRADED	OTHER	TRUE
ROUGHY	H&G UNG	Orange Roughy, headed and gutted - ungraded	OTHER	TRUE
ROUGHY	ROUND	Orange roughy ROUND	OTHER	TRUE
ROVE	GUTTED	Red sea haarder GUTTED	OTHER	TRUE
ROVE	ROUND	Red sea haarder (Whole)	OTHER	TRUE
ROVE	UNGRADED	RED SEA HAARDER UNGRADED	OTHER	TRUE
RSTM	GUTTED	Red stumpnose GUTTED	OTHER	TRUE
SELGUE	SELGUE	Squirrel hake - UNGRADED	OTHER	TRUE
SEPIA	SEPIA	Cuttlefish - UNGRADED	OTHER	TRUE
SFSH	H&G + T	Soupfin shark H&G + T	OTHER	TRUE
SGRN	GUTTED	Spotted Grunter GUTTED	OTHER	TRUE
SGRN	UNGRADED	Spotted grunter UNGRADED	OTHER	TRUE
SHRK	H&G + T	Sharks H&G + T	OTHER	TRUE
SHRK	LIVERS	Sharks LIVERS	OTHER	TRUE
SHRK	UNGRADED	Sharks UNGRADED	OTHER	TRUE
SJSH	H AND G	St. Joseph H AND G	OTHER	TRUE
SJSH	SILV FLA	St. Joseph SILV FLA	OTHER	TRUE
SJSH	UNGRADED	St. Joseph UNGRADED	OTHER	TRUE
SNOK	F&FROZ	Snoek Fleck & Frozen	SnokTotal	TRUE
SNOK	H&G + T	Snoek H&G + T	SnokTotal	TRUE
SNOK	HEADED	Snoek HEADED	SnokTotal	TRUE
SNOK	RND UNGR	Snoek Round Ungraded	SnokTotal	TRUE
SNOK	SALTED	Snoek Fleck & Salted	SnokTotal	TRUE
SNOK	UNGRADED	Snoek UNGRADED	SnokTotal	TRUE
SNTR	UNGRADED	Santer UNGRADED	OTHER	TRUE
SOLE	CLEAN	Soles cleaned	SoleTotal	TRUE
SOLE	LARGE	Soles LARGE	SoleTotal	TRUE
SOLE	MEDIUM	Soles MEDIUM	SoleTotal	TRUE
SOLE	SLIPS	Soles SLIPS	SoleTotal	TRUE
SOLE	UNGRADED	Sole ungraded	SoleTotal	TRUE
SOLE	XLARGE	Soles XLARGE	SoleTotal	TRUE
SSLD	UNGRADED	Sand soldier UNGRADED	OTHER	TRUE
STNT	UNGRADED	Steentjie	OTHER	TRUE
SWFS	ROUND	Swordfish ROUND	OTHER	TRUE
TUNA	BETN	Big Eye Tuna	OTHER	TRUE
TUNA	YFTN	Yellow fin Tuna	OTHER	TRUE
WBRBL	H&G	Barbel Headed & Gutted	OTHER	TRUE
WBRBL	WBRBL	Barbel Headed & Gutted	OTHER	TRUE
WCSOLE	GUTUNG	West Coast Sole, gutted, ungraded	OTHER	TRUE
WCSOLE	LARGE	West coast sole LARGE	OTHER	TRUE
WCSOLE	MEDIUM	West coast sole MEDIUM	OTHER	TRUE
WCSOLE	SLIPS	West coast sole SLIPS	OTHER	TRUE
WCSOLE	XLARGE	West coast sole XLARGE	OTHER	TRUE
WHST	GUTTED	White steenbras GUTTED	OTHER	TRUE
WRFS	GUTTED	Wreckfish GUTTED	OTHER	TRUE
WSTM	GUTTED	White stumpnose GUTTED	OTHER	TRUE

Figure A1.1:


There are 2 scenarios:
1.species & category code in landing but not in drags – this data cannot be assigned drag information and is put in dragsnoeffort table.
2.species & category code in drag but not in landing – this data remains in the drag file BUT is assigned a nominal mass of zero.
Relationship Tools
Relationships - Microsoft Access
Home
Create
External Data
Database Tools
Add-Ins
Design
Landings & "catch" info are captured first – the front page of the book as filled in by the inspectors
One landing – many species & categories caught
landings
land_ID
country_code
company_number
vessel_number
docking_date_dd
docking_date_mm
docking_date_yy
docking_date_hh
docking_date_mi
sailing_date_dd
sailing_date_mm
sailing_date_yy
sailing_date_hh
sailing_date_mi
voyage_number
permit_holder
permit_holder_user_id
user_name
skipper_initials
skipper_surname
product_list_code
catch_estimation_units
catch_unit_size
trash_estimation_units
trash_unit_size
catch_transferred
bottom_trawl
midwater_trawl
freezer_landing
wetfish_landing
fuel_used
number_of_drags
daily_tally_landing
drag_by_drag_landing
entry_user_id
validated
validated_user_id
ctrm_executed
One landing – many drags
Drags are captured later – the contents of the logbook as filled in by the skipper for the "cleaned mass"
drags
land_ID
drag_ID
country_code
company_number
vessel_number
docking_date_dd
docking_date_mm
docking_date_yy
docking_date_hh
docking_date_mi
start_date_dd
start_date_mm
start_date_yy
start_data_hh
start_date_mi
end_date_dd
end_date_mm
end_date_yy
end_date_hh
end_date_mi
permit_holder
permit_holder_user_id
product_list_code
activity_code
true_course
magnetic_course
grid_code
start_latitude
start_longitude
end_latitude
end_longitude
depth
fishing_depth
bottom_temperature
surface_temperature
wind_direction
wind_force
target_species_code
gear_type_code
rpm
pitch
towing_speed
distance_towed
catch_volume
catch_production
validated
validate_user_id
mesh_size
2
One drag – many species & categories estimated
drags_no_effort
land_ID
drag_no_effort_ID
country_code
company_number
vessel_number
docking_date_dd
docking_date_mm
docking_date_yy
docking_date_hh
docking_date_mi
icseaf_division
species_code
category_code
nominal_mass
1
drag_catches
drag_ID
country_code
company_number
vessel_number
docking_date_dd
docking_date_mm
docking_date_yy
docking_date_hh
docking_date_mi
start_date_dd
start_date_mm
start_date_yy
start_date_hh
start_date_mi
species_code
category_code
cleaned_mass
nominal_mass
GLM_categories
species_code
category_code
name
interval
GLM_category
used_in_GLM
landing_catches
land_ID
country_code
company_number
vessel_number
docking_date_dd
docking_date_mm
docking_date_yy
docking_date_hh
docking_date_mi
species_code
category_code
landed_mass
dbo_product_mappings
landing_species_code
landing_category_code
drag_species_code
drag_category_code
The drags and drag catches are used in combination with the GLM categories to assign certain categories into larger categories for the GLM extract for the CPUE time series
CONVERT TO REAL MASS uses the product mappings and raising factors to calculate the nominal mass per category from the cleaned mass drag estimates so that:
∑nominal mass = landed mass*raising factor for each landing
Navigation Pane
Ready
start
Microsoft Access - De...
Microsoft PowerPoint ...
05:03 PM

Appendix 2: Sybase Convert to Real Mass.sql

```
print    'sp_Convert2RealMass'
SETUSER  'dbo'
go

 /*
 * sp_Convert2RealMass
 * Updated on Feb 16, 2004 11:45
 */
create procedure sp_Convert2RealMass @pCountryCode varchar(10),
   @pCompanyNumber smallint,
   @pVesselNumber smallint,
   @pDockingDate smalldatetime
as
declare @vStartDate smalldatetime,
   @vSpeciesCode varchar(13),
   @vCategoryCode varchar(13),
   @vCleanedMass decimal(15,3),
   @vLandedMass decimal(15, 3),
   @vPrevSpeciesCode varchar(13),
   @vPrevCategoryCode varchar(13),
   @vTotalLandedMass decimal(15, 3),
   @vTotalDragMass decimal(15,3),
   @vSortIndex integer
begin
  /*------------------------------------------------------------------------------
   * For the new-comer. The convert to real mass store procedure IS one of the
   * central store procedures in the demersal system. Its function IS to
   * raise/lower the drag catch estimates to that of the weight as measured at
   * landing. It will later also be responsible to move the '7' product categories
   * on the landings back to the '3' categories on the drags.
   * To move the cleaned_mass that IS on the drag_catch TABLE to the nominal_mass
   * field, the following process IS used.
   * 1. Select the total weight FOR all the drags in the landing - GROUP them BY
   *    species/category code. Store this in a temp TABLE. (sum(cleaned_mass) also
   *    referred to as sigma_drag)
   * 2. Create a CURSOR that will SELECT all the drag_catches FOR a given landing.
   * 3. For each row in the CURSOR, do the following :
   *    a. Select the total landed mass of all the species/categories using the
   *       mapping TABLE. (A category on the drag TABLE can map to more that one
   *       category on the species TABLE). This also need to be mulptiplied with
   *       the raising factor (landed_mass).
   *    b. Select FROM the temp TABLE the total cleaned_mass FOR the given species
   *       AND category (SELECT sigma_drag).
   *    c. Multiply the cleaned_mass with the landed_mass divide BY the sigma_drag
   *       AND write that to the records nominal mass.
   * 4. Update the landing AND SET the indicator that this landing has been
   *    processed BY convert to real mass.
   * 5. Drop the temp TABLE that holds the sigma_drag VALUES.
   */
  --// Clear out the old "convert to real mass" VALUES.
  UPDATE drag_catches
  SET nominal_mass= NULL
  WHERE country_code= @pCountryCode AND
     company_number= @pCompanyNumber AND
     vessel_number= @pVesselNumber AND
```

```
   docking_date= @pDockingDate

DELETE FROM drags_no_effort
WHERE country_code= @pCountryCode AND
   company_number= @pCompanyNumber AND
   vessel_number= @pVesselNumber AND
   docking_date= @pDockingDate

--// Remove any records where the cleaned mass IS 0.
DELETE FROM landing_catches
WHERE country_code= @pCountryCode AND
   company_number= @pCompanyNumber AND
   vessel_number= @pVesselNumber AND
   docking_date= @pDockingDate AND
   (landed_mass= 0 OR landed_mass IS NULL)

DELETE FROM drag_catches
WHERE country_code= @pCountryCode AND
   company_number= @pCompanyNumber AND
   vessel_number= @pVesselNumber AND
   docking_date= @pDockingDate AND
   (cleaned_mass= 0 OR cleaned_mass IS NULL) AND
   (nominal_mass= 0 OR nominal_mass IS NULL)

DELETE FROM daily_tally_catches
WHERE country_code= @pCountryCode AND
   company_number= @pCompanyNumber AND
   vessel_number= @pVesselNumber AND
   docking_date= @pDockingDate AND
   (cleaned_mass= 0 OR cleaned_mass IS NULL) AND
   (nominal_mass= 0 OR nominal_mass IS NULL)

/*--------------------------------------------------------------------------------
 * Start the "convert to real mass" process
 */
--// step 1. Create the temp tables.
--// The first TABLE will store the species/category code AND the mass FOR the
--// whole landing.
--// The second TABLE will contain the species/category code that has been
--// processed already.
CREATE TABLE #t_ThisLandingCatches(country_code varchar(13) NOT NULL,
   company_number smallint NOT NULL,
   vessel_number smallint NOT NULL,
   docking_date smalldatetime NOT NULL,
   species_code varchar(13) NOT NULL,
   category_code varchar(13) NOT NULL,
   landed_mass integer NULL)

INSERT INTO #t_ThisLandingCatches
SELECT landing_catches.country_code,
   landing_catches.company_number,
   landing_catches.vessel_number,
   landing_catches.docking_date,
   landing_catches.species_code,
   landing_catches.category_code,
   landing_catches.landed_mass
FROM landing_catches
```

```
  WHERE country_code= @pCountryCode AND
     company_number= @pCompanyNumber AND
     vessel_number= @pVesselNumber AND
     docking_date= @pDockingDate

  CREATE TABLE #t_ThisDragCatches(country_code varchar(13) NOT NULL,
     company_number smallint NOT NULL,
     vessel_number smallint NOT NULL,
     docking_date smalldatetime NOT NULL,
     start_date smalldatetime NOT NULL,
     species_code varchar(13) NOT NULL,
     category_code varchar(13) NOT NULL,
     cleaned_mass decimal(13,3) NULL)

  INSERT INTO #t_ThisDragCatches
  SELECT drag_catches.country_code,
     drag_catches.company_number,
     drag_catches.vessel_number,
     drag_catches.docking_date,
     drag_catches.start_date,
     drag_catches.species_code,
     drag_catches.category_code,
     drag_catches.cleaned_mass
  FROM drag_catches
  WHERE drag_catches.country_code= @pCountryCode AND
     drag_catches.company_number= @pCompanyNumber AND
     drag_catches.vessel_number= @pVesselNumber AND
     drag_catches.docking_date= @pDockingDate

  CREATE TABLE #t_ProcessedCategories(species_code varchar(13) NOT NULL,
     category_code varchar(13) NOT NULL)

  --// If the code IS SOLE, convert the code to ECSOLE.
--  UPDATE #tmpSumDragCatches
--  SET species_code= 'ECSOLE'
--  WHERE species_code= 'SOLE'

  --// step 2.
  --// Get all the drags for a given landing. This will be split INTO
  --// species/category groups. NOTE: The sort ORDER IS SET to the number
  --// of times that a species/category IS defined in the product mappings
  --// TABLE. This means that drag species/categories that IS mapped to a lot
  --// of landing species/categories will have a lower priority than drag
  --// species/categories that IS mapped to only a few landing species/categories.
  DECLARE c_DragCatches CURSOR FOR
  SELECT start_date,
     species_code,
     category_code,
     cleaned_mass,
     (SELECT count(1) FROM product_mappings WHERE drag_species_code=
t_ThisDragCatches.species_code AND drag_category_code= t_ThisDragCatches.category_code)
  FROM #t_ThisDragCatches t_ThisDragCatches
  ORDER BY 2, 5, 3

  --// Reset the link to the previous record. This link will indicate when to SELECT the new VALUES.
  SELECT @vPrevSpeciesCode= NULL,
     @vPrevCategoryCode= NULL
```

```
  OPEN c_DragCatches
  WHILE (1= 1)
  BEGIN
    --// Fetch the drag_catch record.
    FETCH c_DragCatches
    INTO @vStartDate,
    @vSpeciesCode,
       @vCategoryCode,
       @vCleanedMass,
       @vSortIndex

    IF (@@sqlstatus<> 0)
    BEGIN
      BREAK
    END

    --// The SOLE species code that needs to move to ECSOLE should NOT be part of
    --// this routine. This IS NOT part of the convert to real mass routine. It IS
    --// a data capture issue.
--    IF (@vSpeciesCode= 'SOLE')
--    BEGIN
--      SELECT @vSpeciesCode= 'ECSOLE'
--    END

    IF ((@vSpeciesCode<> @vPrevSpeciesCode) OR
       (@vCategoryCode<> @vPrevCategoryCode))
    BEGIN
      --// The species/category code does NOT match the previous
      --// species/category code. Select the total landed mass FOR the new
      --// species/category code, SELECT the total drag mass FOR the new
      --// species/category code, INSERT the landed species/category codes
      --// used according to the product mapping TABLE INTO the processed
      --// TABLE AND SET the previous species/category code to the new
      --// VALUES.
    SELECT @vTotalLandedMass= isnull(sum(landed_mass* isnull((SELECT raising_factor FROM
vw_ProductCategoryFactors WHERE species_code= t_ThisLandingCatches.species_code AND
category_code= t_ThisLandingCatches.category_code), 1)), 0)
      FROM #t_ThisLandingCatches t_ThisLandingCatches,
         product_mappings
      WHERE t_ThisLandingCatches.species_code= product_mappings.landing_species_code AND
         t_ThisLandingCatches.category_code= product_mappings.landing_category_code AND
         product_mappings.drag_species_code= @vSpeciesCode AND
         product_mappings.drag_category_code= @vCategoryCode AND
         0= (SELECT count(1) FROM #t_ProcessedCategories WHERE species_code=
t_ThisLandingCatches.species_code AND category_code= t_ThisLandingCatches.category_code)

      SELECT @vTotalDragMass= sum(cleaned_mass)
      FROM #t_ThisDragCatches
      WHERE species_code= @vSpeciesCode AND
         category_code= @vCategoryCode

      --// Store all the species that has been processed BY the convert to real mass process.
      INSERT INTO #t_ProcessedCategories
      SELECT product_mappings.landing_species_code,
         product_mappings.landing_category_code
      FROM product_mappings
```

```
    WHERE product_mappings.drag_species_code= @vSpeciesCode AND
      product_mappings.drag_category_code= @vCategoryCode

    SELECT @vPrevSpeciesCode= @vSpeciesCode,
      @vPrevCategoryCode= @vCategoryCode
   END

   IF (@vTotalDragMass> 0)
   BEGIN
    --// step 5.
    --// Update the nominal value FOR the current row of the CURSOR.
    IF (NOT((@vCleanedMass= 0) OR (@vCleanedMass IS NULL)))
    BEGIN

     UPDATE drag_catches
     SET nominal_mass= convert(decimal(15,3), (@vTotalLandedMass* @vCleanedMass)/
@vTotalDragMass)
     WHERE drag_catches.country_code= @pCountryCode AND
       drag_catches.company_number= @pCompanyNumber AND
       drag_catches.vessel_number= @pVesselNumber AND
       drag_catches.docking_date= @pDockingDate AND
       drag_catches.start_date= @vStartDate AND
       drag_catches.species_code= @vSpeciesCode AND
       drag_catches.category_code= @vCategoryCode
    END
   END
  END
  CLOSE c_DragCatches
  DEALLOCATE CURSOR c_DragCatches

  --// step 6.
  --// Move all the information that we could NOT IF in the drag_catches TABLE, but was in the
  --// landing_catches TABLE INTO the drags_no_effort TABLE. (work through the mapping TABLE)
  DECLARE c_LandingCatches CURSOR FOR
  SELECT species_code
  , category_code
  , sum(landed_mass* isnull((SELECT raising_factor FROM vw_ProductCategoryFactors WHERE
species_code= t_ThisLandingCatches.species_code AND category_code=
t_ThisLandingCatches.category_code), 1))
  FROM #t_ThisLandingCatches t_ThisLandingCatches
  WHERE EXISTS(SELECT 1 FROM product_categories WHERE species_code=
t_ThisLandingCatches.species_code AND category_code= t_ThisLandingCatches.category_code)
  GROUP BY species_code
  , category_code

  OPEN c_LandingCatches
  WHILE (1= 1)
  BEGIN
   FETCH c_LandingCatches
   INTO @vSpeciesCode,
     @vCategoryCode,
     @vLandedMass

   IF (@@sqlstatus<> 0)
   BEGIN
    BREAK
   END
```

```
    IF (NOT(EXISTS(SELECT 1
        FROM #t_ThisDragCatches t_ThisDragCatches,
            product_mappings
        WHERE t_ThisDragCatches.species_code= product_mappings.drag_species_code AND
            t_ThisDragCatches.category_code= product_mappings.drag_category_code AND
            product_mappings.landing_species_code= @vSpeciesCode AND
            product_mappings.landing_category_code= @vCategoryCode)))
    BEGIN
      --// If the code is SOLE, it was converted to ECSOLE.
--      IF (@vSpeciesCode<> 'SOLE')
--      BEGIN
        INSERT INTO drags_no_effort
        VALUES (@pCountryCode,
            @pCompanyNumber,
            @pVesselNumber,
            @pDockingDate,
            0,
            @vSpeciesCode,
            @vCategoryCode,
            convert(decimal(13, 3), @vLandedMass))
--      END
    END
  END
  CLOSE c_LandingCatches
  DEALLOCATE CURSOR c_LandingCatches

  --// Remove the temp tables used.
  DROP TABLE #t_ThisLandingCatches
  DROP TABLE #t_ThisDragCatches
  DROP TABLE #t_ProcessedCategories

  --// Set the flag that convert to real mass has take place on this record.
  UPDATE landings
  SET ctrm_executed= 1
  WHERE country_code= @pCountryCode AND
      company_number= @pCompanyNumber AND
      vessel_number= @pVesselNumber AND
      docking_date= @pDockingDate
end
go

SETUSER
go

grant Execute  on sp_Convert2RealMass to bachelor
go
```