Start-of-season CPUE and in-season adjustment of TACC for FLA 3 in 2011/2012

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Introduction

The management approach for FLA 3 is designed to enable responsiveness to changing abundance levels while ensuring sustainability and increased benefits to stakeholders when abundance is high. Flatfish are included in the Second Schedule of the Fisheries Act (1996) for these stocks, s13(7) of the Fisheries Act allows the Minister to implement an in-season increase to the TAC.

The TACC for flatfish in FLA 3 was reduced on the 1st of October 2007 from 2,681 to 1,430t. With this reduction it is now possible for the TACC to be exceeded in years following strong recruitment events. This was recognised by the Ministry of Agriculture and Forestry (then Ministry of Fisheries) and work was commissioned to develop an in-season increase procedure.

Bentley (in prep.) developed a model that uses the catch per unit effort (CPUE) from the first three months of the fishing year to predict the end of year catch. This model was reviewed and ultimately accepted by the Southern Inshore Fisheries Assessment Working Group. As part of that work Bentley (2011) developed Structured Query Language (SQL) code called *Updater* to query the Ministry database, and coding in R to run the management procedure and produce the outputs.

This report presents the results for the 2012 Management Procedure to calculate the end of season TACC for FLA3 for the 2011/12 fishing year. This report will be presented to the Ministry Inshore Fishery Management Team for their consideration.

Results

Most of the core vessels have remained in the fishery through the time series, however, there is a proportional shift in the number of strata (vessel-date-statistical area combination) for each vessel with a few vessels having proportionally more strata in recent years (Figure 1). In recent years there has also been a shift in the number of strata into Statistical Area 26 (Figure 2) and a higher proportion in November (Figure 3).

Overall the number of vessels used, number of tows and fishing duration have all declined over time and as a result, the number of strata used in the analysis have declined (Figure 4).

Figure 5 provides a summary of the comparison of landing and estimated catches for each trip in the start-of-season data set. In 2011/12 about 2% of the strata were excluded because the ratio between landings and estimated catches was outside the acceptable range. This is consistent with previous years.

Figures 6 and 7 show the annual distributions of the standardising coefficients and landings adjustments respectively. As seen in the full-year CPUE standardisation (Bentley in prep) there has been a general shift in the proportion of effort towards statistical areas (in particular 026) and vessels with higher coefficients.

Figure 8 and Table 1 provide summaries of the relationship between historical catches and the start-of-season CPUE calculated using the *Updater* SQL and R. The operation of the Management Procedure in 2012 produced the same TACC across fishing years as when it was operated in March 2011. The single exception being that the Management Procedure operation in 2012 produced a TACC for 2010/11 that was 28t less than the Management Procedure operation in March 2011. This arose because in early 2012, more data for the period October to December 2010 was available than in early 2011 resulting in a slightly different start of season CPUE for 2010/11.

Discussion

This report provides diagnostics summaries of the data used to calculate the start-of-season CPUE for FLA in 2011/12. Note that these data summaries are only for the data which match the criteria listed in *Updater* (Bentley 2011). The summaries are not intended to provide a characterisation of the FLA 3 fishery. Rather they summarise the data that has been chosen as a sub-sample from which a start-of-season CPUE index can be based.

The start of season CPUE for the 2011/12 fishing year is similar to the previous year and as a result the TACCs recommended by the Management Procedure are similar. While these are lower than the highs of 2008-2010 they are higher than the lows experienced in the mid-2000s.

The Management procedure recommends a TACC of 1,495t for the 2011/12 fishing year, 65t above the baseline TACC of 1,430t.

Table 1: Summary of FLA 3 start-of-season CPUE, landings and TACC for each fishing year. Start-of-season CPUE is for 1 October to 31 December. Strata: the number of CPUE strata (vessel-date-statistical area combination) available. Unadjusted: the geometric mean of the estimated catch divided by the number of tows. Adjusted: the geometric mean of the estimated catch adjusted for landings and for coefficients for month, statistical area, vessel, number of tows and total fishing duration. MP: the TACC (t) calculated by the current in-season management procedure.

Fishing year	Strata	Unadjusted	Adjusted Landings coefficient	Catch	TACC	MP in 2011	MP for 2012
1990	710	68.60	81.071	1637	2585	2059	2059
1991	801	49.51	55.040	1341	2681	1398	1398
1992	851	50.38	54.697	1229	2681	1389	1389
1993	1069	51.05	62.344	1954	2681	1584	1584
1994	1299	64.51	84.785	1942	2681	2154	2154
1995	1225	63.12	81.524	1968	2681	2071	2071
1996	1149	63.15	80.404	2319	2681	2042	2042
1997	1173	73.30	96.374	2592	2681	2448	2448
1998	1489	73.17	87.484	2351	2681	2222	2222
1999	1194	64.24	73.211	1907	2681	1860	1860
2000	1175	57.53	70.573	1583	2681	1793	1793
2001	1060	56.51	60.773	1703	2681	1544	1544
2002	977	59.69	67.815	1695	2681	1723	1723
2003	1074	64.41	68.952	1650	2681	1752	1752
2004	1078	52.11	54.885	1286	2681	1394	1394
2005	895	46.00	48.953	1353	2681	1244	1244
2006	856	46.80	46.305	1177	2681	1176	1176
2007	710	52.25	47.408	1429	2681	1204	1204
2008	762	78.70	63.389	1371	1430	1610	1610
2009	615	92.72	87.610	1544	1430	2226	2226
2010	546	86.26	75.822	1525	1430	1926	1926
2011	566	63.27	58.761	1027	1430	1520	1493
2012	518	75.29	58.845	NA	1430	NA	1495

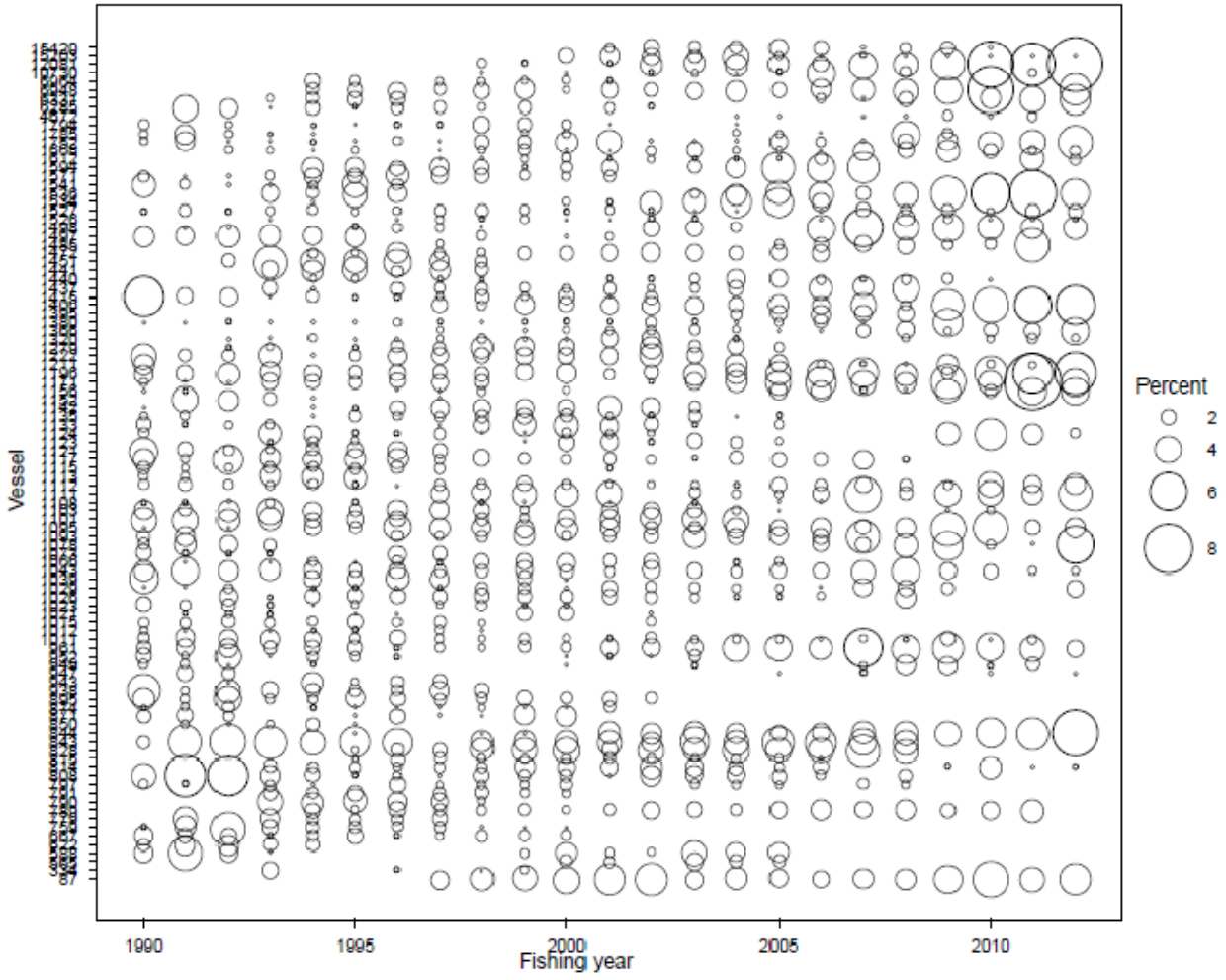

Figure 1: The participation history of selected core vessels used in the analysis. Circle size represents the proportion of strata from each vessel within a year.

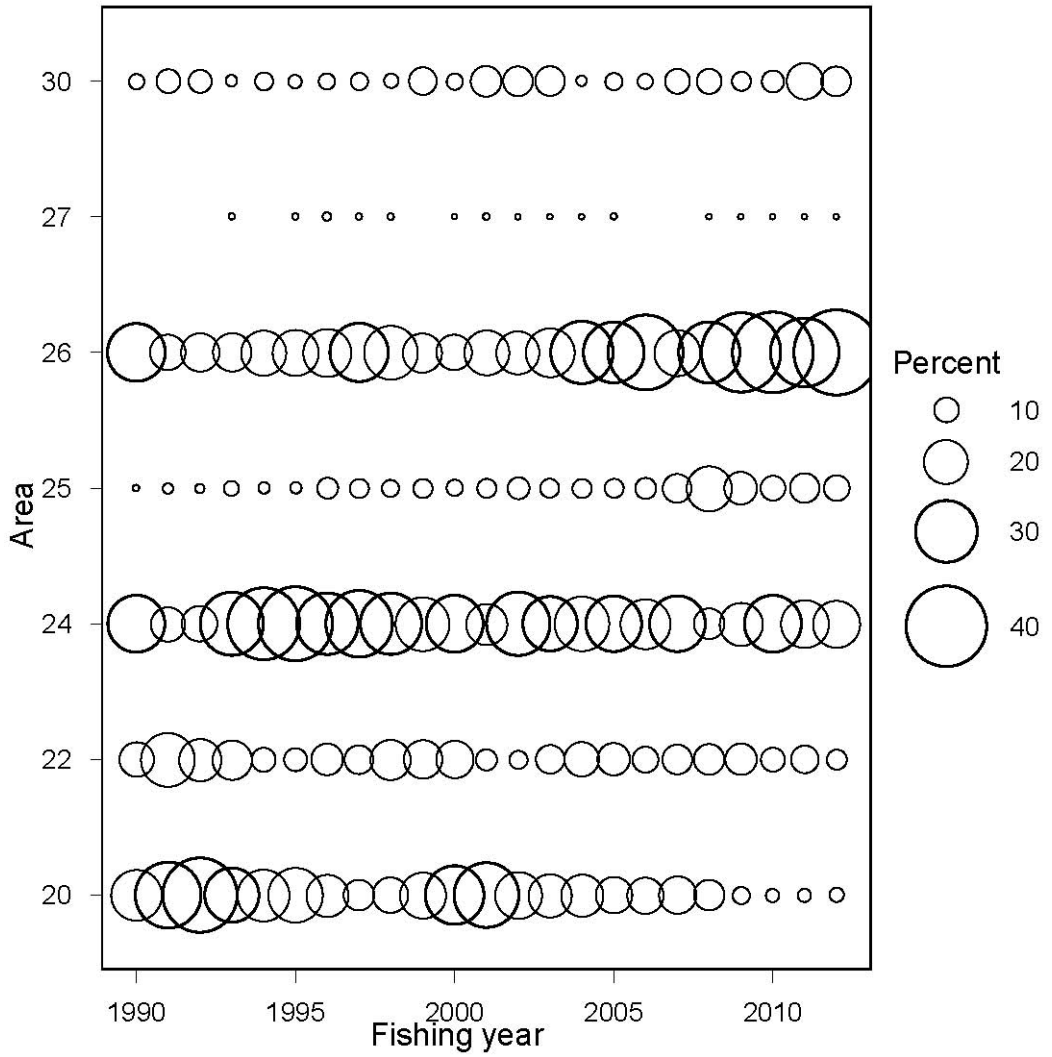

Figure 2: Distribution of the flatfish catch across the main statistical areas, by fishing year. Circle areas are proportional to the strata from each area within a year.

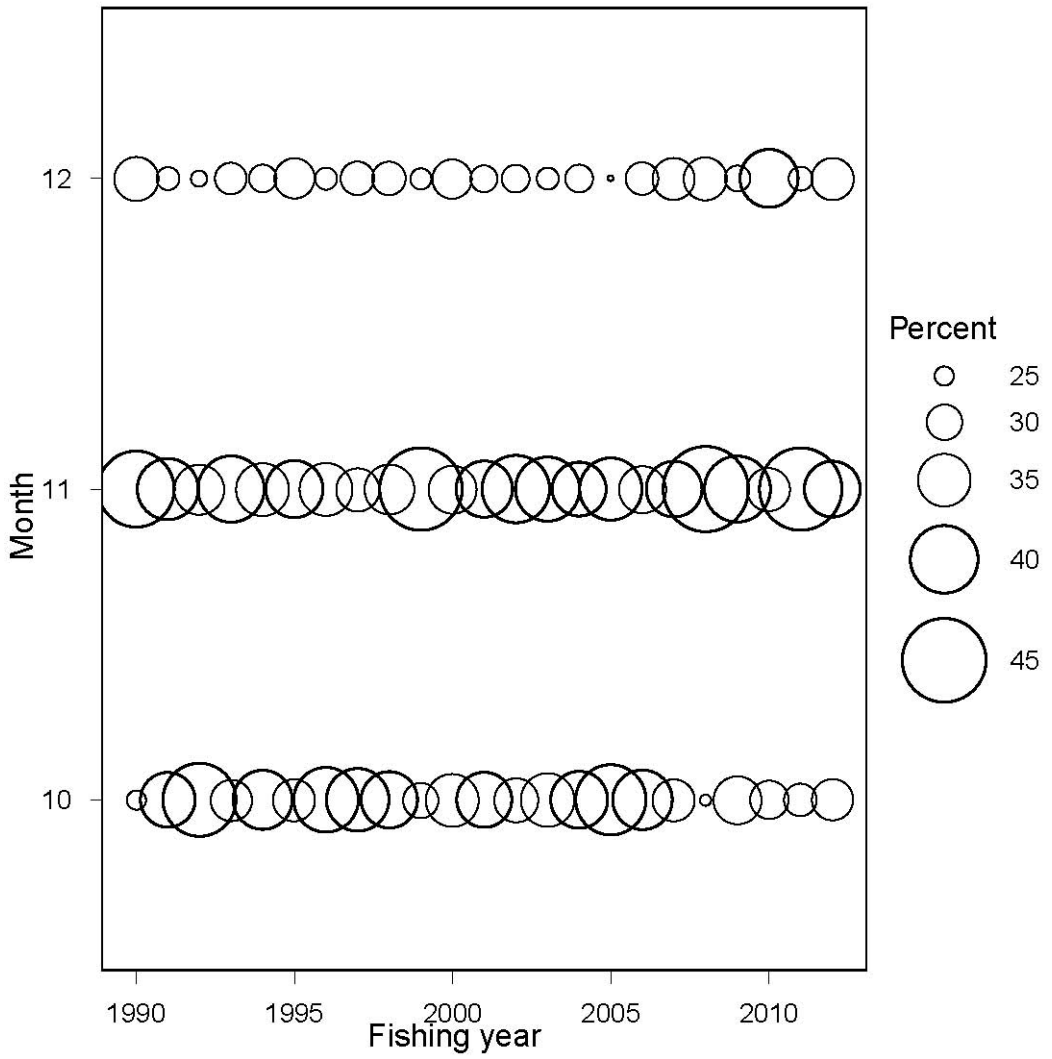

Figure 3: Distribution of the flatfish catch, by month and year for the three months used in the management procedure. Circle areas are proportion of strata from each month within the analysis period.

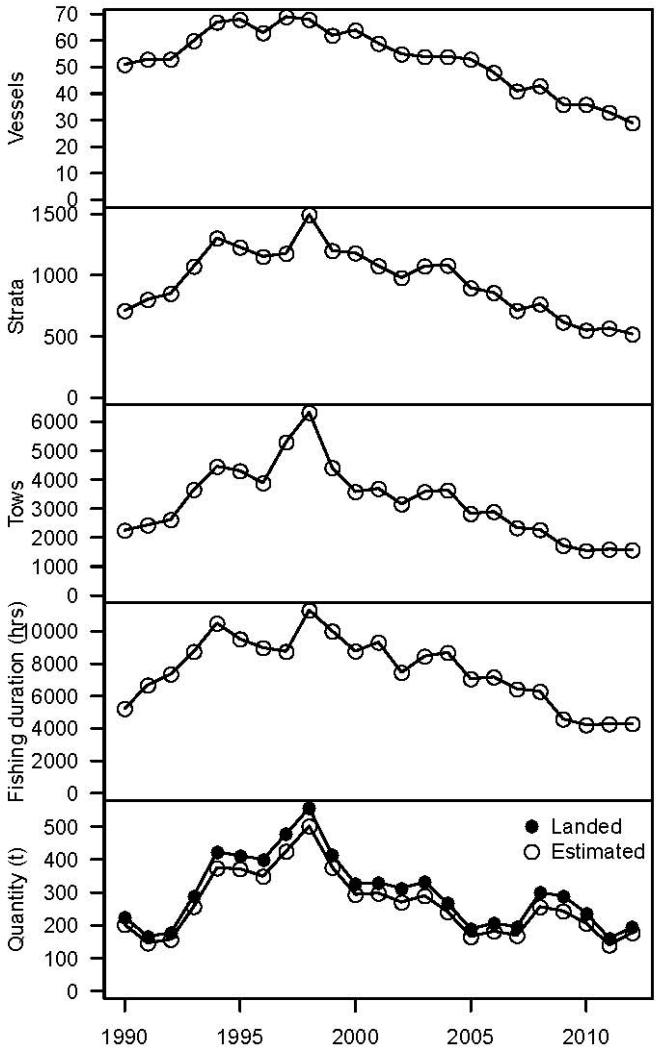

Figure 4: Annual summaries of the data used to calculate the adjusted start-of-season CPUE. Note that this only includes data that match certain criteria including that the vessel belong to the core vessel set defined in Bentley (in prep).

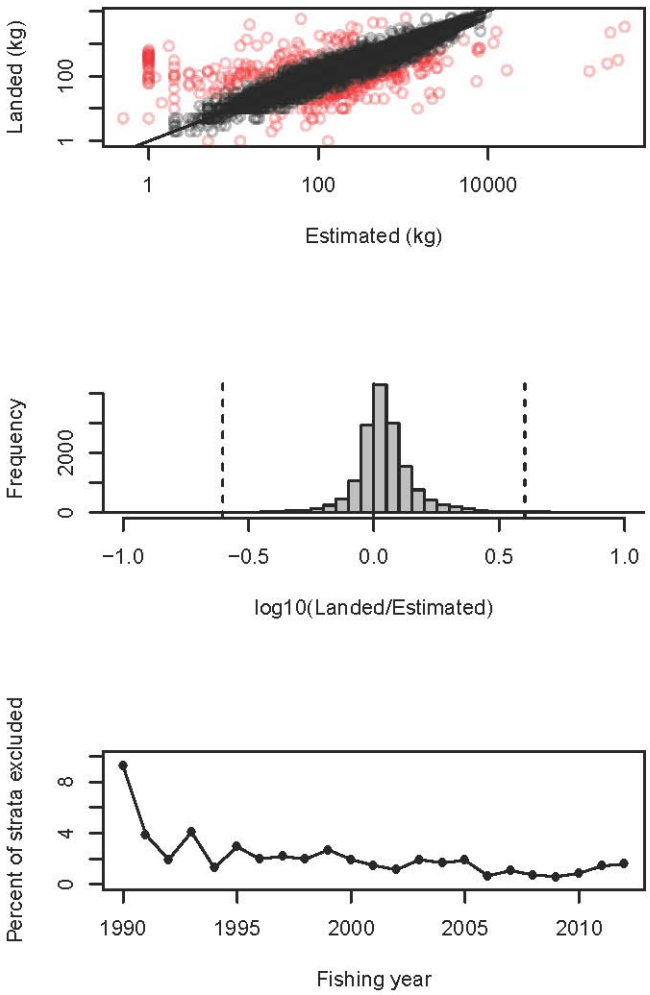

Figure 5: Comparison of landings and estimated catches for data grooming. Only trips where the landed catch was between 0.25 and 4 times the estimated catch were used to calculate start-of-season CPUE. Trips outside of this range are indicated by red circles in the upper panel and by the dashed lines in the second panel. The lower panel shows the percentage of strata excluded on this basis.

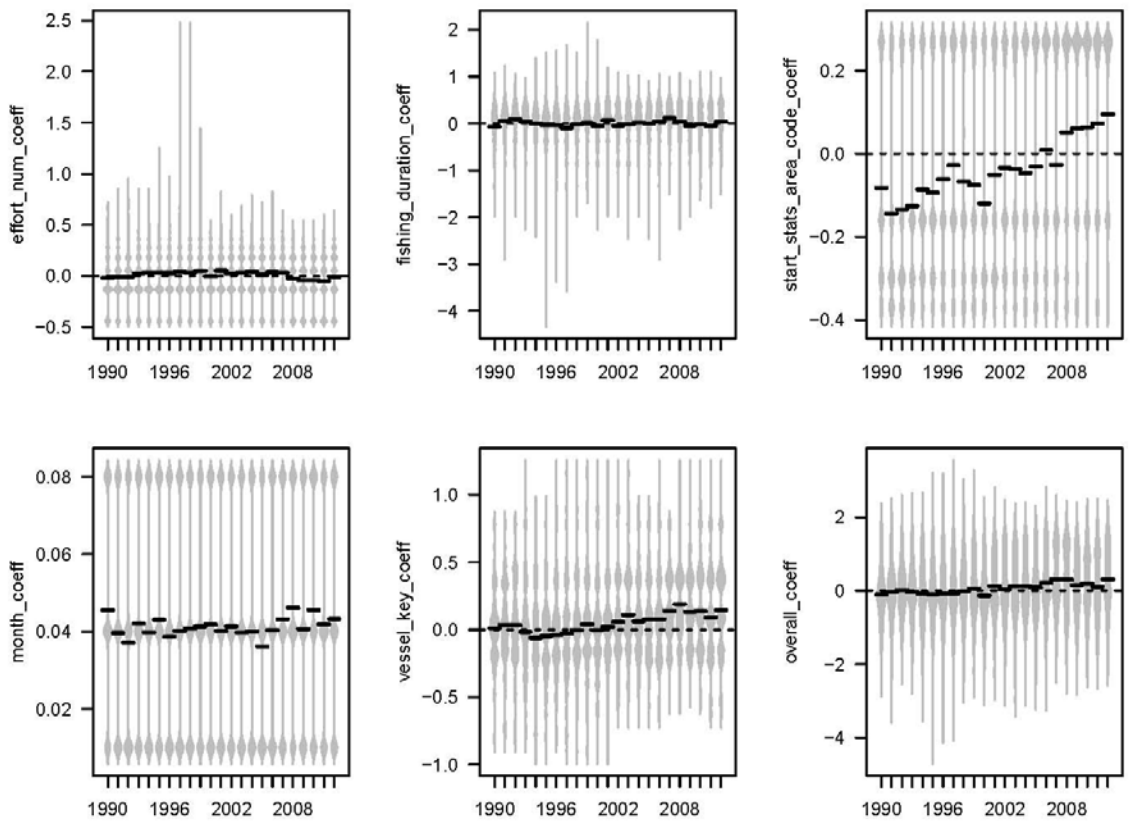

Figure 6: The distribution of each coefficient applied to each stratum in each year in order to adjust estimated catches. The black bars indicate the mean coefficient value in each year. The *overall_coeff* is the sum of all the other coefficients.

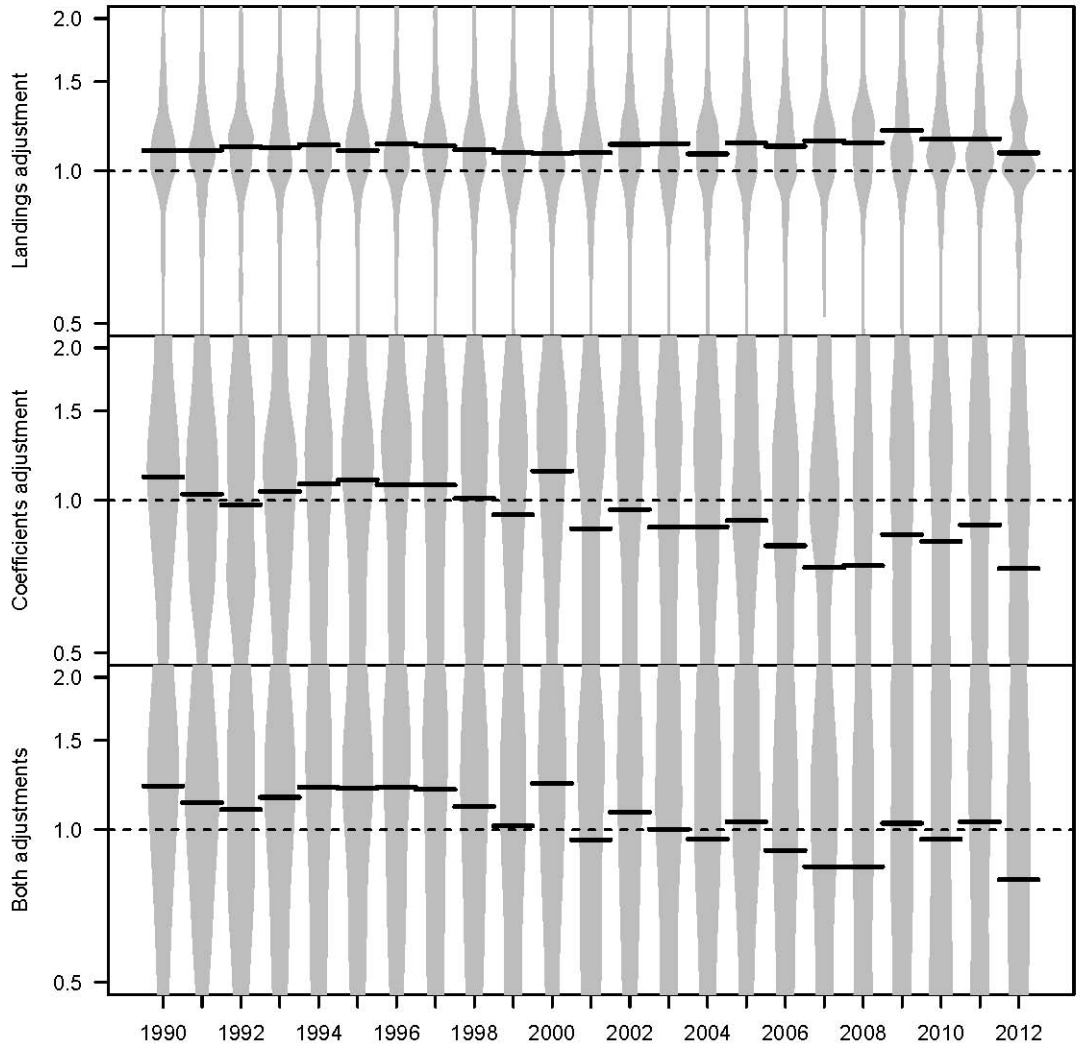

Figure 7: The mean (dark bars) and distribution (shaded areas) of adjustments for landings vs. estimated catch for each year (Top); Adjustments for all coefficients (in Figure 6) combined (Middle); and both adjustments combined (Bottom).

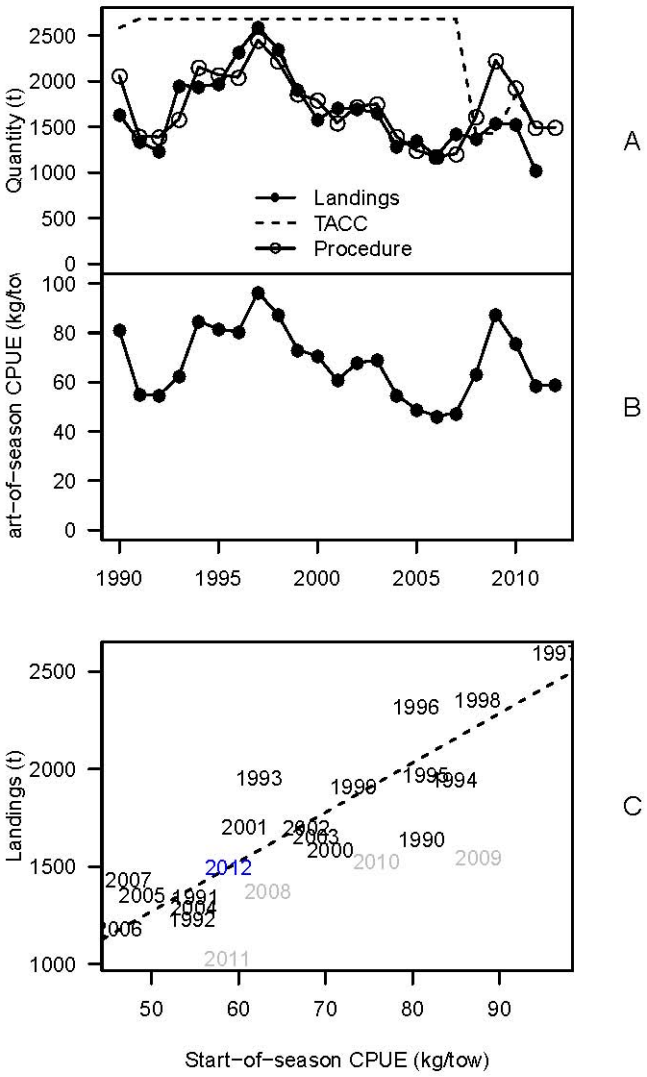

Figure 8: Relationship between start-of-season CPUE and landings. (A) Historical landings and TACC and the TACC recommended by the current management procedure. (B) Start-of-season CPUE index. (C) Relationship between start-of-season CPUE and end of season historical landings. Dotted line represents the geometric mean of the ratio between start-of-season CPUE and landings for the fishing years 1989/90 to 2006/07. The label for 2012 (shown in blue) indicates the relationship between start-of-season CPUE and the TACC calculated by the Management Procedure.

References

Bentley, N. 2011. Start-of-season CPUE and in-season adjustment of TACC for FLA 3 in 2010/2011. SINS-WG-2011-17. 23pp

Bentley, N. in prep. An examination of alternative approaches for in-season increases in total allowable catch for FLA 3. Draft New Zealand Fisheries Assessment Report.