

2012 UPDATE OF THE CANADIAN BLUEFIN TUNA FISHERY AND CPUE SERIES

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SUMMARY

This document discusses recent size composition and nominal catch rates for the Canadian bluefin tuna fishery for the 2012 fishing season.

RÉSUMÉ

Le présent document discute des récents taux de composition des tailles et de capture nominale pour la pêcherie canadienne de thon rouge au titre de la saison de pêche 2012.

RESUMEN

En este documento se debate la composición por talla y las tasas de captura nominal recientes de la pesquería de atún rojo canadiense para la temporada de pesca de 2012.

KEYWORDS

Tuna fisheries catch rates, size composition

1. Description of the fishery and data

1.1. Description of the fishery and target species

The Canadian commercial bluefin fishery generally occurs between July and November, and consists of two commercial fisheries targeting bluefin tuna migrating into Canadian waters: one off the coast of southwestern Nova Scotia (SWNS) and one in the southern Gulf of St. Lawrence (sGSL) (**Figure 1, Figure 2**). Catches for the SWNS fishery are localized along the northern edge of Georges Bank, Hell Hole, Fundy Bay, St. Margaret's Bay, Halifax and Canso areas (**Figure 1**). Fish in the sGSL fishery are generally caught in waters north of Prince Edward Island and west of Cape Breton Island (**Figure 1**).

Prior to 2004, the majority of fishing trips for the SWNS fishery occurred during the month of August (**Figure 3**). Since 2004, the peak of the fishery has shifted between the months of September and October, with November also emerging as a substantial fishing month in recent years (**Figure 3**). Rod and reel continues to be the dominant gear type in the SWNS bluefin tuna fishery (**Figure 4**). The Scotia-Fundy (SF) home fleet is responsible for more than 50% of the catches in the SWNS fishery, with ex-sector fleets (Gulf, PEI, Quebec, Newfoundland) catching ~28% of the fish (**Figure 5**).

Similar to the SWNS fleet, in the past the sGSL fishery used to occur predominantly during the month of August (**Figure 3**). Since 2006, however, the fishery season has shifted to the months of September and October, with November catches becoming more prominent in the last two years (**Figure 3**). It should be noted that for the 2010 season, 94% of September catches occurred on September 27th and 28th, while 97% of fish caught in October were fished on October 4th and 5th (**Figure 6**). In terms of gear use, the sGSL fishery is dominated by rod and reel, with minimal catches attributed to harpoon and tended line (**Figure 4**). The dominant fleets fishing in the sGSL fishery are the Prince Edward Island (PEI) and Gulf Nova Scotia (GNS) fleets (**Figure 5**), though the activity of the other fleet (Gulf NB, ex-sector NS) has been slowly increasing since 2007.

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1.2. Data source and changes in reporting requirements

Detailed trip and effort information for the Canadian bluefin fishery comes from fishermen's logs, dockside monitoring records provide detailed size data. Log submission has been mandatory since 1994, and was extended in 1996 to include trips with zero catch. The dockside monitors are present during unloading and provide detailed size information on each fish, resulting in essentially 100% coverage of the catch.

There have been no changes to reporting requirements following the institution of mandatory log submission in 1996. The Canadian Atlantic statistical system provides information on trip catch (number and weight of tuna), size of fish (length and weight of GSL fish; weight of SWNS fish), effort (hours fished), date, gear characteristics, home port (fleet), catch location (latitude and longitude) and weight of other species caught in SWNS (albacore, bigeye, yellowfin).

Changes to fishery management include a switch to an Individual Transferable Quota (ITQ) system in 2004 for the SWNS, and introduction of self-regulatory (ITQ-like) measures in sGSL following the extremely short 2010 fishing season. The effect of these factors on catch rates is discussed in detail in Hanke et al. 2013.

1.3. Data exclusions and rationale

The SWNS dataset (**Table 1**) excludes catches made using trap gear, as measures of effort (e.g. hours ranged, effort required to bring fish into the trap) and initial catch location of the fish are not available. The dataset also excludes the ex-sector Newfoundland fishing fleet because these vessels behave differently from the other SWNS fleets. Historically, the SWNS dataset has also been limited to the months of August-October and geographically restricted to NAFO areas 4X (except 4Xm), 5Y and 5Z. Due to the historic exclusion of NAFO unit 4Xm, any catches within 4X which did not specify the unit (e.g. "4X unspecified") were often excluded from the dataset. Although these restrictions reflected the area and season covered by this fishery in the past, in recent years the season has begun extending into November, and catches from 4W are becoming more abundant (**Figure 3** and **Figure 2**). Consequently, the season and geographical restrictions previously applied to the SWNS index may need to be re-examined in 2014 (See **Recommendations**). The index presented in this document is derived from the reduced dataset, with all of the historical restrictions in place.

The sGSL dataset (**Table 2**) has been actively limited to tended line and rod and reel gears, and only applies to PEI and Nova Scotia fleets. Similarly to the SWNS dataset, the season for sGSL has begun extending into November in recent years (**Figure 3**), so the historic constraint on season (August – October) should be reconsidered in future updates (See **Recommendations**). In addition, the Gulf NB and ex-sector NS fleets should be considered for inclusion in the dataset, due to their increasing catch contribution in recent years. As in the case of SWNS, the index presented in this document is derived from the reduced dataset, with all of the historical restrictions in place.

1.4. Reports from fishing industry consultations

Fishermen from the southern Gulf of St. Lawrence report large schools of herring in association with large schools of bluefin tuna. Generally, bluefin tuna caught off the northwestern tip of PEI are small compared to catches off the southeastern tip of the island. This distribution has been observed over the past 2 years. Bluefin continue to be found in the Bay de Chaleur and north off the Gaspé peninsula, large schools of herring have been seen with schools of tuna.

In Newfoundland, large schools of tuna between 200 and 1000 pounds have appeared for the 3rd year in Trinity, Bonaventure and Conception Bays.

2. Trends in size composition and age

For the Canadian bluefin tuna fisheries, trends in fish size are generally dictated by market demand and are not necessarily representative of the population structure. However, a switch in management can also affect mean fish weight as evidenced by low average weight for the SWNS fishery in 2002 and 2003 (**Figure 7**) when it was still competitive. In subsequent years, individual quotas allowed the fishing to span a larger portion of the season. In general, the mean weight of fish caught in the SWNS fishery has shown a steady increase throughout the 2000s; in contrast, the median showed an initial increase and then varied without trend until 2009. From

2010 to 2012 the median has dropped dramatically (**Figure 7**). A general expansion of the size range may also be occurring, with the 2012 catch having both the largest mean weight (191 kgs) and the largest range since 2002 (129 kg and 239 kg for 25th and 75th percentiles, respectively). In addition to high values, the 2012 season showed the highest divergence between the mean (191 kgs) and median (152 kgs) weights, indicating that the composition was heavily skewed towards smaller fish. As noted above, this shift can be partially attributed to fishermen targeting specific sizes of fish in accordance with market demand, consequently confounding our ability to attribute these shifts to changes in population structure.

The southern Gulf of St. Lawrence fishery experienced an increase in mean catch weight between the mid and late 2000s, reaching a high of 338 kgs in 2010 (**Figure 7**). Since then, the mean weight has returned closer to the series average (278 kg), with the mean weight of 277 kg for the 2012 fishing season. sGSL also experiences the same broadening of the range as SWNS, with the 2012 season having the largest range of the series (193 kgs and 340 kgs for 25th and 75th percentiles). It should be noted that the 2010 series peak was accompanied by an extremely short fishing season, with 26% of the fish caught on September 26th – 27th and 72% of the fish caught on October 4th – 5th (**Figure 6**). With the combination of favorable market prices and an abundance of large fish, the 2010 peak in weights does not necessarily represent an actual shift in population structure.

Interestingly, the size composition of the 2010 catch suggested a strong year class entering the sGSL fishery (**Figure 8**); an observation which was confirmed with 2011-2012 data. In particular, the 2012 catch composition shows an evident bimodal shape with peaks at 195 kgs and again at 310 kgs. The progression of the second peak from 2010 to 2012, as well as the increase in the proportion of fish attributed to this peak, suggests a strong year-class effect and not simply a shift in market demand. The Canadian Large Pelagics sampling program is currently processing the ~300 otoliths collected during the 2012 season, including fish from both peaks in the sGSL fishery. Results from this study are expected to provide significant insight into these shifts in size composition for the Gulf of St. Lawrence.

3. Nominal CPUE

The nominal 2012 CPUE for the SWNS bluefin tuna fishery shows a small decline from the 2011 season (**Figure 9**), though recent values still come short of the 2003 peak preceding the switch to ITQ. The nominal CPUE for the sGSL fishery has rebounded in 2012, but remains below the 2010 series high (**Figure 9**).

4. Recommendations

Recent shifts in the fishery distribution, season and fleet contribution may require that filters historically applied to the CPUE dataset be re-examined to ensure the CPUE dataset continues to be representative of fishing effort. For example, the current NAFO area and Month restrictions imposed on the SWNS fishery dataset excludes 67 - 74 successful trips per year between 2010 and 2012. Exclusion of these trips and their catches has an effect on size composition (**Figure 10**) and, consequently, CPUE (**Figure 11**). Changes in restrictions on the sGSL dataset (Fleet and Month inclusions) are not expected to have a significant effect on the dataset (**Figure 12**).

References

Hanke, A.R., Andrushchenko, I. and Neilson, J. D. 2013. Indices of stock status obtained from the Canadian bluefin tuna fishery. *Collect. Vol. Sci. Pap. ICCAT*, 69(1): 335-377.

Table 1. Dataset description and nominal CPUE (# fish / hours fished) series from the Southwest Nova Scotia bluefin tuna fishery (rod and reel, tended line and harpoon), based on catch and effort data from commercial logbooks for August through October (2002-2012). Dataset is subject to all historical restrictions.

<i>Year</i>	<i>Number of Trips with BFT catch</i>	<i>Number of Trips with no catch</i>	<i>Number of Fish</i>	<i>Hours Fished</i>	<i>Nominal CPUE</i>
2002	261	71	1,201	7,804	15.38
2003	188	8	1,199	6,288	19.07
2004	134	12	572	6,086	9.40
2005	126	26	600	5,565	10.78
2006	139	4	730	6,065	12.04
2007	88	1	353	3,655	9.66
2008	106	84	566	4,753	11.91
2009	92	11	391	2,700	14.48
2010	101	12	368	2,842	12.95
2011	105	25	383	2,788	13.74
2012	96	30	338	2,578	13.10

Table 2. Dataset description and nominal CPUE (# fish/hours fished) series for the Southern Gulf of St. Lawrence bluefin tuna fishery (tended line and rod and reel), based on catch and effort data from commercial logbooks for August through October (2002-2012). Dataset is subject to all historical restrictions.

<i>Year</i>	<i>Days with Catch</i>		<i>Totals</i>		<i>Catch</i>
	<i>Fail</i>	<i>Succeed</i>	<i>Fish</i>	<i>Hours</i>	<i>Nominal</i>
2002	96	86	549	53,201	1.03
2003	50	75	460	42,754	1.07
2004	42	46	613	32,021	1.91
2005	44	75	700	45,090	1.55
2006	63	72	859	55,297	1.55
2007	23	25	452	16,172	2.77
2008	57	39	515	22,372	2.30
2009	20	25	630	15,169	4.13
2010	1	7	533	3,567	14.94
2011	43	110	503	5,204	9.67
2012	38	102	606	4,372	13.86

<i>Year</i>	<i>Days with Catch</i>		<i>Totals</i>		<i>Catch</i>
	<i>Fail</i>	<i>Succeed</i>	<i>Fish</i>	<i>Hours</i>	<i>Nominal</i>
2002	96	86	549	53,201	1.03
2003	35	75	450	35,325	1.27
2004	40	46	597	31,915	1.87
2005	42	75	689	44,828	1.54
2006	48	72	842	43,942	1.92
2007	13	25	414	13,760	3.01
2008	40	38	487	18,342	2.66
2009	19	25	609	13,518	4.50
2010	1	7	508	3,443	14.75
2011	33	109	499	4,506	11.07
2012	9	103	607	4,374	13.88

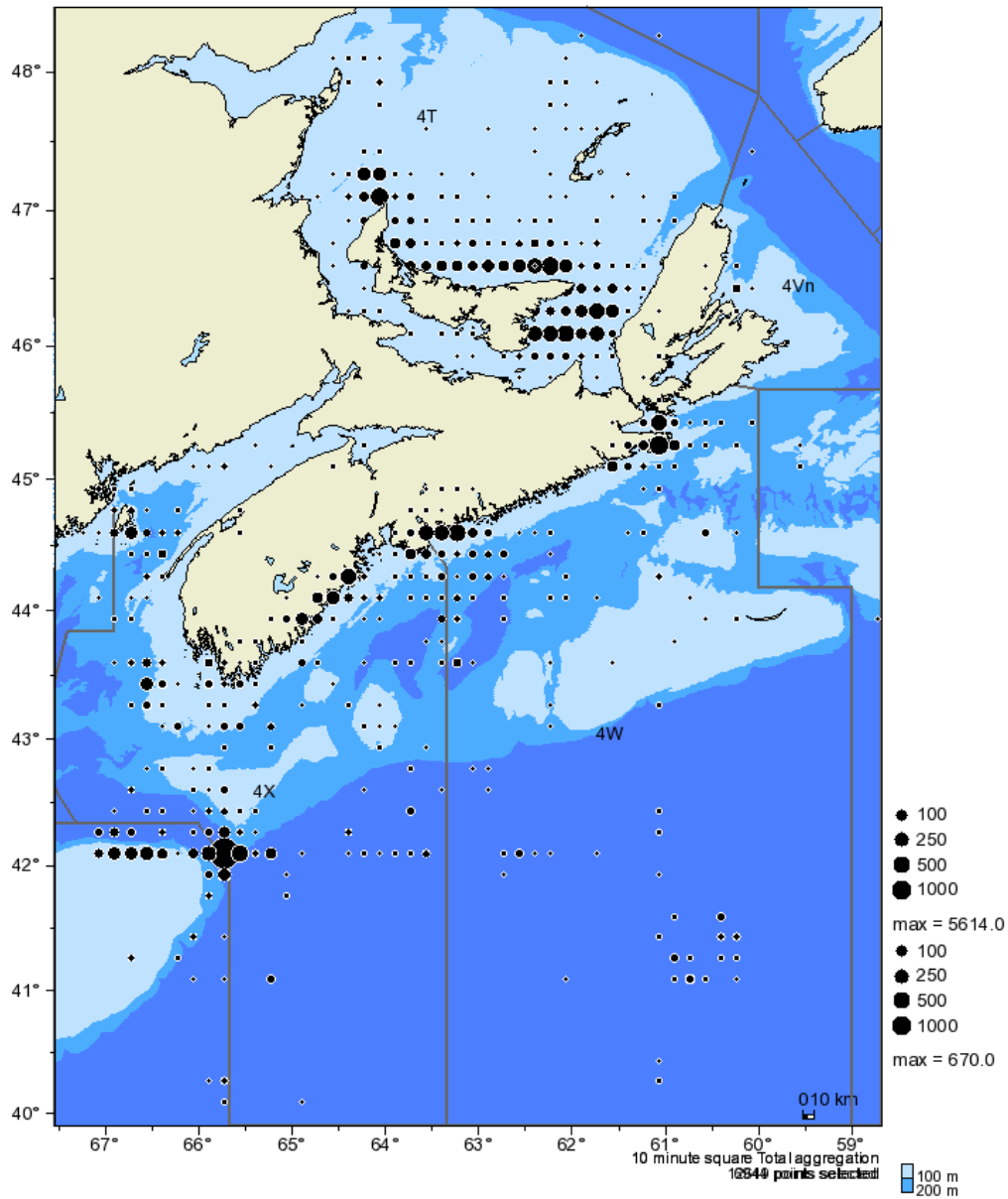


Figure 1. SWNS and sGSL catches between 2002 and 2011. Datasets are limited to Rod and Reel, Tended Line, Harpoon gears in SWNS, and Rod and Reel and Tended Line gear in sGSL.

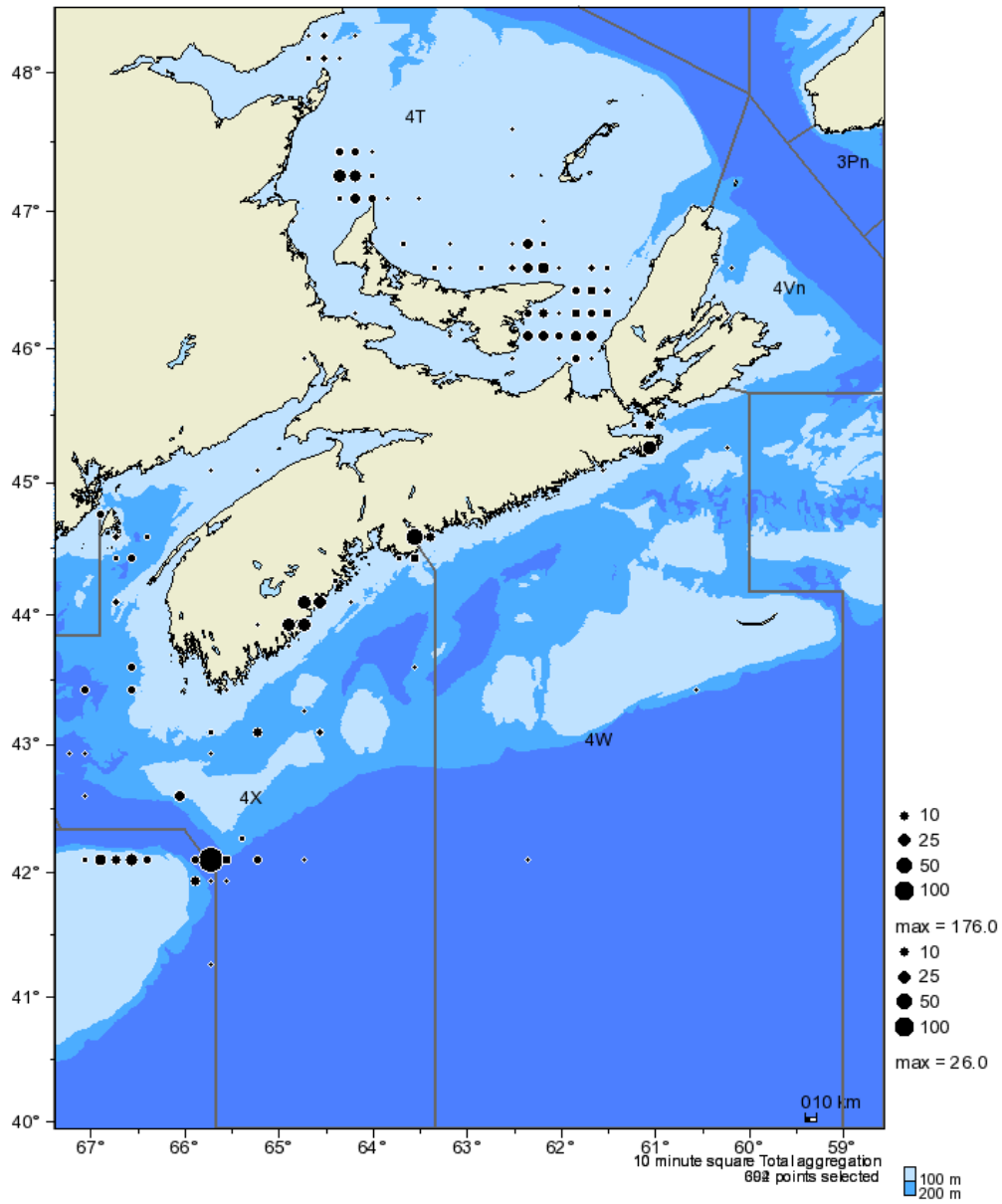


Figure 2. SWNS and sGSL catches in 2012. Datasets are limited to Rod and Reel, Tended Line, Harpoon gears in SWNS, and Rod and Reel and Tended Line gear in sGSL.

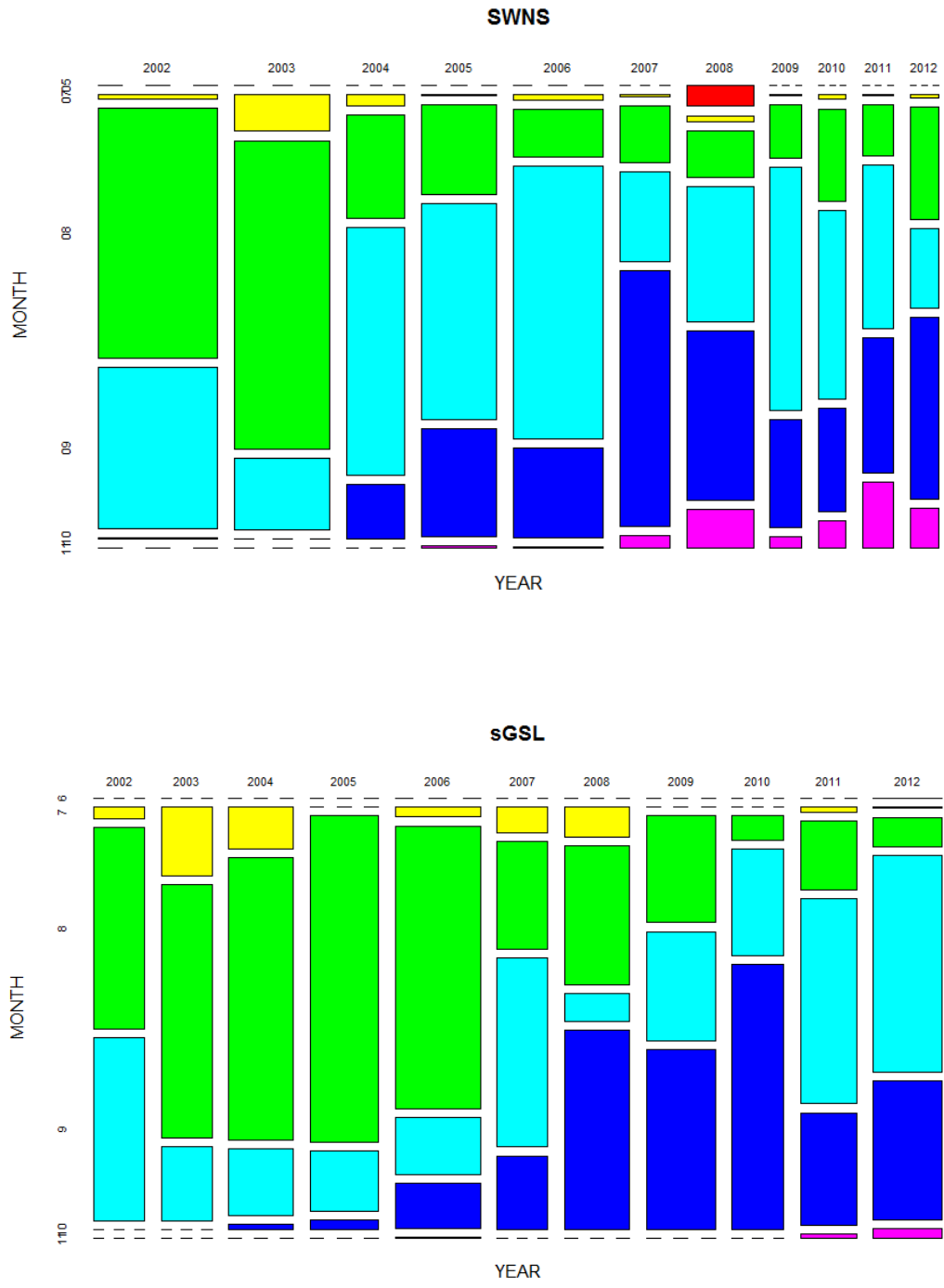


Figure 3. Monthly progression of season for the SWNS and sGSL fisheries since 2002. Data exclude catches by the Newfoundland fleet and trapnet gear (SWNS). No month or area restrictions have been applied.

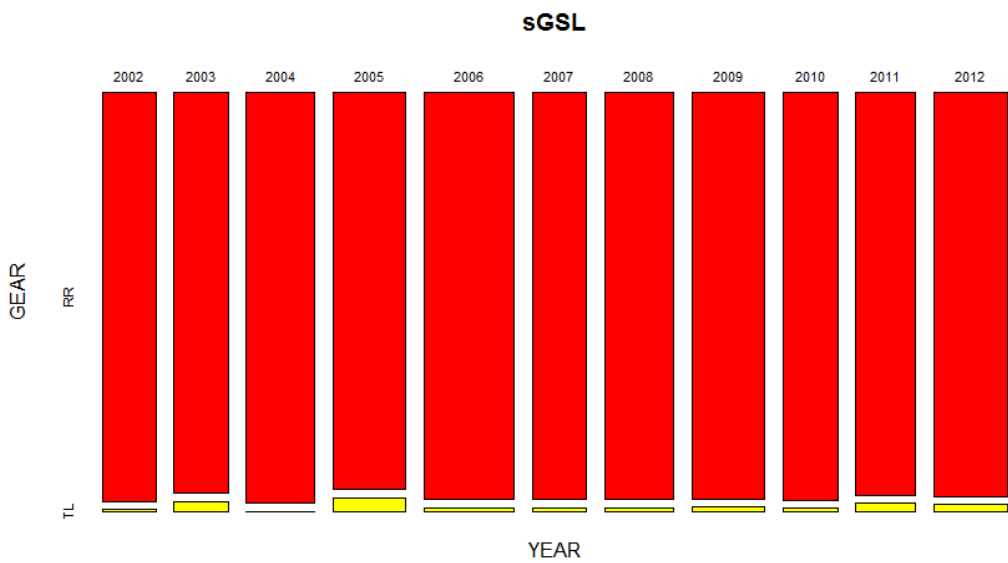
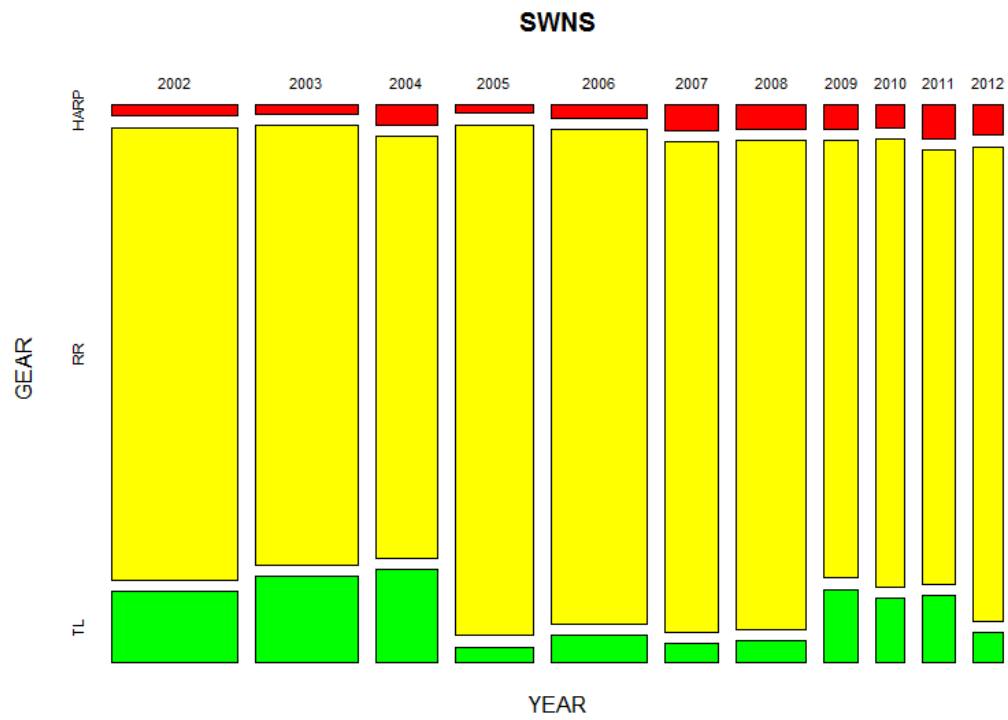


Figure 4. Bluefin tuna catches for the SWNS and sGSL fisheries by gear. Catches made by the Newfoundland fleet are excluded, as are catches made using traps (SWNS). No month or area restrictions have been applied to this dataset.

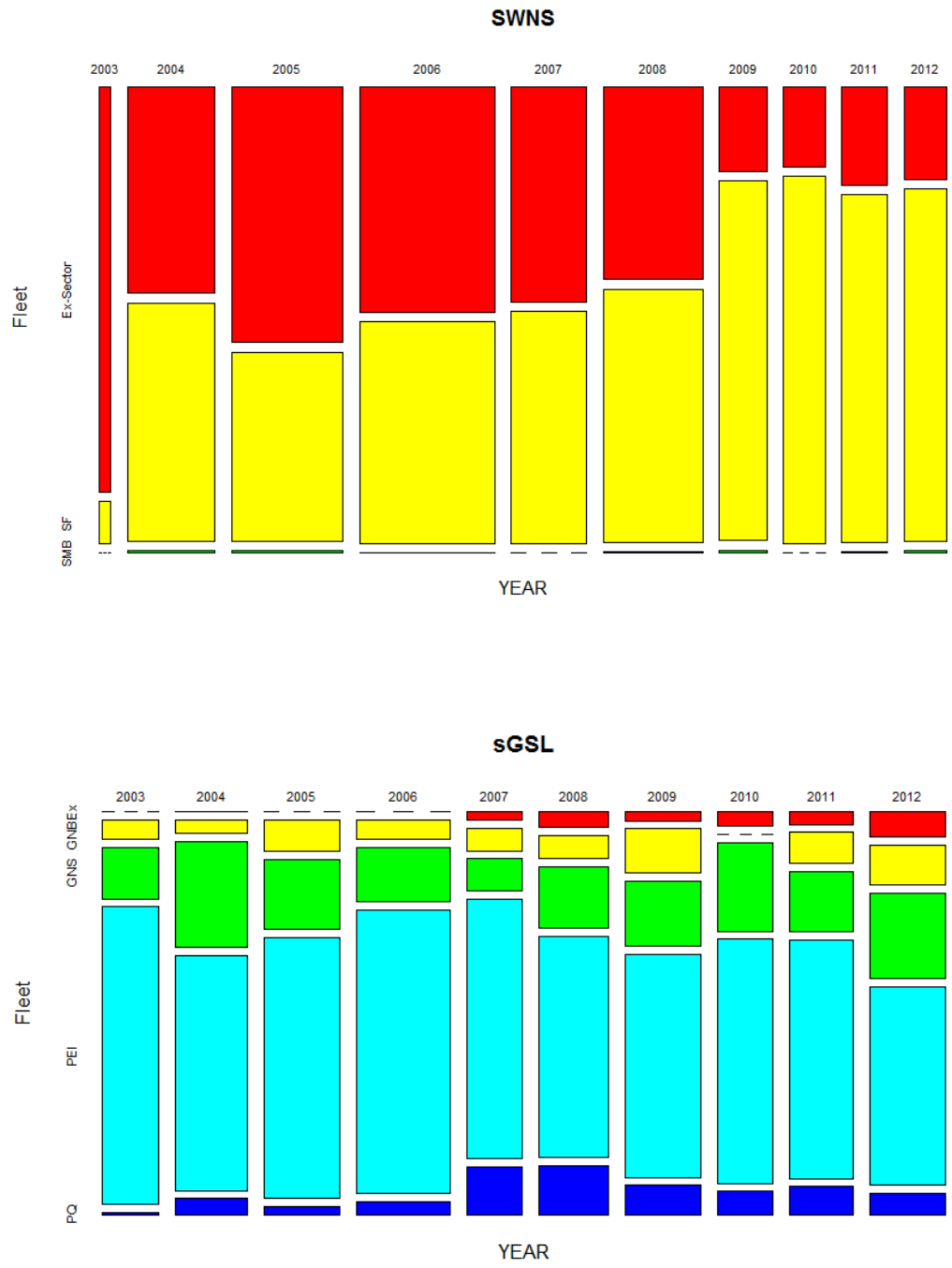


Figure 5. Bluefin tuna catches for the SWNS and sGSL fisheries by fleet. Catches made by the Newfoundland fleet are excluded, as are catches made using traps (SWNS). No month or area restrictions have been applied to this dataset.

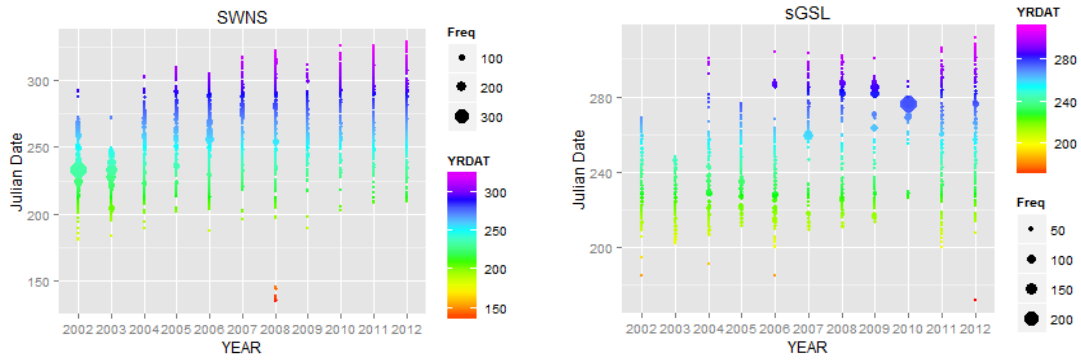


Figure 6. Annual season progression for the SWNS and sGSL fisheries since 2002. Size of the point indicates the number of trips taken by the fleet on that day, while colour is indicative of calendar day. The month restriction has been relaxed to show the full extent of the season.

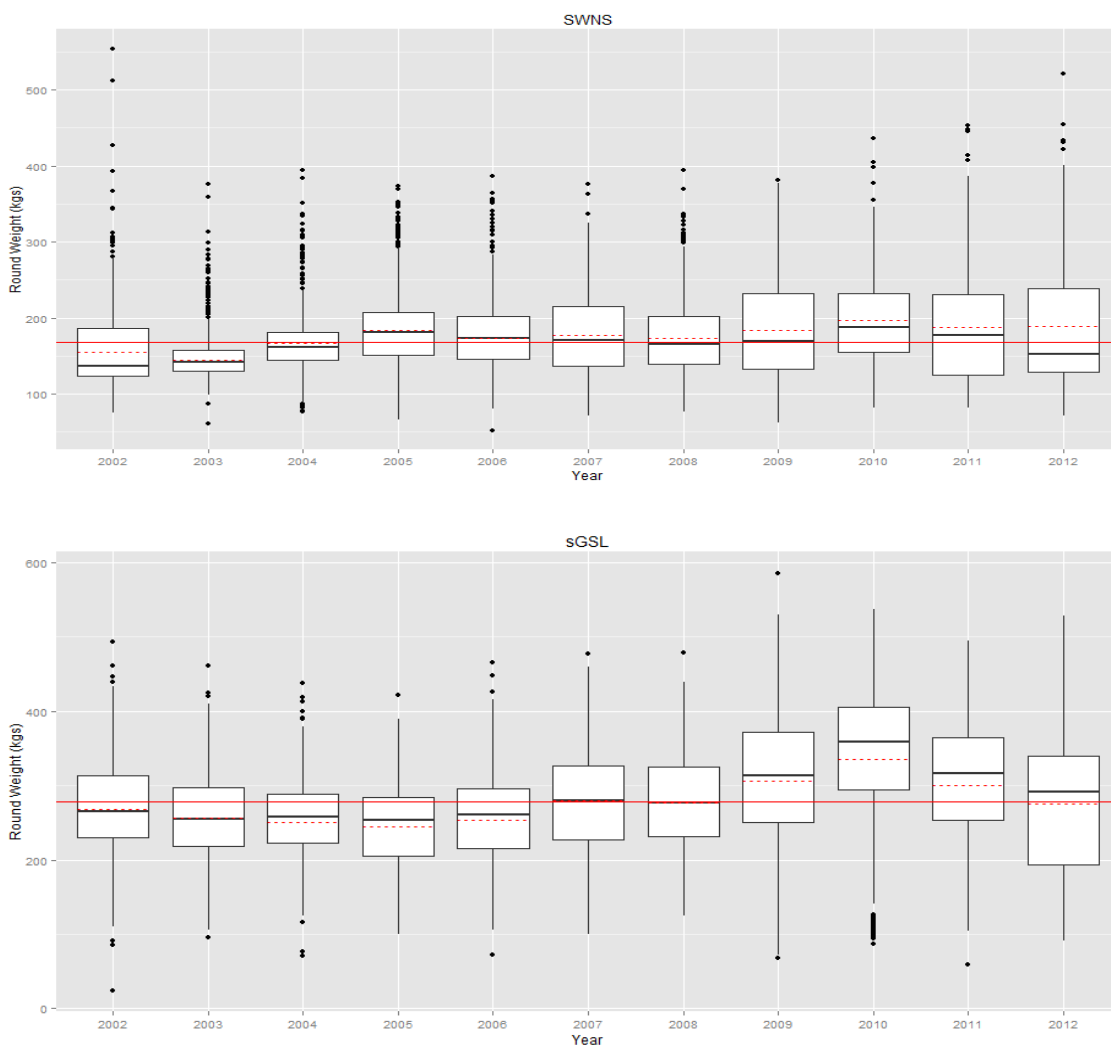


Figure 7. Size composition of the SWNS catch (top panel) and sGSL (bottom panel). In both cases, datasets were subject to the restrictions (SWNS excludes NFLD fleet, trap catches, catches outside of months August – October and catches outside of 4X, 5Z and 5Y); sGSL is restricted to catches made by the NS and PEI fleets, using tended line or rod and reel gears during the months of August - October). Black lines shows annual median, dotted red line indicates annual mean, solid red line indicates series mean.

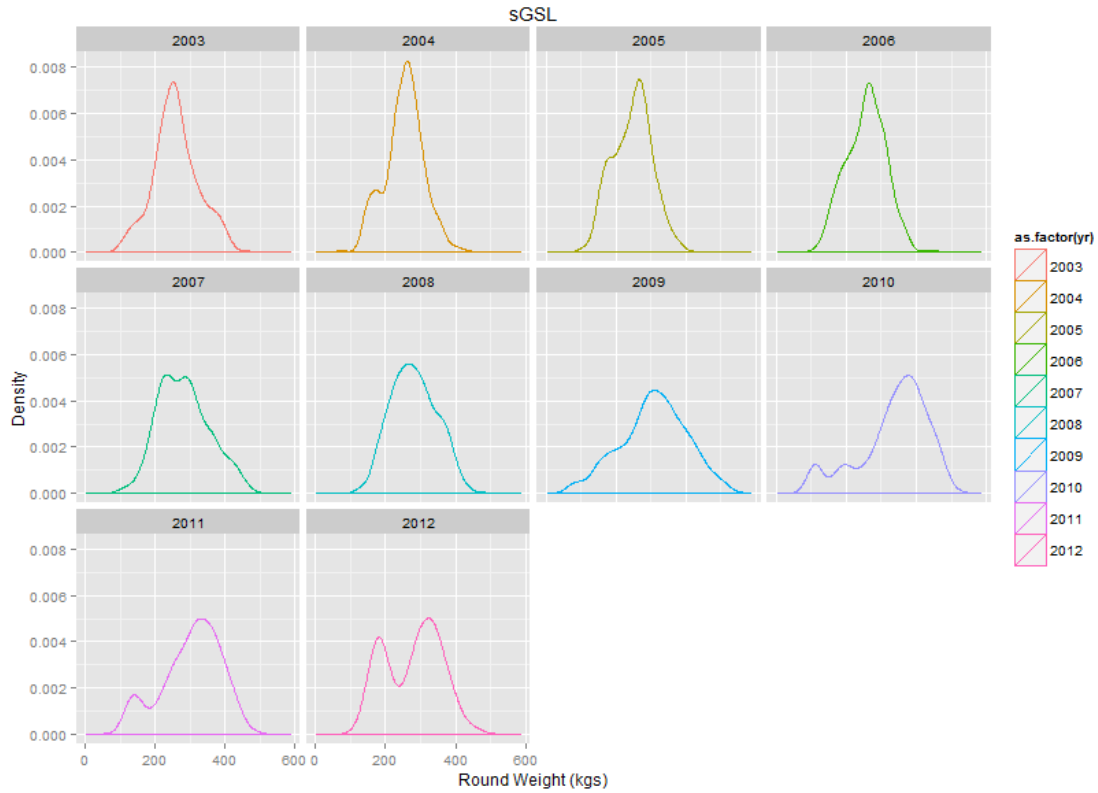


Figure 8. Annual size compositions of the sGSL catch.

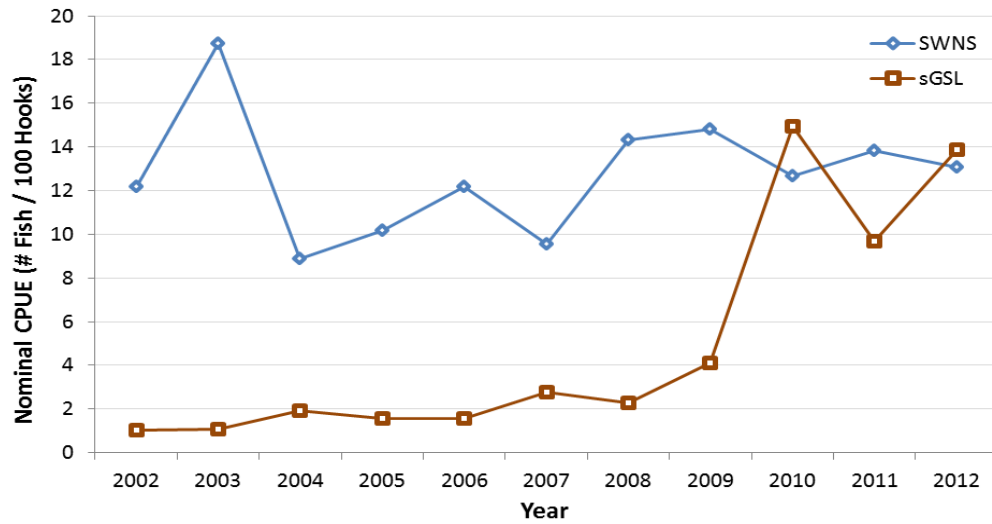


Figure 9. Nominal CPUE (number of fish per 100 hooks) for the SWNS and sGSL fishery.

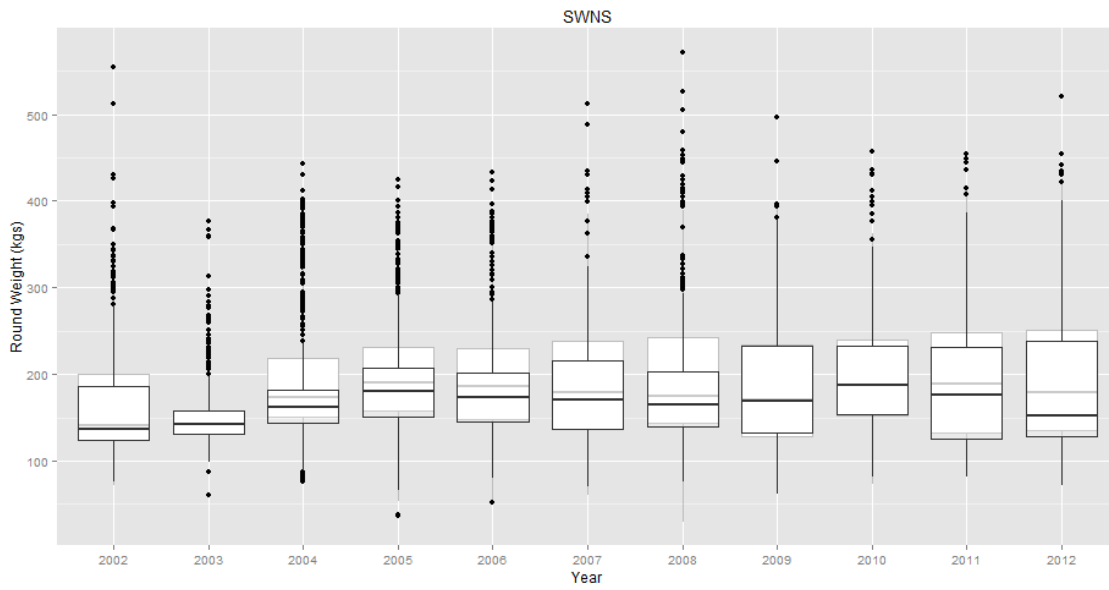


Figure 10. Catch composition for the SWNS bluefin tuna fishery. Black boxes indicate current dataset size composition; grey boxes indicate size composition if NAFO area restrictions are removed and the MONTH restriction is adjusted to include November.

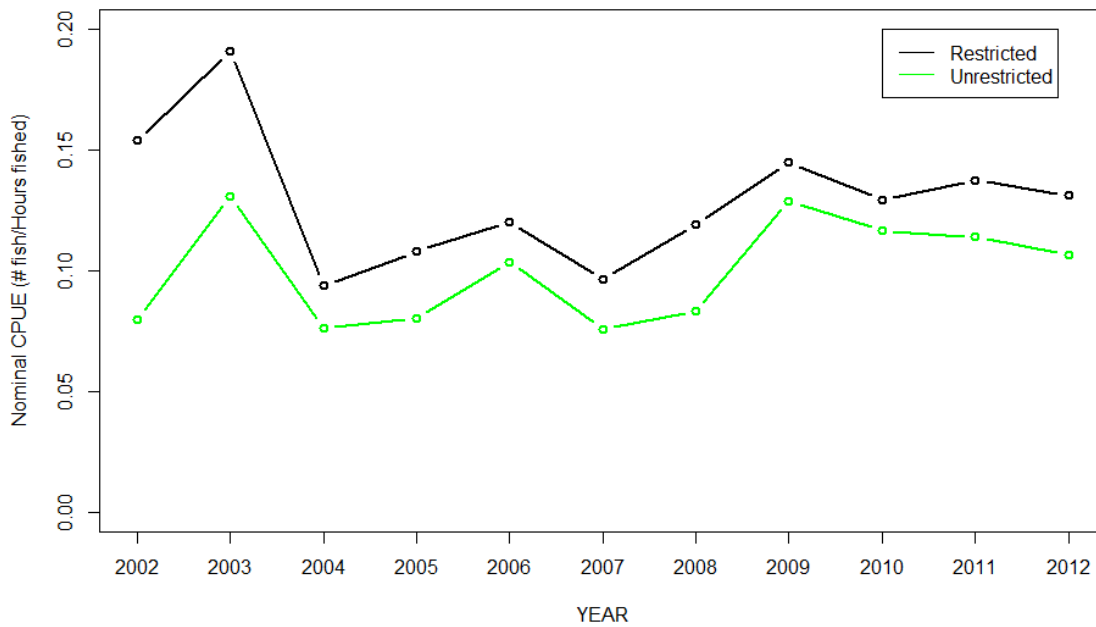


Figure 11. Figure comparing nominal CPUE for the SWNS fishery based on the restricted dataset (all historical filters applied) and an un-restricted dataset where the NAFO and Month restrictions are relaxed.

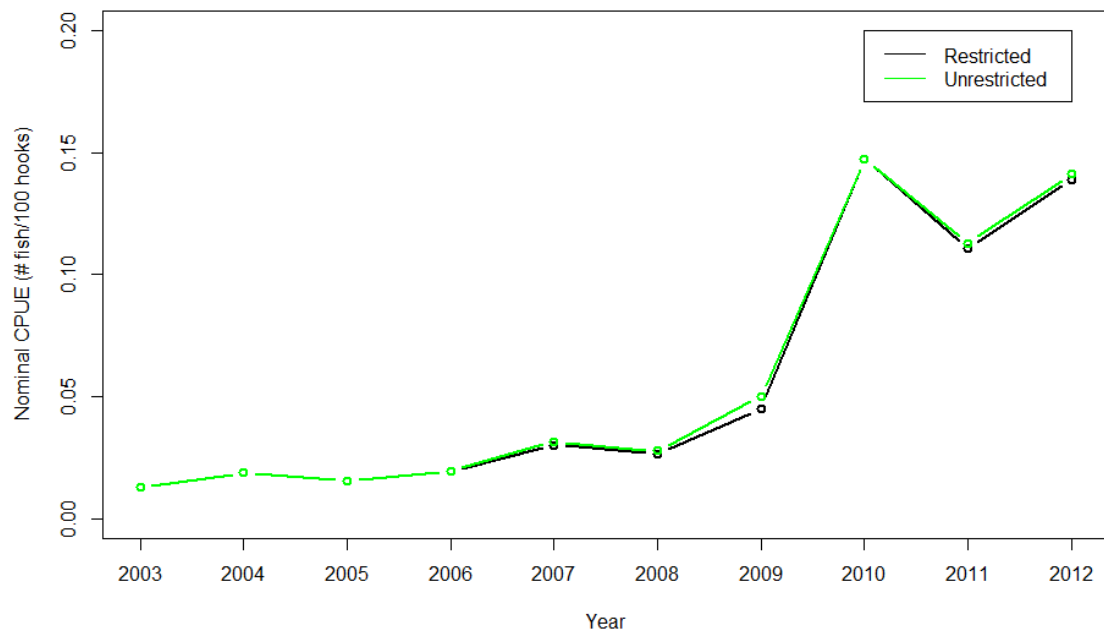


Figure 12. Figure comparing nominal CPUE for the sGSL fishery based on the restricted dataset (all historical filters applied) and an un-restricted dataset where the Fleet and Month restrictions are relaxed.