

UPDATED CPUE FROM THE CANADIAN SWORDFISH LONGLINE FISHERY, 2003-2013

Irene Andrushchenko, Alex R. Hanke¹

SUMMARY

Nominal indices of relative abundance for North Atlantic swordfish caught by the Canadian pelagic longline fishery are updated with 2013 data. The trend in CPUE indicates that relative abundance for 2013 has increased slightly from 2012 levels and remains above levels seen throughout the 1990s and early 2000s.

RÉSUMÉ

Des indices nominaux de l'abondance relative pour l'espadon de l'Atlantique Nord capturé par la pêcherie palangrière pélagique du Canada sont actualisés avec des données de 2013. La tendance de la CPUE indique que l'abondance relative de 2013 s'est légèrement accrue par rapport aux niveaux de 2012 et reste supérieure aux niveaux observés tout au long des années 90 et au début de la première décennie 2000.

RESUMEN

En este documento se actualizan los índices nominales de abundancia relativa para el pez espada del Atlántico norte capturado por la pesquería de palangre pelágico canadiense con los datos de 2013. La tendencia en la CPUE indica que la abundancia relativa para 2013 ha aumentado ligeramente desde los niveles de 2012, pero sigue situándose por encima de los niveles observados durante los noventa y primeros años de la década del 2000.

KEYWORDS

Catch/effort, Logbooks, Commercial fishing, Pelagic fisheries, Tunas

1. Introduction

The last assessment of North Atlantic swordfish by the International Commission for the Conservation of Atlantic Tunas (ICCAT) was done in 2013 (Anon. 2014). This manuscript reports the nominal catch rates for the same fleet using data from 2002 to 2013. We also provide an account of recent trends in the Canadian fishery, as well as an overview of recent size changes in the two main gear sectors (longline and harpoon).

1.1 Description of the fishery

Between 1988 and 2013, catches of swordfish by the Canadian longline fleet ranged from 800 to 2,200 mt, with 39 to 77 vessels actively fishing in a given year. In 2013, 1128.8 mt of swordfish caught on longline gear was landed by 59 longline licenses.

The Canadian longline fishery typically operates in waters from Georges Bank to the Flemish Cap (**Figure 1**). The fishing distribution of swordfish catches has shifted in recent years, with fewer trips going east of the Grand Banks (**Figure 2**). This shift has been attributed to unfavourable water conditions and the high cost of fuel. Seasonally, fishing activity begins in May, starting south of the Scotian Shelf and along the edge of the Gulf Stream and continues until July, when it shifts to the edge of the continental shelf and encompasses Georges Bank, Scotian Shelf and the Grand Banks (**Figure 3**).

¹ Fisheries and Oceans Canada, St. Andrews Biological Station, 531 Brandy Cove Road, St. Andrews, New Brunswick, E5B 2L9, Canada; Email: Irene.Andrushchenko@dfo-mpo.gc.ca

1.2 Data

Catch and effort data for the Canadian longline swordfish fishery were obtained from mandatory logbook submissions made to the Department of Fisheries and Oceans. The logbook database provides specific information about each species caught, such as total weight, number of fish caught and effort (number of hooks) for each set. Tally sheets obtained from the Dockside Monitoring program provides individual fish weights for approximately 90% of the landed swordfish catch and are used in calculating sex-specific CPUE.

1.3 CPUE

The catch per unit effort (CPUE, number of fish per 1000 hooks) was determined for the longline fleet only, as no measure of effort is available for the harpoon fleet. In addition, the activity of harpoon vessels is weather-dependent, making it difficult to distinguish trends due to changes in abundance from those caused by weather conditions. The offshore fleet was also excluded from the analysis, as this fleet primarily targets other tunas. Finally, vessels within the longline fishery are able to use combinations of gears on a given trip (including harpoon and tended line), and these are all recorded as 'longline' catches in the log system. This issue was addressed by separating fishing sets based on the number of hooks, where sets with fewer than 300 hooks were considered a mixture of tended line and harpoon, while those with an effort greater than 300 hooks were strictly longline (Hanke et al., 2012). Sets with one hook were considered to be harpoon, unless more than one species was identified or the total swordfish weight for the set exceeded 1250 kilograms.

The annual nominal CPUE was calculated for males and females aged 2 to 9+ and 5+, as well as for the combined unisex population caught by longline gear.

2. Results and Discussion

2.1 Distribution of fishing and relative abundance

As noted earlier, during the early 2000s, the Canadian longline fishery had some activity east of 50 degrees W. longitude but, in recent years, fishing in this area has declined in favor of closer fishing grounds (**Figure 2**). The seasonal fishing pattern of the longline fishery shows activity off the southern Scotian Shelf in May and June, moving north towards the Scotian Shelf, Emerald Basin and the Grand Banks for July through October (**Figure 3**). Activity generally reaches its maximum spatial extent in September, tapering off by December, while catch rates tend to peak throughout September and October (**Figure 3**). This is consistent with industry comments that swordfish CPUE is typically higher in September and October, as the fishing vessels often target tropical tunas early in the fishing season.

2.2 Catch characteristics

The LJFL frequency distribution from 1999 to 2010 is skewed to the right and ranges from 100 to 300 cm (**Figure 4**). Swordfish caught in the Canadian longline fishery showed some variation in lower jaw fork length (LJFL) prior to 2006, but then have remained consistently below the series median (177 cm, **Figure 5**). In 2011, however, the catch had a considerably larger component of fish longer than 177 cm, as compared to the probability density distribution for the 1999-2010 data (**Figures 4 and 5**). The most recent data indicate that the 2013 catch has a large proportion of smaller fish, bringing the mean weight below the series median again (**Figures 4 and 5**). Swordfish from the Canadian harpoon fishery have remained slightly smaller than the series median since experiencing a drop in LJFL in 2006 (**Figure 5**).

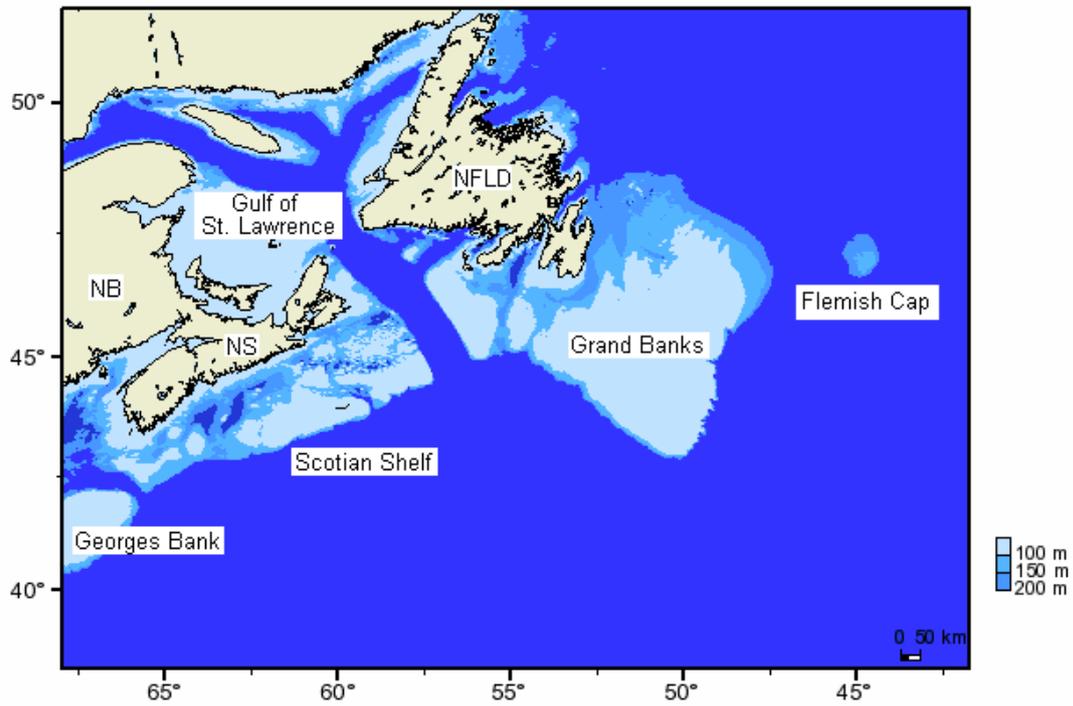
2.3 CPUE

The nominal catch rates (number per 1000 hooks) for the composite swordfish catch from the Canadian longline fishery peaked in 2010, with values comparable to the series maximum in 1990 (**Figures 6**). Following a decrease in 2011, the CPUE has increased steadily in subsequent years, though it remains below the 2010 high (**Figure 6**).

The age-specific CPUE for females aged 2 to 8 showed an increase from 2002 to 2010, with a general decrease since then notable for ages 4+ (**Figure 7**). Males constituted a smaller fraction of the overall population and their trend in relative abundance was less evident by comparison. The males lag the females in size by about 3 years and, consequently, the patterns in the 9+ male CPUE resembles the age 6 female CPUE more so than the 9+ pattern.

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Figure 1. Geographic locations off the Canadian Atlantic coast spanning the longline swordfish fishery.

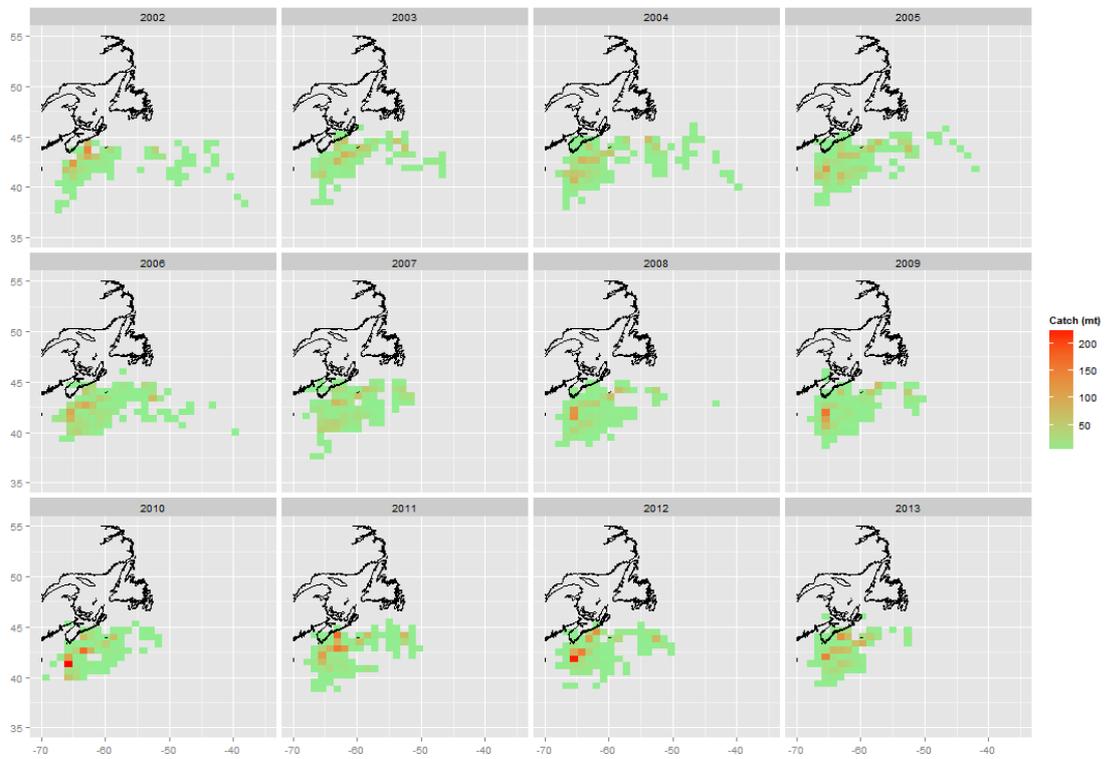


Figure 2. Annual distribution of Canadian pelagic longline sets between 2002 and 2013.

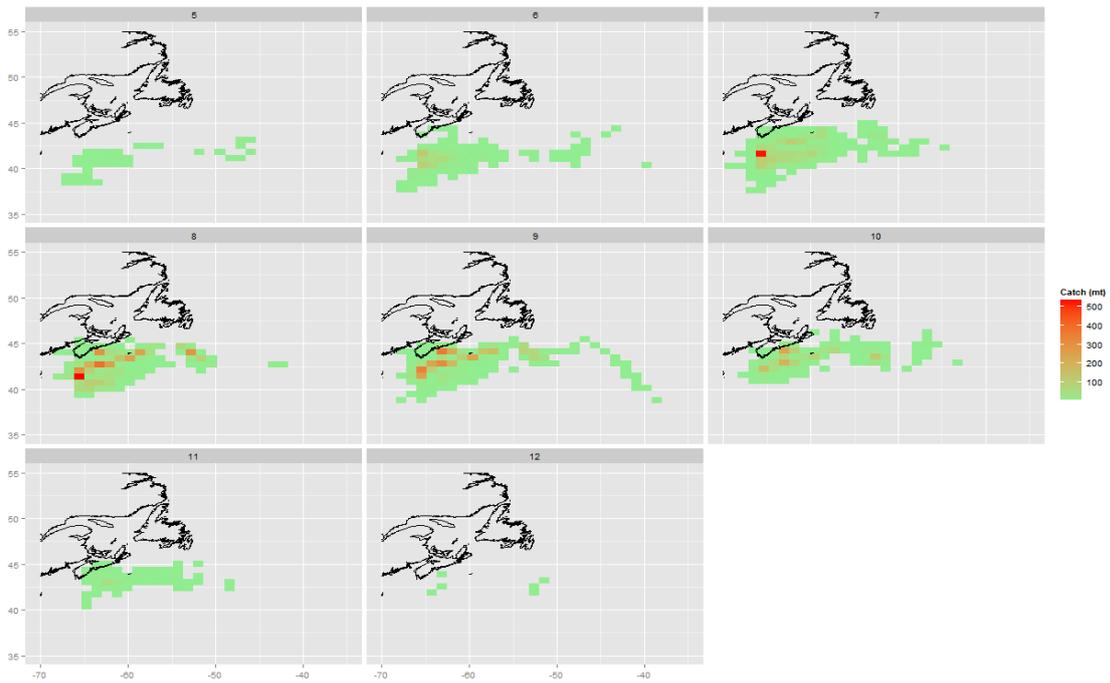


Figure 3. Seasonal distribution and CPUE of catches in the Canadian swordfish longline fishery from 2002 to 2012, aggregated by month. Color is indicative of CPUE.

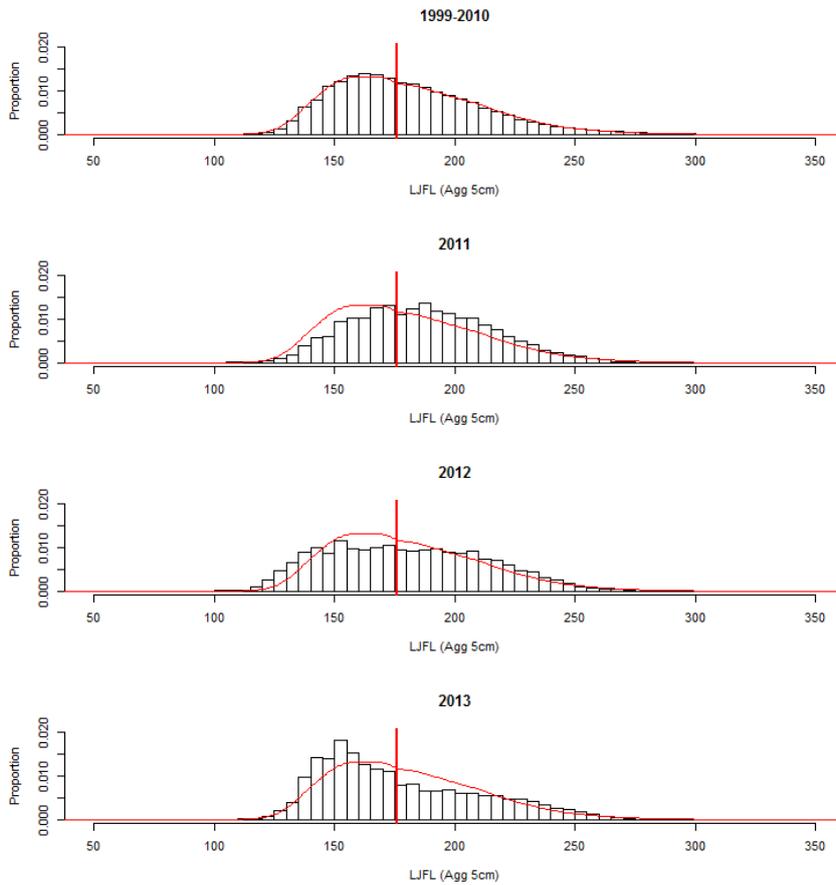


Figure 4. Composite catch at length for swordfish caught by the Canadian pelagic longline fishery. Vertical line and curve represent the median length and probability density distribution for the 1999 to 2013 data series.

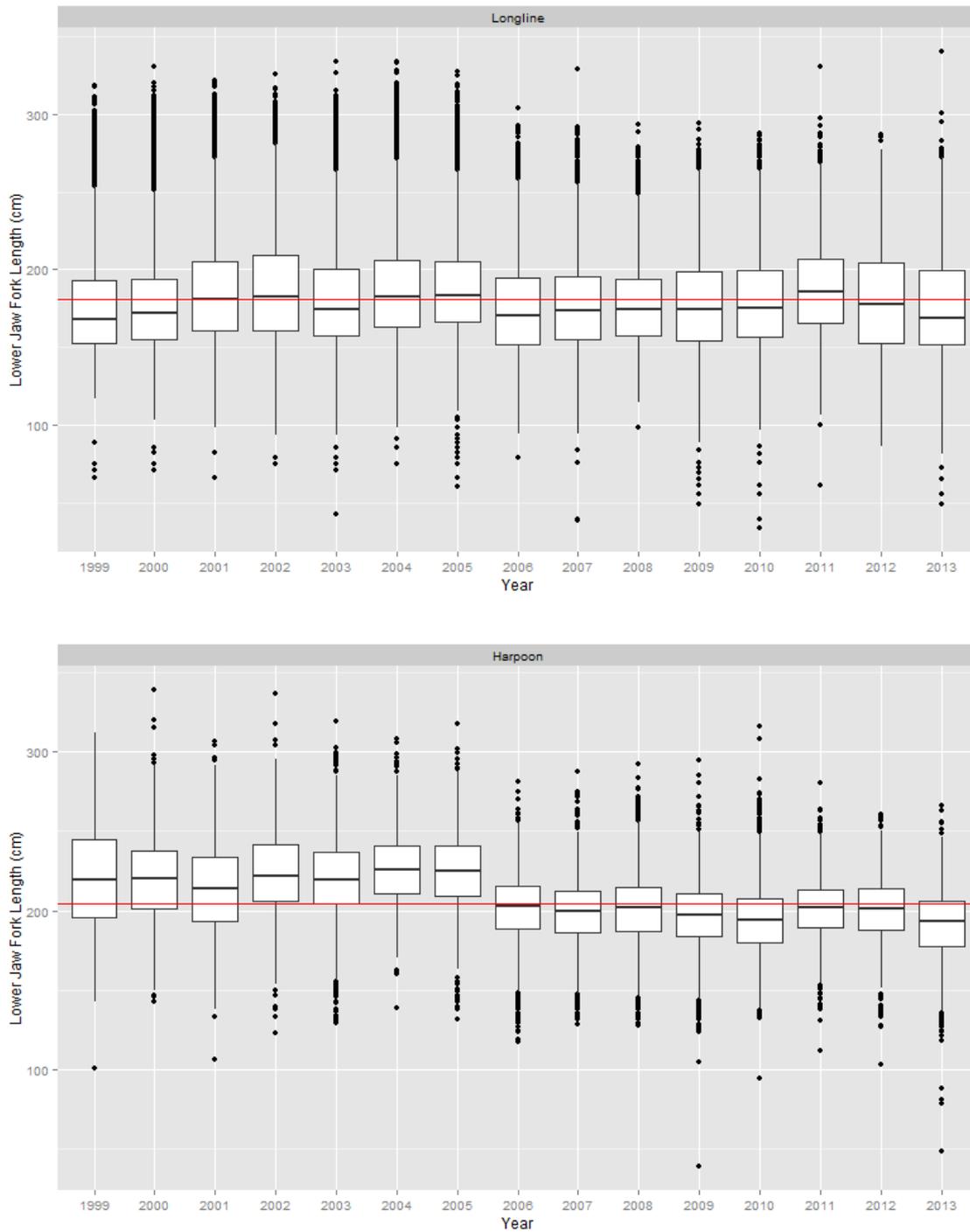


Figure 5. Box and whisker plots depicting the distribution of lower jaw fork lengths (LJFL) of fish caught in the Canadian longline (top) and harpoon (bottom) fisheries between 1999 and 2013. The median for each series is given as reference (181 cm for longline and 205 cm for harpoon).

Number-Based CPUEs

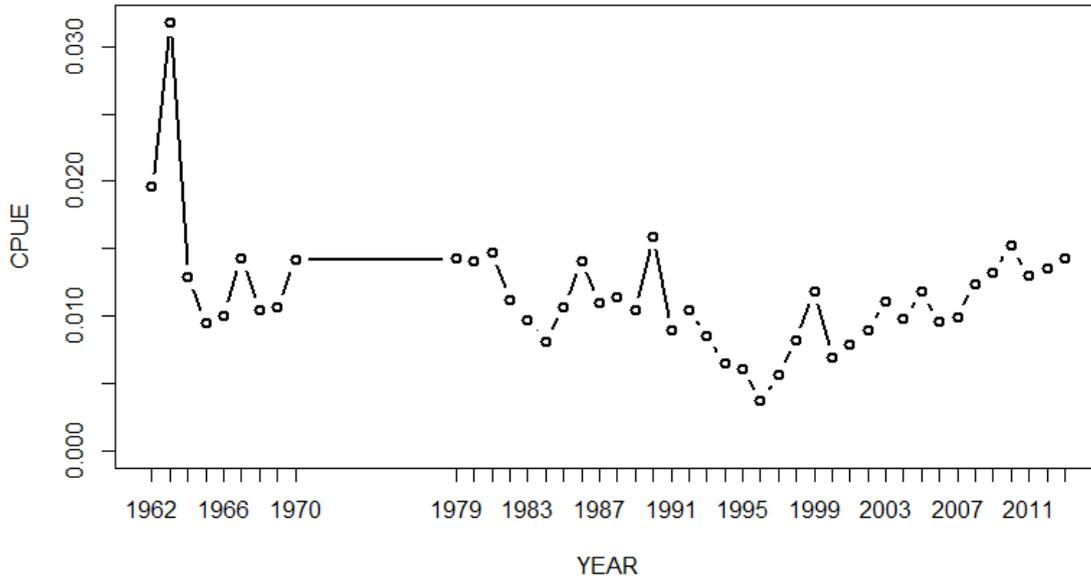


Figure 6. Nominal CPUE (number per 1000 hooks) for swordfish caught by the Canadian pelagic longline fishery from 1962 to 2013. Years between 1970 and 1979 have no data due to fishery closure.

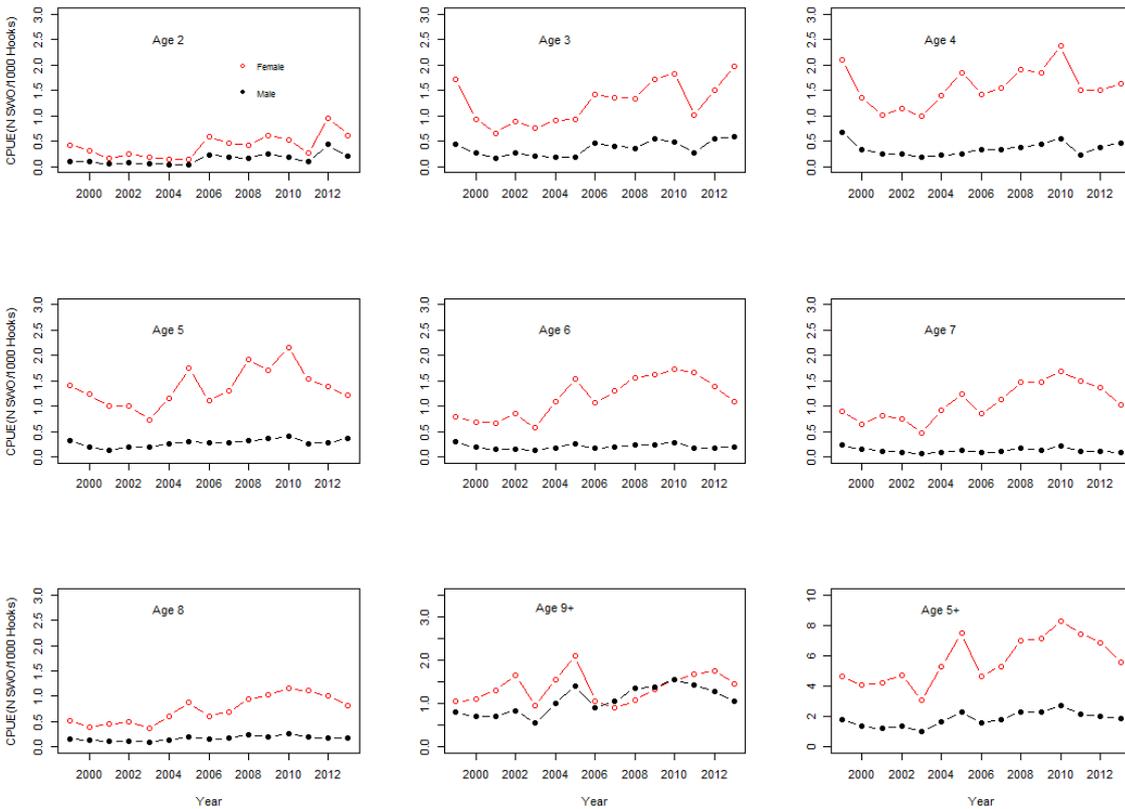


Figure 7. Sex- and age-specific nominal CPUE for swordfish (number of fish per 1000 hooks) for ages 2 – 9+ and 5+ from the Canadian pelagic longline fishery, 2002 – 2013. In each case the upper line represents the females and the lower the males.