

Updated Blue Shark (*Prionace glauca*) bycatch statistics in Canadian fisheries¹

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Abstract

This documents updates the catch statistics for 2019-2020 for Blue Shark in Canadian waters. A dramatic increase in catch was observed in the groundfish line fisheries (discarded) and salmon fisheries (discarded). Increases were also observed in the groundfish trawl fisheries (landed and discarded) and the tuna troll fisheries (discarded), but these catches remain very low. Given the increase in catches across all fisheries, the increase is unlikely to reflect misidentification or a fishery management impact.

Introduction

There are no directed Blue Shark (*Prionace glauca*) fisheries conducted within Canadian waters; as such, all catch statistics are incidental encounters. Blue Shark have been encountered as incidental catch in a number of modern and historical Canadian fisheries, including groundfish trawl and longline fisheries; troll, gillnet and seine fisheries for salmon (*Oncorhynchus* spp.), Pacific Sardine (*Sardinops sagax*), Albacore Tuna (*Thunnus alalunga*), and Neon Flying Squid (*Ommastrephes bartrami*); as well as foreign and joint-venture fisheries for Pacific Hake (*Merluccius productus*). All commercial fisheries in Canada are covered by a dockside monitoring program which provides validated landings. There are very few landings of incidentally encountered Blue Shark. Currently, only the groundfish trawl and longline fisheries have 100% observer coverage, with either an at-sea observer program or electronic monitoring to record discards of incidental catches at sea. Discards at sea of incidental catches by other commercial fisheries are based solely on fisher logbook data.

Methods

Methodology and literature sources for catch statistics for 1979-2018 are previously reported in King and Surry (2019). As requested by the ISC Shark Working Group, Canadian Blue Shark catch statistics are updated here for 2019-2020. Data were obtained from Fisheries and Oceans Canada (DFO) for groundfish fisheries, tuna troll fisheries and salmon fisheries (Jason Parsley, Pacific Biological Station, pers. comm.), extracted from databases maintained by the Fishery and Assessment Data Section, (DFO Pacific Region) and the Regional Catch Statistics Unit (DFO Pacific Region). All data sources included details of catch utilization (whether the catch was landed or discarded); commercial catches were either retained on the vessel and landed for sale, or discarded/released at sea. Landed catch for most commercial fisheries is validated by a third party at the landing port through dockside monitoring programs (DMP) and recorded on sales slips, while discarded catch is generally based on observer log books for observed fisheries, or on fisher log books for non-observed fisheries. Discard information varies in quality depending on the data source and time period; but universally we assume a 100% discard mortality rate. Fishing gear types were categorized as “trawl” (bottom trawl, midwater trawl), “line” (longline, handline), and “other” (salmon and tuna troll).

Groundfish Fisheries

Updated commercial catch data (2019-2020) for the groundfish trawl and line fisheries were obtained from the GFFOS database (Fishery and Assessment Data Section, DFO Pacific Region, M. Surry, DFO Pacific Region, pers. comm.). Trawl data is based on 100% observer coverage of the fishery, consisting of tow-by-tow information including georeferenced capture location, as well as estimates of discarded weight (kg), and is generally considered reliable. Trawl landings are based on validation records from the dockside monitoring program. Line data include landings based on validation records from the dockside monitoring program, as well as records of retained and discarded catch from fisher logbooks when available. Landings based on validation records

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are considered reliable (catch is weighed at the dock). Logbooks provide tow-by-tow information including georeferenced capture location, retained catch, and discarded catch, but retained and discarded catch may be visual estimates, and are often only available as piece counts. Catch by piece counts were converted to weight (kg) using mean weight of 24.57 kg per piece based on logbooks from the 1999 – 2004 longline fishery.

Salmon Fisheries

Updated data (2019-2020) on incidental catches of sharks in the commercial salmon troll, gillnet, and seine fisheries were provided by the Salmon Data Unit (J. Parsley, DFO Pacific Region, pers. comm) and include landing date, area of capture, landings, and discards. Catches are reported in pieces and are based on daily phoned-in catch reports and annual fisher logbook submissions. The quality and completeness of the information is unknown. Piece counts were converted to estimated catch weights using mean weight per piece (24.57 kg) from logbooks for the 1999 – 2004 groundfish longline fishery.

Albacore Tuna Fishery

The North Pacific Albacore Tuna troll fishery is operated under a treaty between the governments of Canada and the United States (US) which allows Canadian and US vessels to fish inside both Canadian and US waters. Updated data (2019-2020) on incidental catches of sharks in Canadian waters by Canadian vessels in the tuna troll fishery include capture date, georeferenced capture location, and discards (pieces) based on fisher logbooks (S. Hawkshaw, DFO Pacific Region, pers. comm). Blue Shark catches were converted to estimated catch weight using mean weight per piece (24.57 kg) from logbooks for the 1999 – 2004 groundfish longline fishery.

Results

Updated 2019-2020 catch estimates (tonnes) by gear type and utilization (landed or discarded) are presented in Table 1, and extend the time series previously reported by King and Surry (2019). Blank cells reflect years in which there were no records of Blue Shark incidental catch, yet it is unknown if those values are actually zero. Large Blue Shark catches in the 1980s reflect the activity of the experimental squid fisheries which operated during that time. Subsequent to the experimental squid fisheries, groundfish line fisheries encountered the majority of Blue Sharks within Canadian commercial fisheries. The sustained increase in discarded Blue Shark statistics in the groundfish line fisheries after 2006 likely reflect the change in requirement for 100% electronic monitoring of discards. Blue Shark are only intermittently landed in the groundfish trawl fisheries, and previous to 2019 in amounts less than approximately 1 tonne per year (Table 1). In 2019 and 2020, there was a dramatic increase in Blue Shark catches (Table 1), observed in groundfish line fisheries and in the salmon fisheries.

Discussion

The catch statistics reported here update (2019-2020) the previous catch data (1978-2018) supplied by Canada for Blue Shark incidental catches in King and Surry (2019). The dramatic increase in annual catch in 2019 and 2020 was observed in both the groundfish and salmon fisheries, and to a much lesser extent also in the groundfish trawl and the tuna troll fisheries. This increase does not appear to be associated with a dramatic increase in effort; for example within the salmon troll fishery effort is measured in 'boat days' and in 2018-2020 there was a decline in boat days due to fishery restrictions to reduce whale impacts along with COVID impacts on the fishery. This increase across all fisheries suggests that it is a reflection of

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increased abundance within Canadian waters, and not likely due to misidentification or misreporting within a fishery.

References

King, J.R. and A.M. Surry. 2019. Blue shark (*Prionace glauca*) bycatch statistics in Canadian fisheries. ISC/19/SHARKWG-1/06.

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Table 1. Catches (tonnes) of Blue Shark (*Prionace glauca*) from British Columbia commercial fisheries in 1979 – 2020. Catches are reported by gear type, and utilization (landed or discarded), and where required is expanded from recorded pieces based on a mean weight per piece of 24.57 kg. “Trawl” includes bottom, midwater, surface, and unspecified trawl gears. “Line” includes longline, handline, and jig gears. “Other” includes troll, seine, and gillnet. Note that catch utilization for commercial Trawl and Other gears was discarded only.

| Year | Gear type | | | | | | All gears | | Total Catch |
|------|-----------|-----------|--------|-----------|--------|-----------|-----------|-----------|-------------|
| | Trawl | | Line | | Other | | Landed | Discarded | |
| | Landed | Discarded | Landed | Discarded | Landed | Discarded | | | |
| 1979 | | | | | 0.89 | | 0.89 | | 0.89 |
| 1980 | | | | | 10.97 | | 10.97 | | 10.97 |
| 1981 | | | | | | | | | |
| 1982 | | | | | | | | | |
| 1983 | | | | | 24.57 | | 24.57 | | 24.57 |
| 1984 | | | 0.89 | | | | 0.89 | | 0.89 |
| 1985 | | | | | 60.43 | | 60.43 | | 60.43 |
| 1986 | | | | | 90.31 | | 90.31 | | 90.31 |
| 1987 | 0.40 | | | | 158.74 | | 0.40 | 158.74 | 159.14 |
| 1988 | 0.46 | | | | | | 0.46 | | 0.46 |
| 1989 | 0.20 | | | | | | 0.20 | | 0.20 |
| 1990 | 0.02 | | | 4.39 | | | 0.02 | 4.39 | 4.41 |
| 1991 | 0.09 | | | 0.32 | | | 0.09 | 0.32 | 0.41 |
| 1992 | | | | | | | | | |

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| Year | Gear type | | | | | | All gears | | Total Catch |
|------|-----------|-----------|--------|-----------|--------|-----------|-----------|-----------|----------------|
| | Trawl | | Line | | Other | | Landed | Discarded | |
| | Landed | Discarded | Landed | Discarded | Landed | Discarded | | | |
| 1993 | | | | | | | | | |
| 1994 | 0.09 | | | | | | 0.09 | 0.09 | |
| 1995 | 0.03 | | | | | | 0.03 | 0.03 | |
| 1996 | 0.28 | 0.39 | 0.03 | | | | 0.31 | 0.39 | 0.70 |
| 1997 | 0.12 | 0.55 | 0.07 | | | | 0.19 | 0.55 | 0.75 |
| 1998 | 0.02 | 0.85 | 1.13 | 0.08 | | | 1.15 | 0.93 | 2.09 |
| 1999 | 0.09 | 0.34 | 0.18 | 0.30 | | | 0.27 | 0.64 | 0.91 |
| 2000 | 0.04 | 0.71 | 0.22 | 0.55 | | | 0.26 | 1.27 | 1.52 |
| 2001 | 0.03 | 0.14 | | 4.60 | | 0.02 | 0.03 | 4.77 | 4.80 |
| 2002 | | 0.09 | 0.04 | 5.34 | | | 0.04 | 5.43 | 5.47 |
| 2003 | | 0.04 | | 17.45 | | | | 17.49 | 17.49 |
| 2004 | | 0.05 | | 4.35 | | 0.02 | | 4.43 | 4.43 |
| 2005 | | 0.01 | 0.01 | 0.66 | | | 0.01 | 0.67 | 0.68 |
| 2006 | | 0.26 | 0.01 | 21.77 | | | 0.01 | 22.03 | 22.05 |
| 2007 | | 0.06 | 0.03 | 9.51 | | | 0.03 | 9.57 | 9.60 |
| 2008 | | | | 6.24 | | | | 6.24 | 6.24 |
| 2009 | | | 0.02 | 9.36 | | 0.02 | 0.02 | 9.39 | 9.41 |
| 2010 | 0.02 | 0.12 | | 8.40 | | | 0.02 | 8.52 | 8.54 |
| 2011 | 0.01 | 0.05 | | 14.15 | | 0.02 | 0.01 | 14.22 | 14.23 |

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| Year | Gear type | | | | | | | | Total Catch |
|------|-----------|-----------|--------|-----------|--------|-----------|-----------|-----------|----------------|
| | Trawl | | Line | | Other | | All gears | | |
| | Landed | Discarded | Landed | Discarded | Landed | Discarded | Landed | Discarded | |
| 2012 | 0.03 | 0.09 | | 9.90 | | 0.10 | 0.03 | 10.09 | 10.12 |
| 2013 | 0.05 | 0.11 | | 29.46 | | 0.07 | 0.05 | 29.65 | 29.69 |
| 2014 | 0.02 | 0.08 | | 10.20 | | 0.07 | 0.02 | 10.35 | 10.37 |
| 2015 | | | | 26.39 | | 0.27 | | 26.66 | 26.66 |
| 2016 | | 0.02 | | 11.72 | | 0.44 | | 12.18 | 12.18 |
| 2017 | | 0.19 | | 24.47 | | 0.07 | | 24.74 | 24.74 |
| 2018 | 0.01 | 0.68 | | 45.33 | | 0.34 | 0.01 | 46.36 | 46.37 |
| 2019 | 0.37 | 1.82 | | 73.51 | | 2.48 | 0.37 | 77.92 | 78.19 |
| 2020 | 0.10 | 0.86 | | 146.24 | | 2.58 | 0.10 | 149.68 | 149.78 |

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