PLENARY 4

20th Meeting of the
International Scientific Committee for Tuna
and Tuna-Like Species in the North Pacific Ocean
Held Virtually
July 15-20, 2020

National Report on Canadian Tuna and Tuna-like Fisheries in the North Pacific Ocean in 2019

Fisheries and Oceans Canada
Pacific Biological Station
3190 Hammond Bay Road
Nanaimo, BC, Canada, V9T 6N7

July 2020

Left Blank for Printing

Left Blank for Printing

SUMMARY

Canada has one fishery for highly migratory species in the Pacific Ocean, a troll fishery targeting juvenile north Pacific Albacore Tuna (*Thunnus alalunga*). Category I, II, and III data from the 2019 fishing season are summarized in this report. The Canadian fleet consisted of 122 vessels and operated exclusively within the eastern Pacific Ocean, in 2019. The Canadian troll fishery continues to be largely coastal in its operations, occurring predominantly within the Canadian and United States exclusive economic zones. Only a small proportion of catch and effort occurred outside the Canadian and United States EEZs, in 2019. Provisional 2019 estimates of catch and effort are 2,402 metric tonnes (t) and 3,882 vessel-days, respectively, which represent a 11.6% decrease in catch and 7.5% decrease in effort relative to 2018. Catch and effort were split primarily between Canadian waters (51.7% of the catch and 51.7% of the effort) and US waters (44.9% of the catch and 41.8% of the effort) while the remaining catch and effort occurred in adjacent high seas waters. Catch rate (CPUE) was comparable between the Canadian EEZ and the U.S. EEZ, in 2019. Albacore Tuna appeared to be more widely distributed temperature-wise in 2019 than in 2018. The proportion of fish caught in favourable water temperature band of 16-19 °C was 73% in 2019, while this proportion was 93% in 2018. Forty-eight (48) vessels measured 11,067 fork lengths in 2019 for a sampling rate of 2.6% of the reported catch. Fork lengths ranged from 40 to 91 cm, having a dominated mode around 67 cm. Mean length was 66.1 cm, which is smaller than the mean length (67.4 cm) in 2018. Proportion of captured large fish was also smaller in 2019 relative to 2018.

1.0 INTRODUCTION

The Canadian fishery for highly migratory species uses troll gear with jigs to target juvenile north Pacific Albacore (*Thunnus alalunga*) in the surface waters of the Pacific Ocean. The majority of catch and effort by the Canadian fleet occurs within the exclusive economic zones (EEZ) of Canada and the United States. Access to the United States EEZ is permitted through a bilateral Treaty, which provides for access by Canadian-flagged and licensed vessels to fish for Albacore and to land Albacore at designated ports. Some of the larger Canadian vessels may follow Albacore into offshore waters and occasionally fish in the central and western Pacific Ocean. The most recent management regulations for Canadian vessels fishing Albacore Tuna cover one year period from 01 April 2020 to 31 March 2021 are documented in the Albacore Tuna Integrated Fisheries Management Plan (IFMP) http://www.pac.dfo-mpo.gc.ca/fm-gp/mplans/tuna-thon-ifmp-pgip-sm-eng.pdf. Historically, most of the Canadian effort and catch for north Pacific Albacore has occurred between early July and the end of October**.**

This report summarizes Category I (annual catch and effort), Category II (monthly 1° x 1° catch and effort), and Category III (bycatch, catch size composition) data for vessels active in the Canadian north Pacific Albacore Tuna troll fishery in 2019.

2.0 DATA SOURCES

Data on Albacore Tuna catch and effort from 1995 through to the present are compiled from hail records, logbooks, and sales slips and stored in the Canadian Albacore Tuna Catch and Effort Relational Database (Stocker et al. 2007). This database contains the best available estimates of annual catch and effort by geographic zone (Canadian, US, and high seas waters) for the Canadian fishery. All Canadian fishing vessels are required to hail (call) a third party service provider when they intend to start fishing and stop fishing, and when they change fishing zones. Canadian vessels must also carry logbooks in which daily position, catch and effort (latitude, longitude, number of fish, estimated weight) are recorded for Albacore Tuna and non-target species. These data have the highest temporal and spatial resolution and are obtained when logbooks are returned in November after the fishing season is completed. The third data source, sales slips, record the weight of Albacore Tuna landed and bought by domestic buyers and provide the most accurate estimates of Albacore Tuna catch in weight since these data are the basis for payment to harvesters (Stocker et al. 2007). Logbooks and sales slips from domestic buyers (plus trans-shipment slips if applicable) are forwarded for entry into the Albacore Tuna catch database (Stocker et al. 2007).

Fork length data are collected through an on-board sampling program initiated in 2009, with a sampling goal of 1% of the reported catch. Harvesters record the lengths of the first 10 Albacore landed daily to randomize measurements. Size composition data were collected by port samplers from a portion of the Canadian catch landed in United States ports between 1981 and 2008. Size data reported by Canada since 2009 are from the domestic on-board sampling program only.

The fishery data provided in this report were taken from Canadian tuna database version 20.03.31. Figures up to and including 2018 are considered definitive and are derived from a reconciliation of logbook data (best estimates of effort, catch in pieces, and geographic location) and sales slip (best estimate of catch weight) data (Stocker et al. 2007). The 2019 data are preliminary at this time.

3.0 AGGREGATED CATCH AND EFFORT DATA

3.1 Catch

The preliminary estimate of the Canadian Albacore Tuna catch in 2019 is 2,402 metric tons (t), which is a 11.6% decrease relative to the catch in 2018 (Table 1; Figure 1). The total catch by the

Canadian troll fishery has ranged from 1,761 t in 1995 to 7,857 t in 2004 and averaged 4,767 ± 1,751 t (± sd) since 2003, the period when annual logbook coverage has exceeded 90% of all vessels participating in this fishery. The 2019 catch was primarily distributed among Canadian coastal waters (51.7%) and United States coastal waters (44.9%). Catch increased by 48.4% from the Canadian EEZ, and decreased by 42.3% in the US EEZ. The remaining small proportion of the catch was from adjacent high seas waters (3.4%). No Canadian albacore-fishing vessels entered the north Pacific WCPFC convention area, in 2019. Canadian vessels which fished the US EEZ dropped from Forty-five (45) in 2018 to Forty-two (42) in 2019.

The number of Albacore released in 2019 was 4,093 fish, lower by 25.7% relative to 2018 (Table 2). The estimated mean weight of released albacore was 3.09 kg in 2019, lower than the mean weight of 3.32 kg in 2018. Albacore are released because they are below the minimum marketable size. The weight of released fish is not accounted for in Table 1, which records retained catch only.

3.2 Effort

The Canadian 2019 Albacore Tuna troll fleet consisted of 122 unique vessels, considerably below the average participation rate of 166 vessels since 2003 (Table 1). The 2019 estimate of fishing effort is 3,882 v-d and is a 7.5% decrease relative to the fishing effort in 2018 (Table 1; Figure 1). Fishing effort in 2019 was primarily split between Canadian coastal waters (51.7%) and United States coastal waters (41.8%). Effort increased by 4.4% in the Canadian EEZ, and decreased by 27.2% in the US EEZ relative to 2018. A small proportion of effort was spent in adjacent high seas waters (6.5%). Annual fishing effort has ranged between 4,320 v-d in 1997 and 10,021 v-d in 2001, averaging 6,417 ± 1,696 v-d since 2003.

3.2 Catch Rate

Catch rate is expressed as catch per unit effort (CPUE), namely amount of catch in metric ton per vessel day. CPUE in 2019 was slightly lower than in 2018 (Figure 1). However, CPUE increased by 42.2% in the Canadian EEZ, but decreased by 20.8% in the US EEZ. CPUE in the Canadian EEZ is slightly lower (by 7%) than CPUE in the US EEZ, in 2019. Monthly CPUE was, however, higher in the Canadian EEZ than in the U.S. EEZ in July and September, but lower in the Canadian EEZ than in the U.S. EEZ in August (Figure 2). Monthly CPUE is particularly low (<0.03 t/vessel-day) in June both in the Canadian and U.S. EEZs.

4.0 SPATIAL DISTRIBUTION OF CATCH AND EFFORT DATA

The Canadian troll fleet operated primarily in the Canadian and US EEZs, where about 95% of the 2019 fishing effort and catch occurred. Fishing effort and catch, however, increased in adjacent high seas waters in 2019 relative to 2018. This coastal distribution is generally consistent with the pattern of operation observed in the last decade.

Effort and catch mainly occurred in the high sea waters adjacent to the US EEZ in June, possibly because the catch rate inside the US EEZ was particularly low in that month, in 2019. Effort and catch shifted into the US EEZ and also, to a less extent, into the Canadian EEZ in July, and distributed almost equally in the Canadian and US EEZs in the months of August and September. Effort and catch occurred exclusively in the Canadian EEZ in October (Figures 3 and 4).

Albacore were caught in waters with sea surface temperatures ranging from 11 to 24 °C in 2019 (Figure 5). The proportion of fish caught in waters within the favourable 16-18 °C temperature band dropped from 93% in 2018 to 73% in 2019.

5.0 BIOLOGICAL DATA

5.1 By-Catch

Reported by-catch contains twelve fish and five sea birds of unidentified species, in 2019. The twelve fish include one bigeye thresher, two blue sharks, one steelhead, and eight yellowtail amberjack (Table 3). All these by-captured fish and sea birds were released.

5.2 Biological Sampling

Forty-eight (48) vessels measured 11,067 fork lengths in 2019 with a sampling rate of 2.6% of the reported catch. Fork lengths ranged from 40 to 91 cm, having a dominated mode around 67 cm (Figure 6). Mean length of measured fish was 66.1 cm in 2019, smaller than the mean length of 67.4 cm in 2018. Proportion of large fish appeared to be smaller in 2019 than in 2018. Monthly mean length of fish increased from June to September, but remained unchanged between September and October, in 2019 (Figure 7). Albacore caught from the Canadian EEZ had a larger mean length than from the US EEZ, and Albacore caught in the high seas are, on average, smaller than those harvested in the Canadian or US EEZ (Figure 8).

6.0 RESEARCH

There are, primarily, three age classes (2-4 years) of the Albacore retained by the Canadian fleet. The number of released small albacore (1 year old) by the Canadian albacore fleet was drastically high both in 2018 and 2019. Although the Canadian total catch was slightly lower in 2019 than in 2018, there was a large proportion of small-sized albacore (likely 2 year old) in the retained catch in 2019. The question is whether the large number of 1-year old albacore present in 2018 and 2019 may lead to an increased amount of albacore catch by the Canadian fleet in 2020. Age compositions of harvested Albacore Tuna may be estimated based on measured length data, using Bayesian mixture modelling. Such a study will allow us to examine possible correlations between abundances of different age classes over the adjacent years and evaluate amount of possible contribution of 1-year old albacore towards the amount of catch in the near future.

7.0 DISCUSSION

Canadian catch and catch rate were particularly low in the year of 2017. Both catch and catch rate increased considerably in 2018, and decreased only slightly in 2019 relative to 2018. In particular, catch and catch rate increased drastically in the Canadian EEZ in 2018 relative 2017, and increased substantially again in 2019 relative to 2018. On the contrary, catch and catch rate decreased considerably in the US EEZ in 2019 relative to 2018. Also, albacore appeared to have migrated into the eastern Pacific later in 2019 than in earlier years, as the catch rate was particularly low in June of 2019. More data are needed to determine if there has been a systematic change in the migratory and distribution patterns of Albacore Tuna in the eastern Pacific.

8.0 LITERATURE CITED

Stocker, M., H. Stiff, W. Shaw, and A.W. Argue. 2007. The Canadian albacore tuna catch and effort relational database. Canadian Technical Report of Fisheries and Aquatic Sciences 2701: vi+76 p.

Table 1. Fishery statistics from the Canadian troll fishery for north Pacific Albacore Tuna, 1995-2019. Catch and effort data are expanded or raised to account for vessels that do not report logbook data. The level of expansion can be determined by the logbook coverage figures.

Year	Total Catch (t)	Effort (vessel-days)	Total Vessels	Logbook Coverage[2] (%)
1995	1,761	5,923	287	18%
1996	3,321	8,164	295	24%
1997	2,166	4,320	200	30%
1998	4,177	6,018	214	50%
1999	2,734	6,970	238	71%
2000	4,531	8,769	243	68%
2001	5,249	10,021	248	81%
2002	5,379	8,323	232	74%
2003	6,847	8,428	193	96%
2004	7,857	9,942	221	92%
2005	4,829	8,564	213	94%
2006	5,833	6,243	174	95%
2007	6,040	6,902	207	92%
2008	5,464	5,774	137	93%
2009	5,693	6,540	138	97%
2010	6,527	7,294	161	96%
2011	5,385	8,556	176	99%
2012	2,484	5,974	174	100%
2013	5,088	6,465	183	99%
2014	4,780	4,745	160	100%
2015	4,391	5,244	164	99%
2016	2,842	5,359	152	100%
2017	1,830	4,978	121	100%
2018	2,717	4,196	121	100%
2019[1]	2,402	3,882	122	100%

1. 2019 data are preliminary based on Ver. 20.03.31 of the *Canadian Albacore Tuna Catch and Effort Relational Database*. See Stocker et al. (2007) for a description of the database.

Table 2. Releases of Albacore below marketable size (3.18 kg) reported by the Canadian Albacore fishery.

Year	Number of Fish	Total Weight (kg)
2013	289	918
2014	2,214	7,153
2015	4,295	14,271
2016	562	2,134
2017	545	1,660
2018	5,508	18,291
2019	4,093	12,929

Table 3. Reported catch of non-target species (by-catch) by the Canadian Albacore Tuna troll fishery in 2019.

Month	Common name	Scientific Name	Catch (in Number)	
			Retained	Released
June	Yellowtail	*Seriola lalandi*		7
July	Sea Bird			2
August	Bigeye Thresher	*Alopias superciliosus*		1
	Blue Shark	*Prionace glauca*		1
	Sea Bird			3
September	Blue Shark	*Prionace glauca*		1
	Steelhead	*Oncorhynchus mykiss*		1
	Yellowtail	*Seriola lalandi*		1
		TOTALS	0	17
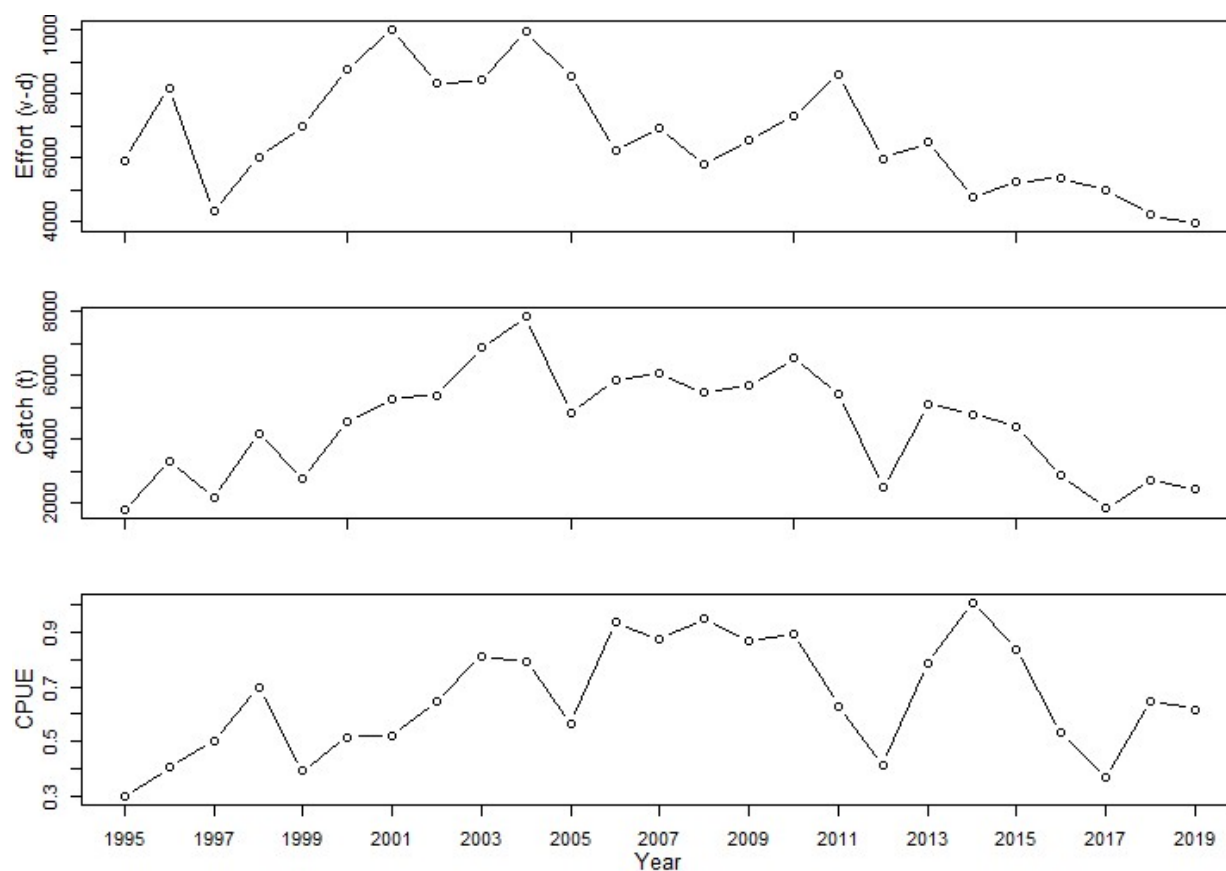
Figure 1. Historical trends in expanded catch (metric tonnes, t), effort (vessel-days, v-d) and catch per unit effort (CPUE, t/vessel-day) in the Canadian troll fishery for north Pacific Albacore Tuna from 1995 to 2019.
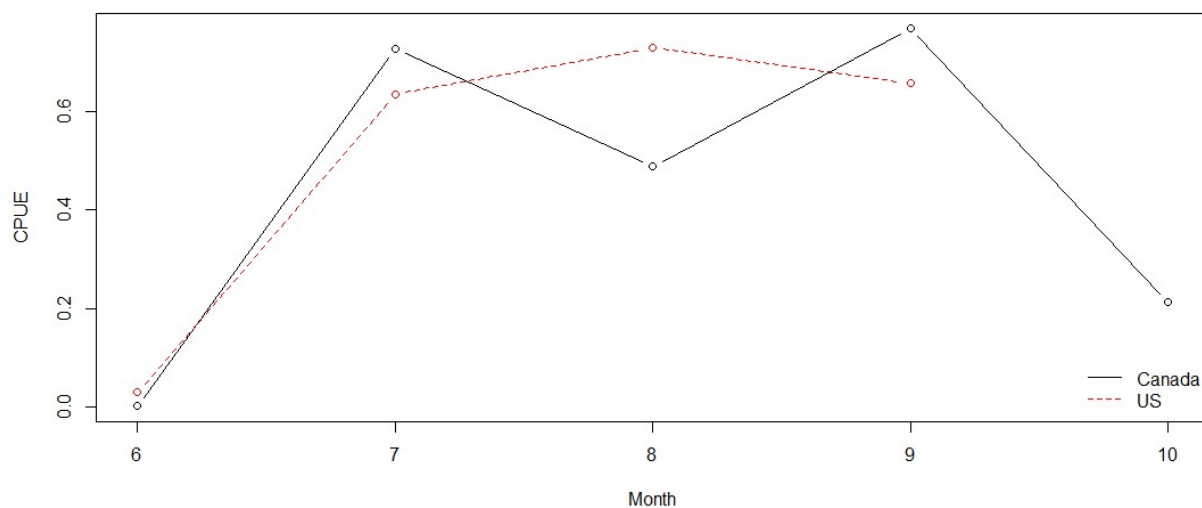
Figure 2. Monthly catch per unit effort (CPUE, t/vessel-day) in the Canadian and U.S. EEZs for Canadian Albacore Tuna troll fishery in 2019.
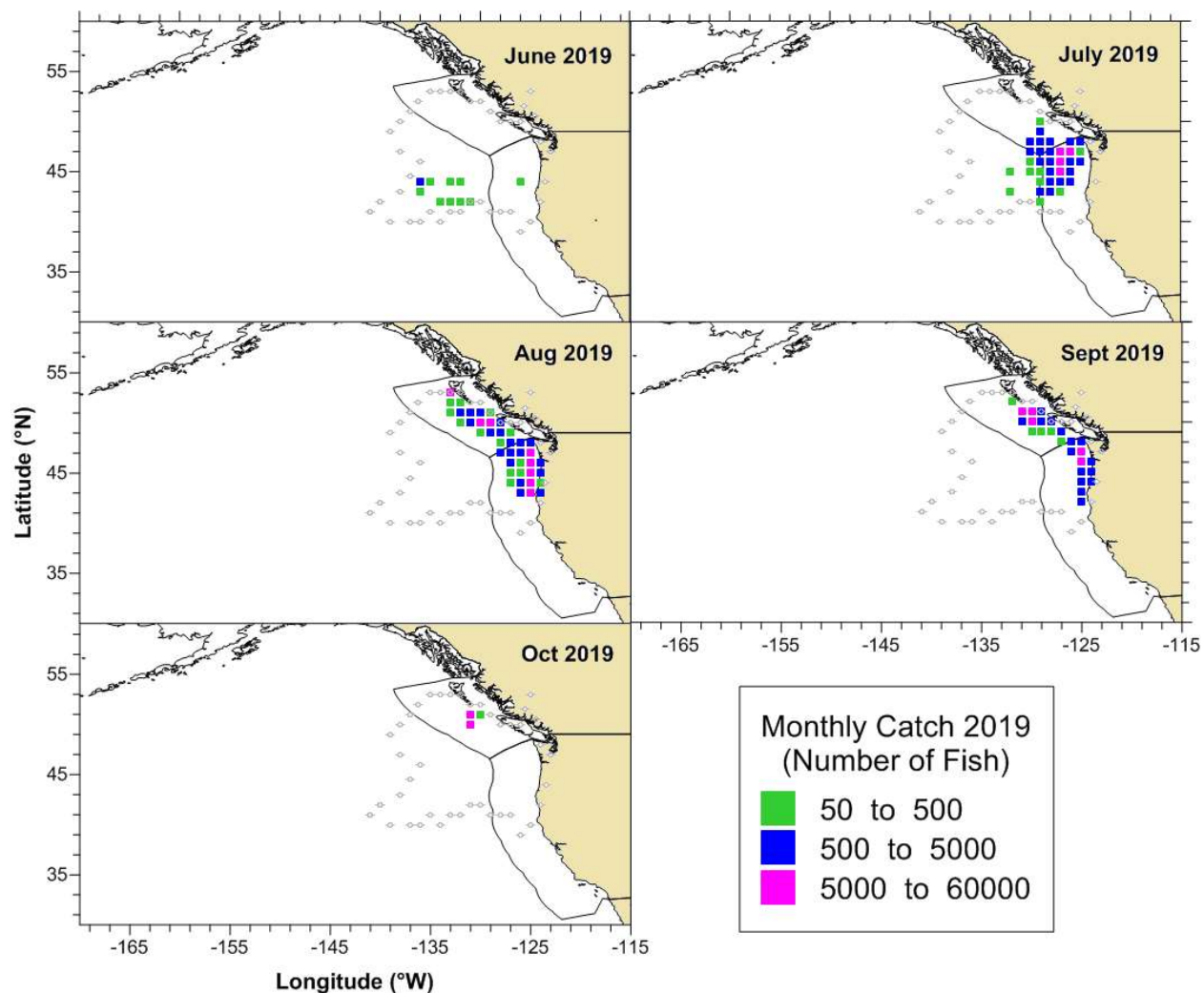
Figure 3. Monthly spatial distribution of reported catch in Canadian Albacore Tuna troll fishery in 2019. Data are plotted on a 1° x 1° strata with symbols located on the bottom-right corner. Strata in which fewer than three vessels reported are not shown. Empty dots approximate the border line of the operational area of the Canadian fishery in 2019.
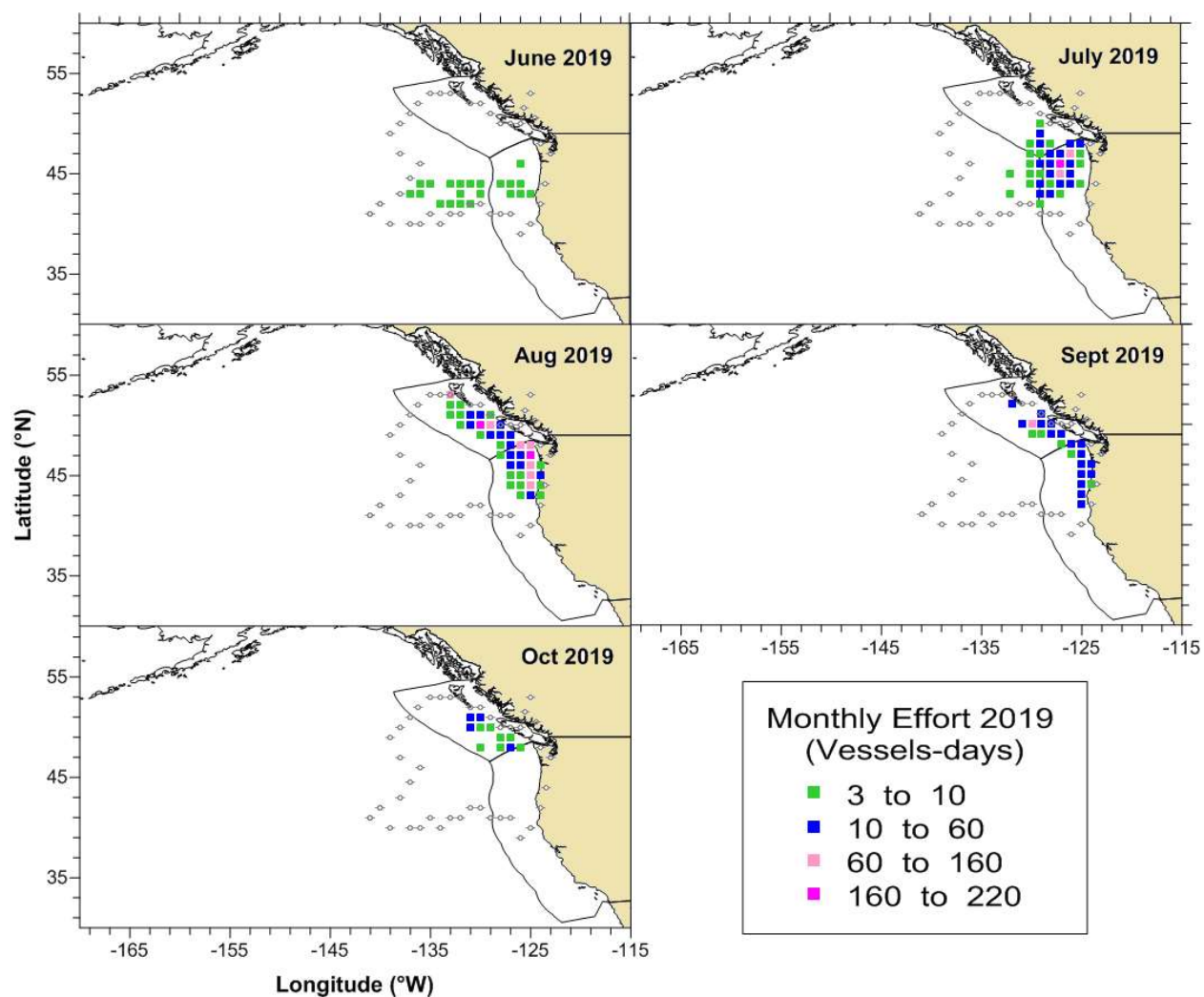
Figure 4. Monthly spatial distribution of effort by the Canadian Albacore Tuna troll fishery in 2019. Data are plotted on 1° x 1° strata with symbols located on the bottom-right corner. Empty dots approximate the border line of the operational area of the Canadian fishery in 2019.
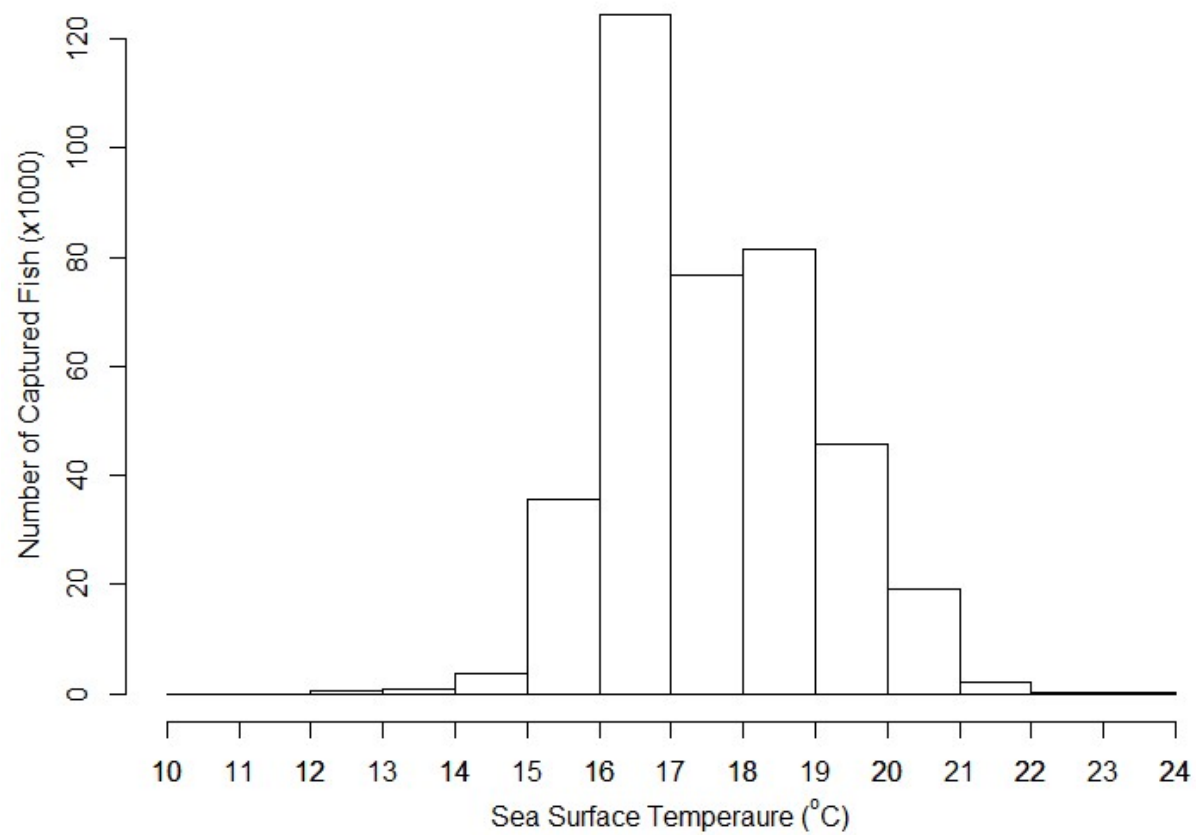
Figure 5. Number of north Pacific Albacore Tuna caught by the Canadian troll fishery in 2019 at various sea surface temperatures.
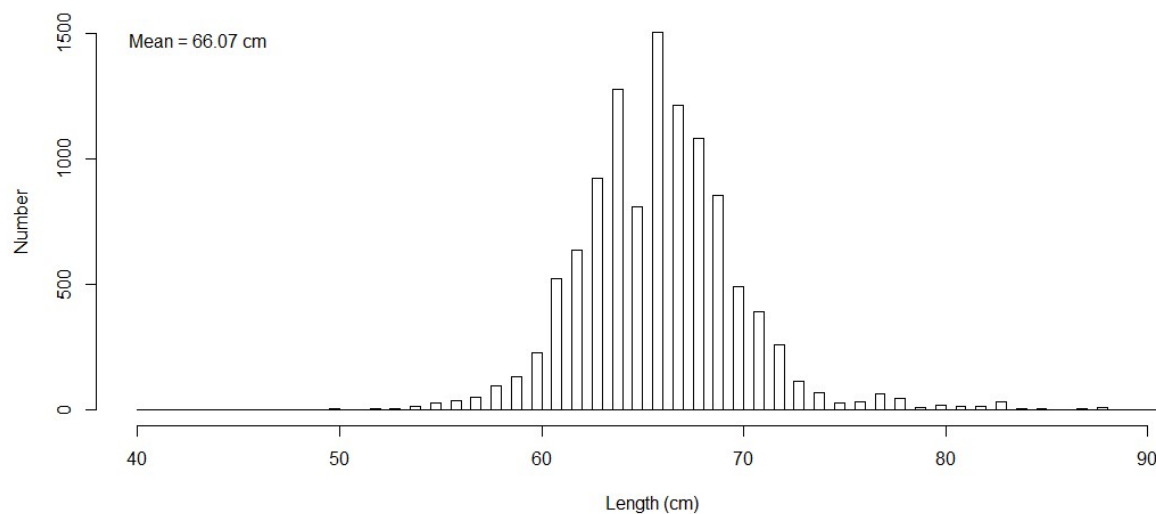
Figure 6. Distributions of fork lengths (cm) of north Pacific Albacore Tuna harvested by the Canadian troll fishery in 2019.
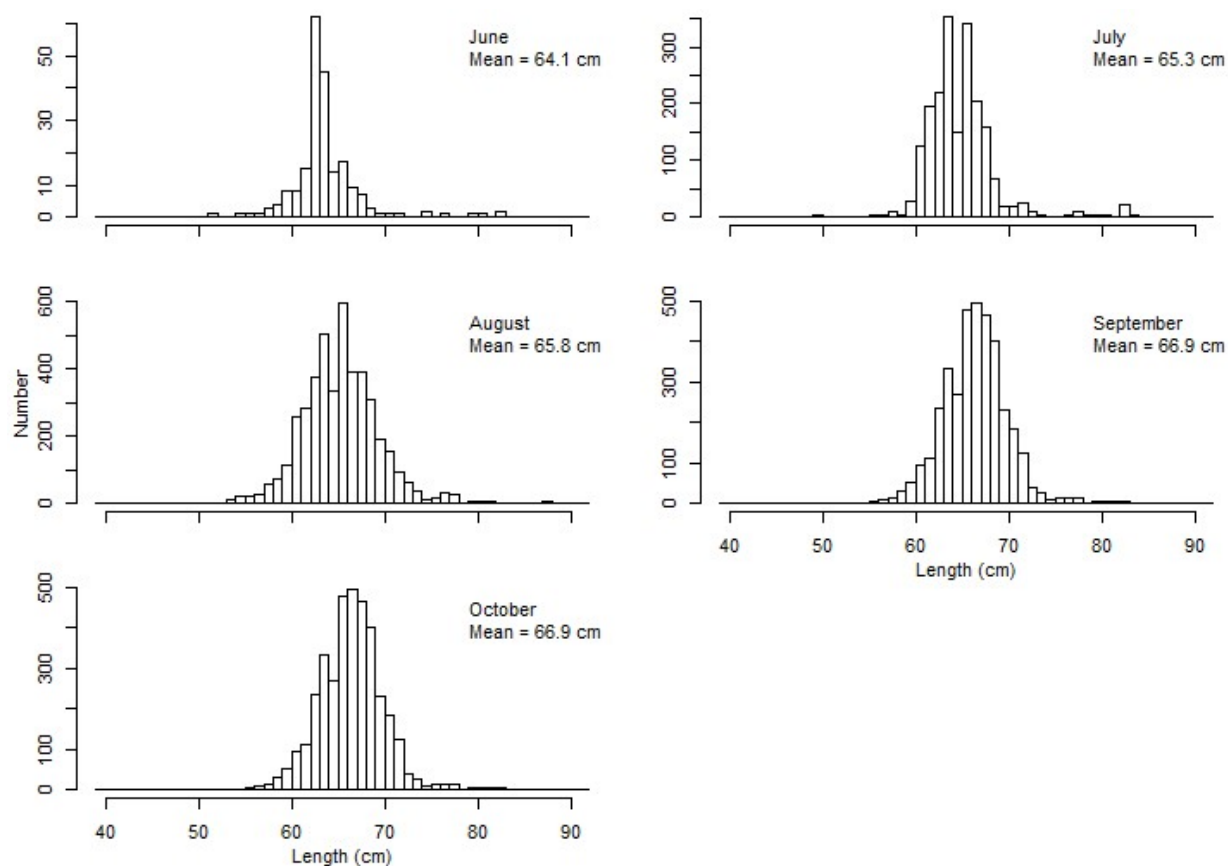
Figure 7. Monthly fork length (cm) distributions of north Pacific Albacore Tuna harvested by the Canadian troll fishery in 2019.
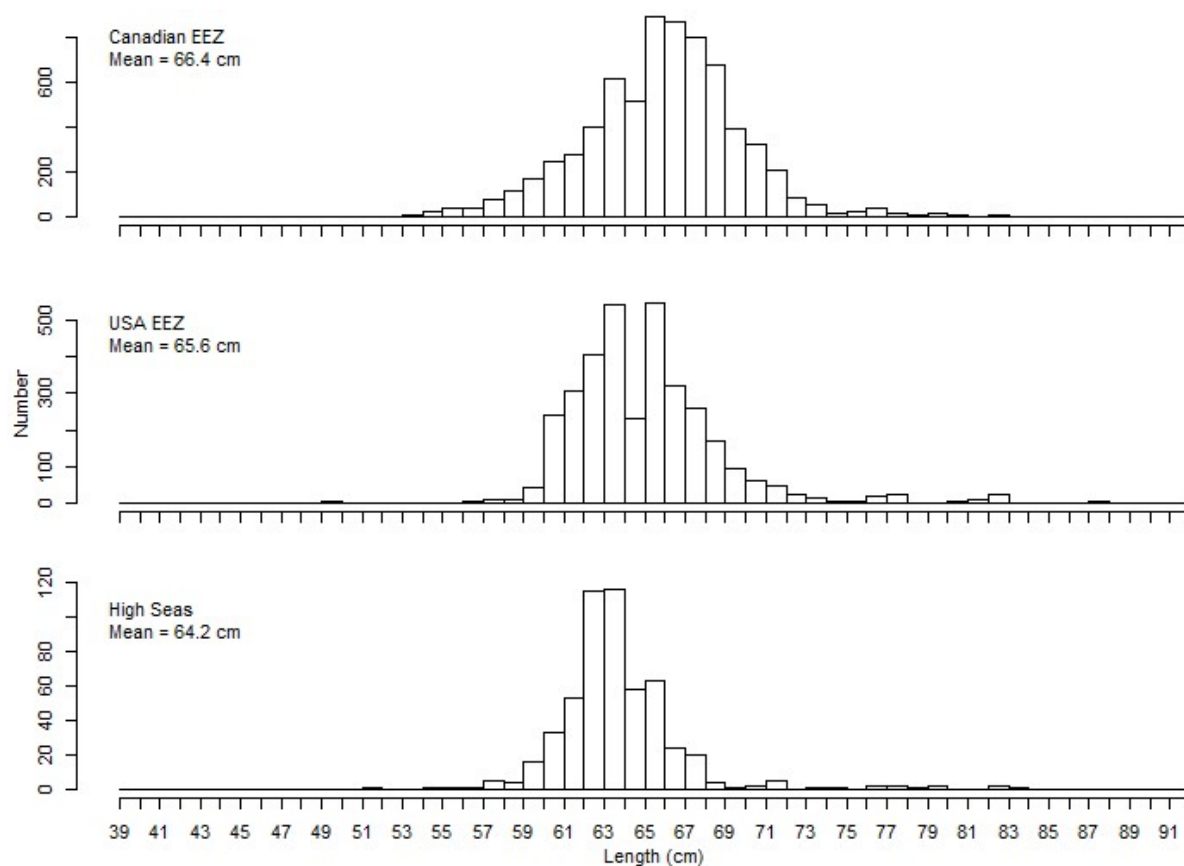
Figure 8. Distributions of fork lengths (cm) of north Pacific Albacore Tuna harvested by the Canadian troll fishery in 2019 in Canadian EEZ, USA EEZ and High Seas.