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Summary of Data from the Offshore Canadian Commercial Fishery for Greenland Halibut in Subarea 0

by

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Abstract

This document updates information from the commercial fishery for Greenland halibut in Subarea 0.

Sampling from the 2003 fisheries

The otter trawl fisheries during 2003 in Div 0A and 0B, as well as the longline fisheries in 0A, were well sampled with respect to length compositions. In Div. 0A, length samples were collected from the Norwegian vessels fishing Canadian quotas under charter arrangements. In Div 0A and 0B, length data were collected from Canadian-flagged vessels as well, although there were no length or otolith samples from the fixed gear (longline, gillnet) fisheries in Div. 0B in 2003.

Otoliths collected from catches in both Div. 0A and 0B have not yet been aged and there are no age based analysis available in 2003.

There are no data on by-catch from the shrimp fishery in Subarea 0 included in this paper, or from catches in the inshore fixed-gear fishery in Cumberland Sound. Catches from these fisheries are relatively small and have generally been dealt with elsewhere.

Catch Data

It should be noted that there are considerable uncertainties with the STATLANT 21A and 21B catch data for Greenland halibut in Subarea 0. In the data for the early-1990s, the use of charter vessels from non-Canadian countries to fish Canadian quotas resulted in some double counting of catch data. Although this problem has been resolved for some time for the Div. 0B catches, the introduction of non-Canadian charters in the Div. 0A fishery has resulted in similar problems with the 2001, 2002 and 2003 STATLANT 21A and B catch data. Also, logbook data for catches in 2000 by some Newfoundland-based vessels were not available and these catches were summarized from quota reports, resulting in incomplete data for month fished. As well, it is likely that some data for vessels fishing with licenses issued for Nunavut-based companies may not have been tabulated for the years 1997-1999. This may explain some of the apparent shortfall of reported catches by Canada of about 1,000 tons against the 5,500 tons quotas in 1998 and 1999. NAFO Scientific Council members have used national and observer databases to compile the catch statistics used in the assessment of the Subareas 0+1 stock. Canadian statistics for the SA0 fishery were recently reviewed during the development of the 2003-2005 Greenland halibut fisheries management plan and updates have been made but these were not available to the designated expert in time for inclusion in the 2004 assessment but will be for 2005.

The introduction of twin trawls to the fishery in 2000 has resulted in a new gear type. There is some question as to whether this new twin trawl gear has been coded differently from single trawls in data from some vessels or fleets operating in Div. 0B. Further examination of logbooks and observer data will be required to see the extent of this problem and whether or not it can be resolved. In the meantime, it is not possible to fully update the Subarea 0 CPUE series until this has been clarified. A non-standardized CPUE series for the Div. 0A fishery is presented.

Results and Discussion

Catch Trends

With the exception of a relatively small inshore fishery in Cumberland Sound, and some exploratory fishing in Subarea 0 beginning in 1996, virtually all the catch in Subarea 0 prior to 1999 occurred offshore in Div. 0B. A TAC of 5,500 tons was in place for SA0 from 1994 to 2000. In 2001, a new quota of 4,000 tons was introduced for Div. 0A and 1A offshore, separate from the 11,000 tons in 0B + 1B-F offshore. In 2003 the TAC for Div. 0A and 1A offshore was increased to 8,000 tons and in 2004 this was applied to Div. 0A and 1AB offshore. The 0A TAC was set at 3,500 tons in 2001, increased to 4,000 in 2002 and 4,400 in 2003.

Ice conditions in Subarea 0 continue to limit the duration of the fishery. In 2003 there was no fishing in Div. 0B during January, February and March. In Div. 0A fishing was on possible during the summer and fall months, August to November (Table 1). In 2003 the catch in Div. 0B was 6,077 tons up from 3,968 tons in 2002. This included an increase in the Cumberland Sound winter longline fishery from 106 tons in 2002 to 244 tons in 2003. Catches in Div. 0A in 2003 were 4,278 tons (preliminary estimate) up from 3,561 tons in 2002.

In Div. 0B catches have been taken mainly by otter trawl (2,403 tons in 2003), although catches by gillnet have become more important since 1999 with 1,168 tons taken by gillnet in 2003 (Table 1). Longline catches in 0B offshore have varied from 400 tons to 800 tons between 1999 and 2003 with a catch of 641 tons in 2003. In 1997, about 70% of the catch of 5,740 tons was taken by otter trawl, but this percentage declined to about 40% in 1999 (Brodie, 2000). In 2000, just over 50% of the catch came from otter trawls, about half of which was taken by twin trawls. The percentage of otter trawl catch varied between 40% and 46% from 2001 to 2003 with approximately 75% caught using twin trawl gear. Vessels from Canada, Japan, Faroe Islands, Russia, and Norway were the main participants in the fishery since the late-1980s, although there have been many changes to fleet compositions over time. During the 1990's, much of the Canadian quota in this fishery was caught under charter agreements with vessels from most of the nations listed above, although there were no such arrangements with non-Canadian vessels from 1999 to 2003 in Div. 0B.

In Division 0A catches were taken entirely by otter trawl from 1996 to 2001. Twin trawl gear was first introduced in 2000. A breakdown of catches by single and twin trawl was not available for 2000 and 2001. Almost 70% of the trawl catch in 2002 and 54% in 2003 were taken using the twin trawl gear. Longline gear was introduced in 2002 and comprised 30% of the catch that year as well as in 2003. The Nunavut based quota holders in this fishery do not have the capacity at this time to undertake fishing operations directly so this catch has been caught under charter arrangements with Southern Canadian and foreign companies from countries that have included Faroes, Poland, Lithuania, Estonia, Latvia, Russia and Norway. In 2003 two Norwegian longline vessels were chartered to fish in Div. 0A.

Catch Distribution

The location of the Div. 0B fishery has not differed greatly from 2000 to 2002 and is located along the shelf slope between 61^{o} and 64^{o}N at 900 m to approx. 1,500 m depths. The otter trawl fleet concentrated between 61^{o} and 63^{o}N.

The Div. 0A fishery is still considered an exploratory fishery and the fleets have varied their fishing locations over the past three years. In 2001 trawl catches were distributed fairly evenly all along the shelf slope from the southern boundary at 66^{o}15'N to 71^{o}N with a few sets taken near 72^{o}N. In 2002 trawl catches extended to approx. 73^{o} with the double trawl catch concentrated between 71^{o} and 72^{o}N. Depths fished in 2002 were similar to previous years for the trawl fleet, ranging from 693 m to 1310 m with the majority concentrated around 1,000 m. The long line fleet concentrated in the southeast of Div. 0A, 66^{o} to 69^{o}N and between 554 m and 1,250 m. In 2003 the longline fleet

also moved north directing 70% of their effort north of 70°N. As well, 90% of the twin trawl effort and 67% of the single trawl effort was north of 70°N.

Length Frequency

Sampling data from observers assigned to the Div. 0A vessels from 1996 to 2003 are shown in Fig. 6 and have not been adjusted to the overall catch. Length frequencies for the single and double trawl gear were similar within years and have been combined. In 1996 lengths ranged from 20 cm to 95 cm with two distinct modes, one at 41 cm and another at 50 cm. In subsequent years there has been a narrowing of the distribution and a shift to a single mode, 50 cm in 1997 and 44 cm in 2001. With the inclusion of longline gear into this fishery in 2002 the length distribution has shifted slightly with a greater number in the 56 cm to 80 cm length range and with a shift in modal length from 47 cm in 2002 to 50 cm in 2003. The modal length for males was 46 cm and for females it was 48 cm in 2003 (Table 2). The mean lengths by sex are not available at this time.

The minimum and maximum size of fish sampled in the 2003 Div. 0A long line catch was larger than in the Div. 0A trawl catch (Table 2). The modal length for males was 49 cm and for females it was 51 cm an increase of 2 cm in both cases over that observed in 2002. Mean length has not been calculated at this time.

Figures 1 a) and 1 b) show the length frequency from the 2002 observer samples by gear type. These data have not been adjusted to the overall catch. The length frequency for trawl gear is similar although there seems to be a slight increase in proportion of large fish in the 2003 0A trawl catch compared to 2002. This shift in length frequency in the 0A fishery is also reflected in the longline data (Fig. 1b).

There is a small fish protocol in Canada that stipulates that there should be no more than 15% of Greenland halibut catch ≤45 cm in length. In some fisheries the vessels have been asked to move to new ground when they have sets that produce more than 15% small fish. However, in Subarea 0 this has been difficult to achieve given the structure and distribution of the Greenland halibut stock in this area, particularly in Div. 0A, and the selectivity of the minimum mesh size allowed in this fishery. Therefore, in the SA0 fishery vessels are not required to move to new grounds if catches exceed this limit but the fishery management objectives are to minimize the overall harvest of small fish and method of achieving this is by having a mixed gear fishery (e.g. longline as well as trawl gear). In 2003 the longline fishery in Div. 0A had 10.2% of fish ≤45 cm and the trawl 22.5%, a decrease from that observed in 2002, 19.2 and 36.5%, respectively.

CPUE

In previous papers (Brodie, 1999; Brodie and Bowering, 1998), a standardized CPUE for Div. 0B was calculated from available data using a multiplicative model. However, it was thought that the lack of overlap of fleets throughout the time series likely caused problems in the CPUE standardization in Subarea 0. It was noted that there is not a single fleet which is present in all years of the time series, and that there was only one fleet involved in the 1999-2001 fisheries for which complete data were available. As well, the presence of twin trawls in 2000-02 has added a new gear type and has raised a question on how this gear code and effort data for twin trawls have been recorded. At least a portion of the twin trawl data in some years may not be distinguishable from single trawl data from the same vessel. An update of CPUE will be presented if/when this issue can be resolved.

Unstandardized mean catch rates have been calculated for trawl and longline vessels fishing in Div. 0A and are presented in Table 3 and Fig. 2. Single trawl mean CPUE has fluctuated around 0.5 t/h between 1996 and 2001 with an increase to approx. 0.9 t/h in 2003. The twin trawl catch rate was approx. 0.8 t/h for 2000 and 2001 and increased to approx. 1.3 t/h in 2003. However, it is important to keep in mind that as in Div. 0B there have been a number of different vessels and size classes operating in this fishery since 1996. Also, the Div. 0A fishery is still a relatively new and developing fishery. Catches have increased each year since 2000 from relatively low levels and in 2002 and 2003 effort has shifted to new grounds in the north that had only been lightly fished in previous years.

References

Brodie, W. 2000. Analysis of data from the commercial fishery for Greenland halibut in Subarea 0. NAFO SCR Doc. 00/26, Ser.No. N4255.

Brodie, W. 1999. Analysis of data from the commercial fishery for Greenland halibut in Subarea 0. NAFO SCR Doc. 99/47, Ser.No. N4106.

Brodie, W.B. and W.R.Bowering. 1998. Data from the commercial fishery for Greenland halibut in Subarea 0. NAFO SCR Doc. 98/39, Ser.No. N3027, 11 p.

Table 1. Canadian catch of Greenland halibut in Subarea 0 in 2003, by Division, region, month and gear. Data from Fisheries and Oceans Statistics Branch and Observers. Fisheries and Oceans statistics show total catches of 244 tons for the 0B C&A inshore long-line fishery, however, a monthly breakdown was not available at this time. Two types of otter trawls were used, the standard single trawl and a double shrimp style trawl with two nets, GN = gillnet and LL = longline.

	DIVISION 0B				**DIVISION 0A**				**SA 0**		**Can (C&A)**				
	Can (N)				**Can (M)**	**Can (C&A)**									
	Single Trawl	Twin Trawl	GN	LL	Single Trawl	Single Trawl	Twin Trawl	LL	**Total**		Single Trawl	Twin Trawl	LL	**Total**	**Total**
Jan	11	130					156		**297**					**0**	**297**
Feb									**0**					**0**	**0**
Mar									**0**					**0**	**0**
Apr	77				28		260		**365**					**0**	**365**
May	668	284	67	22	521	181	419		**2162**					**0**	**2162**
June	225	10	331	196	56				**818**					**0**	**818**
July	6		191	126					**323**				56	**56**	**379**
Aug	32		152	63					**247**		415	625	450	**1490**	**1737**
Sep			107	90					**197**		469	198	321	**988**	**1185**
Oct	87		192	102					**381**		485	366	205	**1056**	**1437**
Nov	253		128	42					**423**		223	160	305	**688**	**1111**
Dec	409	211							**620**					**0**	**620**
Unspec.								244	**244**						**244**
Total	*1768*	*635*	*1168*	*641*	*605*	*181*	*835*	*244*	***6077***		*1592*	*1349*	*1337*	***4278***	**10355**

Table 2 . Overview of length (cm) parameters for the Div. 0A fishery 1996-2003.

a) Otter Trawl

	Length range			Modal Length			Mean Length			Percent
Year	Male	Female	Unknown	Male	Female	Unknown	Male	Female	Unknown	<45 cm
1996	22-80	20-95	30-46	49	50	40	45.5	48.3	38.9	50.6
1997	24-78	24-94		48	50, 52		47.6	50.0		32.0
1998	30-75	30-87		46	49		48.1	50.8		26.8
1999	30-81	30-99		46	47		48.0	50.2		34.3
2000	27-68	28-94		45, 48	47		44.1	47.7		39.8
2001	26-80	23-104	26-98	45	45	46	44.9	46.7	49.1	51.8
2002	17-75	12-102	25-102	45	46	46	46.1	48.4	48.0	36.5
2003	25-76	26-97	26-96	46	48	44				22.5

b) Longline

	Length range			Modal Length			Mean Length			Percent
Year	Male	Female	Unknown	Male	Female	Unknown	Male	Female	Unknown	<45 cm
2002	33-82	32-104	34-129	47	49	46	50.0	55.3	55.1	19.2
2003	34-81	33-106	36-114	49	51	52				10.2

Table 3 a). Trawl CPUE (kg/h) in Division 0A, non-standardized mean for all vessels combined, (no net damage or loss of fish, tow duration ≥2hrs.).

Year	Single Trawl Mean CPUE (kg/h)	s.d.	# tows	Twin Trawl Mean CPUE (kg/h)	s.d.	# tows
1996	641	366	106			
1997	336	277	91	498	430	38
1998	619	302	12			
1999	628	217	84			
2000	339	178	10	863	454	47
2001	494	228	369	882	557	256
2002	842	565	215	1224	624	217
2003	930	528	289	1347	778	145

b). Longline CPUE (kg/1000 hooks) in Division 0A, non-standardized mean for five vessels, for sets ≥2hrs. in duration.

Year	Mean CPUE (kg/1000 hooks)	s.d.	# sets
2002	202	108	827
2003	256	134	674

Table 4. Mesh used in the otter trawl gear during the Div. 0A Greenland halibut fishery, 1996-2003.

Year	Codend Mesh (mm)	Body Mesh (mm)
1996	147, 148	147, 149, 150
1997	145, 147, 148	153, 152, 160
1998	145	146
1999	145, 147	152, 153
2000	145	160
2001	145, 148, 150, 152	100, 135, 150, 155, 160, 200
2002	145 diamond	100, 155 diamond
	156, 158 square	155, 154 square
2003	145, 147, 148	100, 160

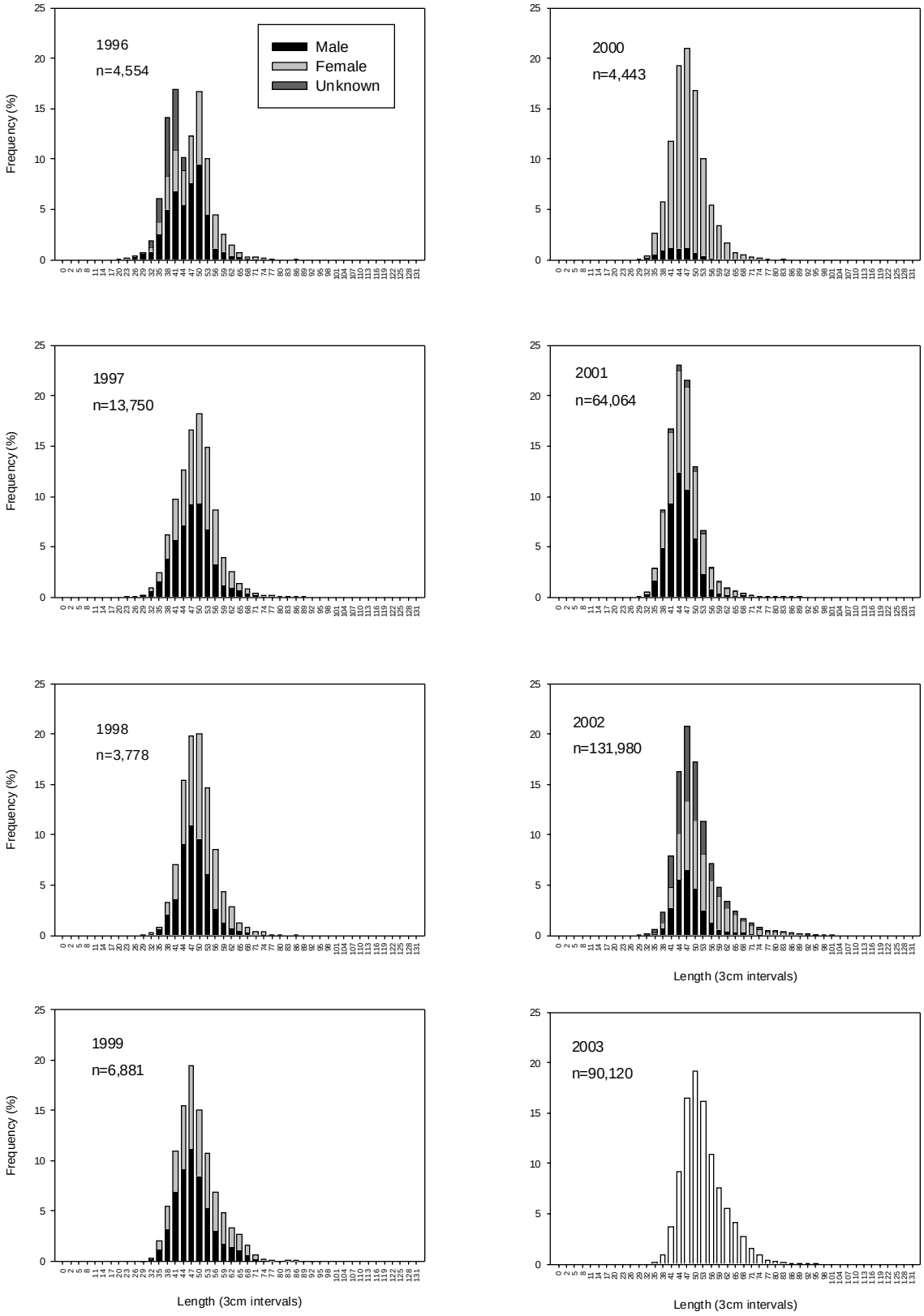

Fig. 1. Greenland halibut length frequency for the Div. 0A fishery, 1996-2003. Data from the sampled catch. Both trawl and long-line gear were used beginning in 2002.

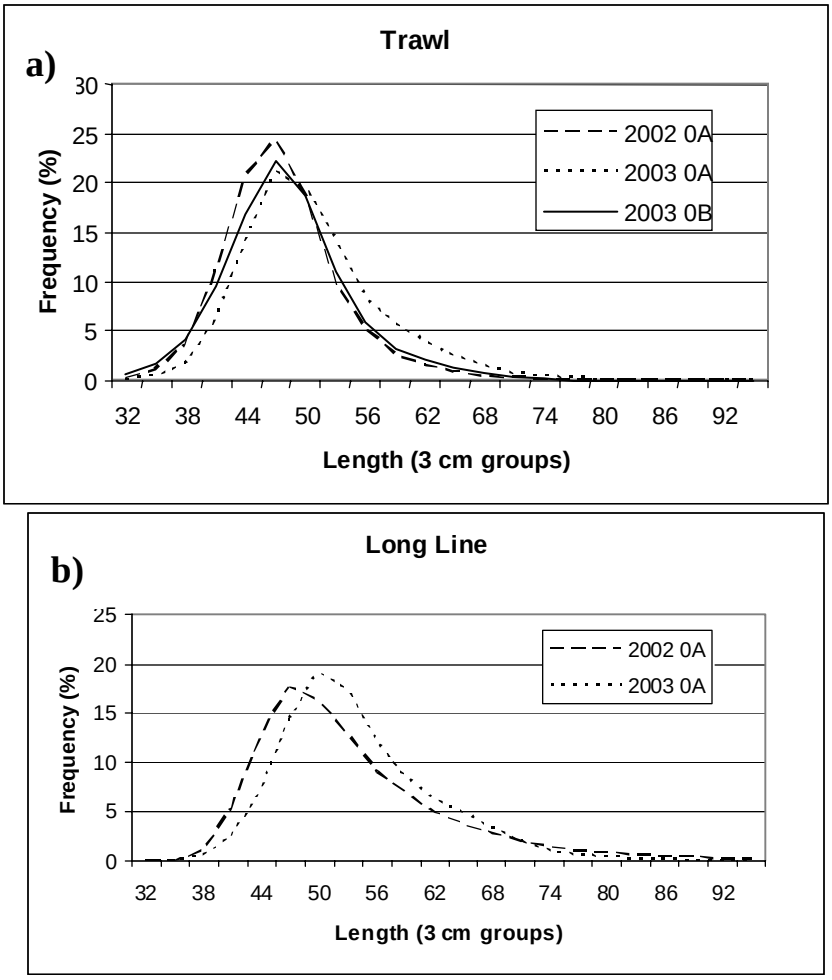

Fig. 2. Greenland Halibut length frequency (%) for Subarea 0 trawl and long line fisheries in 2002 and 2003 for Div. 0A and 2003 for 0B. Data are from the sampled catch. The single and double trawl length frequencies were very similar and have been combined.

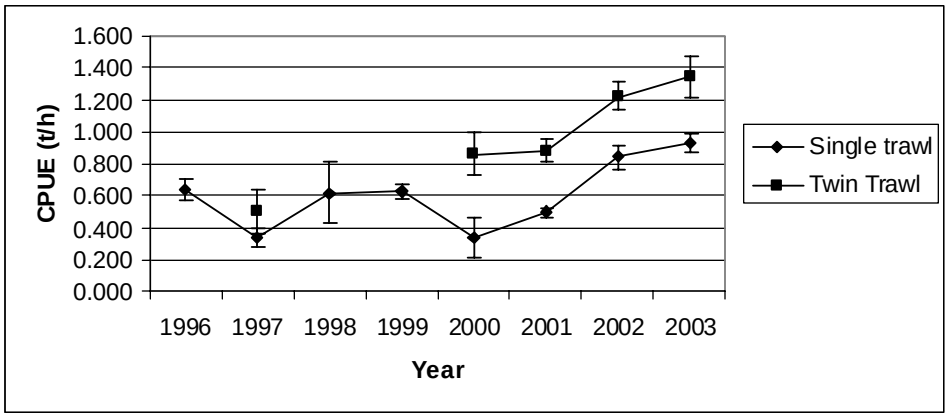

Fig. 3. Unstandardized mean catch per unit effort (CPUE) with 95% confidence intervals for Div. 0A, 1996-2003.