Northwest Atlantic Fisheries Organization

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SCIENTIFIC COUNCIL MEETING - JUNE 2021

National Research Report of Japan (2021)

(May 7, 2021)

Japan Fisheries Research and Education Agency, Japan

Contents

1. Introduction

Japan joined NAFO in 1980 and has conducted fishing operations in the Convention area continuously for 29 years (1980-2008). From 2009, fishing operations stopped for 7 years (2009-2015) due to various reasons, i.e., socio-economics problems of fishing companies, Tsunami disasters (2011) and others. Fishing operations resumed in 2016 with one otter trawl fishing vessel and have continued till now (2021) (6th year after the resumption).

This document is the National Research Report (Japan), responding to a series of requests by SC and NAFO Secretariat (Table 1). Table 1 summarizes progress of these requests as reference.

Table 1. Summary of requests by SC and the Secretariat and responses by Japan (as of May 7, 2021).

Information requested	NAFO circulation No.	Deadline	Response
● Environmental data	NAFO/21-069	May 7, 2021	No data available
● STATLANT 21A	NAFO/20-069	May 1, 2021	To be submitted by Fisheries Agency of JAPAN.
● National Research Report		May 7, 2021	This document
● Planned Surveys for 2021 and Early 2022			No surveys planned
● Lists of Biological Sampling Data during 2016-2020			Figs 7-9 of pages 13-15, Annex A of pages 22-24 (this document)
● List of Tag Releases in 2020 and early 2021			None
● Information on research vessel surveys on a stock-by-stock basis			No research vessel surveys
● STATLANT 21B		**Aug 31, 2021**	To be submitted by Fisheries Agency of JAPAN .

2. Data (1980-2020)

Three data sources used for this National Research Report of Japan are 'STATLANT21A (1980-2020)', 'STATLANT21B (1980-2020)' and 'Japanese Observer data (2016-2020)', which were officially provided by the Fisheries Agency of JAPAN.

3. Overviews (NAFO CA) (1980-2020)

Before describing subarea-based information, the overall situation (1980-2020) since Japan joined NAFO in 1980, is reviewed.

3.1 Gear types

Table 2 shows gear types used in operations by year based on STATLANT 21 available in the NAFO database downloaded from the NAFO homepage (April 2021). Circles indicated gear types used, but numbers of vessels are unknown. Only the numbers of bottom otter trawlers operated are available, which were obtained from Ms Jana Aker (NAFO Fisheries Information Administrator) (January 2019) and the Fisheries Agency of Japan (February 2019). However, numbers are unknown for nine years. As the numbers of vessels by gear type are the fundamental information and important, we plan to further investigate them in the future.

Table 2. Gear types used in fishing operations (1980-2020).

Gear types used in fishing operations by Japan. Circles indicate that at least one vessel used the corresponding gear, but actual number of boats are unknown except bottom otter trawl in column [A]

NAFO area code [STATLANT21B]		8	9	10	12	15	49	51	56	70
	[A]*	[B] Gear type (STATLANT21B)								
Year	No. of bottom otter trawl operated	Bottom otter trawl (charters)	Midwater trawl	Bottom otter trawl (not specified)	Bottom otter trawl	Midwater trawl (stern)	Longlines (charters)	Set lines	Mechanized squid jigger	Dredge (charters)
1980	17	○			○	○				
1981	?	○			○	○				
1982	?	○	○		○	○				
1983	9				○	○				
1984	?	○			○	○				
1985	?	○			○	○				
1986	15	○			○		○			
1987	?	○			○	○	○			
1988	?	○			○	○	○			○
1989	21				○		○			
1990	?				○	○			○	
1991	?	○			○	○			○	
1992	?	○			○	○				
1993	2	○			○					
1994	2	○	○		○					
1995	2	○			○					
1996	2	○			○					
1997	2	○			○	○				
1998	2	○			○	○				
1999	2				○	○				
2000	2				○					
2001	2				○					
2002	2				○					
2003	2				○			○		
2004	1				○					
2005	1				○					
2006	1			○						
2007	1				○					
2008	1				○					
2009										
2010										
2011										
2012					No operations					
2013										
2014										
2015										
2016	1				○					
2017	1				○					
2018	1				○					
2019	1				○					
2020	1				○					

***: Sources from NAFO Secretariat (1980,1983,1986,1989) and Fisheries Agency of Japan (1993-2019).**

?: numbers are unknown.

Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.

(1) Japan jointed NAFO in 1980.

(2) Majority gear is the bottom otter trawl.

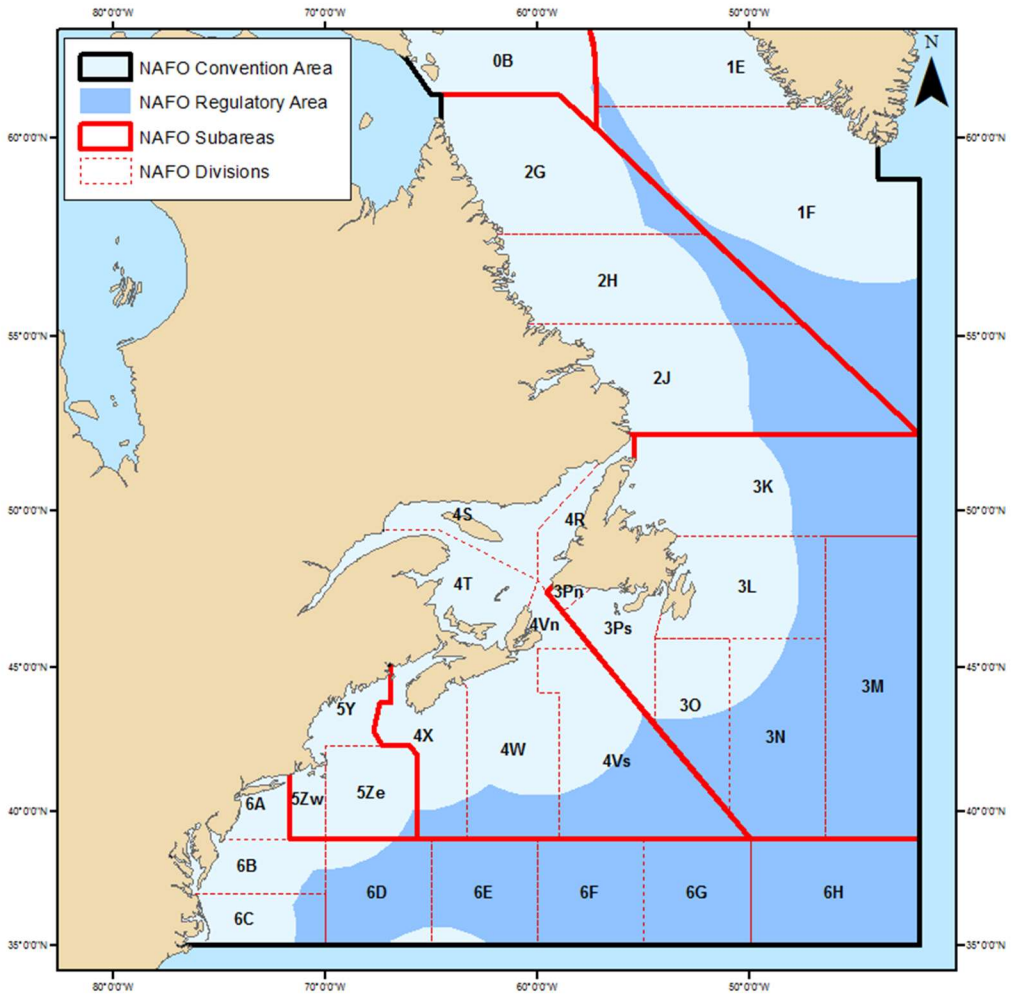
(3) Fishing vessel operated in recent years (2016-2020) is described in Annex B.

2.2 Catch by subarea (Table 3 and Map 1)

Table 3. Annual catch by sub-area (tons). All species and gears are combined (1980-2020).

Year	Subarea							
	0	1	2	3	4	5	6	Total
1980				2,223	18,683	4,652	5,850	31,408
1981				3,191	6,556	3,035	7,795	20,577
1982				6,479	1,416	1,853	5,204	14,952
1983				410	1,360	1,335	1,190	4,295
1984		802	1,221	3,667	2,094	718	1,548	10,050
1985		1,680	111	4,983	1,161	103	379	8,417
1986		2,079	1,546	6,077	1,845	79	229	11,855
1987		1,765	1,705	5,467	1,651			10,588
1988		2,045	1,463	5,085	1,041			9,634
1989		1,428	531	6,546	830			9,335
1990	124	1,189	1,745	6,797	2,182			12,037
1991	235	794	1,774	3,009	1,622	45		7,479
1992	386	3,011	968	5,715	763			10,843
1993	270	1,284	579	3,863				5,996
1994	674	874		1,822				3,370
1995	1,085	376		2,872				4,333
1996	522		28	3,333				3,883
1997				2,565			7	2,572
1998				3,109				3,109
1999				3,112				3,112
2000				2,941				2,941
2001				3,627				3,627
2002				3,389				3,389
2003				3,216				3,216
2004				1,948				1,948
2005				1,996				1,996
2006				1,901				1,901
2007				2,011				2,011
2008				1,972				1,972
2009								
2010								
2011								
2012				No operations				
2013								
2014								
2015								
2016				2,409				2,409
2017				2,595				2,595
2018				2,990				2,990
2019				2,786				2,786
2020				1,765				1,765

Additional Note:
(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(2) Japan jointed NAFO in 1980.
(3) Majority gear is the bottom otter trawl.



MAP 1. Map of NAFO CA highlighted subareas and Divisions.

Fig. 1 shows catch compositions among subareas (all species and gears combined but the majority gear is bottom otter trawler as indicated in Table 1). Japan operated in all of seven subareas (0-6) in the past, and subarea 3 was the major fishing ground during 1980-1996. From 1997 to now, subarea 3 is the only fishing ground for Japan.

Fig. 2 shows catch trends by subareas (all species and gears combined, but majority gears are bottom otter trawls). There is a shift of three different catch levels, i.e., during 1st stage (1980-1982), the catch level was the highest (15,000-31,000 tons), then in the 2nd stage (1983-1993) decreased by half (6,000-12,000 tons except 4,000 tons in 1983) and in the 3rd stage (1994-2008 and 2016-2020), it further decreased to less than 4,000 tons. The decreases are considered mainly due to constraints by TAC.

Subarea 3 has been the only fishing ground for Japan since 1997, thus this report describes the information in subarea 3.

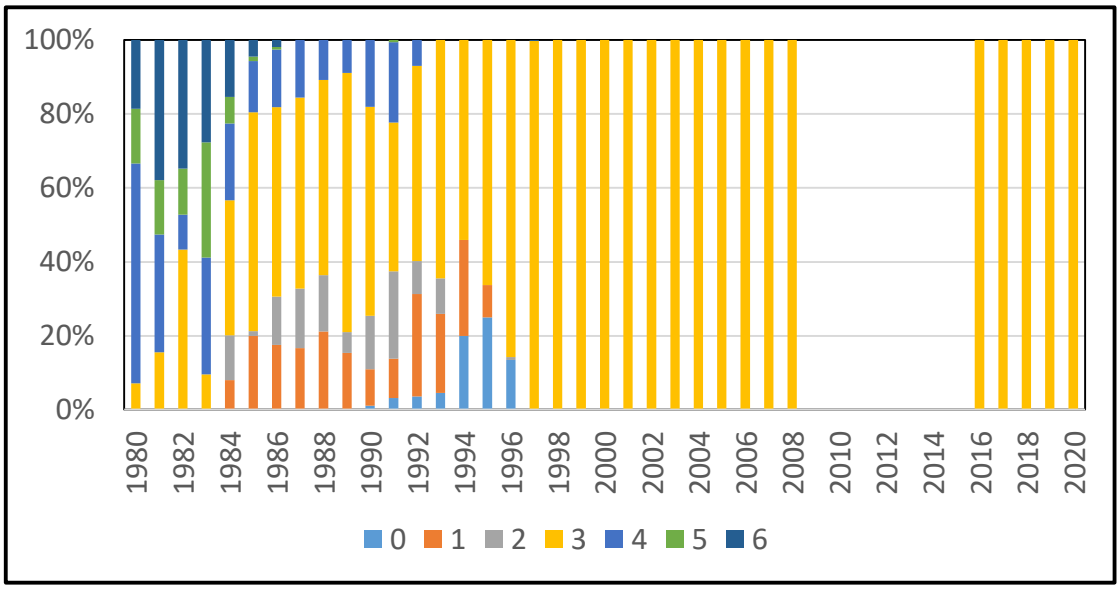


Figure 1. Catch compositions among subareas(1980-2020). All species and gears are combined.

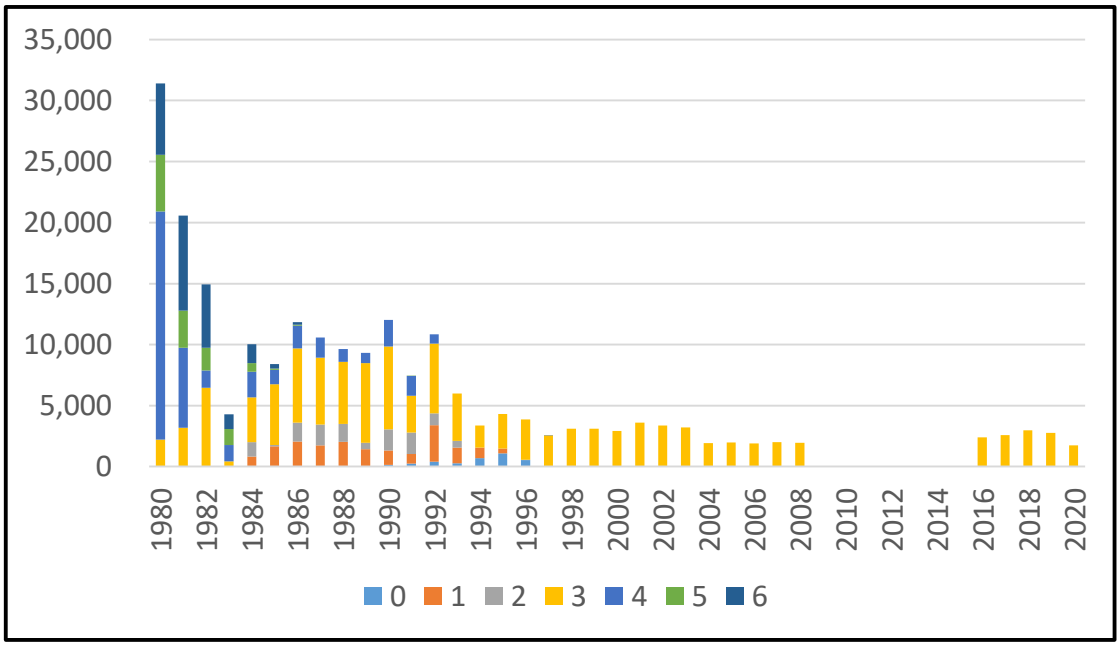


Figure 2. Catch by sub-areas (tons) (1998-2020). All species and gears are combined. No operations were done during 2009-2015.

Note:
(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(2) Japan jointed NAFO in 1980.
(3) Major gear used is the bottom otter trawl.

4. Subarea 3

A. Status of the Fisheries

This should be broken down by species and should first indicate the changes that have been observed in the catches. Any available information regarding quantities of fish, by species if possible, being used for industrial purposes should also be presented. An explanation should follow for these changes based on scientists' best judgement. Reference to biological conditions (e.g. length and age composition), fishing conditions (e.g. effort and availability) and environmental conditions, should be made where necessary and appropriate. Any forecasts for the coming year should be included here. Graphic presentations supporting the text are acceptable.

We will first review the overall situation in subarea 3 then will analyze by Division in subarea 3.

4.1 Overview

(1) Fisheries

Table 4 shows annual catch (tons) by Division in subarea 3 (all species and gears combined) (1980-2020). There are catch for almost all period in Division 3L+3M, while more in the first half for 3K+3N+3O.

Fig. 3 shows catch compositions among Divisions in subarea 3 (all species and gears combined). Japan operated in five Divisions (3K, 3L, 3M, 3N and 3O), but major fishing Division shifted by period, i.e., Division 3L was the major fishing ground in 1980-1981, then shifted to 3K (1984-1987), 3N (1988-1990), 3M (1991-1995), 3L (1996-2008) and 3L+3M+3N in recent years (2016-2020).

Fig. 4 shows annual catch trends by Division in subarea 3 (all species and gears combined). There are two different catch levels, i.e., the higher catch level (average 4,700 tons) in the first half period (1980-1993), while the lower level (average 2,600 tons) in the latter half period (1994-2008 and 2016-2020) resulting 2,100 tons difference.

Table 4. Annual catch by Division in sub-area 3 (tons). All species and gears are combined (1980-2020).

Year	Subarea					
	3K	3L	3M	3N	3O	Total
1980	208	983	1,030		2	2,223
1981	40	2,708	442		1	3,191
1982	3,462	2,014	455		548	6,479
1983			406		4	410
1984	1,257	461	416	85	1,448	3,667
1985	3,790	133	339		721	4,983
1986	4,270	140	444	12	1,211	6,077
1987	2,671	298	436	845	1,217	5,467
1988	856	347	507	1,537	1,828	5,075
1989	526	141	1,409	2,701	1,769	6,546
1990	261	175	2,494	2,431	1,436	6,797
1991	88	488	2,096	103	234	3,009
1992		1,810	3,748	21	136	5,715
1993		1,254	2,441		168	3,863
1994		649	1,173			1,822
1995		847	1,759		266	2,872
1996		2,093	813		427	3,333
1997		2,032	224	15	294	2,565
1998		2,162	577		370	3,109
1999		2,739	370	3		3,112
2000		2,794	147			2,941
2001		3,228	399			3,627
2002		3,071	318			3,389
2003		2,978	238			3,216
2004		1,724	222		2	1,948
2005		1,404	591		1	1,996
2006		1,490	410		1	1,901
2007		1,293	654		64	2,011
2008		1,334	638			1,972
No operations						
2016		624	168	1,573	44	2,409
2017		1,178	242	1,168	7	2,595
2018		1,555	707	724	4	2,990
2019		1,813	585	378	10	2,786
2020		1,399	345	0	21	1,765

Additional Note:
(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(2) Japan jointed NAFO in 1980.
(3) Majority gear is the bottom otter trawl.

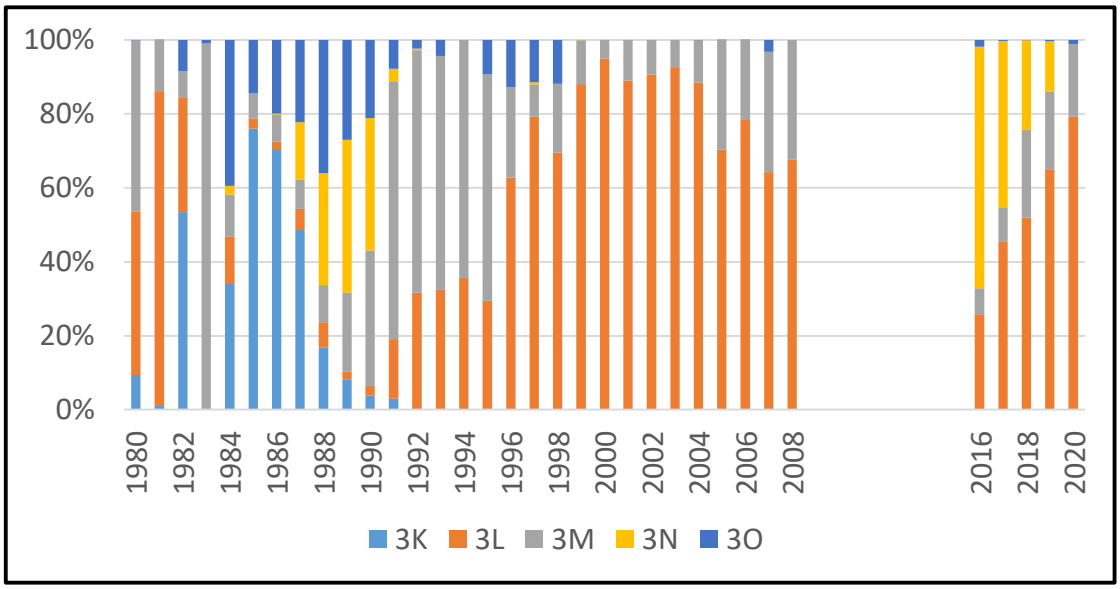


Figure 3. Catch compositions among Divisions in sub-area 3 (1980-2020). All species and gears are combined.

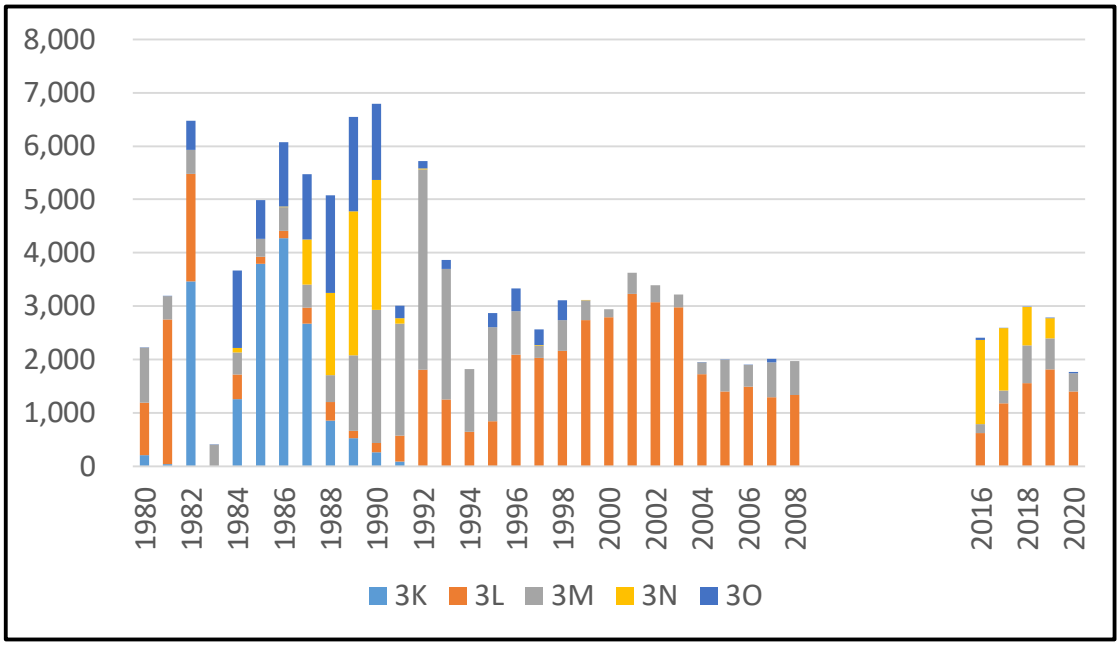


Figure 4. Annual catch (tons) by Division in sub-area 3. All species and gears are combined (1980-2020).

Note:
(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(2) Japan jointed NAFO in 1980.
(3) Majority gear is the bottom otter trawl.

Fig 5 shows TAC species compositions of catch for Japan in subarea 3, i.e., Greenland halibut, Atlantic cod, Atlantic redfish, caplin and squid. Major species compositions vary by period, i.e., Atlantic cod and red fish (1980-1983), redfish (1984-1991), Greenland halibut (1992-2008, 2016-2020) and yellowtail flounder and red fish (2016-2020). Yellowtail flounder is not TAC species for Japan, but its ratio was high in 2016-2017 because of quota transfers (Greenland halibut, red fish and yellowtail flounders) between Japan and Canada in 2016-2017, thus catch in this period did not reflect the allocation of quota (TAC).

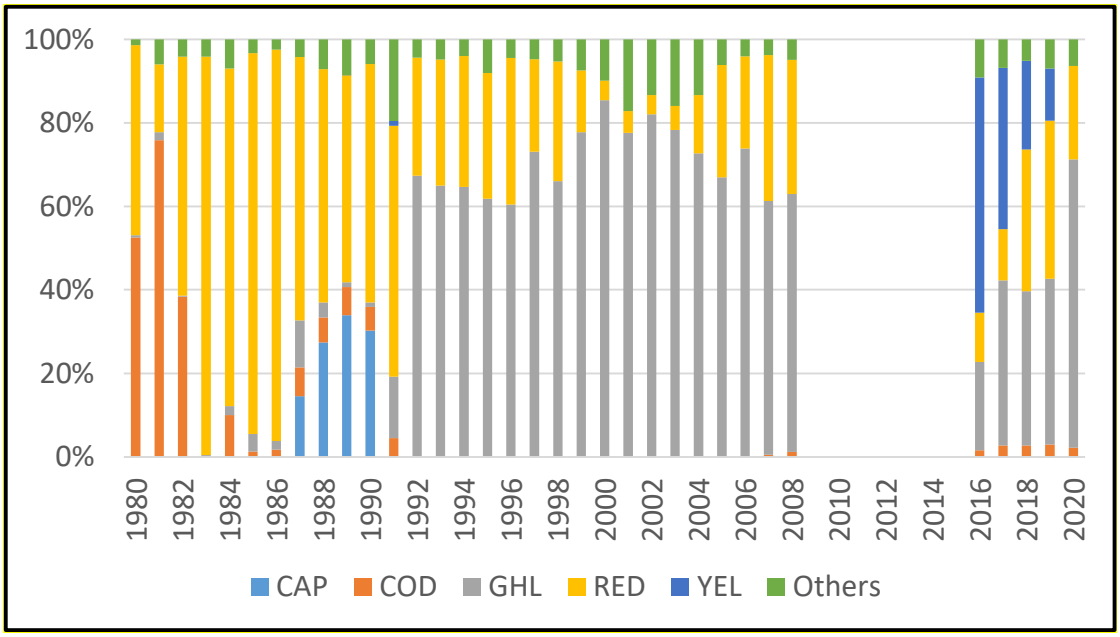


Figure 5. Species compositions of catch in Subarea 3. All gears are combined (1980-2020).
Note:
(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(2) Japan jointed NAFO in 1980.
(3) Majority gear is the bottom otter trawl

Fig. 6 shows annual catch trends by species in subarea 3 during two periods (1980-2020 and 1994-2020). There are high and low catch level periods, i.e., high (1980-1993) (average=12,000 tons) and low (1994-2020) (Average=2,600 tons), which is 4-5 times difference. Yellowtail flounder catch was high (2016-2017) as explained above.

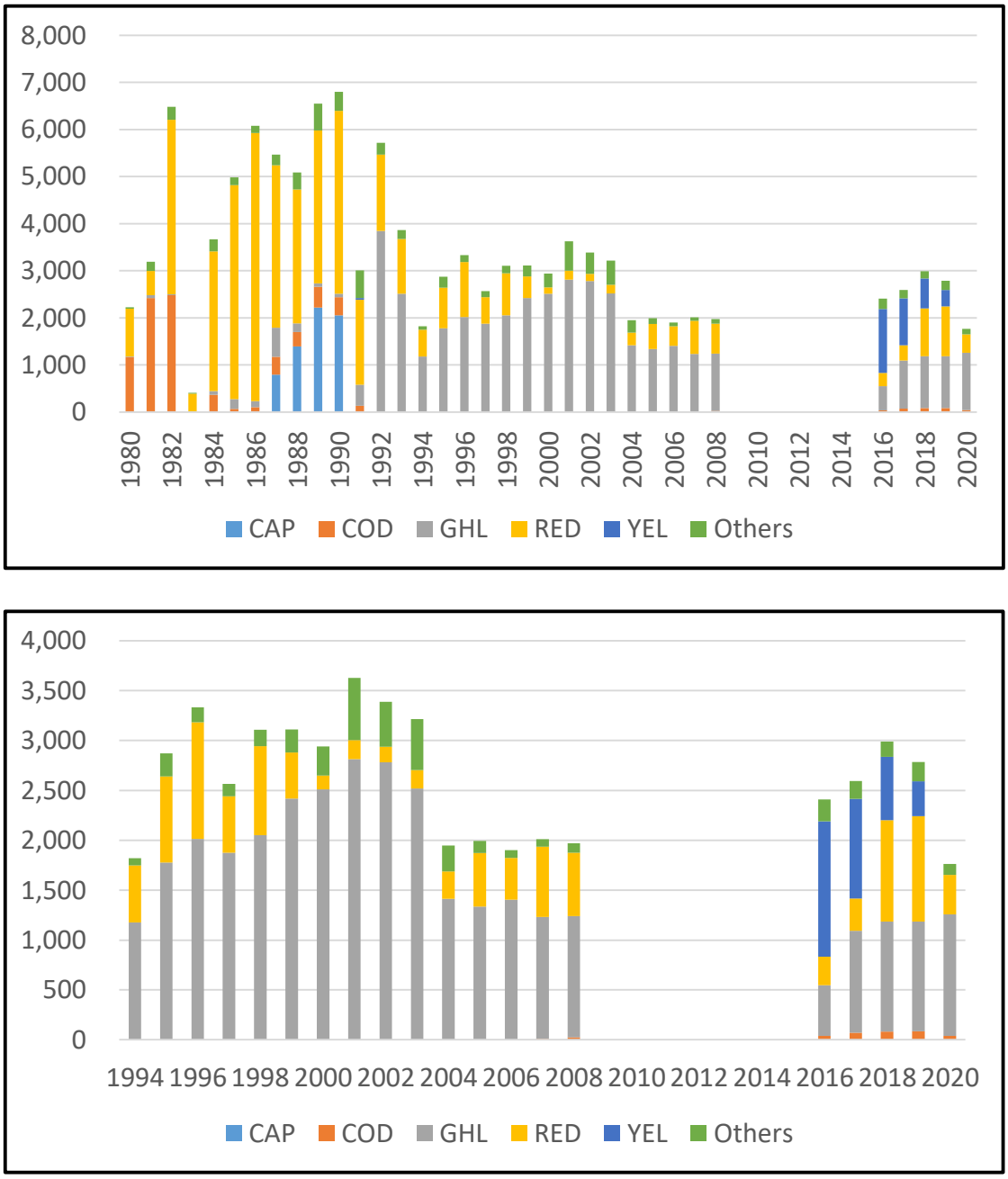


Figure 6. Catch by species (tons) in Subarea 3. All gears are combined (1980-2020: upper, 1994-2020: lower).

Note:
(1) Horizontal broken lines represent averages.
(2) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(3) Japan jointed NAFO in 1980.
(4) *Majority gear is the bottom otter trawl.*

(2) Size frequencies (Total/Fork length by 0.5cm is shown in Annex A)

・Greenland halibut

Size of Greenland halibut has become slightly smaller during 2017-2020 (about 48.6cm) than in 2016 (average=50.5cm).

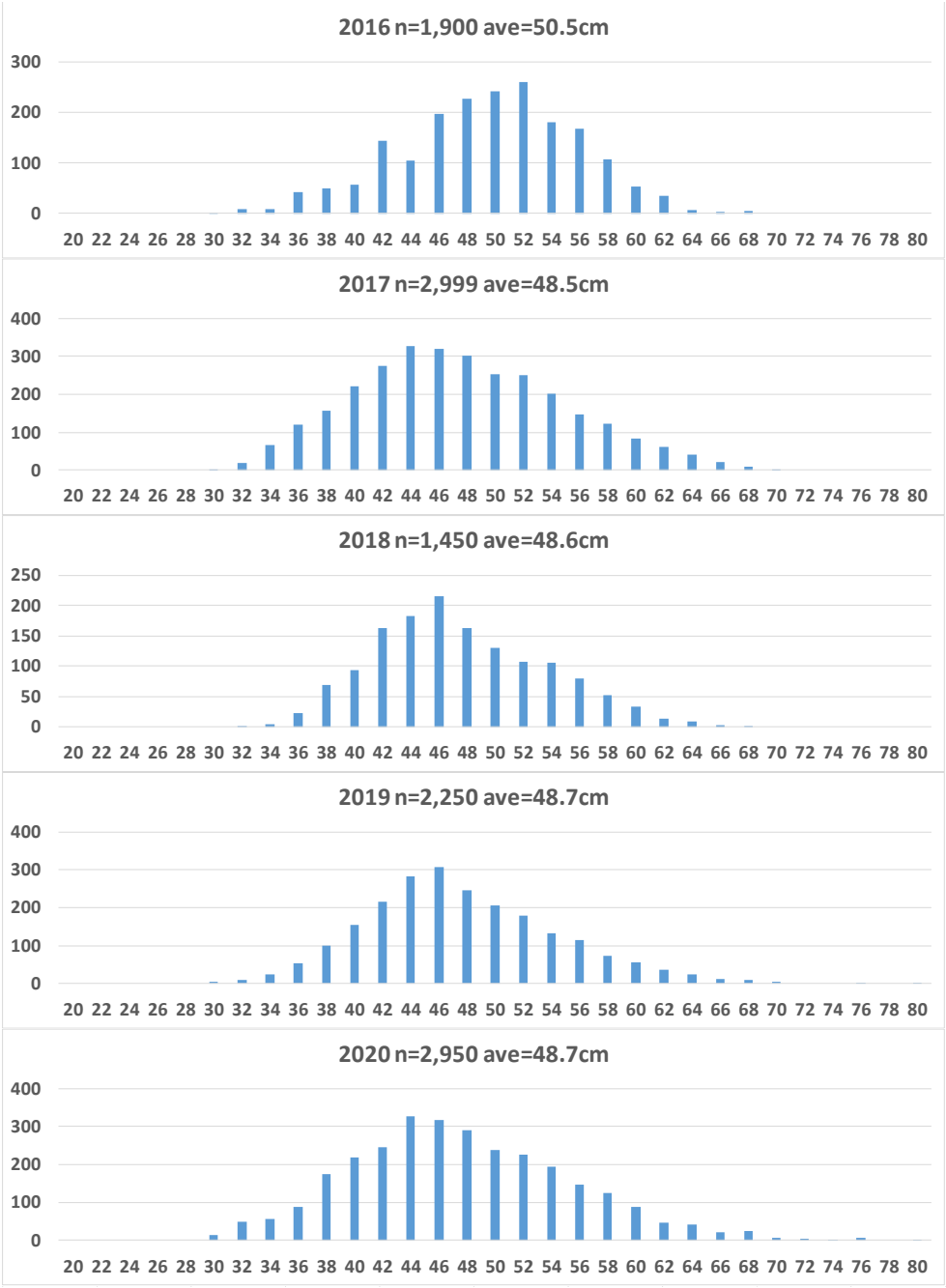


Figure 7. Size frequency distribution based on the total length data measured by one on-board observer for Greenland halibut (2016-2020) (subarea 3).

Red fish

Average sizes (fork length) in 2018-2020 (32-35cm) was much larger than in 2016-2017 (28-29cm). Size frequency distributions formed the bimodal (peaks around in 23cm and 32 cm) in 2016 and the unimodal in 2017-2020 (peak was around 26cm in 2017 and 32cm in 2018-2020).

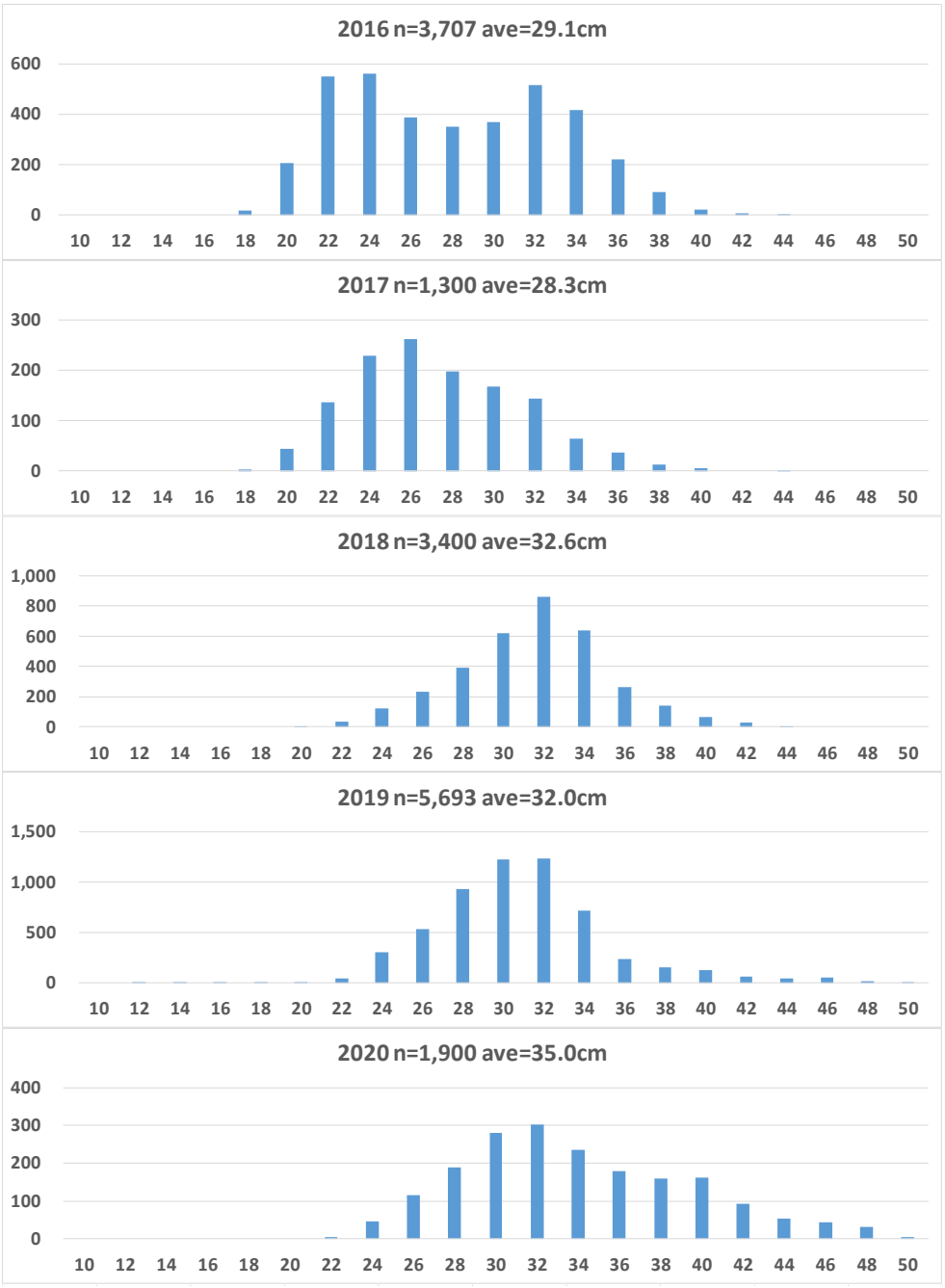


Figure 8. Size frequency distribution based on the fork length data measured by one on-board observer for redfish (2016-2020) (subarea 3).

Yellowtail flounder

No catch was made in 2020. Average sizes were similar during 2016-2019 (ave. 34-35cm). Size frequency distributions for four years formed unimodal (peak around 33 cm).

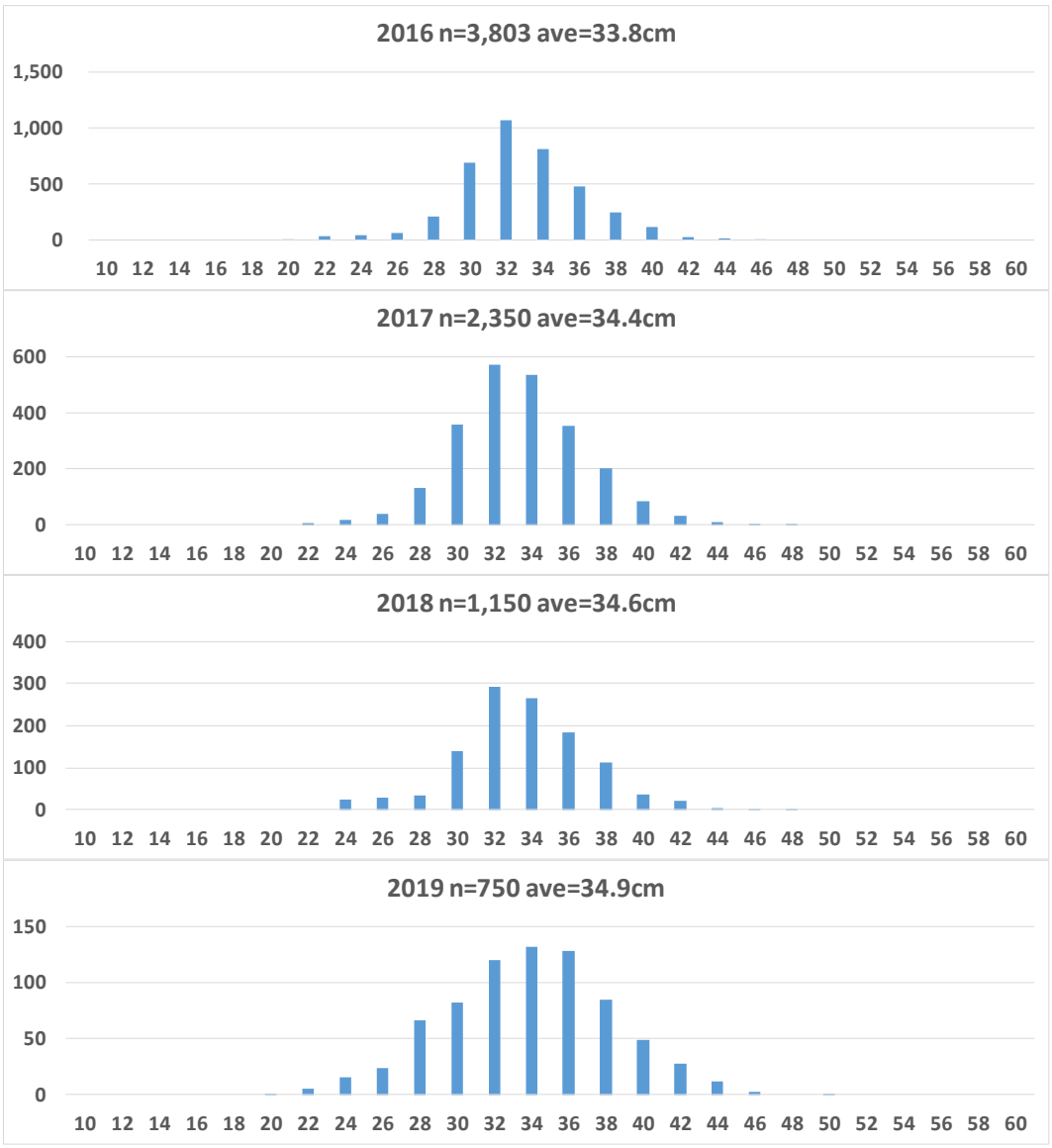


Figure 9. Size frequency distributions based on the total length data collected by one on-board observer for yellowtail flounder (2016-2019) (subarea 3).

4.2 Division 3K

Table 5 shows catch by species in Division 3K (1980-2020) (all gears combined). There were operations only for 11 years (1980-91 except 1983). Redfish was the largest catch (average=1,345 ton), followed by Cod (119 tons) and Greenland halibut (85 tons).

Table 5. Catch (tons) by species in Division 3K (1980-2020) (all gears combined)

CODE	CAT	COD	DGX	FIN	FLW	FLX	GHL	GRO	HAL	PLA	RED	RNG	SHX	SKA	WIT
1980		194				5					9				
1981	2	33									4				1
1982	12	752	1	7			9		2		2,662			2	15
1983	There were operations in NAFO CA, but not in Division 3K.														
1984		40					67	7			1,132		4		7
1985	5	60					196	23		12	3,439				55
1986	27	97					87	9	10	2	3,986	11	9		32
1987		96					431	20	3	8	2,079	9	1		24
1988		17	1				104	19	1	3	693	9	3		6
1989		8					18	6		1	485	5			3
1990		9			1		10				239		1		1
1991				2			8	2		2	63	3	1		7
1992	There were operations in NAFO CA, but not in Division 3K.														
1993															
1994															
1995															
1996															
1997															
1998															
1999															
2000															
2001															
2002															
2003															
2004															
2005															
2006															
2007															
2008															
2009	No operations in NAFO CA.														
2010															
2011															
2012															
2013															
2014															
2015															
2016	There were operations in NAFO CA, but not in Division 3K.														
2017															
2018															
2019															
2020															

Note:

(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.

(2) Japan jointed NAFO in 1980.

(3) Majority gear is the bottom otter trawl.

(4) Blank means catch (tons) < 0.5 (including 0 catch) or no operations.

4.3 Division 3L

Table 6 shows catch by species in Division 3L (1980-2020) (all gears combined) except 1983 and during 2009-2015. Redfish and Greenland halibut were major target (TAC) species.

Table 6. Catch (tons) by species in Division 3L (1980-2020) (all gears combined)

CODE	CAT	COD	DGX	FIN	FLX	GHL	GRO	GSK	HAL	PLA	POK	RED	RHG	RNG	SHX	SKA	SQI	WIT	YEL
1980			938				12			1	6		26						
1981		68	2,379				60			2	29		128				18		24
1982		60	1,707				5			5	43		159				29		6
1983	There were operations in NAFO CA, but not in Division 3L.																		
1984	11	317		1	1	2	5		2	15		105						2	
1985		1					2		1			129							
1986		1				1				3		135							
1987			1			152	16		2			114		8	5				
1988		114				49	17		6	2		152		6	1				
1989		2				4				21		114							
1990		1				8	1			6		151		3				5	
1991		4				302	11			44		84		5				2	36
1992						1,642	17		16	21		67		3				44	
1993						1,168	48					37						1	
1994			2			516	4		2	1		82		41	1				
1995			6			691	50					47		32	16			5	
1996			35		7	1,900	25			11		74		21	9			11	
1997			3		19	1,849	15		4	7		69		40	22			4	
1998			2		34	1,927	33		3	16		98		34	13			2	
1999					92	2,376	35		5	21		141		39	28			2	
2000					72	2,511	25		3	21		107		27	24			4	
2001					244	2,666	8		33	6		109		134	24			4	
2002						2,645	82		14	78		88		92		34		38	
2003	26					2,505	27		2	71		86	2	183		64		12	
2004	5					1,413	18		5	39		61	3	119		54		7	
2005						1,237	7		5	29		52		53	17			4	
2006						1,383	5		2	15		36		43		2	2	2	
2007						1,198	2			27		29	24			8		5	
2008						1,210	15			43		29	20			9		8	
2009																			
2010																			
2011																			
2012	No operations in NAFO CA.																		
2013																			
2014																			
2015																			
2016	2					474	1		2	4		125		11				5	
2017	5	1				1,024			1	3		125		13		1		5	
2018	8	1				1,101			4			412		28				1	
2019	19	1	1			1075	1		6	1		606	88	1		10		4	
2020	22	2				1204		2	4	1		108	53			0		3	

Note:

(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.
(2) Japan jointed NAFO in 1980.
(3) Majority gear is the bottom otter trawl.
(4) Blank means catch (tons) < 0.5 (including 0 catch) or no operations.

4.4 Division 3M

Table 7 shows catch by species in Division 3M (1980-2020) (all gears combined). Redfish and Greenland halibut were major target (TAC) species.

Table 7. Catch (tons) by species in Division 3M (1980-2020) (all gears combined)

CODE	CAT	COD	DGX	FIN	FLX	GHL	GRO	HAL	PLA	POK	PRA	RED	RHG	RNG	SHX	SKA	SQI	WIT
1980		37		16					1			976						
1981		9							47			386						
1982		10							53			392						
1983		1			3	1	2		9			390						
1984		9		3	1	10	2	1	1			389						
1985		5				13	5	1	2			313						
1986		6				35			3			400						
1987		269				33	2					131		1				
1988		5				27	2		78	1		393		1				
1989		38	2			44	25		402			885		9				4
1990		24				58	6		308			2,082		16				
1991		54				128	26	1	450			1,431		6				
1992		2				2,185	78		50			1,424		5				4
1993						1,341	75		49			967		7				2
1994						663						488		22				
1995			8			1,086	82	4				553		25	1			
1996			1			114	7					678		2	11			
1997						12						212						
1998					3	123	6					439		3	3			
1999					5	42						320		1	2			
2000					1	1					114	31						
2001					24	149		3			130	80		12	1			
2002						137	3		5		100	67		6				
2003						14	1		3		117	98	3	2				
2004	1					3			4			209		4		1		
2005	1					100	1	5				483			1			
2006	1					21		3				383				2		
2007	1	10				24		6				613						
2008		24				9		2				603					0	
2009																		
2010																		
2011																		
2012						No operations in NAFO CA.												
2013																		
2014																		
2015																		
2016	1					35		3				128		1				
2017	1	49						1				190				1		
2018	11	82				2		4	2			600		2		3		1
2019	7	81				29		3	3			450	3			7		2
2020	3	37				15		1	0			286	1			1		0

Note:

(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.

(2) Japan jointed NAFO in 1980.

(3) Majority gear is the bottom otter trawl.

(4) Blank means catch (tons) < 0.5 (including 0 catch) or no operations.

4.5 Division 3N

Table 8 shows catch by species in Division 3M (1980-2020) (all gears combined). Fisheries were not so active comparing to other Divisions except for the high capelin catch (1987-1990) (average =1,616 tons) and the high yellowtail flounder catch (2016-2019) (834 tons). No yellowtail founder catch was made in 2020.

Table 8. Catch (tons) by species in Division 3N (1980-2020) (all gears combined)

CODE	ANG	CAP	CAT	COD	DGX	FIN	GHL	GRO	HAL	PLA	RED	RNG	SKA	WIT	YEL
1980															
1981															
1982															
1983															
1984						4					81				
1985															
1986											12				
1987		793					1				51				
1988		1,395	2	114					24	2					
1989		2,222		391	1	3	3	7		31	39	1		2	1
1990		2,054		350				2		21	4				
1991				77			2	2		5	4			13	
1992							18	1			1			1	
1993															
1994															
1995															
1996															
1997							13	1						1	
1998															
1999							2	1							
2000															
2001															
2002															
2003															
2004															
2005															
2006															
2007															
2008															
2009															
2010															
2011															
2012							No operations in NAFO CA.								
2013															
2014															
2015															
2016				38					6	145			22	7	1,355
2017				22					3	116			23	4	1,000
2018										77			12	1	634
2019				2						17			11		348
2020															

Note:

(1) Data source: STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.

(2) Japan jointed NAFO in 1980.

(3) Majority gear is the bottom otter trawl.

(4) Blank means catch (tons) < 0.5 (including 0 catch) or no operations.

4.6 Division 3O

Table 9 shows catch by species in Division 3O (1980-2020) (all gears combined). Fisheries were not so active comparing to other Divisions except high redfish catch (1982-1998 except 1983) (average =748 tons).

Table 9. Catch by species in Division 3O (1980-2020) (all gears combined).

CODE	ANG	ARG	BET	BFT	CAT	COD	DGX	FIN	GHL	GRO	HAD	HAL	HKR	HKS	HKW	PLA	POK	RED	RNG	SHX	SKA	SQI	SWO	WIT	YEL	YFT
1980															2											
1981																						1				
1982	1	11				16		1				8		3	6	5		496						1		
1983											1				2			1								
1984	1	12				1		10		5	29	14	13	16	69	5	1	1,258				1		13		
1985	3	2								3	7	6		2	19	2		661						16		
1986		4				1		1	3	1	4	7		16	8	1		1,162	1	1				1		
1987		9	5			14				4	44	18		1	34			1,074		1		2		10		1
1988	1	12	2	2	1	50			1	5	7	9	2		101	4		1,606		2			2	21		
1989	1	4					2		5	11		14			6			1,724		2						
1990	1	3						1		5	2	5			5	2		1,406				4		2		
1991	1	1							3	1		2						226								
1992	1								2	5		1						125		1				1		
1993	2	1							3	2		1						159								
1994																										
1995												1			1			264								
1996						1				1		1			1			417		4		1		1		
1997									2	3		2						285		2						
1998									3	7		4						355		1						
1999																										
2000																										
2001																										
2002																										
2003																										
2004																		2								
2005																		1								
2006									1																	
2007									1							1		61			1					
2008																										
2009																										
2010																										
2011																										
2012													No operations in NAFO CA.													
2013																										
2014																										
2015																										
2016	2					1						3			1	1		30			1			1	4	
2017												1						6								
2018																		4								
2019														1								9				
2020														1	0			1			0	19				

Note: Data source: *(1) STATLANT21A based on the official statistics provided by Fisheries Agency of Japan.*
(2) Japan jointed NAFO in 1980,
(3) Majority gear is he bottom otter trawl and
(4) Blank means catch (tons) < 0.5 (including 0 catch) or no operations.

B. Special Research Studies

1. Environmental Studies
    a) Hydrographic studies
    b) Plankton studies (including eggs and larvae)
    c) Benthic studies
    d) Observations on ice conditions in Subareas 0 to 4
    e) Other environmental studies
2. Biological studies by species
    Material should be presented in the order of the life cycle, reporting studies on eggs and larval stages first.
3. Gear and selectivity studies, including studies on fishing operations
4. Miscellaneous studies

Not conduced in 2020.

5. Recommendations

There is no recommendation.

Annex A Frequency of total/fork length by 0.5 cm for GLH, RED and YEL

1) Frequency of total length for Greenland halibut

TL (cm)	2016	2017	2018	2019	2020	TL (cm)	2016	2017	2018	2019	2020	TL (cm)	2016	2017	2018	2019	2020
30.0-30.5	0	0	0	0	2	50.0-50.5	88	50	36	55	58	70.0-70.5	0	1	0	0	3
30.5-31.0	0	0	0	2	3	50.5-51.0	42	71	35	59	73	70.5-71.0	0	0	0	2	5
31.0-31.5	1	0	0	0	3	51.0-51.5	82	61	31	41	55	71.0-71.5	0	0	0	1	0
31.5-32.0	0	1	0	2	6	51.5-52.0	30	70	28	50	53	71.5-72.0	0	0	0	1	0
32.0-32.5	0	6	0	2	3	52.0-52.5	76	66	30	47	55	72.0-72.5	0	0	0	0	1
32.5-33.0	2	6	0	2	13	52.5-53.0	65	60	25	47	64	72.5-73.0	0	0	0	0	3
33.0-33.5	6	3	1	4	18	53.0-53.5	72	62	21	39	67	73.0-73.5	0	0	0	0	0
33.5-34.0	1	3	0	1	15	53.5-54.0	47	63	32	47	39	73.5-74.0	0	0	0	0	0
34.0-34.5	2	6	0	3	12	54.0-54.5	48	54	30	33	51	74.0-74.5	0	0	0	0	0
34.5-35.0	2	17	0	6	13	54.5-55.0	42	47	26	39	51	74.5-75.0	0	0	0	0	1
35.0-35.5	2	22	2	9	10	55.0-55.5	67	50	21	31	39	75.0-75.5	0	0	0	0	0
35.5-36.0	3	21	3	7	20	55.5-56.0	24	50	29	29	52	75.5-76.0	0	0	0	0	1
36.0-36.5	18	23	6	16	18	56.0-56.5	73	43	18	34	47	76.0-76.5	0	0	0	0	0
36.5-37.0	7	25	1	11	14	56.5-57.0	19	36	24	25	36	76.5-77.0	0	0	0	0	0
37.0-37.5	9	36	10	13	26	57.0-57.5	51	35	18	24	30	77.0-77.5	0	0	0	0	6
37.5-38.0	8	36	6	14	31	57.5-58.0	25	34	19	32	34	77.5-78.0	0	0	0	1	0
38.0-38.5	13	40	18	15	52	58.0-58.5	45	32	17	18	34	78.0-78.5	0	0	0	0	0
38.5-39.0	8	45	14	27	39	58.5-59.0	21	45	11	22	27	78.5-79.0	0	0	0	0	0
39.0-39.5	11	41	22	30	38	59.0-59.5	26	24	12	14	31	79.0-79.5	0	0	0	0	0
39.5-40.0	18	32	15	29	44	59.5-60.0	15	22	12	20	34	79.5-80.0	0	0	0	0	0
40.0-40.5	12	42	20	35	52	60.0-60.5	25	19	12	16	33	80.0-80.5	0	0	0	0	0
40.5-41.0	13	57	16	46	44	60.5-61.0	12	17	6	16	13	80.5-81.0	0	0	0	1	0
41.0-41.5	21	50	29	28	53	61.0-61.5	12	25	11	13	21	81.0-81.5	0	0	0	0	0
41.5-42.0	10	72	28	45	69	61.5-62.0	4	22	5	11	22	81.5-82.0	0	0	0	0	2
42.0-42.5	35	58	36	56	50	62.0-62.5	20	13	4	12	18	82.0-82.5	0	0	0	0	0
42.5-43.0	30	69	34	52	51	62.5-63.0	6	19	8	9	18	82.5-83.0	0	0	0	0	0
43.0-43.5	44	73	41	51	70	63.0-63.5	6	16	2	4	8	83.0-83.5	0	0	0	0	0
43.5-44.0	35	76	51	58	75	63.5-64.0	3	12	0	12	3	83.5-84.0	0	0	0	0	0
44.0-44.5	32	81	30	61	76	64.0-64.5	3	15	6	8	15	84.0-84.5	0	0	0	0	0
44.5-45.0	13	79	46	75	77	64.5-65.0	2	10	0	6	8	84.5-85.0	0	0	0	0	0
45.0-45.5	49	82	49	68	95	65.0-65.5	2	6	2	4	10	85.0-85.5	0	0	0	0	0
45.5-46.0	11	84	58	78	78	65.5-66.0	0	10	1	7	9	85.5-86.0	0	0	0	0	0
46.0-46.5	71	82	42	73	76	66.0-66.5	0	9	2	4	4	86.0-86.5	0	0	0	0	0
46.5-47.0	27	72	62	72	88	66.5-67.0	2	5	0	2	10	86.5-87.0	0	0	0	0	0
47.0-47.5	67	88	58	81	70	67.0-67.5	1	5	0	3	4	87.0-87.5	0	0	0	0	0
47.5-48.0	32	77	53	81	82	67.5-68.0	0	2	1	3	3	87.5-88.0	0	0	0	0	0
48.0-48.5	71	89	41	61	70	68.0-68.5	0	6	0	2	14	88.0-88.5	0	0	0	0	0
48.5-49.0	26	71	50	53	81	68.5-69.0	0	2	0	5	4	88.5-89.0	0	0	0	0	0
49.0-49.5	85	80	28	66	74	69.0-69.5	5	1	0	1	2	89.0-89.5	0	0	0	0	0
49.5-50.0	44	63	44	65	65	69.5-70.0	0	1	1	2	3	89.5-90.0	0	0	0	0	0

2) Frequency of fork length for Red fish

FL (cm)	2016	2017	2018	2019	2020	FL (cm)	2016	2017	2018	2019	2020
10.0-10.5	0	0	0	0	0	35.0-35.5	102	18	153	170	60
10.5-11.0	0	0	0	0	0	35.5-36.0	80	11	114	114	50
11.0-11.5	0	0	0	0	0	36.0-36.5	69	14	101	79	53
11.5-12.0	0	0	0	0	0	36.5-37.0	59	6	68	77	50
12.0-12.5	0	0	0	0	0	37.0-37.5	50	7	53	42	37
12.5-13.0	0	0	0	0	0	37.5-38.0	44	9	40	42	39
13.0-13.5	0	0	0	0	0	38.0-38.5	31	7	41	34	25
13.5-14.0	0	0	0	1	0	38.5-39.0	23	3	37	45	46
14.0-14.5	0	0	0	0	0	39.0-39.5	24	3	32	40	34
14.5-15.0	0	0	0	0	0	39.5-40.0	13	0	27	35	54
15.0-15.5	0	0	0	0	0	40.0-40.5	8	2	28	38	48
15.5-16.0	0	0	0	2	0	40.5-41.0	8	0	14	37	40
16.0-16.5	0	0	0	0	0	41.0-41.5	2	2	16	21	38
16.5-17.0	0	0	0	1	0	41.5-42.0	2	1	11	31	35
17.0-17.5	0	0	0	1	0	42.0-42.5	5	0	10	21	23
17.5-18.0	0	0	0	0	0	42.5-43.0	1	0	8	21	32
18.0-18.5	1	0	0	1	0	43.0-43.5	0	0	7	11	23
18.5-19.0	2	1	0	2	0	43.5-44.0	0	0	3	7	16
19.0-19.5	5	0	0	2	0	44.0-44.5	1	1	3	13	16
19.5-20.0	9	2	0	0	0	44.5-45.0	0	0	0	12	5
20.0-20.5	16	0	0	1	0	45.0-45.5	0	0	0	11	18
20.5-21.0	43	2	0	0	0	45.5-46.0	0	0	1	9	14
21.0-21.5	59	18	0	2	0	46.0-46.5	0	0	0	17	10
21.5-22.0	88	23	3	1	0	46.5-47.0	0	0	0	10	9
22.0-22.5	103	31	3	3	1	47.0-47.5	0	0	0	12	16
22.5-23.0	142	32	7	9	1	47.5-48.0	0	0	0	11	9
23.0-23.5	152	39	8	11	1	48.0-48.5	0	0	0	6	10
23.5-24.0	151	35	18	23	2	48.5-49.0	0	0	0	7	9
24.0-24.5	142	66	27	50	3	49.0-49.5	0	0	0	4	6
24.5-25.0	159	54	22	65	9	49.5-50.0	0	0	0	0	6
25.0-25.5	121	56	37	84	17	50.0-50.5	0	0	0	3	3
25.5-26.0	137	53	33	100	16	50.5-51.0	0	0	0	1	0
26.0-26.5	112	75	36	90	31	51.0-51.5	0	0	0	2	1
26.5-27.0	96	58	54	122	35	51.5-52.0	0	0	0	2	1
27.0-27.5	87	80	82	158	20	52.0-52.5	0	0	0	1	2
27.5-28.0	90	48	59	163	29	52.5-53.0	0	0	0	0	1
28.0-28.5	91	64	77	176	49	53.0-53.5	0	0	0	0	0
28.5-29.0	89	50	102	230	43	53.5-54.0	0	0	0	0	0
29.0-29.5	84	40	115	240	55	54.0-54.5	0	0	0	0	0
29.5-30.0	86	43	98	283	41	54.5-55.0	0	0	0	0	0
30.0-30.5	68	50	113	291	63						
30.5-31.0	96	44	134	304	68						
31.0-31.5	95	41	176	309	72						
31.5-32.0	110	32	195	319	77						
32.0-32.5	124	42	192	305	67						
32.5-33.0	127	36	216	327	82						
33.0-33.5	136	37	232	325	76						
33.5-34.0	129	28	222	275	77						
34.0-34.5	126	21	204	237	61						
34.5-35.0	109	15	168	194	65						

3) Frequency of total length for Yellowtail flounder

TL (cm)	2016	2017	2018	2019	2020	TL (cm)	2016	2017	2018	2019	2020
20.0-20.5	0	0	0	0		40.0-40.5	40	30	14	12	
20.5-21.0	1	0	0	0		40.5-41.0	36	22	8	13	
21.0-21.5	3	0	0	1		41.0-41.5	27	15	10	8	
21.5-22.0	3	0	0	0		41.5-42.0	15	18	5	16	
22.0-22.5	6	0	0	0		42.0-42.5	2	11	6	7	
22.5-23.0	8	1	0	0		42.5-43.0	12	10	6	11	
23.0-23.5	8	3	0	5		43.0-43.5	5	6	8	4	
23.5-24.0	9	1	0	0		43.5-44.0	6	4	2	5	
24.0-24.5	13	1	0	0		44.0-44.5	4	3	1	2	
24.5-25.0	10	2	0	2		44.5-45.0	4	2	1	5	
25.0-25.5	10	7	16	6		45.0-45.5	4	3	2	3	
25.5-26.0	11	6	8	7		45.5-46.0	0	2	0	2	
26.0-26.5	16	7	12	6		46.0-46.5	1	0	0	0	
26.5-27.0	13	8	7	7		46.5-47.0	1	2	1	1	
27.0-27.5	14	10	6	6		47.0-47.5	2	0	1	2	
27.5-28.0	17	16	5	5		47.5-48.0	0	2	1	0	
28.0-28.5	26	20	5	17		48.0-48.5	0	0	0	0	
28.5-29.0	55	22	6	15		48.5-49.0	0	1	1	0	
29.0-29.5	39	35	13	12		49.0-49.5	0	1	0	0	
29.5-30.0	94	56	11	22		49.5-50.0	0	0	1	0	
30.0-30.5	96	63	18	21		50.0-50.5	0	0	0	1	
30.5-31.0	167	77	20	24		50.5-51.0	0	0	0	0	
31.0-31.5	170	97	44	17		51.0-51.5	0	0	0	0	
31.5-32.0	258	122	58	20		51.5-52.0	0	0	0	0	
32.0-32.5	225	127	60	25		52.0-52.5	0	0	0	0	
32.5-33.0	292	143	78	26		52.5-53.0	0	0	0	0	
33.0-33.5	284	153	73	44		53.0-53.5	0	0	0	0	
33.5-34.0	266	148	81	25		53.5-54.0	0	0	0	0	
34.0-34.5	229	157	72	29		54.0-54.5	0	0	0	0	
34.5-35.0	232	135	67	41		54.5-55.0	0	0	0	0	
35.0-35.5	164	138	61	35		55.0-55.5	0	0	0	0	
35.5-36.0	182	105	65	27		55.5-56.0	0	0	0	0	
36.0-36.5	123	108	52	29		56.0-56.5	0	0	0	0	
36.5-37.0	135	86	43	39		56.5-57.0	0	0	0	0	
37.0-37.5	117	81	50	27		57.0-57.5	0	0	0	0	
37.5-38.0	102	80	39	33		57.5-58.0	0	0	0	0	
38.0-38.5	74	68	37	18		58.0-58.5	0	0	0	0	
38.5-39.0	68	57	24	29		58.5-59.0	0	0	0	0	
39.0-39.5	51	41	23	21		59.0-59.5	0	0	0	0	
39.5-40.0	53	37	28	17		59.5-60.0	0	0	0	0	

Annex B Fishing vessel in recent years (2016-2021)

FV No 68 Fukuyoshi maru (stern trawler) (Gross Tonnage:401 t) (Photo 1) started her first fishing operation in the NAFO CA from April 8, 2016 (Division 3L) targeting Greenland halibut after 7 years absence of operations by other Japanese vessels. There is one scientific observer on-board.

Photo 1 FV No 68 Fukuyoshi maru
(St. John's, Newfoundland and Labrador, Canada)