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(E)

ANNUAL MEETING - JUNE 1975Efficiency of sampling the major fisheries of the  
Northwest Atlantic in 1973.by  
Assistant Executive SecretaryIntroduction

A paper prepared by the ICNAF Secretariat in 1972 contained information on the sampling efficiency for some of the major fisheries in the Northwest Atlantic for the years 1969 and 1970 (ICNAF, 1972). Of the 8 species covered in that analysis (cod, haddock, redfish, silver hake, herring, American plaice, yellowtail and witch), only 2, namely haddock and silver hake, could be considered as having been adequately sampled in those years. The present analysis based on 1973 data was undertaken to determine the present status of sampling relative to that of 1969 and 1970 and to indicate particular gaps in the current ICNAF sampling program.

Materials and Methods

As was the case in treating the 1969-70 data, the minimum sampling requirement was taken to be the length measurement of 200 fish per 1000 tons of fish caught in each quarter of the year for each species by stock area. The present analysis utilizes the nominal catch statistics of ICNAF *Statistical Bulletin*, Vol. 23 for 1973 and all commercial sampling data reported to the Secretariat for that year. Pure research vessel data were generally not used, except in cases where it appeared obvious that the samples were taken with commercial-sized gear and seemed to be associated with significant commercial fisheries.

Fourteen species are dealt with in this study, namely, cod, haddock, redfish, silver hake, red hake, pollock, yellowtail, American plaice, witch, Greenland halibut, roundnose grenadier, mackerel, herring and squid.

The "sampling efficiency" is defined as the ratio of the "number measured" to "the nominal catch in 1000 tons units multiplied by 200". Thus efficiency values less than 1.0 indicate that sampling for length was below the minimum required level of 200 fish measured per 1000 tons caught. The values greater than 1.0 indicate the extent by which the minimum sampling level was exceeded in so far as length measurements are concerned.

Results

Tables 1 to 14 give the sampling efficiency by stock area and country for 14 major species now under regulation in the Northwest Atlantic. The symbol "\*\*\*", which occurs frequently under "sampling efficiency" in most of the tables indicates that no sampling data were reported to the Secretariat, even though the quarterly nominal catch was greater than 2000 tons. The symbol "\*" indicates that some sampling data are available but that the quantity, when treated on an annual basis, is below the minimum requirement. In the following table the overall efficiency values for 1973 are compared with those previously calculated for 1969 and 1970 (ICNAF Res. Doc. 72/63):

Species	1969	1970	1973
Cod	0.9	0.9	1.5
Haddock	3.4	2.3	4.3
Redfish	1.1	0.6	1.8
Silver hake	2.5	4.8	2.8
Red hake			2.2
Pollock			0.7
Yellowtail	1.5	2.1	5.0
American plaice	0.5	0.5	0.8
Witch	0.9	0.2	0.9
Greenland halibut			1.1
Roundnose grenadier			2.2
Mackerel			1.6
Herring	1.4	1.7	2.6
Squids			2.3

While there has been some improvement in the amount of sampling between 1969-70 and 1973 for the 8 species that can be compared, all of the flatfish species (except yellowtail) need special attention, and pollock was inadequately sampled in 1973.

Reference to Tables 1 to 14 indicates that of the 55 stocks dealt with the following 20 stocks require special attention:

Species	Stock area	1973 catch (000 tons)	Sampling efficiency
Cod	3M	23	0.1
	3NO	80	0.8
	4TVn	56	0.9
	4X	22	0.3
	5Y	6	**
Redfish	2+3K	39	0.5
	3LN	33	**
	3O	9	**
	3P	18	0.8
Silver hake	5Zw+6	65	0.9
Red hake	5Zw+6	41	0.7
Pollock	4VWX	30	0.8
	5+6	13	0.5
American plaice	3LNO	52	0.9
	3Ps	15	0.6
	4VWX	12	0.3
Witch	3NO	7	0.1
	4VWX	14	0.3
G. halibut	2+3KL	23	0.9
RN. grenadier	2+3	17	0.6

\*\* = No sampling data.

In the present study, only the quantitative aspect of sampling is considered. However, during the course of the analysis it was noted that some of the data was lacking in quality. In particular, the length compositions for the flatfish species and some others were often not reported by sex as required, and in many instances where length sampling was quite adequate no age-length keys were provided to enable the calculation of age compositions. Also there are instances where the sampling carried out was not directly related to the months or quarters when catches were significant.

#### References

- ICNAF. 1972. Efficiency of sampling. Int. Com. Northw. Atlantic Fish., Res. Doc. 72/63, 6p.
- ICNAF. 1975. Fishery statistics, 1973. Int. Com. Northw. Atlantic Fish., Stat. Bull. Vol. 23, 277 p.
- ICNAF. 1975. List of sampling data for 1973. Int. Com. Northw. Atlantic Fish., Samp. Yearbook Vol. 18, 37 p.

NOTE: With reference to Tables 1 to 14, the following symbol definitions apply:

- \*\* - No sampling data reported.
- \* - Sampling below the minimum level.



Table 1. (continued)

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks <sup>1</sup>
			1	2	3	4	NK Total	1	2	3	4	Total	
4VSW	CAN-MQ	OT	5	2	+	1	8	1.4	1.8	-	5.8	1.8	No sampling data Sampling inadequate No age data
	"	Oth.	+	1	2	1	4	-	-	-	-		
	CAN-N	OT	3	+	-	-	3	**	-	-	-	**	
	SPA	PT	11	2	7	11	31	1.4	-	**	**	0.5*	
	USSR	OT	+	2	1	+	3	-	1.4	10.7	-	5.5	
	Others		2	+	+	+	3	5					
	Total		21	7	10	13	3	54	1.5	3.3	2.9	1.0	
4X	CAN-MQ	OT	1	1	2	+	4	1.0	1.5	0.3	1.0	0.9*	Sampling inadequate
	"	LL	1	3	4	2	10	-	0.6	**	0.6	0.3*	
	"	HL	+	1	2	1	4	-	-	-	0.6	0.1*	
	"	Oth.	+	1	1	+	2	-	-	-	-	-	
	Others		1	1	+	+	2						
	Total		3	7	9	3	22	0.3	0.6	0.1	0.6	0.3*	
5Y	USA	Mix	1	2	1	2	6	-	-	-	-	**	No sampling data
	Others		+	+	+	+	+						
	Total		1	2	1	2	6	-	-	-	-	**	
5Z	CAN-MQ	OT	+	1	2	+	3	-	-	0.8	-	0.5*	Sampling inadequate No 3 & 4 quarterly samples No age data
	SPA	PT	2	+	2	2	6	4.4	-	**	**	1.3	
	USA	OT	2	5	4	5	16	3.0	2.2	2.0	2.7	2.4	
	Others		2	+	1	1	4						
	Total		6	6	9	8	29	2.6	1.7	1.1	1.7	1.6	

<sup>1</sup> Age data are available except where indicated under Remarks.

Table 2. Haddock catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks <sup>1</sup>
			1	2	3	4	NK Total	1	2	3	4	Total	
4VW	CAN		2	1	+	+	3	4.4	1.1	2.5	-	2.8	No age data
	USSR		+	+	+	+	+	75.0	53.0	-	-	64.0	
	Others		+	+	+	+	+						
	Total		2	1	+	+	3	6.2	3.1	2.5	-	3.2	
4X	CAN		5	3	4	1	13	4.2	2.3	1.5	4.6	3.0	
	USA		+	+	+	+	+	7.4	12.3	-	-	9.0	
	Others		+	+	+	+	+						
	Total		5	3	4	1	13	4.3	2.7	1.5	4.6	3.1	
SA 5	CAN		+	+	1	1	2	-	-	2.7	7.2	3.2	No age data
	USSR		-	1	+	+	1	-	12.0	10.0	-	11.7	
	USA		+	1	1	1	3	12.4	8.9	6.4	10.7	9.3	
	Others		+	+	+	+	+						
	Total		+	2	2	2	6	8.3	8.8	4.1	9.6	7.4	

<sup>1</sup> Age data are available except where indicated under Remarks.

Table 3. Redfish catches and sampling efficiency in 1973.

Stock Area	Country Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks <sup>1</sup>
		1	2	3	4	NK Total	1	2	3	4 Total		
2+3K	FRG	1	2	-	+	3	-	-	-	-	-	Not reported by sex
	POL	1	2	1	+	4	5.9	-	-	-	1.8	
	POR	-	1	1	1	3	-	-	-	-	-	
	USSR	9	1	10	4	24	1.1	-	**	**	0.4*	
	Others	2	2	1	+	5	-	-	-	-	-	
Total		13	8	13	5	39	1.4	**	**	**	0.5*	Sampling inadequate
3M	POL	1	-	-	-	1	14.7	-	-	-	14.7	Not reported by sex
	USSR	14	4	1	1	20	4.5	1.6	-	-	3.5	
	Others	+	1	+	+	1	-	-	-	-	-	
	Total		15	5	1	1	22	4.7	1.4	-	-	
3LN	USSR	1	+	24	2	27	-	-	**	-	**	No sampling data
	Others	1	1	3	1	5	-	-	**	-	**	
	Total		2	1	27	3	33	-	-	**	-	**
30	USSR	+	2	6	-	8	-	**	**	-	**	No sampling data
	Others	+	+	1	+	1	-	**	**	-	**	
	Total		+	2	7	+	9	-	**	**	-	**
3P	CAN	4	2	5	4	15	1.7	1.3	1.0	**	1.0	No sampling quarter 4
	Others	+	1	2	+	3	-	-	-	-	-	
	Total		4	3	7	4	18	1.6	0.8	0.7	**	0.8*
4VWX	CAN	6	5	3	3	17	0.2	0.8	1.5	1.7	0.9*	Sampling inadequate Not reported by sex
	USSR	+	5	5	+	10	-	1.8	22.8	-	14.0	
	USA	3	3	2	3	11	4.3	3.9	2.3	5.2	4.0	
	Others	+	2	+	+	2	-	-	-	-	-	
	Total		9	15	10	6	40	1.6	1.6	12.2	3.3	
SA 5	USSR	2	3	1	+	6	-	**	-	-	**	No sampling data
	USA	3	5	2	1	11	2.1	3.2	3.2	1.3	2.6	
	Total		5	8	3	1	17	1.4	2.0	2.4	1.0	1.8

<sup>1</sup> The only age data reported are for USSR in Div. 3K and 3M.

Table 4. Silver hake catches and sampling efficiency in 1973.

Stock Area	Country Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks
		1	2	3	4	NK Total	1	2	3	4 Total		
4VWX	USSR	12	206	65	16	299	9.6	1.4	4.8	9.7	3.1	Age data only by sex
	Others	-	+	+	-	+	-	-	-	-	-	
	Total		12	206	65	16	299	9.6	1.4	4.8	9.7	
5Y	USA	+	1	4	3	8	27.7	3.0	1.9	0.8	1.7	No age data
	Others	+	+	+	+	+	-	-	-	-	-	
	Total		+	1	4	3	8	27.7	3.0	1.9	0.8	
5Ze	USSR	24	16	10	5	55	1.5	2.9	7.5	9.2	3.7	Age data only by sex No age data
	USA	-	+	5	1	6	-	1.8	1.4	-	1.4	
	Others	+	1	+	+	+	-	-	-	-	-	
	Total		24	17	15	6	62	1.5	2.7	5.3	8.7	
5Zw+6	USSR	21	11	7	19	58	1.0	0.6	0.4	1.3	1.0	Age data only by sex No age data
	USA	+	1	+	1	4	6.0	1.1	1.6	-	0.5*	
	Others	+	1	+	+	1	-	-	-	-	-	
	Total		21	13	7	20	4	65	1.0	0.6	0.5	

Table 5. Red hake catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
5Ze	USSR	OT	4	3	11	7		25	4.0	7.1	3.5	6.2	4.7	
	Others		+	+	+	+								
	Total		4	3	11	7		25	4.0	7.1	3.5	6.2	4.7	
5Zw+6	USSR	OT	18	11	3	5		37	0.8	0.5	0.5	**	0.6*	Sampling inadequate
	USA	OT	1	1	+	1	1	4	5.7	5.5	3.2	-	2.4	
	Others		+	+	+	+		+						
	Total		19	12	3	6	1	41	0.9	0.8	0.6	**	0.7*	Sampling inadequate

Table 6. Pollock catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
4VWX	CAN-MQ	OT	3	9	6	4		22	1.1	0.4	0.4	2.7	0.8*	Sampling inadequate
	Others		+	1	2	1		4	-	-	-	-		
	USSR	OT	+	+	+	+		+	10.0	15.0	2.5	-	9.0	No age data
	Others		+	2	1	1		4						
Total		3	12	9	6		30	1.3	0.6	0.4	1.5	0.8*	Sampling inadequate	
5+6	CAN-MQ	OT	+	+	1	1		2	-	-	-	4.1	1.5	No sampling data Sampling inadequate, no ages
	USSR	OT	2	+	+	1		3	**	-	-	-	**	
	USA	OT	1	1	1	3		6	1.9	-	1.3	0.3	0.7*	
	Others		1	+	+	1		2						
	Total		4	1	2	6		13	0.5	-	0.5	0.6	0.5*	

Table 7. Yellowtail catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
3LNO	CAN-N	OT	3	8	10	7		28	4.9	1.4	1.0	0.6	1.4	No age data; not sexed No sampling data
	FRA-SP	OT	-	+	+	+		+	-	36.0	-	13.5	26.5	
	USSR	OT	+	+	3	+		3	-	-	**	-	**	
	Others		+	1	1	+		2						
	Total		3	9	14	7		33	4.6	2.1	0.7	0.9	1.5	
4VWX	CAN-MQ	OT	+	1	+	+		1	-	3.3	-	-	2.5	No age data; not sexed.
	USSR	OT	+	+	1	+		1	-	44.8	153.0	-	127.8	
	Total		+	1	1	+		2	-	16.6	136.0	-	88.5	
5+6	USSR	OT	+	+	+	+		+	-	50.0	41.0	150.0	47.0	No age data; not sexed.
	USA	OT	7	6	8	6	3	30	3.6	3.1	2.1	2.5	2.5	
	Others		+	+	+	+		+						
	Total		7	6	8	6	3	30	3.4	4.1	2.6	4.6	3.3	

Table 8. American plaice catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
2+3K	CAN-N	GN	+	+	1	+	1	-	-	10.0	-	8.2	No sampling data	
	USSR	OT	2	1	+	+	3	**	-	-	-	**		
	Others		1	+	+	+	1							
	Total		3	1	1	+	5	**	-	8.2	-	1.8		
3M	Total		+	+	+	+	+	-	-	-	-	-		
3LNO	CAN-MQ	OT	-	2	1	+	3	-	0.6	0.9	3.3	0.9*	No age data	
	CAN-N	OT	6	11	8	7	32	1.1	0.6	1.5	**	0.8*	Sampling inadequate	
	"	Oth.	-	1	2	+	3	-	-	-	-	-		
	POL	OT	1	+	-	-	1	9.0	-	-	-	-	9.0	Data not given by sex
	USSR	OT	2	1	9	1	13	3.2	-	**	-	-	0.5*	Sampling inadequate, no ages
	Others		+	+	+	+	+							
Total		9	15	20	8	52	2.4	0.6	0.7	0.1	0.9*	Sampling inadequate		
3Ps	CAN-MQ	OT	-	-	2	+	2	-	-	1.4	3.4	1.8	No age data	
	CAN-N	OT	4	2	2	3	11	1.2	-	-	**	0.5*	Sampling inadequate	
	Others		1	+	1	+	2							
	Total		5	2	5	3	15	1.2	**	0.5	0.3	0.6*	Sampling inadequate	
4VWX	CAN-MQ	OT	1	1	+	1	3	1.0	0.5	-	2.5	1.2	No age data	
	USSR	OT	+	2	5	+	7	-	-	**	-	**	No sampling data	
	Others		1	+	1	+	2							
	Totals		2	3	6	1	12	0.5	0.2	**	2.0	0.3*	Sampling very inadequate	
5+6	USA	OT	+	1	1	+	2	-	0.4	2.3	-	0.7	No age data	
	Others		+	+	+	+	+							
	Totals		+	1	1	+	2	-	0.4	1.7	-	0.5		

Table 9. Witch catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks
			1	2	3	4	NK Total	1	2	3	4	Total	
2J+3KL	CAN-N	OT	+	+	+	+	+	-	2.0	-	-	0.4	Not reported by sex No sampling data
	"	GN	-	+	3	+	3	-	-	3.4	-	3.1	
	POL	OT	9	3	+	-	12	1.8	3.9	-	-	2.3	
	USSR	OT	2	1	+	+	3	**	-	-	-	**	
	Others		2	2	1	+	5						
	Total		13	6	4	+	23	1.2	1.9	2.6	-	1.6	
3NO	CAN-N	OT	2	2	+	1	5	**	0.2	-	-	0.1*	Sampling very inadequate
	Others		+	+	2	+	2						
	Total		2	2	2	1	7	**	0.2	-	-	0.1*	Sampling very inadequate
3Ps	Total		1	1	1	+	3	-	-	-	-	-	
4VWX	CAN-M	OT	2	1	+	1	4	1.2	0.8	-	-	0.9*	No sampling data
	"	DS	+	1	+	+	1	-	2.0	-	-	0.8	
	USSR	OT	+	2	6	+	8	-	**	**	-	**	
	Others		1	+	+	+	1						
	Total		3	4	6	1	14	0.8	0.5	**	-	0.3*	
5+6	USA	OT	+	1	1	1	3	1.2	0.8	2.7	-	1.3	No age date, not sexed
	Others		+	+	+	+	+						
	Total		+	1	1	1	3	0.8	0.8	2.1	-	1.0	

Table 10. G. Halibut catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
2+3KL	CAN-N	GN	+	1	5	1		7	-	-	1.7	-	1.2	No age data No sampling data Research; no ages  Inadequate sampling
	POL	OT	+	2	1	+		3	-	**	-	-	**	
	USSR	OT	4	3	1	1		9	**	**	12.5	-	1.6	
	Others		1	2	+	+	1	4						
	Total		5	8	7	2	1	23	**	**	2.9	-	0.9*	
0+1	DEN-G	Mix	1	1	1	1	1	5	6.2	-	8.0	-	3.1	No ages; not sexed No sampling data
	USSR	OT	-	+	+	3		3	-	-	-	**	**	
	Others		+	+	+	+		+						
	Total		1	1	1	4	1	8	5.4	-	7.8	**	1.8	

Table 11. RN Grenadier catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
0+1	GDR	OT	-	-	-	2		2	-	-	-	21.5	21.5	Not sexed No sampling data
	USSR	OT	-	+	1	2		3	-	-	-	**	**	
	Total		-	+	1	4		5	-	-	-	10.2	7.9	
2+3	GDR	OT	+	+	+	1		1	-	-	-	20.3	14.5	Not sexed No sampling data Inadequate sampling
	USSR	OT	1	+	12	3		16	-	-	**	**	**	
	Total		1	+	12	4		17	-	-	**	2.4	0.6*	

Table 12. Mackerel catches and sampling efficiency in 1973.

Stock Area	Country	Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks	
			1	2	3	4	NK Total	1	2	3	4	Total		
SA 3	Total		-	+	1	1		2	-	-	-	-	-	
SA 4	CAN		-	3	13	3		19	-	**	**	**	**	No sampling data No age data
	USSR		+	11	5	1		17	-	4.4	7.6	11.5	5.9	
	Total		+	14	18	4		36	-	3.5	2.1	3.4	2.8	
5+6	BUL		15	10	1	6		32	1.3	0.6	-	1.1	1.0	Sampling inadequate  Sampling very inadequate No sampling data No age data
	GDR		46	15	+	16		77	1.0	**	-	**	0.6*	
	JAP		+	+	-	+		+	3.3	-	-	-	2.2	
	POL		44	27	2	44		117	0.6	0.2	6.8	0.1	0.4*	
	ROM		1	4	-	-		5	-	**	-	-	**	
	USSR		54	60	16	16		146	2.4	2.4	4.9	5.7	3.0	
	USA		+	+	+	+	1	1	2.2	2.3	-	-	0.7	
	Others		2	+	+	1		3						
	Total		162	116	19	83	1	381	1.3	1.3	4.8	1.2	1.5	



Table 13. Herring catches and sampling efficiency in 1973.

Stock Area	Country Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks
		1	2	3	4	NK Total	1	2	3	4	Total	
4VW(a)	CAN-MQ	9	+	+	14	23	2.1	5.0	-	3.7	3.0	Inadequate sampling
	CAN-N	1	3	-	1	5	1.0	**	-	-	0.1*	
	Others	+	1	+	1	2						
	Total	10	4	+	16	30	2.0	0.4	-	3.1	2.3	
4XW(b)	CAN-MQ	2	19	78	3	102	-	**	**	**	**	No data reported
	USSR	+	13	17	1	31	5.0	1.9	1.4	0.3	1.6	
	Others	-	+	1	+	1						
	Total	2	32	96	4	134	0.5	0.7	0.2	0.1	0.4*	
5Y	FRG	-	-	+	1	1	-	-	-	14.0	14.0	Inadequate sampling
	GDR	-	3	-	2	5	-	**	-	1.3	0.6*	
	USA	+	3	13	6	22	10.0	1.0	2.2	1.1	1.2	
	Others	2	2	+	+	4						
	Total	2	8	13	9	32	0.6	0.4	2.1	1.0	1.3	
5Z+6	CAN-MQ	+	+	5	+	5	-	-	**	-	**	No sampling
	FRG	-	-	28	4	32	-	-	9.0	10.0	9.1	
	GDR	1	2	36	15	54	13.4	-	0.9	0.8	1.0	
	USSR	15	28	8	1	52	2.9	1.6	35.4	81.3	8.0	
	USA	4	3	+	+	7	0.1	**	-	-	0.1*	
	POL	5	5	19	20	49	**	**	4.4	1.7	2.4	
	Others	+	1	3	2	6						
	Total	25	39	99	42	205	2.2	1.2	6.6	3.0	4.3	

Table 14. Squid catches and sampling efficiency in 1973.

Stock Area	Country Gear	Catch by quarter (000 tons)					Sampling efficiency					Remarks
		1	2	3	4	NK Total	1	2	3	4	Total	
SA 4+	USSR	-	6	3	+	9	-	2.6	1.8	-	2.2	
	Others	-	+	+	+	+						
	Total	-	6	3	+	9	-	2.6	1.8	-	2.2	
5+6	JAP	7	1	1	7	16	0.4	1.4	-	1.3	0.8*	Research samples only
	POL	+	6	2	1	9	-	**	-	-	**	
	USSR	1	2	6	+	9	6.2	17.5	2.2	50.0	12.0	No sampling
	SPA	7	1	1	6	15	**	-	-	**	**	
	Others	3	1	+	3	8						
	Total	18	11	10	17	57	0.4	3.6	1.3	4.2	2.3	

