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Foreword

In accordance with its mandate to disseminate information on fisheries research to the scientific community, the Scientific Council of NAFO publishes the *Journal of Northwest Atlantic Fishery Science*, which contains peer-reviewed primary papers and notes on original research, and *NAFO Scientific Council Studies*, which contains review papers of topical interest and importance.

This issue of *NAFO Scientific Council Studies* contains miscellaneous contributions nominated for publication by the Standing Committee on Publications (STACPUB) of the Scientific Council from research documents presented to its meetings. The 33 previous issues of the *NAFO Scientific Council Studies* are listed on the back cover of this volume.

2001

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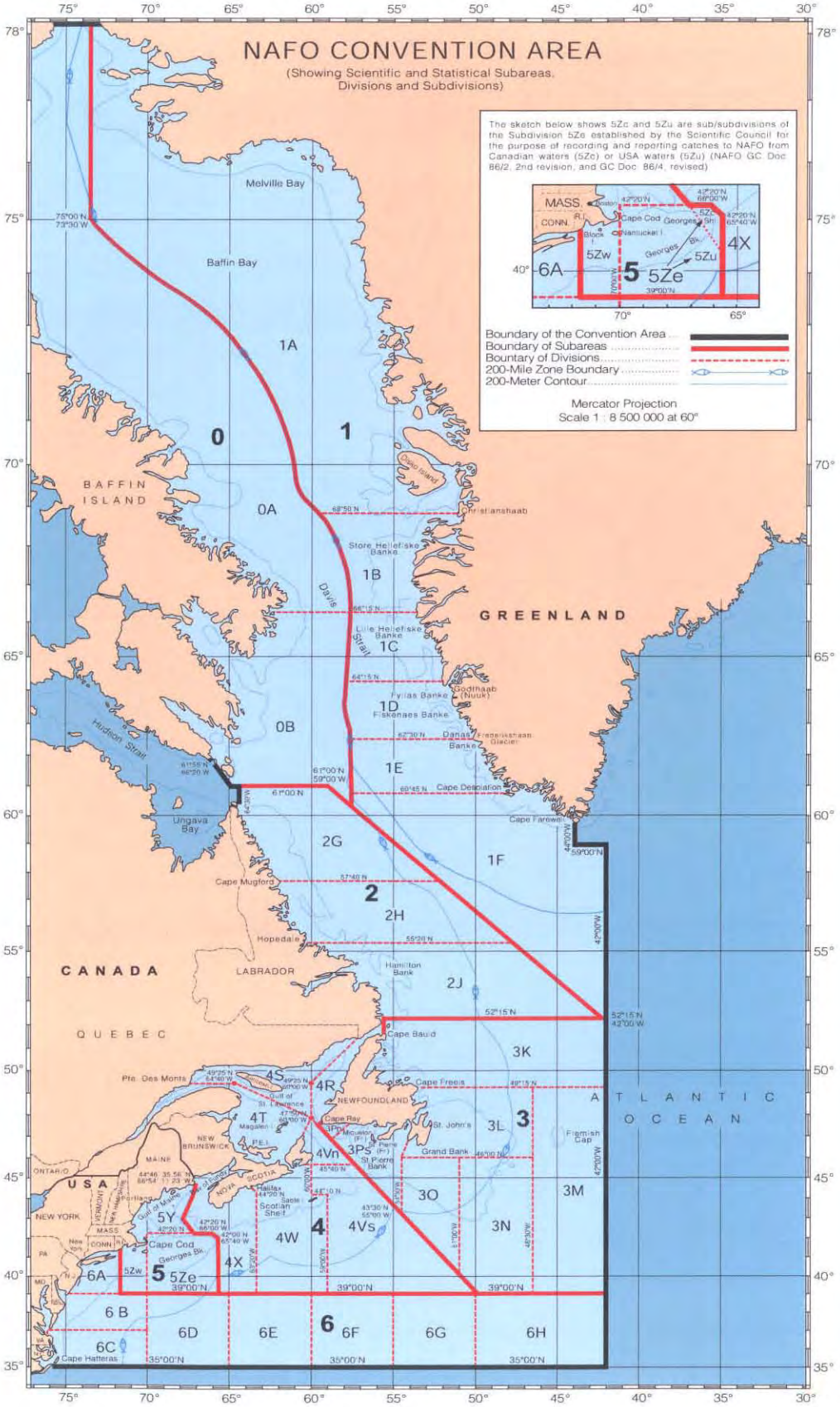
NAFO CONVENTION AREA
(Showing Scientific and Statistical Subareas, Divisions and Subdivisions)
The sketch below shows 5Zc and 5Zu are sub/subdivisions of the Subdivision 5Ze established by the Scientific Council for the purpose of recording and reporting catches to NAFO from Canadian waters (5Zc) or USA waters (5Zu) (NAFO GC Doc. 86/2, 2nd revision, and GC Doc. 86/4, revised)
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Gulf of St. Lawrence
Scotian Shelf
Cape Hatteras
Godthaab (Nuuk)
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Yellowtail Flounder Length-at-maturity in the Grand Bank (1995–98)

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Abstract

Length-at-maturity estimates of yellowtail flounder (*Limanda ferruginea*) based on data collected in the spring Spanish surveys in the NAFO Regulatory Area of Divisions 3NO are presented. Female length at 50% maturity (L_{50}) decreased from 35 cm in 1995 to 23 cm in 1998. In males, this parameter decreased from 23 cm in 1995 to 19 cm in 1998. The differences in L_{50} estimates in females were significant between 1997 and the previous years, and between 1998 and both 1996 and 1995, and were not significant between 1997 and 1998. In males, differences were significant between all the years, except between 1997 and 1998. The covariance analysis between the linearized maturity curves was highly significant in both sexes.

Keywords: females, length-at-maturity, males, maturity curves, yellowtail flounder

Introduction

The yellowtail flounder (*Limanda ferruginea*) is a spring-early summer spawner species (Zamarro, MS 1988). In the past this stock had a northern distribution limit in commercial concentrations off Newfoundland coast, but at present it is concentrated on the Grand Bank, mainly in the southern part, where the juvenile and the adult components overlap in their distribution (Walsh, 1992; Brodie *et al.*, 1998). There was a fishing moratorium for this stock from 1994 to 1997, and for 1998 the Scientific Council recommended reopening a limited fishery, stating also that this fishery should be carefully monitored and sampled.

Morgan and Walsh (MS 1997) presented estimates of length- and age-at-maturity for yellowtail flounder in Div. 3LNO from 1975 to 1995, based on the Canadian spring survey. They observed a decline in males length-at-maturity, but no decline was evident in females. Durán *et al.* (MS 1998) presented estimates of the length-at-maturity based on the Spanish spring survey in the Regulatory Area, where the decline was observed in both sexes. Variations in length-at-maturity can be caused by several factors: growth variability, geographic distribution and stock abundance. Besides, random natural variability can occur, though under stable population conditions this should be small (Walsh and Morgan, MS 1998).

In this paper additional data from the spring Spanish survey in Div. 3NO on this subject is examined, in order to determine the consistency of the declining trends in length-at-maturity observed in previous years.

Material and Methods

Yellowtail maturity data used in this study have been collected during the Spanish spring surveys conducted in the Regulatory Area in Div. 3NO from 1995 to 1998 (Paz *et al.*, MS 1996 and MS 1997; Durán *et al.*, MS 1998). The geographic distribution of the samples analysed in the successive surveys appears in Fig. 1, and the length ranges and numbers in Table 1. Fish were classified as mature or immature by visual examination of the gonads. A simple four-point scale was used to do it, where the first stage is defined as immature and all the others (maturing, spawning and post-spawning) as matures.

The proportion of mature males and females by size were adjusted to a logistic equation as described by Ashton (1972):

$$\hat{P} = \frac{e^{a+bL}}{1+e^{a+bL}}$$

and the logit transformation:

$$\ln \frac{\hat{P}}{1-\hat{P}} = a + bL$$

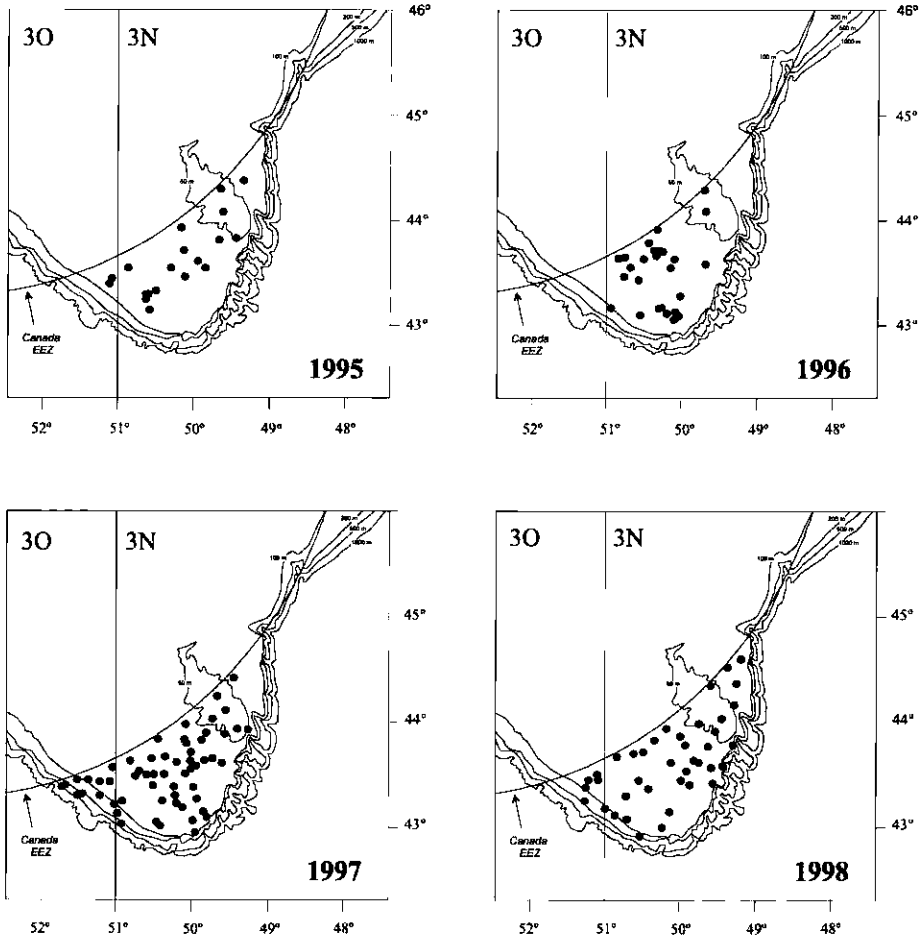

Fig. 1. Yellowtail flounder sampling area in the Spanish spring bottom trawl surveys in Div. 3NO (1995–98).

where $\hat{P}$ is the predicted mature proportion, a and b the coefficients estimated of the logistic equation and L the length. The size-at-maturity can be estimated as the minus ratio of the coefficients ($-a/b$) by substituting $\hat{P}$ = 0.5 in the above equation.

To evaluate the differences in size-at-maturity between years, the variance of those parameters every year was calculated from the variances and covariance of the maturity curve coefficients (Ashton, 1972):

$$V(L_{50}) = \frac{1}{b^2}\left[V(a) + \frac{a^2}{b^2}V(b) - \frac{2a}{b}\mathrm{FRY}(a,b)\right]$$

Assuming that L_{50} estimates are normally distributed, then the Z statistic can be computed as:

$$Z = \frac{\frac{a_1}{b_1} - \frac{a_2}{b_2}}{\sqrt{V_1 + V_2}}$$

where a and b are the logistic regression coefficients and V_1 *and* V_2 the L_{50} variances of each year compared. Z values can be used to test the null hypothesis of parameters equality (Gunderson, 1977). The linear transformation of the maturity curves are also compared using a covariance analyses to evaluate between year differences in the curve slopes and the influence of the length distributions on the length-at-maturity estimates.

All the statistical analysis has been performed using the Statistica package (StatSoft. Inc., 1995).

Results and Discussion

The length range was approximately similar in the three years analysed (Table 1), but since 1997 the proportion of the smaller length-classes increased in the samples. This is reflected in a parallel decrease of

TABLE 1. Number of yellowtail flounder sampled by length, sex and year in the spring Spanish survey in Div. 3NO.

Length	Females				Males			
(cm)	1995	1996	1997	1998	1995	1996	1997	1998
>14			2	6		2	1	2
14–16	12		18	9	8	16	12	4
17–19	37	42	42	51	8	55	38	50
20–22	22	61	87	90	14	82	85	79
23–25	28	103	100	82	26	53	91	75
26–28	20	48	118	53	22	64	109	70
29–31	34	55	150	69	34	74	80	84
32–34	66	71	112	68	33	60	66	56
35–37	46	123	121	59	33	20	60	45
38–40	39	119	116	74	17	9	34	38
41–43	24	51	91	79	3	1	10	19
44–46	12	42	23	41			4	5
47–49	5	14	4	11			1	
50–52	3	2	1					
53–55		5	1					
Total	348	736	986	692	198	436	591	527

the yellowtail flounder lengths caught in the survey. In 1997 and 1998, the level of sampling was higher in Div. 3O compared with previous years, due an increase in the yellowtail flounder presence in that area during those surveys (Paz *et al.*, MS 1997), but it does not affect the parameter estimates.

The maturity curves for females and males are shown in Fig. 2, and the parameters of the fitted curves in Table 2. Female length at 50% maturity decreased slightly from 1995 (35 cm) to 1996 (34 cm), but a pronounced decrease was observed in 1997 (24 cm) and maintained in 1998 (23 cm). In males the L_{50} ranged from 23 cm in 1995 to 27 cm in 1996, and then decreased to 21 cm in 1997 and 19 cm in 1998. The differences in L_{50} estimates in females were significant between 1997 and the previous years (1995 and 1996), and between 1998 and both 1995 and 1996, and were not significant between 1997 and 1998 (Table 3). In males, the differences were significant between all the years, except between 1997 and 1998 (Table 3).

The covariance analyses of the maturity curves (Table 4) indicate that the slopes and intercepts were significantly different between years in both sexes. Thus, the mature proportions at length were different in the years analysed, not only due to a difference in the length distributions involved. Also the rate of increase of the mature proportions with length was different.

Decreases in both age- and length-at-maturity in coincidence with decreases in stock abundance has been observed in recent years in several shelf species from this same area (Stearns *et al.*, 1984; Morgan *et al.*, MS 1993; Saborido and Junquera, 1998). However it is difficult to assert that such could be the case of the yellowtail flounder, as the stock seems to be at present in a better situation than it was in the past (Anon., 1997). From Morgan and Walsh (MS 1997) results, which include a much longer time series (1975–95), few trends were evident, though a decline in males L_{50} since 1984 occurred from 30 cm to 25 cm at the end of their time series. The L_{50} estimates in the only coincident year with the present study (1995) are approximately similar in both sexes, but in contrast, Morgan and Walsh (MS 1997) found a more pronounced decreasing trend on males L_{50} while we found it in females.

The present study is based in a series of surveys which cover only partially the yellowtail flounder distribution range, namely the part of the stock in the Regulatory Area. The length-at-maturity results obtained in 1997 are consistent with the 1998 estimates, and can be reflecting a change in the species distribution pattern. In 1997 and 1998 significant amounts of small and mature

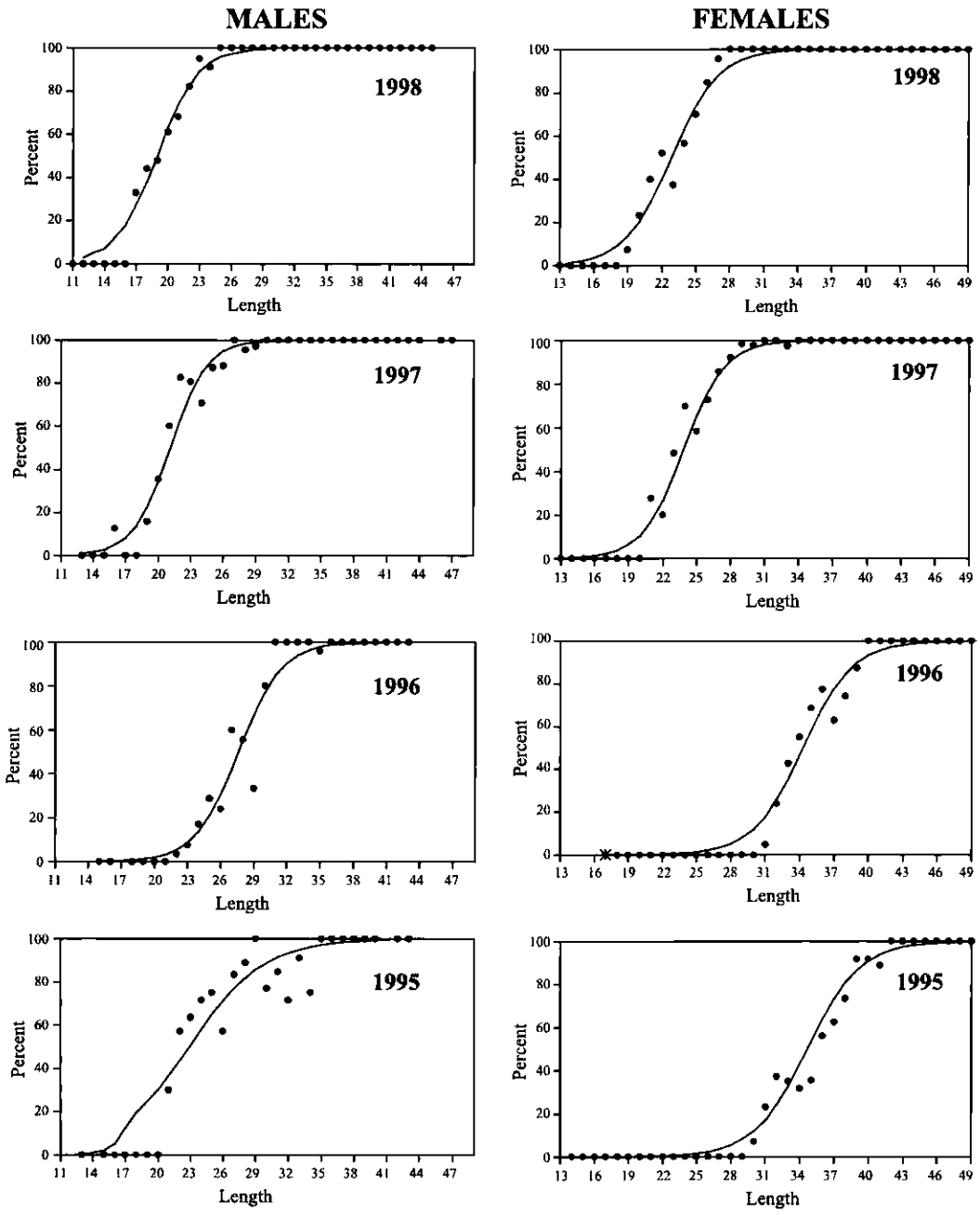

Fig. 2. Yellowtail flounder maturity curves by sexes in Div. 3NO (1995–98).

fish appeared in the survey area (Paz *et al.*, MS 1997, Durán *et al.*, MS 1998) and they were largely more concentrated than in previous surveys. Thus mature small fish, likely first spawners, could have become more available to the surveys in 1997–98 just because of a change in their distribution, or those small adults could have become more abundant because they belong to a large year-class.

TABLE 2. Parameters of the yellowtail flounder females and males maturity curves in Div. 3NO (1995–98). 'a' and 'b' = coefficients of the adjusted logistic curve; St. Error = standard error of the estimates; L_{50} = length at 50% maturity; Var. exp. = variance explained by the model; N = numbers sampled.

	Females							
	1995		1996		1997		1998	
	a	b	a	b	a	b	a	b
Estimate	-12.98	0.37	-15.65	0.46	-13.08	0.55	-10.98	0.48
St. error	1.50	0.04	1.34	0.03	0.85	0.03	1.34	0.06
L_{50}	**35 cm**		**34 cm**		**24 cm**		**23 cm**	
Var. exp.	54%		62%		64%		62%	
N	348		736		986		692	
	Males							
	1995		1996		1997		1998	
	a	b	a	b	a	b	a	b
Estimate	-6.65	0.29	14.06	0.50	-12.45	0.59	-9.63	0.51
St. error	1.41	0.06	1.27	0.04	1.46	0.07	1.38	0.02
L_{50}	**23 cm**		**27 cm**		**21 cm**		**19 cm**	
Var. exp.	35%		64%		50%		40%	
N	198		436		591		527	

TABLE 3. Z values of the comparative analysis of the yellowtail flounder length at maturity between years. *significance ($p<0.05$); **significance ($p<0.01$); otherwise not significant.

Z – Females	1996	1997	1998
1995	0.55	5.18**	14.1**
1996		8.53**	16.8**
1997			0.65
Z – Males	**1996**	**1997**	**1998**
1995	2.99**	2.15*	1.78*
1996		4.36*	5.26**
1997			0.41

TABLE 4. Covariance analysis between years (1995–98) of the mature proportions at length (effect) in Div. 3NO yellowtail flounder.

	Females				
	SS	df	MS	F	P-level
Effect	26.16	44	0.59	16.46	0.0000
Error	3.09	122	0.04		
	Males				
	SS	df	MS	F	P-level
Effect	17.12	38	0.45	12.84	0.0000
Error	2.07	93	0.03		

References

ANON. 1997. Report of Scientific Council NAFO SCS Document.

ASHTON, W. D., 1972. The logit transformation with special reference to its uses in bioassay. Hafner Publishing Co., Inc., New York, 88 p.

BRODIE, W. B., S. J. WALSH, and D. B. ATKINSON. 1998. The effect of stock abundance on range contraction of yellowtail flounder (*Pleuronectes ferruginea*) on the Grand Bank of Newfoundland in the Northwest Atlantic from 1975–1995. *J Sea Res.*, **39**: 139-152.

DURÁN, P., S. JUNQUERA, and X. PAZ. MS 1998. Observations of Length at Maturity in yellowtail flounder on the Grand Bank (1995–97). *NAFO SCR a oc.*, No. 27, Serial No. N3012, 6 p.

DURÁN, P., X. PAZ, and E. CÁRDENAS. MS 1998. Results from the 98 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR a oc.*, No. 48, Serial No. N3039, 20 p.

GUNDERSON, D. R. 1977. Population Biology of Pacific Ocean Perch, *Sebastes alutus*, stocks in the Washington-Queen Charlotte sound region, and their response to fishing. *Fish. Bull.*, **75**(2): 369–403.

MORGAN, M. J., C. A. BISHOP, and J. W. BAIRD. MS 1993. Temporal and spatial variation in age and length at maturity in 2J3KL cod. *NAFO SCR a oc.*, No. 57, Serial No. N2240, 8 p.

MORGAN, M. J., and S. J. WALSH. MS 1997. Observations on maturation, recruitment and spawning stock biomass in yellowtail flounder on the Grand Bank. *NAFO SCR a oc.*, No. 71, Serial No. N2905, 7 p.

PAZ, X., P. DURÁN, and E. DE CÁRDENAS. MS 1996. Preliminary results from the 1996 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR a oc.*, No. 49, Serial No. N2725, 12 p.

PAZ, X., P. DURÁN, and E. DE CÁRDENAS. MS 1997. Preliminary results from the 1997 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR a oc.*, No. 25, Serial No. N2856, 13 p.

SABORIDO-REY, F., and S. JUNQUERA. 1998. Histological assessment of variation in the sexual maturity of cod (*Gadus morhua* L.) at the Flemish Cap (north-west Atlantic). *ICbS J. Mar. Sci.*, **55**: 515–521.

STATSOFT INC. 1995. STATISTICA for Windows [Computer program manual]. Tulsa, OK.

STEARNS, S. C., and R. E. CRANDALL, 1984. Plasticity for age and size at sexual maturity: A life-history response to unavoidable stress. *In*: Fish Reproduction. Strategies and Tactics. G. W. Potts and R.J. Wootton (Eds.). Academic Press, London. p. 13–33.

WALSH, S. J. 1992. Factors influencing distribution of juvenile yellowtail flounder (*Limanda ferruginea*) on the Grand Bank off Newfoundland. *Neth. J. Sea Res.*, **29**: 193–203.

WALSH, S. J., and M. J. MORGAN. MS 1998. Factors in maturation of yellowtail flounder (*Pleuronectes ferruginea*) on the Grand bank. *NAFO SCR a oc.*, No. 105, Serial No. N4006, 36 p.

ZAMARRO, J. MS 1988. Spawning process of the yellowtail flounder (*Limanda ferruginea*). *NAFO SCR a oc.*, No. 33, Serial No. N1471, 11 p.

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On Biology of Two Sympatric Species of Hermit Crab (Crustacea, Decapoda, Paguridae) at St. Chads, Newfoundland

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Abstract

Two sympatric species of Hermit Crab, *Pagurus acadianus* and *P. arcuatus*, from the sublittoral near St. Chads, Newfoundland, have many similarities in their life history. These are expressed in their feeding, maturities of females (both species hatching eggs in early spring, extruding eggs in late autumn and carrying eggs through the winter), finding shells plentiful at small sizes but scarce at large sizes, and availability at a sublittoral station throughout the year. Differences seen were low rate of parasitization with *Peltogaster paguri* in *P. acadianus*: only one in almost five hundred specimens, while there were about 18% in *P. arcuatus*; and in the former slightly higher fecundity, longer period of male maturity, somewhat larger size, and, as shown earlier, lower frequency in plankton from the area. Percent of ectocommensal protozoans on gills was low in *P. acadianus* but high in *P. arcuatus*, while those on setae of maxillule were high in both species.

Key words: Crustacea, ectocommensal protozoa, fecundity, feeding, hermit crabs, maturity, Newfoundland, *Pagurus acadianus*, *P. arcuatus*, *Peltogaster* parasite

Introduction

While hermit crabs are not likely to be of commercial importance like snow crabs, lobsters and shrimps in Newfoundland waters, they belong to the same group of crustaceans, and they contribute appreciably to the mass of planktonic organisms in coastal waters that help to feed the young of these commercial species.

Like many other invertebrate coastal species in the Newfoundland area they produce a lot of eggs each summer and, when these hatch, the larvae spend several weeks in the plankton where they are preyed on by many other species (Squires *et al*, 1997). Hermit crabs are benthic and live close to a primary level of feeding, making use of minute algae and other organisms on rocks, sand and mud on the bottom mostly in shallow areas. The two species studied in this paper are *Pagurus acadianus* Benedict, 1901, and *P. arcuatus* Squires, 1964, anomuran decapods of the Family Paguridae (McLaughlin, 1974). They are both found only in the Northwest Atlantic and not much farther north than the Straits of Belle Isle in our records, although the northerly range of *P. arcuatus* is said to be Greenland (Williams, 1984). Both species extend as far south as Virginia, USA. There is only one other species of hermit crab in this general area, *P. pubescens* Krøyer, 1848, but it is found in deeper water here and also found in the Arctic and in Greenland and northern Europe (Squires, 1990, 1993). However it is reported as a sympatric species with *P. acadianus* from the sublittoral of Maine, USA (Grant and Ulmer, 1974).

Work on the biology and ecology of hermit crabs mainly in Europe and the Americas has been extensively reviewed by Elwood and Neil (1992). Hermit crab biology in the Northwest Atlantic area has been mentioned briefly by Squires (1957, 1962, 1963, 1967 and 1990).

The present paper deals with a sublittoral collection of hermit crabs from St. Chads, Newfoundland, taken monthly by scuba diving. They were included in collections of benthiic decapod crustaceans during a study of larvae of lobster (*Homarus americanus)* and other decapod larvae in coastal plankton. Data on both species include sizes of males and females, their use of gastropod shells, monthly maturity, fecundity, stomach contents, and parasitization. These allow for comparisons between the two species. Decapod crustacean species in plankton from the area are noted in Squires (1996) and Squires *et al.*, (1997).

Materials and Methods

A total of about 1 500 specimens of hermit crabs was collected by hand in mostly one sampling period each month from April 1971 to March 1972, by scuba diving at St. Chads, northeastern Newfoundland (Fig. 1), at 4 sites near shore about 10 m deep. Some details of collecting and annual seawater temperatures at the site are noted in Squires *et al.* (2000).

The samples of hermit crabs in their shells were preserved in 7% formalin in seawater. They were later removed from their shells and measured and maturities assessed. During this process the eggs carried by females were first removed and preserved in Gilson's fluid. Later the clutches of eggs were dried to constant weight and put in vials. Some of these were weighed with a precision balance and the egg numbers calculated from calibrating counts. However the numbers of eggs in most clutches were later given actual counts for this paper.

Counting the eggs was done by pouring the hardened eggs from a vial into a petri dish that had been coated peripherally with a thin ribbon of vegetable oil. Some eggs attached to remnants of pleopods were removed with needle probes in the oil. Eggs were then counted under magnification with a dissecting microscope, moving them into groups of 100 eggs in the oil, the hundreds recorded as counted on a calculator and the number less than one hundred added at the end.

The gastropod shells the hermit crabs were extracted from were kept separate for each month's sample and species, and the greatest height of each measured with vernier calipers to nearest 1.0 mm, estimating full height where spires were encrusted or eroded.

The length of the anterior shield (including short rostrum) of the carapace of each hermit crab was measured with vernier calipers under low power of dissecting microscope to the nearest 0.5 mm.

For maturity of each female, ova (from ovaries at posterior abdomen) were measured to nearest 0.1 mm on a stage millimeter grid under low power (about 40X). Small ova were 0.1–0.2 mm and large ova 0.3–0.4 mm in diameter. Eggs on pleopods were designated as eyed or not eyed according to embryonic development. Eggs were 0.5–0.6 mm in diameter. Male maturity was estimated from appearance of spermatophores in the vasa deferentia dissected out at the anterior abdomen dorsally.

Stomach contents were spread in water on a glass slide, covered with cover slip and examined at 100X and/or 420X power of a light microscope to recognize ingested organisms from fragments or the whole organism.

Drawings of each separate species of microscopic filamentous algae were made to estimate the number of species.

All specimens of both species were examined later for incidence of protozoan ectocommensals on gills and tips of setae of the coxal endite of the maxillule.

Results

Shield lengths

As in general with hermit crabs, in both species the males reached a greater length than the females (Fig. 2 and 3), while the females were in greater numbers at small sizes in all samples. There were no apparent seasonal differences in lengths, although many small females were collected in autumn and winter in both species. Two major modal groups were apparent only in males (5 and 8 mm in *P. arcuatus*) and more clearly in *P. acadianus* (6 and 9 mm) than in *P. arcuatus*. Sizes were quite similar in both species, but some *P. acadianus* reached a greater length than *P. arcuatus* (Fig. 2 and 3).

Gastropod Shells

Shells used by the two species of hermit crab included *Buccinum undatum, Littorina littorea* and *Thais (Nucella) lapillus*. There was an overlap in size of these shells but *Buccinum* was the largest and *Thais* almost the same size as *Littorina* (Fig. 4 and 5). The

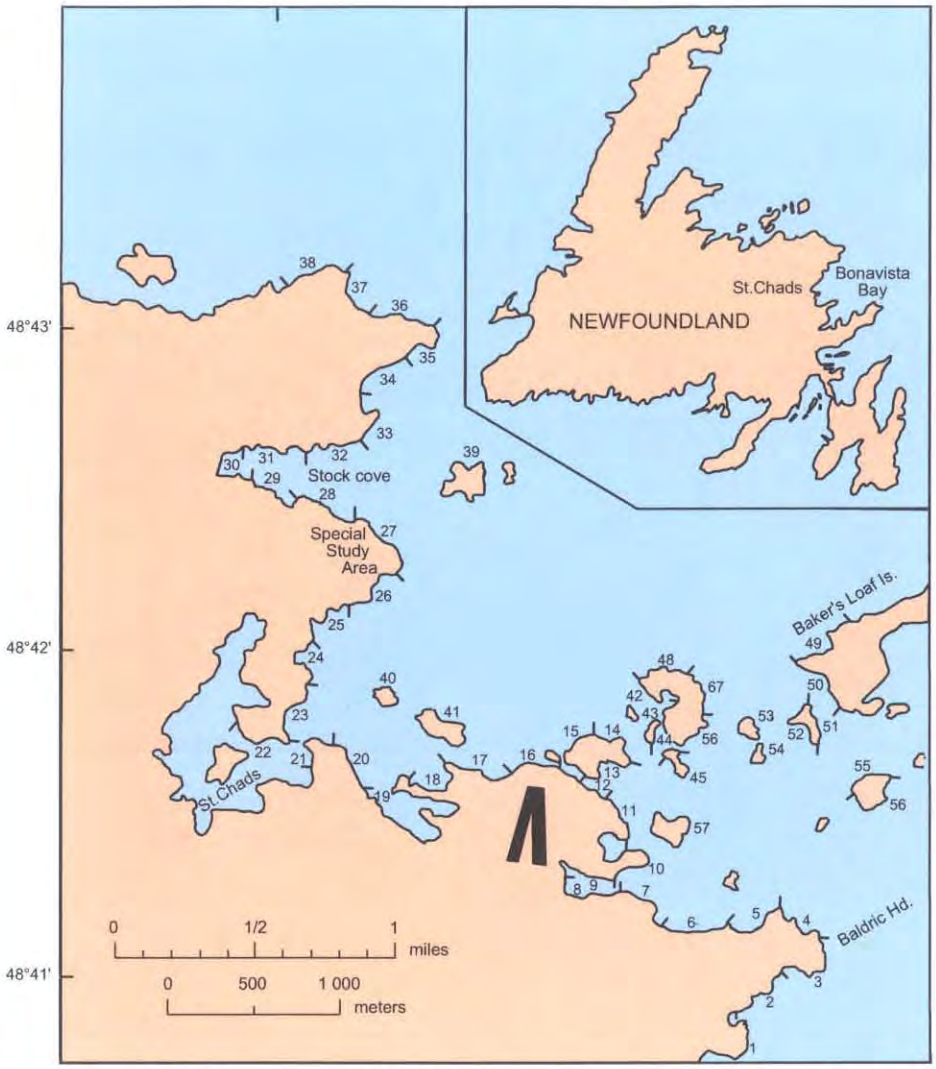

Fig. 1. Map of St. Chads, Bonavista Bay, Newfoundland showing area of sampling of hermit crabs, *Pagurus acadianus* and *P. arcuatus,* (from Squires *et al,* 1997).

shells collected with the hermit crabs were apparently very old, and may have been used over many years by succeeding generations of hermit crabs. Where size of hermit crabs is aligned with size of shells, the small shells seem to be in sufficient numbers for the small hermits but large shells appear to be mostly in short supply for the larger ones (Fig. 6 and 7).

Heights of shells from *P. acadianus* were as follows: *Thais* mode 26 mm, range 18–32 mm (112 specimens); *Littorina* mode 26 mm, range 16–36 mm (148 specimens); and *Buccinum* mode 56 mm, range 32–74 mm (314 specimens) (Fig. 4).

Heights of shells from *P. arcuatus,* were as follows: *Thais* mode 24 mm, range 16–32 mm (402 specimens), *Littorina* mode 24 mm, range 16–40 mm (240 specimens); and *Buccinum* mode 52 mm, range 22–66 mm (140 specimens) (Fig. 5).

Maturity

The seasonal pattern of maturity of females was similar in both species (Fig. 8 and 9). The spring samples had eggs that were eyed mostly, and the ova in the ovaries were small (0.1–0.2 mm) except for a few individuals with large ova (0.3–0.4 mm). The latter would probably produce a second batch of eggs after

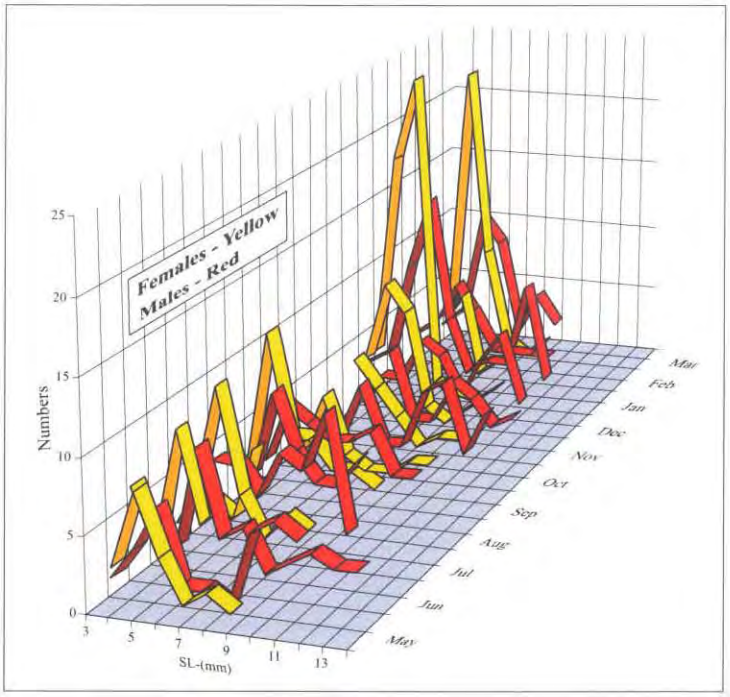

Fig. 2. Shield lengths of female and male *P. acadianus* at each month sampled from May 1971, to March 1972, at St. Chads, Newfoundland.

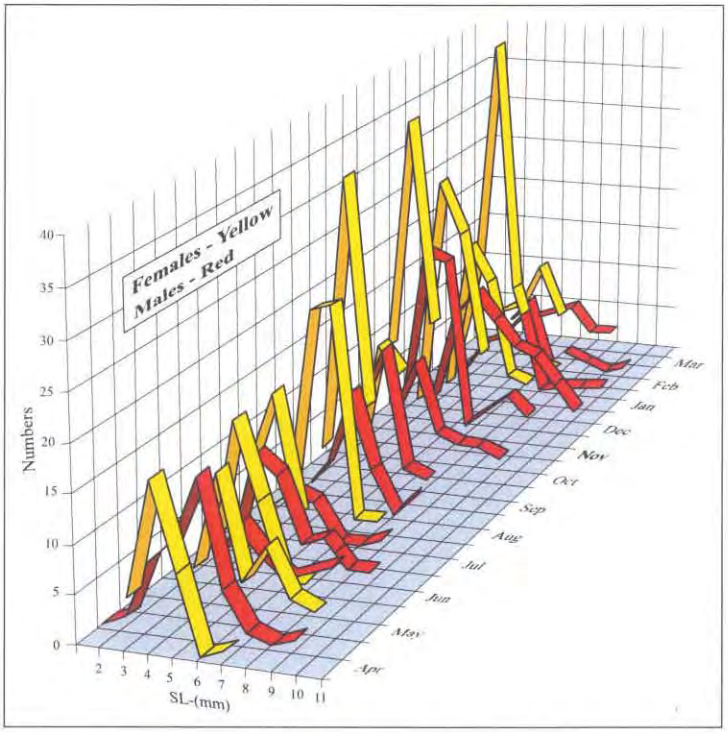

Fig. 3. Shield lengths of female and male *P. arcuatus* at each month sampled from April 1971 to March 1972 at St. Chads, Newfoundland.

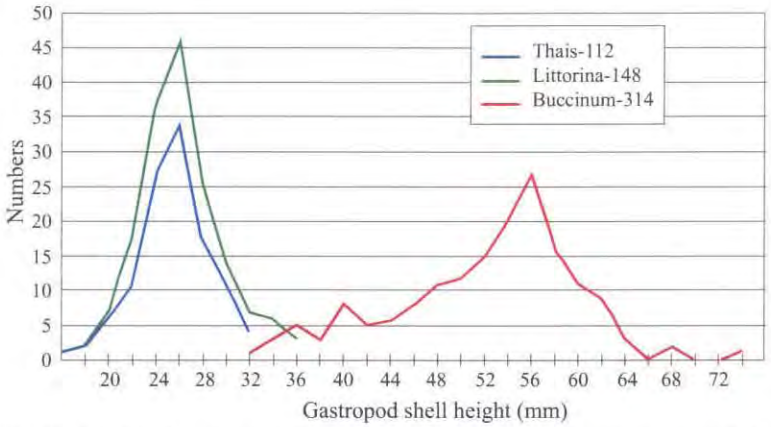

Fig. 4. Heights of gastropod shells *Thais, Littorina* and *Buccinum* occupied by *P. acadianus* from samples collected at St. Chads, Newfoundland, in 1971–72.

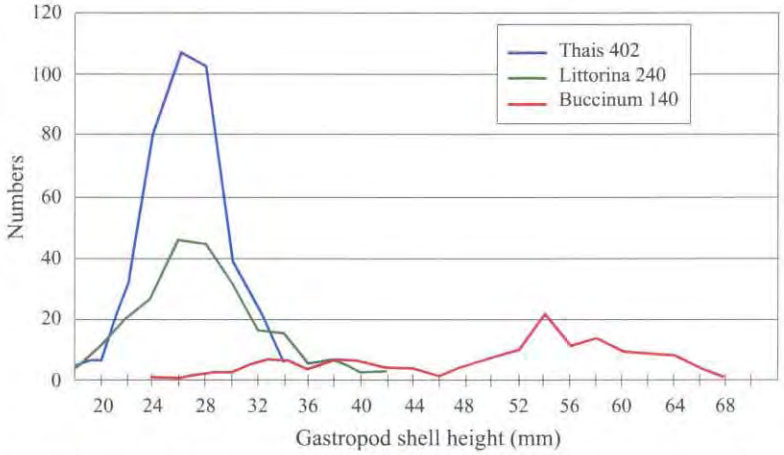

Fig. 5. Heights of gastropod shells *Thais, Littorina* and *Buccinum* occupied by *P. arcuatus* from samples collected at St. Chads, Newfoundland, in 1971–72.

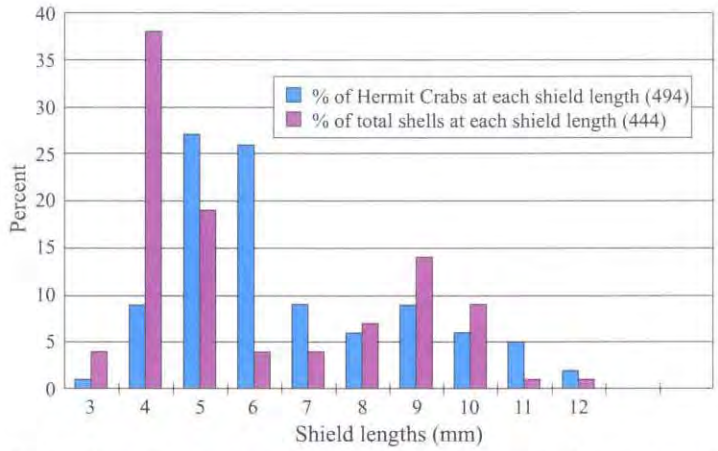

Fig. 6. Percent of gastropod shells at shield lengths of *P. acadianus* collected at St. Chads, Newfoundland.

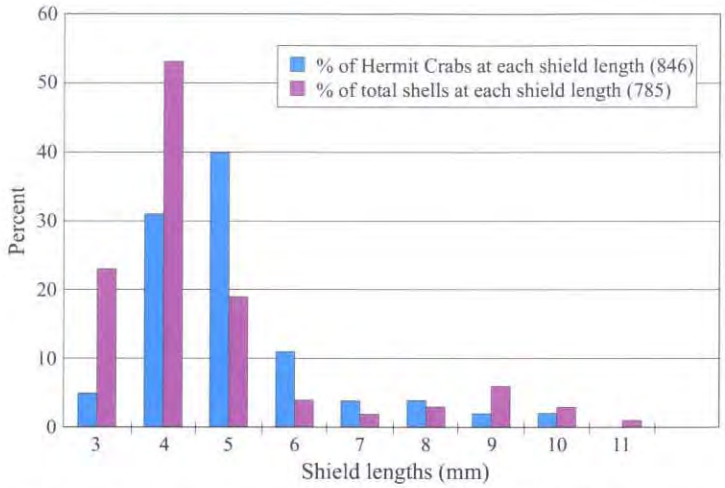

Fig. 7. Percent of gastropod shells at shield lengths of *P. arcuatus* collected at St. Chads, Newfoundland.

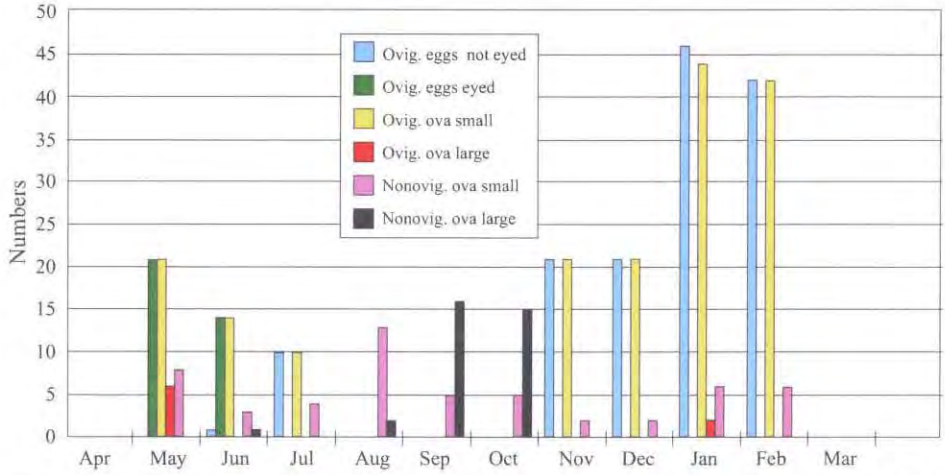

Fig. 8. Monthly maturity of female *P. acadianus* (N = 218) from April 1971 to March 1972, collected at St. Chads, Newfoundland.

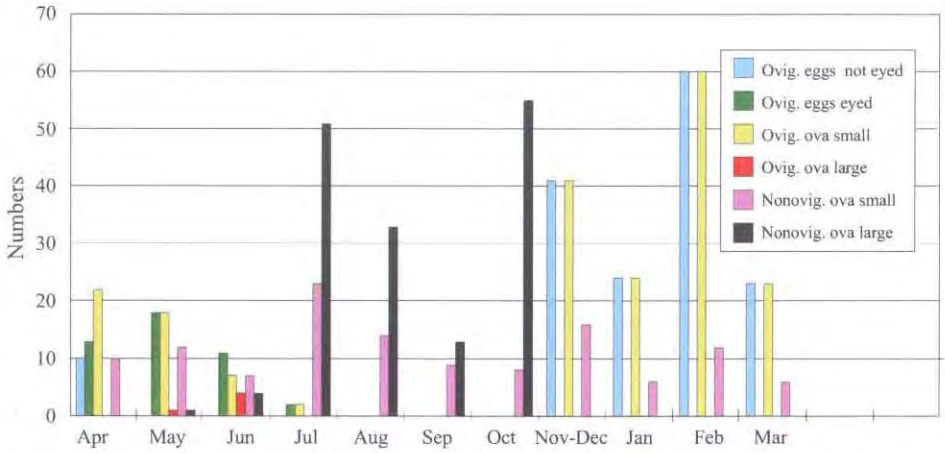

Fig. 9. Monthly maturity of female *P. arcuatus* (N = 453) from April 1971 to March 1972, collected at St. Chads, Newfoundland.

the ones carried had hatched. During the summer months (July and August) the eggs hatched, and ova were small. With the approach of autumn (August to October) numbers with small ova decreased while those with large ova increased and eggs were extruded in November. Most females carried eggs through the winter with no sign of embryonic development until early spring (April). Females were first mature at 3 mm shield length in *P. arcuatus* and 4 mm in *P. acadianus* (no specimens taken at less than 4 mm in the latter).

Male maturity was different in the two species. In *P. acadianus* males had a high percentage mature (the vasa deferentia full of ripe spermatophores) throughout the year (Fig. 10). In *P. arcuatus* the percentage mature was greater during April to October than later in the year (Fig. 11). In both species males were first mature at 4 mm shield length. Specimens at 2 and 3 mm were immature in *P. arcuatus*.

Fecundity

P. acadianus appeared to produce more eggs than *P. arcuatus* (Fig. 12). Average numbers of eggs per hermit crab in the former were about 2 500 at an average shield length of 6 mm, while in the latter the average was about 1 500 eggs.

Greatest numbers of eggs at a shield length of about 9 mm was about 14 000 in the former and 8 000 in the latter.

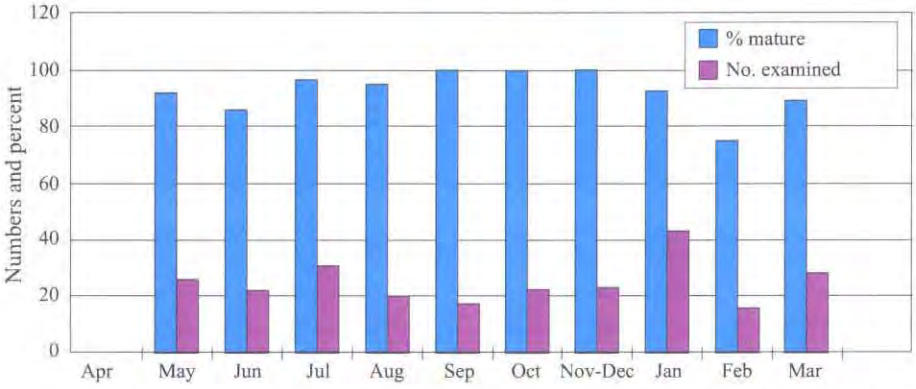

Fig. 10. Monthly maturity of male *P. acadianus* ($N = 251$) from April 1971 to March 1972, collected at St. Chads, Newfoundland.

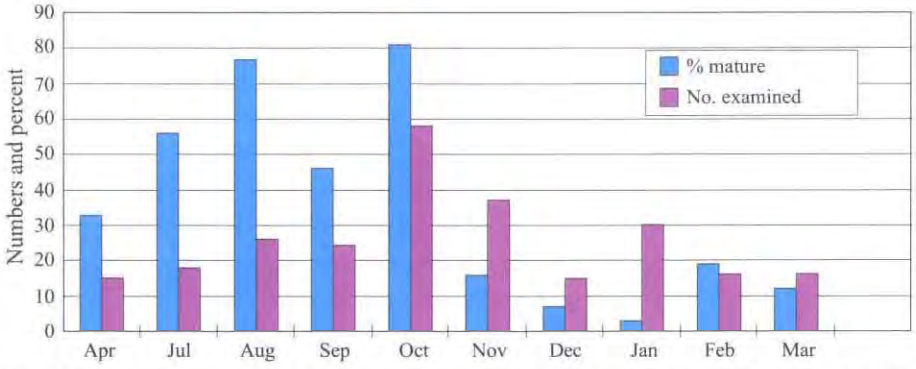

Fig. 11. Monthly maturity of male *P. arcuatus* ($N = 379$) from April 1971 to March 1972, collected at St. Chads, Newfoundland.

Equations for conversion from shield length to egg numbers were apparently polynomial (quadratic) and are approximate at sizes of 3–7 mm shield length. Trend lines were curved but not really representative since larger sizes of females were not present in samples. They were not included in the scatter diagram of egg numbers at each shield length (Fig. 12). The equations are:

for *P. acadianus* $y = 29.37x^2 - 7.29x + 842.35$
and *P. arcuatus* $y = 9.57x^2 + 386.65x - 345.73$

Feeding

For the most part hermit crabs are scavenging detritivores (Elwood and Neil, 1992). In the present area both species, *P. acadianus* and *P. arcuatus*, fed primarily on sponges (these are spread matlike – greenish and with occasional ostia – over rocks and bottom areas), filamentous algae (at least 15 microscopic species), small crustaceans (mostly harpacticoid copepods), polychaetes (apparently tubeworm heads and anterior parts are pinched or bitten off), settling stages of bivalves and gastropods (the latter appearing first in early autumn samples), pieces of kelp and hydroids, and detritus which included foraminiferans and diatoms (centric and pennate). Almost every stomach had many sponge spicules, mostly monaxon but some triaxon, indicating that the sponges were calcareous. The pattern of feeding was similar in both species of hermit crab (Fig. 13 and 14).

About 250 stomachs from each species were examined.

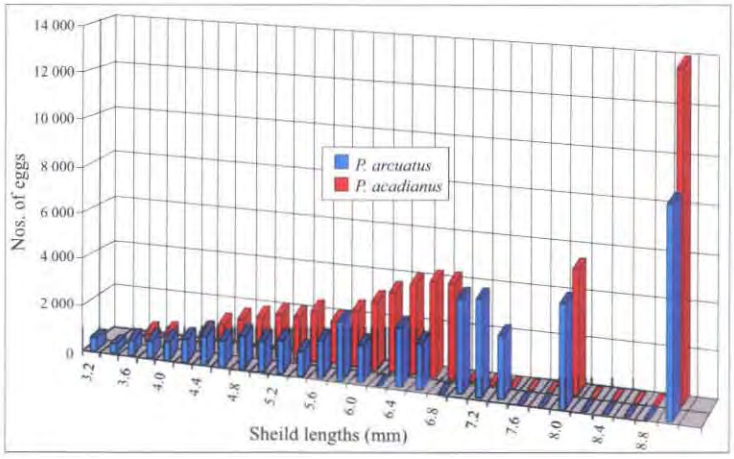

Fig. 12. Average numbers of eggs produced by *P. acadianus* (red) ($N = 68$) (fecundity equation $y = 9.57x^2 + 386.65x - 345.73$) and *P. arcuatus* (blue) ($N = 70$) (fecundity equation $y = 9.37x^2 - 7.29x + 842.35$) at each shield length from samples at St. Chads, Newfoundland.

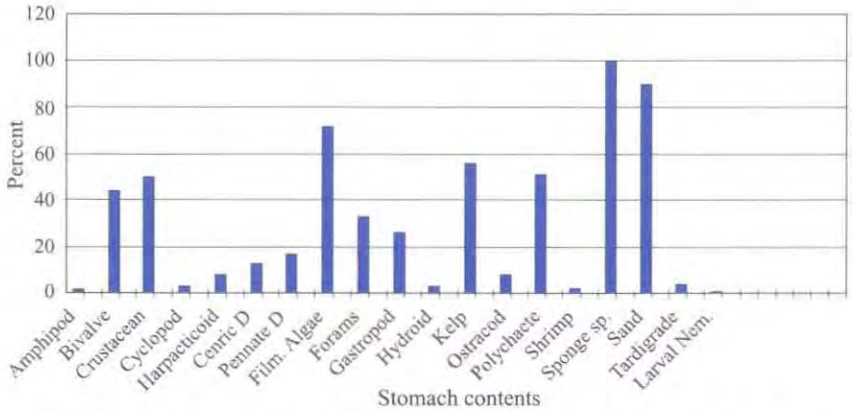

Fig. 13. Stomach contents of *P. acadianus* ($N = 254$) collected at St. Chads, Newfoundland.

Parasitization

About 18% of both female and male *P. arcuatus* were parasitized by the cirripede *Peltogaster (Clistosaccus) paguri* (Total females 453 and males 379 examined). According to size those males and females at 4–6 mm shield lengths had the highest percentages parasitized (Fig. 15).

Only one specimen of *P. acadianus* (1 male at 4 mm shield length, out of a total of 212 females and 262 males examined) carried the parasite.

Because the hermit crabs had been removed from the shells before they were examined by us, a search for symbionts was not done. However, Squires (1963) mentioned the occurrence of male and female amphipods, *Podoceropsis* sp., frequently in shells with *P. arcuatus* from the Newfoundland area. It has also been reported from hermit crabs in European waters (Vader, 1971).

Ectocommensal protozoans

A greenish protozoan was attached to filaments of gills of a high percentage (about 30%) of *P. arcuatus*, while in *P. arcadianus* the percentage was low (less than 5%). However, a brownish protozoan attached to tips of setae of the coxal endite of the maxillule was present in most specimens of both species.

White flocculant material in abdomen

In some specimens the abdomen was distended with white flocculent material. This occurred in 15 females and 28 males of *P. arcuatus* (totals examined

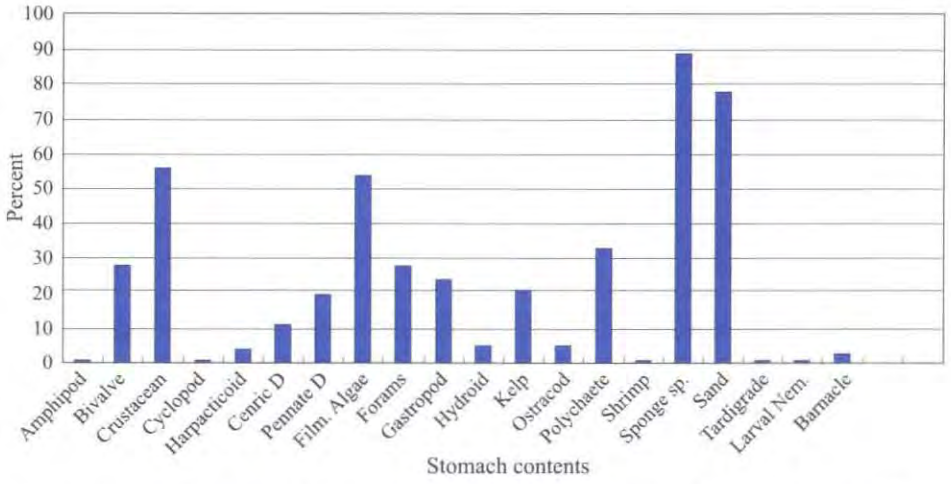

Fig. 14. Stomach contents of *P. arcuatus* (N = 287) collected at St. Chads, Newfoundland.

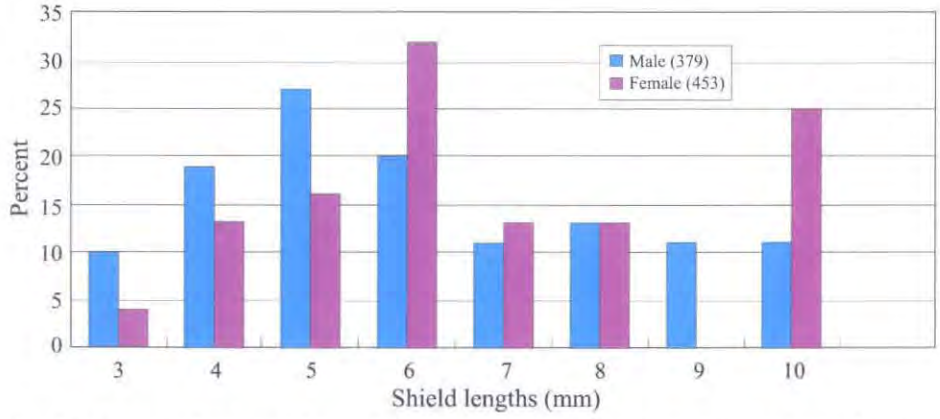

Fig. 15. Percent of male and female *P. arcuatus* at each shield length parasitized by *Peltogaster paguri* from samples (females 453, males 379) collected at St. Chads, Newfoundland.

453 females, 379 males). Only 4 females and 8 males of these were also carrying a parasite. It was also in *P. acadianus* in 1 female and 3 males (totals examined 212 females, 262 males).

Discussion

Since all specimens of hermit crabs seen were collected in the limited time available when scuba diving, the numbers taken indicate that slightly fewer *Pagurus acadianus* than *P. arcuatus* were present in the area. This was also shown in the comparative numbers of both species in the plankton (Squires, 1996 and Squires *et al.*, 1997). Also no megalopas of *P. acadianus* appeared in the plankton, indicating that they might have settled earlier or outside the area of plankton tows where the other species was collected. The advantage of *P. acadianus* with greater egg production at each size would give expected larger numbers of larvae in the plankton.

The pattern of associated shell sizes with hermit crab sizes is the same in both species. The graphs show that possibly at the smaller sizes shells were not in short supply. The shortage of larger shells could indicate interspecies as well as intraspecies competition (see also Elwood and Neil, 1992) with possibly *P. acadianus* having the advantage because of its larger size. Since gastropod shells are limited in number where hermit crabs live, and small shells are apparently more abundant, population strategy has evolved for females to put more energy into egg production than growth (Elwood and Neil, 1992). This leaves more large shells for males, which are less impeded in growth as a consequence. Our data support this conclusion.

The extreme difference in rates of parasitization could perhaps be explained on some subtle differences in body chemistry, which would make *P. acadianus* less attractive than *P. arcuatus* to the parasite that so completely invades its host. The parasite in its planktonic phase settles on the abdomen of the hermit crab and injects its body contents into the body fluids of the host (Høeg and Lutzen, 1985).

The pattern of maturity in male *P. arcuatus* is different from that of *P. acadianus* (Fig. 10 and 11). There may be an adaptation for conservation of resources (where spermatophores are not needed after all the females are carrying fertilized eggs) in *P. arcuatus*. Also, this might be an adaptation of *P. arcuatus* because it is a more northerly species than *P. acadianus*. It has been reported from just north of the Straits of Belle Isle in our records (Squires, 1990), farther north than the latter.

Although the range of depths given for both species of hermit crabs is from low water mark to 270 and 485 m (Williams, 1984), the niche occupied by those from the present collection suggests abundance to be in shallow coastal waters. My field experience has indicated their presence in many areas around the coast of Newfoundland.

Acknowledgements

We thank Dr. Craig Squires for reading a draft of this paper with suggestions for its improvement. Dr. R. A. Khan of the Marine Sciences Institute of MUN indicated that the ectocommensals were protozoans, and they were later examined by Dr. D. H. Lynn of the University of Guelph.

References

ELWOOD, R. W., and S. J. NEIL. 1992. Assessment and decisions: a study of information gathering by hermit crabs. Chapman and Hall, London. 192 p.

GRANT, W. C. Jr., and K. M. ULMER. 1974. Shell selection and aggressive behaviour in two sympatric species of hermit crabs. *Biol. Bull.*, **146**: 32–43.

HØEG, J. T., and J. LUTZEN. 1985. Crustacea Rhizocephala. Marine Invertebrates of Scandinavia, No. 6. Norwegian University Press, Oslo.

McLAUGHLIN, P. A. 1974. The hermit crabs (Crustacea, Decapoda, Paguridae) of northeastern North America. *Zool. Verh.*, **130**: 396 p., 1 pl.

SQUIRES, H. J. 1957. Decapod Crustacea of the CALANUS expeditions to Ungava Bay, 1947–50. *Can. J. Zool.*, **35**: 463–494.

1962. Decapod Crustacea of the CALANUS expeditions in Frobisher Bay, Baffin Island, 1951. *J. Fish. Res. Board. Can.*, **19**: 677–686.

1963. Decapod crustacean fauna of the Northwest Atlantic. PhD thesis, University of Durham, 376 p.

1967. Decapod Crustacea from CALANUS collections in Hudson Bay in 1953, 1954 and 1958–61. *J. Fish. Res. Board. Can.*, **24**: 1873–1903.

1990. Decapod Crustacea from the Atlantic coast of Canada. *Bull. Can. Fish. Aquat. Sci.*, **221**: 532 p.

1993. Decapod Crustacean larvae from Ungava Bay. *J. Northw. Atl. Fish. Sci.*, **15**: 169 p.

1996. Larvae of the hermit crab, Pagurus *arcuatus, from* the plankton. *J. Northw. Atl. Fish. Sci.*, **18**: 43–56.

SQUIRES, H. J., G. P. ENNIS, and G. DAWE. 1997. Decapod larvae from a near shore area of northeastern Newfoundland (Crustacea, Decapoda). *NAFO Sci. Coun. Studies*, **30**: 75–87.

2000. On biology of the shrimp, *Eualus pusiolus* (Krøyer, 1841) (Crustacea, Decapoda) at St. Chad's, Newfoundland. *NAFO Sci. Coun. Studies*, **33**: 1–10.

VADER, W. 1971. *Podoceropsis nitida* (Amphipoda, Photidae) an associate of hermit crabs. *Levende Natuur*, **74**: 134–137.

WILLIAMS, A. B. 1984. Shrimps, lobsters and crabs of the Atlantic coast of the eastern United States, Maine to Florida. Smithsonian Institution Press, Washington, D.C., 550 p.

NAFO Sci. Coun. Studies, 34: 19–83

Stock-by-Stock Research Vessel Surveys Reported During 1990–2000

NAFO Secretariat

The Scientific Council at its meeting in June 1990 agreed to compile an inventory and information on research vessel surveys conducted with respect to stocks assessed by the Scientific Council (SCS Doc. 90/22). This inventory was judged to be a useful reference and very helpful for the establishment of other inventories. During its meeting in June 1991 the Council agreed that the Designated Experts for the stocks should update the information annually (*NAFO Sci. Coun. Rep.*, 1991, p. 37) for review by STACFIS. In 1991 and the subsequent years through the decade, the inventory has been compiled annually and presented to the Scientific Council in the form of Scientific Council Summary Documents (SCS Doc.) (SCS Doc. 91/8, 92/22, 93/18, 94/18, 95/17, 96/15, 97/13, 98/18, 00/28).

A review of the annual inventories showed that there often were revisions and updates from one year to the next, and consequently readers of the SCS Document series may experience difficulties in interpreting the information. The Secretariat therefore took the initiative to compile a decadal publication. Noting this represented the best interpretation of the available information, Designated Experts responsible for stock assessments were requested to verify the accuracy of this compilation.

The following tabulations were compiled by the Secretariat in order to provide a comprehensive overview of surveys during the 1990–2000 decade used for stock assessments by the Scientific Council. Information supplied in the SCS Documents mentioned above were collated and edited as needed, and the SCR Documents cited in them were checked and corrections made to the tables when necessary.

In a few cases, the information supplied by the Designated Experts in the document series was not clear and document citations were not listed. In such cases the best representative interpretations by the Secretariat are presented in these Tables. It was also noted data on different stocks were collected in the same surveys but often the surveys were not referred to in a consistent way. These were re-tabulated to achieve best consistency.

This paper is compiled in the format designed by the Scientific Council in 1990s. Stock-by-Stock tabulations are listed with the northernmost stock first and progress southward from Subarea 0 to 4. The following is the sequence of presentation:

Greenland halibut in Subarea 0 + Divisions 1B–1F
Greenland halibut in Division 1A
Roundnose grenadier in Subareas 0 and 1
Cod in Subarea 1
Redfish in Subarea 1
Other Finfish in Subarea 1
Cod in Division 3M
Redfish in Division 3M
American plaice in Division 3M
Cod in Divisions 3N and 3O
Redfish in Divisions 3L and 3N
American plaice in Divisions 3L, 3N and 3O
Yellowtail flounder in Divisions 3L, 3N and 3O
Witch flounder in Divisions 3N and 3O
Capelin in Divisions 3N and 3O
Groundfish (Cod in Subdivision 3Ps)
Roundnose grenadier in Subareas 2 and 3
Roughhead grenadier in Subareas 2 and 3
Cod in Divisions 2J, 3K and 3L

Witch flounder in Divisions 2J + 3KL
Greenland halibut in Subarea 2 and Divisions 3K and 3L
Short-finned Squid in Subareas 3 and 4
Silver hake in Divisions 4V, 4W and 4X
Elasmobranchs in Subareas 2–6
Short-finned Squid in Subareas 5 and 6
Shrimp in Divisions 3LNO
Shrimp in Division 3M
Shrimp in Subareas 0 and 1
Shrimp in Denmark Strait

References to pertinent documents are noted in the tables and a complete list of documents cited is listed at the end.

Stock name: Greenland halibut in Subarea 0 + Divisions 1B-1F

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
Joint Japan/ Greenland survey	1A-1D	Apr-May	1987-89	Stratified-random bottom trawl	Greenland halibut	61	-	-	400-1500 m	N	Y	N	Y	N	Japan/ Greenland	SCR 90/39
		Jun Aug-Sep	1990			90	N	35	400-1500 m	Y	Y	Y	Y	Y	Japan/ Greenland	SCR 91/50
		Aug-Sep Nov	1991			90	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 92/48
		Aug Nov-Dec	1992			139	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 93/58
	1B-D	Aug-Sep	1993			87	N	30	400-1500 m	Y	Y	Y	Y	Y	Japan/ Greenland	SCR 94/31
		Aug	1994			80	N	?	400-1500 m	N	N	Y	Y	Y	Japan/ Greenland	SCR 95/23
	1A-1D	Aug	1995			91	N	?	400-1500 m	N	Y	Y	Y	Y	Japan/ Greenland	SCR 96/29
Greenland deep-sea	1CD	Sep-Oct	1997	Stratified-random bottom trawl	Greenland halibut	63	N	?	400-1500 m	Y	Y	Y	Y	Y	Greenland	SCR 98/25
			1998			56	N	?	400-1500 m	Y	Y	Y	Y	Y	Greenland	SCR 99/30
			1999		Greenland halibut Roundnose grenadier	38	N	?	400-1500 m	Y	Y	Y	Y	Y	Greenland	SCR 00/10
Inshore longline survey	1A	Aug	1989	Tagging-longline	Greenland halibut	35	-		350-800 m	-	-	-	Y	-	Greenland	
		Jul-Aug	1993	Longline		52	Y	10	200-1500 m	Y	N	Y	Y	Y	Greenland	

Greenland halibut in Subarea 0 + Divisions 1B-1F (continued)

Offshore Exploratory longline fishery	1BCD	Nov	1989	Stratified-random longline		13	-		400-1600 m	-	-	-	Y	-	Faroes	SCR 90/38
Deepwater longline	1DE	May-Jun	1992	Longline	Greenland halibut	52	Y	-	300-2200 m	N	N	Y	Y	Y	Greenland/ Norway	SCR 93/53
	1AB	Aug	1993			44	Y	30	400-1400 m	Y	N	Y	Y	Y	Greenland /Norway	SCR 94/10
USSR survey	0 + 1	Sep-Nov	1979-87	Stratified-random bottom trawl	Greenland halibut		Y	70	200-1300 m	Y	Y	Y	Y	Y	USSR	SCR 88/41
	0B	Sep-Nov	1990	Stratified-random bottom trawl and longline	Greenland halibut	66/61	Y	35	200-1500 m	Y	Y	Y	Y	Y	USSR	SCR 91/66
		Oct-Nov	1991	Stratified-random bottom trawl	Greenland halibut	59	N	?	200-1500 m	Y	Y		Y	-	Russia	SCR 92/22
		Nov	1992	Stratified-random bottom trawl	Roundnose grenadier	26	Y	?	500-1500 m	Y	Y	Y	Y	Y	Russia	SCR 93/12
Joint USSR/GDR (EEC-DEU) trawl survey	0B, 1B, 1C, 1D	Oct-Nov	1989-90	Stratified-random bottom trawl	Greenland halibut	116	Y	90	200-1500 m	Y	Y	Y	Y	Y	USSR/ GDR (EEC-DEU)	SCR 91/21
West Greenland trawl survey	1A-1F	Jul-Sep	1988-92	Stratified-random bottom trawl	Greenland halibut	206	N	?	0-600 m	Y	Y	N	Y	N	Greenland	SCR 93/52
	1A-1F Disko Bay	Jul-Sep	1993		Greenland halibut	187	N	5	0-600 m	Y	Y	N	Y	N	Greenland /Denmark	SCR 94/9
			1994		Shrimp Groundfish	176	N	5	0-600 m	N	N	Y	Y	Y	Greenland	SCR 95/19
			1995		Shrimp	194	N	?	50-600 m	Y	Y	Y	Y	Y	Greenland	SCR 96/67
			1996		Shrimp Groundfish	199	N	?	0-600 m	Y	Y	Y	Y	Y	Greenland	SCR 97/39

Greenland halibut in Subarea 0 + Divisions 1B-1F (continued)

West Greenland trawl survey	1A-1F Disko Bay	Jul-Sep	1997	Stratified-random bottom trawl	Shrimp Groundfish	278	N	?	0-600 m	Y	Y	Y	Y	Y	Greenland	SCR 98/40
			1998			233	N	?	0-600 m	Y	Y	Y	Y	Y	Greenland	SCR 99/27
			1999			245	N	?	0-600 m	Y	Y	Y	Y	Y	Greenland	SCR 00/22

Stock name: Greenland halibut in Division 1A

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
Longline survey	1A inshore	Jul-Aug	1993	Longline	Greenland halibut	52	Y	10	200-1100 m	Y	N	Y	Y	Y	Greenland	
			1994			73	Y	?	200-800 m	N	N	Y	Y	Y	Greenland	SCR 95/67
	Iiulissat Uummannaq Upernavik (2 a year)	Jul-Aug	1996	Fixed stations Longliners	Greenland halibut	30 in each location (60 a year)	Y	?	200-900 m	N	N	Y	Y	Y	Greenland	SCR 96/68 97/78
	Disko Bay Uummannaq Upernavik	Jul-Aug	1997-99	Fixed stations longliners	Greenland halibut	30 in each location (60 a year)	Y	?	200-900 m	N	N	Y	Y	Y	Greenland	SCR 98/44 99/48 00/29 00/47
Bottom trawl survey	1A offshore Disko Bay inshore	Jul-Sep	1988-94	Stratified-random bottom trawl	Northern shrimp Groundfish	176	N	?	0-600 m	Y	Y	Y	Y	Y	Greenland	SCR 95/19

Stock name: Roundnose Grenadier in Subareas 0 and 1

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
Joint Japan/ Greenland bottom trawl survey	SA 1	Apr-May	1987-89	Stratified-random bottom trawl	Greenland halibut	61	-	?	400-1500 m	Y	Y	N	Y	Y	Japan/ Greenland	SCR 90/39
	1A-D	Jun Aug-Sep	1990		Greenland halibut Roundnose grenadier	75/88	N	35	400-1500 m	Y	Y	Y	Y	Y	Japan/ Greenland	SCR 91/50
		Aug-Sep	1991			108	N	Much less than 100	1-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 92/48
		Aug	1992			90	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 93/58
	1C-D	Nov-Dec	1992			49	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 93/58
	1B-D	Aug-Sep	1993			87	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 94/31
		Aug	1994			80	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 95/23
	1A-D	Aug	1995			91	N	?	400-1500 m	N	Y	N	Y	N	Japan/ Greenland	SCR 96/29
Greenland Deep-sea	1CD	Sep-Oct	1997	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier	63	N	?	400-1500 m	Y	Y	N	Y	N	Greenland	SCR 98/25
			1998			56	N	?	400-1500 m	Y	Y	N	Y	N	Greenland	SCR 99/30

Roundnose Grenadier in Subareas 0 and 1 (continued)

Greenland Deep-sea	1CD	Sep-Oct	1999	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier	38	N	?	400-1500 m	Y	Y	N	Y	N	Greenland	SCR 00/10
USSR Greenland halibut survey	SA 0	Sep-Oct	1979-89	Stratified-random bottom trawl	Greenland halibut	?		?	to 1500 m	N	N	Y	Y	Y	USSR	SCR 90/06
	0+1	Sep-Nov	1990	Stratified-random bottom trawl	Roundnose grenadier Greenland halibut	-	-	-	to 1500 m	-	-	Y	Y	-	USSR	SCR 91/8
Russian Greenland halibut survey	SA 0B	Nov	1991		Greenland halibut	59	N	Much less than 100	200-1500 m	Y	Y	N	Y	N	Russia	SCR 92/9 92/22
			1992		Greenland halibut Roundnose grenadier	26	Y	?	500-1500 m	Y	Y	Y	Y	Y	Russia	SCR 93/12
Joint USSR/GDR (EEC-DEU) trawl survey	0B, 1B-D	Oct-Nov	1989-90	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier	66	Y	90	200-1500 m	Y	Y	Y	Y	Y	USSR/GDR (EEC-DEU)	SCR 91/21 91/66

Stock name: Cod in Subarea 1

Survey	Location	month(s)	Years of survey from. to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
West Greenland Groundfish Survey	1BCDEF	Nov-Dec	1982-89	Stratified-random bottom trawl	Cod	140		100	0-600 m	Y	Y	Y	Y	Y	Federal Republic of Germany	
			1990	Stratified-random bottom trawl	Cod	111	Y	70	0-600 m	Y	Y	Y	Y	Y	Federal Republic of Germany	SCR 91/76
West Greenland trawl survey	1B, 1D 1F	Jul-Aug	1989-90	Bottom trawl Stomach sampling, mid-water trawl for 0-group	Cod/other Demersal	51	N	50	45-430 m	N	N	N	Y	Y	Federal Republic of Germany	SCR 91/35 91/76
West Greenland Longline Survey	1BCDE	Oct-Nov	1987-90	Stratified-random longline	Cod	123		30	0-300 m	Y	N	Y	Y	Y	Greenland	
West Greenland Young cod survey	1BDF	Jul	1985-89	Gillnet	Cod	208		20	0-35 m	Y	N	Y	Y	Y	Greenland	
			1990	Gillnets with different mesh sizes	Cod	171	Y	30	0-40 m	Y	N	Y	Y	Y	Greenland	SCR 91/64
		Jun-Jul	1986-94	Gillnets	Cod	170	Y		0-20 m	Y	N	Y	Y	Y	Greenland	
West Greenland shrimp survey	1ABCD	Jul-Aug	1988-91	Stratified-random bottom shrimp trawl	Shrimp	140		?	150-600 m	N	N	?	Y	Y	Greenland	
Greenland trawl survey	1A-1F	Jul-Sep	1988-93	Stratified-random bottom trawl	Cod	187	N	5	0-600 m	Y	Y	N	Y	N	Greenland	SCR 94/9
Japanese Groundfish survey	1C, 1D	Apr-May	1987-90	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier	61		10	400-1500 m	Y	Y	N	Y	N	Japan	

Stock name: Redfish in Subarea 1

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abun-dance	bio-mass					
Groundfish survey off West Greenland	1B-1F	Oct-Nov	1982-90	Stratified-random bottom trawl	Cod	111		100	0-600 m	Y	Y	Y	Y	N	EU-Germany	SCR 91/36
			1991			97										SCR 92/40
			1992			47	N	50	0-400 m	Y	Y	N	Y	Y		SCR 93/26
			1993			55	N	90% for cod, other finfish unknown	0-400 m	Y	Y	N		N		SCR 94/7
			1994			78	N	90% for cod, other finfish unknown	0-400 m	Y	Y	N		N		SCR 95/3
			1995		Cod, redfish, other finfish	35 (incom-plete coverage	N	80	0-400 m	Y	Y	N	Y	N		SCR 96/6
			1996			55	N	80	0-400 m	Y	Y	N	Y	N		SCR 97/5
			1997			45	N	80	0-400 m	Y	Y	N	Y	N		SCR 98/21
			1998			63	N	80	0-400 m	Y	Y	N	Y	Y		SCR 99/20
			1999			63	N	80	0-400 m	Y	Y	N	Y	N		SCR 00/28
West Greenland Joint Japan/ Greenland groundfish survey	1ABCD	May-Jun Aug/Sep	1987-90	Stratified-random bottom trawl	Greenland halibut	61		Continental slope	400-1600 m	N	Y	N	N	N	Japan/ Greenland	SCR 91/50

Redfish in Subarea 1 (continued)

West Greenland Joint Japan/ Greenland groundfish survey	SA 1 – 1A-D	Aug-Sep Nov	1991	Stratified-random bottom trawl	Redfish	100 90	N	40	0-1500 m	N	Y	N	Y	N	Greenland/ Japan	SCR 92/48
	1A-D	Aug Nov-Dec	1992	Stratified-random bottom trawl	Groundfishes	96 49	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 93/58
Greenland/Japan Joint B.T.S.	1B-1D *1A not covered due to ice	Aug-Sep	1993	Stratified-random bottom trawl	Groundfishes	87	N	?	400-1500 m	Y	Y	N	Y	N	Greenland/ Japan	SCR 94/31
	1B-1D	Aug	1994			80	N		400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 95/23
	1A-1D	Aug	1995			91	N	80	600-1500 m	Y	Y	N	Y	N	Greenland/ Japan	SCR 96/29
Greenland bottom trawl	1C-D	Sep-Oct	1997	Stratified-random bottom trawl	Greenland halibut	63	N	80	600-1500 m	Y	Y	N	Y	N	Greenland	SCR 98/25
			1998			56	N	80	600-1500 m	Y	Y	N	Y	N	Greenland	SCR 99/30
			1999			36	N	80	600-1500 m	Y	Y	N	Y	N	Greenland	SCR 00/10
West Greenland shrimp survey	1A-E + Subarea 0 (part)	Jul-Aug	1988-90	Stratified-random shrimp bottom trawl	Shrimp	135		Offshore 61°52'N-72°30'N	150-600 m	N	N	N	Y	N	Greenland	
	SA 1, 1A Disko Bay (inshore)	Sep	1991			44	N	<10	150-550 m	Y	Y	N	Y	N	Greenland	SCR 92/43
	SA 1 1A, 1B (offshore)	Jul-Aug	1988-91			41	N	20	150-600 m	Y	Y	N	Y	N	Greenland	SCR 92/44

Redfish in Subarea 1 (continued)

West Greenland trawl surveys	1A-1F	Jul-Sep	1988-92	Stratified-random bottom trawl	Shrimp, groundfish	202	N	?	0-600 m	Y	Y	N	Y	N	Greenland	SCR 93/52
			1993	Stratified-random bottom trawl	Shrimp, information on redfish	187	N	?	0-600 m	Y	Y	N	Y	N	Greenland	SCR 94/9
			1994	Stratified-random shrimp bottom trawl	Shrimp/ Groundfish	181	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 95/19
		Jul-Aug	1996	Stratified-random shrimp bottom trawl	Shrimp	194	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 97/39
			1997			278	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 98/40
			1998			233	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 99/27
			1999			230	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 00/22

Stock name: Other Finfish in Subarea 1

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
West Greenland groundfish survey	1BCDEF	Nov-Dec	1982-89	Stratified-random bottom trawl	Cod	140		80 - Offshore	0-600	Y	Y	N	Y	Y	EEC-Germany	
	1B-1F	Oct-Nov	1982-92	Stratified-random bottom trawl	Cod	100	N	?	0-400 m	Y	Y	N	Y	N	EEC-Germany	SCR 93/26
			1993		Cod (Redfish Other finfish)	60	N	?	0-400 m	Y	Y	N	N	N	EEC-Germany	SCR 94/7
		Oct	1995		Cod Redfish	35	N	80	0-400 m	Y	Y	N	Y	Y	EU-Germany	SCR 96/4 96/5
		Oct-Nov	1996		Cod Redfish Other finfish	55	N	80	0-400	Y	Y	N	Y	Y	EU-Germany	SCR 97/5
			1997			45	N	80	0-400	Y	Y	N	Y	Y	EU-Germany	SCR 98/21
			1998			63	N	80	0-400	Y	Y	N	Y	Y	EU-Germany	SCR 99/21 99/33 99/37
			1999			63	N	80	0-400	Y	Y	N	Y	Y	EU-Germany	SCR 00/11 00/28
Japanese groundfish survey	1CD	Apr-May	1987-89	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier	61		10	400-1500 m	?	Y	N	Y	N	Japan	
Joint Japan/ Greenland survey off West Greenland	1A-1D	Aug	1987-92	Stratified-random bottom trawl	Greenland halibut	92	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 93/58
	1CD	Nov-Dec			Roundnose grenadier	49										

Other Finfish in Subarea 1 (continued)

Joint Japan/ Greenland survey off West Greenland	1B-1D	Aug	1994	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier Redfish Other finfish	80	N	?	400-1500 m	Y	Y	N	Y	N	Japan/ Greenland	SCR 95/23
	1A-1D		1995	Stratified-random bottom trawl	Greenland halibut	91	N	80	400-1500 m	Y	Y	N	Y	N	Greenland/ Japan	SCR 96/29
Greenland deepsea	1CD	Sep-Oct	1997	Stratified-random bottom trawl	Greenland halibut Roundnose grenadier	63	N	80	400-1500 m	Y	Y	N	Y	N	Greenland	SCR 98/25
			1998			56	N	80	400-1500 m	Y	Y	N	Y	N	Greenland	SCR 99/30
			1999			36	N	80	400-1500 m	Y	Y	N	Y	N	Greenland	SCR 00/10
Greenland shrimp	1A-1F	Jul-Sep	1988-92	Stratified-random bottom trawl	Shrimp Groundfish	206	N	?	0-600 m	Y	Y	N	N	N	Greenland	SCR 93/52
			1994		Shrimp	181	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 95/19
		Jul-Aug	1995			194	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 97/39
			1997			278	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 98/40
			1998			233	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 99/27
			1999			230	N	80	0-600 m	Y	Y	N	Y	N	Greenland	SCR 00/22
Norwegian Longline Survey	1D+1E	May-Jun	1989-92	Longline	Greenland halibut Roughhead grenadier Cusk	52	Y	?	300-2200 m	N	N	N	Y	N	Norway	SCR 93/53

Stock name: Cod in Division 3M

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abun-dance	bio-mass					
Canadian groundfish survey	3M	Jan-Feb	1977-85	Stratified-random Bottom trawl	Groundfish	34-142		100	Up to 730 m	Y	Y	Y	Y	Y	Canada	SCR 83/29
		Sep-Oct	1996	Stratified-random Bottom trawl	All	68	Y	100	127-730 m	Y	Y	Y	Y	Y	Canada Nfld.	SCR 97/42
USSR ground-fish survey	3M	Apr-Jul	1971-92	1971-82 fixed station 1983-90 random 1987-90 trawl and acoustic	Groundfish Groundfish Groundfish	12-76 85-109 85-109	Y Y Y	100	120-720 m	Y	Y	Y	Y	Y	USSR	SCR 91/5 92/13
Russian trawl/ acoustic survey	3M	Apr	1993	Bottom trawl + Acoustic (1987-93)	All	53	T	95	/400	Y	Y	N	N	N	Russia	
	3MLNO	Apr-May	1993	Groundfish Acoustic	Cod Redfish Capelin American plaice Witch flounder	316	Full	3M-100 3L-70 3N-100 3O-100	50-700 m	Y	Y	Y	Y	Y	Russia	SCR 94/12
			1994	No survey												
	3M	May	1995-96	Stratified-random bottom trawl	All	58	Y	100	80-730 m	Y	Y	Y	Y	Y	Russia	SCR 96/7 97/7
EEC survey	3M	Jul-Aug	1988-89	Stratified-random bottom trawl	Cod	115-116	1988 Y	100	120-720 m	Y	Y	Y	Y	Y	EEC	
		Jul	1990	Stratified-random bottom trawl	Groundfish	113	N	100	120-720 m	Y	Y	Y	Y	Y	EEC	SCR 91/95
			1991	Stratified-random bottom trawl	Groundfish	117	N	100	120-720 m	Y	Y	Y	Y	Y	EEC	SCR 92/27
			1992	Stratified-random bottom trawl	All	117	N	100	to 720 m	Y	Y	Y	Y	Y	EEC	SCR 93/19

Cod in Division 3M (continued)

EEC survey	3M	Jul	1993	Stratified-random bottom trawl	All	101	N	100	to 720 m	Y	Y	Y	Y	Y	EU	SCR 94/22
			1994	Stratified-random bottom trawl	All	116	N	100	Up to 730	Y	Y	Y	Y	Y	EU	SCR 95/26
			1995	Stratified-random bottom trawl	All	121	N	100	80-730 m	Y	Y	Y	Y	Y	EU	SCR 96/54
			1996-97	Stratified-random bottom trawl	All	117	N	100	127-730 m	Y	Y	Y	Y	Y	EU	SCR 97/28 98/30
			1998	Stratified-random bottom trawl	All	119	N	100	80-730 m	Y	Y	Y	Y	Y	EU	SCR 99/22
			1999	Stratified-random bottom trawl	All	117	N	100	80-730 m	Y	Y	Y	Y	Y	EU	SCR 00/9

Stock name: Redfish in Division 3M

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
USSR groundfish	3M	Apr-Jul	1971-90	1971-92 Fixed stations 1983-90 random 1987-90 trawl and acoustic	Groundfish	12-76	Y	100	120-750 m	Y	Y	Y	Y	Y	USSR	SCR 91/5
	3M	Apr-May	1991	Stratified-random & acoustic	Redfish	107	?	100	200-700 m	Y	Y	N	Y	?	USSR/ Russia	SCR 92/12
Russian bottom trawl survey		Apr	1992			47	Y	89	200-700 m	Y	Y	Y	Y	Y	Russia	SCR 93/11
		Jun-Jul	1993	Acoustic		56	?	100	0-732 m	Y	Y	N	Y	?	Russia	SCR 94/13
			1994	Not surveyed												SCR 95/13
	3M	May	1995	Stratified-random bottom trawl, (Same stratification as EU-survey)	Redfish	58	Y	80	127-732 m	Y	Y	N	Y	N	Russia	SCR 96/9
			1996	Stratified-random bottom trawl	Groundfish	76	Y	Unknown	127-914 m	Y	Y	N	N	N	Russia	SCR 97/8
		Apr-Jul	1987-96 (no 1994)	Stratified-random bottom trawl	*Sebastes marinas*	76-131	Y		0-914 m	Y	Y	-	Y	-	Russia	SCR 97/9
Canadian groundfish survey	3M	Jan-Feb	1977-85	Stratified-random	Groundfish	108-142	Y	100	120-720 m	Y	Y	Y	Y	Y	Canada	SCR 83/29
		Sep-Oct	1996	Stratified-random bottom trawl	Groundfish	68	Y	Unknown	127-731	Y	Y	Y	Y	Y	Canada	SCR 97/42

Redfish in Division 3M (continued)

Canadian groundfish survey	3M	Nov-Dec	1996	Stratified-random bottom trawl	Groundfish	18	Y	Unknown	731-1463 m	Y	Y	Y	Y	Y	Canada	SCR 97/42
EEC groundfish survey	3M	Jul-Aug	1988-90	Stratified-random	Groundfish	113-116	Y	100	120-720 m	Y	Y	Y	Y	Y	EEC	SCR 91/95
		Jun-Jul	1991			117	N	100	280-476 m	Y	Y	Y	Y	Y	EEC	SCR 92/27
			1992			117	N	100	to 720 m	N	Y	Y	Y	Y	EEC	SCR 93/19 93/24
			1993			101	N	100	to 720 m	Y	Y	Y	Y	Y	EEC	SCR 94/22
		Jul	1994			116	N	100	to 720 m	Y	Y	Y	Y	Y	EEC	SCR 95/26
EU groundfish	3M		1995			121	N	100	to 720 m	Y	Y	Y	Y	Y	EU	SCR 96/54
		Jun-Jul	1996			117	N	Unknown	to 720 m	Y	Y	Y	Y	Y	EU	SCR 97/28
		Jul-Aug	1997			117	N	100	to 720 m	Y	Y	Y	Y	Y	EU	SCR 98/30
		Jul-Aug	1998			119	N	100	to 730 m	Y	Y	Y	Y	Y	EU	SCR 99/22
		Jul	1999			117	N		127-730 m	Y	Y	Y	Y	Y	EU	SCR 00/9
Japan deepwater survey	3L, 3M	Mar-Apr	1995	Stratified-random bottom trawl	Greenland halibut	58 – 3L 131 – 3M	N	3L – ? 3M – 100	3L – 400-700 fm 3M – 300-800 fm	N	Y	N	N	N	Japan	SCR 95/48

Stock name: American plaice in Division 3M

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
Canadian groundfish survey	3M	Jan-Feb	1977-85	Stratified-random bottom trawl	Groundfish	34-142		100	130-728 m	Y	Y	Y	Y	Y	Canada	SCR 92/76
		Sep-Oct <731 m Nov >73 m	1996	Stratified-random with Campelen	Groundfish	68	Y	100 for most species	127-1400 m	Y	Y	Y	Y	Y	Canada	SCR 97/42
USSR trawl & acoustic survey	3M	Apr-Jul	1977-93	Stratified-random bottom trawl & acoustic	Groundfish	52-110		100	120-720 m	Y	Y	-	Y	Y	USSR	SCR 88/24 94/12 SCS 94/3
USSR Survey	3M	Spring Summer	1972-91	Fixed station 1972-83 Stratified-random 1984-91	Groundfish	19-76 120	Y	100	75-720	Y	Y	N	Y	N	Russia	SCS 91/5 92/12 SCR 90/71 91/60
EEC Survey	3M	Jul	1988	Stratified-random bottom trawl	Cod	120	Y	100	120-170	Y	Y	Y	Y	Y	EEC	SCR 89/60
			1989			129	N									SCR 90/68
		Jul-Aug	1990		Groundfish	113	N	100	75-720 m	Y	Y	Y	Y	Y	EEC	SCR 91/28
		Jun-Jul	1991			117	N	100	120-720 m	Y	Y	Y	Y	Y	EEC	SCR 92/27
			1992			117	N	100	720 m	Y	Y	Y	Y	Y	EEC	SCR 93/19
			1993			101	N	100	720 m	Y	Y	Y	Y	Y	EEC	SCR 94/22
EU survey			1994			116	N	100	720 m	Y	Y	Y	Y	Y	EU	SCR 95/26
			1995			121	N	100	720 m	Y	Y	Y	Y	Y	EU	SCR 96/54

American plaice in Division 3M (continued)

EU survey	3M	Jun-Jul	1996	Stratified-random bottom trawl	Groundfish	117	N	100	720 m	Y	Y	Y	Y	Y	EU	SCR 97/28
		Jul-Aug	1997			117	N	100	720 m	Y	Y	Y	Y	Y	EU (Spain & Portugal)	SCR 98/30
			1998			119	N	100	730 m	Y	Y	Y	Y	Y	EU (Spain & Portugal)	SCR 99/22
		Jul	1999			117	N	100	730 m	Y	Y	Y	Y	Y	EU (Spain & Portugal)	SCR 00/9
EEC tagging survey	3M	Feb-Apr	1991-92	Cod tagging	Cod	58	N	-	-	-	-	-	-	-	EEC	SCR 92/29 93/16

Stock name: Cod in Divisions 3N and 3O

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abun-dance	bio-mass					
Canadian spring groundfish survey	3NO	Apr-Jun	1971-90	Stratified-random Bottom trawl	Groundfish Cod Flounder	195		100	31-200 fm	Y	Y	Y	Y	Y	Canada	
			1991			173	Y	100	31-400 fm	Y	Y	Y	Y	Y	Canada	SCR 91/83
			1992			209	Y	100	31-200 fm	Y	Y	Y	Y	Y	Canada	SCR 92/75
			1993-2000			160	Y	100	30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 93/90 94/87 95/70 96/80 97/70 98/65 99/62
Canadian autumn groundfish survey	3NO	Nov	1st survey in 1990	Stratified-random bottom trawl	Groundfish	201	Y	100	31-300 fm	Y	Y	Y	Y	Y	Canada	SCR 91/83
			1991			151	Y	100	31-300 fm	Y	Y	Y	Y	Y	Canada	SCR 92/75
			1992-98			160	Y	100	31-400 fm (extended to 800 fm in autumn 1998)	Y	Y	Y	Y	Y	Canada	SCR 93/90 94/87 95/70 96/80 97/70 98/65 99/62
Canadian juvenile flatfish	3NO	Aug-Sep	1989-94	Stratified-random bottom trawl	Groundfish		Y	100	30-150	Y	Y	Y	Y	Y	Canada	SCR 95/59 96/80

Cod in Divisions 3N and 3O (continued)

USSR spring survey	3NO	Apr-Jun	1972-89	Fixed station 1972-82 Stratified-random 1983-89 Trawl acoustic Since 1986	Groundfish	190		100	31-400 fm	Y	Y	Y	Y	Y	USSR	
			1990			115	Y	100	31-400 fm	Y	Y	Y	Y	Y	USSR	SCR 91/5
			1991			131	Y	100	31-400 fm	Y	Y	Y	Y	Y	USSR/ Russian	SCR 92/13
Russian trawl acoustic survey	3MLNO	Apr-Jul	1971-93	Groundfish/ Acoustic	Cod Redfish Capelin American plaice Witch flounder	316	Full	3M-100 3L-70 3N-100 3O-100	50-700 m	Y	Y	Y	Y	Y	Russia	SCR 94/12
EU-Spain	3NO Reg. area	May	1995-99	Stratified-random Lofoten	Groundfish	112-137	N	20	1100 m	Y	Y	N	Y	N	EU-Spain	SCR 95/55 96/49 97/25 98/48 99/57 00/46

Stock name: Redfish in Divisions 3LN

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
Canadian groundfish (covering deepwater strata)	3L	Various	1978-99	Stratified-random bottom trawl	Multi-species	Min. of 40 in depths >183 m	Y	Unknown	to 732 m 1994, 1996, 1997 (over 732 m)	Y	Y	Y	Y	Sometimes	Canada	SCR 91/90 92/80 93/73 94/54 95/69 96/76 97/64 98/74 99/65 00/52
Canadian redfish	3L	Jan	1990	Stratified-random bottom trawl	Redfish	55	Y	Unknown	183-732 m	Y	Y	Y	Y	Y	Canada	SCR 90/87
Canadian groundfish	3LN	Apr-May	1990-92	Stratified-random bottom trawl	Groundfish	60-70 in redfish depths	Y	Unknown	to 732 m	Y	Y	Y	Y	Y	Canada	SCR 93/80
			1993			90 in redfish depths										SCR 94/54
			1994-99			-	Y	Unknown	to 732 m	Y	Y	Y	Y	Y	Canada	SCR 95/69 96/76 97/64 98/74 99/65 00/52
	3L	Aug	1990	Stratified-random bottom trawl	Redfish	125	Y	Unknown	183-732 m	Y	Y	Y	Y	Y	Canada	-

Redfish in Divisions 3LN (continued)

Canadian groundfish	3LN	Aug	1991			60-70 in redfish depths										SCR 92/80
			1993			59 – 3L 47 – 3N										SCR 94/54
	3LN	Oct-Dec	1990-91	Stratified-random bottom trawl	Groundfish	161 – 3L 30 – 3N	Y	Unknown	to 732 m	Y	Y	Y	Y	N	Canada	SCR 91/90 92/80
			1992			160-185 – 3L 60-70 – 3N	Y	Unknown	to 732 m	Y	Y	Y	Y	N	Canada	SCR 93/73
			1993			99 – 3L 29 – 3N	Y	Unknown	to 732 m	Y	Y	Y	Y	N	Canada	SCR 94/54
			1994-99			-	Y	Unknown	to 732 m	Y	Y	Y	Y	N	Canada	SCR 95/69 96/76 97/64 98/74 99/65 00/52
Canadian deepwater	3KLM	Sep	1991	Stratified-random bottom trawl	Greenland halibut	-	-	-	750-1500 m	Y	Y	-	Y	Y	Canada	SCR 95/51
	3KLMN	Feb-Mar	1994			-	-	-	550-1500 m	Y	Y	-	Y	Y	Canada	SCR 95/51
		Mar-Apr	1995			-	-	-	500-1500 m	Y	Y	-	Y	Y	Canada	SCR 95/51
USSR groundfish	3LN	Apr-Jul (mostly)	1971-82	Fixed station Bottom trawl	Multi-species Groundfish	50-60 per Div.	Y	Unknown	1972-76: to 367m 1977-82: to 732 m	Y Y	Y Y	Y Y	Y Y	Some-times	USSR	SCR 86/66
		Apr-Jun (mostly)	1983-90	Stratified-random Bottom trawl	Multi-species	-	Y	Unknown	to 732 m	Y	Y	Y	Y	Some-times	USSR	SCR 91/6

Redfish in Divisions 3LN (continued)

Russian groundfish	3LN	Apr-Jun	1991	Stratified-random Bottom trawl	Groundfish	82 – 3N 100 – 3L	Y	Unknown	to 732 m	Y	Y	Y	Y	Some-times	Russia	SCR 92/12
		Apr-May	1993			33 – 3L 42 – 3N	Y	Unknown	to 732 m	Y	Y	Y	Y	Some-times	Russia	SCR 94/13
	3L	Jun-Jul	1994			48		Unknown	to 732 m	Y	Y	Y	Y	Some-times	Russia	SCR 95/13
USSR acoustic	3LN	Apr-Jul	1987-91, 1993	Acoustic	Multi-species	unknown midwater sampl.	Y	Unknown	to 732 m	Y	Y	Y	Y	Some-times	USSR	SCR 88/24 89/6 90/9 91/6 92/12 94/13

Stock name: American plaice in Divisions 3L, 3N and 3O

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
Canadian Groundfish (Spring)	3LNO	Spring Apr-May	1971-90	Stratified-random bottom trawl	Groundfish	~400		100	Bottom depths to 336 m[1]	Y	Y	Y	Y	Y	Canada	
			1991			350	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR91/93
			1992			320	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 92/79
			1993			320	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 93/91
			1994			350	Y	95	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 94/55 95/62
		Apr-Jun	1995	Otter-trawl – Engels	Groundfish	325	Y	95	to 730 m	Y	Y	Y	Y	Y	Canada	SCR 96/75
			1996	Otter-trawl – Campelen	Groundfish	356	Y	95	to 730 m	Y	Y	Y	Y	Y	Canada	SCR 97/60
			1998	Stratified-random Campelen	Groundfish	310	Y	95	to 730 m	Y	Y	Y	Y	Y	Canada	SCR 98/69
			1999			-	Y	95	to 730 m	Y	Y	Y	Y	Y	Canada	SCR 99/40
			2000			310	Y	95	to 730 m	Y	Y	Y	Y	Y	Canada	SCR 00/41

[1] Depth range extended from 366 m to 731 m in 1990

American plaice in Divisions 3L, 3N and 3O (continued)

Canada Ground-fish (autumn)	3L	Autumn Oct-Nov	1981-89	Stratified-random bottom trawl	Groundfish	~180		~50	Bottom depths to 366 m	Y	Y	Y	Y	N	Canada	
	3LNO		1981-90 (3L) 1990 (3NO)			180 350	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 91/93
			1991			219 – 3L 151- 3NO	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 92/79
			1992			220 – 3L 160 – 3NO	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 93/91
			1993			160 – 3L 160 – 3NO	Y	95	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 94/55
			1994			160 – 3L 160 – 3NO	Y	95	Bottom depths to 731 m	Y	Y	Y	Y	Y	Canada	SCR 95/62
		Sep 95-Jan 96	1995/96	Campelen		332	Y	95	to 730 m	Y	Y	Y	Y	Y	Canada	SCR 96/75
		Sep-Dec	1996			353	Y	95	to 1500 m	Y	Y	Y	Y	Y	Canada	SCR 97/60
			1997	Stratified-random Campelen		386	Y	100	to 1460 m	Y	Y	Y	Y	Y	Canada	SCR 98/69
			1998			-	Y	100	to 1460 m	Y	Y	Y	Y	Y	Canada	SCR 99/40
			1999			386	Y	100	to 1460 m	Y	Y	Y	Y	Y	Canada	SCR 00/41

American plaice in Divisions 3L, 3N and 3O (continued)

Juvenile flatfish	3LNO	Autumn Aug-Sep	1985-89	Stratified-random bottom trawl	American Plaice	250		90	Bottom depths to 183 m	Y	Y	Y	Y	N	Canada	SCR 88/28 89/71 90/76
			1990			200	Y	90	Bottom depths to 183 m	Y	Y	Y	Y	Y	Canada	SCR 91/81
			1991			206	Y	90	Bottom depths to 183 m	Y	Y	Y	Y	Y	Canada	SCR 92/78
			1992			250	Y	90	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 93/71
			1993			260	Y	90	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 94/56
			1994			197	Y	90	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 95/59
USSR Groundfish	3LNO	Spring Apr-Jun	1972-90	Fixed station up to 1982. 1983-90 Stratified-random bottom trawl	Groundfish	350-400	Y	100	<57 to 731 m	Y	Y	Y	Y	Y	USSR	SCR 91/60
			1991	Stratified-random bottom trawl	Groundfish	229	Y	100	<57 to 731 m	Y	Y	Y	Y	Y	USSR	SCS 92/12
EU-Spain	3NO Reg. area	May	1995	Stratified-random Lofoten	Groundfish	77	N	10	to 1100 m	Y	Y	N	Y	N	Spain	SCR 95/55
			1996			112	N	10	600 fm	Y	Y	N	Y	N	Spain	SCR 96/49
		Apr-May	1997			128	N	10	700 fm	Y	Y	N	Y	N	Spain	SCR 97/25
		May	1998			124	N	10	800 fm	Y	Y	N	Y	N	Spain	SCR 98/48
			1999			117	N	10	800 fm	Y	Y	N	Y	N	Spain	SCR 99/57

American plaice in Divisions 3L, 3N and 3O (continued)

EU-Spain	3NO Reg. Area	May	2000	Stratified-random Padreira	Groundfish	137	N	10	to 1460 m	Y	Y	N	Y	N	Spain	SCR 00/46
Canadian DFO-Industry Co-operative	3NO	Quarterly in 1997-98 (12 surveys)	1996-99	Grid survey with commercial Engel trawl (unlined)	Yellowtail (by-catches of cod, A. plaice)		Y	20	45-90 m	N	N	N	N	N	Canada	SCR 97/31 98/73 99/42 00/42
Canadian DFO-Industry Co-operative A. plaice survey	3LNO	Nov-Dec	1998	Stratified-random commercial Engel (unlined)	American plaice	241	Y	95	to 731 m	Y	Y	N	Y	N	Canada	SCR 99/55

Stock name: Yellowtail flounder in Divisions 3L, 3N and 3O

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
Canadian groundfish spring survey	3LNO	Apr	1971-90	Stratified-random bottom trawl	Cod American plaice Yellowtail flounder	410	-	100	32-366 m	Y	Y	Y	Y	N	Canada	
		Apr-May	1991	Stratified-random bottom trawl	Groundfish	350	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	N	Canada	SCR 91/80
			1992			320	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	N	Canada	SCR 92/61
		Apr-Jun	1993			320	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	N	Canada	SCR 93/76
			1994			350	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	N	Canada	SCR 94/44
			1995			317	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	N	Canada	SCR 95/74
			1996			298	Y	100	Bottom depths to 731 m	Y	Y	Y	Y	N	Canada	SCR 96/74
			1996			356	Y	100	51 to 941 m	Y	Y	Y	Y	Y	Canada	SCR 97/72

Yellowtail flounder in Divisions 3L, 3N and 3O (continued)

Canadian groundfish spring survey	3LNO	Apr-Jun	1997	Stratified-random bottom trawl	Groundfish	310	Y	100	51 to 941 m	Y	Y	Y	Y	Y	Canada	SCR 98/72
			1998			336	Y	100	51 to 941 m	Y	Y	Y	Y	Y	Canada	SCR 99/44
			1999			243	Y	100	51 to 941 m	Y	Y	Y	Y	Y	Canada	SCR 00/35
Autumn juvenile flatfish survey	3LNO	Aug-Sep	1985-89	Stratified-random bottom trawl	Yellowtail flounder Groundfish	250		90	32-183 m	Y	Y	Y	Y	N	Canada	
			1990			200	Y	90	32-183 m	Y	Y	Y	Y	Y	Canada	SCR 91/80
			1991			206	Y	90	32-183 m	Y	Y	Y	Y	Y	Canada	SCR 92/61
			1992			250	Y	100	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 93/76
			1993			260	Y	100	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 94/44
			1994			195	Y	100	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 95/59
			1995			195	Y	100	Bottom depths to 273 m	Y	Y	Y	Y	Y	Canada	SCR 96/74

Yellowtail flounder in Divisions 3L, 3N and 3O (continued)

Canadian groundfish autumn survey	3L 3NO	Oct-Nov	1981-90 1990	Stratified-random bottom trawl	Groundfish	350	Y	100	Bottom depths to 731 m[1]	Y	Y	Y	Y	Y	Canada	SCR 91/80
	3LNO		1991			219 – 3L 151 = 3NO	Y	100	to 731 m	Y	Y	Y	Y	Y	Canada	SCR 92/61
			1992			220 – 3L 160 – 3NO	Y	100	to 731 m	Y	Y	Y	Y	Y	Canada	SCR 93/76
			1993			160 – 3L 160 – 3NO	Y	100	to 731 m	Y	Y	Y	Y	Y	Canada	SCR 94/44
			1994			348	Y	100	to 731 m	Y	Y	Y	Y	Y	Canada	SCR 95/74
			1995			237	Y	100	to 731 m	Y	Y	Y	Y	Y	Canada	SCR 96/25
			1996			353	Y	100	51-1437 m	Y	Y	Y	Y	Y	Canada	SCR 97/72
			1997			386	Y	100	51-1437 m	Y	Y	Y	Y	Y	Canada	SCR 98/72
			1998			317	Y	100	51-1437 m	Y	Y	Y	Y	Y	Canada	SCR 99/44
			1999			315	Y	100	51-1437 m	Y	Y	Y	Y	Y	Canada	SCR 00/35
USSR groundfish spring survey	3LNO	Apr-Jun	1983-89	Fixed Station up to 1972-82 Stratified-random bottom trawl 1983-89	Yellowtail flounder Groundfish	350-400		100	<37-730 m	Y	Y	Y	Y	Y	USSR	

[1] Extended from 366 m to 731 m in 1990.

Yellowtail flounder in Divisions 3L, 3N and 3O (continued)

USSR groundfish spring survey	3LNO	Apr-Jun	1990	Stratified-random bottom trawl	Groundfish	350-400	Y	100	<37-130 m	Y	Y	Y	Y	Y	USSR	SCR 91/61
			1991			229	Y	100	<57-731 m	Y	Y	Y	Y	Y	Russian	SCS 92/12
Spanish groundfish spring survey	3NO Reg. Area	May	1995-96			112	N	Unknown	Bottom depths to 1100 m	Y	Y	N	Y	N	EU-Spain	SCR 96/49
		Apr-May	1997			106	N	Unknown	45 to 1280 m	Y	Y	N	N	N	EU-Spain	SCR 97/25
			1998			124	N	Unknown	45 to 1280 m	Y	Y	N	N	N	EU-Spain	SCR 98/48
		May	1999			117	N	Unknown	45 to 1464 m	Y	Y	N	N	N	EU-Spain	SCR 99/57
			2000			124	N	Unknown	45 to 1280 m	Y	Y	N	N	N	EU-Spain	SCR 00/46
Canadian DFO/Industry	3NO	Summer 1996 Winter 1997 Spring 1997	1996-97	Grid survey with fixed stations	Yellowtail flounder	81	Y	80	45-90 m	N	N	N	Y	N	Canada	SCR 97/31
		Summer 1997 Autumn 1997 Winter 1998	1997-98			285	Y	80	45-90 m	N	N	N	Y	N	Canada	SCR 98/73
		Spring 1998 Summer 1998 Autumn 1998 Winter 1999	1998-99			287	Y	80	45-90 m	N	N	N	Y	N	Canada	SCR 99/42
		Spring 1999 Summer 1999	1999			285	Y	80	45-90 m	N	N	N	Y	N	Canada	SCR 00/42

Stock name: Witch Flounder in Divisions 3N and 3O

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
Canadian groundfish survey spring	3NO	Spring	1971-89	Stratified-random bottom trawl	American plaice Yellowtail flounder Cod			Variable (minimal for witch)	<366 m	N	N	Y	Y	N	Canada	
		Apr-May	1990	Stratified-random bottom trawl	Groundfish	173		Variable (minimal for witch)	<366 m	Y	Y	Y	Y	Y	Canada	
			1991			184		Variable (minimal for witch)	731 m	Y	Y	Y	Y	Y	Canada	
		Apr-Jun	1992		Groundfish Cod Flounder	160	Y	100	30-400 fm	Y	Y	Y	Y	Y	Canada	
			1993				Y	100	30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 94/49
			1994				Y	100	30-400 fm	Y	Y	N	Y	Y	Canada	SCR 95/63
			1995-97				Y	90	30-400 fm.	Y	Y	N	Y	Y	Canada	SCR 98/49
			1998		Multispecies		Y	90	30-800 fm	Y	Y	N	Y	Y	Canada	SCR 99/34
			1999		Groundfish	315	Y	100	51 to 941 m	Y	Y	N	Y	Y	Canada	SCR 00/14
Canadian goundfish survey autumn	3NO	Autumn	First survey - 1990	Stratified-random bottom trawl	Groundfish	201		Variable	<548 m	Y	Y	Y	Y	Y	Canada	

Witch Flounder in Divisions 3N and 3O (continued)

Canadian goundfish survey autumn	3NO	Autumn	1991	Stratified-random bottom trawl	Groundfish	151		Variable	<548 m	Y	Y	Y	Y	Y	Canada	
			1992		Groundfish Cod Flounder	160	Y	100	30-400 fm	Y	Y	Y	Y	Y	Canada	
		Nov	1993				Y	100	30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 94/49
			1994				Y	100	30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 95/63
			1995-97				Y	90	30-300 fm	Y	Y	Y	Y	Y	Canada	SCR 98/49
			1998				Y	90	30-800 fm	Y	Y	Y	Y	Y	Canada	SCR 99/34
		Oct-Nov	1990-99		Groundfish	683 – 3N 750 – 3O	Y	100	51 to 1437 m	Y	Y	Y	Y	Y	Canada	SCR 99/34
USSR groundfish	3NO	Apr-Jun	1972-90	Fixed stations 1972-82, Stratified-random 1983-90 all with bottom trawl	Groundfish	115		Variable	<731 m	Y	Y	N	Y	N	USSR	SCS 91/5 SCR 91/56
			1991	Stratified-random bottom trawl	Groundfish	131		Variable	<731 m	Y	Y	-	Y	Y	USSR	SCS 92/12
Spanish groundfish spring survey	3NO Reg. Area	May	1995-97			77	N	100	30-400 fm	Y	Y	N	Y	N	EU-Spain	SCR 95/55
			1998			77	N	25	30-400 fm	Y	Y	N	Y	N	EU-Spain	SCR 98/48
			1999			117	N	35	30-800 fm	Y	Y	N	Y	N	EU-Spain	SCR 99/57
		Apr-May	2000			118	N	Unknown	45 to 1500 m	Y	Y	N	N	N	EU-Spain	SCR 00/46

Stock name: Capelin in Divisions 3L, 3N and 3O

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
Canadian acoustic survey	3L	Apr May	1982-84 1985-90	Acoustic survey mid-water trawl	Capelin	23	Y	60	0-200 m	Y	Y	Y	Y	Y	Canada	SCR 91/37
		May	1992			26	Y	70	0-500 m	Y	Y	Y	Y	Y (from L-W. reg.)	Canada	SCR 92/57
	3NO	Jun	1981-89	Acoustic survey mid-water trawl	Capelin	-	Y	80	0-80 m	Y	Y	Y	Y	Y	Canada	SCR 90/61
		Jun-Jul	1992			-	Y	80	0-80 m	Y	Y	Y	Y	Y	Canada	SCR 93/21
Russian acoustic survey	3INO	May-Jun	1982-91	Acoustic survey mid-water trawl	Capelin	55	Y	70	0-500 m	Y	Y	Y	Y	Y	Russia	SCR 92/1
Russian groundfish survey	3MNLO	Apr-Jul	1971-93	Groundfish Capelin	Cod Redfish Capelin American plaice Witch flounder	316	Fill	3M – 100 3L – 70 3N – 100 3O – 100	50-700 m	Y	Y	Y	Y	Y	Russia	SCR 94/14

Stock name: **Groundfish (Cod in Subdivision 3Ps)**

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abun-dance	bio-mass	ALK	LF			
ERHAPS 901	3Ps	Feb-Mar	1978-90	Bottom trawl	Cod American plaice All groundfish	107	N	100	0-600 m	Y	Y	Y	Y	Y	E-FRA FRA-SP	-
ERHAPS 911	3Ps	Feb-Mar	1978-91	Bottom trawl	Cod American plaice All groundfish	89	N	100	0-600 m	Y	Y	Y	Y	Y	E-FRA FRA-SP	-

Stock name: Roundnose grenadier in Subareas 2 + 3

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
USSR Greenland Halibut Survey	2GH + 3K	Nov	1979-90	Stratified-random bottom trawl	Groundfish	?	-	?	to 1500 m	N	N	Y	Y	Y	USSR	SCR 90/6 91/8
		Sep-Oct, Nov-Dec	1991			-	-	-	200-1500 m	N	N	N	Y	N	USSR	SCR 92/9
		Oct	1992			-	-	-	200-1500 m	N	N	Y	Y	Y	USSR	SCR 93/12
Canada autumn groundfish survey	2GHJ + 3KLMNO	Oct-Nov Sep-Dec	1978-99	Stratified-random bottom trawl	Multi-Groundfish	-	Y	?	30-1500 m	Y	Y	N	Y	N	Canada	SCR 98/57
Japan bottom trawl survey	2GH	Aug	1996-97	Bottom trawl	Mixed	151	Y	?	to 1500 m	N	Y	N	Y	N	Japan	
Canadian Deepwater	3KLM	Sep	1991	OTB-Engel	Mixed	106	Y	?	750-1500 m	Y (3KLM only)	Y (3KLM only)	N	Y	N	Canada	SCR 95/51
	3KLMN	Feb-Mar	1994			131	Y	?	50-1500 m	Y (3KLM only)	Y (3KLM only	N	Y	N	Canada	SCR 95/51
		Mar-Apr	1995			142	Y	?	500-1500 m	Y	Y	N	Y	N	Canada	SCR 95/51

Stock name: Roughhead grenadier in Subareas 2 and 3

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
Canadian spring survey	3LNO	May-Jul	1978-99	Stratified-random	Groundfish	330	Y	?	to 800 fm	+	+	N	+	N	Canada	
Canada autumn survey	2GH 3MLNO	Sep-Dec	1978-99			750	Y	?	to 400 fm	+	+	N	+	N	Canada	
Canadian deepwater	3KLMN	Sep-Mar Feb-Mar Mar-Apr	1991 1994 1995			106 131 142	Y	?	750-1500 m 550-1500 m 500-1500 m	Y	Y	N	Y	N	Canada	SCR 95/51
Spanish spring surveys	3NO	Apr-May	1995-2000	Stratified-random (Pedreira)	Groundfish	118	N		50-1500 m	+	+	+	+	+	EU-Spain	SCR 00/46
Flemish Cap surveys	3M	Jun-Aug	1988-99	Stratified-random (Lofoten)	Groundfish	117	N		50-1500 m	+	+	+	+	+	EU	SCR 00/9

Stock name: Cod in Divisions 2J, 3K and 3L

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
Spring groundfish survey	3L	May-Jun	1971-92	Stratified-random bottom trawl	Groundfish Cod Flounder	200	Y	100	31-400 fm	Y	Y	Y	Y	Y	Canada	
			1993		Groundfish		Y		30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 94/40
			1994-95			160	Y		30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 95/60 96/62
			1996-99			160	Y		30-800 fm	Y	Y	Y	Y	Y	Canada	SCR 97/59 98/46 99/28 00/33
Autumn groundfish survey	2J3K	Oct-Dec	1978-92	Stratified-random bottom trawl	Groundfish Cod Flounder	505	Y	100	2J3K 100-1000 m 3L, 3O 400 fm	Y	Y	Y	Y	Y	Canada	
			1993		Groundfish		Y		100-1000 m	Y	Y	Y	Y	Y	Canada	SCR 94/40
			1994-99			400	Y	100	100-1000 m	Y	Y	Y	Y	Y	Canada	SCR 95/60 96/62 97/59 98/46 99/28 00/33
	3L	Oct-Nov	1981-98	Stratified-random bottom trawl	Groundfish	160	Y		30-400 fm	Y	Y	Y	Y	Y	Canada	SCR 94/40 95/60 97/59 98/46 99/28

Cod in Divisions 2J, 3K and 3L (continued)

Winter acoustic	2J3KL	Feb	1993 (Since 1987)	Acoustic Bottom trawl	Cod	-	Y	?	0-1000 m	Y	Y		Y		Canada	
Summer acoustic	2J3KL	Jun-Jul	1993 (Since 1990)	Acoustic Bottom trawl	Cod	-	Y	?	0-600 m	Y	Y		Y	Y	Canada	
Acoustics	3KL	May-Jun	1971-94	Acoustic	Cod		Y		30-400 fm	N	N	Y	Y	N	Canada	
		Apr	1996	Acoustic	Cod		Y			N	Y	Y	Y	N	Canada	SCR 97/49
		Oct-Dec	1997	Acoustic	Cod Herring		N		<120 m	N	Y	Y	Y	N	Canada	SCR 98/46
	3L	Jun-Jul	1971-93	Acoustic	Cod		Y		30-400 fm	N	N	Y	Y	N	Canada	
			1994				Y		30-400 fm	N	N	Y	Y	N	Canada	
		Apr	1997	Acoustic	Cod		Y		30-800 fm	N	Y	Y	Y	N	Canada	SCR 97/49
Juvenile cod	2J3KL	Dec-Jan(94)	1977-93	Line	Groundfish		Y		100-1000 m	N	N	Y	Y	N	Canada	SCR 94/40 95/60
		Aug-Sep	1992-99	Fixed station	0-group cod	100-150	Y	70	30-400 fm	Y	N	Y	Y	N	Canada	SCR 97/41 98/46 99/28 00/33
	3L	Oct-Nov	1989-94	Line	Cod		Y		30-150 fm	N	N	Y	Y	N	Canada	
Juvenile flatfish	3L	Aug-Sep	1989-94	Stratified-random bottom trawl	Groundfish		Y		30-150 fm	Y	Y	Y	N	N	Canada	SCR 95/59
Juvenile cod-capelin	3KL	Sep-Oct	1989-94	Line	Cod Capelin		Y		30-150 fm	N	N	Y	Y	N	Canada	
Russian groundfish	3L	May-Jun	1993-94	Stratified-random bottom trawl	Groundfish	74	Y		30-400 fm	Y	Y	Y	Y	Y	Russia	

Stock name: Witch flounder in Divisions 2J + 3KL

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS / SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abun-dance	bio-mass					
Canadian Autumn Groundfish	2J, 3K, 3L	Oct-Dec	1978-99 2J3K 1981-99 3L	Stratified-random Engel trawl 1978-94 2J3K Yankee trawl 1981-82 3L Engel trawl 1984-94 3L Campelen Trawl all areas 1995-99	Groundfish (Cod, flounders, G. halibut, Redfish & shellfish)	439 in 1999	Y	This column not appropriate for this species given differences in depth coverage and areas covered in the surveys.	2J3K in 1997 123-1488 m 3L in 1997 35-1436 m	Y	Y	Y	Y	Y	Canada	SCR 00/12

Stock name: Greenland halibut in Subarea 2 and Divisions 3K and 3L

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
USSR/Greenland halibut survey	Subarea 1	Oct.	1987-88	Stratified-random bottom trawl	Greenland halibut	68	-	80	200-1500 m	Y	Y	Y	Y	Y	USSR	
	Div. 0B	Oct-Dec	1979-89	Stratified-random bottom trawl	Greenland halibut	73	-	90	200-1500 m	Y	Y	Y	Y	Y	USSR	
	Div. 2GH	Oct-Nov	1979-89	Stratified-random bottom trawl	Greenland halibut	65	-	60	200-1500 m	Y	Y	Y	Y	Y	USSR	
	Div. 2G	Oct-Nov	1990	Stratified-random bottom trawl	Greenland halibut	21	Y	<40	200-1500 m	Y	Y	Y	Y	Y	USSR	SCS 91/5
Russian trawl survey	Div. 2GH	Oct-Nov	1991	Stratified-random bottom trawl	Greenland halibut	190	Y	<40	200-1500 m	Y	Y	Y	Y	Y	USSR/ GDR	SCR 92/22
		Nov	1992			26	Y	?	0-1500 m	Y	Y	?	?	?	Russia	SCR 93/15
USSR groundfish	Div. 3K	Jun-Jul	1972-89	Stratified-random bottom trawl (since 1983)	Groundfish	107	-	90	to 730 m	Y	Y	Y	Y	Y	USSR	SCR 90/57
	Div. 3KL	Jun-Jul	1990	Stratified-random bottom trawl	Groundfish	200-250	Y	<50	to 731 m in 3L to 1000 m in 3K	Y	Y	Y	Y	Y	USSR	SCR 91/56
USSR longline survey	2GHJ	Sep-Nov	1st survey 1990	Longline	Greenland halibut	25	Y	?	500-1500 m	Y	Y	-	Y	-	USSR	SCR 91/66
Canadian shrimp	2H,2J	Jul	1979-88	Stratified-random bottom trawl	Shrimp	N/A		N/A	200-600 m	N/A	N/A	Y	Y		Canada	
Canadian autumn groundfish survey	2J	Autumn	1977-89	Stratified-random bottom trawl	Multispecies Groundfish	122		Unknown	to 1000 m	Y	Y	Y	Y		Canada	
	3K		1978-89			151		Unknown	to 1000 m	Y	Y	Y	Y		Canada	

Greenland halibut in Subarea 2 + Divisions 3K and 3L (continued)

Canadian autumn groundfish survey	2GH	Sep-Oct	On occasion 1977-96	Stratified-random Campelen in 1996	Groundfish & shellfish	117	Y		1500 m	Y	Y	Y	Y	Y	Canada	SCR 97/30
			1997	Stratified-random Campelen	Groundfish & shellfish	140	Y		201-1382 m	Y	Y	Y	Y	Y	Canada	SCR 98/47
			1998	Stratified-random Campelen	Groundfish & shellfish	117	Y		98-1488 m	Y	Y	Y	Y	Y	Canada	SCR 99/38
			1999	Stratified-random Campelen	Groundfish & shellfish	150	Y		201-1382 m	Y	Y	Y	Y	Y	Canada	SCR 00/12
	2J3KL	Nov-Dec	1990	Stratified-random bottom trawl	Groundfish	400-500	Y	<70	to 1000 m in 2J3K to 731 m in 3L	Y	Y	Y	Y	Y	Canada	SCR 91/88
		Oct-Dec	1991-92			505	Y			Y	Y	Y	Y	Y	Canada	SCR 92/81 93/75
			1993-95				Y	100	3L 35-1436 m	Y	Y	Y	Y	Y	Canada	SCR 94/57 95/64 96/73
			1996	Stratified-random Campelen trawl		About 500	Y	-	2J3K 111-1410 m 3L 1443 m	Y	Y	Y	Y	Y	Canada	SCR 97/52
			1997			497	Y	-	2J3K 123-1488 m 3L 35-1436 m	Y	Y	Y	Y	Y	Canada	SCR 98/47
Canadian autumn groundfish survey	2J 3KL	Oct-Dec	1998	Stratified-random Campelen trawl	Groundfish	493	Y	-	2J3K 122-1415 m 3L 35-1436 m	Y	Y	Y	Y	Y	Canada	SCR 99/38

Greenland halibut in Subarea 2 + Divisions 3K and 3L (continued)

Canadian autumn groundfish survey	2J 3KL	Oct-Dec	1999	Stratified-random Campelen trawl	Groundfish	439	Y	-	2J3K 123-1488 m 3L 35-1436 m	Y	Y	Y	Y	Y	Canada	SCR 00/12
	3MNO	Sep-Dec	1996			86 – 3M 82 – 3N 61 – 3O	Y		1400 m in 3M 1147 m in 3N 690 m in 3O	Y	Y	Y	Y	Y	Canada	SCR 97/52
			1997			26 – 3M 100 – 3N 81 – 3O	Y	3M* 1997 only in deepwater Sackville Spur, Flemish Pass	1379 m in 3M 769 m in 3N 611 m in 3O	Y	Y	Y	Y	Y	Canada	SCR 98/47
			1998			26 – 3M 119 – 3N 96 – 3O	Y	3M* 1998-98 only in deepwater Sackville Spur, Flemish Pass	1436 m in 3M 1447 m in 3N 1076 m in 3O	Y	Y	Y	Y	Y	Canada	SCR 99/38
			1999			12 – 3M 68 – 3N 75 – 3O	Y	3M* 1997-98 only in deepwater Sackville Spur, Flemish Pass	1379 m in 3M 769 m in 3N 611 m in 3O	Y	Y	Y	Y	Y	Canada	SCR 00/12
Deepwater line transect	Div. 0B 2GHJ	Aug	1991	Line transect bottom trawl	Greenland halibut	30	Y	?	750-1500 m	Y	-	Y	Y	-	Canada	SCR 92/82
	3KLM	Sep	1991	Line transect bottom trawl	Greenland halibut	110	Y		750-1700 m	Y	-	Y	Y	-	Canada	SCR 92/82
Spring groundfish survey	3LNO	Apr-Jun	1971-97	Yankee 1971-82 Engel 1984-95 Campelen 1996 All surveys Stratified-random	Groundfish	About 350 in 1996 310 in 1997	Y	-	to 731 m	Y	Y	Y	Y	Y	Canada	

Greenland halibut in Subarea 2 + Divisions 3K and 3L (continued)

Canadian deepwater Survey	3KLM	Sep	1991	Stratified-random bottom trawl	Greenland halibut	106	Y	-	750-1500 m	Y	Y	Y	Y	Y	Canada	SCR 95/52
	3KLMN	Feb-Mar	1994			131	Y	100	732-1000 m	Y	Y	Y	Y	Y	Canada	SCR 95/52
		Mar-Apr	1995			142	Y	-	500-1500 m	Y	Y	Y	Y	Y	Canada	SCR 95/52
Japan groundfish	2GH	Aug	1996	Stratified-random bottom trawl	Groundfish	134	Y	-	1500 m	Y	Y	Y	Y	Y	Japan/ Canada	SCR 97/23
Japanese exploratory survey	3LM	Mar-Apr	1995	Bottom trawl (not random)	Greenland halibut	189	N	-	550-1500 m	Y	Y	N	Y	N	Japan	SCR 95/48
EU-Spain bottom trawl survey	Reg. Area 3NO	May	1995	Stratified-random bottom trawl	Groundfish	77	N	-	-	Y	Y	N	Y	N	EU-Spain	SCR 95/55
			1996			112	N	-	-	Y	Y	N	Y	N	EU-Spain	SCR 96/49
		Apr-May	1997			128	N		~1300 m	Y	Y	N	Y	N	EU-Spain	SCR 97/25
			1998			124	N		to 1500 m	Y	Y	N	Y	N	EU-Spain	SCR 98/48
			1999			117	N		to 1462 m	Y	Y	N	Y	N	EU-Spain	SCR 99/57
		May	2000			137	N		to 1462 m	Y	Y	N	Y	Y	EU-Spain	SCR 00/46
Russian groundfish survey	3LM Flemish Cap	Feb	1995				Y	-	914 m	Y		Y	Y	N	Russia	SCR 96/39
	3LM	May	1995				Y	-	731 m	Y	Y	Y	Y	N	Russia	SCR 96/8
	3M	May	1987-96			76	Y	-	to 731 m (914 m in 1996)	Y	Y	Y	Y	N	Russia	SCR 98/13

Stock name: Short-finned Squid in Subareas 3 and 4

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
Flemish Cap groundfish survey	3M	Jun-Jul	1988-91	Stratified-random bottom trawl	Cod	11>	N	<1	-	N	N	N	N	N	EU-Spain	SCR 92/27
Bottom trawl Scotian Shelf survey	SA 4	Jul	1970-98	Stratified-random bottom trawl	Multispecies		Y	?	? unknown	Y	Y	N	Y	N	Canada	SCR 98/59 99/50 00/37
September Gulf of St. Lawrence survey	SA 4 (4T)	Sep	From 1971-99	Stratified-random bottom trawl	Multispecies		N	?	?	Y	Y	N	Y	N	Canada	SCR 99/50 00/37

Stock name: Silver hake in Divisions 4V, 4W and 4X

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
Scotian Shelf groundfish survey	4VWX	Jul	1977-89	Stratified-random	Multispecies	≥ 150		100	50-250 m	Y	Y	Y	Y	Y	Canada	SCR 90/20
			1990			197	N	100	40-200 m	Y	Y	Y	Y	Y	Canada	SCR 91/42
			1991		Mixed Groundfish	195	Y	100	50-300 m	Y	Y	Y	Y	Y	Canada	SCR 92/50
			1992			-	Y	100	50-300 m	Y	Y	Y	Y	Y	Canada	SCR 93/102
			1993			-	Y	100	50-300 m	Y	Y	Y	Y	Y	Canada	SCR 94/32
Scotia Fundy summer groundfish survey	4VWX + 5	Jul	1970 to 1994	Stratified-random	Groundfish	200	Y	100	50-200 fm	Y	Y	Y	Y	Y	Canada	SCR 95/76
	4VWX		1995			-	Y	100	50-200 fm	Y	Y	Y	Y	Y	Canada	SCR 96/78
			1996			200	Y	100	50-200 fm	Y	Y	Y	Y	Y	Canada	SCR 97/69
Canada-USSR-Joint juvenile survey	4VWX	Oct-Nov	1981-89	Stratified-random	Silver hake	74	-	90	50-150 m	Y	N	N	Y	Y	Canada/ USSR	SCR 90/1 90/20
			1990	Stratified-random IGYPT trawl	Silver hake juveniles	100	N	100	40-200 m	Y	N	N	N	N	USSR/ Canada	SCR 91/1 91/2 91/42
			1991	Stratified-random IGYPT trawl	Silver hake juveniles	80	N	80-100	50-300 m	Y	N	Y	Y	Y	USSR/ Canada	SCR 92/50 92/33

Silver hake in Divisions 4V, 4W and 4X (continued)

Juvenile Silver hake survey	4WX	Oct-Nov	1993 (no 1992 survey)	Stratified-random IGYPT trawl	0-group Silver hake	96	N	60	50-400 m	Y	N	N	N	N	Canada	SCR 94/32
			1994			73	N	60	50-400 m	Y	N	N	N	N	Canada	SCR 95/76
Silver Hake 0-group survey	4VWX	Oct-Nov	1995	IYGPT Stratified-random design, 3 step oblique	Silver hake	80	N	80	50-200 fm	Y	N	N	Y	N	Canada	SCR 96/78
			1996			80	N	80	50-200 fm	Y	N	N	Y	N	Canada	SCR 97/69
Winter juvenile survey	4WX	Dec-Jan	1989-90	Stratified-random IGYPT trawl	Silver hake juveniles	50	N	100	40-200 m	Y	Y	Y	Y	Y	USSR	SCR 91/1 91/12

Stock name: Elasmobranchs in Subareas 2-6

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS / SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
Deepwater survey	SA 0	Oct	1999	Stratified-random bottom trawl	Greenland halibut	66	Y	Partial	400-1500 m	Y	Y	N	Y	N	Canada	SCR 00/31
Spring Multispecies	SA 3	Apr-Jun	1971-2000	Stratified-random	Multispecies	~200	Y	Partial	50-1100 m	Y	Y	N	Y	N	Canada	
Autumn Multispecies	SA 3	Sep-Nov	1978 to 2000	Stratified-random	Multispecies	~250	Y	All	50-1100 m	Y	Y	N	Y	N	Canada	
Spanish bottom trawl	3NO (RA)	May	1995-99	Stratified-random bottom trawl	Groundfish	137	-	-	To 800 fm	Y	Y	-	Y	Y	Spain	SCR 00/46
R/V bottom trawl survey	SA 4-6	Autumn	1963-99	Bottom trawl	Groundfish	-	-	-	-	Y	Y	N	Y	N	USA	SCR 00/19
		Spring	1968-99	Bottom trawl	Groundfish	-	-	-	-	Y	Y	N	Y	N	USA	SCR 00/19
		Winter	1992-99	Bottom trawl	Groundfish	-	-	-	-	Y	Y	N	Y	N	USA	SCR 00/19

Stock name: **Short-finned Squid in Subareas 5 and 6**

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock dis-tribution (%)	Depth Range	Research data related to stock				Indivi-dual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abun-dance	bio-mass					
Autumn Bottom Trawl	SA 5+6	Sep-Dec	From 1967-99	Stratified random bottom trawl	Multispecies		Y	?	? unknown	Y	Y	N	Y	Y	USA	SCR 98/59 00/37

Stock name: Shrimp in Divisions 3LNO

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
Multi-species spring survey	3LNO 3Ps	May-Jun	Since 1998-2000	Stratified-random bottom trawl	Groundfish Shellfish (crab, shrimp)/ capelin	272	Y	100% of area covered	30-732 m	Y	Y	N	Y	N	Canada	SCR 00/85
Multi-species autumn survey	2J 3KLNO	Oct-Dec	1995 to 2000			(376 sets done in Div. 3LNO)	Y	100% of area covered	30-1500 m	Y	Y	N	Y	N	Canada	SCR 00/85

Stock name: **Shrimp in Division 3M**

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	biomass					
EU bottom trawl survey	3M	Jul	1988-95	Stratified-random bottom trawl	All	121	N	100	80-730 m	Y	Y	N	Y	Y	EU	SCR 95/100
		Jul	1996	Stratified-random bottom trawl	All	-	N	100	80-730 m	Y	Y	N	Y	Y	EU	SCR 96/94 96/98
Faroese bottom trawl survey	3M	Jun	1997-2000	Stratified-random bottom trawl	Shrimp	61	-		100-300 fm	Y	Y	-	Y	Y	Faroe Islands	SCR 00/83

Stock name: Shrimp in Subareas 0 and 1

Surveys	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates						
										Abundance	biomass	ALK	LF			
West Greenland shrimp survey	1A-1D	Jul-Aug	1988-89	Stratified-random bottom trawl	Shrimp	140	-	-	150-600 m	Y	Y	Y	Y	Y	Greenland	
	0A, 1A-1D		1990	Stratified-random bottom trawl	*Pandalus borealis*	246	N	90(?)	15-600 m	Y	Y	N	Y	N	Greenland	SCR 91/70
	0A, 1A-1E	Jul-Sep	1991			260	N	(?)	100-600 m	Y	Y	N	Y	N	Greenland	SCR 92/55 92/67
	0A, 1A-1F	Jul-Oct	1992			213	N	(?)	0-600 m	Y	Y	N	Y	Y	Greenland	SCR 93/70 93/72
Greenland bottom trawl survey	0A, 1A-1F	Jul-Sep	1995		Northern shrimp Groundfish	194	N	95	150-600 m	Y	Y	N	Y	Y	Greenland	SCR 95/111 95/113
			1996			172	N	95	150-600 m	Y	Y	N	Y	Y	Greenland	
			1997-98			212	N	95	150-600 m	Y	Y	N	Y	Y	Greenland	SCR 98/115 98/118
			1999-2000			202	N	95	150-600 m	Y	Y	N	Y	Y	Greenland	SCR 00/78
Shrimp trawl selection studies	1A, 1B, 1C	Jul	1991	Bottom trawl	*Pandalus borealis*	77	Y	?	-	N	N	N	Y	N	Greenland	
	1B, 1C, 1D		1992			57	Y		150-600 m	N	N	N	Y	N	Greenland	
Southwest Greenland shrimp survey	1D, 1E	Oct	1991	Stratified-random bottom trawl	*Pandalus borealis*	15	N	?	150-600 m	Y	Y	N	Y	N	Greenland	

Stock name: Shrimp in Denmark Strait

Survey	Location	month(s)	Years of survey from, to or since	Type of survey and gears	Target Species	No. of Sets	24 hr fishing	Area of coverage in relation to stock distribution (%)	Depth Range	Research data related to stock				Individual weights	Country	SCS/ SCR Doc. No.
										Stock size estimates		ALK	LF			
										Abundance	bio-mass					
East Greenland Shrimp Survey	ICES Div. XIVb	Aug-Sep	1989-90	Stratified-random bottom trawl	Shrimp	99	N	?	199-653 m	Y	Y	N	Y	N	Greenland	SCR 91/52
			1991	No survey												
		Oct	1992	Stratified-random bottom trawl	Shrimp	59	N	60	150-600 m	Y	Y	N	Y	N	Greenland	SCR 93/66
			1993	No survey												
		Sep-Oct	1994-95	Spline survey bottom shrimp trawl	Northern shrimp	72	N	Main distribution area	200-600 m	No info.	4558	N	Y	N	Greenland	SCR 95/109
			1996			40	N	Not known	200-600 m	N	N	N	Y	N	Greenland	SCR 96/116

References

ANDERSON, J. T., and E. L. DALLEY. MS 1997. Year-class strength of northern cod (2J3KL) estimated from pelagic juvenile fish surveys in the Newfoundland Region, 1994, 1995 and 1996. *NAFO SCR Doc.*, No. 41, Serial No. N2875, 14 p. (+corrigendum)

ATKINSON, D. B., M. J. MORGAN, W. B. BRODIE, B. SMITH, and G. GREGORY. MS 1999. Results of a 1998 Canadian industry survey for American plaice in NAFO Divisions 3LNO with comparisons to results from Canadian fall DFO survey. *NAFO SCR Doc.*, No. 55, Serial No. N4114, 9 p.

BAIRD, J. W., C. A. BISHOP, and E. F. MURPHY. MS 1991. An assessment of the cod stock in NAFO Div. 3NO. *NAFO SCR Doc.*, No. 83, Serial No. N1967, 33 p.

MS 1992. An assessment of the cod stock in NAFO Div. 3NO. *NAFO SCR Doc.*, No. 75, Serial No. N2130, 28 p.

BAKENEV, V. S. MS 1992. Results from acoustic capelin surveys in Div. 3LNO and 2J+3KL in 1991. *NAFO SCR Doc.*, No. 1, Serial No. N2034, 12 p.

BAKENEV, V. S., and T. M. SERGEEVA. MS 1994. Results of acoustic survey for capelin (*Mallotus villosus*) in NAFO Divisions 3LNO in 1993. *NAFO SCR Doc.*, No. 14, Serial No. N2377, 5 p.

BECH, G. MS 1993. Survey biomass and abundance of Greenland halibut (*Reinhardtius hippoglossoides*) and redfish (*Sebastes* spp.) in Greenland trawl survey 1992 (NAFO Subarea 1). *NAFO SCR Doc.*, No. 52, Serial No. N2235, 8 p.

MS 1994. Biomass and abundance of Greenland halibut (*Reinhardtius hippoglossoides*) and redfish (*Sebastes* spp.) from a bottom trawl survey in NAFO Subarea 1 in 1993. *NAFO SCR Doc.*, No. 9, Serial No. N2367, 12 p.

MS 1995a. Recruitment of Greenland halibut at West Greenland. *NAFO SCR Doc.*, No. 19, Serial No. N2526, 12 p.

MS 1995b. An assessment of the inshore Greenland halibut stock component in NAFO Division 1A. *NAFO SCR Doc.*, No. 67, Serial No. N2582, 9 p.

BECH, G., J. BOJE, and C. B. PEDERSEN. MS 1996. An assessment of the inshore Greenland halibut stock component in NAFO Division 1A. *NAFO SCR Doc.*, No. 68, Serial No. N2744, 22 p.

BISHOP, C. A., J. T. ANDERSON, E. COLBOURNE, G. R. LILLY, and R. A. MYERS. MS 1995. Cod in NAFO Divisions 2J+3KL. *NAFO SCR Doc.*, No. 60, Serial No. N2575, 15 p.

BISHOP, C. A., J. ANDERSON, E. DALLEY, M. B. DAVIS, E. F. MURPHY, G. A. ROSE, D. E. STANSBURY, C. TAGGART, G. WINTERS, and D. METHVEN. MS 1994. An assessment of the cod stock in NAFO Divisions 2J+3KL. *NAFO SCR Doc.*, No. 40, Serial No. N2410, 50 p.

BOJE, J. and N.-R. HAREIDE. MS 1993. Trial deepwater longline fishery in the Davis Strait, May–June 1992. *NAFO SCR Doc.*, No. 53, Serial No. N2236, 6 p.

BOWERING, W. R. MS 1987. Distribution and abundance of Greenland halibut in Davis Strait (NAFO Subareas 0 and 1) from a Canadian research vessel survey in 1986. *NAFO SCR Doc.*, No. 22, Serial No. N1305, 10 p.

MS 1995. Assessment of witch flounder in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 63, Serial No. N2578, 7 p.

MS 1999. A stock status update of witch flounder in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 34, Serial No. N4092, 17 p.

MS 2000a. Trends in distribution, biomass and abundance of Greenland halibut (*Reinhardtius hippoglossoides*) in NAFO Subarea 2 and Divisions 3KLMNO from Canadian research vessel surveys during 1978–99. *NAFO SCR Doc.*, No. 12, Serial No. N4234, 42 p.

MS 2000b. Resource status of witch flounder in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 14, Serial No. N4236, 20 p.

BOWERING, W. R., W. B. BRODIE, M. J. MORGAN, D. POWER, and D. ORR. MS 1996. The status of the Greenland halibut resource in the management area of NAFO Subarea 2 and Divisions 3KLMNO. *NAFO SCR Doc.*, No. 73, Serial No. N2748, 34 p.

BOWERING, W. R., W. B. BRODIE, and D. POWER. MS 1993. An evaluation of the status of the Greenland halibut resource in NAFO Subarea 2 and Divisions 3KLM. *NAFO SCR Doc.*, No. 75, Serial No. N2260, 29 p.

BOWERING, W. R., W. B. BRODIE, D. POWER, and M. J. MORGAN. MS 1994. Greenland halibut in NAFO Subarea 2 and Divisions 3KLM: a rapidly declining resource with a rapidly increasing fishery. *NAFO SCR Doc.*, No. 57, Serial No. N2428, 25 p.

MS 1995. An evaluation of the Greenland halibut resource in NAFO Subarea 2 and Divisions 3KLMN. *NAFO SCR Doc.*, No. 64, Serial No. N2579, 20 p.

BOWERING, W. R., W. B. BRODIE, D. POWER, and D. ORR. MS 1997. An assessment of Greenland halibut in NAFO Subarea 2 and Divisions 3KLMNO. *NAFO SCR Doc.*, No. 52, Serial No. N2886, 37 p.

BOWERING, W. R., and A. K. CHUMAKOV. MS 1990a. Estimates of abundance and biomass of witch flounder(*Glyptocephalus cynoglossus*) in Div. 3NO and Greenland halibut (*Reinhardtius hippoglossoides*) in Div. 3KL from USSR groundfish surveys during 1987–89. *NAFO SCR Doc.*, No. 57, Serial No. N1778, 7 p.

MS 1990b. Trends in biomass and abundance estimates of American plaice (*Hippoglossoides platessoides*) from USSR surveys in Divisions 3K, 3L, 3M and 3O. *NAFO SCR Doc.*, No. 71, Serial No. N1793, 18 p.

BOWERING, W. R., and D. C. ORR. MS 1998. An evaluation of the current status and historic review of the witch flounder resource in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 49, Serial No. N3040, 31 p.

BOWERING, W. R., and D. POWER. MS 1995. Distribution and abundance of Greenland halibut at the Continental Slope of Divisions 3KLMN based upon Canadian deepwater surveys in 1991, 1994 and 1995. *NAFO SCR Doc.*, No. 52, Serial No. N2563, 11 p.

BOWERING, W. R., D. POWER, and W. B. BRODIE. MS 1994. Stock status of witch flounder in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 49, Serial No. N2420, 15 p.

BOWERING, W. R., D. POWER, and M. J. MORGAN. MS 1995. Distribution and abundance of five major groundfish species at the Continental Slope of Divisions 3KLMN based upon Canadian deepwater surveys in 1991, 1994 and 1995. *NAFO SCR Doc.*, No. 51, Serial No. N2562, 26 p.

BRATTEY, J., and D. PORTER. MS 1997. An acoustic survey of Atlantic cod (*Gadus morhua*) in three inshore areas of western Trinity Bay (NAFO Division 3L). *NAFO SCR Doc.*, No. 49, Serial No. N2883, 22 p.

BRODIE, W. B. MS 1991. An assessment of Greenland halibut in SA 2 + Divisions 3KL. *NAFO SCR Doc.*, No. 88, Serial No. N1972, 29 p.

BRODIE, W. B., and J. W. BAIRD. MS 1991. An assessment update for the American plaice stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 93, Serial No. N1978, 41 p.

MS 1992. Data for the assessment of Greenland halibut in SA 2 + Divisions 3KLM. *NAFO SCR Doc.*, No. 81, Serial No. N2136, 16 p.

BRODIE, W. B., J. W. BAIRD, and J. MORGAN. MS 1992. An assessment of the American plaice stock in Div. 3LNO. *NAFO SCR Doc.*, No. 79, Serial No. N2134, 43 p.

BRODIE, W. B., J. W. BAIRD, and D. POWER. MS 1992.Analysis of data from deepwater surveys in Div. 0B, 2GHJ, and 3KLM in 1991. *NAFO SCR Doc.*, No. 82, Serial No. N2137, 8 p.

BRODIE, W. B., and W. R. BOWERING. MS 1992. Results for American plaice from Canadian surveys in Div. 3M, 1978–85. *NAFO SCR Doc.*, No. 76, Serial No. N2131, 4 p.

BRODIE, W. B., W. R. BOWERING, and D. ORR. MS 1997. Comparison of results for Greenland halibut from Canadian and Japanese research vessel surveys in Divisions 2GH in 1996. *NAFO SCR Doc.*, No. 30, Serial No. N2862, 16 p.

BRODIE, W. B., W. R. BOWERING, D. ORR, D. MADDOCK PARSONS, and M. J. MORGAN. MS 1998. Assessment data for Divisions 3LNO American plaice. *NAFO SCR Doc.*, No. 69, Serial No. N3061, 30 p.

BRODIE, W. B., W. R. BOWERING, D. POWER, M. J. MORGAN, and G. BOLAND. MS 1999. An assessment of Greenland halibut in NAFO Subarea 2 and Divisions 3KLMNO. *NAFO SCR Doc.*, No. 38, Serial No. N4097, 42 p.

BRODIE, W. B., W. R. BOWERING, D. POWER, and D. ORR. MS 1998. An assessment of Greenland halibut in NAFO Subarea 2 and Divisions 3KLMNO. *NAFO SCR Doc.*, No. 47, Serial No. N3038, 38 p.

BRODIE, W. B., A. K. CHUMAKOV, and W. R. BOWERING. MS 1991. Update of abundance and biomass estimates of Witch flounder in Divisions 3NO and Greenland halibut in Divisions 3KL from USSR surveys in 1987–90. *NAFO SCR Doc.*, No. 56, Serial No. N1940, 7 p.

BRODIE, W. B., A. K. CHUMAKOV, J. W. BAIRD, and W. R. BOWERING. MS 1991. Results of American plaice from USSR surveys in Divisions 3KLMNO. *NAFO SCR Doc.*, No. 60, Serial No. N1944, 15 p.

MS 1991. Results for yellowtail flounder from USSR surveys in Divisions 3LNO. *NAFO SCR Doc.*, No. 61, Serial No. N1945, 9 p.

BRODIE, W. B., D. MADDOCK PARSONS, C. McFADDEN, D. ORR, and S. J. WALSH. MS 1998. Results of surveys directed at yellowtail flounder in NAFO Divisions 3NO, conducted on a Canadian commercial trawler, 1996–1998. *NAFO SCR Doc.*, No. 73, Serial No. N3065, 34 p.

BRODIE, W. B., M. J. MORGAN, and E. F. MURPHY. MS 1997. Results for selected species from a Canadian research vessel survey on Flemish Cap, NAFO Div. 3M, in 1996. *NAFO SCR Doc.*, No. 42, Serial No. N2876, 15 p.

BRODIE, W. B., M. J. MORGAN, and D. POWER. MS 1994. An assessment of the American plaice stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 55, Serial No. N2426, 43 p.

BRODIE, W. B., D. POWER, and M. J. MORGAN. MS 1993. An assessment of the American plaice stock in NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 91, Serial No. N2277, 60 p.

BRODIE, W. B., and S. J. WALSH. MS 1992. An assessment of the yellowtail flounder stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 61, Serial No. N2115, 28 p.

BRODIE, W. B., S. J. WALSH, and J. W. BAIRD. MS 1991. An assessment of the yellowtail flounder stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 80, Serial No. N1964, 38 p.

BRODIE, W. B., S. J. WALSH, and D. ORR MS 1997. Results of surveys directed at yellowtail flounder in NAFO Divisions 3NO, conducted on a Canadian commercial trawler. *NAFO SCR Doc.*, No. 31, Serial No. N2863, 23 p.

BRODIE, W. B., S. J. WALSH, D. POWER, and W. R. BOWERING. MS 1993. An assessment of the yellowtail flounder stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 76, Serial No. N2261, 43 p.

BRODIE, W. B., S. J. WALSH, D. POWER, and M. J. MORGAN. MS 1994. An assessment of the yellowtail flounder stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 44, Serial No. N2414, 40 p.

BULATOVA, A. Yu., and A. D. CHUMAKOV. MS 1986. USSR trawl surveys in NAFO Subareas 0, 2, 3. *NAFO SCR Doc.*, No. 66, Serial No. N1183, 13 p.

CARLSSON, D. M. MS 1996. Trawl survey for shrimp (*Pandalus borealis*) in Denmark Strait, 1996. *NAFO SCR Doc.*, No. 116, Serial No. N2813, 8 p.

CARLSSON, D., O. FOLMER, C. HVINGEL, and P. KANNEWORFF. MS 1995a. Stratified random trawl survey for shrimp (*Pandalus borealis*) in Disko Bay and Vaigat, inshore West Greenland 1995. *NAFO SCR Doc.*, No. 111, Serial No. N2650, 11 p.

MS 1995b. Offshore trawl survey for shrimp (*Pandalus borealis*) in NAFO Subareas 0 and 1 in 1995. *NAFO SCR Doc.*, No. 113, Serial No. N2652, 23 p.

CARLSSON, D. M., and P. KANNEWORFF. MS 1991. Report on stratified-random trawl survey for shrimp (*Pandalus borealis*) in NAFO Subareas 0+1 in July–August 1990, and a comparison with earlier surveys. *NAFO SCR Doc.*, No. 70, Serial No. N1954, 34 p.

MS 1992. Report on a stratified-random trawl survey for shrimp (*Pandalus borealis*) in NAFO Subareas 0+1 in July–September 1991, and a comparison with earlier surveys. *NAFO SCR Doc.*, No. 67, Serial No. N2121, 27 p.

MS 1993a. Stratified-random trawl survey for shrimp (*Pandalus borealis*) in Denmark Strait in 1992. *NAFO SCR Doc.*, No. 66, Serial No. N2250, 13 p.

MS 1993b. Stratified-random trawl survey for shrimp (*Pandalus borealis*) in inshore areas at West Greenland, NAFO Subarea 1, in 1992. *NAFO SCR Doc.*, No. 72, Serial No. N2256, 12 p.

MS 1995. Trawl survey for shrimp (*Pandalus borealis*) in Denmark Strait, 1995. *NAFO SCR Doc.*, No. 109, Serial No. N2648, 14 p.

MS 1998a. Stratified-random trawl survey for shrimp (*Pandalus borealis*) in Disko Bay and Vaigat, inshore West Greenland, 1998. *NAFO SCR Doc.*, No. 115, Serial No. N4024, 13 p.

MS 1998b. Offshore stratified-random trawl survey for shrimp (*Pandalus borealis*) in NAFO Subareas 0+1, in 1998. *NAFO SCR Doc.*, No. 118, Serial No. N4027, 18 p.

MS 2000. Stratified-random trawl survey for northern shrimp (*Pandalus borealis*) in NAFO Subareas 0+1 in 2000. *NAFO SCR Doc.*, No. 78, Serial No. N4335, 27 p.

CARLSSON, D. M., P. KANNEWORFF, and K. H. NYGAARD. MS 1992. Report on a stratified-random trawl survey for shrimp (*Pandalus borealis*) in inshore areas West Greenland, NAFO Subarea 1, in 1991. *NAFO SCR Doc.*, No. 55, Serial No. N2108, 18 p.

CARLSSON, D. M., P. KANNEWORFF, D. G. PARSONS. MS 1993. Stratified-random trawl survey for shrimp (*Pandalus borealis*) in NAFO Subarea 0+1, 1992. *NAFO SCR Doc.*, No. 70, Serial No. N2254, 23 p.

CHUMAKOV, A. K., and W. R. BOWERING. MS 1988. Post-stratified biomass and abundance estimates of Greenland halibut from USSR surveys in Subareas 0+2 and Division 3K. *NAFO SCR Doc.*, No. 41, Serial No. N1481, 20 p.

CHUMAKOV, A. K., and S. M. SOSHIN. MS 1991. Results of stratified-random bottom trawl and long-line survey on Greenland halibut in NAFO Div. 0B in 1990. *NAFO SCR Doc.*, No. 66, Serial No. N1950, 11 p.

CORNUS, H.-P., and W. B. BRODIE. 1990. A compilation of research vessel surveys on a stock by stock basis. *NAFO SCS Doc.*, No. 22, Serial No. N1820, 17 p.

DAVIS, M. B., C. A. BISHOP, D. STANSBURY, and E. F. MURPHY. MS 1994. Update of the assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 87, Serial No. N2470, 13 p.

DAVIS, M. B., E. F. MURPHY, D. STANSBURY, and P. A. SHELTON. MS 1996. An assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 80, Serial No. N2755, 31 p.

DAVIS, M. B., D. STANSBURY, E. F. MURPHY, and C. A. BISHOP. MS 1993. An assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 90, Serial No. N2276, 38 p.

DAVIS, M. B., D. E. STANSBURY, E. F. MURPHY, P. A. SHELTON, M. J. MORGAN, G. R. LILLY, and J. BRATTEY. MS 1997. An assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 70, Serial No. N2904, 23 p.

DAWE, E. G., P. C. BECK, and J. DREW. MS 1999. The fishery for short-finned squid (*Illex illecebrosus*) in NAFO Subareas 3 and 4 in 1998. *NAFO SCR Doc.*, No. 50, Serial No. N4109, 13 p.

DAWE, E. G., and L. C. HENDRICKSON. MS 1998. A review of the biology, population dynamics, and exploitation of short-finned squid in the Northwest Atlantic Ocean, in relation to assessment and management of the resource. *NAFO SCR Doc.*, No. 59, Serial No. N3051, 33 p.

DAWE, E. G., L. C. HENDRICKSON, and M. A. SHOWELL. MS 2000. An update to commercial catch and survey indices for short-finned squid (*Illex illecebrosus*) in the Northwest Atlantic for 1999. *NAFO SCR Doc.*, No. 37, Serial No. N4266, 7 p.

DE CÁRDEÑAS, E., and Ph. MOGUEDET MS 1992. Preliminary results from EEC cod tagging on Flemish Cap. *NAFO SCR Doc.*, No. 29, Serial No. N2076, 8 p.

DE CÁRDEÑAS, E., E. RODRÍGUEZ-MARÍN, F. SABORIDO, M. CARNEIRO, and J. GIL. MS 1993. Preliminary results of European cod tagging programme in NAFO Division 3M (second year). *NAFO SCR Doc.*, No. 16, Serial No. N2193, 29 p.

DEL RIO, J. L. MS 1996. Northern shrimp (*Pandalus borealis*) on Flemish Cap in July 1996. *NAFO SCR Doc.*, No. 94, Serial No. N2777, 7 p.

DURÁN, P., X. PAZ, and E. DE CÁRDENAS. MS 1998. Results from the 98 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc.*, No. 48, Serial No. N3039, 20 p.

ENGELSTOFT, J. J., and O. JØRGENSEN. MS 1997. Biomass and abundance of demersal fish stocks off West Greenland estimated from the Greenland trawl survey, 1988–1996. *NAFO SCR Doc.*, No. 39, Serial No. N2871, 17 p.

MS 1998. Biomass and abundance of demersal fish stocks off West Greenland estimated from the Greenland trawl survey, 1988–1997. *NAFO SCR Doc.* 98/40, Serial No. N3028, 19 p.

MS 1999. Biomass and abundance of demersal fish stocks off West Greenland estimated from the Greenland shrimp survey 1988–1998. *NAFO SCR Doc.*, No. 27, Serial No. N4083, 19 p.

MS 2000. Biomass and abundance of demersal fish stocks off West Greenland estimated from the Greenland shrimp survey, 1988–1999. *NAFO SCR Doc.*, No. 22, Serial No. N4251, 20 p.

ERNST, P., U. HOFFMANN, and A. A. VASKOV. MS 1991. Results on the Greenland halibut survey in Divisions 0B, 1B, 1C and 1D in 1990. *NAFO SCR Doc.*, No. 21, Serial No. N1900, 5 p.

GORCHINSKY, K. V. MS 1993. Results from Greenland halibut assessment in Divisions 0B, 2GH by the data from 1992 trawl survey. *NAFO SCR Doc.*, No. 15, Serial No. N2192, 7 p.

GORCHINSKY, K. V., and P. I. SAVVATIMSKY. MS 1996. Composition of catches in the northern Flemish Pass from data of Russian trawl survey in February 1996 and some information on biology of roughhead grenadier. *NAFO SCR Doc.*, No. 39, Serial No. N2714, 6 p.

GORCHINSKY, K. V., and A. A. VASKSOV. MS 1992. Trawl survey results on Greenland halibut stock evaluation in NAFO Divs. 0B and 2GH in October/December 1991. *NAFO SCR Doc.*, No. 22, Serial No. N2069, 15 p.

GUNDERSEN, A. C., N.-R. HAREIDE, V. BERG, and S. A. PEDERSEN. MS 1994. A trial longline fishery for Greenland halibut (*Reinhardtius hippoglossoides*) in the Northern Davis Strait, August 1993. *NAFO SCR Doc.*, No. 10, Serial No. N2373, 11 p.

HOVGÅRD, H. MS 1991. Preliminary assessment of Subarea 1 cod. *NAFO SCR Doc.*, No. 76, Serial No. N1960, 21 p.

IGASHOV, T. M., and A. A. VASKOV. MS 1997. Assessment of *Sebastes marinus* stock in Division 3M by Russian research trawl surveys in 1987–1996. *NAFO SCR Doc.*, No. 9, Serial No. N2836, 7 p.

JØRGENSEN, O. MS 1998. Survey for Greenland halibut in NAFO Divisions 1C–1D. *NAFO SCR Doc.*, No. 25, Serial No. N3010, 26 p.

MS 1999. Survey for Greenland halibut in NAFO Divisions 1C–1D, 1998. *NAFO SCR Doc.*, No. 30, Serial No. N4086, 25 p.

MS 2000. Survey for Greenland halibut in NAFO Divisions 1C–1D, 1999. *NAFO SCR Doc.*, No. 10, Serial No. N4232, 26 p.

JØRGENSEN, O and K. AKIMOTO. MS 1990. Results of stratified-random bottom trawl survey in NAFO Subarea 1 in 1989. *NAFO SCR Doc.*, No. 39, Serial No. N1756, 14 p.

MS 1991. Results of two trawl surveys in NAFO Subarea 1 in 1990. *NAFO SCR Doc.*, No. 50, Serial No. N1933, 14 p.

JØRGENSEN, O. A., and G. BECH. MS 1996. Assessment of the Greenland halibut stock component in NAFO Subarea 0 + Divisions 1B–1F. *NAFO SCR Doc.*, No. 67, Serial No. N2743, 13 p.

JØRGENSEN, O., and J. BOJE. MS 1993. An assessment of the Greenland halibut stock component in NAFO Subareas 0+1. *NAFO SCR Doc.*, No. 80, Serial No. N2265, 6 p.

KANNEWORFF. P., and K. M. LEHMANN MS 1991. Report on a stratified-random trawl survey for shrimp (*Pandalus borealis*) in ICES Division XIVb in 1990. *NAFO SCR Doc.*, No. 52, Serial No. N1935, 11 p.

KISELEVA, V. M. MS 1996. Estimation of cod stock in Div. 3M by data of 1995 trawl survey. *NAFO SCR Doc.*, No. 7, Serial No. N2673, 7 p.

MS 1997. Assessment of cod stock on the Flemish Cap from data of trawl survey in 1996. *NAFO SCR Doc.*, No. No. 7, Serial No. N2834, 9 p.

KISELEVA, V. M., and A. A. VASKOV MS 1994. Status of cod stock in NAFO Subarea 3 from 1993 trawl-acoustic survey data. *NAFO SCR Doc.*, No. 12 (Rev.), Serial No. N2375, 9 p.

KUZMIN, S. A. MS 1991. Assessment of cod stock in NAFO Subarea 3 by the data from 1990 trawl-acoustic survey. *NAFO SCR Doc.*, No. 5, Serial No. N1877, 19 p.

MS 1992. Stock assessment of cod from NAFO Subarea 3 by the data from 1991 trawl-acoustic survey. *NAFO SCR Doc.*, No. 13, Serial No. N2055, 11 p.

LILLY, G. R., P. A. SHELTON, J. BRATTEY, N. G. CADIGAN, E. F. MURPHY, and D. E. STANSBURY. MS 1999. An assessment of the cod stock in NAFO Divisions 2J+3KL. *NAFO SCR Doc.*, No. 28, Serial No. N4084, 141 p.

MS 2000. An assessment of the cod stock in NAFO Divisions 2J+3KL. *NAFO SCR Doc.*, No. 33, Serial No. N4262, 107 p.

LILLY, G. R., P. A. SHELTON, J. BRATTEY, N. CADIGAN, E. F. MURPHY, D. E. STANSBURY, M. B. DAVIS, and M. J. MORGAN. MS 1998. An assessment of the cod stock in NAFO Divisions 2J+3KL. *NAFO SCR Doc.*, No. 46, Serial No. N3037, 94 p.

LLORET, J. MS 1996. Population dynamics of American plaice (*Hippoglossoides platessoides*) off West Greenland (NAFO Divisions 1B–1F), 1982–94. *NAFO SCR Doc.*, No. 5, Serial No. N2670, 24 p.

MADDOCK PARSONS, D., W. B. BRODIE, D. POWER, and S. J. WALSH. MS 2000. Update on cooperative surveys of yellowtail flounder in NAFO Divisions 3NO, 1996–1999. *NAFO SCR Doc.*, No. 42, Serial No. N4272, 23 p.

MAMYLOV, V. S. MS 1988. Experimental trawl-acoustic survey in NAFO Subarea 3 from March to July 1987. *NAFO SCR Doc.*, No. 24, Serial No. N1460, 27 p.

MILLER, D. S. MS 1991. Estimates of biomass from an acoustic survey for capelin (*Mallotus villosus*) in Division 3L, May 1990. *NAFO SCR Doc.*, No. 37, Serial No. N1917, 14 p.

MS 1992. Results of an acoustic survey for capelin (*Mallotus villosus*) in NAFO Division 3L in 1992. *NAFO SCR Doc.*, No. 57, Serial No. N2110, 4 p.

MS 1993. Results from an acoustic survey for capelin in Divisions 3NO in 1992. *NAFO SCR Doc.*, No. 21, Serial No. N2198, 5 p.

MILLER, D. S., and J. E. CARSCADDEN. MS 1990. A biomass estimate from a hydroacoustic survey for capelin (*Mallotus villosus*) in NAFO Division 3N and observations on the Soviet fishery for capelin in Divisions 3NO. *NAFO SCR Doc.*, No. 61, Serial No. N1782, 5 p.

MÖLLER, V., and H. J. RÄTZ MS 1999. Assessment of Atlantic wolffish (*Anarhichas lupus* L.) off West and East Greenland, 1982–98. *NAFO SCR Doc.*, No. 37, Serial No. N4095, 14 p.

MORGAN, M. J. MS 2000. A stock status update of American plaice in NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 41, Serial No. N4271, 15 p.

MORGAN, M. J., and W. B. BRODIE. MS 1995. An assessment of the American plaice stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 62, Serial No. N2577, 39 p.

MORGAN, M. J., W. B. BRODIE, and W. R. BOWERING. MS 1999. An assessment of American plaice in NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 40, Serial No. N4099, 55 p.

MORGAN, M. J., W. B. BRODIE, S. J. WALSH, and D. ORR. MS 1997. An assessment of Divisions 3LNO American plaice. *NAFO SCR Doc.*, No. 60, Serial No. N2894, 47 p.

MORGAN, M. J., W. B. BRODIE, S. J. WALSH, D. POWER, and D. ORR. MS 1996. An assessment of the American plaice stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 75, Serial No. N2750, 31 p.

MURPHY, E. F., D. E. STANSBURY, P. A. SHELTON, J. BRATTEY, and G. R. LILLY. MS 1997. A stock status update for NAFO Divisions 2J+3KL cod. *NAFO SCR Doc.*, No. 59, Serial No. N2893, 58 p.

NAFO. 1992. Scientific Council Reports, 1991. *NAFO Sci. Coun. Rep.*, 1991, 163 p.

NAFO Secretariat. 1991. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 18, Serial No. N1982, 18 p.

MS 1992. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 22, Serial No. N2138, 18 p.

MS 1993. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 18, Serial No. N2274, 21 p.

MS 1994. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 18, Serial No. N2434, 19 p.

MS 1995. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 17, Serial No. N2587, 19 p.

MS 1996. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 15, Serial No. N2756, 21 p.

MS 1997. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 13, Serial No. N2912, 20 p.

MS 1998. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 18, Serial No. N4035, 22 p.

MS 2000. A compilation of research vessel surveys on a stock-by-stock basis. *NAFO SCS Doc.*, No. 28, Serial No. N4346, 25 p.

NICOLAJSEN, Á. MS 2000. Biomass estimate, growth, length and age distribution of the northern shrimp (*Pandalus borealis*) stock on Flemish Cap (NAFO Division 3M) in June. *NAFO SCR Doc.*, No. 83, Serial No. N4340, 17 p.

NIELSEN, J. R. MS 1990. Longline fishery for Greenland halibut in the Davis Strait, November 1989. *NAFO SCR Doc.*, No. 38, Serial No. N1755, 4 p.

NYGAARD, K. H., and S. A. PEDERSEN. MS 1991. Young cod distribution and abundance in West Greenland inshore areas, 1990. *NAFO SCR Doc.*, No. 64, Serial No. N1948, 7 p.

OGAWA, M., K. YOKAWA, and O. JØRGENSEN. MS 1994. Results of a stratified-random bottom trawl survey off West Greenland in 1993. *NAFO SCR Doc.*, No. 31, Serial No. N2399, 12 p.

ORR, D. C., P. VEITCH, and D. SULLIVAN. MS 2000. An update of information pertaining to northern shrimp (*Pandalus borealis*) and groundfish in NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 85, Serial No. N4342, 33 p.

PAZ, X., and P. DURÁN. MS 1999. Results from the 99 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc.*, No. 57, Serial No. N4116, 23 p.

PAZ, J., P. DURAN, and E. DE CÁRDENAS. MS 1996. Preliminary results from the 96 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc.*, No. 49, Serial No. N2725, 12 p.

MS 1997. Preliminary results from the 97 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc.*, No. 25, Serial No. N2856, 10 p.

PAZ, J., J. MARTINEZ, and E. DE CÁRDENAS. MS 1995. Preliminary results from the 95 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc.*, No. 55, Serial No. N2568, 10 p.

PAZ, X., E. ROMÁN, and P. DURÁN MUÑOZ. MS 2000. Results from the 2000 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc.*, No. 46, Serial No. N4277, 18 p.

PEDERSEN, S. A., and P. KANNEWORFF. MS 1992. Survey biomass of redfish (*Sebastes* spp.) off West Greenland (NAFO Subareas 0+1), July-August 1988–91. *NAFO SCR Doc.*, No. 44, Serial No. N2095, 12 p.

PEDERSEN, S. A., and K. H. NYGÅRD. MS 1992. Survey biomass of fishes in the Disko Bay area West Greenland-September 1991. *NAFO SCR Doc.*, No. 43, Serial No. N2094, 9 p.

POWER, D. MS 1992. An assessment of redfish in NAFO Divisions 3LN. *NAFO SCR Doc.*, No. 80, Serial No. N2135, 31 p.

MS 1993. An assessment of Divisions 3LN redfish. *NAFO SCR Doc.*, No. 73, Serial No. N2258, 31 p.

MS 1994. The status of the Division 3LN redfish resource. *NAFO SCR Doc.*, No. 54, Serial No. N2425, 36 p.

MS 1995. An assessment of redfish in Divisions 3LN. *NAFO SCR Doc.*, No. 69, Serial No. N2584, 36 p.

MS 1996. An assessment of redfish in Divisions 3LN. *NAFO SCR Doc.*, No. 76, Serial No. N2751, 33 p.

MS 1997. Redfish in NAFO Divisions 3LN. *NAFO SCR Doc.*, No. 64, Serial No. N2898, 37 p.

MS 2000. A stock status update of redfish in Divisions 3LN. *NAFO SCR Doc.*, No. 52, Serial No. N4285, 18 p.

POWER, D., and D. B. ATKINSON. MS 1990. Status of the redfish resource in NAFO Divisions 3LN. *NAFO SCR Doc.*, No. 87, Serial No. N1813, 18 p.

POWER, D., and J. W. BAIRD MS 1990. An assessment of redfish in NAFO Divisions 3LN. *NAFO SCR Doc.*, No. 90, Serial No. N1974, 30 p.

POWER, D., and D. MADDOCK PARSONS. MS 1998. An assessment of roundnose grenadier (*Coryphaenoides rupestris*) in NAFO Subareas 2+3 and catch information on roughhead grenadier (*Macrourus berglax*). *NAFO SCR Doc.*, No. 57, Serial No. N3049, 11 p.

MS 1998.The status of the redfish resource in NAFO Divisions 3LN. *NAFO SCR Doc.*, No. 74, Serial No. N3066, 23 p.

MS 1999. The status of the redfish resource in NAFO Divisions 3LN. *NAFO SCR Doc.*, No. 65, Serial No. N4124, 27 p.

RÄTZ, H.-J. MS 1991. Notes of the structures and changes in the ichthyofauna off West Greenland. *NAFO SCR Doc.*, No. 36, Serial No. N1916, 16 p.

MS 1992. Decrease in fish biomass off West Greenland (Subdivisions 1B-1F) continued. *NAFO SCR Doc.*, No. 40, Serial No. N2088, 8 p.

MS 1993. Abundance and present length structure of demersal fish stocks off West Greenland (Divisions 1B–1F, 0–400 m). *NAFO SCR Doc.*, No. 26, Serial No. N2203, 10 p.

MS 1994. Status of the demersal fish assemblage off West Greenland and a simple production model, 1982-93 (Divisions 1B–1F, 0–400 m). *NAFO SCR Doc.*, No. 7, Serial No. N2363, 15 p.

MS 1995. Redfish Subarea 1 (0–400 m): groundfish survey results, 1982-94 and length structure of German landings, 1962–78. *NAFO SCR Doc.*, No. 3, Serial No. N2504, 15 p.

MS 1996a. Status of the demersal fish assemblage and near bottom temperature off West Greenland, 1982–95 (Divisions 1B–1F, 0–400 m). *NAFO SCR Doc.*, No. 4, Serial No. N2669, 10 p.

MS 1996b. Redfish Subarea 1 (0–400 m): groundfish survey results, 1982–95 and length structure of German catches, 1962–90. *NAFO SCR Doc.*, No. 6, Serial No. N2671, 18 p.

MS 1997. Structures and changes of the demersal fish assemblage off Greenland and trends in near bottom temperature, 1982–96. *NAFO SCR Doc.*, No. 5, Serial No. N2830, 32 p.

MS 1998. Abundance, biomass and size composition of dominant demersal fish stocks and trend in near bottom temperature off West and East Greenland, 1982–97. *NAFO SCR Doc.*, No. 21, Serial No. N3005, 22 p.

RÄTZ, H. J., and J. LLORT. MS 1999a. Assessment of American plaice (*Hippoglossoides platessoides*) in NAFO Subarea 1 and ICES Div. XIVb based on survey indices, 1982–98. *NAFO SCR Doc.*, No. 21, Serial No. N4071, 10 p.

MS 1999b. Assessment of thorny skate (*Raja radiata*) in NAFO Subarea 1 and ICES Div. XIVb based on survey indices, 1982–98. *NAFO SCR Doc.*, No. 33, Serial No. N4090, 15 p.

RÄTZ, H. J., and C. STRANSKY. MS 1999. Assessment of redfish (*Sebastes marinus, S. mentella*) in NAFO Subarea 1 and ICES Div. XIVb based on survey indices, 1982–98. *NAFO SCR Doc.*, No. 20, Serial No. N4070, 22 p.

RIKHTER, V. A., I, K, SIGAEV, V. BOROVKOV, K. GORCHINSKY, S. KOVALEV, AND P. SAVVATIMSKY. MS 1994. Russian national research report, 1993. *NAFO SCS Doc.*, No. 3, Serial No. N2353, 14 p.

SABORIDO-REY, F. MS 1993. Distribution, abundance and biomass trends in the Genus *Sebastes* on Flemish Cap (Div. 3M). *NAFO SCR Doc.*, No. 24, Serial No. N2201, 12 p.

SAINZA, C. MS 1995. Northern shrimp (*Pandalus borealis*) on Flemish Cap in July 1995. *NAFO SCR Doc.*, No. 100, Serial No. N2622, 7 p.

SATANI, M., S. KAWAHARA, and O. JØRGENSEN. MS 1993. Results of two stratified-random bottom trawl surveys at West Greenland in 1992. *NAFO SCR Doc.*, No. 58, Serial No. N2241, 12 p.

SAVVATIMSKY, P. I. MS 1990. Variations in catch composition of roundnose grenadier from the Northwest Atlantic during 1971–1989. *NAFO SCR Doc.*, No. 06, Serial No. N1717, 16 p.

MS 1991. Causes of decrease in total catch of roundnose grenadier (*Coryphaenoides rupestris* Gun.) in the Northwest Atlantic in 1979–1990. *NAFO SCR Doc.*, No. 8, Serial No. N1880, 22 p.

MS 1992. Distribution and biological characteristic of rock grenadier (*Coryphaenoides rupestris*) as shown by trawl surveys in the Northwest Atlantic in 1989–1991. *NAFO SCR Doc.*, No. 9, Serial No. N2051, 12 p.

MS 1993. Results of investigations of roundnose grenadier in NAFO Subareas 0, 2 and Division 3K in 1971–1992. *NAFO SCR Doc.*, No. 12, Serial No. N2189, 8 p.

SAVVATIMSKY, P. I. and A. A. VASKOV. MS 1996. Distribution and biological characteristic of Greenland halibut in the Flemish-Pass area and on the Flemish-Cape Bank in May 1995. *NAFO SCR Doc.*, No. 8, Serial No. N2674, 7 p.

MS 1998. Results of Russian surveys on Greenland halibut stock assessment on the Flemish Cap in 1987–1996. *NAFO SCR Doc.*, No. 13, Serial No. N2992, 10 p.

SHELTON, P. A., D. E. STANSBURY, E. F. MURPHY, G. R. LILLY, and J. BRATTEY. MS 1996. An assessment of the cod stock in NAFO Divisions 2J+3KL. *NAFO SCR Doc.*, No. 62, Serial No. N2738, 56 p.

SHERSTJUKOV, A. I. MS 1990. Distribution and abundance of 0-group silver hake on the Scotian Shelf in autumn 1988. *NAFO SCR Doc.*, No. 01, Serial No. N1701, 16 p.

SHERSTYUKOV, A. I. MS 1991. Distribution and abundance of young silver hake of 1989 year-class on the Scotian Shelf in 1989-1990 fall-winter season. *NAFO SCR Doc.*, No. 1, Serial No. N1869, 21 p.

SHERSTYUKOV, A. I., and V. I. VINOGRADOV. MS 1991. Studies on vertical distribution of Scotian young silver hake in fall-winter season 1989–1990. *NAFO SCR Doc.*, No. 2, Serial No. N1870, 14 p.

SHOWELL, M. A. MS 1996. Assessment of the 4VWX Silver hake population in 1995. *NAFO SCR Doc.*, No. 78, Serial No. N2753, 24 p.

MS 1997. Assessment of the 4VWX silver hake population in 1996. *NAFO SCR Doc.*, No. 69, Serial No. N2903, 27 p.

SHOWELL, M. A., and M. C. BOURBONNAIS. MS 1994. Status of the Scotian Shelf silver hake populations in 1993 with projections to 1995. *NAFO SCR Doc.*, No. 32, Serial No. N2400, 33 p.

MS 1995. Assessment of the 4VWX silver hake population in 1994. *NAFO SCR Doc.*, No. 76, Serial No. N2593, 22 p.

SHOWELL, M. A., R. BRANTON, M. C. BOURBONNAIS, and R. G. HALLIDAY. MS 1993. Status of the Scotian Shelf silver hake populations in 1992 with projection to 1994. *NAFO SCR Doc.*, No. 102, Serial No. N2295, 24 p.

SIEGSTAD, H., H. J. RÄTZ, and C. STRANSKY. MS 2000. Stock status update of redfish in NAFO Subarea 1. *NAFO SCR Doc.*, No. 28, Serial No. N4257, 7 p.

SIMONSEN, C. S. MS 1998. An assessment of the Greenland halibut stock component in NAFO Division 1A inshore. *NAFO SCR Doc.*, No. 44, Serial No. N3035, 18 p.

SIMONSEN, C. S., and J. BOJE. MS 1997. An assessment of the inshore Greenland halibut stock component in NAFO Division 1A. *NAFO SCR Doc.*, No. 78, Serial No. N2915, 15 p.

MS 1999. An assessment of the Greenland halibut stock component in NAFO Division 1A inshore. *NAFO SCR Doc.*, No. 48, Serial No. N4107, 24 p.

MS 2000. An assessment of the Greenland halibut stock component in NAFO Division 1A inshore. *NAFO SCR Doc.*, No. 47, Serial No. N4278, 36 p.

SIMONSEN, C. S., J. BOJE, and M. C. S. KINGSLEY. MS 2000. A review using longlining to survey fish populations with special emphasis on an inshore longline survey for Greenland halibut (*Reinhardtius hippoglossoides*) in West Greenland, NAFO Division 1A. *NAFO SCR Doc.*, No. 29, Serial No. N4258, 25 p.

SIMPSON, M., S. J. WALSH, W. B. BRODIE, and D. MADDOCK PARSONS. MS 1999. Update on cooperative surveys of yellowtail flounder in NAFO Divisions 3NO, 1996–1999. *NAFO SCR Doc.*, No. 42, Serial No. N4101, 46 p.

SOSEBEE, K., and P. RAGO. MS 2000. Abundance and distribution of elasmobranchs from the NMFS Northeast Fisheries Science Center research vessel bottom trawl surveys. *NAFO SCR Doc.*, No. 19, Serial No. N4248, 26 p.

STANSBURY, D., C. A. BISHOP, E. F. MURPHY. MS 1995. An assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 70, Serial No. N2585, 34 p.

STANSBURY, D. E., P. A. SHELTON, E. F. MURPHY, and J. BRATTEY. MS 1999. An assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 62 (Rev.), Serial No. N4121, 46 p.

STANSBURY, D. E., P. A. SHELTON, E. F. MURPHY, G. R. LILLY, and J. BRATTEY. MS 1998. An assessment of the cod stock in NAFO Divisions 3NO. *NAFO SCR Doc.*, No. 65, Serial No. N3057, 38 p.

STEIN, M. MS 2000. Climatic conditions around Greenland – 1999. *NAFO SCR Doc.*, No. 11, Serial No. N4233, 15 p.

TREBLE, M. A., W. B. BRODIE, W. R. BOWERING, and O. A. JØRGENSEN. MS 2000. Analysis of data from a trawl survey in NAFO Division 0A, 1999. *NAFO SCR Doc.*, No. 31, Serial No. N4260, 19 p.

VASKOV, A. A. MS 1994. Assessment of redfish stocks in Divisions 3LN and 3M from trawl-acoustic survey data, 1993. *NAFO SCR Doc.*, No. 13, Serial No. N2376, 9 p.

MS 1995. Assessment of deepwater redfish stock in Division 3L by the results of a trawl survey in 1994. *NAFO SCR Doc.*, No. 13, Serial No. N2520, 5 p.

MS 1997. Stock assessment of redfish in Division 3M by data from 1996 Russian trawl survey. *NAFO SCR Doc.*, No. 8, Serial No. N2835, 7 p. (+ corrigendum)

VASKOV, A. A., A. G. GALUZO, I. A. OGANIN. MS 1990. Estimation of the stock status and TAC for redfish, *Sebastes marinus* in Div. 3M for 1991. *NAFO SCR Doc.*, No. 08, Serial No. N1719, 15 p.

VASKOV, A. A., and T. O. IVANOVA. MS 1993. Stock assessment of redfish in Division 3M by the data from 1992 trawl-acoustic survey. *NAFO SCR Doc.*, No. 11, Serial No. N2188, 7 p. (+ addedum, 2 p.)

VASKOV, A. A., and A. L. KARSAKOV. MS 1996. Assessment of the redfish stock in Div. 3M by the data from the trawl survey in 1995. *NAFO SCR Doc.*, No. 9, Serial No. N2675, 6 p.

VASKOV, A. A., and I. A. OGANIN. MS 1991. Status of redfish stock in Divisions 3LN. *NAFO SCR Doc.*, No. 6, Serial No. N1878, 8 p.

MS 1992. Evaluation of redfish stocks in Divisions 3LN and 3M by the trawl-acoustic survey in 1991. *NAFO SCR Doc.*, No. 12, Serial No. N2054, 12 p.

VASKOV, A. A., G. B. RUDNEVA, and I. A. OGANIN. MS 1989. Estimation of the stock status and TAC for redfish in Div. 3M and 3LN for 1990. *NAFO SCR Doc.*, No. 6, Serial No. N1570, 23 p.

VAZQUEZ, A. MS 1989 Results from bottom-trawl survey of Flemish Cap in July 1988. *NAFO SCR Doc.*, No. 60, Serial No. N1640, 15 p.

MS 1990. Results from bottom trawl survey of Flemish Cap in July 1989. *NAFO SCR Doc.*, No. 68, Serial No. N1790, 25 p.

MS 1991a. Results from bottom trawl survey on Flemish Cap in July–August 1990. *NAFO SCR Doc.*, No. 28, Serial No. N1908, 25 p.

MS 1991b. Flemish Cap cod stock analysis. *NAFO SCR Doc.*, No. 95, Serial No. N1980, 18 p.

MS 1992. Results from bottom trawl survey of Flemish Cap in July 1991. *NAFO SCR Doc.*, No. 27, Serial No. N2074, 17 p.

1993. Results from bottom trawl survey of Flemish Cap in July 1992. *NAFO SCR Doc.*, No. 19, Serial No. N2196, 22 p.

1994. Results from bottom trawl survey of Flemish Cap in July 1993. *NAFO SCR Doc.*, No. 22, Serial No. N2388, 42 p.

MS 1995. Results from bottom trawl survey of Flemish Cap in July 1994. *NAFO SCR Doc.*, No. 26, Serial No. N2535, 33 p. (+corrigendum)

MS 1996. Results from bottom trawl survey of Flemish Cap in July 1995. *NAFO SCR Doc.*, No. 54, Serial No. N2730, 27 p.

MS 1997. Results from bottom trawl survey of Flemish Cap in July 1996. *NAFO SCR Doc.*, No. 28, Serial No. N2860, 30 p.

MS 1999. Results from bottom trawl survey of Flemish Cap in July 1998. *NAFO SCR Doc.*, No. 22, Serial No. N4073, 37 p.

MS 2000. Results from bottom trawl survey on Flemish Cap of July 1999. *NAFO SCR Doc.*, No. 9, Serial No. N4228, 50 p.

VAZQUEZ, A., A. AVILA DE MELO, and F. SABORIDO-REY. MS 1998. Results from bottom trawl survey of Flemish Cap in July 1997. *NAFO SCR Doc.*, No. 30, Serial No. N3017, 38 p.

VAZQUEZ, A., and Á. NICOLAJSEN. MS 1996. Length distribution of northern shrimp (*Pandalus borealis*) on Flemish Cap July 1996 by strata and depth. *NAFO SCR Doc.*, No. 98, Serial No. N2781, 3 p.

WALDRON, D. E., M. C. BOURBONNAIS, and M. A. SHOWELL. MS 1990. Status of the Scotian Shelf silver hake (Whiting) populations in 1989. *NAFO SCR Doc.*, No. 20, Serial No. N1737, 27 p.

WALDRON, D. E., M. A. SHOWELL, and G. HARRISON. MS 1991. Status of the Scotian Shelf silver hake (Whiting) population in 1990. *NAFO SCR Doc.*, No. 42, Serial No. N1922, 34 p.

WALDRON, D. E., M. A. SHOWELL, and M. C. BOURBONNAIS. MS 1992. Status of the Scotian Shelf silver hake (whiting) population in 1991 with projections to 1993. *NAFO SCR Doc.*, No. 50, Serial No. N2102, 22 p.

WALSH, S. J. MS 1989. Distribution of juvenile American plaice on the Grand Bank, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 71, Serial No. N1651, 15 p.

MS 1990. Distribution of juvenile and adult American plaice on the Grand Bank, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 76, Serial No. N1798, 19 p.

MS 1991. Juvenile American plaice on the Grand Banks, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 81, Serial No. N1965, 18 p.

MS 1992. Distribution and abundance of juvenile and adult American plaice on the Grand Bank, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 78, Serial No. N2133, 11 p.

MS 1993. Dynamics of juvenile American plaice populations on the Grand Banks, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 71, Serial No. N2255, 21 p.

MS 1994. Distribution, abundance and biomass of juvenile and adult American plaice populations on the Grand Banks, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 56, Serial No. N2427, 17 p.

WALSH, S. J., and W. B. BRODIE. MS 1988. American plaice distribution on the nose and tail of the Grand Bank. *NAFO SCR Doc.*, No. 28, Serial No. N1464, 12 p.

WALSH, S. J., W. B. BRODIE, D. B. ATKINSON, and D. POWER. MS 1995. An assessment of the yellowtail flounder stock in Divisions 3LNO. *NAFO SCR Doc.*, No. 74, Serial No. N2591, 44 p.

WALSH, S. J., W. B. BRODIE, M. J. MORGAN, W. R. BOWERING, D. ORR, and M. VEITCH. MS 1997. An assessment of the Grand Bank yellowtail flounder stock in NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 72, Serial No. N2906, 54 p.

WALSH, S. J., W. B. BRODIE, M. VEITCH, D. ORR, C. McFADDEN, and D. MADDOCK PARSONS. MS 1998. An assessment of the Grand Bank yellowtail flounder stock in NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 72, Serial No. N3064, 78 p.

WALSH, S. J., W. B. BRODIE, M. VEITCH, D. ORR, D. POWER, and M. J. MORGAN. MS 1996. The status of yellowtail flounder resource in the NAFO fisheries management area of Divisions 3LNO. *NAFO SCR Doc.*, No. 74 (Rev.), Serial No. N2749, 36 p.

WALSH, S. J., and D. POWER. MS 1995. Abundance and biomass of American plaice populations on the Grand Banks as derived from the juvenile groundfish surveys, NAFO Divisions 3LNO. *NAFO SCR Doc.*, No. 59, Serial No. N2574, 21 p.

WALSH, S. J., M. J. VEITCH, M. J. MORGAN, W. R. BOWERING, and B. BRODIE. MS 2000. Distribution and abundance of yellowtail flounder (*Limanda ferruginea*) on the Grand Bank, NAFO Divisions 3LNO, as derived from annual Canadian bottom trawl surveys. *NAFO SCR Doc.*, No. 35, Serial No. N4264, 54 p.

WALSH, S. J., M. VEITCH, M. SIMPSON, and D. MADDOCK PARSONS. MS 1999. Distribution, abundance, size and age composition of yellowtail flounder (*Pleuronectes ferruginea*) on the Grand Bank, NAFO Divisions 3LNO, as derived from the Canadian annual bottom trawl surveys. *NAFO SCR Doc.*, No. 44, Serial No. N4103, 50 p.

WELLS, R. MS 1983a. An examination of age composition estimated for cod of the Flemish Cap in the period 1977-82. *NAFO SCR Doc.*, No. 26, Serial No. N677, 13 p.

MS 1983b. Distribution and abundance of cod on the Flemish Cap, 1977–83. *NAFO SCR Doc.*, No. 29 (Rev.), Serial No. N681, 8 p.

WIELAND, K. MS 1991. Distribution of larval and 0-group fish off West Greenland in summer and autumn 1989 and 1990. *NAFO SCR Doc.*, No. 35, Serial No. N1915, 10 p.

YANO, K. and O. JØRGENSEN. MS 1992. Results of two stratified-random bottom trawl surveys at West Greenland in 1991. *NAFO SCR Doc.*, No. 48, Serial No. N2100, 14 p.

YOKAWA, K., and J. KOGA. MS 1995. Results of a deepwater survey in the NAFO Regulatory Area in the spring of 1995, with emphasize on Greenland halibut. *NAFO SCR Doc.*, No. 48, Serial No. N2559, 12 p.

YOKAWA, K., I. KOUYA, and O. JØRGENSEN. MS 1996. Results of a stratified-random bottom trawl survey off West Greenland in 1995. *NAFO SCR Doc.*, No. 29, Serial No. N2702, 12 p.

YOKAWA, K., and M. SATANI. MS 1997. Results of a stratified random bottom trawl survey in NAFO Divisions 2GH in 1996. *NAFO SCR Doc.*, No. 23, Serial No. N2853, 19 p.

YOKAWA, K., H. SHIMIZU, O. JØRGENSEN, and H. YAMADA. MS 1995. Results of a stratified-random bottom trawl survey off West Greenland in 1994. *NAFO SCR Doc.*, No. 23, Serial No. N2531, 12 p.

NAFO Sci. Coun. Studies, 34: 85–87

NOTICE

Elasmobranch Fisheries: Managing for Sustainable Use and Biodiversity Conservation

Hosted by the Scientific Council of the Northwest Atlantic Fisheries Organization (NAFO)

11–13 September 2002
Spain (venue to be announced)

The Scientific Council of NAFO is pleased to announce this Symposium to be held in conjunction with the NAFO Annual Meeting in Spain in September 2002. The Symposium will be co-convened by D. W. Kulka (Fisheries and Oceans – Canada/NAFO), J. Musick (Virginia Institute of Marine Sciences – USA), M. Pawson (Centre for Environment, Aquaculture and Fisheries Science – UK), T. I. Walker (Freshwater Resources Institute – Australia) and organized by the NAFO Secretariat.

Elasmobranch (defined here to include all chondrichthyans: sharks, skates, rays and chimeras) resources are increasingly exploited in various places around the world. A worldwide trend exists towards increasing exploitation of the fishery resources. This has raised a number of issues concerning both the biology and management of these resources. Countries and various regional management bodies (notably tuna commissions) around the world are preparing Shark Assessment Reports and Plans of Action in response to FAO's International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks), where the term 'shark' is defined to include all chondrichthyans. It is the generally low productivity of shark populations compared with the productivity of teleosts and invertebrates that led to development of the IPOA-Sharks. The IPOA-Sharks has two main thrusts:

1. Sustainable and rational use of targeted and by-product species through responsible management, and
2. Conservation of biodiversity through management of by-catch.

This Symposium will provide the first opportunity for international discussion following adoption of the IPOA-Sharks. The purpose of this Symposium will be to discuss the available biological information and the issues in the management of elasmobranch fisheries. The Symposium will address elasmobranch resources around the world.

Topics include the following:

- **Population Dynamics and Biology**. Population dynamics and biology is generally poorly understood. Elasmobranchs tend to have different population dynamics compared to teleosts and invertebrates particularly in their early life history having a lower productivity.
- **Stock identity and structuring.** Many species of shark and possibly skates, rays, and chimaeras exhibit complex movement patterns and often separate spatially by sex and size, but stock identity and structuring in populations of these animals are not well understood. In many fisheries, even species identity is uncertain.
- **Stock assessment methods and application in relation to elasmobranch biology.** The population biology of sharks and other elasmobranchs has more in common with marine mammals than the much more extensively investigated teleost and invertebrate species. Consequently, standard assessment methods and the types of biological and monitoring data collected in most fisheries are not always suitable for elasmobranch species.
- **Conservation of elasmobranch biodiversity: harvest strategies to manage stocks sustainably and rationally.** To manage shark fisheries there is need to determine the most appropriate harvest strategies to avoid depletion of stocks to levels below sustainable yields or collapse. These animals taken as by-catch require special management and innovative approaches for rapid assessment of sustainability.

Structure:

The Symposium will be convened for three days. Papers will be presented in non-overlapping thematic sessions, and posters will be displayed throughout the meeting. Oral presentations will be 30 minutes, including a question period. On the last day, a session will be devoted to summarizing the major themes and conclusions of the Symposium.

Written work shall be presented in English and the meeting will be conducted in English.

Venue:

The Symposium will be held in Spain, in conjunction with the NAFO Annual Meeting (venue to be announced). Details on venue, hotels and other accommodation will be made available shortly.

Participation:

The Symposium is open to scientists, managers, policy-makers and all those with an interest in elasmobranch fisheries. Those wishing to attend or contribute papers (oral presentations or posters) are invited to complete the attached registration form and return it to the NAFO Secretariat. There is no Symposium fee.

Papers and Posters:

Papers are invited on any of the above listed topics. Papers on other subject areas related to elasmobranch fisheries will also be considered. Posters will also constitute an important part of the Symposium. Poster contributions are encouraged. Papers and posters will be selected and placed in appropriate sessions on the basis of their relevance to the topics. Authors may submit both posters and papers.

Authors will be sent instructions on the format to follow in preparing their contributions upon receipt and acceptance of their abstracts.

Abstracts:

Abstracts of 250 words or less must be submitted for both oral presentations and posters. Electronic submission of abstracts along with all relevant authorship and contact information is requested using the attached registration form. An abstract booklet will be compiled and distributed to all participants.

A deadline of **1 February 2002** has been set for the provision of titles and abstracts. Authors will be notified of selected contributions by **15 February 2002**. All papers and posters (prepared in a manuscript format) must be submitted to T. Amaratunga (NAFO Secretariat) by **5 September 2002**.

Publication:

It is anticipated that the proceedings of this Symposium will be published in the *Journal of Northwest Atlantic Fishery Science*. The papers will be edited in the standard primary process. Appointed Editors will review papers submitted to this volume for both content and style. Papers will also be considered from those submitting poster presentations. All authors will receive a complementary copy of the proceedings.

For further information, please contact one of the following. Further details and practical information will be supplied to intended participants.

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NAFO Sci. Coun. Studies, 34: 87–88

Information for Preparing Manuscripts for NAFO Scientific Publications

Introduction

The manuscript should be in English. The sequence of the material should be: title page, Abstract, text including Introduction, Materials and Methods, Results, Discussion and Acknowledgements and References. Number all pages, including the title page, consecutively with arabic numbers in the center of the top margin. There is usually no page limitation or page charge for accepted publications.

Content of Manuscript

Title page

This page should contain the title, followed by the name(s) and address(es) of the author(s) including professional affiliation, and any related footnotes. The title should be limited to what is documented in the manuscript and be as concise as possible. Where necessary the scientific names of species should be included.

Abstract

An informative abstract must be provided, which does not exceed one double-spaced page or about 250 words, the ultimate length being dependent on the size of the manuscript. The abstract should concisely indicate the content and emphasis of the paper. It should begin with the main conclusion from the study and be supported by statements of relevant findings. The scientific names of species where necessary should be included here. It is important that the abstract accurately reflect the contents of the paper because it is often separated from the main body of the paper by abstracting and indexing services.

Text

In general, the text should be organized into Introduction, Materials and Methods, Results, Discussion, Acknowledgments and References. Authors should be guided by the organization of papers that have been published in the NAFO Journal or Studies and by such authorities as the Council of Biological Editors Style Manual (CBE, 9650 Rockville Pike, Bethesda, MD 20814, USA).

The **Introduction** should be limited to the purpose and rationale of the study. The article should begin with a clear description of the subject (include where necessary the scientific names of species), stating the hypothesis and/or defining the problem(s) the research was designed to solve. Define the time of the study, along with literature review and other information limited to what is relevant to the problem.

The **Materials and Methods** should provide the framework for obtaining answers to the problems which concern the purpose of the study. Describe in sufficient detail the materials and methods used so as to enable other scientists to evaluate the work or replicate the work.

The **Results** should answer the questions evolving from the purpose of the study in a comprehensive manner in an orderly and coherent sequence, with illustrative tables and figures. Ensure only relevant information is presented to substantiate the findings. Avoid any confusion between facts and inferences and the restatement of table and figure captions in the text.

The **Discussion** should give the main contributions from the study, with appropriate interpretation of the results focussing on the problem or hypothesis. Compare with those of other authors. Speculation should be limited to what can be supported with reasonable evidence. In the case of short papers, it may be useful to combine Results and Discussion to avoid repetition.

The **Acknowledgements** should be limited to the names of individuals who provided significant scientific and technical support, including reviews, during the preparation of the manuscript, and the names of agencies which provided financial support.

The **References** represents the list of references cited in the text listed alphabetically. Good judgment should be used in the selection of references, which should be restricted largely to significant published literature. Unpublished data and documents, manuscripts in preparation, and manuscripts awaiting acceptance to other journals may be noted in the text as unpublished data or personal communications, with full contact addresses.

Literature references cited in the text must be by author's surname and year of publication, e.g. (Collins, 1960). The surnames of two authors may be used in a citation, but, for more than two authors the citation should be (Collins *et al.*, 1960). The citation of mimeographed manuscript reports and meeting documents should contain the abbreviation "MS", e.g. (Collins *et al.*, MS 1960). All papers referred to in the text must be cited in the References alphabetically by the first author's surname and initials, followed by the initials and surnames of other authors, year of publication, full title of the paper, name of the periodical, volume and/or number, and range of pages. Abbreviations of periodicals should, if possible, follow the "*World List of Aquatic Sciences and Fisheries Serials Titles*", published periodically by FAO (Food and Agriculture Organization of the United Nations). References to monographs should, in addition to the author(s), year and title, contain the name and place of the publisher and the number of pages in the volume. Reference to a paper in a book containing a collection of papers should also contain the page range of the paper, name(s) of editor(s), and actual title of the book. The accuracy of all references and their correspondence with text citations is the responsibility of the author.

Comments on Tables and Figures

All Tables and Figures must be mentioned or discussed in the text. Tables and Figures must be numbered consecutively in arabic numerals, which correspond with the order of presentation in the text. The required position of the Tables and Figures in the text should be indicated in the left margin of the relevant page. Place the originals of Tables and Figures after the list of references.

Tables. Note a well constructed Table can eliminate elaborate text descriptions. Each Table should be carefully constructed to be easily read and understood. Each column and row must be concisely headed, ensuring relevant units of the values are given (usually within parentheses). Each Table should have a complete but concise descriptive heading, and should be on a separate sheets.

Figures. Note any reference to geographic areas relevant to the study should be shown in a Figure (or map) form giving coordinates. These and illustrations and photographs can eliminate elaborate text descriptions.

Each Figure should be carefully constructed and labelled to be easily read and understood. Each vertical and horizontal axis (e.g. x and y axes on a graph or latitude and longitudes on a map) must have a concise header with relevant units (usually within parentheses). Each Figure would have a complete but concise descriptive heading, and should be on a separate sheet.

When preparing figures, consideration should be given to details such as shading and lettering with respect to the effects of reduction in size to a page width (e.g. lettering should not be overbearing or too small). If oversized figures are necessary, only good quality page-size photocopies should be submitted. If the paper contains photographs, ensure they have good contrast whether they are in colour or black and white.

Mathematical equations and formulae must be accurately stated, with clear definitions of the various letters and symbols. If logarithmic expressions are used, the type of function (e.g. log, ln, $\log_{10}$ or $\log_e$) must be clearly indicated.

Manuscript Submission

NOTE: The following are the two major NAFO scientific publications, while the Scientific Council Research Documents (SCR Doc.) and Summary Document (SCS Doc.) are series that are submitted for meeting considerations.

The NAFO Secretariat now prefers to receive manuscript submissions, for any of the above publications in a computer electronic form. Coloured Tables and Figures are now accepted.

The manuscript submissions may be done by e-mail (with a hard copy and diskette also forwarded by mail), or by mail (one hard copy and diskette). All texts, Tables and Figures should be formatted using Word or WordPerfect (Word is preferred), with each Table and Figure saved in a separate file (eps (preferably), tiff, pct, jpg, bmp or gif).

The Secretariat may request alternative formats as publication technologies develop.

Journal of Northwest Atlantic Fishery Science

The Journal provides a forum for the primary publication of original research papers. While it is intended to be regional in scope, papers of general applicability and methodology, irrespective of region, may be considered. Both practical and theoretical papers are eligible. Space is also provided for notes, letters to the editor and notices.

Such manuscripts are considered for publication with the understanding that the content is unpublished and is not being submitted elsewhere for publication. Each manuscript is assigned to an Associate Editor of the Journals Editorial Board, for scientific editing. Papers are normally sent by the Associate Editors to two referees for appraisal regarding its suitability as a primary article.

NAFO Scientific Council Studies

The Studies publishes papers which are of topical interest and importance to the current and future activities of the Scientific Council, but which are not considered to be sufficiently high quality to meet the standards for primary publication in the Journal. Such papers have usually been presented as research documents at Scientific Council meetings and nominated for publication by the Standing Committee on Publications. These manuscripts are not normally refereed but undergo critical scrutiny by the Studies editor and by an expert familiar with the subject matter selected from the Journal editorial board.

Manuscripts (one hard copy and one copy saved on a computer diskette) being submitted should be addressed to:

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Scientific Publications of the Northwest Atlantic Fisheries Organization

Journal of Northwest Atlantic Fishery Science

The Journal provides an international forum for the primary publication of original research papers on fisheries science in the Northwest Atlantic, with emphasis on environmental, biological, ecological and fishery aspects of the living marine resources and ecosystems. (Scientific publications during ICNAF times are available at the Secretariat).

Vol. 1 – Miscellaneous papers, (10), December 1980, 112 pp.
Vol. 2 – Miscellaneous papers, (10), October 1981, 76 pp.
Vol. 3, No. 1, 2 – Miscellaneous papers, (17), May and December 1982, 180 pp.
Vol. 4 – Special issue *Guide to the Early Stages of Marine Fishes Occurring in the Western North Atlantic Ocean, Cape Hatteras to the Southern Scotian Shelf*, July 1983, 424 pp.
Vol. 5, No. 1, 2 – Miscellaneous papers, (26), January and November 1984, 224 pp.
Vol. 6, No. 1, 2 – Miscellaneous papers, (17), June and December 1985, 179 pp.
Vol. 7, No. 1, 2 – Miscellaneous papers, (18), December 1986 and December 1987, 177 pp.
Vol. 8 – Miscellaneous papers, (7), December 1988, 88 pp.
Vol. 9 – Miscellanous papers, (13), September and December 1989, 159 pp.
Vol. 10 – Special issue, (1), *The Delimitation of Fishing Areas in the Northwest Atlantic*, December 1990, 57 pp.
Vol. 11 – Miscellaneous papers, (7), February 1991, 80 pp.
Vol. 12 – Miscellaneous papers, (7), January 1992, 84 pp.
Vol. 13 – Miscellaneous papers, (7), December 1992, 114 pp.
Vol. 14 – Symposium papers, (12), on *Changes in Biomass, Production and Species Composition of the Fish Populations in the Northwest Atlantic over the Last 30 Years, and Their Possible Causes*, December 1992, 160 pp.
Vol. 15 – Special issue, (1), *Decapod Crustacean Larvae from Ungava Bay*, December 1993, 170 pp.
Vol. 16 – Miscellaneous papers, (7), July 1994, 100 pp.
Vol. 17 – Miscellaneous papers, (6), October 1994, 78 pp.
Vol. 18 – Miscellaneous papers, (6) (1 Note), April 1996, 115 pp.
Vol. 19 – Symposium papers, (11), on *Gear Selectivity/Technical Interactions in Mixed Species Fisheries*, September 1996, 145 pp.
Vol. 20 – Special issue, (1), *North Atlantic Fishery Management Systems: A Comparison of Management Methods and Resource Trends*, September 1996, 143 pp.
Vol. 21 – Miscellaneous papers, (5), April 1997, 83 pp.
Vol. 22 – Symposium papers, (25) (1 Note), on *The Role of Marine Mammals in the Ecosystem*, December 1997, 387 pp.
Vol. 23 – Symposium papers, (16), *What Future for Capture Fisheries*, October 1998, 277 pp.
Vol. 24 – Miscellaneous papers, (4), November, 1998, 97 pp.
Vol. 25 – Symposium papers, (17), (2 Notes), on "*Variations in Maturation, Growth, Condition and Spawning Stock Biomass Production in Groundfish*", October 1999, 233 pp.
Vol. 26 – Miscellaneous papers, (6), December 2000, 145 pp.
Vol. 27 – Symposium papers (22) (1 Note), *Pandalid Shrimp Fisheries – Science and Management at the Millennium*, December 2000, 289 pp.
Vol. 28 – Special issue, (1), *A Review of the Cod Fisheries at Greenland, 1910–1995*, December 2000, 121 pp.

NAFO Scientific Council Studies

This publication includes papers of topical interest and importance to the current and future activities of the Scientific Council.

No. 1 – Miscellaneous papers, (11), March 1981, 101 pp.
No. 2 – Manual on *Groundfish Surveys*, December 1981, 56 pp.
No. 3 – Miscellaneous papers, (8), April 1982, 82 pp.
No. 4 – Special Session papers, (12), on *Remote-Sensing Applications to Fishery Science*, September 1982, 98 pp.

NAFO Scientific Council Studies (Continued)

No. 5 – Symposium papers, (12), on *Environmental Conditions in 1970–79*, December 1982, 114 pp.
No. 6 – Miscellaneous papers, (8), December 1983, 104 pp.
No. 7 – Miscellaneous papers, (9), August 1984, 98 pp.
No. 8 – Miscellaneous papers, (12), April 1985, 96 pp.
No. 9 – Special Session papers, (17), on *Squids*, November 1985, 180 pp.
No. 10 – Miscellaneous papers, (9), August 1986, 112 pp.
No. 11 – Miscellaneous papers, (11), March 1987, 127 pp.
No. 12 – Miscellaneous papers, (8), March 1988, 90 pp.
No. 13 – Miscellaneous papers, (5), November 1989, 82 pp.
No. 14 – Miscellaneous papers, (6), May 1990, 74 pp.
No. 15 – Miscellaneous papers, (7), May 1991, 68 pp.
No. 16 – Special Session papers, (22), on *Management Under Uncertainties*, November 1991, 190 pp.
No. 17 – Workbook on *Introduction to Sequential Population Analysis*, February 1993, 98 pp.
No. 18 – Symposium papers, (18), on *Changes in Abundance and Biology of Cod Stocks and Their Possible Causes*, July 1993, 110 pp.
No. 19 – Miscellaneous papers, (8), October 1993, 98 pp.
No. 20 – Miscellaneous papers, (7), February 1994, 114 pp.
No. 21 – Collections of Papers, (10), Related to *Northern Cod and Seals in NAFO Divisions 2J and 3KL*, December 1994, 165 pp.
No. 22 – Miscellaneous papers, (6), May 1995, 95 pp.
No. 23 – Miscellaneous papers, (5), September 1995, 95 pp.
No. 24 – Symposium papers, (12), on *Impact of Anomalous Oceanographic Conditions at the Beginning of the 1990s in the Northwest Atlantic on the Distribution and Behaviour of Marine Life*, September 1994, 155 pp.
No. 25 – Collection of Papers, (5), *Flemish Cap Selected Environmental and Other Papers*, July 1996, 91 pp.
No. 26 – Selected Papers, (11), (2 Notes), on *Harp and Hooded Seals*, December 1996, 129 pp.
No. 27 – Miscellaneous papers, (5), (1 Note), December 1996, 81 pp.
No. 28 – Special Session papers, (6), on *Assessment of Groundfish Stocks Based on Bottom Trawl Survey Results*, December 1996, 105 pp.
No. 29 – Selected Papers, (11), *Selected Studies Related to Assessment of Cod in NAFO Divisions 2J+3KL*, May 1997, 125 pp.
No. 30 – Miscellaneous papers, (9), December 1997, 117 pp.
No. 31 – Miscellaneous papers, (8), December 1998, 165 pp.
No. 32 – Miscellaneous papers, (8), April 1999, 133 pp.
No. 33 – Miscellaneous papers, (7), May 2000, 135 pp.

NAFO Scientific Council Reports

This publication contains reports of Scientific Council Meetings held through each year since NAFO replaced ICNAF. (The comparable publication during ICNAF was called the *Redbook*).

1980 – Reports of seven meetings in 1979 and 1980, Published December 1980, 190 pp.
1981 – Reports of four meetings in 1981, Published December 1981, 148 pp.
1982 – Reports of two meetings in 1982, Published December 1982, 110 pp.
1983 – Reports of three meetings in 1983, Published December 1983, 152 pp.
1984 – Reports of three meetings in 1984, Published December 1984, 126 pp.
1985 – Reports of three meetings in 1985, Published December 1985, 146 pp.
1986 – Reports of three meetings in 1986, Published December 1986, 156 pp.
1987 – Reports of three meetings in 1987, Published December 1987, 138 pp.
1988 – Reports of two meetings in 1988, Published December 1988, 150 pp.
1989 – Reports of two meetings in 1989, Published December 1989, 180 pp.
1990 – Reports of two meetings in 1990, Published December 1990, 188 pp.
1991 – Reports of two meetings in 1991, Published December 1991, 164 pp.
1992 – Reports of four meetings in 1992, Published December 1992, 212 pp.
1993 – Reports of three meetings in 1993, Published January 1994, 234 pp.
1994 – Reports of four meetings in 1994, Published January 1995, 234 pp.
1995 – Reports of three meetings in 1995, Published January 1996, 244 pp.

NAFO Scientific Council Reports (Continued)

1996 – Reports of three meetings in 1996, Published January 1997, 226 pp.
1997 – Reports of three meetings in 1997, Published January 1998, 274 pp.
1998 – Reports of three meetings in 1998, Published January 1999, 257 pp.
1999 – Report of four meetings in 1999, Published January 2000, 327 pp.
2000 – Report of four meetings in 2000, Published January 2001, 303 pp.

NAFO Statistical Bulletin

This publication replaced *ICNAF Statistical Bulletin* which terminated with Vol. 28 (revised). The volume numbering continues the series as the *NAFO Statistical Bulletin.*

Vol. 29 – Fishery statistics for 1979, Originally published July 1981; revised edition published November 1984, 290 pp.
Vol. 30 – Fishery statistics for 1980, Originally published August 1982; revised edition published October 1984, 280 pp.
Vol. 31 – Fishery statistics for 1981, Originally published September 1983; revised edition published March 1985, 276 pp.
Vol. 32 – Fishery statistics for 1982, Published December 1984, 284 pp.
Vol. 33 – Fishery statistics for 1983, Published December 1985, 280 pp.
Vol. 34 – Fishery statistics for 1984, Published December 1986, 304 pp.
Vol. 35 – Fishery statistics for 1985, Published December 1987, 322 pp.
Vol. 36 – Fishery statistics for 1986, Published October 1989, 304 pp.
Vol. 37 – Fishery statistics for 1987, Published April 1990, 295 pp.
Vol. 38 – Fishery statistics for 1988, Published February 1991, 307 pp.
Vol. 39 – Fishery statistics for 1989, Published February 1993, 300 pp.
Vol. 40 – Fishery statistics for 1990, Published February 1994, 309 pp.
Vol. 41 – Fishery statistics for 1991, Published February 1995, 318 pp.
– Statistical Bulletin Supplementary Issue, 1960–90, (statistics) Published April 1995, 156 pp.
Vol. 42 – Fishery statistics for 1992, Published October 1995, 310 pp.
Vol. 43 – Fishery statistics for 1993, Published December 1997, 329 pp.
Vol. 44 – Fishery statistics for 1994, Published December 2000, 201 pp.
Vol. 45 – Fishery statistics for 1995, Published October 2001, 207 pp.

Inventory of Sampling Data

This publication replaced *ICNAF Inventory of Sampling Data* 1967–1978 which was completed in 1986.

Inventory of Sampling Data 1979–1984, Published April 1989, 250 pp.
Inventory of Sampling Data 1985–1989, Published March 1993, 265 pp.
Inventory of Sampling Data 1990–1994, Published October 1999, 287 pp.

NAFO Index of Meeting Documents

This publication contains lists of all documents along with a subject and author index of the NAFO Scientific Council documents issued during 5-year periods.

1979–84 – Index of Meeting Documents, Published March 1985, 146 pp.
1985–89 – Index of Meeting Documents, Published December 1990, 116 pp.
1990–94 – Index of Meeting Documents, Published November 1995, 139 pp.
1995–99 – Index of Meeting Documents, Published December 2000, 141 pp.