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Assessments of the cod (*Gadus morhua*) stock in NAFO Divisions 2J3KL (April 2007 and April 2008)

Évaluation du stock de morue (*Gadus morhua*) dans les divisions 2J3KL de l'OPANO (avril 2007 et avril 2008)

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ABSTRACT

The status of the northern cod (*Gadus morhua*) stock in NAFO Div. 2J+3KL was assessed in 2007 and again in 2008. A directed "stewardship" fishery and a recreational fishery for cod were re-opened in the inshore during 2006 and continued in 2007; the offshore remained closed to directed fishing in both years. There was no formal TAC, but commercial fishers were permitted an allowance of 3,000 lb of cod per license holder in 2006 and 2,500 lb in 2007. Recreational fishers were permitted 5 fish per day or 15 fish per boat. Reported landings in 2006 were 2,679 t, including 380 t in the recreational fishery, 159 t in the sentinel surveys, and 45 t of by-catch. Reported landings in 2007 (excluding the recreational fishery) were 2,546 t, comprising 2,192 t of directed catch, 172 t of by-catch mainly in the turbot gillnet test fishery, and 182 t in the sentinel surveys. Two widely differing estimates of recreational catch were available for 2007, but the differences could not be reconciled. Commercial fishers also reported that commercial landings are underestimated; hence total catch for the 2007 fishery is uncertain. Offshore and inshore components of the northern cod stock complex have shown different dynamics since the mid-1990's and the status of cod in the offshore and three inshore regions (northern, central and southern) were evaluated separately at each assessment.

<u>2007 assessment:</u> Offshore abundance and biomass indices in 2006 were the highest observed since the early 1990's, but the average index values during 2004-06 compared to the average of the 1980's were 4-5% (for abundance) and 3-4% (for biomass). Total mortality of cod in the offshore is extremely high (average 58% per year) and recruitment has been weak since 1989. The high rate of mortality is a major impediment to stock recovery and it is recommended that the moratorium on directed fishing be continued, and that by-catch be minimized. For the inshore northern area, it is inferred from the low catch rates in the sentinel surveys (1995-2004) and the commercial fishery (1998-2002) that cod densities have been very low. However, sentinel catch rates increased during 2005 and again in 2006. The origins of the fish generating these increases remain uncertain. They appear to be immigrants, possibly from the offshore; therefore, it would be prudent to keep catches low in this area. A sequential population analysis (SPA) for the inshore central area indicated that spawning stock biomass (SSB) is ~20,000 t and has been increasing since 2003, but exploitable biomass (age 4+) decreased by 6% from 2006 to 2007. Incoming recruitment is estimated to be substantially weaker, which will result in a decline in exploitable biomass and SSB. Projections indicated that the risk of the SSB growing by less than 5% by 1 January 2008 increases rapidly with a catch above 500 t and is very high (0.87) for a catch of 2,500 t. The risk of the SSB growing by less than 5% per year by 1 January 2010 is very high (0.93) even with no catch. For the inshore southern area (southern 3L), the fisheries during 1998-2002 and 2006 were partly dependent on fish that migrate seasonally between 3Ps and 3L. Since the magnitude of annual migration cannot be predicted, the effect of various levels of removals cannot be estimated.

<u>2008 assessment</u>: Offshore abundance and biomass indices increased further in 2007 and show an increasing trend since 2003, most noticeably in southern 3K and northern 3L. The average index values during 2005-07 compared to the average of the 1980's were 7-8% (for abundance) and 4-5% (for biomass). A notable finding was a substantial decline in total mortality and the prospects for stock recovery have improved. Specific limit reference points for this stock have not been established, but the stock remains well below any reasonable limit reference point and recruitment remains weak; it is therefore recommended that the moratorium on directed fishing in the offshore be continued. For the inshore northern area in 2007, commercial catch rates improved but sentinel catch rates were largely unchanged and remain lower than those in the inshore central area; therefore, it is recommended that removals in this area be minimized. The SPA for the inshore central area could not be continued in 2008 because the total catch for the 2007 fishery was uncertain. Sentinel fishery catch rates for the inshore central area improved in 2007, are currently above average, and have been increasing since 2002; stewardship fishery

catch rates also improved in 2007 and are higher than in earlier fisheries during 1998-2002. These results suggest that exploitable biomass in the inshore central area has increased recently, but this trend may not continue as incoming 2003-06 year-classes are weak. The impacts of fishing at specific catch levels could not be quantified in the absence of a population model. For the inshore southern area (southern 3L), sentinel gillnet catch rates have been unchanged since 2003 but are below average; stewardship fishery catch rates improved but are lower than those in the central area. The fishery in this area continues to be influenced by migrants from 3Ps; the extent of annual migration cannot be predicted, therefore, the effect of various levels of removals from this area cannot be estimated.

RÉSUMÉ

L'état des stocks de morues du Nord (*Gadus morhua*) dans les divisions 2J+3KL de l'OPANO a été évalué en 2007, puis en 2008. Une pêche « d'intendance » dirigée et des pêches sportives ont été rouvertes pour la morue dans les eaux côtières en 2006 et se sont poursuivies en 2007; la pêche dirigée est demeurée interdite dans la partie extracôtière au cours de ces deux années. Il n'y avait pas de TAC officiel, mais on a permis aux pêcheurs commerciaux de capturer 3 000 lb de morue par titulaire de permis en 2006 et 2 500 lb en 2007. On a permis aux pêcheurs sportifs de capturer 5 poissons par jour ou 15 poissons par embarcation. En 2006, les débarquements déclarés s'élevaient à 2 679 t, y compris 380 t pour les pêches sportives, 159 t dans les relevés sentinelles, et 45 t de prises accessoires. En 2007, les débarquements déclarés (à l'exception des pêches sportives) s'élevaient à 2 546 t, dont 2 192 t sous forme de prises dirigées, 172 t de prises accessoires réalisées principalement dans le cadre de la pêche expérimentale au flétan avec filets maillants, et 182 t dans le cadre de relevés sentinelles. Deux estimations fort différentes des pêches sportives étaient disponibles pour 2007, mais les différences n'ont pu être rectifiées. Les pêcheurs commerciaux ont également signalé que les débarquements commerciaux étaient sous-estimés; par conséquent, le nombre total des prises pour les pêches de 2007 est incertain. Les volets extracôtiers et côtiers du complexe des stocks de morue du Nord montrent des dynamiques différentes depuis le milieu des années 1990, et l'état de la morue dans les zones extracôtières et les trois zones côtières (nord, centre et sud) a chaque fois été évalué séparément.

<u>Évaluation de 2007</u> : C'est en 2006 que les indices de la biomasse et de l'abondance en zone extracôtière étaient les plus élevés depuis le début des années 1990, mais les valeurs moyennes des indices entre 2004 et 2006, comparativement à la moyenne des années 1980, étaient de 4 à 5 % (pour l'abondance) et de 3 à 4 % (pour la biomasse). Le taux total de mortalité est très élevé chez la morue des zones extracôtières (en moyenne 58 % par année) et le recrutement est faible depuis 1989. Ce taux élevé de mortalité est un obstacle de taille pour le rétablissement des stocks, et il est recommandé de maintenir le moratoire sur la pêche dirigée et de réduire au minimum les prises accessoires. Dans la zone côtière du nord, on peut avancer que les densités de morue sont très faibles en raison des faibles taux de prises observés dans les relevés sentinelles (de 1995 à 2004) et la pêche commerciale (de 1998 à 2002). Toutefois, les taux de prises des relevés sentinelles ont augmenté au cours de 2005, puis en 2006. L'origine des poissons causant ces hausses est incertaine. Il semble s'agir d'immigrants venant probablement des eaux du large; par conséquent, on recommande que les prélèvements soient réduits au minimum dans cette zone. Selon une analyse séquentielle de la population (ASP) pour la zone côtière du centre, la biomasse du stock reproducteur (BSR) est d'environ 20 000 t et augmente depuis 2003, mais la biomasse exploitable (âge 4+) a diminué de 6 % entre 2006 et 2007. Le recrutement futur est considérablement plus faible, ce qui entraînera un déclin de la biomasse exploitable et de la BSR. Selon des prévisions, le risque que la BSP affiche un taux de croissance de moins de 5 % d'ici le 1er janvier 2008 augmente rapidement avec des prises de plus de 500 t et est très élevé (0,87) pour des prises de 2 500 t. Le risque que la BSP affiche un taux de croissance inférieur à 5 % par année d'ici le 1er janvier 2010 est très élevé (0,93) même sans prise. Dans la zone côtière du sud (sud de 3L), les pêches entre 1998 et 2002 et en 2006 dépendaient en partie de poissons migrant sur une base saisonnière entre 3Ps et 3L. Comme l'ampleur de la migration annuelle ne peut pas être prévue, l'effet de divers scénarios de prélèvement ne peut être estimé.

<u>Évaluation de 2008</u> : Les indices de la biomasse et de l'abondance en zone extracôtière étaient encore plus élevés en 2007 et montrent une tendance à la hausse depuis 2003, notamment dans le sud de 3K et le nord de 3L. Les valeurs moyennes des indices entre 2005 et 2007, comparativement à la moyenne des années 1980, étaient de 7 à 8 % (pour l'abondance) et de 4 à

5 % (pour la biomasse). Fait intéressant, il y a eu un déclin considérable dans le taux total de mortalité, et les possibilités de rétablissement des stocks se sont améliorées. Aucun point de référence limite n'a été établi pour ce stock de poissons, mais le stock est bien en deçà de n'importe quel point de référence limite raisonnable et le recrutement demeure faible. En conséquence, on recommande que le moratoire sur la pêche dirigée dans les eaux du large soit maintenu. En 2007, les taux de prises commerciales dans la zone côtière du nord ont augmenté tandis que les taux de prises des relevés sentinelles demeuraient en grande partie inchangés et étaient moins élevés que ceux dans la zone côtière du centre. Par conséquent, on recommande que les prélèvements soient réduits au minimum. L'APS pour la zone côtière du centre ne pouvait être poursuivie en 2008 en raison de l'incertitude concernant le nombre total de prises en 2007. Les taux de prises des pêches sentinelles dans la zone côtière du centre ont augmenté en 2007, et sont actuellement au-dessus de la moyenne, et augmentent depuis 2002. Les taux de prises de la pêche d'intendance ont également augmenté en 2007 et sont plus élevés que ceux des pêches menées entre 1998 et 2002. D'après ces résultats, la biomasse exploitable dans la zone côtière du centre a récemment augmenté, mais cette tendance pourrait ne pas se poursuivre car l'effectif des classes d'âge de 2003 à 2006 est faible. Les effets de niveaux de prises particuliers n'ont pu être quantifiés en raison de l'absence d'un modèle de population. Pour la zone côtière du sud (sud de 3L), les taux de prises des relevés sentinelles effectués avec des filets maillants étaient stables depuis 2003 mais se situaient toutefois en dessous de la moyenne. Les taux de prises de la pêche d'intendance se sont améliorés mais sont inférieurs à ceux de la zone du centre. La migration de poissons de 3Ps continue d'avoir une incidence sur la pêche dans cette zone. Étant donné que l'étendue de la migration annuelle ne peut être prévue, les effets des divers niveaux de prélèvements dans cette zone ne peuvent être estimés.

INTRODUCTION

This document gives a detailed account of two consecutive regional assessments (RAPs) of the northern (NAFO Div. 2J+3KL) cod (*Gadus morhua*) stock which inhabits the waters off the eastern and northeast coast of Newfoundland and southern Labrador eastward to the shelf edge (Fig. 1a-c). The assessments reported here were conducted during March-April 2007 and March-April 2008.

Assessments of the status of 2J3KL cod have been conducted since 1972. Details of assessments and a history of the fishery and various aspects of the biology of northern cod are given elsewhere (Bishop et al. 1993, 1994, 1995, 1997; Lilly et al. 1998b, 1999, 2000b, 2001, 2003, 2004, 2005, 2006). Scientific Advisory Reports of recent assessments are also available (DFO 2003, 2004, 2005, 2006, 2007a, 2008a). Proceedings of the two assessments described herein have also been published (DFO 2007b, 2008b). Specific terms of reference for each of the last two assessments are provided in Appendices I and II. To address the respective terms of reference, data from several sources were reviewed at each assessment. Commercial catch information was examined in detail. For the offshore, indices of abundance, biomass and other biological characteristics were obtained from multi-species research vessel bottom-trawl (RV) surveys conducted by Fisheries and Oceans Canada (DFO) in Div. 2J3KL during the autumn and in Div. 3L during the spring. Information on recruitment and total mortality is obtained from catch rate at age in the autumn surveys. An offshore hydroacoustic-tagging-telemetry survey was initiated in February-March 2007 and repeated in March 2008. This survey provides information on the winter distribution, movements and abundance of cod along the traditional over-wintering area along the continental shelf edge of 2J3KL. For the inshore, indices of abundance are provided by DFO-Industry fixed-gear sentinel surveys (1995-2007), which are conducted by two traditional gears, gillnets of 5½ inch mesh and line-trawls, and a non-traditional 3¼ inch mesh gillnet (1996-2007), which is intended to provide information on young fish. Logbooks from vessels <35 ft for the fisheries in 1998-2002 and 2006-07 are examined for catch rate information. Tagging studies provide information on exploitation, distribution and migration; these were initiated in 1997 and were continued in 2006 and 2007. Telemetry studies were also conducted in 2005-07 (Brattey et al. 2008). Hydroacoustic surveys (Rose 2003) were conducted in Smith Sound for many years, particularly during winter and spring 1997-2004 and in 2006 and 2007. Annual telephone surveys of fish harvesters' observations is conducted by the Fish, Food and Allied Workers (FFAW) Union and results for the fisheries in 2006 and 2007 are reported. Information on the relative abundance of young (age 0 and age 1) cod is provided by beach seine studies in Newman Sound, Bonavista Bay during 1996-2007. Information on the size and age composition of the commercial catch is obtained from lengths and otoliths collected from cod sampled at ports and at sea. A DFO-Industry bottom-trawl survey conducted during July-August 2006 using small (<65 ft) commercial vessels was continued in 2007. This inshore trawl survey provides information on the relative abundance, age composition and distribution of cod inhabiting the coastal and near-shore area of 2J3KL. Oceanographic information is also considered (Colbourne et al. 2008) and broad-scale changes in some major ecosystem components are also briefly reviewed.

REPORTED LANDINGS

Reported landings from this stock from the 1950's until 2005 are described in detail in Lilly et al. (2006). A brief historical summary is given here and new landings information is presented for the directed inshore cod fishery which reopened in 2006 and continued in 2007.

Reported landings of northern cod increased during the 1960's to a peak of over 800,000 t in 1968, declined steadily to a low of 140,000 t in 1978, increased to about 240,000 t through much of the 1980's, and then declined rapidly in the early 1990's in advance of a moratorium on directed fishing in 1992 (Tables 1, 2; Fig. 2-3). The bulk of the landings were taken by non-Canadian fleets prior to extension of jurisdiction in 1977, and from the late 1970's onwards catches were taken mainly by Canadian mobile (offshore) and fixed gear (mostly inshore) fleets. In the 1974-92 period cod traps and gillnets accounted for most of the Canadian fixed gear landings and gillnets increased in prominence in the late 1980's (Table 2; Fig. 4). Gillnets have also been used extensively in the post-moratorium period although reported landings have been greatly reduced.

In the early part of the post-moratorium period (1993-97) landings came from by-catch, food/recreational fisheries, and DFO-industry sentinel surveys that started in 1995 (Fig. 5). Catches from 1998-2002 also came from a limited index/commercial inshore fishery restricted to fixed gear and small vessels (<65 ft). The directed commercial and recreational fisheries were closed again in April 2003; most of the landings in 2003 came from an unusual mortality event in Smith Sound (Colbourne et al. 2003). During 2004 and 2005, substantial by-catches (>600 t) of cod were taken in the inshore, mostly in 3KL, in the winter flounder (blackback, *Pseudopleuronectes americanus*) fishery.

REPORTED LANDINGS DURING 2006 AND 2007

A directed "stewardship" fishery and a recreational fishery for cod were re-opened in the inshore of 2J3KL during 2006 and continued in 2007; the offshore remained closed to directed fishing in both years. There was no formal TAC for these fisheries; commercial fishers were permitted an allowance of 3,000 lb of cod per license holder in 2006 and 2,500 lb in 2007. Recreational fishers were permitted 5 fish per day or 15 fish per boat. Details of the management plans for these fisheries are described in Appendices III and IV.

Reported landings in 2006 were 2,679 t (Table 3a), including 380 t in the recreational fishery, 159 t in the sentinel surveys, and 45 t of by-catch of which 20 t came from the offshore.

Reported landings in 2007 were 2,546 t (Table 3b) excluding the recreational fishery. This included 2,192 t taken as directed catch, and 172 t as by-catch mainly in the turbot gillnet test fishery, with 182 t landed in the sentinel surveys. Two estimates of landings from recreational fisheries in 2007 were available. A telephone survey suggested a recreational catch that was comparable to the directed fishery catch; monitoring by fisheries officers suggested the recreational catch was much lower (371 t). The differences were not reconciled by the time of the assessment, and appeared to be due mainly to large discrepancies in estimates of the amount of effort (i.e. boat trips per day). The issues affecting the 2007 recreational catch estimation may also affect estimates for previous years. Estimates of commercial catch are also uncertain. Commercial fishers often report that commercial landings are underestimated, but the degree of underestimation is unknown. Because of these two factors total catch during 2007 remains uncertain.

An estimate is not yet available for the 2007 catch by non-Canadian fleets outside the 200 nautical mile limit on the Nose of the Grand Bank (Div. 3L). The Scientific Council of the Northwest Atlantic Fisheries Organization (NAFO) estimated that annual catches during 2000-2006 were <70 t. and have been diminishing in recent years (Table 1).

UNACCOUNTED FISHING MORTALITY

By-catches of cod occur in ongoing Canadian and non-Canadian fisheries. All recorded by-catch has been incorporated into the catch (Tables 1 and 2), but not all by-catch is recorded.

In the inshore, by-catches are common in gillnet fisheries for lumpfish and especially winter flounder (blackback). They also occur in the herring gillnet fishery, the capelin trap fishery, and the bait-net fishery. Note that for winter flounder and herring there are both commercial fisheries and bait fisheries. The only inshore fishery that has been studied specifically for by-catch is the herring gillnet bait fishery, in which by-catches of cod appeared to be small (Reddin et al. 2002).

In the offshore, by-catches of cod by Canadian fleets have, in recent years, come from trawl fisheries for yellowtail flounder and both trawl and gillnet fisheries for Greenland halibut. The recorded by-catches in these fisheries have been small, except in 2007 when the cod by-catch in an August-October turbot gillnet test fishery in northern 3L increased substantially from 2% in 2004-06 to 18% in 2007.

Discards

The discarding of cod in the shrimp fishery was dramatically reduced with the introduction of the Nordmore grate in 1993 (Kulka 1998). Total discards from the large-vessel shrimp fishery in 2J3K were 5 t in 1995 and 13 t in 1996 (Kulka 1998).

Shrimp quotas increased dramatically during the late 1990's, and a new fleet of smaller trawlers entered the fishery in 1997. The level of observer coverage in this fleet of smaller vessels has been low (Orr et al. 2002). Therefore, the total quantity of discards may have increased since the mid-1990's, and the opportunities for observing such discards have declined.

Shrimp fisheries expanded into Div. 3L during the 1990's and increased considerably starting in 2000. Studies during the early years of these fisheries indicated that there was little overlap between the distributions of shrimp and small cod during the autumns of 1995-98 (Orr et al. 1999), and the discards of cod by small and large shrimp vessels combined was less than 1 t annually during 2000 and 2001 (Orr et al. 2002).

D. Orr (Fisheries and Oceans Canada, St. John's, NL, October 2004, pers. comm.) provided estimates of the quantity of cod discarded by large and small shrimp vessels in 2J3K and 3L for the years 1997-2003 (Lilly and Murphy 2004). The procedure used was similar to that described for the estimation of by-catch of Greenland halibut in the same fisheries (Bowering and Orr 2004). It was estimated that discards in 2J, 3K and 3L by both fleets combined were less than 5 t each year.

Additional un-quantified sources of mortality include the fallout and discarding of low quality cod caught in gillnets, mortality caused by contact with trawl gear, discarding of small cod caught by hand-lining and linetrawl. Size based price-differentials are also an incentive for fishers to discard smaller cod and retain only the largest and most valuable fish.

Illegal fishing

In recent years there have been removals in inshore waters in excess of sentinel surveys and legal fisheries. The magnitude of poaching is not known.

Impact of unaccounted fishing mortality

In the offshore, the level of mortality associated with unreported catch, discards and injury caused by contact with gear (e.g. shrimp trawls) is not known. However, any such deaths may be important because the abundance of cod in the offshore is much lower than it was prior to the moratorium.

In the inshore, the magnitude of unreported by-catch and poaching is not known, so the impact of such removals cannot be assessed.

SAMPLING OF CATCH IN 2006 AND 2007

The inshore stewardship fishery was sampled intensively during 2006 and 2007, with >111,000 cod measured annually for length (Tables a, 4b) and >9,400 otoliths taken for cod age determination in each year (Tables 5a, 5b). Sampling was well spread across the gears and unit areas, particularly during June-September when the directed and sentinel fisheries were active. Most of the length and otolith samples came from gillnets as this gear accounted for most of the catch.

CATCH NUMBERS AT AGE

The age composition and mean length-at-age of the landings were initially calculated by gear, unit area and quarter as described in Gavaris and Gavaris (1983).

Historic pattern

There is a long time series of catch-at-age from the fishery for northern cod (inshore and offshore combined) extending from 1962 to 2007 (Table 6). Although the bulk of the landings has typically comprised ages 4-8, the overall age range of the catch was much broader in the earlier part of the time series, with cod ages extending up to age 20, particularly in the 1960's. However, the age structure has been shrinking over time, and during the early 1990's older cod (>age 10) disappeared rapidly from the catch. The pattern reflects variability in mortality, year-class strength and variability in the proportion of the catch coming from each of the various gears that have different selectivity (Table 2).

Post-moratorium (1993-2007) period

Most of the catch in the post-moratorium has come from inshore fisheries, whereas during the pre-moratorium period the catch came from inshore and offshore. The age compositions of the total landings from inshore fisheries during 1993 to 2007 indicate a broadening of the age composition from about 1997 onwards (Table 6). When the index fishery opened in 1998, there were very few fish older than age 9 (the 1989 year-class). However, the 1990 and 1992 year-classes were moderately strong relative to other recent year classes in the inshore and have persisted, so that by 2002 there was good representation to age 12. The age composition in 2003 was unusual and was comprised mainly of cod from the Smith Sound mass mortality. The age composition of cod taken in this event (Lilly et al. 2004) may be interpreted as indicating that the older (1990-92) year-classes are better represented in the Smith Sound over-wintering aggregation than in the 2002 catch for 2J3KL as a whole. This interpretation must be treated with caution because older cod may have experienced higher mortality than younger cod during the Smith Sound event. In 2004 and 2005, the age composition of the catch shows that the 1990 and 1992 year-classes were persisting, but in diminishing numbers. However, much of the catch in 2004-05 may have come from by-catch in larger mesh gillnets used to catch winter flounder. Consequently, trends in the age composition of commercial catch in the post-moratorium period can be difficult to interpret as they are being influenced by annual changes in the composition of the gears being used. Nonetheless, the most notable trend in catch at age over the last decade is a gradual broadening of the age structure. Older cod (>age 10) are still less abundant in the catch than in the earlier portion of the time series, but the percentage has increased.

Catch at age during 2006

The total catch-at-age in 2006 comprised a wide range of ages, with cod aged 4-9 each contributing at least 2% by number. Ages 5 and 6 were most prominent, and these two ages accounted for >59% of the total numbers (Table 7a; Fig. 6). The age structure of the catch shows a domed pattern that is typical for a fishery dominated by 5½" mesh gillnets. The age composition of the 2006 catch shows some reduction in the relative importance of the older year-classes compared to the 2000-02 period, with the 1990 and 1992 year-classes more weakly represented. These year-classes are diminishing in abundance and surviving cod from these year-classes are now large and may be poorly selected by gillnets that were the dominant gear in the 2006 fishery.

The age composition of the catch from the inshore central area in 2006 was similar to that from the total area (Table 7a). However, ages 7-9 (1997-99 year-classes) are more strongly represented in the inshore southern area (Fig. 7, upper panel) compared to the inshore central area. Similar findings were noted in the 2005 assessment (Lilly et al. 2005). The 1997 and 1998 year-classes have been relatively strong in Subdiv. 3Ps (Brattey et al. 2005), but not in 3KL. The catch-at-age information therefore supports the contention that in recent years a portion of the cod caught in southern 3L are migratory cod from 3Ps.

Catch at age during 2007

In the 2007 fishery, the age range represented in the catch extends to about age 19, but as in 2006 most of the catch consists of ages 4-9 (Table 7b). Ages 5 and 6 (2002 and 2001 year-classes) make up most (67.2%) of the catch numbers as these cod are the optimum size for capture with gillnets. Four year old cod (2003 year class) are poorly represented in the catch in 2007 compared to 2006 with the percentage dropping from 13.7% to only 3.8% of the total (Tables 7a, 7b).

The age composition of the catch from the inshore central area in 2007 was again similar to that from the total stock area (Table 7b); the central area accounted for about 80% of the total catch numbers. The age composition of the catch from the inshore southern area in 2007 shows a pattern similar to that seen in 2006 where the 1997-99 year-classes (now ages 8-10) are more prominent in the southern area (Fig. 7, lower panel). The 2002 year-class (age 5) is also more prominent in the catch in the central area than in the southern area in 2007.

CATCH WEIGHTS AT AGE

The following standard relationship was applied in deriving average weight-at-age of cod:

$$\log(\text{weight}) = 3.0879*\log(\text{length}) - 5.2106.$$

The mean weights-at-age calculated from mean lengths-at-age in the landings have been variable, increasing in the late 1970's and early 1980's, followed by a decline through the 1980's to low levels in the early 1990's (Table 8). There has been substantial improvement in the latter half of the 1990's, and for some age-groups (e.g. ages 4-7) the weights-at-age calculated for recent years have been at or near the highest levels in the time-series. Interpretation of changes in the weights-at-age is difficult because of changes in the relative contributions of the various gear components and changes in the location and timing of catches from each gear component. For example, much of the landings prior to the moratorium came from otter trawling offshore early in the year, but since the moratorium most of the catch has come from fixed gear inshore in the second half of the year. In addition, the high proportion of landings coming from gillnets in recent years will tend to increase the calculated mean weight-at-age of those age-classes entering the selection range of the gear. This may apply in particular to ages 4 and 5. There may also be an underestimate of weight-at-age for those age-classes leaving the selection range of gillnets. Average weights at age for the oldest ages (>age 12) tend to be more variable due to increased variability in weight with age combined with small sample sizes. Nonetheless, the overall trend in weights at age suggests an improvement since the low point in the early 1990's.

There are clearly problems with the 1993 weights-at-age for ages 8 and 9 that remain to be resolved and values for these ages have been omitted from Fig. 8.

The biomass at age (numbers at age times average weights at age) in the reported landings from 1962 to 2007 is presented in Table 9. Most of the catch biomass in the past two years has come from ages 4-8.

STAKEHOLDER PERSPECTIVE

Telephone surveys conducted by the Fish, Food and Allied Workers (FFAW) Union (Jarvis and Stead 2005) were continued following the fisheries in 2006 and 2007 to assess the opinions of fish harvesters regarding the abundance of cod in inshore waters, the size and condition of the cod, and the abundance of prey. Additional comments were conveyed at the assessment meetings and these are summarized below

FISHERY IN 2006

Based on the telephone survey, most harvesters in 2J felt that there were less cod during 2006 than there was during the late 1980's, whereas in 3K and 3L most felt abundance was better during 2006 than the late 1980's. Most harvesters in 2J and 3K felt that cod were more abundant during 2006 than during 2005. In 3L, fish harvesters' opinion was evenly split between 2006 abundance being about the same and abundance being better than it was during 2005. While there was a wide range of opinion about the distribution of cod in 2J, in 3K and 3L most felt that cod were widely distributed or distributed throughout the area. Most fish harvesters in 2J, 3K and 3L felt that cod were in good condition during 2006.

Fish harvesters throughout 2J3KL felt that the overall catch is a source of uncertainty. Harvesters believe the amount landed in the recreational fishery was significantly higher than 380 t. The recreational catch in 2001 was about 1,700 t, when cod were less abundant, less time was available to fish, and more restrictions were placed on participants. These facts coupled with harvesters' observations of the recreational fishery suggest the catch in 2006 was actually much higher.

FISHERY IN 2007

Based on the telephone survey, most harvesters in 2J felt cod were less abundant in 2007 than the late 1980's. However, most 3K and 3L harvesters felt cod abundance was better during 2007 than the late 1980's. Harvesters in 2J3KL found cod more abundant in 2007 than in 2006. Most harvesters felt that cod were distributed throughout their area and felt that cod were in good condition in 2007. As this survey continues, added utility can be derived by monitoring harvester's perceptions from year to year.

Fish Harvesters feel that the lack of confidence in recent recreational cod fishery annual catch estimates is reason for concern. To improve those estimates and improve scientific assessments, Fish Harvesters feel that recreational landings should be subject to the same rules and regulations that apply to commercial landings.

During the 2007 fishery, Fish Harvesters observed large concentrations of cod inshore where the Stewardship Fishery was prosecuted and in the offshore where the 3L Turbot test Fishery was prosecuted. Because those fisheries were occurring at the same time, Fish Harvesters have little doubt that there has been a significant increase in cod abundance in the inshore and in the offshore in recent years.

POPULATION INDICES

BOTTOM-TRAWL SURVEYS

Research bottom-trawl surveys have been conducted by Canada during the autumn in Div. 2J, 3K and 3L since 1977, 1978 and 1981, respectively. No autumn survey was conducted in Div. 3L in 1984, but the results of a summer (August- September) survey in 1984 have been used for some analyses. The 1995 and 2002-05 autumn surveys were not completed on time and continued into late January of the following years. In addition, the 2004 survey coverage was incomplete as a portion of 3L was not surveyed. Also, in recent years the number of sets fished in some strata has been reduced due to time constraints associated with mechanical problems with the research vessels. Inshore strata were poorly covered in 2006 and omitted in 2007.

Spring surveys have been conducted by Canada in Div. 3L during the years 1971-82 and 1985-present.

Survey design

The autumn surveys in Div. 2J and 3K were conducted by RV *Gadus Atlantica* until 1994. In 1995-2000 they were conducted mainly by RV *Teleost*, although RV *Wilfred Templeman* surveyed part of Div. 3K. Surveys in Div. 3L were conducted by RV *A.T. Cameron* (1971-82) and RV *Wilfred Templeman* or its sister ship RV *Alfred Needler* (1985-2000 for spring and 1983-2000 for autumn). In recent years, RV *Teleost* occupied some of the 3L stations, particularly those in deep water. The surveying in Div. 2J and 3K became increasingly complex in 2001-05, with more individual trips required to complete the surveys and increased incidence of more than one ship contributing to the surveying of each division.

During the autumn of 1995 both the RV *Wilfred Templeman* and RV *Teleost* used for the first time the Campelen 1800 shrimp trawl with rockhopper footgear, replacing the Engel 145 Hi-rise trawl that had been used since the start of the surveys in 2J and 3K and since the change to the RV *Wilfred Templeman* in Div. 3L. In addition, the Campelen trawl was towed at 3.0 knots for 15 min instead of 3.5 knots for 30 min. The selectivities of the two nets were found through comparative fishing experiments in 1995 and 1996 to be markedly different, with the Campelen being far more effective at catching small cod (Warren 1997; Warren et al. 1997). There were limited data for the comparison of larger cod. Conversion of Engel catches to Campelen equivalent catches was reported by Stansbury (1996, 1997).

The survey stratification scheme, illustrated in Fig. 9-11, is based on depth intervals intersected by lines of latitude and longitude (Doubleday 1981; Bishop 1994). Note that bathymetric charts were only available in fathoms for 3L and in metres for 2J and 3K, hence the difference in depth scale in the stratification scheme for each division. The strata used in 1996 were similar to those in previous years except that the survey was extended to 1500 m and 25 new strata were added to the inshore in Div. 3K and 3L to obtain an estimate of the cod landward of the standard survey area. In 1997 some of the new inshore strata were modified and one stratum was added. The new inshore strata were not fished in 1999. The surveys in 2000-07 were similar to those in 1997-98, except inshore strata were poorly covered in 2006 and not fished in 2007 due to operational problems with the vessels.

Prior to 1988, set allocation was proportional to stratum area, with the provision that each stratum be allocated at least 2 sets. In 1989 and 1990 an “adaptive design” was introduced in an attempt to minimize variance. It was found that this method introduced a bias and the additional sets fished during the second phase of these surveys have been excluded from analyses. In 1991-94, additional sets were allocated in advance to certain strata based on stratum variance observed in the past (Gagnon 1991). In 1995-2007, set allocation was based once again on stratum area alone (with the provision that there be at least 2 sets in each stratum).

Additional details on the research bottom-trawl surveys conducted by DFO since the introduction of the Campelen trawl in 1995 are provided by Brodie (2005).

Autumn bottom-trawl surveys

Autumn abundance and biomass indices: Indices of cod abundance and biomass have been estimated by areal expansion of the stratified arithmetic mean catch per tow (Smith and Somerton 1981). To account for incomplete coverage of some strata in some years, estimates of biomass and abundance for non-sampled strata were obtained using a multiplicative model. Note that such a procedure was not followed for the autumn survey in 2004, when several strata in Div. 3L were not fished, even though the survey was continued into January 2005. See Lilly et al. (2005) for additional information regarding the area that was not fished and the reasons for not estimating the quantity of cod that may have been in the un-fished area at the time of the survey.

Abundance and biomass indices from the autumn surveys in 1978-94 (Div. 2J and 3K) and 1981-94 (Div. 3L) may be found in Tables 12-19 of Shelton et al. (1996). The data from 1983 to 1994 have been converted to Campelen equivalents and are presented in the current document along with the actual Campelen data from 1995 onwards (Tables 10-26). Note that data for 1993-2007 for Div. 2J are based on a revised stratification scheme introduced in 1993 (Bishop 1994); hence many of the survey tables for each NAFO Div. are divided into two parts; up to 1992 and from 1993 onwards. Estimates for surveys in Div. 3L are in Tables 18-21 for strata in depths <=200 fathoms (366 m) and Tables 22-23 for strata in depths >200 fathoms. Estimates for inshore strata added to the survey area in 1996 are given in Tables 24 and 25.

Because there have been changes over time in the depths covered during the survey, annual variability in the indices of abundance and biomass of cod has been monitored for those strata that have been fished most consistently since the start of the surveys. These “offshore index” strata are those in the depth range 100-500 m in Div. 2J and 3K and 55-366 m (30-200 fathoms) in Div. 3L. The inshore strata fished intermittently during 1996-2007 are not included in this index. Separate estimates of abundance (Table 24) and biomass (Table 25) by stratum have been calculated for the inshore strata (Tables 24 and 25), but inshore coverage has been too poor in the past few years to determine recent trends.

Changes in abundance and biomass in the offshore index strata are shown by Div. for the years 1983-2007 in Fig. 12. The trends in abundance and biomass differ in detail, reflecting in part changes in the relative abundance of small and large fish. Of note are the strong positive anomaly in 2J and 3K in 1986, the large increase in 3K in 1989, the increase in 3L in 1990, and the rapid decline during the early 1990's. Abundance and biomass remained at extremely low levels in all divisions for several years after 1993, but an increasing trend is evident during 2003-07 in each NAFO division, particularly in overall biomass. The average biomass index during 2005-07 was 5% of the average of the 1980's and the value in 2007 is the highest since 1992.

The total abundance and biomass of cod among strata aggregated by depth into three groups (i.e. index, offshore deep, and inshore) are summarized by Div. and for the whole stock by year in Table 26. These data only cover the period 1995-2007 which covers all years since the introduction of the Campelen trawl. During this 12 year period, the distribution of the survey catch among groups was variable between adjacent years with no clear trends over time. Index strata cover the greatest fraction of the stock area and have generally accounted for most of the total abundance and biomass, except in 2003 when an unusually high proportion of the abundance, but not biomass estimate, came from the inshore. Inshore strata have typically accounted for 5-15% of the abundance and biomass in most years. Lilly et al. (2006) provide more details on the interpretation of the autumn survey data with respect to depth and timing of the survey.

Autumn mean catch at age per tow: The divisional mean number caught at age per tow in offshore index strata during autumn surveys from 1979 (1981 in Div. 3L) to 1994, and the mean number per tow for Div. 2J, 3K and 3L combined, may be found in Tables 3-6 of Bishop et al. (1995). The data from 1983 to 1994 have been converted to Campelen equivalents and are presented along with the actual Campelen data from 1995 to 2007 in Table 27 for Div. 2J, 3K and 3L separately and for all three divisions combined. Mean catch per tow has continued to be low for each age in each Div. during the past several years, relative to 1983-1991 (Table 27).

Much of the expansion in age distribution in Div. 3L since the collapse in the early 1990's has been due to catches of small numbers of the 1989, 1990 and 1992 year-classes. These year-classes may have originated within the 2J3KL stock area, but there is evidence that some fish from these year classes moved into Div. 3L from the south. The 1989 and 1990 year-classes were stronger than adjacent year-classes in both 3Ps and 3NO during the late 1990's (Lilly et al. 2000a) and were clearly discernable in commercial and research catches in both 3Ps (Brattey et al. 2005) and 3NO (Power et al. 2005).

The relatively large catch rate at age 0 in Div. 2J in 2005 is due primarily to a single large catch of small fish in one tow in stratum 237, which is near the coast in central 2J. There are no age zeros in the catch at age matrix prior to 1996 and generally few in subsequent years as these small cod are poorly selected by trawl gears, either Engels or Campelen.

Autumn distribution: The distribution of cod at the time of the autumn surveys has been illustrated in a series of "expanding symbol" plots showing numbers per standard tow (Shelton et al. 1996; Murphy et al. 1997) and in weight (kg) per standard tow (Lilly 1994, 1995). The catch from each tow in the period 1983-94 has been recalculated to Campelen equivalents, and plots of these recalculated catches for 1985-94 are illustrated in Lilly et al. (1999).

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A detailed history and interpretation of changes in the distribution of cod at the time of the autumn surveys to 2005 is provided in Lilly et al. (2006). Catches from the early to mid-1990's onward tended to be very small, relative to the 1980's (see Fig. 15 in Lilly et al. [2006] and note change in scale). Since the late 1990's the offshore area with the most consistent catches of cod, though still relatively smaller, has been around Funk Island Bank (see Fig. 1b), particularly to the east and southeast. This pattern is continued in 2006 and expanded in 2007 where some larger catches were taken in a broader area that extends from off Cape Bonavista east and northeastward along the 3K-3L border and northward along the outer reaches of Funk Island Bank (Fig. 13, 14). In 2007, some larger catches (in terms of numbers) were also taken off the southern Avalon, and in 2J around Hamilton Bank and the northern flank of Hawke Channel. When the catches are illustrated in terms of weight (Fig. 14), larger catches are more restricted, to the area south and east of Funk Island Bank, indicating that cod caught in this area were larger. Note that inshore strata were not fished in 2007, although some larger catches have been taken in the inshore strata in previous surveys (see Lilly et al. 2006).

Spring 3L bottom-trawl surveys

Spring 3L abundance and biomass: Abundance and biomass of cod in Div. 3L in the spring have been estimated by areal expansion of the stratified arithmetic mean catch per tow. Estimates for the surveys from 1978 to 1995 may be found in Tables 20-21 of Shelton et al. (1996). The data from 1985 to 1995 have been converted to Campelen equivalents. Estimates of abundance and biomass for the index strata (depths <= 366 m or <200 fathoms) during 1985-2007 are provided in Tables 28 and 29 respectively and illustrated in Fig. 15. The indices declined rapidly from 1990 to 1993. However, there was a considerable quantity of cod in deeper strata during 1992 (see below). There are indications from other sources that the cod were distributed more deeply during the early 1990's than they had been during the 1980's, so the rapid decline in the spring indices during the early 1990's may reflect in part a movement to depths beyond the index strata.

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Overall, the indices have remained low since the mid-1990's (Fig. 15). However, the biomass index has been increasing since 2003. The 2005-07 average biomass is about 4.5% of the average in 1986-89 and the 2007 value (34,445 t) is the highest observed since 1991.

Surveying in waters deeper than 200 fathoms in spring started on a regular basis in 1991 (Table 30). In some years, most notably 1992, a substantial biomass was estimated to lie in these deeper strata, particularly those at depths between 200 and 300 fathoms. There may also have been a large biomass in this deeper water in 1991, but stratum 735 (201-300 f), which was estimated to contain 50,000 t in 1992, could not be fished because of ice cover. In the 1996-2007 period, the overall biomass index from all strata fished remained low; however, the proportion of the total found in the deep (200-300 fm) strata has been highly variable, ranging from 0.02 in 1999 to 0.67 in 1996. During the four year period from 2000 to 2003, the proportion of the total abundance and total biomass in deep strata increased progressively from 0.14 to 0.65, but dropped dramatically to zero in 2004 and has remained close to zero from 2004 to 2007.

Spring 3L mean catch at age per tow: The mean numbers caught at age per tow in index strata during 3L spring surveys from 1985 onwards are presented in Table 31. The values from 1985 to 1995 are Campelen equivalents and those from 1996 onward are based on actual Campelen catches. Mean catch per tow declined precipitously in the early 1990's and values continue to be well below levels obtained prior to 1992. However, the age-aggregated total per tow has increased progressively since 2003 and the 2007 value (8.36) is the highest observed since 1992.

As noted for the autumn surveys in Div. 3L, much of the very modest expansion in age distribution since the collapse in the early 1990's has been due to catches of small numbers of the 1989 and 1990 year-classes in the late 1990's, some of which may have moved into Div. 3L from Div. 3NO or Subdiv. 3Ps. In the most recent period (2006 and 2007) catches of cod aged 3-6 have improved slightly compared to the mid to late 1990's and early 2000's.

Spring 3L distribution: The distribution of cod during spring surveys in Div. 3L is described together with distribution in Div. 3NO for the years 1984-2000 in Fig. 18-20 of Lilly et al. (2001) and for the period 1996-2005 in Figs. 19a-19c in Lilly et al. 2006. The distribution of cod catches in the spring survey of 3L during 2006 and 2007 are similar (Fig. 16) and reveal that cod were scarce on the shelf, but some larger catches were taken in the most northern region of 3L. Similar findings are evident in the autumn surveys for 2006 and 2007 (Fig. 13, 14).

SENTINEL SURVEYS

Sentinel surveys for cod were conducted by fishing enterprises operating from many communities (Fig. 17) in Div. 2J, 3K and 3L at various times during summer and autumn from 1995 onwards. Lilly et al. (2006) summarized sentinel data up to 2005 and a more detailed account is provided by Maddock Parsons and Stead (2006). Two further years of sentinel data (2006 and 2007) are now included in the time series (Maddock Parsons and Stead 2007, 2008).

The primary goal of these surveys when they were initiated was to obtain information on relative density of cod on traditional inshore fishing grounds during the moratorium. The surveys continued during the period of index/commercial fishing (1998-2002, 2006-07) and when there was significant by-catch during the intervening years (2003-05). The sentinel surveys have been conducted primarily with gillnets (5½ inch mesh). Linetrawls have been used extensively in only a few areas, and the use of linetrawls has declined over time. Handlines and cod traps have been used much less and have not provided sufficient information over time to discern trends and have been discontinued. Small mesh (3¼ inch) gillnets were introduced at many sites in 1996 to provide information on the relative size of incoming year-classes.

The sentinel surveys were also intended to provide samples that would yield information on various aspects of the biology of cod in the inshore, including age compositions, size-at-age, condition, maturity and feeding. Various analyses were conducted on data collected in 1995-97 (Lilly 1998; Lilly et al. 1998a). Aggregated length-frequencies were examined each year up to 2005 (Lilly et al. 2006) and age compositions for the full time period are available in the form of standardized catch rates at age for each gear type (see below).

The number of enterprises participating in the sentinel fishery varied between 53 and 59 during 1995-2002, but was reduced to 43-45 in 2003-07. See Maddock Parsons and Stead (2007, 2008) for additional details regarding fishing methods and sampling strategy.

Sentinel catch rates by site, gear, and division

Maddock Parsons and Stead (2007, 2008) presented weekly average catch rates and annual relative length frequencies (total number of fish caught at length divided by total amount of gear deployed) by gear, NAFO division, and year for 2006 and 2007; data for individual sites are also given. A brief synopsis of these results is provided below.

The 5½ inch gillnet has the narrowest range of selectivity (mainly 50-80 cm). Catch rates have been highest in 3L. In all Divisions, catch rates declined from 1998 to 2002 and then tended to increase during 2003-07 in 3KL and increased in 2005 in 2J. In 2J, catch rates, though improved, remain much lower than those in 3KL. Several sites, within an area that extends from Too Good Arm in 3K eastward and south to Bay de Verde in 3L, had the highest catch rates in the time series in 2007. In contrast, several of the most southerly sites on the southern Avalon had the lowest catch rates in 2007.

Catch rates with linetrawl were lower in 2J than in 3K and 3L. Linetrawl has not been deployed in 2J since 2001. In 3K, linetrawl catch rates declined from 1997 to 2002 but have been higher during 2003-07. In 3L, linetrawl catch rates were lowest during 2006-07 and are generally lower than those in 3K. Catch rate trends from linetrawl are based on fewer sets than gillnet and are more difficult to interpret.

Catches in the small mesh (3¼ inch) gillnet are characterized by two modes in the length frequency; the smaller one (approximately 34-44 cm) is represented by cod that are meshed in the net, and the larger one (50-65 cm) by fish that are entangled (usually lipped) in the net. Trends in overall catch rates are therefore difficult to interpret with this gear, but for all ages combined there has been slight improvement during 2005-07.

Sentinel standardized (modeled) catch per unit effort (CPUE)

An age-disaggregated index of standardized relative abundance for cod in the inshore of 2J3KL was calculated from data gathered from sentinel fishing with gillnets and linetrawls (Stansbury et al. 2000). The catch from 2J3KL was divided into cells defined by gear type (gillnet 5½ inch, gillnet 3¼ inch and linetrawl), NAFO Div. (2J, 3K, 3L), statistical unit area (e.g. 3Ki, 3Lh), year (1995 onwards) and quarter. Age-length keys were generated for each cell using fish sampled from both fixed and experimental sites. There were no fixed sites using 3¼ inch gillnets. Length frequencies and age-length keys were combined within cells. Numbers of fish at length were assigned ages using an age-length key. Because there were few or no discards in the sentinel fishery and the fish harvesters measured the length of all the fish caught with linetrawl and gillnet, obtaining catch numbers-at-age was relatively straight forward [see Stansbury et al. (2000) for details].

CPUE at age data were standardized to remove site and seasonal effects. For gillnets, only sets fished during June to November (prior to 2006, July-November) with a soak time between 12 and 32 hours were included in the analysis. For linetrawl, sets fished during August to November with a soak time less than or equal to 12 hours were selected. Sets with effort and no catch for some or all ages were considered valid entries in the model. Ages in the model ranged from 3 to 10 for 5½ inch gillnets, 2 to 10 for 3¼ inch gillnet and 3 to 9 for linetrawl. Fish older than age 10 were not included because of their rarity.

A generalized linear model (McCullagh and Nelder 1989) was applied to the catch and effort data for each gear and survey method. The details are described in Lilly et al (2006). The model was fitted using the SAS procedure GENMOD. Amount of gear is expressed as number of nets for gillnet and number of hooks for line trawl. Estimates for age nested in year were adjusted for month nested in site effects (i.e. least-squares means) and transformed to a linear scale to give the relative index at age for each year. Additional details regarding the models (proportion of available data that was actually included, model output and residual plots) were reviewed at the assessment meetings in 2007 and 2008 but are not shown here.

Sentinel catch rates indices - 2006 and 2007: In the 2007 and 2008 assessments, the model adequately fitted the data from gillnets (both mesh sizes) and linetrawls. Age-aggregated and age dis-aggregated indices were re-computed each year, the former by summing the age within year effects for each year. The addition of one more year of data from 2007 did not markedly change the fit so for brevity only the catch rate trends from the 2008 assessments are shown here. Sentinel catch rates from the 2007 assessment are analyzed further later in this document (see Section 7.2.2) and are summarized elsewhere (DFO, 2007a).

The time-series of standardized age-aggregated catch rates from the 5½ inch gillnets shows a steadily increasing trend since 2002, although the 2007 values are still lower than the values observed in the mid- to late 1990's (Fig. 18). For line-trawls, a broadly similar trend is observed, although there is less data and more variability compared to gillnets. For small-mesh gillnets, which have a slightly shorter time series, trends for older (ages 5-10) and younger cod (ages 3 and 4) are shown separately and the graphs clearly show higher catch rates for smaller cod in most years; the trend for older fish declines to lowest values in 2002 and subsequently increases, whereas for younger fish there is no clear trend. Catch rates for 3-4 year old cod were lowest in 1998 and 1999, but three of the last five years have shown higher catch rates.

Standardized age-disaggregated catch rates (ages 3-10) from the 5½ inch gillnets are illustrated as "bubble" plots (Fig. 19) and these show that the 1990 and 1992 year-classes were relatively strong in the late 1990's. Subsequent year-classes appear to have been weaker and catch rates, particularly for older fish (≥ age 6), were poor. However, catch rates at age started to increase again, particularly for the 2002 year class in consecutive years at ages 3, 4 and 5.

The relatively strong 1990 and 1992 year-classes can also be discerned in the "bubble" plots of catch rates from both gillnets mesh sizes and from linetrawls (Fig. 19). The "bubble" plots also show improved catch rates for 3-4 year old fish in 2003-05, but these are followed by lower catch rates in 2006 and 2007.

Interpretation of the trends in catch rate indices from sentinel fishery is complicated because the time-series includes periods with and without commercial fisheries taking place at the same time as the sentinel surveys. In some years, particularly 1998-2002, there may have been competition for space on fishing grounds (some sentinel fishers report commercial nets set across their sentinel gear) and possibly local depletion of cod on some fishing grounds where effort is high. Sentinel catch rates may also be influence by changes in the spatial distribution of cod; the area covered by the sentinel fishery is close to shore and covers a very small fraction of the stock area; consequently, catch rates are prone to annual shifts in the distribution of cod due to changes in factors such as prey availability and water temperature.

Sentinel catch rates by sub-area – (2006 and 2007): Beginning in 2005, the inshore of 2J3KL was divided into 3 sub-areas for the purposes of assessment (Fig. 20); an inshore northern area (White Bay, the northern Peninsula and southern Labrador), an inshore central area (Notre Dame Bay, Bonavista Bay, and Trinity Bay), and an inshore southern area (Conception Bay, eastern Avalon and St. Mary's Bay). The sub area boundaries were assigned based on catch rates and new information from tag returns in the post-moratorium period. Standardized catch rate indices were also computed for each of these sub-areas although for some area/gear combinations there were insufficient data.

The gillnet (5½ inch mesh) catch rate indices have generally increased in each sub-area in recent years (Fig. 21). In the northern area, catch rates with gillnets (5½ inch mesh) in 2007 were similar to those observed in 2005-06 and are currently above the average of the time series. In the central area, catch rates continued to increase in 2007 and are currently above average, but below the levels observed in 1998. In the southern area, catch rates have remained similar since 2003, but are currently below average and below those observed in the central area.

In the central area, catch-rate indices from line-trawls increased during 2007 to above the average of the time-series (Fig. 22). Catch rates in the southern area have been slightly below average in recent years, but were marginally above average in 2007. There are insufficient line-trawl data in the northern area to produce a standardized time series.

In the central area, catch-rate indices from the inshore central area for small-mesh gillnets were highest during 1996 but declined to lower values during 1999-2002. Catch rates have been close to the average of the time series in the past four years with no clear trend (Fig. 23). Catches rates were also plotted separately for ages 3-5 by year-class to investigate possible trends in recruitment (Fig. 24). The results suggest that the 2000 and 2002 year-classes are marginally stronger and early indications are that the 2003 and 2004 year-classes are weak relative to others within the time series.

HYDRO-ACOUSTIC SURVEYS OF COD IN SMITH SOUND

Hydro-acoustic studies have been conducted in an effort to quantify a large aggregation of cod that over-winters in Smith Sound in western Trinity Bay (Fig. 20) (Rose 2003); this aggregation was first observed in 1995. Most cod leave Smith Sound from late spring to early summer and disperse around the coast in summer, but tagging and telemetry studies show that these cod show strong over-wintering site fidelity and many return to Smith Sound in late autumn or early winter (Brattey et al. 2008).

Estimates of the over-wintering biomass of cod within Smith Sound have varied considerably. From hydro-acoustic surveys in January-February, the average index of biomass has ranged from 15,000 t in 1999 to about 26,000 t in 2001 (Rose 2003). There was no comparable January-February survey of Smith Sound during 2005, but surveying resumed in 2006. Average indices of biomass were stable in 2006 at 16,500-18,500 t, but declined in 2007 to 13,000 t, the lowest in the time series. The estimate for 2007 was revised upward substantially from the initial estimate (DFO, 2007a). Sampling has been sporadic, but samples collected during the 2004 survey typically included a wide range of cod sizes (30-120 cm).

BEACH SEINE SURVEYS

Information on recent year-classes is available from a beach seining survey in Newman Sound, Bonavista Bay (Gregory et al. 2006). The survey catches cod mainly of ages 0 and 1, with age 0 being much more strongly represented. New information from this survey in 2006 and 2007 was presented at the 2007 and 2008 assessments, respectively (DFO 2007a, 2008a).

The pre-recruit ages sampled in this survey are not adequately represented in surveys with other gear types and information from this survey can provide early indications of the relative strength of recent year classes entering the population. Trends in the numbers of age 1 cod from the beach seine survey are illustrated in Fig. 25. Although the beach seine survey has limited spatial coverage, the information on age 1 cod from this study has been consistent with the sentinel gillnet indices for the same year-classes at older ages (DFO, 2007a). Recent year-classes (2003-06) are all weak at age 1 and the 2005 year-class is the lowest in the time-series. Relatively high numbers of age 0 cod were caught at Newman Sound and several other sites during 2007 surveys. However, survival to age 1 can be highly variable; therefore, the strength of the 2007 year-class is currently uncertain.

INSHORE TRAWL SURVEY

This joint industry-DFO survey was initiated in July-August 2006 and continued in August 2007. The surveyed area included the coastal zone from 15 to 200 m depth and the intent was to cover the area where recent inshore commercial fisheries have taken place, within the 12 nm limit. The survey followed a stratified random design. A stratification scheme in place since the mid-1990's for "inshore" strata employed on the DFO multi-species spring and autumn surveys (generally beginning at 50m) was available, but further stratification landward of this was required. The allocation of sets was apportioned separately for two areas and within each area set allocation was proportional to stratum size. The new strata most adjacent to land (within which most of the fishery was to occur) encompassed an area of 3837 sq. n. mi and these were allocated 110 sets. Perimeter strata on the seaward side, but adjacent to the inshore strata taken from the existing DFO multispecies stratification, covered an area of 9095 sq. n. mi; this area was allocated 65 sets. With the exception of doors and restrictor cables on the warps, each vessel used the same gear employed in the Northern Gulf (4RS-3Pn) and Southern Gulf (4T) cod surveys, i.e. a Star Balloon 300 trawl with Rockhopper footgear and a 40mm liner in the codend. Vessel speed was 2.5 knots. A net monitoring system that enabled measurements of door spread and opening was used. An estimation of wingspread was then possible (approximately 15.8m ~ 52 feet) for swept area estimates of biomass and abundance.

In spite of the rough bottom that is characteristic of many near-shore areas, the survey coverage was reasonably good in both years with 146 sets successfully completed in 2006 and 142 sets in 2007. A summary of catches, with strata grouped into the same three inshore areas as described in the sentinel fishery results, is given in Table 32. The time series is too short to interpret trends in catch rates or to use the data as an index of abundance, but catches have generally been higher in the shallowest strata (< 50 m depth) and lowest in the northern area in both 2006 and 2007. Lengths of cod caught ranged from 12-73 cm with a mode at about 20-23 cm in each year (Fig. 26). Ages of cod caught ranged from 1-10 years, but ages 2 and 3 were most strongly represented, comprising about 70% of the numbers caught in each year (Fig. 26).

ACOUSTIC-TRAWL AND TAGGING-TELEMETRY SURVEY OF OFFSHORE OVER-WINTERING AREAS

A hydro-acoustic/bottom-trawl survey was conducted during March 2007 covering the traditional over-wintering area of northern cod along the shelf edge off southern Labrador and Eastern Newfoundland (NAFO Divisions 2J3KL). The survey objectives included determining the distribution, biomass, abundance and biological traits of cod in this area. Most cod were found in two main regions, adjacent to the Bonavista Corridor (NAFO 3KL) and in Hawke Channel (NAFO 2J). The fish were highly aggregated at these locations and found in the demersal zone at depths ranging between 400-550 m. These fish were predominantly younger (3-5) and of smaller size-classes (24-55 cm), although several larger fish (70-87 cm) were caught in the Bonavista Corridor. The remaining areas, including most of NAFO 3L, were characterized by low abundance. Biomass estimates (using acoustic data) over the surveyed areas ranged from approximately 2,600-4,000 t (3L and 2J respectively) to 17,000 t in 3K.

During the offshore winter acoustic survey in 2007, a total of 1,127 cod (>45 cm) were also tagged and released in 3K, following capture in the Campelen trawl during targeted fishing on an aggregation observed on the echosounder. The tagged cod included 164 fish released with surgically implanted transmitters. None of the conventionally tagged cod were reported as recaptured during the inshore fishery in the summer of 2007, but two of the telemetred fish were detected on inshore receivers, one in southern Bonavista Bay and one in Trinity Bay, indicating that they had migrated inshore. The offshore cod were captured, tagged, and released in deep water (~450 m) and likely suffered high post-release mortality due to the extreme depth. Nonetheless, the results provided a hint that some offshore cod were migrating inshore.

During March 2008, as part of the second winter offshore acoustic-trawl and tagging-telemetry survey, a further 2,268 tagged cod were released, including 147 with surgically implanted transmitters. These were captured, tagged, and released at shallower depths (340 m) than in the 2007 survey and may provide more information about movements in the coming years.

SCIENCE LOGBOOKS

Fishers that participate in the cod fishery are required to return logbooks which include information on the weight of fish caught and the amount of gear fished. The return rate of logbooks has been variable and low in some years. The return rate for the 2006 fishery was 63%, compared to about 70% in the 1998-2002 period, but return rates were not available for logbooks from the 2007 fishery at the time of the 2008 assessment.

Median commercial gillnet catch rates (Fig. 27) were calculated from catch and effort data recorded in logbooks for the < 35 ft. sector for years when the directed inshore cod fishery was open. There were insufficient data to produce a time series for other gear types (i.e. linetrawl or handline). There was no directed fishery for cod during 2003-05. The results were grouped into the same three inshore areas as described for the sentinel fishery. Catch rates during 2007 were higher than those observed in 2006 in all three areas. Catch rates in 2006-07 were higher than in earlier fisheries during 1998-2002 in the northern and inshore central areas, but about average in the southern area. Catch rates in the northern and southern areas have been lower than those in the central area after 1998, suggesting lower cod densities in these areas.

There have been many changes in the management plans for the recent inshore cod fisheries during 1998-2002 and 2006-07, particularly with respect to the duration and timing of the fishery. Due to the changes in the seasonal availability of cod in different regions, this could influence catch rates in a manner that is not directly related to stock size. Consequently, it is uncertain to what degree commercial catch rates are indicative of trends in stock size, although the general trend observed is broadly similar to the trend seen in sentinel catch rates (Fig. 21).

POPULATION BIOLOGY

The information on maturity, growth and condition reported in this section is derived from sampling during the autumn offshore bottom-trawl surveys.

MATURITY

Annual estimates of age at 50% maturity (A50) for females from the 2J3KL cod stock, collected during annual autumn DFO research bottom-trawl surveys, were calculated as described by Morgan and Hoenig (1997). Maturation is estimated by cohort. The estimated age at 50% maturity (A50) was generally between 6.0 and 7.0 among cohorts produced in the late-1950's and around 6.0 among those produced during the late 1960's to the early 1980's, but declined dramatically thereafter (Fig. 28). Age at maturity has remained low but variable (4.9-5.7) for the 1990-2003 cohorts, with no clear trend. The last two cohorts (2002 and 2003) show the lowest estimated values for A50 in the time-series but are more uncertain because only younger ages are available to estimate A50. Results from the 1990 cohort onwards from the 2007 assessment are overlaid on the 2008 assessment results (Fig. 28). This comparison shows that the addition of one more year of data has less and less influence on progressively older cohorts that are mostly mature, and mainly influences the most recent cohorts for which there is less data. Males show a similar trend over time (data not shown), but tend to mature about one year earlier than females.

Estimates of proportion mature for ages 3-8 show a similar increasing trend (i.e. increasing proportions of mature fish at young ages) through the late 1970's and 1980's, particularly for ages 5, 6, and 7 (Fig. 29). For example, the proportion of 6 yr olds that are mature has increased from about 15% during the early 1960's to about 50% in the 1970's and 1980's and to about 80% or more during the 1990's and 2000's.

Although the number of cod older than age 6 has increased slightly in the past two years, the age composition of the offshore components of 2J3KL cod remains extremely protracted relative to the pre-moratorium period. A spawning stock biomass that consists mainly of older fish, or a broad age range, may result in a longer time span of spawning (Hutchings and Myers 1993; Trippel and Morgan 1994). Older, larger fish also produce more viable eggs and larvae (Solemdal et al. 1995; Kjesbu et al. 1996; Trippel 1998; Stares et al. 2007). However, Morgan et al. (2007) also found that there was no consistent relationship between age-composition of the spawning stock and recruitment in 3Ps cod.

The time series of maturities for 2J3KL cod shows a long-term trend as well as considerable annual variability. To project the maturities forward to 2010, for each age group the average of the last three estimates for the same age group was used (Table 33a, b). Note that Table 33a was produced at the 2007 assessment and the values were used in subsequent analyses described in Section 7.2.2; the values in Table 33b (and in Figs. 28 and 29) were produced at the 2008 assessment and include data from the autumn 2007 survey. To fill in missing age groups in the early part of the time series the average of the first three estimates for the same age was used. There has been considerable debate at recent assessments about the best way to project maturities forward for cod and other stocks. The present method can result in large changes in the estimates of proportion mature for incomplete cohorts, and hence considerable variability in the most recent estimates and projections of spawning stock biomass. For the most recent cohorts there are no data for older ages and model fits use data from younger ages. Alternative methods that also use information from older ages in adjacent cohorts are presently being explored as a possible way of providing more reliable estimates of maturity for unfinished cohorts and for projections.

During the 2007 assessment of 2J3KL cod, concern was raised that addition of one more year of data to unfinished cohorts each year might introduce a retrospective pattern in estimates of spawning stock biomass (SSB). Morgan et al. (2008) explored this issue for northern cod and found no significant impact. There was also little impact of the method on estimates of SSB, and a minor impact on projections of SSB.

Portions of the inshore cod populations of 2J3KL have a more extended age distribution with some larger, older cod, particularly around the Bonavista Peninsula, where the ages of cod in the catch extend out to the mid-teens. Maturities are available from sampling the sentinel catch in the inshore of 3KL, but due to the gear types used, these samples are mainly for cod aged 4 and older. A previous analysis of data collected by the inshore sentinel survey during 1995-97, fitted by year rather than by cohort, showed a similar low age at maturity to that observed for the offshore portion of the stock (Lilly et al. 1998a).

GROWTH

The lengths-at-age and weights-at-age of cod sampled during the autumn surveys confirm the general pattern of a decline in the 1980's and early 1990's as observed in commercial weights-at-age (Fig. 8). The research survey data (Tables 34, 35; Figs. 30a,b, 31, 32) illustrate that the changes varied with Division; there was a strong decline in Div. 2J, a lesser decline in Div. 3K, and little or no decline in Div. 3L. The Divisional differences in mean lengths and weights are more apparent in Fig. 32, which focuses on changes in cod of ages 4 and 6. Superimposed on the long-term decline are periods of relatively quicker or slower growth associated with changes in water temperature (Shelton et al. 1999).

The trend toward low mean lengths-at-age and weights-at-age in the early 1990's has been reversed during the latter half of the 1990's. For example, in Div. 2J, where the decline was the greatest, recent mean lengths-at-age have been at about the average for the 1978-2007 period (Fig. 30b).

Size-at-age has varied without trend in the past few years. Sample sizes at ages greater than age 4-5 have been small since about 1992-1994 (Lilly 1998), so the accuracy of the estimates may be poor.

CONDITION

Condition can be expressed in various formulations. One formulation is Fulton's condition factor ($W/L^3 * 10^5$), where W is either the gutted weight of the fish or the liver weight in kg, and L is the length in cm. Arithmetic means by division, year and age are presented for gutted condition (Table 36; Fig. 33) and liver index (Table 37; Fig. 34).

In Div. 2J, both gutted condition and liver index declined in the early 1990's. During the second half of the 1990's gutted condition returned to approximately average, whereas the liver index improved but did not fully recover. There has been variability with little trend since the mid-1990's.

In Div. 3K, gutted condition declined during the early 1990's and improved during the latter half of the 1990's. Liver index changed little during the 1990's. As in Div. 2J, there has been variability with little trend since the mid-1990's.

In Div. 3L, gutted condition has remained relatively unchanged over time whereas liver index increased considerably in the early 1990's and has since declined to an intermediate level.

The formulation of condition presented above is not independent of fish length. Therefore changes in condition at age can be the result of changes in mean length at age. The same gutted condition and liver indices as described above were calculated for each division for three length classes (27-29 cm, 36-38 cm and 48-50 cm). In Div. 2J and 3K gutted condition at length declined during the early 1990's and then increased to the levels observed prior to the 1990's. Gutted condition at length showed little trend over time in Div. 3L (Fig. 35). For Div. 3K and 3L, liver condition increased up to the early 1990's, and since has shown no trend. In Div. 2J, there is an indication of lower liver condition after the 1990's, particularly for bigger fish (Fig. 36).

Another way to examine condition without an effect of length is to calculate relative condition (relative K). A length versus gutted weight regression was fitted for each division. The condition index is then observed condition divided by the condition predicted from the length weight regression for a fish of that length. Relative liver condition (relative LK) was calculated in a similar fashion using a liver weight length regression. Relative K and relative LK for each year were estimated for each division using a generalized linear model with an identity link function and a gamma error distribution, with year as a class variable. Both Div. 2J and 3K show lower relative K in the early 1990's (Fig. 37a and 37b). There is little trend in Div. 3L, but condition is estimated to have been unusually high in 1995. The cause of this large estimate has not been examined. There was a significant year effect in all three divisions. Relative LK showed a decline in the late 1980's early 1990's in Div. 2J. Relative LK subsequently increased but did not reach the levels of the early 1980's. Relative LK has increased in both Div. 3K and 3L. In each division there was a significant year effect.

The various methods of calculating condition show essentially the same patterns. In Div. 2J and 3K gutted condition declined during the early 1990's and then increased to the levels observed prior to the 1990's. Gutted condition at length showed little trend over time in Div. 3L. For Div. 3K and 3L, liver condition has shown some increase. In Div. 2J, there is an indication of lower liver condition after the 1990's.

STOCK TRENDS

Since the mid-1990's cod in the offshore of 3KL have shown different dynamics compared to those in the inshore, and the status of cod in the offshore and inshore have been presented separately at assessments since the late 1990's. More recently, the inshore has been further subdivided into three regions (see Fig. 20) based on catch rate trends, age compositions, and results from tagging. In the 2007 and 2008 assessments the status was again evaluated separately for the offshore and three inshore regions.

TRENDS IN THE OFFSHORE

There continues to be no analytical model of the dynamics of cod in the offshore of 2J3KL and information on stock trends offshore comes primarily from the research bottom trawl surveys. The indices of abundance (numbers) and biomass (total weight) for the index strata from the autumn surveys of 2J3KL and the spring survey of 3L are the main source of information about trends in the status of cod in the offshore (Tables 10-31 and Fig. 13, 15).

Biomass and abundance indices

2007 Assessment: The offshore biomass index from the autumn survey has been very low since 1992 (Fig 13). The average biomass index during the 1980's exceeded 1 million tons and the average during 2004-06 is approximately 3% of this value.

The offshore biomass index from the spring survey of 3L has been low since 1991 (Fig`. 15). The average biomass index from the spring survey during the 1980's exceeded 400,000 t and the average during 2004-06 is approximately 4% of this value.

The offshore abundance index from the autumn survey has been very low since 1992 (Fig`. 13). The average abundance index during the 1980's exceeded 1,500 million fish and the average during 2004-06 is approximately 5% of this value.

The offshore abundance index from the spring survey of 3L has been low since 1991 (Fig. 15). The average abundance index from the spring survey during the 1980's exceeded 400 million individuals and the average during 2004-06 is approximately 4% of this value.

At the 2007 assessment it was noted that the 2006 index values for abundance and biomass for the autumn survey and spring survey were the highest observed since the early 1990's.

*2008 Assessment: B*ased on results from the autumn and spring surveys conducted in 2007, the offshore abundance and biomass indices continued to increase (Fig. 13, 15). The average biomass during 2005-07 was 4-5% of the average of the 1980's. The average abundance was 7-8% of the average of the 1980's. The 2007 values for spring and fall surveys were the highest observed since the early 1990's and it was noted that survey indices were showing an increasing trend since 2003. The increases were most noticeable in southern 3K and northern 3L. In 2004 the autumn survey did not complete a portion of northeastern 3L that included seven strata where cod had been found at higher density in previous surveys; consequently, the estimate for 2004 is probably low.

Recruitment in the offshore

Catch rates of cod aged 2 and 3 (in Campelen equivalents prior to 1995 and actual Campelen catches from 1995 onwards) from the autumn surveys have been used to monitor trends in recruitment in the offshore. Interpreting catch rates of younger ages is problematic because of the gear change in 1996; the Engels trawl was poor at catching ages 0 and 1 and zero catches remain zero in the converted data; consequently the numbers of ages 0 and 1 are likely underestimated prior to 1995.

At the 2007 and 2008 assessments, trends in the catch rates of cod aged 2 and 3 (re-scaled to a maximum of 1 within each age and shown as year-classes, not survey years) were presented and these show that all cohorts produced since the late 1980's have been relatively weak (Fig. 38). The most recent information on offshore recruitment came from the 2007 survey presented at the 2008 assessment. This survey provided information on 2-yr-old cod from the 2005 cohort and 3-yr-olds from the 2004 cohort. There is no information from the offshore on more recent cohorts which have yet to be sampled adequately by the Campelen gear. Nonetheless, the available information at the 2007 and 2008 assessments gives no indication of any recent improvement in recruitment in spite of the increasing trend in the offshore abundance and biomass indices. On the right hand panel in Fig. 38 the 2002 year-class appears marginally better than all cohorts since the early 1990's, but interpretation is complicated by incomplete coverage in the

2004 survey such that catches of the 2002 cohort at age 2 (and the 2001 cohort at age 3) may be underestimated.

Mortality rates in the offshore

Total mortality rates were estimated from autumn research vessel survey catch rate data as described by Lilly et al. (2006). In the 2007 and 2008 assessments, only ages 4-6 were used in this analysis and the time-series was restricted to the post-1996 period to avoid complications associated with the different type of trawl used in the earlier time-period. Ages 4-6 are assumed to be fully recruited to the gear (Campelen trawl) in this analysis. Older ages could not be included in this analysis because they disappeared from the survey catches in the mid to late 1990's. Lilly et al. (2006) used survey data back to the early 1980's and outlined many of the details and problems that can influence the outcome of this type of analysis. The total mortality rate based on offshore trawl surveys from 1996 onwards is shown in Fig. 39.

At the 2007 assessment (when survey data to 2006 were available) it was concluded that total mortality had remained high since the mid-1990's, typically at 60-70% per year. The negative 2006 value may have resulted from an apparent year-effect in the surveys; the numbers at age 5, 6, and 7 in the 2006 survey were all higher than the age 4, 5, and 6 values in the 2005 survey. The relative contributions of fishing and natural mortality to the high total mortality are difficult to quantify. Reported by-catches in the offshore have been small, so attention has focused on the possibility that natural mortality has been high. Natural mortality rates of cod can be influenced by several factors, although Lilly et al. (2006) noted that predation and insufficient prey have received the most attention.

At the 2008 assessment (when survey data to 2007 were available) it was again noted that the total mortality rate had remained at a high level throughout the mid-1990`s, and increased further during 2001-03 (Fig. 39); the high level of mortality (average Z from 1996 to 2007 was 0.87, which corresponds to 58% mortality each year) had been a major impediment to stock recovery. However, with addition of the 2007 survey data point total mortality rate appeared to have declined substantially, possibly since 2003. It remains difficult to determine from fall survey data alone precisely when Z was changing, given the apparent year effect in the 2006 survey coupled with incomplete survey coverage in 2004 (which may also have influenced the 2004 and 2005 estimates of Z). However, data from other sources also supported the interpretation that the rate of total mortality in the offshore had decreased, (1) catch rates of larger fish increased in the spring survey of 3L in 2007, (2) winter acoustic surveys of the traditional over-wintering area along the shelf edge reported aggregations of commercial sized cod, and (3) the level of by-catch of commercial sized cod in the turbot gillnet fishery in northern 3L increased substantially between 2006 and 2007 (see next section).

Trends in by-catch of cod in the turbot test fishery: Following the imposition of the Northern Cod moratorium in the early 1990's and subsequent expansion of the inshore crab fishery along the Northeast and East coast of Newfoundland, concerns were raised over the incidental catch and corresponding mortality of cod and crab in shallow water turbot gillnet fisheries. In recognition of these concerns, measures were taken to close the inshore fishing zones and the fishing grounds at the 160-300 fathoms depth within the mid-shore and offshore areas of NAFO Div. 3KL. These area closures were established on a long-term basis through Conservation Harvesting Provisions (CHP) of the Integrated Fisheries Management Plans (IFMP). The Inshore Fixed Gear Fleet CHP, however, contains a provision to allow for commercial testing within the closed areas to evaluate the possibilities for a re-opening of a directed gillnet turbot fishery.

Activation of the test fishery provision in NAFO Div. 3L started in 2004 and continued over the ensuing three years. Fisher participation climbed from 13 in the first year to 86 in 2007.

Specific management measures employed included special individualized test permits and the establishment of 3 test zones in the northern portion of 3L (north of 48◦30' N latitude to 49◦15' N and from approx 22 to 170 nautical miles east from land). Gear limits ranged from a high of 150 gillnets in zone 3 to a low of 60 nets in zone one depending on the zone, year and problems encountered in the fishery. Generally, the gillnet limit for each of the three zones decreased over the 4 year period due to undesirable incidental crab and groundfish catches. A 6`` mesh size minimum was mandatory and appeared to be the standard gillnet mesh used by all fishers.

License conditions restricted incidental cod catch to 10% daily (of turbot catch) to a season cap of 2,000 lbs round weight for 2004 and 2005. The cap increased to 3,000 lbs in 2006 and was 2,500 lbs in 2007, reflecting limits approved for the Northern Cod Stewardship fishery. Once fishers reached their cod seasonal cap, either through a directed fishery or by way of by-catch in other groundfish fisheries, by license condition they were obligated to cease all groundfish fisheries for the remainder of the year. A "three strikes" provision was also in play in the test fishery requiring fishers to exit the fishery should they encounter three daily occurrences of >10% cod by-catch. Commencing in 2005, a minimum of 20 deepwater floats were required on the head-ropes of each turbot gillnet; a measure adopted to mitigate high crab by-catch occurrences.

Seasons for the test fishery ranged from early August to late October depending on the number of fishers licensed in the year and available "<65 foot vessel fixed gear" fleet sector TAC. Test fishing trips completed increased from 61 in 2004 to a high of 248 in 2005 and averaged 157 for the last 2 years. At-sea observer coverage (observed trips) was very high in 2004 (72%) and 2005 (61%) but due to lower funding levels, dropped off to 24% and 30% respectively in the later years.

Average cod incidental catch, relative to the landed turbot catch, was at or below 2% for the 3 years from 2004 to 2006 but increased to 18% in 2007. The highest cod by-catch trip per season increased over the 4 year series; from 9% (461 lbs cod vs. 5,122 lbs Turbot) in 2004, 20% (1,162 lbs vs. 5,810 lbs) in 2005, 14% (2,768 lbs vs. 19,771 lbs) in 2006, to 306% (11,801 lbs vs. 3,862 lbs) in 2007. It is evident that in 2007 there was a marked increase in cod by-catch. Cod were captured over a wide area of northern 3L during August-October when catch rates in some adjacent inshore areas were also high. This increase in cod by-catch is consistent with the increased cod biomass and appearance of older cod observed in the same area of 3L during the autumn and spring RV surveys in 2007.

TRENDS IN THE INSHORE

Tagging and telemetry

The large scale mark-recapture study of cod in the inshore of NAFO Div. 3KL that started in the mid-1990's was continued in 2006. The re-opening of the directed fishery for cod in the inshore during 2006 provided another opportunity to use tag returns to determine exploitation rates and cod movement patterns; this approach was used extensively during the 1998-2002 period when the directed fishery was open (Brattey 1999, 2000; Brattey and Healey 2003, 2005; Cadigan and Brattey 2000, 2003). Approximately 4,000 cod were tagged and released with external Floy tags in 2006 prior to re-opening of the fishery (Brattey and Healey 2007).

2007 Assessment: Tag returns from the 2006 fishery were used to estimate exploitation rates in three inshore areas that accounted for most of the landings (3Ki, 3La, 3Lb). The tagging study incorporated estimates of tagging mortality, tag loss, and reporting rates using methods described in Brattey and Healey (2003). Based on recaptures of tagged cod >50 cm fork length and recaptured in 2006, exploitation rates (% harvested) were high (25-35%) for cod released in 3Ki in the Twillingate area compared to those tagged about 50 km away southeast of Fogo (10%) and the average for 3Ki was 20%; reported landings from 3Ki during 2006 were only 573 t. Cod tagged further south in 3La (Bonavista Bay) and 3Lb (Trinity Bay) were much larger (mostly >65 cm) and exploitation estimates were 5% for cod tagged in Bonavista Bay and 10% for those tagged in Smith Sound, Trinity Bay. The overall average exploitation rate was 10% for the inshore central area during 2006. The distribution of recaptures was similar to that of previous (1997-2002) inshore cod tagging experiments and indicated a resident inshore component of northern cod that mostly remains within an area bounded by the 3Kd/3Ki border in the north and the 3Lb/3Lf border to the south.

Cadigan and Brattey (2003) developed a migration model with the tagging data and used the model to estimate exploitation rates and exploitable biomass in specific regions around Newfoundland when the inshore fishery in 3KL was open during 1998-2002. It was not possible to continue with this type of analysis during the 2007 or 2008 assessments because of the reduced levels of catch and tagging in the preceding years.

Preliminary results from a new acoustic telemetry project were also presented, based on release of cod in Smith Sound with external tags and surgically implanted transmitters and deployment of receivers around the coast. The initial findings were that most cod left Smith Sound in spring and returned in late fall and by January most (75%) had returned, indicating high survival and over-wintering site fidelity. The method showed good promise given the high rates of return of telemetred cod, but results were preliminary as data from many receivers outside Smith Sound was not yet available for analysis.

2008 Assessment: Tagging of cod in the inshore was continued in 2007; in addition, further results from a combined tagging and new telemetry study of cod were presented (Brattey et al. 2008). The conventional tagging, which employed methods as described by Brattey and Healey (2003), indicated that exploitation rates from the 2007 fishery were consistently low among inshore central and inshore southern areas, ranging from 6 to 7%. No tagging was conducted in the inshore northern area.

Cadigan and Brattey (2008) also used the data from the high-reward tagging study to estimate the tag reporting rate (fraction of tags that are returned by fishermen and other participants). They found that the tag reporting rate for single low-reward tags in 3KL had declined in recent years from approximately 70-92% in 1997-2005 to 62% in 2006-07; these estimates were used in the computation of annual exploitation rates.

The telemetry study investigated the survival and migratory behaviour of a coastal population of northern cod, with emphasis on over-wintering cod in Smith Sound (SS), Trinity Bay, Newfoundland (Brattey et al. 2008). The home range, seasonal movements, fidelity to over-wintering areas, and survival (mortality) rates of these cod were investigated. Movement patterns inferred from telemetry results were also compared with those based on recaptures of conventionally tagged cod. Following a pilot scale study in 2005, large numbers of cod (>100 per year) were released with surgically implanted coded transmitters (Vemco V16, 69kHz) and two external (Floy) t-bar tags. A "counting fence" of receivers (Vemco VR2) was deployed at the mouth of SS to provide detailed information about daily movements of cod. Arrays of receivers were also deployed along the northeast coast of NL to investigate migration patterns and dispersal, and determine if SS cod were subsequently over-wintering in other inshore areas. Small numbers of cod (<20) with implanted transmitters were also captured and released at other sites along the north east coast and their movements monitored. Survival of telemetred cod following release was only 66% for trawled cod from deep (190-225 m) water, compared to 96.4% for those caught with hand-lines in shallow (10-82 m) water. There was a clear seasonal pattern in cod movements that was repeated in three consecutive years (2005-07); most cod left SS in spring (March-June), remained outside SS during summer, dispersed mainly northward in Trinity and Bonavista bays, and returned during late autumn and winter (November-January); a small proportion of telemetred cod (0-20%) remained in SS throughout the year. Cod released in SS showed strong over-wintering site fidelity and return rates were: 9 of 9 (100%) in 2005, 64 of 77 (83%) in 2006, and 65 of 99 (65%) in 2007. Less than 10% of telemetred cod showed other behaviours, including over-wintering elsewhere in subsequent years, and returning to and leaving SS repeatedly during summer and fall. Ten percent of telemetred SS cod were captured in the fishery in 2006 and 9% in 2007, from reported landings of only a few thousand tons. Direct estimates of the minimum survival rate of two groups of telemetred cod were 80% (from 19 May 2006 to 29 January 2007) and 68% (from 31 May 2007 to 29 January 2008). Some cod released with transmitters off Twillingate and in Newman Sound over-wintered in the deep inlets of southern Bonavista Bay, whereas those released in southern 3L (Petty Harbour) in mid-July stayed in the local area or moved south and some were captured in NAFO Subdiv. 3Ps the following winter. The telemetry results support the revised stock structure used in assessments of northern cod since 2005, and indicate a resident component in the inshore central region of 3KL, and a migratory component in southern 3L.

Sequential population analysis (SPA)

Lilly et al. (2006, and references therein), describe the history of assessments for northern cod, up to and including the 2005 assessment meeting. There have been no accepted SPA's for the stock as a whole since the early 1990's. Since the mid-1990's there have been strong indications that the inshore and offshore components of the stock have been showing different dynamics, and an SPA that attempts to capture the dynamics of an inshore component of the stock was introduced in 2001. These analyses, using inshore catch from the post-moratorium period and tuned with indices from the inshore, were refined and modified in various ways as new data became available at assessments conducted ◦during 2001-06.

At the 2005 and 2006 assessments, several SPA formulations using ADAPT were considered and there was detailed consideration of the available information, particularly with respect to (1) the geographic range of the input data (catch and indices) which resulted in the inshore being sub-divided into three regions (Fig. 20), (2) the appropriate value to assume for M (the rate of natural mortality), (3) which of the inshore tuning indices to include, particularly with regard to the inshore strata from the fall multi-species survey, (4) which age ranges to incorporate from the indices, and (5) fine tuning of the F constraints. Lilly et al. (2005, 2006) provide details of the final accepted SPA analyses from the 2005 and 2006 assessments.

SPA at the 2007 assessment: At the 2007 assessment several SPA formulations using ADAPT were evaluated in an effort to capture the dynamics of the component of the stock inhabiting the inshore central area. The inputs and model structure were generally similar to those adopted in the 2006 assessment. Initially, a comparison SPA run was conducted where the formulation from the 2006 assessment was updated with one more year of data. Various other exploratory analyses were conducted. These included formulations with and without sentinel data for the month of June (June data was not included in the sentinel standardization in previous years); this had a minimal influence on overall model fit. In addition, the structure of the F-constraints required to estimate cohorts prior to the terminal year was explored. Using the FRATIO method of ADAPT, the ratio of the fishing mortality on the plus-group (10+) relative to the oldest true age (age 9) is estimated or assigned. In the 2006 assessment, three FRATIO parameters were estimated: a common F-ratio over 1995-2002, an F-ratio parameter for 2003, and a common F-ratio parameter for 2004-05. The 2003 and 2004-05 parameters were considered separately due to unusual catch circumstances in those years: in 2003, the majority of the catch came from the Smith Sound mass mortality; in 2004 and 2005, removals were primarily by-catches from a winter (black-back) flounder fishery that used gillnets of larger mesh size than those typically employed in directed cod fisheries. In the 2007 assessment, initial runs estimated a fourth FRATIO parameter for 2006 (when the directed cod fishery was reopened). The estimate for 2006 was nearly identical to that for 1995-2002, so these estimates were collapsed to a single parameter. The overall fit of the model in these exploratory runs was generally good (MSE's typically ranged from 0.17 to 0.34), but it was evident that there was a lack of convergence due to the short time series of data and generally low values of F in most years.

Following these exploratory analyses, a final model formulation was accepted at the 2007 assessment. The inputs were as follows: a catch at age matrix was constructed for the inshore central area, i.e. from unit areas 3Kh, 3Ki, 3La, 3Lb. Small catches from 3Ka and 3Kd that were included in the 2006 assessment were excluded in 2007. The total reported landings from the inshore central area in 2006 were 2,299 t. The overall catch at age matrix included ages 2 to 10+ from 1995-2006 (Table 38). The commercial mean weights at age computed during the process of deriving catch-at-age are provided in Table 39. Beginning-of year (stock) weights at age, computed from the commercial weights-at-age using formulae in Rivard (1982, p14), are provided in Table 40. The standardized sentinel catch rates at age were re-computed using data from June to November 1995-2006 from sites within the inshore central area. Indices from all three sentinel gears were included: the 5½" gillnet using ages 3-9 from fixed sites, the 3¼" gillnet using ages 3-9 from experimental sites, and the line-trawl index using ages 3-7 from fixed sites (Table 41). All indices were equally weighted. A matrix of estimated proportions mature at age (see Table 33a) was used to calculate spawner biomass. The instantaneous rate of natural mortality (M) was assumed to be 0.4 per year. Lilly et al. (2006) describe the basis, mainly from tagging data, for the assumed value of M.

The SPA was used to estimate the numbers of survivors for ages 4 to 10+ on 1 January 2007 and catchabilities for each index/age combination. There were no estimates of survivors aged 2 for 1 January 2006 or 1 January 2007; these were computed from the geometric mean of the 2003-05 numbers at age 2. The numbers of age 3's on 1 January 2007 was computed by adjusting the age 2 numbers from 1 January 2006 for catch and M. To compute biomass on 1 January 2007, the geometric mean of the stock weights-at-age for 2004-06 was used (see Table 40).

The robustness of the final model run was also explored. Three runs were conducted where each one of the sentinel indices was left out in turn to examine the sensitivity of the results. In these comparisons the overall trends were similar.

A 2 year retrospective analysis was also conducted by excluding successive years of catch and sentinel data; longer retrospectives were not justified given the short time series of inshore data. The analysis did not indicate any retrospective problems.

A time series of annual estimates of exploitation rates from tagging was also examined and compared with the results of the SPA from the 2006 assessment. The data sources for these two analyses were independent and the 2007 assessment meeting decided that this may be a useful way to corroborate the SPA results, particularly with respect to the lack of convergence. Annual estimate of exploitation rate from tagging for cod of length range 50-85 cm at release were compared with the exploitation rate of 5+ cod from the SPA conducted at the 2006 assessment. The estimates were within 6% each year for 1998-2000 and 2004-06. The SPA estimates were somewhat higher in 2001 and 2002, possibly because there were large recreational fisheries in those years and recreational participants were not as familiar with the tagging programme and returned fewer tags. The values for 2006 were 6.9% exploitation from the SPA and 9.6% from tagging. Overall, the comparison indicated reasonably good agreement in most years.

SPA model output – 2007 assessment: In the final SPA model, the relative error of most parameters was <0.2, although the relative errors (standard error/estimate) were slightly higher for the estimates of survivors for ages 4 (0.31), the plus group (0.24), and two of the three F-ratios (Table 42). The overall Mean Square Error (MSE) was 0.230.

Residual plots from the ADAPT analysis are presented in Fig. 40 and 41. The mean square residuals are generally <0.25 for most index/ages, however, there are some high values, notably age 9 from 3¼" gillnet and age 7 from sentinel linetrawl (Fig. 40). In the plots of annual residuals, there is some evidence of year effects (Fig. 41). The overall fits of the model to each index are shown in Fig. 42. The 2007 assessment meeting concluded that the overall fit of the model was acceptable.

Estimates of bias-adjusted abundance at age are given in Table 43. Total abundance (2+) declined from about 53 million in 1995 to about 26 million in 2000, increased to about 42 million in 2004 and has remained at around 37 million during 2005-2007 (Fig. 43).

Estimates of recruitment at age 3 (Table 43, Fig. 44) suggest that the 1992 year-class has been the strongest within the short period covered by the SPA. Year-class strength declined to lows in 1996-99, but subsequently improved, particularly in 2000 and 2002. The 2003 year-class, though based on less information, appears weak. This is broadly consistent with Fig. 24 and 25.

Population biomass at age (Table 44) was computed from the bias-corrected numbers at age at the beginning of the year (Table 43) and beginning of year weights-at-age derived from commercial sample data (Table 40). Exploitable (4+) biomass peaked at about 34,000 t in 1997-98, declined to about 14,000 t in 2003, and subsequently increased to about 27,000 t by 2006 with the 2007 value marginally lower (Fig. 45).

Spawner stock biomass (SSB) at age (Table 45) was computed from the population biomass at age (Table 44) and the cohort model estimates of proportion mature at age from offshore survey data (Table 33a). SSB increased from 11,600 t in 1995 to about 24,500 t in 1998-99, declined to 8,400 t in 2003, but has subsequently increased steadily to almost 20,000 t by the beginning of 2007 (Fig. 45).

Estimates of fishing mortality at age are given in Table 46. The average fishing mortality over ages 5-10+ (Fig. 46) was low from 1995 to 1997 when the directed fisheries were closed (except for a small food/recreational fishery in 1996). During the period of the index/commercial fisheries (1998-2002) there was a variable but increasing trend in fishing mortality, peaking at 0.38 in 2001. Fishing mortality declined dramatically when directed fishing was stopped in 2003 and the average for 2004-05 was <0.05. Fishing mortality increased slightly to 0.09 in 2006 coincident with the reopening of the directed fishery and an increase in reported landings.

In summary, population biomass increased during the mid-1990's partly as a result of growth of the relatively strong 1990 and 1992 year-classes. Biomass declined by more than 50% from about 1998 to 2003 as a result of reduced recruitment and increasing fishing mortality. Biomass increased again after 2003 as a result of reduced fishing mortality and improved recruitment. These analyses suggest that the stock in the inshore central area has increased in recent years, but by 1 January 2007 it had still not reached the level observed in 1998-99. There is concern that incoming year-classes are weaker than those that have supported recent fisheries.

Stock projections – 2007 assessment: The consequences of various catch options for the inshore central area were explored through deterministic and stochastic projections of the 1 January 2007 survivors based on the SPA. It is emphasized that these are not predictions of what will occur, but rather projections using current estimates of stock size and plausible values for recruitment and M based on the recent past.

Medium-term (3 year) projection results are highly dependent on the recruitment assumption applied, but the accepted SPA does not provide estimates of the 2004 and 2005 year-classes. The most recent Newman Sound beach seine results do provide information on these pre-recruit year-classes. A comparison of the cohort information at age 1 from the Newman Sound beach seine survey (Fig. 25) and the cohort information at age 3 from the SPA for the inshore central area revealed a strong correlation (Fig. 47). The beach seine survey results indicate that the 2003-05 year-classes are the lowest in the time series. The recruitment used in the projections incorporated these results.

In the 2005 and 2006 assessments, alternative recruitment options (low, medium and high) were considered in projections because there were no estimates of recruitment for the projection period. With the information from the Newman Sound pre-recruit index, it would be misleading to consider alternative recruitment options in the projections of the SSB; this index provides information on recruitment for 2 year-classes in the projection and these year-classes are estimated to be weak. The strength of subsequent year-classes (2006-08) has minimal impact on the projected SSB over the 3 year period to 2010 as these cod are still too young (≤age 4) to contribute significantly to SSB.

Deterministic projections of stock size to 2010 were computed from the SPA results under catch options of 0 t, 1,250 t, and 2,500 t. The value of natural mortality used in the projections was the same as that in the SPA (M=0.4 per year).

In the 1 year projection (to 1 January 2008), SSB is projected to increase for all three catch options. Assuming no removals, SSB is projected to increase by 12%. SSB increases by 6% assuming 1,250 t removals, and by 1% assuming a catch of 2,500 t.

In the 3 year projection (from 2008 to 2010), SSB is projected to increase on average by 2% per annum assuming no removals. The SSB is projected to decline under catch options of 1,250 t (annual average decrease of 3%) or 2,500 t (annual average decrease of 8%).

Risk analysis – 2007 assessment: The second method of exploring consequences of various catch options for the inshore central area was to compute the risk of not attaining a specified rate of population growth. No target rebuilding rate is in place for northern cod (Shelton 2006). The risk of the SSB not growing, of growing at less than 5% and at less than 10% per year was computed for 1 and 3 years at catch options between 0 and 2,500 t. The risk that is calculated includes only the uncertainty in both the estimated numbers of survivors at the beginning of 2007 and incoming recruitment. Recruitment values are consistent with the Newman Sound pre-recruit index.

The risk of 0% growth in SSB by 1 January 2008 at catches below 1,250 t is less than 0.01, and increases to 0.30 at catches of 2,500 t (Fig. 48, upper panel). The risk of SSB growing by less than 5% increases rapidly with catch options above 500 t; assuming catches of 2,500 t in 2007, the risk is 0.87. The risk of not achieving 10% growth in 1 year increases rapidly with increasing catch options, and is near 1 at removals of 2,500 t.

In the 3 year risk analysis (2008-10), there is a 0.50 probability of 0% growth in the SSB for annual catch options exceeding 600 t (Fig. 48, lower panel). The risk of not achieving 5% annual growth in the SSB is extremely high (0.93) even if there are no removals from 2007 to 2009. The risk analysis indicates that this stock will not grow by 10% annually in the next 3 years.

CONCLUSIONS AND ADVICE - 2007 ASSESSMENT

OFFSHORE

Mortality of cod in the offshore is extremely high. The high rate of mortality is a major impediment to stock recovery. The extent to which ongoing fishing activities may be contributing to this mortality, from by-catch, incidental mortality, or directed fishing on seasonal migrants that move inshore, has not been determined. Nevertheless, it is recommended that the moratorium on directed fishing be continued, and that by-catch be minimized.

INSHORE NORTHERN AREA

For the inshore northern area (2J plus northern 3K), it is inferred from the low catch rates in the sentinel surveys (1995-2004) and the commercial fishery (1998-2002) that cod densities have been very low. However, catch rates in the sentinel surveys increased during 2005 and again in 2006. The origins of the fish generating these increases remain uncertain. They appear to be immigrants, possibly from the offshore; therefore, it would be prudent to keep catches low in this area.

INSHORE CENTRAL AREA

Although SSB increased by 3,800 t (24%) from 2006 to 2007, exploitable biomass (age 4+) decreased by 6%. Incoming recruitment is estimated to be substantially weaker, which will result in a decline in exploitable biomass and SSB. The risk of the SSB growing by less than 5% by 1 January 2008 increases rapidly with a catch above 500 t and is very high (0.87) for a catch of 2,500 t. The risk of the SSB growing by less than 5% per year by 1 January 2010 is very high (0.93) even with no catch.

INSHORE SOUTHERN AREA

For the inshore southern area (southern 3L), the tagging data illustrated that fisheries during1998-2002 were primarily dependent on fish that migrate seasonally between 3Ps and 3L. Since the magnitude of annual migration cannot be predicted, the effect of various levels of removals cannot be estimated. However, fisheries in southern 3L will contribute additional mortality to fish that migrate between 3Ps and southern 3L. Some of these fish already experience high fishing mortality within Placentia Bay.

OTHER CONSIDERATIONS

Management issues

Consequences of an inshore fishery for offshore recovery: There is a possibility that cod currently offshore in 2J3KL undergo spring/summer feeding migrations to the inshore, similar to their historic pattern. At current offshore population levels, any offshore fish exploited in an inshore fishery could further impede recovery in the offshore. Shelton et al. (2006) recently concluded that fishing mortality is further delaying recovery in many Canadian Atlantic cod stocks, in conjunction with increased natural mortality and lower productivity. The potential for cod currently in the inshore to repopulate the offshore of 2J3KL remains uncertain. Studies with one specific genetic technique have demonstrated a population substructure between inshore and most offshore areas. It has been suggested that this substructure indicates a low likelihood that inshore-spawning cod will contribute to offshore recovery. Nevertheless, it is well known that fish populations can expand into new environments, and that this is more likely to occur as population levels increase. Cod from inshore populations may expand into the offshore habitat; allowing the inshore populations to grow might increase the likelihood of this happening. In consideration of the above, there is a risk that fishing in the inshore will impede recovery in the offshore. However, at this time the level of risk is difficult to quantify.

Implications of fishing bay-by-bay: The distribution of fish harvesters does not match the distribution of cod. This will cause geographic variability in fishing mortality. For example, in the 2006 fishery, tagging data indicated that exploitation was much higher in southern 3K (21%) compared to Bonavista and Trinity bays combined (7%). Therefore, fishing bay-by-bay may result in local overexploitation and managers should attempt to preserve and enhance population spatial structure and diversity within the stock.

Physical environment

The marine environment off Labrador and eastern Newfoundland experienced considerable variability since the start of standardized measurements in the mid-1940's. A general warming phase reached its maximum by the mid-1960's. Beginning in the early 1970's there was a general downward trend in ocean temperatures, with particularly cold periods in the early 1970's, early to mid-1980's and early 1990's. Ocean temperatures have been above normal for the past decade, with the most recent year (2006) at a record high. Studies based on data up to the mid-1990's have demonstrated that growth of cod declines when temperature declines, but there has been no analysis of more recent data. Whether or not the cold water of the early 1990's influenced recruitment and natural mortality is contentious. It is anticipated that cod in this area may be more productive when water temperatures are toward the warm end of the regional norm.

Predators (seals)

No new information regarding the impact of seals on the dynamics of cod was presented to the meeting. Previous cod assessments (DFO, 2003) have concluded, based on seal feeding behaviour and trends in the abundance of both seals and cod, that predation by seals is a factor contributing to the high total mortality of cod in the offshore and the high natural mortality of adult cod in the inshore. A 2 year programme of enhanced study of seals, initiated in 2003, has included new population surveys, new studies of distribution, and new studies of diet, both inshore and offshore. A pilot study on the efficacy of seal exclusion zones was conducted in Smith Sound (Bowen 2004). The information from these programmes is not yet available for review.

Prey (capelin)

The trend in capelin biomass has been uncertain since the late 1980’s. Biomass estimates from hydroacoustic surveys in an index area offshore have been much lower since the early 1990’s compared with the 1980’s. No offshore biomass estimates are available for 2005 and 2006 due to incomplete or missed surveys. Indices of capelin biomass from the inshore did not show such extensive declines in the early 1990's. However, these same inshore indices are no longer available. Concurrent with the decline in capelin abundance offshore, capelin underwent dramatic changes in their biological and behavioural characteristics. These included: decreased size of spawners, delayed timing of spawning, reduced beach spawning and perceived increase in off-beach spawning. There have also been changes in horizontal and vertical distribution, decreases in condition and changes in prey composition. In the last two years it would appear that size of spawners are increasing, spawning times are getting earlier and beach spawning, especially in the northern areas has increased, but none of these attributes have yet approached levels observed in the late 1980’s.

Sources of uncertainty

The terms of reference requests that the major sources of uncertainty in the assessment are identified and these are as follows:

The contribution of offshore cod to inshore biomass during summer is uncertain. If offshore cod are migrating inshore the reopened fishery will be imposing some level of fishing mortality on offshore cod.

The level of unreported catch is unknown. If this level is substantial, then there is more uncertainty in the assessment and in the evaluation of the impact of future removals.

The value of natural mortality (M=0.4 per year) used in the SPA was inferred from tagging studies during 1997-2002 and is considered uncertain. The results of the SPA are sensitive to this value.

Projection results are dependent upon the value of natural mortality applied in both the SPA and in the projections themselves. There is insufficient information on spatial and temporal variability in natural mortality to explore informative alternatives.

The cohort information at age 1 from the Newman Sound beach seine study is consistent with cohort information at age 3 from the SPA for the inshore central area. The beach seine study alone provided estimates for the strength of the 2004-05 cohorts used in the projections and the estimates were very low. There is some uncertainty whether the strength of the 2004-05 cohorts from the beach seine study will represent the strength of these cohorts in the inshore central area.

Several of the recent autumn research bottom-trawl surveys have extended well beyond their normal time and into the winter because of vessel problems. In addition, the survey was not fully completed in some years. These changes may affect survey estimates of abundance and biomass. In addition, distribution, growth, condition and maturity vary seasonally, and changes in survey timing complicate the comparison of recent survey results with those from previous years.

CONCLUSIONS AND ADVICE – 2008 ASSESSMENT

No SPA analyses were presented at the 2008 assessment, because no reliable estimate of total catch in 2007 was available (see Section 2.1; DFO, 2008a).

OFFSHORE

Based on autumn and spring surveys, the average biomass of cod in the offshore over the last 3 years is 4-5% of the average during the 1980's. However, survey biomass has been increasing since 2003 and for both surveys the 2007 value is the highest since 1992.

Total mortality in the offshore was extremely high during 1996-2003 and has been a major impediment to stock recovery. Total mortality has declined substantially since 2003 and the prospects for recovery have improved.

Specific limit reference points have not been established; however, the stock is well below any reasonable limit reference point. Therefore, it is recommended that the moratorium on directed fishing in the offshore be continued, and that by-catch be minimized.

INSHORE NORTHERN AREA

It is inferred from low catch rates in the sentinel surveys (1995-2004) and the commercial fishery (1998-2002) that cod densities have been very low. Catch rates in the sentinel surveys during 2005-07 and the Stewardship fishery during 2006-07 were slightly higher, but they remain lower than those in the inshore central area. The origins of fish in the northern area remain uncertain. They appear to be immigrants, possibly from the offshore; therefore, it is recommended that removals be minimized.

INSHORE CENTRAL AREA

Sentinel catch rates have generally increased since 2002 and are currently above the average for the time series. Stewardship fishery catch rates in 2006-2007 were higher than in earlier fisheries during 1998-2002. This implies that the exploitable biomass has increased recently. However, due to the weaker 2003-06 year-classes, this trend may not continue. The impacts on stock growth of fishing at specific catch levels could not be quantified.

INSHORE SOUTHERN AREA

Sentinel catch rates have remained stable since 2003, but are below the average for the time series. Stewardship fishery catch rates in 2006-07 were similar to those in earlier fisheries during 1998-2002, but are lower than those in the inshore central area. Tagging data and age compositions of catches indicate that fisheries during 1998-2002 and 2006-2007 were partly dependent on fish that migrate seasonally between 3Ps and the inshore southern area. Since the magnitude of annual migration cannot be predicted, the effect of various levels of removals cannot be estimated.

Fisheries in this area will contribute additional mortality to fish that migrate between 3Ps and southern 3L. Some of these fish already experience high fishing mortality within Placentia Bay. If fisheries in the southern area increase, the consequences for the neighbouring 3Ps stock should be carefully considered.

STOCK AS A WHOLE

There is no single measure of the biomass of the stock as a whole. The information from the RV survey in the offshore and the three inshore areas are not directly comparable. However, information from offshore and inshore areas suggests that the biomass of the overall stock is increasing. Historically, the bulk of the biomass was in the offshore, and based on autumn and spring surveys, the average biomass of cod in the offshore over the last 3 years is 4-5% of the average during the 1980's.

There is a risk that fishing inshore will impede stock growth offshore. The level of risk is difficult to quantify, but exploitation rates inshore are currently low and offshore biomass is increasing. If exploitation rates inshore increase then the risk of fishing inshore on stock growth offshore may increase.

OTHER CONSIDERATIONS

Management issues

Consequences of an inshore fishery for offshore recovery: Cod currently offshore in 2J3KL may undergo spring/summer feeding migrations to the inshore, similar to their historic pattern. At current offshore population levels, there is a risk that fishing inshore will impede stock growth offshore. The risk may have been higher in the late 1990's when offshore biomass was low and showed no signs of increasing.

The inshore fishery in 1998-2002, though small by historical standards, clearly had a significantly negative impact on the stock. Catch rates in the sentinel fishery and commercial fishery declined dramatically, and tagging indicated high fishing mortality in some areas, particularly in southern 3Ki where resident inshore cod may be less abundant. The increase in total mortality in the offshore at the same time was of further concern. The small inshore fishery may have also been an important source of mortality on offshore cod migrating to the inshore.

The closure of the fishery in 2003 and lower landings in 2004-05 coincided with a decline in mortality and improved survival in the offshore. Sentinel catch rates in the inshore also began to increase in this period.

The stewardship and recreational fisheries in 2006-07 have not resulted in an increase in total mortality offshore, or a reduction in catch rates inshore, and tagging suggests inshore exploitation (harvest) rates were low in 2006-07. However, if exploitation rates inshore increase in the future then this situation may change. Managers should be aware that a recent reduction in recruitment, as indicated by the beach-seine surveys and small-mesh sentinel catch rates, will likely result in increased exploitation rates in the next few years, even if total catches remain at 2006-2007 levels. In the event of lower recruitment, fishing mortality may also increase on offshore cod that migrate inshore.

The potential for cod currently in the inshore to repopulate the offshore of 2J3KL remains uncertain. Some genetic studies have demonstrated a population substructure between inshore and most offshore areas. Genetic substructure indicates a lower likelihood that inshore-spawning cod will contribute to offshore recovery. Nevertheless, it is well known that fish populations can expand into new environments, and that this is more likely to occur as population levels increase. Cod from inshore populations may expand into the offshore habitat; allowing the inshore populations to grow might increase the likelihood of this happening.

Implications of fishing bay-by-bay: The distribution of fish harvesters does not match the distribution of cod. In some years this has caused geographic variability in fishing mortality rates, as evidenced by tagging studies. Therefore, fishing bay-by-bay may result in local over-exploitation, particularly in areas where resident inshore cod are less abundant and effort is high. Managers should attempt to keep exploitation rates low and preserve and enhance population spatial structure and diversity within the stock.

Physical environment

The marine environment off Labrador and eastern Newfoundland experienced considerable variability since the start of standardized measurements in the mid-1940’s. A general warming phase reached its maximum by the mid-1960’s. Beginning in the early 1970’s there was a general downward trend in ocean temperatures, with particularly cold periods in the early 1970’s, early to mid-1980’s and early 1990’s. Ocean temperatures have been above normal for the past decade, with 2006 at a record high, but temperatures in 2007 declined to nearer normal values.

Studies based on data up to the mid-1990’s have demonstrated that growth of cod declines when temperature declines, but there has been no analysis of more recent data. Whether or not the cold water of the early 1990’s influenced recruitment and natural mortality is contentious.

It is anticipated that cod in this area may be more productive when water temperatures are toward the warm end of the regional norm; cod in the offshore have not shown increased growth rates or recruitment, but there are indications that biomass is increasing mainly through improved survival.

Predators

No new information regarding the impact of seals on the dynamics of cod was presented to the meeting. Previous cod assessments (DFO 2003) have concluded, based on seal feeding behaviour and trends in the abundance of both seals and cod, that predation by seals is a factor contributing to the high total mortality of cod in the offshore and the high natural mortality of adult cod in the inshore.

A 2 year programme of enhanced study of seals, initiated in 2003, has included new population surveys, new studies of distribution, and new studies of diet, both inshore and offshore. A pilot study on the efficacy of seal exclusion zones was conducted in Smith Sound (Bowen 2004). The information from these programmes is not yet available for review.

White hake (*Urophycis tenuis*) have been identified as an important predator of cod <1 yr old in the nearshore environment (Laurel et al. 2003).

Prey

The trend in capelin biomass has been uncertain since the late 1980’s. Biomass estimates from hydroacoustic surveys in an index area offshore have been much lower since the early 1990’s compared with the 1980’s. No offshore biomass estimates are available for 2005 and 2006 due to incomplete or missed surveys. Indices of capelin biomass from the inshore did not show such extensive declines in the early 1990's. However, these same inshore indices are no longer available. Concurrent with the decline in capelin abundance offshore, capelin underwent dramatic changes in their biological and behavioural characteristics. These included: decreased size of spawners, delayed timing of spawning, reduced beach spawning and perceived increase in off beach spawning. There have also been changes in horizontal and vertical distribution, decreases in condition and changes in prey composition. In the last two years it would appear that size of spawners are increasing, spawning times are getting earlier and beach spawning, especially in the northern areas has increased, but none of these attributes have yet approached levels observed in the late 1980's.

Broad scale changes in major ecosystem components

At the 2008 assessment some ecosystem-level background information was presented to see if there had been any recent changes in components of the marine fish community. A brief overview of major signals and trends of the fish community as a whole was presented, from data prepared by M. Koen-Alonso and co-workers under the Ecosystem Research Initiative - Nereus, NL region. The main source of data was the multispecies surveys using data from the index strata. Fish species were grouped into six major functional groups, namely: small benthivores [45 species] (max size <45 cm, e.g. alligator fish, sculpins), medium benthivores [34 species] (45 cm<max size <80 cm, e.g. yellowtail, lumpfish), large benthivores [29 species] (max size >80 cm, e.g. American plaice), piscivores [31 species] (e.g. Atlantic cod, turbot, Atlantic halibut), plankton-piscivores [8 species] (e.g. redfish, Arctic cod), planktivores [14 species] (e.g. capelin, herring, butterfish). The time series of survey catches was broken in 2 periods based on the gear used (Engels and Campelen trawls). Index values are not directly comparable between gears due to differences in catchabilities. There are no conversion coefficients for most species.

The fall survey data is used to produce RV indices of various species groups for 2J3K while the spring survey is used for 3LNO. This geographical partitioning does not necessarily respect stock boundaries.

The most notable findings were that since 2002-03 there is an increasing trend in the fish biomass in 2J3K and 3LNO. The trend is not as general nor pronounced in terms of abundance. The biomass to abundance ratio also shows increasing trends in some 2J3K functional groups (piscivores and large benthivores), but no obvious pattern is observed for 3LNO. Overall, the fish community appears to be showing some positive signals, but it still remains at a significantly lower level in comparison to the pre-collapse period. It is too early to know if these positive signals are the prelude of long term recovery trends. At the present time the drivers behind these signals remain uncertain, but the extent of the patterns may suggest system-wide processes rather than stock-specific or local ones.

Sources of uncertainty

The movement of offshore cod to the inshore during summer is uncertain. For example, the 2002 year-class is well represented in the inshore and offshore in 2J3KL, but it is not clear if this reflects substantial mixing and/or synchronous recruitment. Hence, the degree of exploitation of offshore cod by inshore fisheries is uncertain, but is likely to be higher in areas where resident inshore cod are less abundant.

Two estimates of landings from recreational fisheries in 2007 were available. One suggested a recreational catch that was comparable to the stewardship fishery catch; the other suggested the recreational catch was much lower (371 t). The main source of disagreement is in estimates of the amount of effort (number of boat trips per day). Until a reliable method of estimating recreational catch is determined, total catch for northern cod and adjacent coastal cod stocks remains uncertain. Estimates of recreational catch for previous years may also require revision.

Estimates of commercial catch are also uncertain. At stock assessment meetings commercial fishers often report that commercial landings are underestimated. If the level is substantial, then there is more uncertainty in catch-based assessments and in the evaluation of the impact of future removals.

Several of the recent autumn RV surveys have extended well beyond their normal time and into the winter because of vessel problems. In addition, the survey was not fully completed in some years. These changes may affect survey estimates of mortality rates, abundance, and biomass.

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Table 1. Historical landings (t) of cod from NAFO Div. 2J+3KL from 1959 onward.

	2J				3K				3L				2J3KL			
	Offshore mobile gear		Fixed gear		Offshore mobile gear		Fixed gear		Offshore mobile gear		Fixed gear					
Year	Canada	Other	Canada	Total	Canada	Other	Canada	Total	Canada	Other	Canada	Total	Total Canada	Total Other	Total	TAC (000's)
1959	0	46372	17533	63905	0	97678	56264	153942	4515	51515	85695	141725	164007	195565	359572	
1960	1	164123	15418	179542	53	74999	47676	122728	7355	63985	94192	165532	164695	303107	467802	
1961	1	243144	17545	260690	0	64023	31159	95182	4675	73899	70659	149233	124039	381066	505105	
1962	0	226841	23424	250265	0	47015	42816	89831	4383	90276	72271	166930	142894	364132	507026	
1963	1	197868	23767	221636	0	79331	47486	126817	4446	83015	73295	160756	148995	360214	509209	
1964	13	197359	14787	212159	0	121423	40735	162158	10158	142370	75806	228334	141499	461152	602651	
1965	0	246650	25117	271767	21	50097	26467	76585	7353	130387	58943	196683	117901	427134	545035	
1966	39	226244	22645	248928	13	58907	32208	91128	8253	120206	55990	184449	119148	405357	524505	
1967	28	217255	27721	245004	114	78687	24905	103706	13478	200343	49233	263054	115479	496285	611764	
1968	4650	355108	12937	372695	1849	119778	40768	162395	15784	211808	47332	274924	123320	686694	810014	
1969	30	405231	4328	409589	56	80949	24923	105928	18255	151945	67973	238173	115565	638125	753690	
1970	0	212961	1963	214924	92	78274	21512	99878	14471	137840	53113	205424	91151	429075	520226	
1971	0	154700	3313	158013	31	61506	21111	82648	11976	148766	38115	198857	74546	364972	439518	
1972	0	149435	1725	151160	7	133369	14054	147430	4380	109052	46273	159705	66439	391856	458295	
1973	1123	52985	3619	57727	108	159653	13190	172951	1258	97734	24839	123831	44137	310372	354509	666
1974	0	119463	1804	121267	19	149189	10747	159955	880	67918	22630	91428	36080	336570	372650	657
1975	410	78578	3000	81988	189	112678	15518	128385	670	53770	22695	77135	42482	245026	287508	554
1976	94	30691	3851	34636	771	79540	20879	101190	2187	40998	35209	78394	62991	151229	214220	300
1977	525	39584	3523	43632	1051	26776	28818	56645	5362	26799	40282	72443	79561	93159	172720	160
1978	4682	17546	6638	28866	7027	6373	29623	43023	9213	12263	45194	66670	102377	36182	138559	135
1979	9194	6537	8445	24176	21572	16890	27025	65487	14184	12693	50359	77236	130779	36120	166899	180
1980	13592	7437	17210	38239	21920	6830	37015	65765	15523	13963	42298	71784	147558	28230	175788	180
1981	22125	4760	14251	41136	23112	3847	23002	49961	21754	15070	42827	79651	147071	23677	170748	200
1982	58384	8923	14429	81736	8881	4074	42141	55096	27181	9271	56490	92942	207506	22268	229774	230
1983	37276	4158	10748	52182	31621	2815	40683	75119	39123	10920	55001	105044	214452	17893	232345	260
1984	9231	2782	13150	25163	48114	11059	35143	94316	47668	15973	49351	112992	202657	29814	232471	266
1985	1466	78	10211	11755	68880	12945	30368	112193	36863	31176	39306	107345	187094	44199	231293	266
1986	5734	7859	12916	26509	62086	5781	28384	96251	57805	53946	32202	143953	199127	67586	266713	266
1987	39344	3999	16022	59365	39686	6160	27442	73288	44612	25916	36743	107271	203849	36075	239924	256
1988	41468	9	17112	58589	40260	50	33820	74130	57805	26748	51405	135958	241870	26807	268677	266
1989	33626	1003	23304	57933	37350	1179	20711	59240	40958	36621	59238	136817	215187	38803	253990	235
1990	17883	183	14505	32571	26920	504	27516	54940	31187	25488	75266	131941	193277	26175	219452	199.26

Cont'd:-

Table 1. Cont'd.

	2J				3K				3L				2J3KL			
	Offshore mobile gear		Fixed gear		Offshore mobile gear		Fixed gear		Offshore mobile gear		Fixed gear					
Year	Canada	Other	Canada	Total	Canada	Other	Canada	Total	Canada	Other	Canada	Total	Total Canada	Total Other	Total	TAC (000's)
1991	621	82	2214	2917	30112	311	13332	43755	30264	49660 [2]	45416 [3]	125340	121959	50053	172012	190
1992	0	0	18	18	584	273	884	1741	13627	14610 [4]	10960 [5]	39197	26073	14883	40956	0
1993	0	0	13	13	0	0	541	541	2	2425 [6]	8411 [7]	10838	8967	2425	11392	0
1994	0	0	9	9	0	0	368	368	0	1	936	937	1313	1	1314 [8]	0
1995 [13]	0	0	0	1	0	0	122	122	1	0	290	290	413	0	413 [9]	0
1996 [13]	0	0	3	3	0	0	961	961	1	1	908	910	1874	1	1875 [#]	0
1997 [13]	0	0	4	4	0	0	280	280	0	0	592	593	877	0	877	0
1998 [13]	0	0	16	16	0	0	1994	1994	1	6	2491	2497	4501	0	4507	4
1999 [13]	0	0	33	33	0	0	3554	3554	0	1	4938	4939	8525	1	8526	9
2000 [1]	0	0	3	3	0	0	1410	1410	26	54 [12]	3937	4017	5376	54	5430	7
2001 [1]	0	0	21	21	0	0	1736	1736	7	82 [12]	5124	5212	6887	82	6969	5.6
2002 [1]	0	0	13	13	0	0	647	647	3	53 [12]	3533	3589	4196	53	4249	5.6
2003 [1]	0	0	2	2	0	0	29	29	3	23 [12]	937 [11]	963	971	23	994	0
2004 [1]	0	0	3	3	0	0	152	152	6	6	482	494	643	6	649	0
2005 [1]	0	0	6	6	1	0	555	556	1	1	767	769	1330	1	1331	0
2006 [1]	0		65	65	5	0	1103	1109	0	22	1506	1528	2679	22	2701	0 [14]
2007 [1]	0		71	71	0	0	1178	1178	0	0	1668	1669	2918	0	2918	0 [14, 15]

[1] Provisional catches.
[2] Includes French catch and other foreign catch as estimated by Canadian surveillance.
[3] Figure is 4000 t less than Can. statistics (this quantity is 3NO catch misreported as 3L).
[4] Derived from reported catch and Canadian surveillance estimate of foreign catch.
[5] Includes 5000 t catch from the recreational fishery after the moritorium was declared.
[6] Canadian surveillance estimate of foreign catch .
[7] Includes 5053 t estimated for the recreational fishery <u>additional</u> to that recorded by Canadian statistics.
[8] 1300 t is from the food fishery; the remainder is bycatch
[9] Includes 275 t caught in the sentinel survey and 138 t caught as bycatch.
[10] Comprised of a sentinel survey catch of 296 t, a food fishery catch of 1155 t and bycatch of 422 t.
[11] 780 t of this catch was the result of a mass mortality in Smith Sound
[12] NAFO Scientific Council agreed catches.
[13] Canadian catches have been updated based most recent catch data
[14] There was no TAC in 2006 or 2007 but an allowance of 3,000 lb and 2,500 lb of cod per licence holder for vessels < 45 ft only.
[15] Excludes recreational fishery

Table 2. Annual fixed gear landings of cod from NAFO Div. 2J, 3K and 3L from 1975 onwards. Landings from statistical areas other than Newfoundland are not included. GN=gillnet, LL=Line-trawl, HL=hand-line.

	2J					3K					3L					2J3KL
Year	Trap	GN	LL	HL	Total	Trap	GN	LL	HL	Total	Trap	GN	LL	HL	Total	Total
1975	642	2304	0	54	3000	4662	8645	565	1646	15518	10390	7552	1641	3112	22695	41213
1976	1022	2787	6	36	3851	7056	10666	718	2439	20879	18404	9066	2904	4835	35209	59939
1977	1285	2076	37	125	3523	11501	11611	1294	4412	28818	20988	8852	3591	6851	40282	72623
1978	2872	3376	55	335	6638	11329	11445	3647	3202	29623	23218	9023	5114	7839	45194	81455
1979	1333	5663	175	1274	8445	3532	11474	8414	3605	27025	20785	13488	7022	9064	50359	85829
1980	4679	11414	204	913	17210	12732	13549	8059	2675	37015	12871	11231	9394	8802	42298	96523
1981	3893	10105	72	181	14251	3952	10679	6360	2011	23002	10177	13579	11425	7646	42827	80080
1982	4464	9121	114	730	14429	16415	17571	6101	2054	42141	24248	20295	5704	6243	56490	113060
1983	3870	4854	842	1182	10748	10490	18305	2560	9328	40683	25690	16446	3834	9031	55001	106432
1984	5618	6116	379	1037	13150	9957	14362	2499	8325	35143	23103	14985	3824	7439	49351	97644
1985	4973	2992	252	1994	10211	13310	8082	2352	6624	30368	21594	8760	3245	5707	39306	79885
1986	4373	7804	109	630	12916	14555	7626	1555	4648	28384	15669	9865	2492	4176	32202	73502
1987	5158	9228	218	1418	16022	11278	10223	1590	4351	27442	11370	17419	3338	4616	36743	80207
1988	5907	9183	272	1750	17112	16261	11898	935	4726	33820	22148	18576	4004	6677	51405	102337
1989	6713	14846	290	1455	23304	8189	7921	700	3901	20711	23964	22231	4676	8367	59238	103253
1990	3616	9364	653	872	14505	11201	7726	3838	4751	27516	32158	28936	4545	9627	75266	117287
1991	1016	271	93	834	2214	7696	1384	1851	2401	13332	26524	11696 [2]	1247	5949	45416 [2]	60962
1992	0	0	2	16	18	27	103	9	745	884	1173	1131	16	8640 [3]	10960 [3]	11862
1993	0	0	1	12	13	3	37	9	492	541	11	93	80	8227 [3]	8411 [3]	8965
1994	0	0	0	9	9	0	8	0	359	367	6	38	22	870	936	1312
1995	0	0	0	0	0	25	65	31	1	122	23	207	41	20	291	413
1996	0	0	0	3	3	65	184	31	680	959	42	335	30	501	656	1500 [4]
1997	0	2	0	0	2	57	150	63	8	278	71	427	42	45	585	865
1998	0	3	5	8	16	24	1081	245	644	1994	31	1377	284	798	2490	4501
1999 [1]	0	20	4	9	33	14	3080	110	350	3554	35	4469	70	365	4938	8525
2000 [1]	0	4	0	1	5	15	1126	43	275	1459	63	2954	189	684	3891	5354
2001 [1]	0	3	1	17	21	28	796	90	822	1735	175	2844	110	1994	5124	6880
2002 [1]	0	7	0	6	13	2	272	30	342	647	128	2517	30	858	3533	4193
2003 [1]	0	2	0	0	2	0	25	4	0	29	0	152	4	781	937	968 [5]
2004 [1]	0	1	0	0	1	0	146	5	0	152	0	479	2	0	481	635
2005 [1]	0	6	0	0	6	0	547	8	1	555	0	763	4	0	767	1328
2006 [1]	0	5	0	31	35	0	856	21	203	1080	5	1004	58	439	1505	2621
2007 [1]	0	17	2	52	71	0	783	21	374	1178	6	1112	13	538	1668	2917 [6]

[1] Provisional catches.

[2] Catch is 4000 (t) less than Canadian statistics as this quantity is considered 3NO gillnet catch misreported in 3L.

[3] Estimate for recreational fishery has been reported as 3L handline.

[4] Comprised of sentinel survey catch of 294 t, a food fishery catch of 1155 t and by-catch 142 t.
An amount of 103 t must still be allocated by gear type and division from the sentinel catches.

[5] 780t of this catch was the result of a mass mortality in Smith Sound. (Actual gear used was gaff or dip net).

[6] Excludes recreational fishery catch.

Table 3a. Reported landings (t) of cod in NAFO Div. 2J+3KL during 2006 from all sources (directed, recreational, by-catch and sentinel surveys) by unit area and month. Unit areas are shown in Fig. 1d.

Div/unit	JAN	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
2J					12.1	2.1				14.2
2JA					1.4					1.4
2JM				0.7	32.5	15.2				48.4
2JN	0.0	0.0	0.0		0.8					0.8
3K					122.6	20.5				143.2
3KA			0.8	2.1	29.3					32.3
3KB	0.0	0.0			1.3	0.0				1.3
3KC			0.4	0.0		0.7			0.0	1.0
3KD			1.0	9.9	42.9	13.0	1.3			68.1
3KF			2.1			0.1				2.2
3KG			1.4	0.4		0.0				1.8
3KH			4.5	12.4	63.3	108.3	96.4	0.7		285.6
3KI		0.1	10.7	22.2	526.9	2.7	3.8	5.6	1.0	573.0
3LA		0.1	7.3	13.4	84.2	294.8		10.5		410.4
3LB			15.8	19.1	278.3	164.8				478.0
3LC				0.0	9.5	1.2				10.7
3LD					1.0					1.0
3LF			3.5	17.0	233.4	5.5	0.3			259.6
3LG					1.0					1.0
3LJ	0.1		3.1	5.5	76.6	136.2				221.4
3LQ		0.4	2.5	3.6	39.8	0.0	0.2	0.6		47.2
3LR					0.2					0.2
3LS					61.7	14.2				76.0
Total	0.1	0.7	53.1	106.3	1619.0	779.4	101.9	17.4	1.0	2679.0

Table 3b. Reported landings (t) of cod in NAFO Div. 2J+3KL during 2007 from all sources (except recreational fishery) by unit area and month.

Div/unit	JAN	FEB	MAR	JUN	JUL	AUG	SEP	OCT	Total
2JF	0.0	0.1	0.0	0.0	0.0	0.0	0.0		0.1
2JJ				0.2					0.2
2JM			0.0		0.3	8.3	46.4	10.2	65.4
3KA					1.2	20.2	12.7		34.2
3KB		0.0	0.0		4.5				4.5
3KD				0.0	2.8	47.6	41.3	2.4	94.2
3KH		0.2	0.2	0.1	78.9	53.5	100.1	70.7	303.7
3KI				2.9	254.5	135.7	110.8	97.7	601.5
3LA				2.0	97.0	84.2	175.1	26.0	384.3
3LC						26.6		0.5	27.1
3LD						5.8	0.5		6.4
3LE	0.0	0.0				0.2	6.1		6.3
3LF				2.4	83.9	32.9	127.2	27.7	274.1
3LG						72.9	0.1	2.4	75.4
3LJ				0.2	47.2	16.3	141.1	22.3	227.1
3LQ				3.7	8.4	13.0	18.7	0.2	44.1
3LR						0.1			0.1
Total	0.6	0.4	0.2	24.0	704.2	575.4	925.2	316.4	2546.2

Table 4a. Numbers of cod measured for length from sampling of the 2006 fishery in NAFO Div. 2J+3KL, by gear, unit area and month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Gillnets													
2JM							228	1091	767				2086
3KA						443	457	1489					2389
3KD						193	1742	2459	1498	255			6147
3KH						1224	4043	3140	1038	1190	296		10931
3KI					13	2171	5482	7645	242	476	1323		17352
3LA						453	3257	4547	1179		1699		11135
3LB						2154	3855	8871	2589				17469
3LF						971	4034	3728	65				8798
3LG								8					8
3LJ						973	1669	2938	1702				7282
3LQ					17	495	1399	617	7				2535
Total	0	0	0	0	30	9077	26166	36533	9087	1921	3318	0	86132
Gillnets (small mesh)													
2JM							378	1483	1375				3236
3KA							492	544					1036
3KD						41	235	301	97				674
3KH						142	324	210		21	91		788
3KI						67	638	404	43	109	83	83	1427
3LA						26	839	375	5		106		1351
3LB						104	557	916	291				1868
3LF						57	196	87					340
3LJ						60	115	48	55				278
3LQ						5	13	7					25
Total	0	0	0	0	0	502	3787	4375	1866	130	280	83	11023
Handline													
3KA								58					58
3KD								49	23				72
3KH									1733	25			1758
3LA								103	601				704
3LB								426	317				743
3LF								68					68
3LJ								44	1190				1234
3LQ								708					708
Totals	0	0	0	0	0	0	0	1456	3864	25	0	0	5345
Linetrawl													
3KH								249	1515	66			1830
3KI								784	568				1352
3LA								332	135				467
3LF									135	186			321
3LQ								203		95			298
Total	0	0	0	0	0	0	0	1568	2353	347	0	0	4268
Ottertrawl													
3KC			11			164							175
3KG		31	4				91						126
Total	0	31	15	0	0	164	91	0	0	0	0	0	301
Twin trawl													
2JB					24								24
2JC					10								10
2JF					3	18			14			10	45
2JN			98										98
3KC				64		5	124						193
3LI			13										13
Total	0	0	111	64	37	23	124	0	14	0	0	10	383
Shrimp trawl													
2JB			3		2								5
2JC		5				3							8
2JF		69			27	5	2		8				111
2JN	119	270	700	98									1187
3KB	512	10				327							849
3KC				21		47	67	4					139
3KE						1339	38						1377
3KF						39							39
3KG									11				11
3LE			2	2									4
3LI	25		40									5	70
Total	656	354	745	121	29	1760	107	4	19	0	0	5	3800
All Gears	656	385	871	185	96	11526	30275	43936	17203	2423	3598	98	111252

Table 4b. Numbers of cod measured for length from sampling of the 2007 fishery in NAFO Div. 2J+3KL, by gear, unit area and month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Gillnets													
2JM							99	1309	457				1865
3KA							80	1958	71				2109
3KD							837	4357	617				5811
3KH						70	4394	5302	425	73			10264
3KI						595	12613	10448	1122	17			24795
3LA						104	5041	6512	766				12423
3LB						905	6113	5572	3587				16177
3LC								2161		69			2230
3LD								83					83
3LF						329	4082	3343	1314				9068
3LJ						44	2361	2169	791				5365
3LQ						654	465	556	17				1692
Total						2701	36085	43770	9167	159			91882
Gillnets (small mesh)													
2JM							134	1015	1232				2381
3KA								255					255
3KD							52	234	48				334
3KH							216	374	40				630
3KI						3	251	859	146				1259
3LA						2	54	761					817
3LB						60	678	1164	763				2665
3LF						42	143	121	82				388
3LJ						7	161	144					312
3LQ						19	11						30
Total						133	1700	4927	2311				9071
Handline													
3KA							18						18
3KD							53	404	127				584
3KH									2254	175			2429
3KI									1259	139			1398
3LA							54		139				193
3LB									631				631
3LF									1153				1153
3LJ							107		2374	59			2540
3LQ								515	268				783
Total							232	919	8205	373			9729
Linetrawl													
3KD									70				70
3KH								371	1997				2368
3KI								618	1011				1629
3LF									213				213
3LJ									37				37
Total								989	3328				4317
Ottertrawl													
2JC		54											54
2JF		27											27
Total		81											81
Shrimp trawl													
2JB				6	2								8
2JC		22			387	10							419
2JF			8	10	324	152		7	121				622
2JL									7				7
2JN	12	255	242	784		246			7				1546
3KA			283										283
3KB		9	793			48							850
3KC	12	133	5	21	29	4							204
3KE							57						57
3KF							23						23
3KG								40	41				81
3LE	3	22											25
Total	27	441	1331	821	742	460	80	47	176				4125
All Gears	27	522	1331	821	742	3294	38097	50652	23187	532	0	0	119205

Table 5a. Numbers of cod aged from sampling of the 2006 fishery in NAFO Div. 2J+3KL, by gear, unit area, and quarter (1=January-February, 2=March-May, 3=June-August, 4=September-December).

		Quarter				
		1	2	3	4	Total
Gillnets	2JM	.	.	715	.	715
	3KA	.	21	264	.	285
	3KD	.	47	778	20	845
	3KH	.	121	802	30	953
	3KI	.	79	552	148	779
	3LA	.	30	633	61	724
	3LB	.	60	1185	.	1245
	3LF	.	70	505	.	575
	3LJ	.	87	687	.	774
	3LQ	.	59	99	.	158
	Total	0	574	6220	259	7053
Handline	2JM	.	.	33	.	33
	3KA	.	.	106	.	106
	3KD	.	.	65	.	65
	3KH	.	.	208	.	208
	3KI	.	.	22	.	22
	3LA	.	.	182	.	182
	3LB	.	.	263	.	263
	3LF	.	.	54	.	54
	3LJ	.	.	132	.	132
	3LQ	.	.	173	.	173
	Total	0	0	1238	0	1238
Linetrawl	3KH	.	.	226	14	240
	3KI	.	.	35	.	35
	3LA	.	.	56	.	56
	3LF	.	.	35	28	63
	3LQ	.	.	42	.	42
	Total	0	0	394	42	436
Ottertrawl	3KC	9	.	.	.	9
	3KG	22	.	22	.	44
	Total	31	0	22	0	53
Twin trawls	2JB	.	23	.	.	23
	2JC	.	10	.	.	10
	2JF	.	18	.	11	29
	2JI	.	1	.	.	1
	2JN	50	.	.	.	50
	3KC	.	69	123	.	192
	Total	50	121	123	11	305
Shrimp trawl	2JB	4	3	.	.	7
	2JC	4	1	.	.	5
	2JF	62	18	5	.	85
	2JN	244	50	.	.	294
	3KB	12	.	.	.	12
	3KC	.	21	17	.	38
	3KG	.	.	1	.	1
	3LE	2	2	.	.	4
	3LI	53	.	.	1	54
	Total	381	95	23	1	500
	All gears	462	790	8020	313	9585

Table 5b. Numbers of cod aged from sampling of the 2007 fishery in NAFO Div. 2J+3KL by gear, unit area, and quarter (1=January-February, 2=March-May, 3=June-August, 4=September-December).

		Quarter				
		1	2	3	4	Total
Gillnets	2JM			674		674
	3KA			84		84
	3KD			775		775
	3KH		37	777		814
	3KI		55	655	155	865
	3LA			599	60	659
	3LB		67	1187		1254
	3LF		60	641		701
	3LJ		6	506		512
	3LQ		53	119		172
	Total		278	6017	215	6510
Handline	3KD			168		168
	3KH			218		218
	3KI			148	34	182
	3LA			52		52
	3LB			161		161
	3LF			119		119
	3LJ			275		275
	3LQ			111		111
	Total			1252	34	1286
Linetrawl	3KH			181	23	204
	3KI			56		56
	3LF			33	55	88
	3LQ				15	15
	Total			270	93	363
Otter trawl	2JC	36				36
	2JF	21				21
	Total	57				57
Shrimp trawl	2JB	1	7			8
	2JC	3	189			192
	2JE	1				1
	2JF	9	123	58		190
	2JL			4		4
	2JN	178	426	7		611
	3KA	13				13
	3KB	63	20			83
	3KC	37	48	1	2	88
	3LE	20				20
	3LH	1				1
	Total	326	813	70	2	1211
All gears		383	1091	7609	344	9427

Table 6. Catch numbers at age (000's, ages 2-20) for cod caught in the fishery in NAFO Div. 2J+3KL from 1962 onwards.

Age	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
2	301	1446	2872	85	819	790	288	59	6819	33	236	0	473	420	15	108
3	8666	5746	19338	5177	14057	15262	6142	4330	18104	12876	6737	3963	3231	3968	13767	7128
4	26194	27577	27603	28709	65992	77873	94291	39626	60102	71557	79809	40785	13201	14101	33727	65510
5	64337	60234	57757	46800	93687	100339	205805	100858	82357	95384	116562	94844	34927	25370	28049	40462
6	58163	118112	60681	66946	62812	96759	150541	163228	101249	98111	76196	59503	74403	34426	20898	12107
7	47314	58996	100147	64360	59312	54996	83808	107509	85696	57865	55984	35464	60539	39105	16811	5397
8	27521	29349	50865	68176	30423	38691	39443	52661	29218	25055	29553	27351	35687	36485	16022	3396
9	20142	15520	20892	33819	23844	17146	23171	19651	10857	11732	11750	14153	18854	13421	10931	2730
10	18036	11612	12264	14913	8762	16084	10984	12370	3825	4470	6393	7566	10492	7514	4637	1381
11	10444	8248	8698	6945	4528	5949	5591	6389	2000	2223	2987	3815	5818	2315	1462	532
12	9468	4204	6352	3729	2280	3367	5249	4479	1200	1287	1660	2153	2934	1179	631	296
13	7778	3942	4989	3948	1825	2108	1939	3004	507	1140	1388	1173	1078	808	292	149
14	5785	2933	4036	3730	1186	1529	1334	1557	224	720	725	450	652	372	251	75
15	4669	2928	2703	2722	967	685	818	622	214	355	748	278	249	165	100	42
16	3888	1737	1456	1859	806	424	610	567	244	474	606	309	338	82	50	21
17	3955	1263	1918	575	416	193	127	319	124	124	452	85	162	5	40	20
18	2161	1352	1154	971	279	107	89	100	32	128	136	27	113	8	64	14
19	232	328	501	183	486	72	83	46	10	148	195	38	45	22	30	2
20	403	182	312	226	178	211	26	99	34	78	36	8	20	1	20	6
Total	319457	355709	384538	353873	372659	432585	630339	517474	402816	383760	392153	291965	263216	179767	147797	139376

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
2	0	0	92	0	0	18	3	0	1	42	25	8	58	35	0	0
3	1323	1152	2554	2185	1702	2585	782	650	831	2329	2779	1696	7693	3111	430	940
4	17556	12361	12025	7172	31286	13616	14871	14824	15219	9217	14651	17639	40557	31654	3860	4993
5	39206	37493	28814	13191	19003	42602	31760	36614	44168	32340	20184	21150	36410	53805	14535	3343
6	20319	29202	30016	24800	14397	19028	38624	33922	45869	49061	47917	25212	22695	29553	12211	1940
7	7711	10982	18017	22014	25435	12044	12503	28006	26025	28469	45725	38708	16390	9064	4526	700
8	3078	3460	4830	11848	16930	14701	7246	7050	14722	19505	18608	28499	17940	6164	1372	147
9	1530	1300	1217	3175	11936	8934	8910	3836	3104	5818	9026	8696	9156	4745	376	21
10	1083	757	520	779	1923	6341	4227	5162	2000	1346	4337	3640	2865	1696	199	0
11	437	560	232	309	338	1018	2536	2905	1977	676	774	1695	1084	641	104	0
12	219	183	229	195	156	248	451	1681	1101	873	422	572	478	250	18	0
13	105	116	56	125	90	90	146	254	574	391	366	244	103	88	9	0
14	62	51	65	48	153	41	48	107	116	200	223	180	98	39	4	0
15	40	43	37	14	40	29	41	39	29	37	100	94	36	21	0	0
16	21	38	13	28	12	11	30	20	18	22	32	43	25	9	0	0
17	7	7	10	20	13	9	7	17	11	3	5	4	8	3	0	0
18	8	7	14	5	4	6	7	1	9	1	10	9	7	2	0	0
19	2	4	4	5	0	2	4	3	2	4	5	0	1	2	0	0
20	7	9	10	5	0	3	3	5	2	0	5	1	0	0	0	0
Total	92714	97725	98755	85918	123418	121326	122199	135096	155778	150334	165194	148090	155604	140882	37644	12084

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2	0	0	1	0	3	7	5	10	6	0	1	0	0	0
3	105	12	35	12	96	70	141	249	166	9	10	16	12	12
4	379	41	157	39	229	238	258	778	296	11	24	27	159	44
5	575	93	304	92	395	638	419	710	399	19	33	137	307	357
6	177	76	401	95	689	795	437	611	335	53	47	182	381	423
7	74	25	131	148	384	1157	328	365	235	44	59	101	168	178
8	22	10	24	35	236	370	294	190	124	28	32	51	79	69
9	2	2	7	5	74	253	151	272	77	22	14	19	30	21
10	0	0	2	2	10	52	136	80	113	9	7	7	13	8
11	0	0	0	0	5	13	33	117	50	32	3	4	5	5
12	0	0	0	0	2	3	5	33	52	20	5	2	2	2
13	0	0	0	0	1	0	3	3	10	27	2	2	1	1
14	0	0	0	0	0	0	1	1	2	7	2	1	2	1
15	0	0	0	0	0	0	0	0	0	3	0	1	1	1
16	0	0	0	0	0	0	0	0	0	0	0	0	1	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0 .		0
20	0	0	0	0	0	0	0	0	0	0	0	0	0 .	
Total	1334	259	1062	429	2125	3596	2210	3418	1866	286	241	550	1161	1122

Note: The 2007 values exclude the recreational fishery catch and much of the catch in 2003 came from a mass mortality of cod in Smith Sound, Trinity Bay.

Table 7a. Estimated average weight (kg), length (cm) and number (000's, plus standard error and coefficient of variation) of cod for the 2006 catch at age from 2J+3KL for all gears combined. Values for the total stock area and the inshore central area are shown.

AGE	WEIGHT (kg.)	LENGTH (cm.)	NUMBER (000'S)	NUMBER STD ERR.	NUMBER CV	Percent of total
Total stock area						
1	0.09	22.00	0.0	0.00	.	0.0
2	0.27	31.08	0.2	0.04	0.22	0.0
3	0.57	40.09	12.0	1.02	0.08	1.0
4	1.12	49.94	159.4	5.33	0.03	13.7
5	1.54	55.41	306.8	7.51	0.02	26.4
6	2.27	62.96	380.6	8.90	0.02	32.8
7	2.82	67.52	168.1	6.37	0.04	14.5
8	3.29	70.87	78.8	6.21	0.08	6.8
9	4.10	75.67	30.1	2.29	0.08	2.6
10	4.71	79.52	13.2	1.62	0.12	1.1
11	5.59	84.31	4.6	0.47	0.10	0.4
12	6.63	89.32	1.6	0.35	0.22	0.1
13	7.15	91.51	1.3	0.25	0.19	0.1
14	7.19	91.88	1.8	0.28	0.16	0.2
15	6.75	90.03	1.4	0.39	0.27	0.1
16	7.62	93.45	0.6	0.15	0.26	0.1
17	7.86	94.57	0.1	0.05	0.51	0.0
18	7.52	93.26	0.1	0.07	0.67	0.0
19	.	.	.	.	. .	
20	7.62	94.00	0.0	0.01	0.80	0.0
Total			1160.7			
Central inshore area (3Kh, 3Ki, 3La, 3Lb)						
1	.	.	.	.	.	
2	0.35	34.66	0.1	0.02	0.31	0.0
3	0.59	40.58	7.0	0.61	0.09	0.8
4	1.14	50.27	112.1	4.61	0.04	13.3
5	1.53	55.44	221.7	6.76	0.03	26.3
6	2.30	63.24	292.7	8.48	0.03	34.8
7	2.90	68.06	119.6	6.04	0.05	14.2
8	3.42	71.75	54.3	5.97	0.11	6.4
9	4.56	78.47	18.6	2.13	0.11	2.2
10	5.26	82.53	6.8	0.74	0.11	0.8
11	6.03	86.52	2.9	0.43	0.15	0.3
12	6.83	90.22	1.2	0.34	0.28	0.1
13	7.27	92.00	1.2	0.24	0.20	0.1
14	7.29	92.25	1.4	0.27	0.19	0.2
15	6.76	90.04	1.5	0.39	0.27	0.2
16	7.63	93.46	0.6	0.15	0.26	0.1
17	7.85	94.54	0.1	0.05	0.51	0.0
18	10.63	104.64	0.0	0.01	0.77	0.0
19	.	.	.	.	.	.
20	7.62	94.00	0.0	0.01	0.80	0.0
Total			841.6			

Table 7b. Estimated average weight (kg), length (cm) and number (000's, plus standard error and coefficient of variation) of cod for the 2007 catch at age from Div. 2J3KL for all gears combined excluding the recreational catch. Values for the total stock area and the inshore central area are shown.

AGE	WEIGHT (kg.)	LENGTH (cm.)	NUMBER (000'S)	STD ERR.	CV	Percent of total
Total stock area						
1	.	.	.	.	.	
2	0.38	35.44	0.1	0.06	0.67	0.0
3	0.59	40.35	11.9	0.92	0.08	1.0
4	1.12	49.72	44.2	2.95	0.07	3.8
5	1.68	57.24	356.7	6.53	0.02	30.7
6	2.08	61.40	423.3	6.88	0.02	36.5
7	2.79	67.26	177.7	4.71	0.03	15.3
8	3.53	72.45	68.5	2.38	0.03	5.9
9	4.23	76.90	20.6	1.10	0.05	1.8
10	4.94	80.82	8.2	0.44	0.05	0.7
11	5.90	85.56	4.5	0.28	0.06	0.4
12	6.35	87.72	1.7	0.17	0.10	0.1
13	6.79	90.06	1.2	0.13	0.11	0.1
14	7.57	92.94	1.1	0.11	0.10	0.1
15	7.98	94.63	1.3	0.14	0.10	0.1
16	8.01	95.30	0.4	0.07	0.17	0.0
17	9.21	99.40	0.6	0.08	0.13	0.1
18	12.45	108.43	0.1	0.03	0.26	0.0
19	6.42	88.40	0.1	0.04	0.33	0.0
20 .	.		.	.		
Total			1160.7			
Central inshore area (3Kh, 3Ki, 3La, 3Lb)						
1	0.00	0.00	0.0	0.00	.	0.0
2	0.40	36.11	0.1	0.07	0.81	0.0
3	0.55	39.40	8.9	0.97	0.11	1.1
4	1.08	49.02	27.9	2.88	0.10	3.3
5	1.69	57.38	274.8	6.70	0.02	32.7
6	2.09	61.43	314.5	7.11	0.02	37.4
7	2.81	67.40	134.5	4.95	0.04	16.0
8	3.68	73.56	48.4	2.43	0.05	5.8
9	4.61	79.25	11.8	0.97	0.08	1.4
10	5.58	84.39	4.6	0.32	0.07	0.5
11	6.26	87.52	3.2	0.25	0.08	0.4
12	6.37	87.72	1.6	0.17	0.11	0.2
13	6.85	90.41	1.1	0.13	0.12	0.1
14	7.95	94.82	0.8	0.10	0.12	0.1
15	8.03	94.96	1.2	0.14	0.12	0.1
16	8.02	95.30	0.4	0.07	0.19	0.0
17	9.11	99.02	0.6	0.09	0.15	0.1
18	12.49	108.54	0.1	0.03	0.26	0.0
19	6.45	88.52	0.1	0.05	.	0.0
20	.	.	.	.	. .	
Total			841.6			

Table 8. Catch weights-at-age (kg) for cod caught in the fishery in NAFO Div. 2J+3KL from 1962 onward.

Age	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
2	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	.	0.11	0.26	0.25	0.09
3	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.44	0.32	0.35	0.45	0.45	0.45
4	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.53	0.47	0.68	0.63	0.61	0.60
5	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.64	0.71	0.91	0.96	0.93	0.97
6	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.08	0.96	1.11	1.18	1.32	1.66
7	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.52	1.30	1.27	1.39	1.75	2.33
8	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.13	1.80	1.56	1.74	2.07	2.82
9	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.86	2.20	2.05	2.21	2.24	3.46
10	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.29	2.82	2.75	2.61	2.99	3.88
11	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.95	3.19	3.13	3.34	3.67	4.78
12	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.12	3.79	3.41	3.66	4.56	6.13
13	6.06	6.06	6.06	6.06	6.06	6.06	6.06	6.06	6.06	6.06	5.00	4.53	4.92	4.78	6.18	7.31
14	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	9.32	6.93	4.40	5.20	8.19	8.40
15	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.11	9.40	7.22	6.33	5.20	9.77	8.81
16	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	6.89	7.05	5.50	5.46	11.23	11.75
17	6.44	6.44	6.44	6.44	6.44	6.44	6.44	6.44	6.44	6.44	14.67	9.45	7.57	8.51	12.44	10.63
18	6.07	6.07	6.07	6.07	6.07	6.07	6.07	6.07	6.07	6.07	12.04	11.16	11.07	9.24	11.16	12.27
19	6.61	6.61	6.61	6.61	6.61	6.61	6.61	6.61	6.61	6.61	7.62	7.62	7.62	7.62	7.62	7.62
20	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	17.46	17.46	17.46	17.46	17.46	17.46

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
2	.	.	0.41	.	.	0.31	0.34	.	0.21	0.32	0.29	0.26	0.29	0.17	.	.
3	0.40	0.46	0.53	0.55	0.53	0.62	0.59	0.48	0.51	0.43	0.49	0.48	0.42	0.36	0.29	0.57
4	0.72	0.74	0.77	0.78	0.84	0.87	0.88	0.73	0.72	0.66	0.73	0.74	0.69	0.61	0.58	0.71
5	1.04	1.13	1.16	1.17	1.20	1.32	1.20	1.10	1.04	1.03	1.08	1.03	1.06	0.97	0.81	0.97
6	1.58	1.67	1.71	1.64	1.77	1.75	1.79	1.43	1.54	1.32	1.38	1.44	1.50	1.41	1.19	1.25
7	2.46	2.46	2.38	2.23	2.10	2.28	2.28	2.06	1.85	1.87	1.67	1.83	1.94	1.88	1.73	1.59
8	3.26	3.57	3.56	2.86	2.66	2.61	2.71	2.66	2.35	1.93	2.21	2.07	2.22	2.27	2.05	8.40
9	4.05	4.41	5.01	3.81	3.09	3.18	2.96	3.23	2.94	2.80	2.51	2.64	2.44	2.63	2.66	9.23
10	4.46	5.25	5.49	5.32	4.18	3.50	3.65	3.32	3.47	3.51	3.04	3.02	3.06	3.14	2.24	.
11	5.02	5.80	6.72	6.29	6.16	4.79	4.28	4.06	3.80	4.80	4.37	3.96	3.58	3.80	2.68	.
12	6.72	7.03	7.87	7.06	7.19	7.76	6.19	4.55	4.54	4.64	5.49	5.41	4.68	4.96	4.95	.
13	8.10	8.96	8.38	7.32	8.00	9.07	8.39	7.03	5.34	5.74	6.55	7.50	6.23	5.49	5.34	.
14	7.42	8.54	10.03	10.01	8.36	9.14	10.26	9.67	7.12	6.13	8.60	9.24	8.51	7.61	7.02	.
15	8.20	9.46	11.31	8.99	7.86	10.62	11.44	11.37	11.77	8.53	9.76	10.05	9.78	11.58	.	.
16	11.26	10.70	13.87	11.54	7.91	10.57	11.61	11.27	11.24	13.51	9.73	9.34	12.58	11.01	.	.
17	11.61	13.12	10.68	10.48	9.58	13.13	17.47	12.68	14.15	9.10	12.58	15.74	15.45	12.82	.	.
18	8.92	13.49	16.09	11.15	12.95	15.97	12.94	12.42	16.14	21.77	16.01	18.66	13.58	13.00	.	.
19	10.57	15.51	12.04	9.82	.	9.73	15.21	14.38	12.30	17.66	16.60	.	17.26	13.10	.	.
20	16.00	14.77	11.37	12.59	.	15.88	12.81	19.49	15.72	.	11.03	17.64	.	.	.	.

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
2	.	0.22	0.37	0.32	0.29	0.32	0.26	0.38	0.41	0.31	0.33	0.28	0.27	0.38
3	0.40	0.49	0.70	0.54	0.63	0.59	0.66	0.63	0.63	0.50	0.56	0.53	0.57	0.59
4	0.68	0.80	1.01	0.88	0.94	1.05	0.97	0.91	0.91	0.82	0.87	0.85	1.12	1.12
5	0.98	1.47	1.42	1.46	1.51	1.62	1.71	1.36	1.56	1.41	1.54	1.77	1.54	1.68
6	1.41	1.91	2.04	1.98	2.14	2.12	2.14	2.02	2.09	2.03	2.12	2.17	2.27	2.08
7	1.85	2.27	2.51	2.44	2.48	2.51	2.79	2.54	2.70	2.54	2.73	2.60	2.82	2.79
8	2.05	2.62	2.77	2.91	3.02	2.96	3.39	3.24	3.24	3.03	3.33	3.14	3.29	3.53
9	3.05	3.02	3.22	3.63	3.35	3.66	3.95	3.93	3.83	3.64	4.18	3.89	4.10	4.23
10	.	2.81	3.87	4.25	4.18	4.70	4.54	4.43	4.45	4.36	5.02	4.71	4.71	4.94
11	.	4.67	5.18	4.36	4.01	5.17	4.88	5.06	4.77	4.91	5.46	5.68	5.59	5.90
12	.	.	4.04	6.06	3.80	5.57	6.03	6.56	5.13	5.72	6.34	6.43	6.63	6.35
13	.	.	7.62	6.22	6.42	6.23	5.63	7.21	5.90	5.92	6.26	7.80	7.15	6.79
14	.	.	4.46	.	.	7.66	4.80	5.46	5.70	6.07	6.56	6.69	7.19	7.57
15	.	.	.	.	.	.	9.42	7.62	6.10	5.38	6.81	7.73	6.75	7.98
16	.	.	.	.	.	.	.	.	.	.	.	8.26	7.62	8.01
17	.	.	.	.	.	.	11.28	.	.	6.90	.	8.43	7.86	9.21
18	.	.	.	.	.	.	.	.	8.40	.	.	.	7.52	12.45
19	.	.	.	.	.	.	.	.	.	.	.	.	.	6.42
20	.	.	.	.	.	.	.	.	.	.	.	.	7.62	.

* note that 2007 values exclude the recreational fishery catch.

Table 9. Catch biomass (t) at age for cod caught in NAFO Div. 2J3KL from 1962 onwards.

Age	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
2	42	202	402	12	115	111	40	8	955	5	33	.	52	109	4	10
3	2946	1954	6575	1760	4779	5189	2088	1472	6155	4378	2964	1268	1131	1786	6195	3208
4	14407	15167	15182	15790	36296	42830	51860	21794	33056	39356	42299	19169	8977	8884	20573	39306
5	56617	53006	50826	41184	82445	88298	181108	88755	72474	83938	74600	67339	31784	24355	26086	39248
6	71540	145278	74638	82344	77259	119014	185165	200770	124536	120677	82292	57123	82587	40623	27585	20098
7	78541	97933	166244	106838	98458	91293	139121	178465	142255	96056	85096	46103	76885	54356	29419	12575
8	58345	62220	107834	144533	64497	82025	83619	111641	61942	53117	62948	49232	55672	63484	33166	9577
9	53175	40973	55155	89282	62948	45265	61171	51879	28662	30972	33605	31137	38651	29660	24485	9446
10	57354	36926	39000	47423	27863	51147	34929	39337	12164	14215	21033	21336	28853	19612	13865	5358
11	39269	31012	32704	26113	17025	22368	21022	24023	7520	8358	11799	12170	18210	7732	5366	2543
12	39292	17447	26361	15475	9462	13973	21783	18588	4980	5341	6839	8160	10005	4315	2877	1814
13	47135	23889	30233	23925	11060	12774	11750	18204	3072	6908	6940	5314	5304	3862	1805	1089
14	32049	16249	22359	20664	6570	8471	7390	8626	1241	3989	6757	3119	2869	1934	2056	630
15	28528	17890	16515	16631	5908	4185	4998	3800	1308	2169	7031	2007	1576	858	977	370
16	22667	10127	8488	10838	4699	2472	3556	3306	1423	2763	4175	2178	1859	448	562	247
17	25470	8134	12352	3703	2679	1243	818	2054	799	799	6631	803	1226	43	498	213
18	13117	8207	7005	5894	1694	649	540	607	194	777	1637	301	1251	74	714	172
19	1534	2168	3312	1210	3212	476	549	304	66	978	1486	290	343	168	229	15
20	2898	1309	2243	1625	1280	1517	187	712	244	561	629	140	349	17	349	105
Total	644926	590090	677428	655244	518248	593302	811698	774346	503047	475357	458793	327188	367583	262319	196809	146023

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
2	.	.	38	.	.	6	1	.	0	13	7	2	17	6	.	.
3	529	530	1354	1202	902	1603	461	312	424	1001	1362	814	3231	1120	125	536
4	12640	9147	9259	5594	26280	11846	13086	10822	10958	6083	10695	13053	27984	19309	2239	3545
5	40774	42367	33424	15433	22804	56235	38112	40275	45935	33310	21799	21785	38595	52191	11773	3243
6	32104	48767	51327	40672	25483	33299	69137	48508	70638	64761	66125	36305	34043	41670	14531	2425
7	18969	27016	42880	49091	53414	27460	28507	57692	48146	53237	76361	70836	31797	17040	7830	1113
8	10034	12352	17195	33885	45034	38370	19637	18753	34597	37645	41124	58993	39827	13992	2813	1235
9	6197	5733	6097	12097	36882	28410	26374	12390	9126	16290	22655	22957	22341	12479	1000	194
10	4830	3974	2855	4144	8038	22194	15429	17138	6940	4724	13184	10993	8767	5325	446	.
11	2194	3248	1559	1944	2082	4876	10854	11794	7513	3245	3382	6712	3881	2436	279	.
12	1472	1286	1802	1377	1122	1924	2792	7649	4999	4051	2317	3095	2237	1240	89	.
13	851	1039	469	915	720	816	1225	1786	3065	2244	2397	1830	642	483	48	.
14	460	436	652	480	1279	375	492	1035	826	1226	1918	1663	834	297	28	.
15	328	407	418	126	314	308	469	443	341	316	976	945	352	243	.	.
16	236	407	180	323	95	116	348	225	202	297	311	402	315	99	.	.
17	81	92	107	210	125	118	122	216	156	27	63	63	124	38	.	.
18	71	94	225	56	52	96	91	12	145	22	160	168	95	26	.	.
19	21	62	48	49	.	19	61	43	25	71	83	.	17	26	.	.
20	112	133	114	63	.	48	38	97	31	.	55	18	.	.	.	.
Total	131904	157091	170005	167661	224625	228118	227236	229191	244066	228564	264975	250632	215096	168021	41200	12290

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
2	.	0	0	0	1	2	1	4	3	0	0	0	0	0
3	42	6	25	6	60	41	93	157	104	5	6	8	7	7
4	258	32	158	34	214	249	249	704	268	9	21	23	178	49
5	564	138	433	134	596	1032	716	967	623	26	51	242	471	600
6	250	144	817	189	1478	1687	936	1232	702	109	101	395	864	882
7	137	57	329	361	954	2908	915	926	635	112	162	263	474	495
8	45	25	67	102	713	1094	994	614	402	84	106	160	259	242
9	6	6	22	19	247	927	598	1068	296	81	59	75	123	87
10	.	1	8	7	40	246	616	354	501	41	35	34	62	40
11	.	1	1	2	22	65	162	592	239	159	16	25	26	27
12	.	.	1	1	7	14	31	219	269	116	33	13	10	11
13	.	.	0	0	6	2	18	20	61	159	13	15	9	8
14	.	.	0	.	.	1	5	5	11	40	13	4	13	8
15	.	.	.	.	.	.	1	1	3	16	2	4	10	11
16	.	.	.	.	.	.	.	.	.	.	.	4	4	3
17	.	.	.	.	.	.	1	.	.	0	.	3	1	6
18	.	.	.	.	.	.	.	.	1	.	.	.	1	1
19	.	.	.	.	.	.	.	.	.	.	.	.	0	1
20	.	.	.	.	.	.	.	.	.	.	.	.	0	.
Total	1301	411	1861	857	4338	8269	5335	6864	4117	957	618	1268	2513	2479

* note that 2007 values exclude the recreational fishery catch.

Table 10. Estimates of cod abundance (000's) from surveys of NAFO Division 2J during 1983-1992. Values are in Campelen equivalent units.

Stratum depth (meters)	Stratum number	Area sq. nautical miles	Gadus 86-88 1983	Gadus 101-102 1984	Gadus 116-118 1985	Gadus 131-132 1986	Gadus 145-146 1987	Gadus 159-160 1988	Gadus 174-176 1989	Gadus 190-191 1990	Gadus 208-209 1991	Gadus 224-226 1992
Mean survey date			5-Nov-83	5-Nov-84	30-Oct-85	11-Nov-86	6-Nov-87	14-Nov-88	10-Nov-89	12-Nov-90	14-Nov-91	5-Nov-92
101-200	201	1427	87811	52543	82806	99720	25126	319	0	0	0	0
	205	1823	122517	182501	48964	44029	34532	38745	502	1223	0	0
	206	2582	55637	142654	68017	134937	17607	83620	48332	2874	3197	3339
	207	2246	145830	101693	171902	37826	38648	45550	9825	15492	0	1545
201-300	202	440	5387	8111	4086	31746	7838	1025	0	0	0	0
	209	1608	108766	14599	39668	142610	48249	47602	140710	8590	9006	2522
	210	774	389901	16929	772	97706	479	10221	43414	34603	24230	2783
	213	1725	62645	33648	67470	102247	36569	43632	183006	89430	25390	1948
	214	1171	18102	112678	78314	157299	128223	115524	70582	18267	2942	897
	215	1270	25616	42569	26380	293011	27603	90521	1689	9434	2271	2114
	228	1428	22525	8643	2582	61157	4153	6679	14364	15813	154727	1964
	234	508	50198	16841	11926	22187	6825	2690	0	0	0	256
301-400	203	480	990	1552	638	5745	3962	5910	0	0	66	110
	208	448	5947	760	4622	9768	12572	1849	53462	8012	986	2465
	211	330	4698	908	2361	4880	4835	6945	35386	23197	67475	8058
	216	384	18	740	396	317	9720	1347	2562	872	687	106
	222	441	0	20	698	61	849	182	33214	4853	1597	364
	229	567	6357	208	3536	1872	338	1222	6214	5577	11518	1508
401-500	204	354	1704	5235	0	1802	1242	5405	268	146	0	162
	217	268	0	38	0	0	184	0	0	0	74	0
	227	686	47	0	0	157	236	252	3350	18150	6810	582
	235	420	9620	404	144	0	780	462	664	3178	12537	212
total strata fished <= 500 meters			1124316	743236	615282	1249077	410570	508714	647594	260268	323637	30960
1 STD strata fished <= 500 meters			320612	112688	88262	261581	66519	74633	112157	45978	165231	5287
501-750	212	664	0	91	23	761	365	548	206	3562	41423	274
	218	420	0	**nf**	0	0	0	0	0	0	0	0
	224	270	0	0	0	0	0	0	0	0	130	0
	230	237	0	0	0	0	0	98	0	978	0	0
501-750		1591	0	91 [1]	23	761	365	646	206	4540	41553	274
751-1000	219	213	0	**nf**	0	0	0	0	0	0	0	0
	231	182	0	0	0	0	0	0	**nf** [1]	0	0	325
	236	122	0	0	0	34	0	0	**nf** [1]	0	0	0
751-1000		517	0	0	0	34	0	0	0 [1]	0	0	325
total strata fished > 500 meters			0	91	23	795	365	646	206	4540	41553	599
total all strata fished			1,124,317	743,328	615,304	1,249,871	410,936	509,360	647,797	264,807	365,191	31,560
1 STD all strata fished			320612	112687	88263	261582	66519	74635	112159	46014	170124	5304
mean number per tow			345.328	237.344	188.987	383.891	126.217	159.411	201.556	81.334	112.166	9.693

[1] Not all strata in the depth range have been fished. Strata not fished in the <= 500 meter depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.

Table 11. Estimates of cod biomass (t) from surveys in NAFO Division 2J during 1983-1992. Values are in Campelen equivalent units.

Stratum depth (meters)	Stratum number	Area sq. nautical miles	Gadus 86-88 1983	Gadus 101-102 1984	Gadus 116-118 1985	Gadus 131-132 1986	Gadus 145-146 1987	Gadus 159-160 1988	Gadus 174-176 1989	Gadus 190-191 1990	Gadus 208-209 1991	Gadus 224-226 1992
Mean survey date			5-Nov-83	5-Nov-84	30-Oct-85	11-Nov-86	6-Nov-87	14-Nov-88	10-Nov-89	12-Nov-90	14-Nov-91	5-Nov-92
101-200	201	1427	61842	41743	58556	88676	27395	208	0	0	0	0
	205	1823	53701	95026	30679	38754	31421	61555	691	182	0	0
	206	2582	33286	121643	49111	123683	16999	92563	38555	661	1333	1489
	207	2246	46134	55054	107180	25989	36773	18803	2352	6370	0	649
201-300	202	440	8365	7647	3064	32711	11398	1874	0	0	0	0
	209	1608	127333	17017	35398	119210	56901	28242	52339	1670	3966	990
	210	774	241006	21752	1521	87332	737	10667	36642	12536	13406	1116
	213	1725	50086	27703	55229	98497	41997	53146	120476	34360	11859	587
	214	1171	19316	104048	77051	189715	170212	137161	56924	13766	1018	399
	215	1270	30986	31690	30602	379256	36553	146322	315	8508	1073	760
	228	1428	8049	7695	1244	52833	4800	10296	12552	8973	65772	672
	234	508	16910	11930	9173	22705	7342	5157	0	0	0	68
301-400	203	480	2250	3445	582	7875	6300	9640	0	0	45	77
	208	448	7465	1115	4301	8575	16641	3653	22845	3699	455	1091
	211	330	6334	1570	3287	4661	7667	7283	56896	10465	35048	3629
	216	384	52	1592	429	435	13557	2201	3178	255	287	25
	222	441	0	32	784	59	1192	247	9028	2559	579	175
	229	567	2354	263	3823	2399	340	1889	6166	4265	4906	595
401-500	204	354	2458	5863	0	2174	1732	8318	36	37	0	48
	217	268	0	60		0	211	0	0	0	45	0
	223	180	0	0	0	0	0	57	23	212	107	13
	227	686	217	0	0	224	341	353	5407	17904	4643	311
	235	420	4348	332	133	0	1090	717	962	1930	5594	101
total strata fished	<= 500 meters		722492	557160	472147	1285763	491599	598478	425387	128352	150136	12795
1 STD strata fished	<= 500 meters		177183	83218	65293	325107	31381	97959	218324	25701	72612	2315
501-750	212	664	0	**nf**	0	0	0	0	0	2196	20693	159
	218	420	0	0	0	0	0	0	0	0	62	0
	224	270	0	0	0	0	0	193	0	0	0	0
	230	237	0	0	0	0	0	0	0	1395	0	0
501-750		1591	0	0 [1]	0	0	0	193	0	3591	20755	159
751-1000	219	213	0	nf	0	0	0	0	0	0	0	0
	231	182	0	0	0	0	0	0	**nf**	0	0	144
	236	122	0	0	0	62	0	0	**nf**	0	0	0
751-1000		517	0	0	0	62	0	0	0 [1]	0	0	144
total strata fished	> 500 meters		0	0	0	62	0	193	0	3591	20755	303
total all strata fished			722491	557302	472214	1287042	492144	599436	425874	131943	170892	13096
1 STD all strata fished			177183	83218	65293	325108	84935	97963	85921	25746	74135	2326

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 500 meter depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

Table 12. Estimates of cod abundance (000's) from surveys in NAFO Division 2J during 1993-2007. The data are in Campelen equivalent units for 1993 and 1994 and actual Campelen units for 1995 onwards.

Stratum depth (meters)	Stratum number	Area sq. nautical miles	Gadus 236-238 1993	Gadus 250-252 1994	Tel. 20-23 1995-6	Tel. 39 1996	Tel. 54-54 1997	Tel. 72-73 1998	Tel. 86-88 1999	Tel. 340-343 2000	Tel. 361 AN 399-400 2001	Tel. 415, 454,457 2002	Tel. 509-510 2003	Tel. 537-539 2004	Tel. 611,612 WT 632 2005-6	Tel. 680-682 2006	Tel. 802 752-753 2007
Mean survey date			7-Nov-93	17-Nov-94	28-Dec-95	30-Oct-96	27-Oct-97	27-Oct-98	13-Nov-99	7-Nov-00	28-Nov-01	24-Dec-02	8-Dec-03	10-Nov-04	27-Nov-05	2-Nov-06	15-Nov-07
101-200	201	633	0	0	nf	0	0	44	44	0	0	0	44	44	0	121	0
	205	1594	63	219	nf	110	110	32	37	37	37	0	0	37	37	73	0
	206	1870	547	0	0	184	257	294	110	115	171	37	110	220	37	514	992
	207	2246	2128	2699	350	588	138	751	666	1280	447	1032	1122	623	623	835	2566
	237	733	151	0	273	134	0	34	0	101	25	307	2041	178	7125	571	5042
	238	778	nf	0	nf	107	36	0	0	0	36	0	306	41	0	0	0
201-300	202	621	0	0	49	0	0	0	0	0	0	0	0	0	0	85	0
	209	680	374	514	327	249	62	243	374	187	28	218	258	234	31	699	1350
	210	1035	5731	854	1424	320	214	178	854	676	261	269	473	570	249	320	854
	213	1583	871	0	2504	835	1085	871	290	1161	416	954	1327	617	1716	2178	5807
	214	1341	1771	338	323	959	406	451	221	517	823	833	148	1402	369	221	2675
	215	1302	1719	358	90	2917	1381	498	788	609	191	466	1197	2006	1075	537	1648
	228	2196	436	0	949	2068	1347	2001	868	944	1847	1729	874	1284	2228	1020	1635
	234	530	0	0	nf	73	142	36	32	36	36	146	0	146	36	49	0
301-400	203	487	0	301	0	335	234	67	100	0	0	33	0	67	167	0	38
	208	588	0	162	809	566	0	40	40	335	144	0	352	243	1213	324	337
	211	251	414	322	708	483	0	192	383	533	78	72	104	138	173	104	161
	216	360	0	173	927	715	99	74	275	198	303	297	57	371	891	297	322
	222	450	279	846	495	543	1021	272	371	495	954	836	340	464	248	743	2569
	229	536	590	295	627	946	205	74	442	184	1180	885	442	332	1548	2618	221
401-500	204	288	0	0	16	20	0	0	14	0	0	20	0	0	0	198	20
	217	241	66	55	561	63	0	166	33	33	15	715	38	83	215	17	0
	223	158	0	0	880	91	54	19	0	nf	0	73	54	54	33	22	22
	227	598	795	0	370	1207	41	247	0	55	0	329	0	247	247	165	370
	235	414	1044	1006	541	101	85	85	0	0	0	159	28	85	111	28	28
	240	133	9	0	123	9	18	0	128	18	42	125	0	18	146	0	0
total strata fished <= 500 m			16989	8145	12346	13625	6936	6669	6074	7516	7033	9534	9315	9503	18519	11739	26656
upper			28803	16368	16367	17716	9046	8575	8163	10007	9222	12588	13125	11582	50073	19669	42992
t-value			2.571	3.182	2.228	2.179	2.110	2.070	2.180	2.200	2.140	2.090	2.365	2.050	4.300	4.300	2.780
1 STD strata fished <= 500 m			4595	2584	1805	1877	1000	921	958	1132	1023	1461	1611	1014	7338	1844	5876
501-750	212	557	77	128	69	136	77	0	0	38	0	72	82	0	38	0	88
	218	362	0	50	1660	75	0	0	0	0	0	100	0	25	0	0	0
	224	228	0	0	596	0	0	0	42	0	0	233	47	0	0	0	0
	230	185	0	34	13	0	0	0	13	13	0	480	0	0	0	0	0
	239	120	17	17	0	8	7	0	0	0	7	8	0	8	8	25	17
751-1000	219	283	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	231	186	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	236	193	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0
1001-1250	220	330	nf	nf	nf	0	0		nf		0	0	0	0	0	0	0
	225	195	nf	nf	nf	0	0		0		0	0	0	0	0	0	0
	232	228	nf	nf	nf	0	0		0		0	0	0	0	0	0	0
1001-1250[1]			nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
1251-1500	221	330	nf	nf	nf	0	0		0	0	0	0	0	0	0	0	0
	226	201	nf	nf	nf	0	0		0	0	0	0	0	0	0	0	0
	233	237	nf	nf	nf	0	0		0	0	0	0	0	0	0	0	0
1251-1500[1]			nf	nf	nf	0		0	0	0	0	0	0	0	0		0
total strata fished > 500 m			94	229	2350	219	84	0	55	51	7	893	129	33	46	25	105
total all strata fished			17082	8373	14654	13844	7020	6636	6129	7567	7040	10427	9445	9536	18465	11764	26760
upper			28898	16608	19098	17946	9136	8538	8220	10060	9230	13495	13254	11615	50120	19695	43098
t-value			2.571	3.182	2.16	2.179	2.11	2.07	2.18	2.2	2.14	2.09	2.365	2.05	4.3	4.3	2.78
1 STD all strata fished			4596	2588	2057	1883	1003	919	959	1133	1023	1468	1611	1014	7362	1844	5877

[1] Not all strata in the depth range have been fished . Because of the short time series with the revised stratification scheme and a switch in 1995 to a different vessel and gear no attempt has been made to use a multiplicative model to fill strata which were not fished.

Table 13. Estimates of cod biomass (t) from surveys in NAFO Division 2J during 1993-2007. The data are in Campelen equivalent units for 1993 and 1994 and actual Campelen units for 1995 onwards.

Stratum depth (meters)	Stratum number	Area sq. nautical miles	Gadus 236-238 1993	Gadus 250-252 1994	Tel. 20-23 1995-6	Tel. 39 1996	Tel. 54-55 1997	Tel. 72-73 1998	Tel. 86-88 1999	Tel. 340-343 2000	Tel. 361 AN 399-400 2001	Tel. 415,454, Tel.457 2002	Tel. 509-510 2003	Tel. 537-539 2004	Tel. 611-612 WT 632 2005-6	Tel. 680-682 2006	Tel. 802 752-753 2007
Mean survey date			7-Nov-93	17-Nov-94	28-Dec-95	30-Oct-96	27-Oct-97	27-Oct-98	13-Nov-99	7-Nov-00	28-Nov-01	24-Dec-02	8-Dec-03	10-Nov-04	27-Nov-05	2-Nov-06	15-Nov-07
101-200	201	633	0	0	nf	0	0	30	6	0	0	0	44	24	0	115	0
	205	1594	63	151	nf	16	42	5	4	42	41	0	0	5	39	7	0
	206	1870	155	0	0	62	125	186	24	47	90	20	7	76	34	246	332
	207	2246	452	507	44	57	110	406	156	220	107	26	204	114	118	349	510
	237	733	83	0	13	8	0	2	0	3	8	2	23	22	65	252	40
	238	778	nf	0	nf	21	27	0	0	0	11	0	2	59	0	0	0
201-300	202	621	0	0	9	0	0	0	0	0	0	0	0	0	0	58	0
	209	680	100	67	52	20	44	162	86	60	7	56	82	79	19	458	794
	210	1035	1158	139	108	26	112	98	168	271	77	72	121	254	59	193	145
	213	1583	346	0	336	214	586	639	180	398	208	389	715	410	817	956	2183
	214	1341	700	174	39	273	186	289	127	303	355	460	122	878	194	111	817
	215	1302	443	210	21	959	586	404	625	436	88	371	646	1207	736	378	822
	228	2196	294	0	263	665	747	1258	280	433	514	613	329	572	924	667	1070
	234	530	0	0	nf	22	83	3	1	3	17	31	0	54	3	11	0
301-400	203	487	0	220	0	136	157	67	107	0	0	23	0	26	148	0	19
	208	588	0	41	123	200	0	4	12	268	63	0	149	142	229	206	31
	211	251	241	110	141	81	0	139	71	208	36	17	27	43	60	30	59
	216	360	0	96	234	194	54	73	82	95	148	134	33	186	515	298	300
	222	450	146	276	124	290	495	194	200	193	363	374	257	297	142	412	1300
	229	536	109	124	184	305	138	54	172	63	469	339	216	190	984	1760	109
401-500	204	288	0	0	1	8	0	0	19	0	0	25	0	0	0	118	1
	217	241	67	19	135	26	0	177	14	7	10	401	37	40	121	12	0
	223	158	0	0	135	32	35	25	0	nf	0	47	43	42	28	22	35
	227	598	441	0	109	748	33	197	0	23	0	146	0	115	224	102	165
	235	414	318	559	175	84	30	71	0	0	0	58	8	74	121	57	26
	240	133	13	0	68	2	19	0	192	10	32	77	0	13	140	0	0
total strata fished <= 500 m			5129	2693	2312	4261	3609	4483	2527	3082	2646	3680	3065	4921	5719	6818	8755
upper			7096	3824	2905	6472	4574	5924	4023	4171	3345	4790	4226	5996	7650	26037	12633
t-value			2.228	2.201	2.179	2.776	2.086	2.08	2.45	2.23	2.09	2.13	2.262	2.07	2.26	12.71	2.57
1 STD strata fished <= 500 m			883	514	272	796	463	693	611	488	334	521	513	519	854	1512	1509
501-750	212	557	93	89	15	22	49	0	0	10	0	45	115	0	63	0	5
	218	362	0	51	519	12	0	0	0	0	0	77	0	31	0	0	0
	224	228	0	0	205	0	0	0	45	0	0	152	68	0	0	0	0
	230	185	0	32	14	0	0	0	18	6	0	307	0	0	0	0	0
	239	120	17	11	0	2	3	0	0	0	1	7	0	1	11	15	8
751-1000	219	283	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	231	186	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	236	193	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
1001-1250	220	330	nf	nf	nf	0	0	0	nf	0	0	0	0	0	0	0	0
	225	195	nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
	232	228	nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
1001-1250[1]			nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
1251-1500	221	330	nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
	226	201	nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
	233	237	nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
1251-1500[1]			nf	nf	nf	0	0	0	0	0	0	0	0	0	0	0	0
total strata fished > 500 m			110	183	755	36	52	0	63	16	1	588	183	32	74	15	13
total all strata fished			5238	3448	3067	4484	3662	4483	2590	3098	2647	4270	3248	4953	5793	6833	8768
upper			7217	4019	3927	6621	4629	5924	4091	4187	3346	5387	4411	6028	7730	26053	12646
t-value			2.228	2.179	2.262	2.776	2.08	2.08	2.45	2.23	2.09	2.12	2.262	2.07	2.26	12.71	2.57
1 STD all strata fished			888	262	380	770	465	693	613	488	334	527	514	519	857	1512	1509

[1] Not all strata in the depth range have been fished . Because of the short time series with the revised stratification scheme and a switch in 1995 to a different vessel and gear no attempt has been made to use a multiplicative model to fill strata which were not fished.

Table 14. Estimates of cod abundance (000's) from surveys of NAFO Division 3K during 1983-1992 in Campelen equivalent units.

Stratum depth (meters)	Stratum number	Area sq. nautical miles	Gadus 87-88 1983	Gadus 101-103 1984	Gadus 117-118 1985	Gadus 131-132 1986	Gadus 146-147 1987	Gadus 160-161 1988	Gadus 175-176 1989	Gadus 191-192 1990	Gadus 209-210 1991	Gadus 224-226 1992
	Mean survey date		26-Nov-83	23-Nov-84	18-Nov-85	1-Dec-86	27-Nov-87	5-Dec-88	5-Dec-89	4-Dec-90	4-Dec-91	26-Nov-92
101-200	618	1455	**17028**	24569	26453	64689	14954	57577	14811	13210	721	1268
	619	1588	**3835**	9955	1155	17476	6826	19598	63705	2578	0	218
201-300	620	2709	126888	110535	4685	135397	32793	100337	253826	11304	3780	2236
	621	2859	33593	32109	8338	27811	16059	32525	44025	14230	2517	131
	624	668	10016	9786	2550	2573	1746	3982	4901	24948	7076	735
	632	447	30765	**9851**	4591	4735	7410	51959	4888	22044	10336	1438
	634	1618	61564	31160	29182	323578	60702	21441	269092	4610	99321	694
	635	1274	7711	29442	4682	14225	3593	9534	5934	3505	1490	701
	636	1455	8807	17788	3828	21566	6777	12743	13850	715	1134	133
	637	1132	31704	73889	15928	46132	15805	24915	13766	6634	5320	156
301-400	623	1027	29291	51057	3697	4026	11782	23649	102872	50690	3155	5557
	625	850	4677	1988	7156	3196	11400	5554	21251	11693	1676	546
	626	919	6953	3266	2705	62324	5815	5006	12566	9260	1264	632
	628	1085	7935	4670	6617	2687	1582	18448	12575	5522	9303	4179
	629	495	2357	2557	1647	5720	938	7276	3135	6521	978	1853
	630	544	1497	2170	262	262	524	524	7009	1085	499	150
	633	2179	15312	21312	38293	96780	49404	15737	220703	243039	185926	7410
	638	2059	53867	17476	37259	36467	24472	23650	137139	360185	200000	7511
	639	1463	12449	5283	8780	15127	5980	12176	19270	52757	91771	2262
401-500	622	632	304	1434	283	1652	174	3188	21561	12476	1449	1594
	627	1194	1032	1038	372	4658	2633	1173	10505	85313	4506	3692
	631	1202	1025	33	472	207	3059	6063	42471	28964	15157	992
	640	198	194	0	9	14	0	109	2982	150	1970	17459
	645	204	0	0	9	**90**	112	28	4686	379	0	75
total strata fished <=500 meters			447748	451517	208952	891302	284541	457191	1307523	971810	649350	61622
1 STD strata fished <=500 meters			61132	68574	27228	321032	44267	73335	270219	184614	159892	17726
501-750[1]		917	0	0	0	**nf**	107	**nf**	**nf**	92	122	263
751-1000[1]		1340	**nf**	**nf**	0	**nf**	**nf**	**nf**	**nf**	128	56	0
total strata fished > 500 meters			0	0	0	0	107	0	0	220	178	263
total all strata fished			447748	451517	208952	891302	284648	457191	1307523	972029	649529	61886
1 STD all strata fished			61132	68574	27228	321032	44267	73335	270219	184614	159892	17726

[1] Not all strata in the depth range have been fished. Strata not fished in the <= 500 meter depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.

Table 15. Estimates of cod biomass (t) from surveys of NAFO Division 3K during 1983 -1992 in Campelen equivalent units.

Stratum depth (meters)	Stratum number	Area sq. nautical miles	Gadus 87-88 1983	Gadus 101-103 1984	Gadus 117-118 1985	Gadus 131-132 1986	Gadus 146-147 1987	Gadus 160-161 1988	Gadus 175-176 1989	Gadus 191-192 1990	Gadus 209-210 1991	Gadus 224-226 1992
Mean survey date			26-Nov-83	23-Nov-84	18-Nov-85	1-Dec-86	27-Nov-87	5-Dec-88	5-Dec-89	4-Dec-90	4-Dec-91	26-Nov-92
101-200	618	1455	**7987**	18702	24894	53641	10200	2443	1575	1514	261	450
	619	1588	**1491**	4801	1113	3157	2538	1212	3363	154	0	119
201-300	620	2709	67557	87523	8223	131461	27088	13232	24447	1636	1158	847
	621	2859	18041	25813	6216	19356	3294	11590	7313	1021	359	194
	624	668	3920	3082	2340	2798	802	3087	1660	8649	3809	331
	632	447	33968	**10779**	4106	4540	7824	51549	2030	8677	5581	663
	634	1618	56301	24843	28663	436500	80357	19008	322401	1976	77639	450
	635	1274	4940	11970	3551	16754	3329	3843	2609	998	617	319
	636	1455	11657	13899	3977	13264	5871	9229	3577	431	334	138
	637	1132	36769	75369	15341	50718	15913	29982	13010	2665	2332	85
301-400	623	1027	23690	46679	5155	4602	17254	3662	22849	12857	1130	1960
	625	850	5410	2474	7062	3405	11136	5766	12105	4049	861	291
	626	919	5565	3377	4274	41267	4852	1188	5858	718	345	218
	628	1085	8807	4909	7807	2564	1484	7998	7102	2184	4028	1345
	629	495	2506	1739	955	5557	907	1391	1550	2003	95	535
	630	544	1452	1564	435	292	743	863	9065	644	267	85
	633	2179	15440	23201	39817	115810	66782	15297	148660	169097	132091	4366
	638	2059	56662	12773	35965	37822	31829	18946	184194	353107	150413	3564
	639	1463	17739	5242	8657	14185	6332	7526	7803	24244	74514	941
401-500	622	632	541	1487	215	1307	163	847	8794	2974	498	564
	627	1194	970	772	360	5307	1150	1208	4805	13523	1248	765
	631	1202	2700	138	493	273	3049	6448	31211	11300	8691	732
	640	198	**385**	0	16	22	0	299	2436	204	1231	16334
	645	204	0	0	50	**255**	139	122	1628	368	0	48
total strata fished <=500 meters			374634	370356	209686	964600	303038	216734	830045	624993	467505	35346
1 STD strata fished <=500 meters			51399	58138	26560	428297	61366	50225	289567	207590	128742	16146
501-750[1]		917	0	0	0	**nf**	174	**nf**	**nf**	72	133	258
751-1000	642	931	**nf**	0	0	**nf**	0	**nf**	**nf**	70	0	0
	647	409	**nf**	**nf**	0	**nf**	**nf**	**nf**	**nf**	0	39	0
751-1000[1]		1340	**nf**	**nf**	0	**nf**	**nf**	**nf**	**nf**	70	39	0
total strata fished > 500 meters			0	0	0	0	174	0	0	142	172	258
total all strata fished			374634	370356	209686	964600	303212	216734	830045	645136	649529	35604
1 STD all strata fished			51399	58138	26560	428297	61366	50225	289567	198748	159892	16146

[1] Not all strata in the depth range have been fished. Strata not fished in the <= 500 meter depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.

Table 16. Estimates of cod abundance (000's) from surveys of NAFO Division 3K during 1993-2007. The data are in Campelen equivalent units for 1993 and 1994 and actual Campelen units from 1995 onwards.

					WT 176-	WT 196-	WT 217				WT 376, 398	Tel. 415,457	Tel. 509,510	Tel. 539-	Tel. 611, 662	Tel. 681-682	Tel. 755,
Depth		Stratum	Gadus	Gadus	81, Tel.	199, Tel.	Tel.	Tel.	Tel.	Tel.	Tel. 362, 397	WT 431, 455	513,514	542	WT 631-632	684, 733	802,
range	Stratum	area	236-238	250-252	20-23	40-42	55-57	73-75	86-88	340-343	AN 399	WT 456	WT 511, 515	WT 588	WT 660	WT 707-708	WT 774
meters	number	sq. mi.	1993	1994	1995-6	1996	1997	1998	1999	2000	2001	2002-3	2003-4	2004-5	2005-6	2006	2007
Mean survey date			23-Nov-93	7-Dec-94	26-Dec-95	14-Nov-96	18-Nov-97	14-Nov-98	30-Nov-99	23-Nov-00	8-Dec-01	20-Dec-02	15-Jan-04	14-Dec-04	24-Dec-05	30-Nov-06	6-Dec-07
101-200	618	1347	2409	159	1170	1887	1174	1065	865	2038	812	388	1346	1544	813	1746	1863
	619	1753	965	0	655	218	448	2411	281	2097	1021	512	1131	693	586	5899	864
201-300	620	2545	3268	350	1465	915	764	1814	2514	3383	3172	1246	3214	2976	1641	2741	3701
	621	2736	0	251	2580	303	444	494	1301	1700	1196	988	979	3403	761	966	748
	624	1105	391	152	813	2432	395	973	472	456	1277	924	213	730	790	517	1009
	634	1555	468	642	214	1246	31	672	397	616	1497	937	299	1176	4054	250	3212
	635	1274	467	0	88	386	243	491	245	361	70	257	70	0	208	**nf**	1928
	636	1455	734	200	286	133	267	367	300	291	392	371	272	534	271	4937	9807
	637	1132	4983	389	242	810	125	529	1093	**nf**	352	775	436	799	1017	1393	3956
301-400	617	593	1876	184	693	109	1006	160	547	1332	2882	236	109	1224	979	1097	530
	623	494	1138	0	578	510	136	217	34	136	1446	755	442	1665	238	815	748
	625	888	285	0	342	131	305	329	1160	275	912	1000	92	1530	366	702	580
	626	1113	714	204	2709	1415	31	1868	4651	1217	3253	2927	1654	7196	2616	1014	732
	628	1085	1443	299	1556	826	358	1151	2507	2478	1791	2047	1944	2158	1970	1918	3134
	629	495	908	375	545	68	69	102	272	393	230	847	306	180	613	375	454
	630	332	0	0	41	0	69	23	69	95	15	0	0	23	0	20	0
	633	2067	1153	2218	851	1381	885	695	1788	853	876	2428	903	2514	2537	2085	1294
	638	2059	8780	1187	1252	2155	472	661	5413	7308	5119	13407	3191	3682	5490	9045	10284
	639	1463	1489	1711	712	1025	537	503	1540	786	690	7864	973	738	993	14960	8151
401-500	622	691	1141	57	542	230	63	507	405	665	602	383	289	475	2743	475	634
	627	1255	2992	604	4924	1918	514	414	2463	9091	699	1746	886	863	3061	623	345
	631	1321	0	182	501	273	84	0	784	54	99	199	346	91	1296	683	30
	640	69	228	16	218	25	43	47	66	47	19	71	100	20	394	0	28
	645	216	79	119	134	30	15	43	59	104	66	45	178	193	158	15	15
	650	134	995	65	276	92	350	74	78	**nf**	46	1501	535	65	238	9	74
total strata fished <= 500 m			36906	9364	23387	18518	8828	15610	29304	35776	28534	41854	19908	34468	33834	52285	54122
upper			49711	14727	27099	22878	10868	19783	35059	59488	35927	64414	23813	41996	41953	97712	72011
t-value			2.201	2.228	2.086	2.06	2.16	2.12	2.04	2.78	2.13	2.2	2.017	2.12	2.06	3.18	2.18
1 STD strata fished <= 500 m			5818	2407	1779	2117	944	1968	2821	8529	3471	10255	1936	3551	3941	14285	8206
501-750	641	230	11	21	63	47	0	16	0	**nf**	16	662	158	16	253	0	0
	646	325	75	0	0	0	22	0	89	0	0	45	224	1565	0	0	0
	651	359	16	123	691	25	0	198	0	**nf**	28	85	1580	0	25	0	0
751-1000	642	418	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	647	360	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	652	516	142	106	0	0	0	71	35	0	0	0	0	0	0	0	0
1001-1250	643	733	**nf**	**nf**	0	0		0	0		0	0	0	0	0	0	0
	648								0		16	0	0	0	0	0	0
	653	531	0	**nf**	0	0		0	0		0	0	0	0	0	0	0
1001-1250[3]		1264	**nf**	**nf**	0	0	0	0	0	0	16	0	0	0	0	0	
1251-1500	644	474	**nf**	**nf**	0	0		0	0	0	0	0	0	0	0	0	0
	649	212						0	0	0	0	0	0	0	0	0	0
	654	479	**nf**	**nf**	0	0		0	0	0	0	0	0	0	0	0	0
1251-1500[3]		1165	**nf**	**nf**	0	0	0	0	0	0	0	0	0	0	0		
total strata fished > 500 m			359	250	754	72	22	285	124	0	60	792	1962	1581	278	0	0
total all strata fished			37265	9612	24142	18590	8850	15896	29433	39110	28595	42644	21868	36049	34112	52285	54122
upper			50073	14985	27956	22950	10891	20071	35187	61174	35987	65206	25860	44372	42248	97712	72011
t-value			2.201	2.228	2.08	2.06	2.16	2.12	2.04	2.57	2.13	2.2	2.014	2.14	2.06	3.18	2.18
1 STD all strata fished			5819	2412	1834	2117	945	1969	2821	8585	3470	10255	1982	3889	3950	14285	8206

[1] Not all strata in the depth range have been fished. Because of the short time series with the revised stratification scheme and a switch in 1995 to a different vessel and gear no attempt has been made to use a multiplicative model to fill strata which were not fished.

Table 17. Estimates of cod biomass (t) from surveys of NAFO Division 3K during 1993-2007. The data are in Campelen equivalent units for 1993 and 1994 and actual Campelen units from 1995 onwards.

					WT 176-181	WT 196-199	WT 217				WT 376,398	Tel. 415,457	Tel. 509,510	Tel. 539-	Tel. 611,662	Tel. 681,682,	Tel. 755,
Depth		Stratum	Gadus	Gadus	Tel.	Tel.	Tel.	Tel.	Tel.	Tel.	Tel. 362 397	WT431,455	513,514	542	WT 631-632	684, 733	802
range	Stratum	area	236-238	250-252	20-23	40-42	55-57	73-75	86-88	340-343	AN 399	WT 456	WT 511, 515	WT 588	WT 660	WT 707,708	WT 774
meters	number	sq. mi.	1993	1994	1995-6	1996	1997	1998	1999	2000	2001	2002-3	2003-4	2004-5	2005-6	2006	2007
Mean survey date			23-Nov-93	7-Dec-94	26-Dec-95	14-Nov-96	18-Nov-97	14-Nov-98	30-Nov-99	23-Nov-00	8-Dec-01	20-Dec-02	15-Jan-04	14-Dec-04	24-Dec-05	30-Nov-06	6-Dec-07
101-200	618	1347	721	40	87	221	291	170	56	252	99	72	85	170	138	166	246
	619	1753	708	0	32	42	36	158	20	154	97	101	38	80	82	178	73
201-300	620	2545	614	118	238	230	203	471	245	415	649	164	595	671	443	364	659
	621	2736	0	267	302	77	202	207	296	397	169	186	44	567	129	254	100
	624	1105	177	85	251	714	207	752	263	225	492	364	64	342	430	191	263
	634	1555	189	417	97	391	7	300	178	152	637	424	219	481	2400	48	1354
	635	1274	189	0	10	94	208	322	76	104	17	82	6	0	122	**nf**	1056
	636	1455	334	141	92	39	234	303	171	260	96	93	49	131	107	4136	16783
	637	1132	2039	74	74	358	38	321	575	**nf**	168	235	109	253	410	1127	5855
301-400	617	593	383	74	97	14	359	95	212	237	748	97	53	306	407	212	145
	623	494	213	0	32	144	37	70	10	41	309	153	107	272	119	115	177
	625	888	229	0	99	66	139	166	573	173	296	342	75	658	192	226	311
	626	1113	468	89	289	340	6	1034	1217	259	716	543	156	1366	574	347	197
	628	1085	736	80	353	409	274	647	837	524	953	588	171	554	837	2116	2381
	629	495	343	20	70	12	45	54	116	192	97	176	69	21	220	266	236
	630	332	0	0	11	0	53	14	30	38	8	0	0	3	0	9	0
	633	2067	502	1067	420	535	516	624	1138	615	543	1105	534	1114	1833	1280	1116
	638	2059	3913	401	635	720	232	593	3372	3974	2863	3385	1080	1691	3259	9824	14139
	639	1463	622	761	290	415	260	494	1124	780	418	2542	422	265	550	16979	12753
401-500	622	691	299	32	68	55	19	143	178	138	214	70	218	106	1580	143	78
	627	1255	891	226	702	466	211	150	825	2917	135	438	194	166	1295	335	244
	631	1321	0	208	99	45	90	0	481	27	59	36	218	36	827	340	15
	640	69	131	11	90	13	30	71	96	37	13	35	58	29	275	0	49
	645	216	84	87	48	14	11	44	62	84	63	48	111	254	220	46	31
	650	134	441	43	112	40	292	76	78	**nf**	30	613	236	72	245	8	166
total strata fished <= 500 m			14227	4241	4600	5455	3998	7280	12230	11994	9890	11889	4912	9609	16696	38709	58427
upper			18515	6644	5485	6692	5034	9559	14902	19284	12834	18138	6118	11713	21527	104979	85973
t-value			2.228	2.262	2.056	2.037	2.145	2.23	2.07	2.45	2.14	2.18	2.023	2.05	2.07	4.3	2.26
1 STD strata fished <= 500 r			1925	1062	430	607	483	1022	1291	2976	1376	2867	596	1026	2334	15412	12188
501-750	641	230	16	18	83	101	0	13	0	**nf**	14	438	175	17	329	0	0
	646	325	51	0	0	0	42	0	200	0	0	41	208	749	0	0	0
	651	359	25	116	317	30	0	133	0	**nf**	35	78	1274	0	12	0	0
751-1000	642	418	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	647	360	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	652	516	208	62	0	0	0	96	89	0	0	0	0	0	0	0	0
1001-1250	643	733	**nf**	**nf**	0	0	0	0	0	0	0	0	0	0	0	0	0
	648							0	0	0	7	0	0	0	0	0	0
	653	531	0	**nf**	0	0	0	0	0	0	0	0	0	0	0	0	0
1001-1250[3]			**nf**	**nf**	0	0	0	0	0	0	7	0	0	0	0	0	
1251-1500	644	474	**nf**	**nf**	0	0	0	0	0	0	0	0	0	0	0	0	0
	649	212						0	0	0	0	0	0	0	0	0	0
	654	479	**nf**	**nf**	0	0	0	0	0	0	0	0	0	0	0	0	0
1251-1500[3]			**nf**	**nf**	0	0	0	0	0	0	0	0	0	0	0	0	
total strata fished > 500 m			372	196	400	131	42	242	289	0	56	557	1657	766	341	0	0
total all strata fished			14598	4437	5000	5586	4040	7522	12519	12585	9946	12446	6569	10375	17038	38709	58427
upper			18892	6848	6010	6825	5081	9812	15222	19889	12892	18696	8435	13381	21904	104979	85973
t-value			2.228	2.262	2.11	2.037	2.145	2.23	2.06	2.45	2.14	2.18	2.365	2.36	2.07	4.3	2.26
1 STD all strata fished			1927	1066	479	608	485	1027	1312	2981	1377	2867	789	1274	2351	15412	12188

[1] Not all strata in the depth range have been fished. Because of the short time series with the revised stratification scheme and a switch in 1995 to a different vessel and gear no attempt has been made to use a multiplicative model to fill strata which were not fished.

Table 18. Estimates of cod abundance (000's) from surveys of NAFO Division 3L during 1983-1992 in depths <= 200 fathoms. The data are in Campelen equivalent units.

Stratum depth (fath)	Stratum number	Area sq. nautical miles	WT 7-9 1983	WT 16-18 1984	WT 37-39 1985	AN 72 1986	WT 65 1987	WT 78 1988	WT 87 1989	WT 101 1990	WT 114-115 1991	WT 129-130 1992
Mean survey date			27-Oct-83	15-Aug-84	27-Oct-85	21-Nov-86	24-Oct-87	3-Nov-88	20-Oct-89	5-Nov-90	21-Nov-91	16-Nov-92
31-50	350	2071	26886	62391	66442	43614	15131	13276	10854	5911	5359	1140
	363	1780	38933	73152	143316	6156	21384	23286	43993	52247	3702	13036
	371	1121	20972	36304	5199	565	3547	4472	193	7556	411	1079
	372	2460	157018	160636	65709	16318	57710	16269	32627	141824	3774	2919
	384	1120	29119	73645	1560	801	34383	1489	986	41791	1061	146
51-100	328	1519	**6868**	1985	1802	37264	2507	8806	1224	2090	279	1114
	341	1574	14723	8401	4949	6124	337	1245	298	1985	505	217
	342	585	2837	4466	912	885	1073	429	80	2052	161	54
	343	525	915	14408	1517	1974	337	650	24	1372	481	722
	348	2120	8934	34810	6978	6008	3143	3995	6189	6389	1896	3208
	349	2114	9306	62170	15645	8724	2472	7302	1745	4736	3722	58
	364	2817	25576	97381	20064	3720	4789	10048	1656	13595	291	388
	365	1041	7074	102281	4242	8821	1456	1690	573	895	1575	286
	370	1320	5811	52295	2865	2905	1059	623	121	1888	121	484
	385	2356	5445	20391	756	4497	972	25	29	1713	389	648
	390	1481	815	33751	553	5229	23276	3107	2183	1290	0	136
101-150	344	1494	5823	15722	10733	8250	5600	4874	4580	9454	3186	5446
	347	983	5995	11719	3056	3651	2502	10628	4571	30560	609	676
	366	1394	11314	56011	**51115**	59062	25367	66130	17888	9812	19359	44544
	369	961	9628	14919	5222	53011	11336	12241	1005	2809	12559	1884
	386	983	**10318**	8587	4327	14705	7167	4895	6464	7099	135	766
	389	821	**10850**	3614	4518	4179	49636	13270	10023	2936	10842	0
	391	282	16778	291	6440	485	2289	427	1028	1629	233	129
151-200	345	1432	6821	7936	14730	12410	8963	11285	5881	11977	4432	985
	346	865	17634	9023	9567	14120	30253	27058	9073	14517	37387	33292
	368	334	**21257**	2688	6524	12497	3101	5008	1861	11555	27437	30338
	387	718	**12466**	19062	3704	22519	4708	1753	1350	3325	2963	2864
	388	361	**5572**	4817	1341	**3629**	844	1813	5761	1962	1556	579
	392	145	150	1107	339	110	10	289	40	598	259	20
total strata fished <= 200 fathoms			428505	993964	464125	358606	325352	256383	172299	395569	144684	147159
ADJUSTED			495838	993963	464125	362233	325352	256383	172300	395567	144684	147158
upper			531562	1232300	652696	472366	434746	312134	235628	525307	181155	215462
t-value			2.16	2.228	2.131	2.262	2.16	2.069	2.06	2.201	2.08	2.012
1 STD strata fished <= 200 fathor			47712	106973	88489	50292	50645	26946	30742	58945	17534	33948

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

Table 19. Estimates of cod abundance (000's) from surveys of NAFO Division 3L during 1993-2007 in depths <= 200 fathoms. The 1993 and 1994 data are in Campelen equivalent units and 1995 onwards are in actual Campelen units.

Stratum depth (fath)	Stratum number	Area sq. nautical miles	WT 145-146 1993	WT 160-162 1994	WT 176-181 1995	Tel 41 WT 196-198 1996	Tel 55-57 WT 213-217 1997	WT 230-233 1998	WT 245-247 1999	WT 321-323 Tel 342-343 2000	AN 399, WT 373-376, Tel. 357-358, 361 2001	Tel 412 ,413 Tel 415 WT 428-431 2002-03
Mean survey date			23-Nov-93	22-Nov-94	27-Nov-95	2-Nov-96	27-Nov-97	15-Nov-98	29-Nov-99	28-Nov-00	15-Nov-01	
31-50	350	2071	1804	122	1045	285	570	773	1587	936	1420	512
	363	1780	408	367	365	82	1306	481	367	184	245	408
	371	1121	103	0	31	0	0	0	39	0	0	77
	372	2460	299	0	353	414	42	1114	1269	1523	926	550
	384	1120	154	0	0	0	0	0	385	77	0	39
51-100	328	1519	488	139	0	334	376	334	1226	209	5391	775
	341	1574	1516	0	36	289	54	223	1256	476	1261	558
	342	585	0	80	40	121	40	80	724	201	188	40
	343	525	72	96	36	0	68	0	361	397	36	36
	348	2120	**nf**	219	250	393	167	194	767	292	1333	287
	349	2114	1939	208	122	166	344	162	955	614	706	291
	364	2817	1421	323	43	116	525	0	775	1163	388	172
	365	1041	95	95	215	207	191	0	0	**nf**	95	239
	370	1320	666	0	73	0	91	0	0	257	45	40
	385	2356	0	0	0	36	0	41	41	0	162	0
	390	1481	0	0	34	0	0	0	204	0	0	0
101-150	344	1494	2363	771	530	2950	914	715	1548	2023	968	1219
	347	983	439	34	199	391	541	406	316	371	496	225
	366	1394	2972	115	230	236	652	443	345	671	5420	3209
	369	961	227	0	78	0	220	39	1332	0	176	44
	386	983	135	0	0	45	0	0	45	0	45	45
	389	821	0	0	38	0	38	0	151	113	38	0
	391	282	116	0	0	0	19	0	97	19	0	17
151-200	345	1432	1510	542	2780	433	302	653	2863	4436	3467	1055
	346	865	1417	136	754	379	1269	297	881	4557	3570	806
	368	334	15627	88	299	128	459	368	980	9396	694	184
	387	718	2601	779	66	44	1514	132	527	494	329	88
	388	361	414	177	99	0	135	0	5313	472	221	50
	392	145	27	0	19	18	20	0	928	130	104	18
total strata fished <= 200 fath.			36813	4292	7735	7066	9859	6454	25281	29010	27724	10984
ADJUSTED			36813	4291	7735	7067	9859	6454	25281	29010	27724	10984
upper			65605	6233	12328	12052	15027	8524	95232	52913	42861	15550
t-value			2.306	2.042	2.306	2.571	2.776	2.05	12.71	4.3	2.23	2.36
1 STD strata fished <= 200 fath			12486	951	1992	1939	1862	1010	5504	5559	6788	1935

[1] Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.

cont'd.

Table 19. Cont'd.

Stratum depth (fath)	Stratum number	Area sq. nautical miles	Tel 513 WT 487-489 WT 511 2003	WT 558-559 WT 587 Tel 540 2004	Tel 662 WT 628-630, 637 AN 657-658 2005-06	Tel 682-684 Wt 705-707 2006	Wt 772-773, 804, Tel 751 Tel 752, 803 2007
Mean survey date			5-Dec-03	5-Dec-04	14-Nov-05	10-Nov-06	21-Nov-07
31-50	350	2071	692	1750	163	413	2754
	363	1780	245	542	77	740	77
	371	1121	77	77	0	121	154
	372	2460	296	296	254	350	1747
	384	1120	0	77	0	0	0
51-100	328	1519	3636	1319	251	478	4681
	341	1574	693	1291	396	173	2737
	342	585	201	483	0	40	1006
	343	525	144	144	29	217	253
	348	2120	329	1280	208	833	542
	349	2114	706	1015	412	83	831
	364	2817	400	2177	560	301	464
	365	1041	0	**nf**	143	143	180
	370	1320	52	**nf**	0	0	45
	385	2356	0	41	41	0	0
	390	1481	41	41	0	0	0
101-150	344	1494	2089	4091	1169	1878	3863
	347	983	406	406	90	1467	135
	366	1394	920	**nf**	107	2685	17148
	369	961	176	**nf**	32	157	416
	386	983	0	**nf**	0	0	85
	389	821	0	225	38	33	38
	391	282	19	39	39	190	205
151-200	345	1432	1435	2272	630	4982	5117
	346	865	535	801	920	1446	3799
	368	334	436	**nf**	49	296	431
	387	718	99	**nf**	0	88	280
	388	361	0	199	3129	1473	221
	392	145	9	38	44	124	40
total strata fished <= 200 fath.			13638	18605	8780	18711	47249
ADJUSTED			13638		8780	18711	47249
upper			18275	22936	49867	25842	62123
t-value			2.365	2.06	12.71	2.2	2.36
1 STD strata fished <= 200 fatł			1961	2102	3233	3241	6303

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

Table 20. Estimates of cod biomass (t) from surveys of NAFO Division 3L during 1983-1992 in depths < = 200 fathoms. The data are in Campelen equivalent units.

Stratum depth (fath)	Stratum number	Area sq. nautical miles	WT 7-9 1983	WT 16-18 1984	WT 37-39 1985	AN 72 1986	WT 65 1987	WT 78 1988	WT 87 1989	WT 101 1990	WT 114-115 1991	WT 129-130 1992
Mean survey date			27-Oct-83	15-Aug-84	27-Oct-85	21-Nov-86	24-Oct-87	3-Nov-88	20-Oct-89	5-Nov-90	21-Nov-91	16-Nov-92
31-50	350	2071	18204	42081	35227	46248	14242	16885	10769	6602	6434	1877
	363	1780	36935	50726	103274	9116	22124	30177	33959	35121	4266	7504
	371	1121	13316	24055	3285	366	4935	7746	457	9110	481	893
	372	2460	100388	74560	62776	22328	68454	19194	29816	177108	3164	1896
	384	1120	15999	57404	1314	163	27226	1681	223	61815	674	127
51-100	328	1519	2634	832	1378	11971	603	3397	1101	415	185	1748
	341	1574	4517	5043	2694	4218	473	1273	198	1237	920	253
	342	585	752	1733	554	588	451	583	114	1029	383	123
	343	525	1341	6036	518	1930	404	661	90	653	132	459
	348	2120	6763	24084	4851	5686	3229	3906	4158	2995	1666	1504
	349	2114	5245	23149	9512	7711	2203	8207	2690	3630	5454	66
	364	2817	5306	21027	4966	2813	3463	7216	1681	6851	915	526
	365	1041	2101	20303	2383	4292	2116	1961	797	509	2814	347
	370	1320	2403	21444	1579	579	1605	1128	224	1159	189	673
	385	2356	1719	5657	316	2583	1624	303	110	1620	300	735
	390	1481	1366	6250	108	561	1850	516	294	283	0	81
101-150	344	1494	3698	12067	9056	7635	4726	2746	2435	5079	809	3003
	347	983	6183	10733	2265	3960	1906	9386	5239	18473	369	181
	366	1394	15941	18725	54100	70142	28721	76378	18189	8194	15225	40824
	369	961	9321	8962	8086	65455	19792	12361	3266	3223	13072	937
	386	983	8056	5281	6595	23005	5487	6410	7472	10209	124	366
	389	821	5277	4726	5017	3420	9036	2951	5134	3838	3388	0
	391	282	1418	157	1522	711	400	76	158	577	74	18
151-200	345	1432	10540	7499	15729	16629	9962	14557	7883	7575	1775	736
	346	865	14781	6034	10546	15984	36414	33516	14619	13512	27945	29383
	368	334	23841	2557	10438	21732	7227	7539	4904	13883	26629	29646
	387	718	13000	14254	7063	37565	5152	2623	1146	9129	3515	2018
	388	361	5572	1730	3116	3629	389	1067	3506	1564	740	390
	392	145	172	245	251	43	15	110	55	276	117	9
total strata fished <= 200 fathoms			278412	477355	368514	387438	284230	274553	160688	405668	121761	126323
ADJUSTED			336789	477354	368519	391063	284229	274554	160687	405669	121759	126323
upper			361946	559984	491927	534112	349929	337286	205564	592708	154941	193308
t-value			2.365	2.04	2.12	2.365	2.056	2.086	2.069	2.306	2.131	2.014
1 STD strata fished <= 200 fathoms			35321	40504	58214	62019	31955	30073	21690	81110	15570	33260

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

Table 21. Estimates of cod biomass (t) from surveys of NAFO Division 3L during 1993-2007 in depths < = 200 fathoms. The data are in Campelen equivalent units for 1993 and 1994 and Campelen units for 1995 onwards.

Stratum	Stratum	Area sq.				Teleost 41	Tel 55-57				AN 399	Tel 412 ,413
depth	number	nautical	WT	WT	WT	WT	WT	WT	WT	WT 321-323	WT 373-376	Tel 415
(fath)		miles	145-146	160-162	176-181	196-199	213-217	230-233	246-248	Tel 342-343	TEL 357-358 361	WT 428-431
			1993	1994	1995	1996	1997	1998	1999	2000	2001	2002-3
Mean survey date			23-Nov-93	22-Nov-94	27-Nov-95	2-Nov-96	27-Nov-97	15-Nov-98	29-Nov-99	28-Nov-00	15-Nov-01	12-Nov-02
31-50	350	2071	1522	179	1276	362	1355	997	1342	842	2442	367
	363	1780	344	211	506	224	2895	152	80	28	588	1230
	371	1121	91	0	10	0	0	0	26	0	0	73
	372	2460	287	0	54	557	29	431	608	66	1303	1074
	384	1120	67	0	0	0	0	0	212	4	0	0
51-100	328	1519	166	248	0	537	1014	144	195	41	3995	145
	341	1574	289	0	2	248	16	290	1043	120	475	272
	342	585	0	36	22	184	66	5	164	135	79	13
	343	525	79	34	18	0	45	0	69	130	5	6
	348	2120	**nf**	322	181	326	144	191	144	55	583	174
	349	2114	1755	54	88	117	327	357	531	228	658	114
	364	2817	873	302	1	95	353	0	331	403	59	82
	365	1041	54	114	129	147	72	0	0	**nf**	72	72
	370	1320	171	0	72	0	41	0	0	107	17	22
	385	2356	0	0	0	11	0	57	13	0	77	0
	390	1481	0	0	13	0	0	0	81	0	0	0
101-150	344	1494	988	382	233	2214	221	409	802	908	274	601
	347	983	351	20	99	324	259	407	81	87	224	175
	366	1394	2426	116	121	87	264	223	58	321	2527	1572
	369	961	180	0	174	0	170	4	1048	0	64	15
	386	983	194	0	0	20	0	0	26	0	18	10
	389	821	0	0	12	0	35	0	58	54	9	0
	391	282	53	0	0	0	21	0	178	1	0	31
151-200	345	1432	957	245	1441	370	76	512	1301	1299	2178	709
	346	865	702	91	459	243	466	287	414	1359	2350	394
	368	334	10776	80	129	48	181	240	954	8268	290	169
	387	718	1984	321	25	19	851	99	284	227	180	30
	388	361	268	119	35	0	78	0	3080	335	140	97
	392	145	19	0	15	7	10	0	489	51	97	10
total strata fished <= 200 fathoms			24594	2873	5114	6140	8991	4804	13611	15070	18706	7460
ADJUSTED			24596	2874	5115	6140	8991	4804	13611	15070	18706	7460
upper			44710	3895	7661	9799	13920	6901	56006	83892	27204	10528
t-value			2.306	2.035	2.145	2.306	2.228	2.04	12.71	12.71	2.12	2.13
1 STD strata fished <= 200 fathoms			8723	502	1187	1587	2212	1028	3336	5415	4008	1440

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

cont'd.

Table 21. Cont'd.

Stratum depth (fath)	Stratum number	Area sq. nautical miles	Tel 513 WT 487-489 WT 511 2003	WT 558,559 WT 587 Tel 540 2004	Tel 662 WT 628-630, 637 AN 657-658 2005/6	Tel 682-684 Wt 705-707 2006	Wt 772-773, 804 , Tel 751 Tel 752 , 803 2007
Mean survey date			5-Dec-03	5-Dec-04	14-Nov-05	10-Nov-06	21-Nov-07
31-50	350	2071	1181	179	39	299	1595
	363	1780	232	42	36	301	62
	371	1121	51	11	0	42	70
	372	2460	49	127	165	201	208
	384	1120	0	33	0	0	0
51-100	328	1519	407	394	190	609	370
	341	1574	304	181	101	160	136
	342	585	74	54	0	40	73
	343	525	44	31	10	51	11
	348	2120	122	300	123	1207	315
	349	2114	88	313	254	61	892
	364	2817	97	712	325	276	102
	365	1041	0		35	11	155
	370	1320	2		0	0	10
	385	2356	0	2	13	0	0
	390	1481	8	16	0	0	0
101-150	344	1494	765	1343	741	1987	3425
	347	983	109	144	22	1483	32
	366	1394	292		57	2242	17434
	369	961	71		17	29	864
	386	983	0		0	0	112
	389	821	0	102	37	3	2
	391	282	6	4	16	45	51
151-200	345	1432	658	627	449	5312	3559
	346	865	77	618	487	1701	5328
	368	334	201		97	158	268
	387	718	2		0	99	430
	388	361	0	23	1887	571	221
	392	145	7	11	16	97	47
total strata fished <= 200 fathoms			4849	5266	5118	16985	35772
ADJUSTED			4849		5118	16985	35772
upper			7539	6640	29932	23443	54137
t-value			2.228	2.09	12.71	2.2	2.57
1 STD strata fished <= 200 fathoms			1207	657	1952	2935	7146

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

Table 22. Estimates of cod abundance (000's) and biomass (t) from surveys of NAFO Division 3L in 1983-1993 in depths > 200 fathoms. The data are in Campelen equivalent units.

Stratum depth (fathoms)	Stratum number	Area sq. nautical miles	WT 7-9 1983	WT 16-18 1984	WT 37-39 1985	AN 72 1986	WT 65 1987	WT 78 1988	WT 87 1989	WT 101 1990	WT 114-115 1991	WT 129-130 1992	WT 145-146 1993
Mean survey date			27-Oct-83	15-Aug-84	27-Oct-85	21-Nov-86	24-Oct-87	3-Nov-88	20-Oct-89	5-Nov-90	21-Nov-91	16-Nov-92	23-Nov-93
							ABUNDANCE						
201-300	729	186	nf	320	0	0	nf	nf	nf	38	0	13	213
	731	216	nf	15	30	nf	nf	nf	nf	15	30	168	277
	733	468	nf	1481	43	nf	nf	nf	nf	386	21	494	1223
	735	272	nf	25	94	0	nf	nf	nf	nf	923	886	9155
301-400	730	170	nf	0	0	nf	nf	nf	nf	nf	0	0	0
	732	231	nf	0	0	nf	nf	nf	nf	0	0	0	0
	734	228	nf	0	0	nf	nf	nf	nf	0	0	0	31
	736	175	0	nf	0	0	nf	nf	nf	0	24	0	96
401-500	737	227	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	741	223	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	745	348	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	748	159	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
401-500		957	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
501-600	738	221	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	742	206	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	746	392	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	749	126	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
501-600		945	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
601-700	739	254	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	743	211	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	747	724	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	750	556	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
601-700		1745	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
701-800	740	264	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	744	280	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	751	229	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
701-800		773	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
total strata fished > 200 fathoms			0	1841	167	0	0	0	0	439	998	1561	10995
total all strata fished offshore			428505	995804	464291	358606	325352	256383	172299	396008	145682	148719	47809
upper			531562	1234157	652863	472366	434746	312134	235628	525748	182099	217045	77554
t-value			2.16	2.228	2.131	2.262	2.16	2.069	2.06	2.201	2.074	2.012	2.228
1 STD all strata fished offshore			47712	106981	88490	50292	50645	26946	30742	58946	17559	33959	13351
							BIOMASS						
201-300	729	186	nf	206	0	0	nf	nf	nf	107	0	45	208
	731	216	nf	92	248	nf	nf	nf	nf	19	49	131	177
	733	468	nf	1678	461	nf	nf	nf	nf	937	28	316	837
	735	272	nf	276	466	0	nf	nf	nf	nf	1214	1233	4809
301-400	730	170	nf	0	0	nf	nf	nf	nf	nf	0	0	0
	732	231	nf	0	0	nf	nf	nf	nf	0	0	0	0
	734	228	nf	0	0	nf	nf	nf	nf	0	0	0	18
	736	175	0	nf	0	0	nf	nf	nf	0	56	0	51
401-500	737	227	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	741	223	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	745	348	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	748	159	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
401-500		957	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
501-600	738	221	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	742	206	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	746	392	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	749	126	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
501-600		945	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
601-700	739	254	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	743	211	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	747	724	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	750	556	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
601-700		1745	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
701-800	740	264	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	744	280	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
	751	229	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
701-800		773	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf	nf
total strata fished > 200 fathoms			0	2252	1175	0	0	0	0	1063	1347	1725	6100
total all strata fished offshore			278412	479606	369689	387438	284230	274553	160688	406730	123108	128048	30694
upper			361946	562277	493108	534112	349929	337286	205564	593770	156389	195072	51127
t-value			2.365	2.04	2.12	2.365	2.056	2.086	2.069	2.306	2.131	2.014	2.262
1 STD all strata fished offshore			35321	40525	58217	62019	31955	30073	21690	81110	15618	33279	9033

Note: Not all strata in the depth range have been fished. Strata not fished in the greater than 200 fathom depth range have not been filled using a multiplicative model.

Table 23. Estimates of cod abundance (000's) and biomass (t) from surveys of NAFO Division 3L in 1994-2007 in depths > 200 fathoms. The 1994 data are in Campelen equivalent units and the data for 1995 onwards are in actual Campelen Units.

Stratum depth (fathoms)	Stratum number	Area sq. nautical miles	WT 160-162 1994	WT 176-181 1995	Teleost 41 WT 196-198 1996	Tel 55-57 WT 213-217 1997	WT 230-233 1998	WT 246-249 1999	WT 321-323 Tel 342-343 2000	AN 399 WT 373-376 TEL 357-358 361 2001	Tel 412 ,413 Tel 415 WT 428-431 2002-3
Mean survey date			22-Nov-94	27-Nov-95	2-Nov-96	27-Nov-97	18-Nov-98	29-Nov-99	28-Nov-00	15-Nov-01	12-Nov-02
						ABUNDANCE					
201-300	729	186	0	0	0	13	0	38	0	38	0
	731	216	21	13	**nf**	178	0	40	208	106	0
	733	468	107	32	0	193	61	64	101	444	29
	735	272	180	187	0	449	112	67	3528	692	83
301-400	730	170	8	0	0	0	0	0	0	0	0
	732	231	0	0	0	0	0	0	0	0	0
	734	228	42	0	0	167	0	0	0	0	0
	736	175	28	32	0	144	0	24	0	12	0
401-500	737	227	**nf**	16	0	0	0	0	0	0	0
	741	223	**nf**	**nf**	0	0	0	0	0	0	0
	745	348	**nf**	**nf**	0	0	0	0	0	0	0
	748	159	**nf**	**nf**	0	0	0	0	0	0	0
401-500		957	**nf**	16	0	0	0	0	0	0	0
501-600	738	221	**nf**	0	0	0	0	0	0	0	0
	742	206	**nf**	**nf**	0	0	0	0	0	0	0
	746	392	**nf**	**nf**	0	0	0	0	0	0	0
	749	126	**nf**	**nf**	0	0	0	**nf**	0	0	0
501-600		945	**nf**	0	0	0	0	0	0	0	0
601-700	739	254	**nf**	**nf**	0	0	0	0	0	0	0
	743	211	**nf**	**nf**	0	0	0	0	0	0	0
	747	724	**nf**	**nf**	0	0	0	0	0	0	0
	750	556	**nf**	**nf**	0	0	0	0	0	0	0
601-700		1745	**nf**	**nf**	0	0	0	0	0	0	
701-800	740	264	**nf**	**nf**	0	0	0	0	0	0	0
	744	280	**nf**	**nf**	0	0	0	**nf**	0	0	0
	751	229	**nf**	**nf**	0	0	0	**nf**	0	0	0
701-800		773	**nf**	**nf**	0	0	0	0	0	0	0
total strata fished > 200 fathoms			386	280	0	1144	173	233	3837	1292	112
total all strata fished offshore			4678	8013	7066	11003	6628	25514	32846	29017	11096
upper			6627	12630	12052	19944	8699	95474	58560	44211	15667
t-value			2.042	2.306	2.571	2.447	2.05	12.71	4.3	2.23	2.36
1 STD all strata fished offshore			954	2002	1939	3654	1010	5504	5980	6813	1937
						BIOMASS					
201-300	729	186	0	0	0	19	0	67	0	45	0
	731	216	23	5	**nf**	178	0	20	165	108	0
	733	468	85	14	0	161	68	66	110	261	36
	735	272	91	109	0	369	167	104	3973	697	155
301-400	730	170	8	0	0	0	0	0	0	0	0
	732	231	0	0	0	0	0	0	0	0	0
	734	228	42	0	0	313	0	0	0	0	0
	736	175	28	15	0	169	0	37	0	7	0
401-500	737	227	**nf**	17	0	0	0	0	0	0	0
	741	223	**nf**	**nf**	0	0	0	0	0	0	0
	745	348	**nf**	**nf**	0	0	0	0	0	0	0
	748	159	**nf**	**nf**	0	0	0	0	0	0	0
401-500		957	**nf**	17	0	0	0	0	0	0	0
501-600	738	221	**nf**	0	0	0	0	0		0	0
	742	206	**nf**	**nf**	0	0	0	0		0	0
	746	392	**nf**	**nf**	0	0	0	0		0	0
	749	126	**nf**	**nf**	0	0	0	**nf**		0	0
501-600		945	**nf**	0	0	0	0	0	0	0	0
601-700	739	254	**nf**	**nf**	0	0	0	0		0	0
	743	211	**nf**	**nf**	0	0	0	0		0	0
	747	724	**nf**	**nf**	0	0	0	0		0	0
	750	556	**nf**	**nf**	0	0	0	0		0	0
601-700		1745	**nf**	**nf**	0	0	0	0	0	0	0
701-800	740	264	**nf**	**nf**	0	0	0	0		0	0
	744	280	**nf**	**nf**	0	0	0	**nf**		0	0
	751	229	**nf**	**nf**	0	0	0	**nf**		0	0
701-800		773	**nf**	**nf**	0	0	0	0	0	0	0
total strata fished > 200 fathoms			277	160	0	1209	235	294	4248	1118	191
total all strata fished offshore			3149	5275	6140	10200	5039	13904	19318	19824	7652
upper			4178	7834	9799	19797	7148	56316	91155	28382	10721
t-value			2.032	2.145	2.306	2.447	2.07	12.71	12.71	2.12	2.12
1 STD all strata fished offshore			506	1193	1587	3922	1019	3337	5652	4037	1448

Note: Not all strata in the depth range have been fished. Strata not fished in the greater than 200 fathom depth range have not been filled using a multiplicative model.

Table 23. Cont'd.

Stratum depth (fathoms)	Stratum number	Area sq. nautical miles	Tel 513 WT 487-489 WT 511 2003	WT 558-559 WT 587 Tel 540 2004	Tel 662, WT 628-630, 637 AN 657-658 2005/6	Tel 682-684 Wt 705-707 2006	Wt 772-773, 804, Tel 751 Tel 752 , 803 2007
Mean survey date			5-Dec-03	5-Dec-04	14-Nov-05	10-Nov-06	21-Nov-07
					ABUNDANCE		
201-300	729	186	13	36	0	0	23
	731	216	0	17	0	0	0
	733	468	322	0	0	0	0
	735	272	337	**nf**	33	50	0
301-400	730	170	0	0	0	0	0
	732	231	0	0	0	0	0
	734	228	0	**nf**	0	0	0
	736	175	139	**nf**	0	0	0
401-500	737	227	0	**nf**	0	0	0
	741	223	0	**nf**	**nf**	0	0
	745	348	0	**nf**	**nf**	0	0
	748	159	0	**nf**	**nf**	0	0
401-500		957	0	**nf**	0	0	0
501-600	738	221	0	**nf**	**nf**	0	0
	742	206	0	**nf**	**nf**	0	0
	746	392	0	**nf**	**nf**	0	0
	749	126	0	**nf**	**nf**	**nf**	0
501-600		945	0	**nf**	**nf**		0
601-700	739	254	0	**nf**	0	0	0
	743	211	0	**nf**	**nf**	0	0
	747	724	0	**nf**	**nf**	0	0
	750	556	0	**nf**	**nf**	**nf**	0
601-700		1745		**nf**	0	0	0
701-800	740	264	0	**nf**	0	0	0
	744	280	0	**nf**	**nf**	0	0
	751	229	0	**nf**	**nf**	**nf**	0
701-800		773	0	**nf**	0	0	0
total strata fished > 200 fathoms			811	53	33	50	23
total all strata fished offshore			14448	18657	8813	18761	47271
upper			19068	22989	49903	25892	62145
t-value			2.306	2.06	12.71	2.2	2.36
1 STD all strata fished offshore			2003	2103	3233	3241	6303
					BIOMASS		
201-300	729	186	42	30	0	0	23
	731	216	0	4	0	0	0
	733	468	156	0	0	0	0
	735	272	226	**nf**	43	87	0
301-400	730	170	0	0	0	0	0
	732	231	0	0	0	0	0
	734	228	0	**nf**	0	0	0
	736	175	164	**nf**	0	0	0
401-500	737	227	0	**nf**	0	0	0
	741	223	0	**nf**	**nf**	0	0
	745	348	0	**nf**	**nf**	0	0
	748	159	0	**nf**	**nf**	0	0
401-500		957	0	**nf**		0	0
501-600	738	221	0	**nf**	**nf**	0	0
	742	206	0	**nf**	**nf**	0	0
	746	392	0	**nf**	**nf**	0	0
	749	126	0	**nf**	**nf**	**nf**	0
501-600		945	0	**nf**			0
601-700	739	254	0	**nf**	0	0	0
	743	211	0	**nf**	**nf**	0	0
	747	724	0	**nf**	**nf**	0	0
	750	556	0	**nf**	**nf**	**nf**	0
601-700		1745	0	**nf**		0	0
701-800	740	264	0	**nf**	0	0	0
	744	280	0	**nf**	**nf**	0	0
	751	229	0	**nf**	**nf**	**nf**	0
701-800		773	0	**nf**		0	0
total strata fished > 200 fathoms			588	34	43	87	23
total all strata fished offshore			5438	5300	5161	17072	35794
upper			8157	6675	29981	23533	54160
t-value			2.201	2.09	12.71	2.2	2.57
1 STD all strata fished offshore			1235	658	1953	2937	7146

Note: Not all strata in the depth range have been fished. Strata not fished in the greater than 200 fathom depth range have not been filled using a multiplicative model.

Table 24. Estimates of cod abundance (000's) from surveys of inshore strata in Div. 3K and 3L during 1996-1998 and 2000-2006 (inshore strata were not fished in 2007).

Division 3K

Stratum depth (meters)	Stratum number	Area sq. nautical miles	WT 196-199 TELEOST 40-42	WT 217 TELEOST 55-57	WT 233	WT 321-323 Tel 342-343	WT 372-376 WT 398	WT 428-431	WT 515 TEL 514	Tel 539-542 WT 588	Tel 611+ 662 Wt 631-632 WT 660	Tel 681-684 733 Wt 705-708	el. 755,802 WT 774
			1996	1997	1998	2000	2001	2002	2003	2004-5	2005-6		2007
Mean survey date			14-Nov-96	18-Nov-97	2-Dec-98	28-Nov-00	15-Nov-01	6-Dec-02	13-Jan-04	14-Dec-04	24-Dec-05	30-Nov-06	6-Dec-07
							abundance						
101-200	608	798	915	1061	1647	2023	3732	951	7191	1536	3638	695	**nf**
	612	445	510	92	367	184	284	153	1377	551	909	207	**nf**
	616	250	103	52	206	103	209	52	79	59	**nf**	774	**nf**
201-300	609	342	436	329	155	188	588	518	2315	338	608	235	**nf**
	611 [3]	600	122	578	169	428	254	631	1826	275	1813	140	**nf**
	615	251	0	17	104	86	86	17	92	35	17	69	**nf**
301-400	610	256	31	405	493	317	345	247	149	194	194	51	**nf**
	614	263	16	0	18	0	0	0	0	36	18	0	**nf**
401-500	613	30	0	0	12	7	0	0	2	4	4	0	**nf**
total inshore strata			2134	2534	3171	3336	5498	2568	13032	3030	7201	2171	**nf**
total offshore			18622	8450	15896	35774	28595	42934	21868	36049	34112	52285	54122
total all strata fished			20756	10984	19067	39110	34093	45502	34899	39079	41314	54457	**.**
upper			25281	13883	23352	61173	41607	68034	41513	47477	49789	99914	**.**
t-value			2.048	2.101	2.1	2.57	2.12	2.2	2.306	2.13	2.05	3.18	**.**
STD all strata fished			2209	1380	2040	8585	3544	10242	2868	3943	4134	14295	**.**

Division 3L

Stratum depth (fathoms)	Stratum number	Area sq. nautical miles	Teleost 41 WT 196-198	WT 213-217 TELEOST 57-58	WT 233	WT 321-323 Tel 342-343	WT 372-376 WT 398	WT 428-431	WT488-489 WT 511	WT 558-559 WT 587 Tel 540	Tel 611+ 662 Wt 631-632 WT 660	Tel 681-684 733 Wt 705-708	el. 755,802 WT 774
			1996	1997	1998	2000	2001	2002	2003	2004	2005-6		2007
Mean survey date			2-Nov-96	27-Nov-97	28-Nov-98	28-Nov-00	15-Nov-01	12-Nov-02	18-Nov-04	5-Dec-04	14-Nov-05	10-Nov-06	6-Dec-07
							abundance						
16-30	784	268	1161	995	203	1419	4737	250	276	977	442	**nf**	**nf**
31-50	785	465	3998	1279	352	1567	2910	959	192	1983	1060	**nf**	**nf**
51-100	786	84	12	97	532	58	56	116	1375	20	249	**nf**	**nf**
	787	613	42	84	4005	1288	201	422	12522	421	84	0	**nf**
	788 [1]	252	2409	323	144	1849	1387	156	2549	1562	664	197	**nf**
	790	89	55	444	61	208	318	402	4440	631	294	**nf**	**nf**
	793	72	599	119	64	337	1362	594	1766	203	136	**nf**	**nf**
	794	216	609	97	104	**nf**	1997	1119	396	893	1025	1844	**nf**
	797	98	20	27	101	440	162	150	620	329	81	798	**nf**
	799	72	857	30	39	89	312	11	299	114	37	337	**nf**
101-150	795	164	11	64	163	1277	429	654	14900	256	114	589	**nf**
	791 [2]	227	X	200	94	710	1102	281	687	734	85	**nf**	**nf**
101-200	789 [1]	81	0	0	0	4	10	0	20	10	5	0	**nf**
	791 [2]	308	191	X	X	X	X	X	X	X	X	X	**nf**
	798	100	14	0	34	107	227	360	104	110	61	**nf**	**nf**
151-200	796	175	0	23	12	138	686	300	226	144	84	72	**nf**
	800 [2]	81	X	6	49	94	95	40	61	67	0	**nf**	**nf**
201-300	792	50	0	0	3	3	10	3	7	14	0	**nf**	**nf**
total inshore strata			9978	3788	5960	9588	16002	5817	40442	8467	4422	3837	**nf**
total offshore			7066	11004	6628	32846	29017	11096	14448	18657	8780	18711	47249
total all strata fished			17044	14792	12588	42435	45019	17024	54890	27124	13235	22599	**.**
upper			27958	19944	61095	62955	61291	22146	120325	35275	55601	29815	**.**
t-value			2.776	2.447	12.71	3.18	2.14	2.2	4.303	2.45	12.71	2.18	**.**
STD all strata fished			3932	2105	3816	6453	7604	2328	15207	3327	3333	3310	**.**

Table 25. Estimates of cod biomass (t) from surveys of inshore strata in Div. 3K and 3L during 1996-1998 and 2000-2006 (inshore strata were not fished in 2007).

Stratum depth (meters)	Stratum number	Area sq. nautical miles	WT 196-199 TELEOST 40-42 1996	WT 217 TELEOST 55-57 1997	WT 233 1998	WT 321-323 2000	WT 372-376 WT 398 2001	WT 428-431 2002	WT 515 TEL 514 2003	Tel 539-542 WT 588 2004-5	Tel 611+ 662 Wt 631-632 WT 660 2005-6	Tel 681-684 733 Wt 705-708	el. 755,802 WT 774 2007
Mean survey date			14-Nov-96	18-Nov-97	2-Dec-98	28-Nov-00	15-Nov-01	6-Dec-02	13-Jan-04	14-Dec-04	24-Dec-05	30-Nov-06	6-Dec-07
							biomass						
101-200	608	798	201	142	113	288	431	86	401	135	216	262	**nf**
	612	445	111	3	18	7	20	8	36	71	47	28	**nf**
	616	250	4	0	5	9	6	11	2	30	**nf**	20	**nf**
201-300	609	342	108	64	30	79	188	128	162	60	102	130	**nf**
	611 [3]	600	25	129	9	136	83	118	82	20	256	93	**nf**
	615	251	0	0	61	8	14	1	4	2	1	3	**nf**
301-400	610	256	3	117	50	63	58	55	14	29	28	41	**nf**
	614	263	2	0	33	0	0	0	0	3	0	0	**nf**
401-500	613	30	0	0	1	1	0	0	0	1	0	0	**nf**
total inshore strata			454	455	320	592	800	408	701	351	650	577	**nf**
total offshore			5588	4020	7521	11994	9946	12523	6569	10375	17038	38709	58427
total all strata fished			6039	4475	7843	12585	10746	12931	7270	10726	17688	39286	**.**
upper			7036	5583	10141	19889	13694	19174	9115	13740	22558	105561	**.**
t-value			2.032	2.11	2.23	2.45	2.14	2.18	2.306	2.36	2.07	4.3	**.**
STD all strata fished			491	525	1030	2981	1378	2864	800	1277	2353	15413 .	

Division 3L

Stratum depth (fathoms)	Stratum number	Area sq. nautical miles	Teleost 41 WT 196-198 1996	WT 213-217 TELEOST 57-58 1997	WT 233 1998	WT 321-323 2000	WT 372-376 WT 398 2001	WT 428-431 2002	WT 488-489 WT 522 2003	WT 558-559 WT 587 Tel 540 2004	Tel 611+ 662 Wt 631-632 WT 660 2005-6	Tel 681-684 733 Wt 705-708	el. 755,802 WT 774 2007
Mean survey date			2-Nov-96	27-Nov-97	28-Nov-98	28-Nov-00	15-Nov-01	20-Dec-02	18-Nov-04	5-Dec-04	14-Nov-05	10-Nov-06	6-Dec-07
							biomass						
16-30	784	268	80	40	3	597	378	6	54	38	27	**nf**	**nf**
31-50	785	465	6627	1786	109	564	181	150	53	75	149	**nf**	**nf**
51-100	786	84	2	36	54	43	17	39	56	24	49	**nf**	**nf**
	787	613	135	61	105	214	28	264	794	117	158	0	**nf**
	788 [1]	252	177	232	92	79	208	85	79	162	158	147	**nf**
	790	89	56	222	24	67	53	181	161	156	136	**nf**	**nf**
	793	72	155	56	24	35	84	171	209	30	51	**nf**	**nf**
	794	216	84	122	31	**nf**	474	229	138	123	490	463	**nf**
	797	98	11	13	24	25	8	25	19	28	8	49	**nf**
	799	72	410	19	9	9	43	7	17	7	11	141	**nf**
101-150	795	164	5	50	58	69	80	145	385	41	46	252	**nf**
	791 [2]	227	X	154	53	274	626	148	224	252	36	**nf**	**nf**
101-200	789 [1]	81	0	0	0	1	2	0	5	1	9	0	**nf**
	791 [2]	308	114	X	X	X	X	X	X	X	X	X	**nf**
	798	100	47	0	11	33	53	173	26	16	49	**nf**	**nf**
151-200	796	175	0	8	2	34	136	85	11	53	45	30	**nf**
	800 [2]	81	X	2	60	21	34	14	35	30	0	**nf**	**nf**
201-300	792	50	0	0	3	1	7	1	1	1	0	**nf**	**nf**
total inshore strata			7903	2801	662	2066	2412	1719	2266	1154	1422	1082	**nf**
total offshore			6140	10200	5039	19318	19824	7652	5438	5300	5161	17072	35772
total all strata fished			14044	13000	5702	21386	22236	9099	7705	6454	6583	18154	**.**
upper			92802	19797	7837	93444	30832	12376	10466	7923	31713	24612	**.**
t-value			12.706	2.447	2.06	12.71	2.11	2.11	2.179	2.07	12.71	2.18	**.**
STD all strata fished			6198	2778	1036	5669	4074	1553	1267	710	1977	2962	**.**

changes below were made before 1997 fall survey

[1] Area of stratum 788 was increased by 9 sq. n. mi and the area of stratum 789 was decreased by 9 sq.n. mi.

[2] Stratum 791 in the 100-200 depth range was divided into two separate strata; 791 101-150 with area =227 sq. n. mi.and stratum 800 151-200 area = 81 sq. n.mi.

[3] Stratum 611 area was decreased by 27 sq. n. mi.

Table 26. Cod abundance and biomass for Divisions 2J, 3K and 3L during 1995-2007. Strata are aggregated into three groups: index, offshore deep, and inshore, as defined in the text. There are no inshore strata in Division 2J.

Division	Grouping	Abundance (thousands)												
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2J	index	12,346	13,625	6,936	6,669	6,074	7,516	7,033	9,534	9,315	9,503	18,519	11,739	26,656
	offshore deep	2,350	219	84	0	55	51	7	893	129	33	46	25	105
	total	14,696	13,844	7,020	6,669	6,129	7,567	7,040	10,427	9,444	9,536	18,565	11,764	26,761
3K	index	23,387	18,518	8,828	15,610	29,304	35,776	28,534	41,854	19,908	34,468	33,834	52,285	54122
	offshore deep	754	72	22	285	124	0	60	792	1,962	1,581	278	0	0
	inshore	**nf**	2,134	2,534	3,171	**nf**	3,336	5,498	2,568	13,032	3,030	7,201	2,171	**nf**
	total	24,141	20,724	11,384	19,066	29,428	39,112	34,092	45,214	34,902	39,079	41,313	54,456	54,122
3L	index	7,735	7,066	9,859	6,454	25,281	29,010	27,724	10,984	13,638	18,605	8,780	18,711	47,249
	offshore deep	280	0	1,144	173	233	3,837	1,292	112	811	53	33	50	22
	inshore	**nf**	9,978	3,788	5,960	**nf**	9,588	16,002	5,817	40,442	8,467	4,422	3,837	**nf**
	total	8,015	17,044	14,791	12,587	25,514	42,435	45,018	16,913	54,891	27,125	13,235	22,598	47,271
2J3KL	index	43,468	39,209	25,623	28,733	60,659	72,302	63,291	62,372	42,861	62,576	61,133	82,735	128,027
	offshore deep	3,384	291	1,250	458	412	3,888	1,359	1,797	2,902	1,667	357	75	127
	inshore	**nf**	12,112	6,322	9,131	**nf**	12,924	21,500	8,385	53,474	11,497	11,623	6,008	**nf**
	total	46,852	51,612	33,195	38,322	61,071	89,114	86,150	72,554	99,237	75,740	73,113	88,818	128,154

Division	Grouping	Biomass (t)												
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2J	index	2,312	4,261	3,609	4,483	2,527	3,082	2,646	3,680	3,065	4,921	5,719	6,818	8755
	offshore deep	755	36	52	0	63	16	1	588	183	32	74	15	13
	total	3,067	4,297	3,661	4,483	2,590	3,098	2,647	4,268	3,248	4,953	5,793	6,833	8,768
3K	index	4,600	5,455	3,998	7,280	12,230	11,994	9,890	11,889	4,912	9,609	16,696	38,709	58427
	offshore deep	400	131	42	242	289	0	56	557	1,657	766	341	0	0
	inshore	**nf**	454	455	320	**nf**	592	800	408	701	351	650	577	**nf**
	total	5,000	6,040	4,495	7,842	12,519	12,586	10,746	12,854	7,270	10,726	17,687	39,286	58,427
3L	index	5,114	6,140	8,991	4,804	13,611	15,070	18,706	7,460	4,849	5,266	5,118	16,985	35,772
	offshore deep	160	0	1,209	235	294	4,248	1,118	191	588	34	43	87	22
	inshore	**nf**	7,903	2,801	662	**nf**	2,066	2,412	1,719	2,266	1,154	1,422	1,082	**nf**
	total	5,274	14,043	13,001	5,701	13,905	21,384	22,236	9,370	7,703	6,454	6,583	18,154	35,794
2J3KL	index	12,026	15,856	16,598	16,567	28,368	30,146	31,242	23,029	12,826	19,796	27,533	62,512	102,954
	offshore deep	1,315	167	1,303	477	646	4,264	1,175	1,336	2,428	832	458	102	35
	inshore	**nf**	8,357	3,256	982	**nf**	2,658	3,212	2,127	2,967	1,505	2,072	1,659	**nf**
	total	13,341	24,380	21,157	18,026	29,014	37,068	35,629	26,492	18,221	22,133	30,063	64,273	102,989

Table 27. Autumn bottom-trawl mean number of cod per tow at age in the index strata (adjusted for missing strata) from 1983 onwards. The 2J3KL total is the mean of the Divisional means, weighted by the Divisional survey areas.

2J

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.01	0.02	0.00	0.33	0.74	0.00	2.43	0.00	1.66
1	46.58	7.57	1.71	0.65	1.46	20.52	4.86	2.75	0.37	0.00	0.00	0.18	2.46	0.52	0.00	0.10	0.21	0.57	0.16	0.43	0.66	0.38	0.27	0.06	1.56
2	147.86	41.01	14.01	18.71	3.03	17.69	108.44	13.80	11.17	0.68	3.22	1.21	1.24	2.15	0.41	0.19	0.79	0.66	0.69	0.76	0.47	1.22	0.80	0.90	2.65
3	61.64	86.28	48.03	39.16	8.12	10.83	33.77	46.34	19.04	4.45	1.03	0.83	0.80	1.24	1.42	0.72	0.56	0.77	1.25	0.8	0.79	0.70	1.69	1.27	1.73
4	61.08	38.75	74.50	97.79	12.11	12.14	16.27	12.48	60.31	1.70	1.05	0.34	0.31	0.49	0.39	0.89	0.30	0.45	0.19	0.78	0.31	0.58	0.80	1.17	0.63
5	25.59	53.27	28.44	153.27	50.67	16.35	10.85	4.79	14.89	3.29	0.32	0.15	0.08	0.13	0.11	0.29	0.17	0.04	0.06	0.10	0.13	0.24	0.17	0.45	0.55
6	10.44	14.98	27.11	68.45	43.15	41.46	12.35	2.39	1.73	0.31	0.27	0.01	0.02	0.02	0.00	0.04	0.00	0.04	0.01	0.01	0.02	0.06	0.04	0.07	0.16
7	4.87	2.87	9.75	29.99	9.98	42.71	17.99	1.44	0.70	0.01	0.02	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
8	12.46	1.83	1.35	10.84	6.58	6.93	11.13	2.35	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9	5.05	3.46	0.83	0.70	2.64	4.27	1.45	1.08	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	2.87	1.49	1.14	0.64	0.41	2.06	0.77	0.23	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.58	0.54	0.39	0.55	0.04	0.28	0.35	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.04	0.12	0.17	0.29	0.16	0.11	0.12	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.03	0.02	0.03	0.07	0.06	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.02	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	379.11	252.19	207.46	421.13	138.45	175.48	218.36	87.76	109.11	10.44	5.91	2.74	4.96	4.57	2.33	2.24	2.04	2.55	2.37	3.21	3.12	3.18	6.20	3.94	8.95

3K

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.08	0.15	0.28	0.71	0.05	0.04	0.54	0.03	0.28	1.47	0.17
1	22.84	8.27	0.28	7.91	7.35	37.54	36.91	22.21	0.59	0.65	0.28	0.20	2.77	0.70	0.07	1.13	1.07	2.61	1.46	2.09	2.35	2.58	0.73	1.06	1.67
2	32.49	32.45	5.07	18.35	6.63	29.28	111.95	32.45	15.74	2.85	4.67	0.39	1.56	2.28	0.92	0.80	2.71	2.33	2.22	5.19	0.88	4.04	1.97	1.94	2.58
3	27.87	24.34	13.32	21.13	8.34	18.49	58.16	83.98	23.97	4.12	2.24	1.16	0.98	1.20	0.85	0.92	2.01	2.24	2.37	2.03	0.85	1.10	3.68	2.49	2.40
4	15.09	22.21	12.39	65.26	10.01	8.40	44.92	48.74	70.05	2.33	1.27	0.38	0.34	0.34	0.20	0.59	0.87	1.17	0.71	0.92	0.27	0.66	1.35	3.61	1.92
5	17.24	11.98	10.93	56.87	17.27	6.92	25.69	23.11	37.29	4.01	0.30	0.14	0.10	0.10	0.09	0.20	0.36	0.27	0.30	0.21	0.10	0.17	0.44	2.28	3.13
6	4.39	8.97	4.13	29.01	11.21	7.54	17.17	12.35	9.09	1.16	0.34	0.02	0.02	0.00	0.00	0.06	0.03	0.05	0.03	0.02	0.00	0.04	0.04	0.77	1.45
7	2.58	3.12	3.23	13.32	4.17	3.70	14.93	7.74	2.80	0.16	0.09	0.03	0.00	0.01	0.00	0.05	0.02	0.01	0.00	0.00	0.00	0.02	0.00	0.06	0.32
8	4.26	1.41	0.86	6.66	2.67	1.00	7.06	7.62	1.03	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.04	0.06
9	2.98	2.12	0.65	2.41	1.21	0.44	2.54	2.35	0.56	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
10	0.91	1.06	0.55	0.64	0.52	0.22	1.41	0.68	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
11	0.22	0.34	0.40	0.79	0.21	0.04	0.65	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.12	0.11	0.09	0.58	0.08	0.04	0.16	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.02	0.05	0.01	0.09	0.06	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.01	0.02	0.00	0.07	0.02	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	131.02	116.45	51.91	223.09	69.75	113.64	321.74	241.51	161.39	15.31	9.20	2.34	5.82	4.63	2.21	3.91	7.36	9.39	7.16	10.50	4.99	8.66	8.49	13.72	13.72

Table 27 (cont'd). Autumn bottom-trawl mean number per tow at age in index strata adjusted for missing strata. The 2J3KL total is the mean of the Divisional means, weighted by the Divisional survey areas.

3L

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.30	0.04	0.03	0.03	0.17	0.27	0.02	0.03	0.69
1	17.62	7.68	0.15	1.03	3.87	1.26	0.54	0.82	1.06	0.08	0.00	0.00	0.11	0.04	0.07	0.14	0.79	1.18	0.67	0.30	1.54	0.98	0.07	0.06	1.76
2	27.24	75.48	11.11	9.71	22.54	12.57	5.36	6.54	5.27	3.25	1.66	0.19	0.34	0.21	0.64	0.17	1.51	1.59	1.66	0.90	0.32	2.64	0.25	0.67	1.78
3	40.89	56.42	32.05	9.02	7.70	13.43	12.73	22.12	5.02	8.14	2.44	0.28	0.52	0.36	0.61	0.32	1.86	1.62	1.49	0.37	0.40	0.33	0.99	0.78	1.58
4	9.53	35.05	24.62	22.23	6.96	4.08	7.03	24.38	7.89	7.96	2.46	0.23	0.27	0.43	0.27	0.17	0.20	0.98	0.95	0.31	0.13	0.12	0.31	1.13	1.43
5	9.21	6.44	13.18	13.13	10.93	5.57	2.17	11.06	5.59	5.64	0.79	0.09	0.15	0.19	0.15	0.04	0.15	0.31	0.45	0.18	0.06	0.08	0.05	0.72	1.38
6	1.50	10.12	5.23	10.20	6.81	5.91	2.30	5.29	2.66	3.07	0.32	0.04	0.11	0.09	0.04	0.03	0.08	0.09	0.10	0.05	0.03	0.03	0.03	0.18	0.45
7	1.45	1.48	3.04	2.97	2.86	4.19	2.20	3.21	0.44	0.79	0.05	0.02	0.03	0.05	0.07	0.01	0.01	0.03	0.02	0.01	0.01	0.02	0.00	0.05	0.16
8	2.36	1.02	0.57	2.09	1.10	1.86	0.81	2.38	0.22	0.06	0.01	0.00	0.01	0.01	0.09	0.05	0.02	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.04
9	1.26	0.88	0.69	0.80	0.85	0.90	0.56	1.31	0.23	0.04	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.01	0.02	0.00	0.00	0.01	0.00	0.02	0.02
10	0.44	0.94	0.35	0.32	0.09	0.46	0.17	0.51	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
11	0.13	0.38	0.25	0.41	0.12	0.12	0.06	0.24	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.00
12	0.06	0.22	0.11	0.22	0.19	0.10	0.03	0.15	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.01
13	0.02	0.04	0.04	0.09	0.10	0.12	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
14	0.05	0.03	0.01	0.03	0.03	0.07	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
15	0.00	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.01	0.03	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.02	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	111.87	196.27	91.42	72.30	64.19	50.68	34.04	78.19	28.59	29.08	7.73	0.85	1.54	1.39	1.95	1.28	4.98	5.88	5.48	2.18	2.69	4.49	1.73	3.68	9.32

2J3KL

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.18	0.22	0.26	0.03	0.11	0.43	0.12	0.70	0.50	0.76
1	26.49	7.85	0.58	3.23	4.44	18.12	13.75	8.44	0.73	0.25	0.09	0.11	1.58	0.38	0.05	0.46	0.74	1.51	0.81	0.93	1.59	1.37	0.34	0.39	1.68
2	58.68	52.62	9.81	14.81	12.42	19.41	66.33	16.98	10.22	2.48	3.05	0.51	0.97	1.38	0.68	0.39	1.73	1.61	1.61	2.30	0.54	2.76	0.96	1.15	2.26
3	41.65	53.05	29.73	20.48	8.02	14.48	33.08	48.74	14.80	5.89	2.03	0.71	0.74	0.86	0.89	0.62	1.59	1.62	1.72	1.03	0.65	0.68	2.06	1.47	1.89
4	24.08	31.67	32.81	55.20	9.25	7.51	21.96	29.59	41.55	4.54	1.72	0.31	0.30	0.41	0.28	0.49	0.45	0.91	0.68	0.63	0.22	0.41	0.78	1.97	1.40
5	15.93	19.82	16.18	62.23	22.83	8.67	12.16	13.54	18.47	4.52	0.51	0.12	0.12	0.15	0.12	0.15	0.23	0.23	0.30	0.17	0.09	0.15	0.21	1.17	1.76
6	4.67	10.93	10.25	30.82	17.22	15.21	9.74	6.93	4.58	1.75	0.31	0.03	0.06	0.04	0.02	0.04	0.04	0.06	0.05	0.03	0.02	0.04	0.04	0.35	0.71
7	2.67	2.37	4.76	13.08	5.05	13.51	10.34	4.29	1.29	0.39	0.06	0.02	0.01	0.03	0.03	0.02	0.01	0.02	0.01	0.00	0.00	0.02	0.00	0.04	0.18
8	5.48	1.35	0.86	5.77	2.97	2.82	5.44	4.12	0.54	0.04	0.01	0.01	0.00	0.00	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.02	0.04
9	2.77	1.93	0.71	1.31	1.41	1.58	1.44	1.60	0.35	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
10	1.20	1.12	0.61	0.51	0.31	0.77	0.73	0.50	0.15	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
11	0.27	0.41	0.33	0.57	0.13	0.13	0.33	0.19	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
12	0.07	0.16	0.12	0.36	0.15	0.08	0.10	0.10	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
13	0.02	0.04	0.03	0.09	0.08	0.07	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.03	0.02	0.00	0.04	0.03	0.04	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.02	0.00	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	184.04	183.38	106.79	208.52	84.33	102.43	175.50	135.09	92.76	19.89	7.77	1.81	3.79	3.25	2.10	2.21	5.05	6.23	5.28	5.21	3.56	5.56	5.09	7.10	10.70

Table 28. Estimates of cod abundance (000's) from spring surveys in NAFO Division 3L during 1985-2007 in depths <= 200 fathoms. The 1985-1995 data are in Campelen equivalent units and the 1996-2007 data are in actual Campelen units.

Depth range (fath)	Stratum number	Stratum area sq mi.	WT 28-30 1985	WT 48 1986	WT 59-60 1987	WT 70-71 1988	WT 83 1989	WT 96 1990	WT 106-107 1991	WT 119-122 1992	WT 137-138 1993	WT 152-154 1994	WT 168-170 1995
Mean Date			7-May-85	16-May-86	23-May-87	15-May-88	18-May-89	26-May-90	20-May-91	24-May-92	31-May-93	1-Jun-94	6-Jun-95
31-50	350	2071	52111	14685	17275	90559	24682	8018	748	414	32	0	0
	363	1780	25710	24878	27778	46453	21738	3918	1504	789	306	0	0
	371	1121	29035	2262	3503	3115	4086	3315	32260	123	93	0	0
	372	2460	83387	37973	21684	37778	17675	2852	541	34	62	0	0
	384	1120	591	4442	5238	1078	1566	193	270	0	31	0	0
51-100	328	1519	5642	2113	2866	522	0	3194	1846	0	453	0	0
	341	1574	17899	5678	14651	20425	7984	2436	469	0	0	736	0
	342	585	3702	1127	1328	402	5445	523	0	1314	322	188	0
	343	525	9076	4496	1300	2744	8065	891	2239	1565	614	361	361
	348	2120	38479	16258	21435	19062	12022	6575	73	227	109	365	510
	349	2114	32383	21146	12795	14649	25115	10986	1066	711	905	0	0
	364	2817	38614	10691	21365	13718	24050	4456	1902	0	97	0	0
	365	1041	22237	6272	15466	15931	8306	2076	322	36	0	0	0
	370	1320	57062	2973	16783	8861	18226	1219	34833	0	91	0	0
	385	2356	22038	997	1886	5736	25360	7808	17055	97	383	0	0
	390	1481	2513	484	320	0	891	41	122	34	102	0	0
101-150	344	1494	10481	21142	3288	4110	31503	4864	986	1165	514	0	822
	347	983	7221	14225	7077	11981	6694	913	1690	34	304	0	0
	366	1394	207996	63401	41749	8885	33414	15053	12651	415	384	0	0
	369	961	58351	33952	16392	28158	13021	6134	3701	198	0	0	0
	386	983	46544	12395	14766	26504	37547	32048	32544	68	54	0	0
	389	821	70767	10458	8150	11181	13214	5788	9524	75	0	0	56
	391	282	5916	4442	2812	1494	2819	45154	6750	0	0	0	0
151-200	345	1432	16153	41480	60278	19723	29548	14232	3217	492	525	2167	197
	346	865	10650	63279	18991	11602	9965	145882	10812	1577	833	278	476
	368	334	10154	10912	14289	414	4150	51551	4992	10866	1355	184	23
	387	718	131461	22816	691	2272	16336	241169	93995	23145	6288	0	560
	388	361	2955	11496	25	1738	1606	36947	10809	4618	2235	0	174
	392	145	6642	1855	20	2094	645	22130	4618	40	479	0	110
total strata fished <= 200 fath			1025769	468328	374201	411190	405673	680365	263087	48038	16569	4278	3289
ADJUSTED			1025770	468328	374201	411189	405673	680366	291539	48037	16571	4279	3289
upper			1335489	548125	506851	521077	475378	1169116	395962	105950	29261	7094	5694
t-value			2.16	2.037	2.571	2.16	2.04	2.776	2.365	4.303	3.182	2.201	2.306
1 STD strata fished <= 200 fath			143389	39174	51595	50874	34169	176063	56184	13459	3989	1279	1043

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

cont'd.

Table 28. Cont'd.

Depth range (fath)	Stratum number	Stratum area sq mi.	WT 189-191 1996	WT 207-208 1997	WT 223-224 1998	WT 240-241 1999	WT 317-318 2000	WT 365-370 2001	WT 422-424 2002	WT 479-482 2003	WT 546-549 2004	WT 621 2005	WT 692-693 2006	Tel 799 Vt 762 ,800 2007
Mean Date			14-Jun-96	15-Jun-97	19-Jun-98	22-Jun-99	17-Jun-00	11-Jun-01	10-Jun-02	15-Jun-03	16-Jun-04	20-Jun-05	19-Jun-06	
31-50	350	2071	412	122	47	1268	71	297	81	163	285	570	366	581
	363	1780	111	0	0	281	420	82	0	41	122	147	245	740
	371	1121	0	0	0	0	0	39	39	0	39	62	193	39
	372	2460	217	0	42	602	1203	42	0	42	381	169	435	931
	384	1120	102	0	0	0	77	0	0	39	0	39	116	0
51-100	328	1519	90	35	125	376	1254	139	84	507	79	279	167	788
	341	1574	340	1728	172	577	476	909	43	173	433	379	520	136
	342	585	0	121	80	121	322	241	40	80	201	201	172	161
	343	525	36	0	217	108	72	36	0	0	144	401	108	193
	348	2120	151	65	328	231	109	0	167	333	232	500	596	583
	349	2114	424	145	73	646	332	249	166	249	291	872	374	291
	364	2817	234	49	106	201	155	254	129	0	43	48	406	86
	365	1041	58	0	0	95	0	48	48	0	95	143	245	199
	370	1320	61	0	0	0	36	0	0	0	0	182	45	45
	385	2356	30	0	0	46	81	46	41	0	81	216	41	36
	390	1481	59	0	0	150	0	122	0	0	0	36	163	81
101-150	344	1494	565	300	355	509	260	392	485	870	575	1212	1045	3319
	347	983	0	34	203	336	135	676	45	180	90	1713	4101	19781
	366	1394	245	447	141	133	1630	230	3545	652	1432	1142	8821	6834
	369	961	30	33	66	39	132	196	206	264	118	1586	925	1464
	386	983	0	30	34	265	406	260	45	0	40	130	406	85
	389	821	0	33	33	113	1412	1016	75	0	376	565	75	167
	391	282	0	0	0	19	0	78	19	39	0	466	183	345
151-200	345	1432	773	972	460	1121	2151	2053	2403	906	2430	2114	2758	2075
	346	865	487	579	71	670	948	996	2248	1282	363	1547	6425	2380
	368	334	402	158	46	92	863	1330	578	347	523	712	158	204
	387	718	142	1037	1635	684	3556	307	285	198	1054	1564	592	593
	388	361	84	0	72	372	564	695	290	770	221	1324	323	276
	392	145	111	0	80	41	195	150	748	140	70	417	120	30
total strata fished <= 200 fath			5166	5888	4386	9096	16860	10884	11810	7277	9718	18736	30125	42444
ADJUSTED			5164	5888	4386	9096	16860	10884	11810	7277	9718	18736	30125	42444
upper			6223	10529	10169	11449	52643	14422	16092	9317	14260	24225	47677	256007
t-value			2.023	2.447	4.30	2.05	12.71	2.31	2.33	2.12	2.26	2.31	2.31	12.71
1 STD strata fished <= 200 fath			522	1897	1345	1148	2815	1532	1838	962	2010	2376	7598	16803

[1] **Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.**

Table 29. Estimates of cod biomass (t) from surveys of NAFO Division 3L during spring 1985 -2007 in depths <= 200 fathoms. The 1985-1995 data are in Campelen equivalent units and the 1996-2007 data are in actual Campelen units.

Depth range (fath) Mean Date	Stratum number	Stratum area sq mi.	WT 28-30 1985 7-May	WT 48 1986 16-May	WT 59-60 1987 23-May	WT 70-71 1988 15-May	WT 83 1989 18-May	WT 96 1990 26-May	WT 106-107 1991 20-May	WT 119-122 1992 24-May	WT 137-138 1993 31-May	WT 152-154 1994 1-Jun	WT 168-170 1995 6-Jun
31-50	350	2071	61578	29203	32147	116896	41232	14057	1636	315	35	0	0
	363	1780	29020	26035	38567	49356	30897	12388	2289	526	111	0	0
	371	1121	29516	5426	7039	6714	7089	5149	44086	36	37	0	0
	372	2460	87371	39729	37570	52582	31350	12849	1553	112	96	0	0
	384	1120	557	7038	7416	1515	1308	1029	653	0	71	0	0
51-100	328	1519	568	1708	3573	879	0	5670	180	0	243	0	0
	341	1574	11711	12988	20564	32613	9121	5854	376	0	0	65	0
	342	585	1445	2669	1041	600	1400	1035	0	66	64	33	0
	343	525	2833	3087	1981	2878	3927	255	207	70	52	46	42
	348	2120	17699	22373	52505	40777	18921	6772	273	37	43	47	87
	349	2114	31189	44296	22988	34821	50689	3835	836	125	158	0	0
	364	2817	21165	17309	34942	26822	34642	15553	1228	0	124	0	0
	365	1041	5934	6427	19818	18776	10427	2210	154	81	0	0	0
	370	1320	21097	6523	16440	12422	15405	1288	29422	0	74	0	0
	385	2356	6499	894	2131	4572	10414	2269	13797	95	256	0	0
	390	1481	874	764	891	0	520	129	604	58	83	0	0
101-150	344	1494	1926	16730	1768	2949	15613	696	103	167	83	0	95
	347	983	6837	19615	8729	17943	5283	669	199	35	83	0	0
	366	1394	111212	62264	42788	15741	32354	12386	6899	111	121	0	0
	369	961	36262	27273	23039	37815	18342	7693	3547	78	0	0	0
	386	983	13632	5635	10490	10110	19985	59202	17066	154	66	0	0
	389	821	21457	3540	2864	3284	3509	1529	1654	114	0	0	36
	391	282	1380	1944	797	316	513	6018	1220	0	0	0	0
151-200	345	1432	6738	39168	63833	24326	40145	5601	466	332	120	437	108
	346	865	1650	48302	18827	13037	10501	136822	4834	613	302	86	91
	368	334	4237	13403	16324	1286	5297	41814	3318	4684	590	120	22
	387	718	60424	16437	508	1609	8453	101468	37550	18465	2329	0	227
	388	361	1143	5814	27	695	676	35162	4031	1078	1431	0	60
	392	145	5177	1121	11	573	251	6418	1107	22	63	0	37
total strata fished <= 200 fathoms			601128	487714	489618	531905	428264	505819	164236	27374	6633	834	805
ADJUSTED			601131	487715	489618	531907	428264	505820	179288	27374	6635	834	805
upper			765217	563448	632377	669157	490124	742119	286846	71593	14791	1310	1234
t-value			2.101	2.02	2.447	2.16	1.998	2.228	2.447	4.303	4.303	2.365	2.179
1 STD strata fished <= 200 fathoms			78100	37492	58340	63543	30961	106059	50106	10276	1896	201	197

[1] Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.

cont'd.

Table 29. Cont'd.

Depth range (fath)	Stratum number	Stratum area sq mi.	WT 189-191 1996	WT 207-208 1997	WT 223-224 1998	WT 240-241 1999	WT 317-318 2000	WT 365-370 2001	WT 422-424 2002	WT 479-482 2003	WT 546-549 2004	WT 621 2005	WT 692-693	Tel 799 /t 762 ,800 2007
													2006	
Mean Date			14-Jun	15-Jun	19-Jun-98	22-Jun	17-Jun	11-Jun	10-Jun	15-Jun	16-Jun-04	20-Jun-05	19-Jun-06	
31-50	350	2071	359	135	6	3708	17	621	28	11	22	2142	204	506
	363	1780	61	0	0	693	193	1	0	3	1275	8	641	1544
	371	1121	0	0	0	0	0	25	1	0	1	13	156	3
	372	2460	83	0	0	598	392	4	0	355	8	56	282	153
	384	1120	65	0	0	0	20	0	0	1	0	8	175	0
51-100	328	1519	6	5	115	739	89	37	3	129	61	318	216	251
	341	1574	127	4497	9	1238	96	549	3	16	644	1911	89	9
	342	585	0	346	8	209	23	9	2	9	13	23	14	36
	343	525	9	0	36	254	27	0.361	0	0	11	173	36	28
	348	2120	53	13	536	395	10	0	14	16	20	204	550	143
	349	2114	303	419	101	1903	615	26	5	113	34	551	278	191
	364	2817	20	11	225	683	43	15	3	0	3	75	953	14
	365	1041	5	0	0	178	0	17	1	0	8	37	80	14
	370	1320	6	0	0	0	1	0	0	0	0	59	34	39
	385	2356	4	0	0	227	2	4	42	0	3	86	12	13
	390	1481	31	0	0	6	0	5	0	0	0	9	54	22
101-150	344	1494	111	115	124	496	152	126	71	307	128	579	443	2828
	347	983	0	8	150	52	9	182	3	32	13	949	3557	17971
	366	1394	104	173	61	83	210	25	292	130	396	424	3250	4182
	369	961	16	3	20	11	218	159	10	60	93	976	306	816
	386	983	0	16	183	94	311	131	10	0	25	61	270	119
	389	821	0	9	25	16	587	440	83	0	137	237	9	228
	391	282	0	0	0	4	0	41	2	3	0	145	55	128
151-200	345	1432	149	294	159	359	956	725	605	327	349	918	1867	2597
	346	865	178	238	32	407	582	260	558	644	215	643	4583	2062
	368	334	148	96	8	63	499	417	100	91	225	381	70	60
	387	718	84	303	1199	578	2057	191	112	34	325	604	332	333
	388	361	12	0	27	167	251	176	147	497	67	571	187	141
	392	145	18	0	23	30	19	74	332	13	16	219	53	14
total strata fished <= 200 fathoms			1951	6667	3048	12962	7378	4262	2428	2794	4094	12377	18758	34445
ADJUSTED			1952	6667	3048	12962	7378	4262	2428	2794	4094	12377	18758	34445
upper			2468	17631	6102	18566	30307	6164	3040	4093	7427	18175	30571	223582
t-value			2.017	2.571	3.18	2.16	12.71	2.14	2.18	28	2.36	2.36	2.57	12.71
1 STD strata fished <= 200 fathoms			256	4264	960	2594	1804	889	281	46	1412	2457	4596	14881

[1] Not all strata in the depth range have been fished. Strata not fished in the <= 200 fathom depth range have been filled using a multiplicative model using data to 1992. Std are for strata fished in the depth range.

Table 30. Estimates of cod abundance (000's) and biomass (t) from surveys of NAFO Division 3L during spring 1985-2007 in depths > 200 fathoms. The 1985-1995 data are in Campelen equivalent units and the 1996-2007 data are in actual Campelen units.

Depth range (fath)	Stratum number	Stratum area nautical miles	WT 28-30 1985	WT 48 1986	WT 59-60 1987	WT 70-71 1988	WT 83 1989	WT 96 1990	WT 106-107 1991	WT 119-122 1992	WT 137-138 1993	WT 152-154 1994	WT 168-170 1995
Mean Date			7-May	16-May	23-May	15-May	18-May	26-May	20-May	24-May	31-May	1-Jun	6-Jun
Abundance													
201-300	729	186	102	**nf**	**nf**	**nf**	**nf**	**nf**	141	3876	192	77	0
	731	216	30	**nf**	**nf**	**nf**	**nf**	**nf**	3046	267	416	9701	0
	733	468	1674	**nf**	**nf**	**nf**	**nf**	**nf**	7339	2672	880	1513	483
	735	272	94	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	92905	0	6080	673
301-400	730	170	0	**nf**	**nf**	**nf**	**nf**	**nf**	0	0	0	0	0
	732	231	0	**nf**	**nf**	**nf**	**nf**	**nf**	0	0	0	0	0
	734	228	0	**nf**	**nf**	**nf**	**nf**	**nf**	267	0	0	0	0
	736	175	0	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	60	0	0	0
401-500	737	227	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
	741	223	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
	745	348	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
	748	159	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
Total >200 fathoms			1900	0	0	0	0	0	10793	99780	1488	17371	1156
Total all strata fished			1027668	468328	374201	411190	405673	680365	273879	147819	18056	21649	4445
upper			1337409	548125	506851	521077	475378	1169116	407660	1331862	29180	148586	7460
t-value			2.16	2.037	2.571	2.16	2.04	2.776	2.365	12.706	2.776	12.706	2.365
1 STD all strata fished			143399	39174	51595	50874	34169	176063	56567	93188	4007	9990	1275
Biomass													
201-300	729	186	78	**nf**	**nf**	**nf**	**nf**	**nf**	320	1683	78	29	0
	731	216	78	**nf**	**nf**	**nf**	**nf**	**nf**	1967	389	248	5913	0
	733	468	755	**nf**	**nf**	**nf**	**nf**	**nf**	6351	1959	345	556	219
	735	272	894	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	50199	0	3238	386
301-400	730	170	0	**nf**	**nf**	**nf**	**nf**	**nf**	0	0	0	0	0
	732	231	0	**nf**	**nf**	**nf**	**nf**	**nf**	0	0	0	0	0
	734	228	0	**nf**	**nf**	**nf**	**nf**	**nf**	437	0	0	0	0
	736	175	0	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	69	0	0	0
401-500	737	227	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
	741	223	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
	745	348	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
	748	159	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	0	**nf**
Total >200 fathoms			1805	0	0	0	0	0	9075	54299	671	9736	605
Total all strata fished			602932	487714	489618	531905	428264	505819	173311	81673	7304	10570	1410
upper			767031	563448	632377	669157	490124	742119	296576	729549	15476	86302	7004
t-value			2.101	2.02	2.447	2.16	1.998	2.228	2.447	12.706	4.303	12.706	12.706
1 STD all strata fished			78105	37492	58340	63543	30961	106059	50374	50990	1899	5960	440

nf Not all strata in the depth range were fished. Strata not fished in the greater than 200 fathom depth range have not been filled using a multiplicative model.

cont’d.

Table 30. Cont’d.

Depth range (fath) Mean Date	Stratum number	Stratum area nautical miles	WT 28-30 1985 7-May	WT 189-191 1996 14-Jun	WT 207-208 1997 15-Jun	WT 223-224 1998 19-Jun	WT 240-241 1999 22-Jun	WT 317-318 2000 17-Jun	WT 365-370 2001 11-Jun	WT 422-424 2002 10-Jun	WT 479-482 2003 15-Jun	WT 546-549 2004 16-Jun-04	WT 621 2005 20-Jun-05	WT 692-693 2006 19-Jun-06	Tel 799 Wt 762 ,800 2007
Abundance															
201-300	729	186	102	13	0	13	0	2240	171	50	280	0	0	0	0
	731	216	30	152	0	13	104	155	409	272	1398	0	43	43	51
	733	468	1674	41	89	0	258	315	626	1094	5565	0	0	0	0
	735	272	94	5512	524	3480	35	580	3792	3138	3530	0	0	0	0
301-400	730	170	0	0	0	0	0	0	0	0	0	0	0	0	0
	732	231	0	0	0	0	0	0	0	0	0	0	0	0	0
	734	228	0	0	0	0	0	0	0	0	14	0	0	0	0
	736	175	0	0	0	0	0	0	0	0	0	0	0	0	0
401-500	737	227	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
	741	223	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
	745	348	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
	748	159	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
Total >200 fathoms			1900	5718	613	3506	397	3290	4998	4554	10787	0	43	43	51
Total all strata fished			1027668	10884	6501	7892	9493	20150	15881	16364	18064	9718	18779	30168	42495
upper			1337409	21527	11073	54843	11907	58359	67976	60855	41584	14260	24268	47720	256059
t-value			2.16	4.303	2.365	12.71	2.04	12.706	12.706	12.71	4.303	2.26	2.31	2.31	12.71
1 STD all strata fished			143399	2473	1933	3694	1183	3007	4100	3500	5466	2010	2376	7598	16803
Biomass															
201-300	729	186	78	2	0	31	0	858	78	15	108	0	0	0	0
	731	216	78	69	0	15	57	51	321	117	1588	0	18	36	41
	733	468	755	28	74	0	111	172	290	351	2071	0	0	0	0
	735	272	894	3823	352	2646	24	270	2557	1877	1486	0	0	0	0
301-400	730	170	0	0	0	0	0	0	0	0	0	0	0	0	0
	732	231	0	0	0	0	0	0	0	0	0	0	0	0	0
	734	228	0	0	0	0	0	0	0	0	50	0	0	0	0
	736	175	0	0	0	0	0	0	0	0	0		0	0	0
401-500	737	227	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
	741	223	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
	745	348	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
	748	159	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**	**nf**
Total >200 fathoms			1805	3922	426	2692	192	1351	3246	2360	5303	0	18	36	41
Total all strata fished			602932	5874	7093	5740	13154	8728	7507	4788	8097	4094	12395	18794	34486
upper			767031	32789	18073	41373	18765	32059	41939	27442	16216	7427	18193	30607	223624
t-value			2.101	4.303	2.571	12.71	2.16	12.706	12.706	12.71	3.182	2.36	2.36	2.57	12.71
1 STD all strata fished			78105	6255	4271	2804	2598	1836	2710	1782	2552	1412	2457	4596	14881

nf Not all strata in the depth range were fished. Strata not fished in the greater than 200 fathom depth range have not been filled using a multiplicative model.

Table 31. Spring bottom-trawl mean number of cod per tow at age in the index strata (<=200 fath) in NAFO Div. 3L from 1985 onward.

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0												0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.24	0.05	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.05	0.23	0.69	0.28	0.76	0.16	0.19	0.14	0.16	0.34
2	24.66	4.71	6.20	4.56	6.56	8.14	4.82	1.29	0.08	0.19	0.25	0.43	0.18	0.08	0.54	0.87	0.86	0.89	0.27	1.10	0.72	1.12	0.61
3	85.66	17.70	11.95	24.30	23.92	46.84	13.81	2.26	1.71	0.33	0.19	0.23	0.43	0.25	0.26	0.86	0.35	0.43	0.38	0.31	1.83	1.93	2.35
4	48.28	31.74	11.45	10.16	20.06	41.76	19.67	1.82	0.79	0.12	0.16	0.15	0.16	0.25	0.17	0.69	0.13	0.16	0.12	0.19	0.59	1.61	2.55
5	23.76	18.51	19.07	9.93	5.23	18.34	9.80	2.54	0.34	0.06	0.05	0.05	0.07	0.11	0.11	0.08	0.11	0.07	0.07	0.07	0.20	0.75	1.75
6	8.24	9.85	13.15	17.32	3.62	5.05	4.25	1.09	0.24	0.01	0.01	0.05	0.03	0.07	0.08	0.08	0.01	0.02	0.02	0.01	0.04	0.29	0.51
7	7.17	3.96	6.27	7.39	8.32	4.30	1.07	0.36	0.07	0.00		0.03	0.20	0.02	0.08	0.01	0.00		0.00	0.02	0.07	0.02	0.08
8	1.39	2.95	1.95	3.71	6.06	4.74	0.85	0.06	0.04				0.06	0.02	0.05	0.00	0.01		0.00	0.01	0.06	0.02	0.13
9	0.65	0.65	1.52	1.25	1.58	2.53	0.80	0.01	0.00				0.02	0.01	0.16	0.00			0.00	0.00	0.00	0.02	0.00
10	0.92	0.56	0.58	1.04	0.62	1.02	0.28	0.04					0.01	0.00	0.06	0.00			0.00	0.00	0.01	0.01	0.01
11	1.04	0.96	0.41	0.30	0.54	0.44	0.28	0.00					0.01		0.03	0.01			0.00	0.00	0.01	0.00	0.02
12	0.35	0.62	0.54	0.36	0.14	0.28	0.09	0.00							0.01	0.01			0.00	0.01	0.00	0.00	0.00
13	0.14	0.21	0.33	0.32	0.19	0.21	0.03	0.01							0.01	0.01			0.03	0.00	0.00	0.00	0.01
14	0.04	0.07	0.10	0.25	0.33	0.15	0.01	0.01							0.01					0.01	0.00	0.01	
15	0.06	0.06	0.05	0.10	0.13	0.13	0.02													0.00	0.02	0.00	
16	0.01	0.02	0.01	0.04	0.04	0.07	0.00													0.01			
17	0.00	0.00	0.00	0.03	0.03	0.05	0.00																
18	0.01	0.02	0.01	0.02	0.02	0.01	0.00																
19	0.00	0.00	0.01	0.00	0.01	0.01	0.01																
20	0.01	0.00		0.01			0.01																
21	0.01																						
22	0.00																						
23	0.01																						
TOTAL	202.41	92.59	73.84	81.14	77.40	134.23	55.80	9.49	3.27	0.71	0.66	1.00	1.17	0.86	1.80	3.33	1.75	2.33	1.05	1.93	3.69	5.94	8.36

Table 32. Summary of cod catches by stratum for the DFO-industry inshore mobile gear survey of three near-shore areas of NAFO Div. 2J3KL in 2006 and 2007.

Inshore northern area

Div	Stratum	Range	AREA	Mean N		MeanW (kg)		Abundance		Biomass (kg)		No_Sets	
		(m)	sq n mi	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
3K	21	<=50	13	3.9	3.5	0.3	10.5	4,578	4,162	305	12,346	2	2
3K	22	30 - 50	85	0.5	121.0	1.3	12.4	3,837	928,644	9,593	95,359	2	2
3K	23	30 - 100	196	13.3	4.2	2.9	3.1	235,223	73,959	51,801	54,850	4	4
3K	24	<=50	13	54.5	28.8	38.8	2.2	63,971	33,746	45,484	2,554	2	2
3K	25	<=50	53	3.5	4.3	0.2	2.4	16,849	20,577	1,089	11,246	2	2
3K	26	<=50	20	35.6	NS	38.4	NS	64,232	NS	69,367	NS	2	NS
3K	27	30 - 100	60	12.0	0.0	8.5	0.0	65,010	0	46,048	0	2	2
3K	28	<=50	185	0.3	0.3	0.1	0.0	4,176	4,524	1,670	588	4	4
2J	29	<=30	153	2.1	0.0	1.8	0.0	28,780	0	25,212	0	3	2
2J	30	<=50	221	0.4	0.0	0.2	0.0	7,861	0	3,930	0	3	3
2J	31	30 - 50	37	0.5	0.0	0.2	0.0	1,670	0	501	0	2	2
2J	32	30 - 100	160	0.4	0.0	0.9	0.0	6,260	0	12,520	0	3	3
			1196	4.7	10.0	2.5	1.7	502,448	1,065,612	267,522	176,943		
3K	616	101 - 200	250	1.5	1.3	1.6	0.1	33,859	29,345	36,116	2,934	2	2
3K	618	101 - 200	1347	4.0	0.2	4.4	0.2	486,488	27,403	529,925	27,096	7	7
3K	619	101 - 200	1753	0.9	4.0	1.3	4.1	138,495	628,881	207,743	653,370	8	7
2J	207	101 - 200	2264	2.2	0.5	2.4	0.0	457,155	103,807	480,570	1,661	11	8
			5614	2.2	1.6	2.5	1.4	1,115,998	789,436	1,254,354	685,062		

Inshore central area

Div	Stratum	Range	AREA	Mean N		MeanW (kg)		Abundance		Biomass (kg)		No_Sets	
		(m)	sq n mi	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
3L	7	<=50	97	976.1	19.3	417.7	2.6	8,548,473	168,715	3,658,314	22,771	2	2
3L	8	<=200	54	20.9	45.0	62.5	88.2	101,943	219,407	304,509	429,835	2	2
3L	9	<=50	51	9.4	3.9	11.6	8.6	43,401	17,959	53,577	39,659	2	2
3L	10	<=50	39	485.6	17.0	180.0	20.8	1,709,983	59,863	633,733	73,350	2	2
3L	11	<=50	294	100.9	175.6	72.7	200.0	2,679,328	4,660,985	1,929,608	5,309,391	6	6
3L	12	<=30	51	5.2	0.0	0.1	0.0	24,052	0	417	0	2	2
3L	13	30 - 50	34	33.5	10.8	5.9	22.2	102,860	33,257	18,173	68,011	2	2
3K	14	<=30	259	5.7	32.4	0.7	19.0	133,764	758,347	17,329	444,210	5	5
3K	15	<=50	91	79.3	3.9	11.8	2.1	651,567	32,044	97,201	17,090	2	2
3K	16	30 - 50	181	46.0	8.3	38.2	8.3	751,686	135,582	624,466	136,433	3	3
3K	17	30 - 100	504	5.5	3.4	8.2	9.1	250,847	153,275	373,652	412,440	10	10
3K	18	<=200	342	4.9	3.4	4.9	4.6	151,334	104,812	151,334	140,730	6	6
3K	19	30 - 50	40	5656.4	60.7	559.0	11.3		219,106		40,803	1	2
3K	20	30 - 50	44	4311.7	0.0	1272.4	0.0	17,129,418	0	5,054,900	0	2	2
			2081	175.2	34.9	70.1	38.0	32,278,656	6,563,352	12,917,212	7,134,723		
3L	790	93 - 183	89	35.0	2.6	30.9	2.2	281,480	20,759	248,109	17,411	2	2
3L	793	93 - 183	72	1.7	63.1	0.9	82.7	10,933	409,885	5,747	537,710	2	2
3L	794	93 - 183	216	2.0	3.5	1.8	15.7	39,006	68,260	34,130	305,220	2	2
3L	797	93 - 183	98	6.1	36.5	7.7	42.7	53,976	322,971	67,912	377,390	2	2
3L	799	93 - 183	72	1.8	5.1	1.4	4.6	11,702	33,317	9,101	30,067	2	2
3K	608	101 - 200	798	0.5	1.6	0.3	2.4	36,026	112,582	24,318	170,374	4	4
3K	612	101 - 200	445	4.1	4.5	8.9	2.8	163,229	180,808	359,104	110,494	2	2
			1790	3.7	7.1	4.6	9.6	596,352	1,148,583	748,422	1,548,665		

Table 32. Cont'd

Inshore southern area

Div	Stratum	Range (m)	AREA sq n mi	Mean N 2006	2007	MeanW (kg) 2006	2007	Abundance 2006	2007	Biomass (kg) 2006	2007	No_Sets 2006	2007
3L	1	<=30	98	0.0	2.4	0.0	0.3	0	20,998	0	2,374	2	2
3L	2	30 - 50	262	43.9	50.9	43.4	85.1	1,037,409	1,203,315	1,025,806	2,012,359	5	5
3L	3	<=50	71	339.0	4014.0	40.5	420.5	2,173,216	25,732,410	259,632	2,695,428	2	2
3L	4	<=50	47	36.8	11.4	56.7	12.2	155,975	48,272	240,732	51,720	2	2
3L	5	<=50	71	842.5	26.9	202.2	12.8	5,400,985	172,447	1,296,023	82,057	2	2
3L	6	<=50	13	NS	6.7	NS	9.1	NS	7,861	NS	10,635	NS	2
			562	176.9	535.7	56.9	95.7	8,767,584	27,185,303	2,822,193	4,854,573		
3L	784	30 - 56	268	6.0	6.3	2.0	5.2	145,188	152,447	48,396	126,435	2	2
3L	785	57 - 92	465	34.0	2.6	5.7	3.1	1,427,502	110,212	239,316	132,079	2	2
3L	786	93 - 183	84	22.0	3.5	4.5	0.8	166,858	26,275	34,130	5,829	2	2
3L	787	93 - 183	613	1.3	1.9	0.4	2.0	73,798	102,790	21,217	111,356	3	3
3L	788	93 - 183	261	2.2	3.3	2.0	4.5	52,369	77,431	46,150	106,888	2	2
			1691	12.2	3.1	2.5	3.2	1,865,714	469,155	389,209	482,587		

Table 33a. Estimated proportions mature for female cod from NAFO Div. 2J+3KL from DFO autumn bottom trawl surveys from 1963 to 2006 projected forward to 2010 and back to 1958. Estimates were obtained from a probit model fitted by cohort to observed proportions mature at age. Lightly shaded cells are averages of the first or last three estimates extrapolated back or forward. Darkly shaded cells are the average of adjacent estimates for the same age group.

Year/Age	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1958	0.0000	0.0000	0.0000	0.0007	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1959	0.0000	0.0000	0.0000	0.0007	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1960	0.0000	0.0000	0.0000	0.0007	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1961	0.0000	0.0000	0.0000	0.0000	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1962	0.0000	0.0000	0.0001	0.0008	0.0009	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1963	0.0001	0.0002	0.0003	0.0012	0.0130	0.0396	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1964	0.0002	0.0004	0.0015	0.0035	0.0197	0.1863	0.6493	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1965	0.0003	0.0010	0.0026	0.0098	0.0402	0.2468	0.7986	0.9881	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1966	0.0000	0.0017	0.0054	0.0160	0.0659	0.3347	0.8422	0.9856	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
1967	0.0000	0.0001	0.0081	0.0275	0.0917	0.3598	0.8579	0.9886	0.9992	1.0000	1.0000	1.0000	1.0000	1.0000
1968	0.0000	0.0000	0.0011	0.0389	0.1290	0.3848	0.8264	0.9864	0.9993	1.0000	1.0000	1.0000	1.0000	1.0000
1969	0.0001	0.0000	0.0003	0.0086	0.1664	0.4403	0.7949	0.9732	0.9989	1.0000	1.0000	1.0000	1.0000	1.0000
1970	0.0002	0.0006	0.0000	0.0037	0.0657	0.4959	0.8120	0.9600	0.9961	0.9999	1.0000	1.0000	1.0000	1.0000
1971	0.0086	0.0012	0.0035	0.0003	0.0446	0.3638	0.8290	0.9599	0.9933	0.9994	1.0000	1.0000	1.0000	1.0000
1972	0.0170	0.0217	0.0069	0.0187	0.0085	0.3678	0.8231	0.9599	0.9925	0.9989	0.9999	1.0000	1.0000	1.0000
1973	0.0000	0.0421	0.0539	0.0371	0.0924	0.2004	0.8787	0.9743	0.9916	0.9986	0.9998	1.0000	1.0000	1.0000
1974	0.0000	0.0000	0.1008	0.1298	0.1764	0.3718	0.8800	0.9890	0.9968	0.9983	0.9997	1.0000	1.0000	1.0000
1975	0.0002	0.0002	0.0003	0.2224	0.2990	0.5432	0.8743	0.9954	0.9991	0.9996	0.9997	1.0000	1.0000	1.0000
1976	0.0001	0.0009	0.0018	0.0036	0.4217	0.5967	0.8685	0.9844	0.9998	0.9999	1.0000	0.9999	1.0000	1.0000
1977	0.0000	0.0008	0.0052	0.0150	0.0430	0.6502	0.8471	0.9735	0.9975	1.0000	1.0000	1.0000	1.0000	1.0000
1978	0.0000	0.0003	0.0051	0.0285	0.1136	0.3554	0.8258	0.9485	0.9951	0.9996	1.0000	1.0000	1.0000	1.0000
1979	0.0000	0.0000	0.0024	0.0308	0.1400	0.5188	0.8713	0.9236	0.9818	0.9991	0.9999	1.0000	1.0000	1.0000
1980	0.0000	0.0000	0.0002	0.0173	0.1655	0.4748	0.9007	0.9881	0.9686	0.9933	0.9998	1.0000	1.0000	1.0000
1981	0.0002	0.0002	0.0003	0.0031	0.1129	0.5530	0.8339	0.9871	0.9990	0.9874	0.9974	1.0000	1.0000	1.0000
1982	0.0000	0.0010	0.0022	0.0042	0.0436	0.4788	0.8852	0.9654	0.9984	0.9999	0.9950	0.9990	1.0000	1.0000
1983	0.0000	0.0000	0.0049	0.0186	0.0588	0.3980	0.8689	0.9796	0.9936	0.9998	1.0000	0.9980	0.9996	1.0000
1984	0.0000	0.0000	0.0004	0.0241	0.1417	0.4805	0.9055	0.9795	0.9967	0.9988	1.0000	1.0000	0.9992	0.9998
1985	0.0000	0.0001	0.0002	0.0045	0.1114	0.5898	0.9320	0.9928	0.9971	0.9995	0.9998	1.0000	1.0000	0.9997
1986	0.0000	0.0001	0.0014	0.0027	0.0533	0.3885	0.9260	0.9951	0.9995	0.9996	0.9999	1.0000	1.0000	1.0000
1987	0.0000	0.0003	0.0013	0.0139	0.0394	0.4114	0.7631	0.9909	0.9997	1.0000	0.9999	1.0000	1.0000	1.0000
1988	0.0000	0.0002	0.0022	0.0127	0.1223	0.3800	0.8966	0.9423	0.9989	1.0000	1.0000	1.0000	1.0000	1.0000
1989	0.0000	0.0001	0.0019	0.0150	0.1151	0.5798	0.9015	0.9908	0.9881	0.9999	1.0000	1.0000	1.0000	1.0000
1990	0.0000	0.0000	0.0010	0.0168	0.0976	0.5691	0.9318	0.9927	0.9993	0.9976	1.0000	1.0000	1.0000	1.0000
1991	0.0001	0.0001	0.0005	0.0179	0.1302	0.4338	0.9306	0.9927	0.9995	0.9999	0.9995	1.0000	1.0000	1.0000
1992	0.0023	0.0010	0.0014	0.0131	0.2500	0.5674	0.8444	0.9927	0.9993	1.0000	1.0000	0.9999	1.0000	1.0000
1993	0.0000	0.0082	0.0086	0.0365	0.2756	0.8591	0.9200	0.9746	0.9993	0.9999	1.0000	1.0000	1.0000	1.0000
1994	0.0000	0.0002	0.0291	0.0711	0.5105	0.9160	0.9911	0.9902	0.9963	0.9999	1.0000	1.0000	1.0000	1.0000
1995	0.0001	0.0001	0.0029	0.0980	0.4045	0.9663	0.9968	0.9995	0.9989	0.9995	1.0000	1.0000	1.0000	1.0000
1996	0.0020	0.0008	0.0020	0.0336	0.2825	0.8576	0.9987	0.9999	1.0000	0.9999	0.9999	1.0000	1.0000	1.0000
1997	0.0006	0.0079	0.0078	0.0292	0.2944	0.5877	0.9816	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1998	0.0000	0.0029	0.0303	0.0763	0.3112	0.8336	0.8377	0.9979	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1999	0.0000	0.0003	0.0142	0.1091	0.4636	0.8716	0.9837	0.9492	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000
2000	0.0001	0.0001	0.0035	0.0669	0.3246	0.9004	0.9903	0.9986	0.9854	1.0000	1.0000	1.0000	1.0000	1.0000
2001	0.0008	0.0012	0.0014	0.0396	0.2630	0.6536	0.9895	0.9993	0.9999	0.9959	1.0000	1.0000	1.0000	1.0000
2002	0.0001	0.0041	0.0102	0.0283	0.3249	0.6399	0.8810	0.9990	1.0000	1.0000	0.9989	1.0000	1.0000	1.0000
2003	0.0000	0.0008	0.0218	0.0802	0.3797	0.8487	0.8985	0.9667	0.9999	1.0000	1.0000	0.9997	1.0000	1.0000
2004	0.0003	0.0000	0.0066	0.1073	0.4253	0.9279	0.9849	0.9778	0.9913	1.0000	1.0000	1.0000	0.9999	1.0000
2005	0.0003	0.0016	0.0012	0.0526	0.3938	0.8627	0.9963	0.9987	0.9955	0.9978	1.0000	1.0000	1.0000	1.0000
2006	0.0003	0.0016	0.0099	0.0464	0.3174	0.7782	0.9816	0.9998	0.9999	0.9991	0.9994	1.0000	1.0000	1.0000
2007	0.0003	0.0016	0.0099	0.0688	0.6555	0.7957	0.9499	0.9978	1.0000	1.0000	0.9998	0.9999	1.0000	1.0000
2008	0.0003	0.0016	0.0099	0.0688	0.4556	0.9867	0.9703	0.9903	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
2009	0.0003	0.0016	0.0099	0.0688	0.4556	0.8536	0.9997	0.9964	0.9982	1.0000	1.0000	1.0000	1.0000	1.0000
2010	0.0003	0.0016	0.0099	0.0688	0.4556	0.8536	0.9733	1.0000	0.9996	0.9997	1.0000	1.0000	1.0000	1.0000

Table 33b. Estimated proportions mature for female cod from NAFO Div. 2J+3KL from DFO autumn bottom trawl surveys from 1963 to 2007 projected forward to 2010 and back to 1958. Estimates were obtained from a probit model fitted by cohort to observed proportions mature at age. Lightly shaded cells are averages of the first or last three estimates extrapolated back or forward. Darkly shaded cells are the average of adjacent estimates for the same age group.

Year/Age	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1958	0.0000	0.0000	0.0000	0.0007	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1959	0.0000	0.0000	0.0000	0.0007	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1960	0.0000	0.0000	0.0000	0.0007	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1961	0.0000	0.0000	0.0000	0.0000	0.0112	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1962	0.0000	0.0000	0.0001	0.0008	0.0009	0.1576	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1963	0.0001	0.0002	0.0003	0.0012	0.0130	0.0396	0.7634	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1964	0.0002	0.0004	0.0015	0.0035	0.0197	0.1863	0.6493	0.9875	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1965	0.0003	0.0010	0.0026	0.0098	0.0402	0.2468	0.7986	0.9881	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000
1966	0.0000	0.0017	0.0054	0.0160	0.0659	0.3347	0.8422	0.9856	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
1967	0.0000	0.0001	0.0081	0.0275	0.0917	0.3598	0.8579	0.9886	0.9992	1.0000	1.0000	1.0000	1.0000	1.0000
1968	0.0000	0.0000	0.0011	0.0389	0.1290	0.3848	0.8264	0.9864	0.9993	1.0000	1.0000	1.0000	1.0000	1.0000
1969	0.0001	0.0000	0.0003	0.0086	0.1664	0.4403	0.7949	0.9732	0.9989	1.0000	1.0000	1.0000	1.0000	1.0000
1970	0.0002	0.0006	0.0000	0.0037	0.0657	0.4959	0.8120	0.9600	0.9961	0.9999	1.0000	1.0000	1.0000	1.0000
1971	0.0086	0.0012	0.0035	0.0003	0.0446	0.3638	0.8290	0.9599	0.9933	0.9994	1.0000	1.0000	1.0000	1.0000
1972	0.0170	0.0217	0.0069	0.0187	0.0085	0.3678	0.8231	0.9599	0.9925	0.9989	0.9999	1.0000	1.0000	1.0000
1973	0.0000	0.0421	0.0539	0.0371	0.0924	0.2004	0.8787	0.9743	0.9916	0.9986	0.9998	1.0000	1.0000	1.0000
1974	0.0000	0.0000	0.1008	0.1298	0.1764	0.3718	0.8800	0.9890	0.9968	0.9983	0.9997	1.0000	1.0000	1.0000
1975	0.0002	0.0002	0.0003	0.2224	0.2990	0.5432	0.8743	0.9954	0.9991	0.9996	0.9997	1.0000	1.0000	1.0000
1976	0.0001	0.0009	0.0018	0.0036	0.4217	0.5967	0.8685	0.9844	0.9998	0.9999	1.0000	0.9999	1.0000	1.0000
1977	0.0000	0.0008	0.0052	0.0150	0.0430	0.6502	0.8471	0.9735	0.9975	1.0000	1.0000	1.0000	1.0000	1.0000
1978	0.0000	0.0003	0.0051	0.0285	0.1136	0.3554	0.8258	0.9485	0.9951	0.9996	1.0000	1.0000	1.0000	1.0000
1979	0.0000	0.0000	0.0024	0.0308	0.1400	0.5188	0.8713	0.9236	0.9818	0.9991	0.9999	1.0000	1.0000	1.0000
1980	0.0000	0.0000	0.0002	0.0173	0.1655	0.4748	0.9007	0.9881	0.9686	0.9933	0.9998	1.0000	1.0000	1.0000
1981	0.0002	0.0002	0.0003	0.0031	0.1129	0.5530	0.8339	0.9871	0.9990	0.9874	0.9974	1.0000	1.0000	1.0000
1982	0.0000	0.0010	0.0022	0.0042	0.0436	0.4788	0.8852	0.9654	0.9984	0.9999	0.9950	0.9990	1.0000	1.0000
1983	0.0000	0.0000	0.0049	0.0186	0.0588	0.3980	0.8689	0.9796	0.9936	0.9998	1.0000	0.9980	0.9996	1.0000
1984	0.0000	0.0000	0.0004	0.0241	0.1417	0.4805	0.9055	0.9795	0.9967	0.9988	1.0000	1.0000	0.9992	0.9998
1985	0.0000	0.0001	0.0002	0.0045	0.1114	0.5898	0.9320	0.9928	0.9971	0.9995	0.9998	1.0000	1.0000	0.9997
1986	0.0000	0.0001	0.0014	0.0027	0.0533	0.3885	0.9260	0.9951	0.9995	0.9996	0.9999	1.0000	1.0000	1.0000
1987	0.0000	0.0003	0.0013	0.0139	0.0394	0.4114	0.7631	0.9909	0.9997	1.0000	0.9999	1.0000	1.0000	1.0000
1988	0.0000	0.0002	0.0022	0.0127	0.1223	0.3800	0.8966	0.9423	0.9989	1.0000	1.0000	1.0000	1.0000	1.0000
1989	0.0000	0.0001	0.0019	0.0150	0.1151	0.5798	0.9015	0.9908	0.9881	0.9999	1.0000	1.0000	1.0000	1.0000
1990	0.0000	0.0000	0.0010	0.0168	0.0976	0.5691	0.9318	0.9927	0.9993	0.9976	1.0000	1.0000	1.0000	1.0000
1991	0.0001	0.0001	0.0005	0.0179	0.1302	0.4338	0.9306	0.9927	0.9995	0.9999	0.9995	1.0000	1.0000	1.0000
1992	0.0023	0.0010	0.0014	0.0131	0.2500	0.5674	0.8444	0.9927	0.9993	1.0000	1.0000	0.9999	1.0000	1.0000
1993	0.0000	0.0082	0.0086	0.0365	0.2756	0.8591	0.9200	0.9746	0.9993	0.9999	1.0000	1.0000	1.0000	1.0000
1994	0.0000	0.0002	0.0291	0.0711	0.5105	0.9160	0.9911	0.9902	0.9963	0.9999	1.0000	1.0000	1.0000	1.0000
1995	0.0001	0.0001	0.0029	0.0980	0.4045	0.9663	0.9968	0.9995	0.9989	0.9995	1.0000	1.0000	1.0000	1.0000
1996	0.0020	0.0008	0.0020	0.0336	0.2825	0.8576	0.9987	0.9999	1.0000	0.9999	0.9999	1.0000	1.0000	1.0000
1997	0.0006	0.0079	0.0078	0.0292	0.2944	0.5877	0.9816	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1998	0.0000	0.0029	0.0303	0.0763	0.3112	0.8336	0.8377	0.9979	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1999	0.0000	0.0003	0.0142	0.1091	0.4636	0.8716	0.9837	0.9492	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000
2000	0.0001	0.0001	0.0035	0.0669	0.3246	0.9004	0.9903	0.9986	0.9854	1.0000	1.0000	1.0000	1.0000	1.0000
2001	0.0007	0.0012	0.0014	0.0396	0.2630	0.6536	0.9895	0.9993	0.9999	0.9959	1.0000	1.0000	1.0000	1.0000
2002	0.0001	0.0039	0.0102	0.0283	0.3249	0.6399	0.8810	0.9990	1.0000	1.0000	0.9989	1.0000	1.0000	1.0000
2003	0.0000	0.0010	0.0211	0.0802	0.3797	0.8487	0.8985	0.9667	0.9999	1.0000	1.0000	0.9997	1.0000	1.0000
2004	0.0000	0.0002	0.0079	0.1065	0.4253	0.9279	0.9849	0.9778	0.9913	1.0000	1.0000	1.0000	0.9999	1.0000
2005	0.0001	0.0006	0.0037	0.0570	0.3972	0.8627	0.9963	0.9987	0.9955	0.9978	1.0000	1.0000	1.0000	1.0000
2006	0.0001	0.0006	0.0081	0.0673	0.3155	0.7847	0.9816	0.9998	0.9999	0.9991	0.9994	1.0000	1.0000	1.0000
2007	0.0001	0.0006	0.0066	0.0962	0.5855	0.7783	0.9527	0.9978	1.0000	1.0000	0.9998	0.9999	1.0000	1.0000
2008	0.0001	0.0006	0.0066	0.0735	0.5808	0.9651	0.9639	0.9911	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
2009	0.0001	0.0006	0.0066	0.0735	0.4939	0.9474	0.9982	0.9951	0.9984	1.0000	1.0000	1.0000	1.0000	1.0000
2010	0.0001	0.0006	0.0066	0.0735	0.4939	0.8969	0.9958	0.9999	0.9994	0.9997	1.0000	1.0000	1.0000	1.0000

Table 34. Mean length (cm) at age of cod sampled during autumn bottom-trawl surveys in divisions 2J, 3K and 3L in 1978-2007. Highlighted entries are based on fewer than 5 aged fish. There were no surveys in Div. 3L in 1978-1980 and 1984.

Division 2J

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1																		20.2	19.1		21.9	20.8	22.0	23.0	21.1	20.2	22.6	22.7	**22.0**	22.0
2	29.3	30.1	30.6	29.9	29.8	26.6	27.6	27.0	28.2	29.5	30.4	28.1	26.5	28.1	26.6	26.3	25.8	26.2	28.8	30.6	25.3	27.6	27.8	29.6	28.0	31.6	31.1	28.9	27.4	27.4
3	38.0	41.4	39.4	38.8	38.2	38.9	34.5	33.6	35.7	36.5	37.6	37.3	34.0	33.4	34.1	32.2	36.4	33.3	35.0	37.6	38.8	33.7	37.8	35.1	37.5	38.2	38.1	36.5	35.6	36.5
4	45.9	47.8	49.5	47.1	47.2	46.2	44.6	40.3	41.2	43.3	44.2	43.7	42.2	38.7	38.9	40.2	42.6	42.5	43.5	43.0	44.4	42.1	44.0	44.1	43.6	43.2	45.7	43.3	43.6	43.3
5	54.1	55.7	54.7	54.6	53.5	53.9	51.1	48.6	47.8	49.0	48.6	50.1	46.9	44.0	41.8	44.6	47.0	47.4	49.4	48.2	47.8	52.4	**54.3**	50.0	45.9	50.7	50.3	51.1	48.2	52.2
6	59.7	61.3	60.7	58.2	59.6	60.2	56.7	53.5	52.8	52.5	53.8	53.9	53.3	51.2	47.3	47.0	**56.6**	**57.0**	**56.0**		**52.8**	**69.0**	**62.3**	**55.0**	**41.0**	61.4	55.7	**52.8**	57.9	57.2
7	66.4	68.1	64.4	63.1	61.5	62.9	63.5	57.5	56.6	57.4	55.9	57.1	56.6	56.9	**57.1**	**47.0**	**55.8**		**69.0**		**51.0**			**57.0**				**66.0**		**62.0**
8	69.6	74.0	69.5	66.9	64.5	64.7	65.8	64.3	59.5	58.9	59.8	59.7	59.3	58.7								**79.0**							**74.0**	
9	79.4	69.3	82.2	73.6	68.9	68.6	66.9	67.2	67.7	61.9	63.9	62.9	61.0	63.8																
10	80.4	76.9	83.5	84.1	76.9	73.5	71.6	70.3	68.4	67.8	66.2	64.8	65.4	65.6																
11	87.9	87.7	86.5	90.5	85.5	74.9	78.4	72.8	72.3	77.6	74.2	69.7	71.5	**72.7**																
12	91.4	85.9	87.8	88.6	94.8	94.5	83.5	75.9	75.9	75.7	80.6	69.3	73.0	**66.2**																

Division 3K

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1																		19.0	19.1	21.8	19.5	20.5	20.9	20.1	22.1	19.4	20.9	20.4	17.9	20.6
2	27.9	29.8	30.8	31.3	29.4	28.6	26.5	28.7	29.5	29.7	25.7	27.5	28.2	29.3	28.7	28.4	28.5	25.7	28.8	29.7	25.6	29.2	27.9	28.2	28.5	30.5	28.1	29.1	25.1	27.4
3	37.7	42.0	40.1	42.3	40.4	40.8	37.0	36.0	36.7	38.3	36.7	37.5	36.2	36.4	36.6	37.4	36.9	34.5	35.0	39.3	39.2	36.8	37.1	34.9	35.5	39.0	35.0	38.3	37.1	37.9
4	47.2	49.5	47.4	50.4	50.3	48.3	47.2	44.0	44.1	45.0	44.5	45.3	44.0	43.2	42.7	43.9	41.7	42.2	43.5	48.2	45.4	45.8	45.9	42.7	41.7	45.4	43.7	44.5	47.0	47.9
5	55.1	55.5	54.9	56.4	54.2	56.6	54.5	51.9	50.2	51.3	52.0	51.9	49.7	48.0	47.1	49.7	51.4	47.4	49.4	56.4	51.9	52.6	51.9	52.7	47.6	53.8	49.4	51.6	52.5	57.2
6	62.7	63.0	62.0	60.4	60.7	62.5	61.9	57.3	56.4	54.3	56.2	56.2	56.4	54.9	51.6	51.4	**54.2**	**53.8**	**56.0**		57.9	**55.8**	61.0	**55.4**	**56.7**		57.4	60.4	56.2	61.2
7	69.7	70.0	69.7	65.3	64.5	67.0	64.5	62.6	58.9	60.2	58.7	60.4	58.9	59.7	57.9	51.1	**58.5**		**69.0**		62.6	**72.9**			**57.0**		**60.5**		**71.1**	66.9
8	74.3	76.8	76.5	69.2	69.2	67.8	68.9	69.5	64.3	63.3	66.4	63.6	61.2	62.8	65.2	**64.0**	**61.2**			**68.0**	**83.0**			**73.0**			**81.0**		**65.6**	**74.0**
9	76.7	83.4	85.7	81.9	74.8	72.3	73.1	70.3	67.4	69.6	73.1	67.7	62.8	65.5	**64.0**			**68.0**			**80.0**	**81.0**		**74.0**						**90.0**
10	81.9	78.1	87.8	90.2	79.7	76.4	78.0	73.3	76.8	75.5	78.6	73.8	64.7	69.2								**89.0**					**58.0**			**80.0**
11	**88.4**	86.0	**104.5**	92.0	89.8	84.4	85.4	79.1	76.0	80.8	84.2	74.7	71.2	**80.5**																
12	91.7	**78.9**	94.5	92.1	97.0	85.2	90.8	86.9	73.7	86.6	89.3	82.9	68.0	**68.4**																

Division 3L

Age	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1															16.6	17.3	21.5	18.4	19.3	19.4	18.4	20.6	17.7	20.1	18.6	18.1	18.2
2	28.5	28.8	30.1		26.9	27.9	27.5	28.7	28.5	27.0	29.9	27.9	29.7	28.5	27.9	29.7	30.5	31.2	30.0	28.5	29.0	29.6	29.1	29.0	29.8	28.2	26.8
3	40.0	38.3	39.7		36.1	35.5	35.0	37.4	37.9	35.5	36.6	38.6	38.1	34.8	36.9	38.8	37.2	39.8	39.9	39.8	36.7	38.8	39.8	37.3	38.6	38.9	38.6
4	44.9	50.4	48.1		43.7	44.0	44.1	45.3	44.9	44.8	44.7	44.6	45.7	45.3	41.6	44.3	44.3	47.8	47.4	45.9	45.0	47.3	50.1	48.0	43.9	46.5	47.3
5	53.0	56.4	57.0		52.4	50.7	52.5	53.2	52.3	52.9	51.2	50.7	52.1	52.2	49.7	49.5	53.6	**54.2**	55.4	53.3	51.5	56.5	51.0	50.1	49.6	51.0	55.1
6	60.6	63.8	62.3		58.1	58.3	59.3	58.8	59.4	59.6	56.5	54.9	56.1	58.6	58.6	58.9	**61.7**	**59.0**	60.3	58.0	58.4	63.0	**60.5**	**58.9**	**59.5**	54.3	59.9
7	66.9	69.8	64.8		65.5	62.6	65.2	62.6	64.0	66.5	61.1	56.7	61.7	**70.0**	**66.7**	66.7	68.2	**78.0**	**64.0**	**65.4**	**65.9**	**68.0**	**70.0**	**72.0**	**61.0**	**72.0**	67.1
8	73.1	73.9	69.7		73.3	70.1	69.0	66.7	68.8	71.0	68.0	66.1	**75.0**	**67.0**	**74.0**	**70.0**	72.8	**75.8**	**72.9**	**77.9**	**67.9**			**57.0**	**65.7**	**63.0**	**78.1**
9	82.3	83.2	73.6		72.7	73.2	75.3	69.6	74.9	75.2	71.4	77.4				**66.0**	**74.0**	**79.0**	**86.3**	**81.0**	**75.1**		**71.0**	**69.0**		**87.7**	**93.6**
10	91.1	92.9	76.2		82.5	77.7	80.8	74.3	84.1	76.3	73.3	70.3	**87.0**						**90.7**					**82.0**		**81.5**	**90.0**
11	**103.7**	94.2	90.5		86.8	81.5	88.0	88.9	87.7	82.6	74.5	**73.7**						**77.0**	**79.0**		**91.0**		**89.0**				
12	**119.2**	110.1	85.0		97.8	86.8	85.6	96.7	94.2	86.9	81.7	**94.5**							**100.0**		**101.0**	**97.0**				**75.0**	**100.0**

Table 35. Mean weight (kg) at age of cod sampled during autumn bottom-trawl surveys in divisions 2J, 3K and 3L in 1978-2007. Highlighted entries are based on fewer than 5 aged fish. There were no surveys in Div. 3L in 1978-1980 and 1984.

Division 2J

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1																		0.07	0.19		0.08	0.08	0.09	0.10	0.09	0.07	0.09	0.10	**0.08**	0.09
2	0.20	0.26	0.24	0.22	0.21	0.17	0.15	0.19	0.25	0.27	0.25	0.20	0.15	0.18	0.14	0.15	0.15	0.17	0.37	0.26	0.14	0.20	0.19	0.22	0.19	0.27	0.29	0.22	0.18	0.20
3	0.46	0.63	0.52	0.55	0.50	0.58	0.38	0.36	0.36	0.50	0.54	0.50	0.36	0.31	0.31	0.29	0.41	0.33	0.71	0.48	0.51	0.37	0.47	0.41	0.47	0.50	0.51	0.45	0.41	0.46
4	0.96	1.02	1.04	1.08	0.95	0.96	0.81	0.63	0.62	0.87	0.81	0.82	0.70	0.52	0.51	0.57	0.68	0.70	1.20	0.73	0.82	0.72	0.80	0.77	0.77	0.75	0.88	0.80	0.77	0.75
5	1.54	1.57	1.36	**1.67**	1.55	1.51	1.32	1.12	1.07	1.32	1.12	1.23	1.02	0.79	0.63	0.79	0.93	1.00	1.39	1.05	1.05	1.44	**1.42**	1.15	0.92	1.24	1.25	1.40	1.09	1.31
6	2.22	2.30	2.02	1.96	1.90	1.94	1.81	1.49	1.59	1.52	1.53	1.52	1.46	1.13	0.90	0.89	**1.63**	**1.78**	**2.19**		**1.46**	**3.21**	**2.46**	**1.49**	**0.58**	**2.16**	1.82	**1.32**	1.85	1.85
7	2.69	2.97	2.65	2.49	2.33	**2.18**	2.42	1.95	1.98	2.17	1.75	1.94	1.82	1.57	**1.65**	**0.86**	**1.76**		**2.15**		**1.53**			**1.64**				**2.67**		**2.54**
8	3.80	3.38	**3.07**	3.19	2.79	2.69	2.59	2.41	2.60	2.50	2.43	2.37	2.13	1.76								**5.18**							**3.82**	
9	4.45	5.84	5.68	4.39	4.17	3.31	3.01	3.02	**3.75**	1.80	2.42	2.72	2.46	2.40																
10	5.94	**6.05**	8.12	6.55	6.58	4.31	3.56	3.36	4.48	4.80	3.49	3.25	3.10	2.87																
11	6.41	7.41	7.08	**7.75**	**7.23**	4.73	5.68	4.43	4.62	**4.34**	4.13	3.91	4.21	**4.07**																
12	**9.19**	**6.24**	7.67	**10.95**	**10.18**	9.09	6.81	4.27	6.12	**4.71**	7.09	3.61	4.70	**3.12**																

Division 3K

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1																		0.05	0.06	0.09	0.06	0.07	0.07	0.07	0.09	0.06	0.08	0.07	0.05	0.07
2	0.16	0.21	0.23	0.27	0.23	0.23	0.14	0.20	0.19	0.19	0.17	0.19	0.18	0.21	0.20	0.20	0.20	0.15	0.21	0.23	0.16	0.23	0.20	0.19	0.21	0.25	0.21	0.22	0.14	0.18
3	0.38	0.52	0.59	0.70	0.73	0.55	0.39	0.44	0.43	0.47	0.47	0.49	0.41	0.41	0.41	0.46	0.43	0.37	0.39	0.56	0.53	0.48	0.46	0.38	0.40	0.52	0.43	0.51	0.46	0.52
4	0.83	1.18	0.87	1.25	1.22	1.08	0.86	0.87	0.80	0.89	0.84	0.88	0.77	0.70	0.69	0.76	0.67	0.68	0.73	0.99	0.89	0.90	0.86	0.72	0.65	0.87	0.83	0.86	0.96	1.06
5	1.48	1.60	1.36	**1.73**	1.50	1.70	1.37	1.22	1.18	1.31	1.37	1.37	1.14	1.05	0.97	1.12	1.25	1.01	1.15	1.66	1.33	1.42	1.23	1.28	1.00	1.44	1.20	1.36	1.36	1.77
6	2.37	2.25	2.00	1.94	1.94	2.08	2.08	1.79	1.93	1.51	1.74	1.83	1.61	1.55	1.37	1.33	**1.50**	**1.50**	**1.64**		1.94	**1.56**	**2.09**	**1.77**	**1.52**		1.91	2.32	1.78	2.41
7	3.12	3.33	3.41	2.77	2.47	2.92	2.35	2.56	2.52	2.40	2.37	2.29	1.92	2.02	1.84	1.39	**1.99**		**3.24**		2.61	**3.74**			**1.71**		**2.55**		**3.40**	3.11
8	**5.51**	4.40	3.49	5.12	3.11	3.36		3.45	3.46	2.89	3.04	2.70	2.32	2.33	2.75	**2.40**	**2.36**			**2.61**	**6.32**			**3.45**			**4.57**		**2.84**	**4.21**
9	4.64	4.81	5.88	6.85	4.46	3.77	3.60	4.02	3.54	3.52	4.35	3.37	2.56	2.72	**2.19**			**3.28**			**5.31**	**6.13**		**3.71**						**7.65**
10	6.76	4.64	7.84	6.69	6.38	4.81	5.05	5.05	5.01	5.46	4.91	4.27	2.71	3.53								**7.27**					**2.00**			**5.57**
11	**6.08**	8.86	**11.92**	9.46	6.91	7.20	6.39	6.47	5.97	**10.69**	5.94	4.63	3.68	**5.79**																
12	**8.67**	**10.41**	7.46	8.25	**9.95**	**11.84**	6.25	6.35	**6.48**	7.31	7.98	6.00	3.45	**3.22**																

Division 3L

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1																		0.11	0.04	0.09	0.05	0.06	0.06	0.05	0.08	0.05	0.07	0.05	0.05	0.05
2				**0.20**	0.17	0.22		0.15	0.22	0.18	0.22	0.19	0.16	0.23	0.19	0.23	0.20	0.23	0.24	0.26	0.26	0.26	0.21	0.22	0.24	0.22	0.24	0.23	0.20	0.18
3				0.55	0.38	0.54		0.42	0.45	0.35	0.43	0.44	0.38	0.45	0.55	0.48	0.37	0.46	0.49	0.51	0.57	0.61	0.55	0.50	0.55	0.56	0.53	0.54	0.55	0.53
4				0.82	**0.48**	1.08		0.77	0.78	0.74	0.75	0.79	0.80	0.80	0.87	0.84	0.84	0.68	0.79	0.86	1.05	0.97	0.92	0.87	0.97	1.12	1.00	0.80	0.97	1.02
5				1.26		1.44		1.34	1.15	1.25	1.31	1.52	1.35	1.28	1.29	1.34	1.34	1.15	1.20	1.55	**1.58**	1.56	1.53	1.36	1.73	1.23	1.26	1.16	1.31	1.64
6				1.94		2.05		2.15	1.84	1.79	1.79	1.85	1.91	1.84	1.77	1.84	2.01	2.06	2.07	**2.47**	**1.94**	2.23	1.83	1.92	2.54	**2.17**	**2.39**	**2.05**	1.50	2.23
7				2.67		2.21		2.45	2.60	2.43	2.13	2.59	2.72	2.21	1.98	2.61	**3.34**	**3.34**	3.14	3.40	**4.25**	**2.62**	**2.92**	2.92	**3.02**	**2.94**	**3.14**	**2.53**	**3.74**	3.13
8				5.09	**5.44**	2.93		3.47	2.80	2.89	3.13	3.74	3.52	3.11	3.04	**4.30**	**3.16**	**4.20**	**5.04**	4.54	**4.70**	**3.90**	**4.84**	**3.43**			**1.67**	**2.83**	**2.67**	4.89
9				6.01	6.16	4.18		3.90	4.42	3.84	3.08	3.95	4.38	3.79	4.85				**3.20**		4.96	**6.63**	**5.43**	**3.88**		**3.64**	**3.87**		**6.95**	**8.45**
10				11.42	8.34	4.55		6.31	5.28	**6.71**	3.64	6.98	4.75	4.06	3.59	**6.44**						**8.28**					**5.81**		**6.06**	**8.07**
11				**11.67**	7.84	8.70		5.69	4.64	7.43	7.25	7.53	6.07	4.81	**4.53**						**5.25**	**5.63**		8.26		**7.70**				
12				**17.44**	**11.31**	**8.75**		11.49	10.88	6.08	9.48	**10.20**	7.29	6.06	**8.81**							**10.05**		**12.80**	**9.95**				**4.90**	**10.90**

Table 36. Mean Fulton's condition (gutted weight) at age of cod sampled during autumn bottom-trawl surveys in divisions 2J, 3K and 3L in 1978-2007. Highlighted entries are based on fewer than 5 aged fish. There were no surveys in Div. 3L in 1978-1980 and 1984.

Division 2J

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2	0.703	0.710	0.739	0.764	0.735	0.730	0.706	0.688	0.705	0.730	0.747	0.730	0.684	0.689	0.658	0.742	0.799	0.747	0.735	0.709	0.754	0.706	0.701	0.693	0.697	0.658	0.775	0.747	0.681	0.772
3	0.710	0.728	0.784	0.820	0.782	0.764	0.759	0.730	0.788	0.803	0.776	0.777	0.759	0.716	0.687	0.762	0.717	0.757	0.765	0.762	0.737	0.785	0.737	0.782	0.701	0.723	0.777	0.776	0.760	0.770
4	0.768	0.757	0.709	0.814	0.757	0.807	0.769	0.759	0.818	0.744	0.788	0.779	0.762	0.747	0.694	0.744	0.775	0.750	0.806	0.789	0.773	0.742	0.782	0.730	0.738	0.787	0.785	0.786	0.759	0.762
5	0.765	0.738	0.767	**0.792**	0.779	0.755	0.794	0.759	0.812	0.764	0.768	0.742	0.768	0.753	0.745	0.756	0.757	0.789	0.817	0.814	0.790	0.812	**0.779**	0.784	0.560	0.790	0.810	0.767	0.796	0.746
6	0.753	0.789	0.737	0.796	0.735	0.757	0.782	0.766	0.803	0.807	0.772	0.759	0.758	0.705	0.720	0.763	**0.743**	**0.788**	**0.833**		**0.791**	**0.816**	**0.824**	**0.787**	**0.711**	**0.773**	0.888	**0.822**	0.774	0.800
7	0.782	0.812	0.766	0.814	0.760	**0.679**	0.774	0.774	0.839	0.772	0.829	0.797	0.750	0.716	**0.765**	**0.838**	**0.807**		**0.824**		**0.804**			**0.745**				**0.828**		**0.864**
8	0.735	0.883	**0.787**	0.814	0.785	0.780	0.743	0.739	0.851	0.841	0.794	0.847	0.782	0.737								**0.842**							**0.792**	
9	0.789	0.798	0.801	0.834	0.784	0.784	0.771	0.746	**0.849**	0.821	0.819	0.813	0.826	0.744																
10	0.786	**0.836**	0.847	0.853	0.808	0.820	0.777	0.752	0.777	0.811	0.875	0.909	0.811	0.826																
11	0.848	0.833	0.826	**0.922**	**0.835**	0.862	0.814	0.770	0.857	**0.762**	0.865	0.846	0.832	**0.880**																
12	**0.863**	**0.828**	0.847	**0.853**	**0.864**	0.799	0.811	0.809	0.821	**0.782**	0.905	0.803	0.892	**0.827**																

Division 3K

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2	0.649	0.693	0.691	0.782	0.723	0.723	0.678	0.726	0.740	0.768	0.736	0.687	0.697	0.724	0.695	0.717	0.731	0.735	0.727	0.744	0.690	0.722	0.748	0.618	0.740	0.717	0.750	0.729	0.704	0.765
3	0.704	0.683	0.797	0.780	0.783	0.741	0.706	0.720	0.712	0.730	0.783	0.761	0.713	0.706	0.693	0.728	0.753	0.752	0.774	0.779	0.741	0.785	0.764	0.710	0.731	0.754	0.791	0.769	0.741	0.784
4	0.730	0.753	0.780	0.784	0.766	0.743	0.734	0.744	0.730	0.760	0.797	0.766	0.728	0.729	0.704	0.736	0.780	0.766	0.768	0.745	0.789	0.776	0.742	0.632	0.719	0.761	0.786	0.792	0.766	0.751
5	0.750	0.775	0.723	**0.799**	0.737	0.776	0.748	0.773	0.807	0.764	0.779	0.773	0.745	0.759	0.734	0.718	0.782	0.800	0.811	0.795	0.780	0.789	0.770	0.690	0.721	0.769	0.804	0.814	0.795	0.779
6	0.742	0.746	0.733	0.761	0.736	0.755	0.758	0.775	0.806	0.816	0.816	0.786	0.726	0.766	0.775	0.783	**0.767**	**0.790**	**0.831**		0.804	**0.822**	0.778	0.818	0.717		0.813	0.834	0.825	0.831
7	0.792	0.775	0.710	0.796	0.744	0.741	0.791	0.762	0.823	0.770	0.826	0.785	0.743	0.758	0.768	0.749	**0.770**		**0.801**		0.878	**0.784**	**0.743**		0.826		**0.844**		**0.801**	0.869
8	**0.687**	0.761	0.752	0.759	0.737	0.750		0.782	0.754	0.832	0.861	0.794	0.775	0.769	0.794	**0.824**	**0.819**			**0.706**	**0.867**			**0.745**			**0.726**		**0.850**	**0.819**
9	0.803	0.778	0.765	0.770	0.731	0.806	0.765	0.828	0.842	0.831	0.823	0.842	0.767	0.783	**0.836**			**0.795**			**0.873**	**0.896**		**0.748**						**0.850**
10	0.791	0.798	0.822	0.829	0.783	0.779	0.812	0.766	0.860	0.834	0.840	0.806	0.716	0.831								**0.817**					**0.869**			**0.887**
11	**0.814**	0.792	**0.770**	0.899	0.778	0.824	0.824	0.768	0.849	**0.835**	0.864	0.823	0.801	**0.774**																
12	**0.806**	**0.846**	0.831	0.831	**0.858**	**0.831**	0.814	0.850	**0.842**	0.832	0.907	0.888	0.808	**0.803**																

Division 3L

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2				**0.733**	0.698	0.681		0.650	0.754	0.717	0.738	0.720	0.657	0.701	0.716	0.672	0.737	1.359	0.746	0.737	0.737	0.720	0.723	0.725	0.721	0.641	0.780	0.707	0.725	0.710
3				0.756	0.810	0.731		0.725	0.727	0.734	0.746	0.757	0.700	0.713	0.743	0.692	0.762	0.755	0.753	0.798	0.753	0.819	0.728	0.774	0.739	0.726	0.803	0.763	0.749	0.722
4				0.801	**0.879**	0.706		0.757	0.746	0.746	0.746	0.761	0.712	0.742	0.750	0.724	0.744	0.779	0.768	0.789	0.788	0.790	0.798	0.764	0.740	0.749	0.750	0.810	0.781	0.740
5				0.785		0.729		0.736	0.776	0.719	0.744	0.771	0.759	0.771	0.784	0.741	0.760	0.783	0.805	0.776	**0.848**	0.751	0.800	0.788	0.743	0.761	0.741	0.822	0.809	0.775
6				0.729		0.738		0.736	0.793	0.729	0.773	0.768	0.755	0.802	0.829	0.794	0.817	0.827	0.799	**0.806**	**0.781**	0.845	0.740	0.803	0.823	**0.786**	**0.871**	**0.775**	0.804	0.810
7				0.753		0.775		0.789	0.807	0.714	0.783	0.776	0.752	0.770	0.839	0.774	**0.764**	**0.862**	0.859	0.812	**0.748**	**0.804**	**0.806**	**0.799**	**0.805**	**0.700**	**0.723**	**0.881**	**0.770**	0.847
8				0.843	**0.767**	0.780		0.745	0.788	0.814	0.778	0.814	0.798	0.795	0.795	**0.711**	**0.725**	**0.836**	**0.995**	0.903	**0.833**	**0.822**	**0.798**	**0.854**			**0.740**	**0.854**	**0.848**	0.838
9				0.829	0.754	0.774		0.797	0.833	0.766	0.858	0.781	0.833	0.806	0.826				**0.939**		**0.825**	**0.789**	**0.758**	**0.738**		**0.766**	**0.834**		**0.835**	**0.789**
10				**0.865**	0.820	0.789		0.824	0.835	**0.788**	0.766	0.826	0.816	0.842	0.841	**0.787**						**0.890**					**0.851**		**0.867**	**0.898**
11				**0.870**	0.847	0.849		0.796	0.801	0.800	0.767	0.806	0.841	0.864	**0.911**						**0.944**	**0.909**		0.809		**0.901**				
12				**0.825**	**0.840**	**0.743**		0.795	0.837	0.853	0.839	**0.802**	0.853	0.896	**0.842**							**0.824**		**0.956**	**0.813**				**0.908**	**0.850**

Table 37. Mean liver index at age of cod sampled during autumn bottom-trawl surveys in divisions 2J, 3K and 3L in 1978-2007. Highlighted entries are based on fewer than 5 aged fish. (cells where fewer than 5 aged fish were available are not indicated for years prior to 1995.) There were no surveys in Div. 3L in 1978-1980 and 1984.

Division 2J

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2		0.035	0.036	0.042	0.023	0.029	0.026	0.020	0.037	0.025	0.036	0.015	0.035	0.029	0.023	0.031	0.035	0.043	0.035	0.035	0.038	0.042	0.036	0.037	0.033	0.034	0.050	0.035	0.030	0.044
3		0.047	0.049	0.052	0.045	0.047	0.047	0.032	0.050	0.049	0.043	0.044	0.053	0.035	0.025	0.039	0.036	0.046	0.045	0.044	0.038	0.052	0.037	0.052	0.041	0.038	0.052	0.047	0.042	0.045
4		0.060	0.031	0.062	0.049	0.077	0.054	0.046	0.066	0.049	0.053	0.047	0.062	0.046	0.033	0.036	0.041	0.044	0.044	0.056	0.053	0.051	0.044	0.044	0.042	0.045	0.053	0.051	0.049	0.050
5		0.061	0.050	**0.046**	0.053	0.073	0.066	0.047	0.075	0.059	0.056	0.039	0.066	0.048	0.042	0.041	0.042	0.055	0.048	0.061	0.065	0.060	**0.037**	0.035	0.049	0.047	0.059	0.047	0.064	0.044
6		0.074	0.050	0.054	0.041	0.065	0.071	0.060	0.077	0.075	0.056	0.051	0.058	0.039	0.048	0.050	**0.050**	**0.036**	**0.047**		**0.087**	**0.069**	**0.048**	**0.039**	**0.030**	**0.049**	0.069	0.063	0.048	0.047
7		0.089	0.065	0.066	0.055	**0.046**	0.067	0.074	0.103	0.071	0.080	0.065	0.061	0.032	**0.059**	**0.054**	**0.079**		**0.054**		**0.084**			**0.036**	0.044			**0.034**		**0.063**
8		0.099	**0.072**	0.066	0.064	0.076	0.059	0.056	0.116	0.091	0.080	0.080	0.075	0.036								**0.090**							**0.046**	
9		0.066	0.067	0.074	0.062	0.082	0.075	0.061	**0.084**	0.097	0.073	0.058	0.091	0.039																
10		**0.082**	0.090	0.076	0.063	0.069	0.075	0.066	0.079	0.068	0.088	0.061	0.078	0.046																
11		0.092	0.096	**0.088**	**0.066**	0.105	0.073	0.076	0.102	**0.063**	0.101	0.072	**0.086**	**0.051**																
12		**0.088**	0.086	**0.075**	**0.086**	0.057	0.076	0.091	0.089	**0.080**	0.098	0.051	0.099	**0.042**																

Division 3K

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2	0.016	0.017	0.018	0.036	0.020	0.022	0.013	0.021	0.027	0.026	0.023	0.007	0.027	0.033	0.028	0.039	0.030	0.042	0.037	0.040	0.046	0.048	0.036	0.034	0.047	0.054	0.050	0.038	0.038	0.04
3	0.017	0.023	0.042	0.037	0.031	0.041	0.028	0.046	0.040	0.039	0.041	0.024	0.041	0.035	0.035	0.040	0.041	0.049	0.051	0.048	0.042	0.062	0.046	0.042	0.055	0.037	0.057	0.047	0.047	0.05
4	0.026	0.053	0.036	0.048	0.045	0.044	0.036	0.048	0.049	0.049	0.055	0.042	0.052	0.047	0.047	0.048	0.056	0.046	0.048	0.048	0.056	0.057	0.045	0.041	0.050	0.043	0.055	0.054	0.050	0.053
5	0.042	0.064	0.043	**0.035**	0.051	0.048	0.044	0.057	0.077	0.053	0.057	0.057	0.058	0.066	0.057	0.051	0.059	0.061	0.057	0.054	0.057	0.064	0.053	0.043	0.048	0.048	0.059	0.062	0.060	0.052
6	0.044	0.062	0.053	0.045	0.047	0.043	0.044	0.059	0.079	0.066	0.073	0.071	0.048	0.057	0.075	0.058	**0.058**	**0.065**	**0.043**		0.066	**0.072**	0.041	**0.075**	**0.046**	0.053	**0.063**	0.061	0.074	0.07
7	0.049	0.068	0.046	0.058	0.053	**0.025**	0.055	0.048	0.089	0.055	0.073	0.074	0.060	0.063	0.081	0.077	0.064		**0.059**		0.083	**0.056**			**0.037**		**0.086**	0.071	**0.059**	0.071
8	**0.043**	0.058	0.055	0.051	0.050	0.048		0.058	0.060	0.076	0.077	0.080	0.072	0.065	0.077	**0.047**	0.073			**0.032**	**0.138**			**0.030**	0.045		**0.068**		**0.078**	**0.081**
9	0.059	0.073	0.050	0.058	0.053	0.062	0.044	0.075	0.084	0.074	0.065	0.091	0.085	0.066	**0.108**			**0.036**			**0.073**	**0.113**		**0.037**						**0.073**
10	0.057	0.072	0.052	0.068	0.059	0.056	0.057	0.063	0.095	0.075	0.077	0.079	0.106	0.074								**0.096**					**0.097**			**0.057**
11	**0.060**	0.075	**0.051**	0.082	0.055	0.068	0.058	0.068	0.088	**0.088**	0.089	0.077	0.107	**0.083**																
12	**0.077**	**0.097**	0.070	0.079	**0.067**	**0.070**	0.059	0.064	**0.083**	0.082	0.091	0.082	**0.112**	**0.108**																

Division 3L

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2				**0.017**	0.013	0.019		0.009	0.027	0.026	0.019	0.019	0.027	0.043	0.036	0.034	0.033	0.037	0.032	0.038	0.037	0.040	0.044	0.038	0.043	0.034	0.051	0.034	0.038	0.045
3				0.031	0.025	0.023		0.031	0.023	0.031	0.026	0.033	0.036	0.053	0.055	0.049	0.047	0.045	0.039	0.052	0.042	0.059	0.042	0.051	0.050	0.040	0.064	0.047	0.043	0.044
4				0.044	**0.042**	0.020		0.035	0.032	0.028	0.032	0.040	0.038	0.058	0.072	0.058	0.051	0.055	0.045	0.063	0.058	0.048	0.051	0.055	0.048	0.042	0.044	0.067	0.047	0.052
5				0.047		0.027		0.041	0.039	0.030	0.039	0.042	0.047	0.061	0.074	0.070	0.061	0.059	0.058	0.060	**0.073**	0.052	0.059	0.057	0.060	0.055	0.051	0.070	0.061	0.058
6				0.038		0.028		0.039	0.044	0.031	0.046	0.046	0.050	0.072	0.088	0.084	0.080	0.069	0.058	**0.063**	**0.070**	0.060	0.055	0.058	0.067	**0.051**	**0.081**	**0.056**	0.065	0.065
7				0.043		0.031		0.051	0.047	0.035	0.044	0.054	0.053	0.069	0.076	0.073	**0.039**	**0.089**	0.094	0.060	**0.042**	**0.091**	**0.077**	**0.069**	**0.066**	**0.028**	**0.052**	**0.094**	**0.047**	0.074
8				0.063	0.039	0.040		0.053	0.054	0.042	0.053	0.063	0.064	0.071	0.096	**0.052**	**0.035**	**0.079**	**0.102**	0.077	0.077	**0.066**	**0.076**	**0.068**			**0.059**	**0.067**	**0.070**	0.066
9				0.058	0.049	0.048		0.061	0.052	0.046	0.065	0.064	0.067	0.081	0.073				**0.137**	**0.087**	**0.089**	**0.072**	**0.070**	**0.053**		**0.042**	**0.085**		**0.072**	**0.057**
10				0.068	0.054	0.051		0.068	0.060	**0.052**	0.077	0.075	0.068	0.092	0.092	**0.098**						**0.041**					**0.066**		**0.072**	**0.087**
11				**0.067**	0.075	0.057		0.066	0.056	0.064	0.058	0.071	0.086	0.093	**0.114**						**0.082**	**0.084**		0.067		**0.096**				
12				**0.056**	**0.084**	**0.047**		0.063	0.077	0.073	0.073	**0.063**	0.091	0.105	**0.072**							**0.072**		**0.146**	**0.092**				**0.080**	**0.076**

Table 38. Catch numbers at age (thousands) for cod from the inshore central area (3Kh, 3Ki, 3La, 3Lb). The 10+ group is the sum of ages 10-20.

	Age								
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10+**
1995	0	6	30	73	51	20	6	1	0
1996	0	15	86	234	324	75	12	2	1
1997	0	7	25	57	71	110	19	2	1
1998	2	78	174	316	546	320	190	52	15
1999	6	60	192	508	609	913	306	222	51
2000	4	87	169	271	297	244	220	114	141
2001	8	163	500	508	437	266	135	209	209
2002	5	127	174	239	219	180	100	70	215
2003	0	8	9	16	46	40	26	21	97
2004	1	9	18	23	30	34	22	10	15
2005	0	12	18	105	135	62	21	8	12
2006	0	7	112	222	293	120	54	19	16

Table 39. Mean weights-at-age (kg) of cod caught in the inshore central area.

	Age							
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1995	0.25	0.51	0.83	1.52	1.97	2.33	2.71	3.27
1996	0.44	0.66	0.97	1.44	2.04	2.55	2.98	3.95
1997	0.30	0.53	0.83	1.41	1.99	2.44	2.98	3.87
1998	0.29	0.63	0.94	1.50	2.13	2.48	3.06	3.43
1999	0.31	0.58	1.05	1.59	2.10	2.50	2.98	3.64
2000	0.25	0.65	0.94	1.72	2.14	2.84	3.39	4.01
2001	0.41	0.62	0.88	1.33	2.04	2.61	3.37	4.02
2002	0.41	0.63	0.90	1.59	2.21	2.82	3.36	3.82
2003	0.34	0.50	0.84	1.41	2.04	2.57	3.07	3.66
2004	0.34	0.55	0.86	1.57	2.18	2.95	3.53	4.35
2005	0.28	0.52	0.85	1.79	2.18	2.67	3.41	4.29
2006	0.35	0.59	1.14	1.53	2.30	2.90	3.42	4.56

Table 40. Beginning of year weights-at-age (kg) of cod for the inshore central area. Values for 2007 are the geometric means of the 2003-2006 values.

	Age								
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1995	0.15	0.44	0.71	1.13	1.73	2.23	2.71	3.29	4.30
1996	0.40	0.40	0.70	1.09	1.76	2.24	2.63	3.27	3.75
1997	0.21	0.48	0.74	1.17	1.69	2.23	2.76	3.40	4.56
1998	0.20	0.43	0.70	1.11	1.73	2.22	2.73	3.20	4.18
1999	0.22	0.41	0.81	1.22	1.77	2.31	2.72	3.34	4.15
2000	0.16	0.45	0.74	1.35	1.85	2.44	2.91	3.46	4.28
2001	0.33	0.40	0.76	1.12	1.88	2.36	3.09	3.69	4.80
2002	0.38	0.51	0.75	1.19	1.72	2.40	2.96	3.59	4.65
2003	0.26	0.45	0.73	1.13	1.80	2.39	2.94	3.51	4.80
2004	0.27	0.43	0.66	1.15	1.75	2.45	3.01	3.65	4.91
2005	0.30	0.42	0.68	1.24	1.85	2.41	3.17	3.89	5.91
2006	0.28	0.41	0.77	1.14	2.03	2.51	3.02	3.94	5.61
2007	0.28	0.42	0.70	1.18	1.87	2.46	3.07	3.83	5.46

Table 41. Sentinel survey catch rate-at-age indices for the three gears in the inshore central area.

Year	Age 3	4	5	6	7	8	9
Gillnet (5.5 inch mesh)							
1995.5	0.00	0.04	1.51	2.11	0.98	0.43	0.07
1996.5	0.04	0.22	1.66	7.37	2.12	0.49	0.10
1997.5	0.02	0.11	1.78	3.42	6.15	1.36	0.14
1998.5	0.07	0.20	1.89	6.86	5.23	2.95	0.79
1999.5	0.03	0.15	1.44	2.46	3.83	1.18	0.66
2000.5	0.02	0.09	1.03	2.01	1.38	1.62	0.60
2001.5	0.02	0.09	0.49	1.26	0.79	0.37	0.53
2002.5	0.01	0.05	0.72	0.94	0.75	0.32	0.20
2003.5	0.05	0.12	0.45	1.50	1.00	0.38	0.20
2004.5	0.02	0.17	1.01	1.64	1.40	0.49	0.20
2005.5	0.03	0.11	1.93	2.89	1.71	0.95	0.33
2006.5	0.01	0.42	1.72	3.59	1.83	0.68	0.32
Linetrawl							
1995.5	8	65	59	20	5		
1996.5	23	40	54	30	5		
1997.5	22	51	81	47	43		
1998.5	20	36	26	15	7		
1999.5	12	23	29	6	1		
2000.5	6	9	8	5	2		
2001.5	25	32	12	4	1		
2002.5	15	25	15	7	1		
2003.5	29	73	35	5	1		
2004.5	37	57	27	24	2		
2005.5	30	57	49	16	3		
2006.5	16	56	31	16	4		
Gillnet (3¼ inch mesh)							
1996.5	9.96	21.28	8.50	8.93	0.36	0.04	0.00
1997.5	5.55	12.59	4.82	4.61	3.73	0.39	0.02
1998.5	6.49	3.75	4.27	7.62	3.94	1.64	0.38
1999.5	8.24	5.60	4.00	1.66	1.75	0.32	0.20
2000.5	8.21	6.71	3.14	1.63	0.47	0.44	0.18
2001.5	8.09	7.25	2.53	1.26	0.30	0.08	0.12
2002.5	11.17	5.45	1.79	0.97	0.33	0.04	0.03
2003.5	18.95	8.54	2.54	1.24	0.49	0.08	0.03
2004.5	7.70	8.97	4.67	1.67	0.53	0.10	0.04
2005.5	16.50	9.55	5.03	2.09	0.33	0.11	0.02
2006.5	6.70	10.00	5.22	2.74	0.73	0.11	0.02

Table 42. Parameter estimates and standard errors for the final ADAPT model fit for the inshore central area catch and sentinel survey indices.

Parameter	Estimate	Std. Err.	Rel. Err.	Bias	Rel. Bias
Survivors					
N[2007 4]	3770	1150	0.307	216.00	0.057
N[2007 5]	5940	1360	0.230	216.00	0.036
N[2007 6]	2750	564	0.205	85.10	0.031
N[2007 7]	2150	426	0.198	63.40	0.030
N[2007 8]	909	180	0.198	26.90	0.030
N[2007 9]	401	83	0.206	12.40	0.031
N[2007 10]	432	125	0.290	21.90	0.051
F-ratios					
[1995-2002,2006 10]	0.672	0.060	0.089	0.004	0.006
[2003 10]	1.280	0.400	0.312	0.094	0.073
[2004-2005 10]	0.887	0.236	0.265	0.050	0.056
Catchability (q)					
Sent 5.5 Age 3	3.93E-06	6.97E-07	0.177	0.000	0.005
Sent 5.5 Age 4	2.62E-05	4.44E-06	0.170	0.000	0.004
Sent 5.5 Age 5	3.78E-04	6.57E-05	0.174	0.000	0.004
Sent 5.5 Age 6	1.36E-03	2.51E-04	0.184	0.000	0.006
Sent 5.5 Age 7	1.91E-03	3.85E-04	0.202	0.000	0.009
Sent 5.5 Age 8	1.57E-03	3.57E-04	0.228	0.000	0.015
Sent 5.5 Age 9	1.08E-03	2.83E-04	0.263	0.000	0.026
Sent LT Age 3	2.68E-03	4.57E-04	0.171	0.000	0.004
Sent LT Age 4	8.14E-03	1.38E-03	0.170	0.000	0.004
Sent LT Age 5	9.45E-03	1.64E-03	0.174	0.000	0.004
Sent LT Age 6	6.71E-03	1.23E-03	0.184	0.000	0.006
Sent LT Age 7	3.14E-03	6.34E-04	0.202	0.000	0.009
Sent 3.25 Age 3	1.46E-03	2.59E-04	0.177	0.000	0.005
Sent 3.25 Age 4	1.80E-03	3.16E-04	0.175	0.000	0.005
Sent 3.25 Age 5	1.37E-03	2.43E-04	0.178	0.000	0.005
Sent 3.25 Age 6	1.30E-03	2.42E-04	0.186	0.000	0.006
Sent 3.25 Age 7	7.27E-04	1.47E-04	0.202	0.000	0.009
Sent 3.25 Age 8	3.10E-04	7.03E-05	0.227	0.000	0.014
Sent 3.25 Age 9	1.93E-04	5.01E-05	0.260	0.000	0.025

Table 43. Estimates of cod population abundance (in thousands) from the final bias-corrected ADAPT SPA formulation for the inshore central area.

	Age								
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10+**
1995	12528	18579	8980	9978	2376	568	234	171	0
1996	10232	8398	12449	5995	6629	1551	365	152	114
1997	9656	6859	5617	8275	3828	4180	979	235	176
1998	7890	6473	4592	3745	5501	2509	2713	641	273
1999	8119	5287	4275	2937	2254	3245	1423	1664	558
2000	8682	5438	3495	2710	1559	1022	1443	707	1269
2001	11964	5816	3574	2206	1597	805	489	789	1118
2002	17649	8013	3766	1992	1070	720	327	219	942
2003	14147	11827	5268	2383	1142	541	338	139	549
2004	19316	9483	7921	3524	1585	728	330	205	366
2005	7916	12947	6349	5295	2344	1038	460	203	363
2006	12933	5306	8669	4241	3464	1461	645	292	363
2007	12933	8665	3551	5720	2663	2085	882	389	410

Table 44. Estimates of cod population biomass (t) from the final ADAPT SPA formulation for the inshore central area.

	Age									
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10+**	**Total 2+**
1995	1910	8134	6413	11229	4109	1268	634	561	0	34260
1996	4051	3389	8740	6552	11678	3479	961	497	426	39773
1997	1991	3289	4138	9698	6489	9331	2701	797	800	39234
1998	1614	2807	3235	4167	9533	5571	7414	2050	1139	37531
1999	1773	2173	3482	3596	3996	7488	3867	5553	2316	34243
2000	1376	2463	2584	3652	2879	2496	4204	2444	5433	27531
2001	3983	2298	2712	2468	2995	1902	1513	2914	5373	26156
2002	6642	4081	2827	2362	1838	1728	968	787	4376	25610
2003	3741	5376	3822	2686	2057	1291	994	488	2638	23092
2004	5215	4093	5205	4038	2774	1785	995	750	1798	26652
2005	2371	5384	4343	6579	4335	2504	1461	791	2144	29911
2006	3590	2152	6637	4838	7023	3669	1951	1150	2036	33045
2007	3648	3619	2488	6724	4986	5124	2708	1488	2241	33026

Table 45. Estimates of cod population spawner stock biomass (SSB, t) from the final ADAPT SPA formulation for the inshore central area.

	Age									
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10+**	**Total**
1995	0	23	629	4542	3971	1264	633	560	0	11623
1996	3	7	293	1851	10016	3475	961	497	426	17528
1997	16	26	121	2855	3814	9160	2701	797	800	20289
1998	5	85	247	1297	7947	4667	7399	2050	1139	24835
1999	1	31	380	1667	3483	7365	3671	5552	2316	24465
2000	0	9	173	1186	2592	2471	4199	2409	5432	18470
2001	5	3	107	649	1958	1882	1512	2914	5351	14380
2002	27	42	80	767	1176	1523	967	787	4376	9745
2003	3	117	307	1020	1746	1160	961	488	2638	8439
2004	0	27	559	1717	2574	1758	972	743	1798	10149
2005	4	7	228	2591	3739	2495	1459	787	2139	13449
2006	6	21	308	1536	5465	3601	1951	1150	2034	16072
2007	6	36	171	4407	3967	4867	2702	1488	2241	19886

Table 46. Estimates of fishing mortality-at-age from the final bias-corrected ADAPT SPA formulation for the inshore central area.

	Age									**Mean**
Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**5-10+**
1995	0.000	0.000	0.004	0.009	0.026	0.044	0.032	0.007	0.005	0.020
1996	0.000	0.002	0.008	0.048	0.061	0.060	0.041	0.016	0.011	0.040
1997	0.000	0.001	0.005	0.008	0.023	0.032	0.024	0.010	0.007	0.017
1998	0.000	0.015	0.047	0.108	0.128	0.167	0.089	0.103	0.069	0.111
1999	0.001	0.014	0.056	0.234	0.391	0.411	0.299	0.175	0.117	0.271
2000	0.001	0.020	0.060	0.129	0.260	0.337	0.203	0.216	0.144	0.215
2001	0.001	0.035	0.185	0.324	0.397	0.501	0.401	0.382	0.255	0.377
2002	0.000	0.019	0.058	0.156	0.282	0.356	0.455	0.480	0.320	0.342
2003	0.000	0.001	0.002	0.008	0.050	0.094	0.098	0.201	0.239	0.115
2004	0.000	0.001	0.003	0.008	0.023	0.058	0.084	0.061	0.051	0.048
2005	0.000	0.001	0.003	0.024	0.072	0.075	0.057	0.049	0.041	0.053
2006	0.000	0.002	0.016	0.065	0.108	0.105	0.107	0.082	0.055	0.087

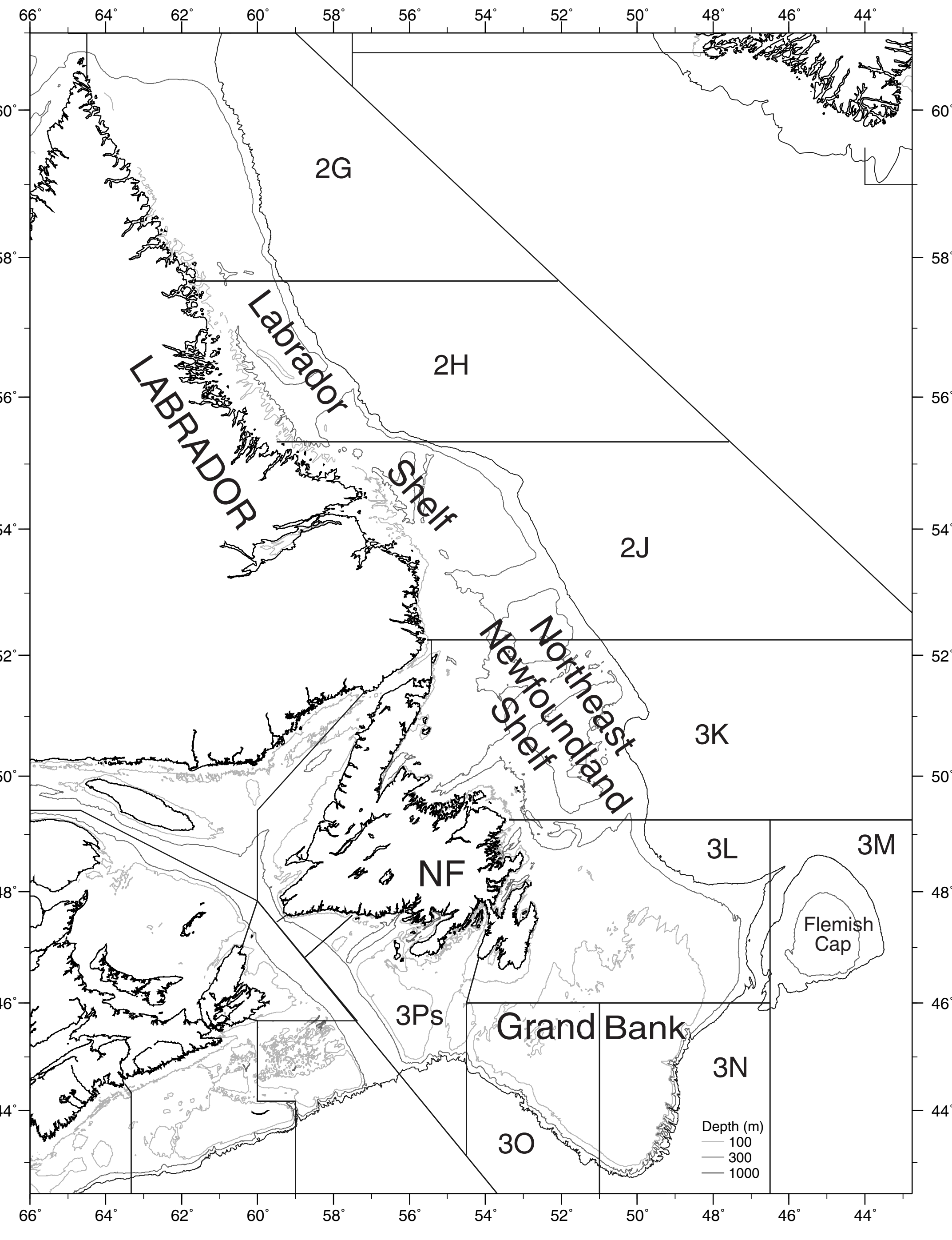


Figure 1a. Major geographic features and NAFO Division and Subdivision boundaries around Newfoundland and Labrador.

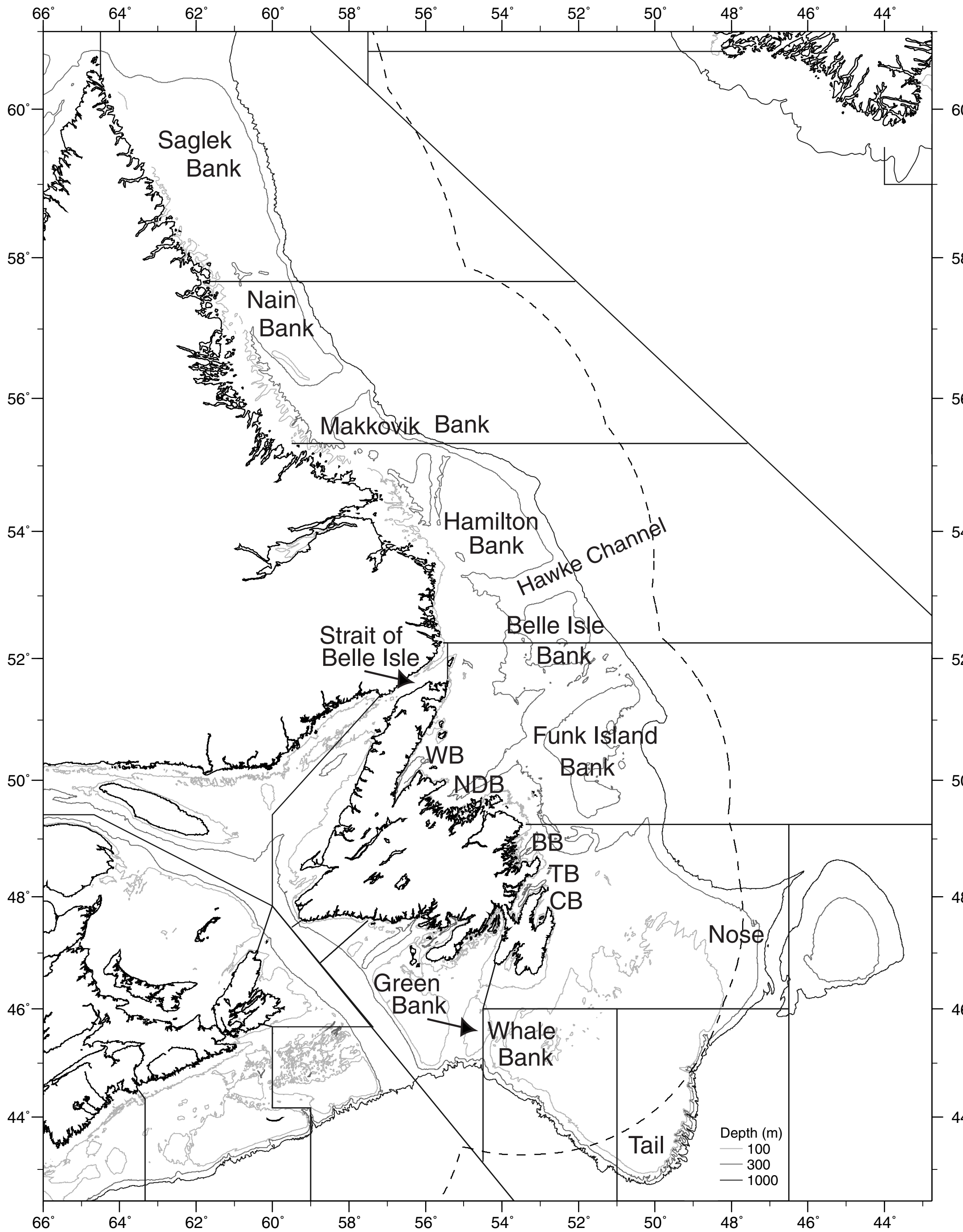


Figure 1b. Bathymetry, fishing banks, and major bays around eastern Newfoundland and Labrador. The dashed line is Canada's 200 nautical mile limit. WB=White Bay, NDB=Notre Dame Bay, BB=Bonavista Bay, TB=Trinity Bay, and CB=Conception Bay.

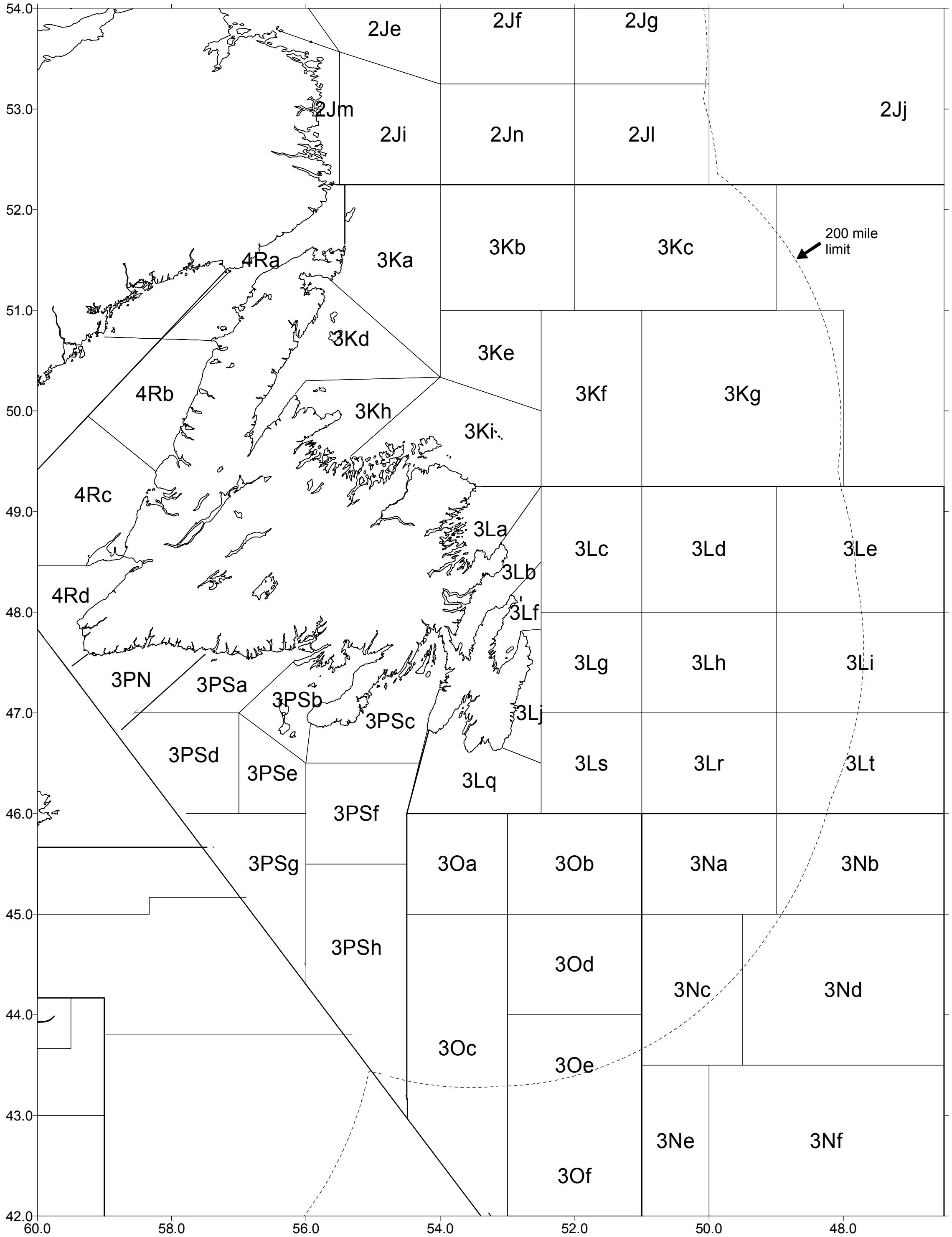


Figure 1c. Boundaries of commercial fishery statistical unit areas and Canada's 200 nautical mile limit (dotted line).

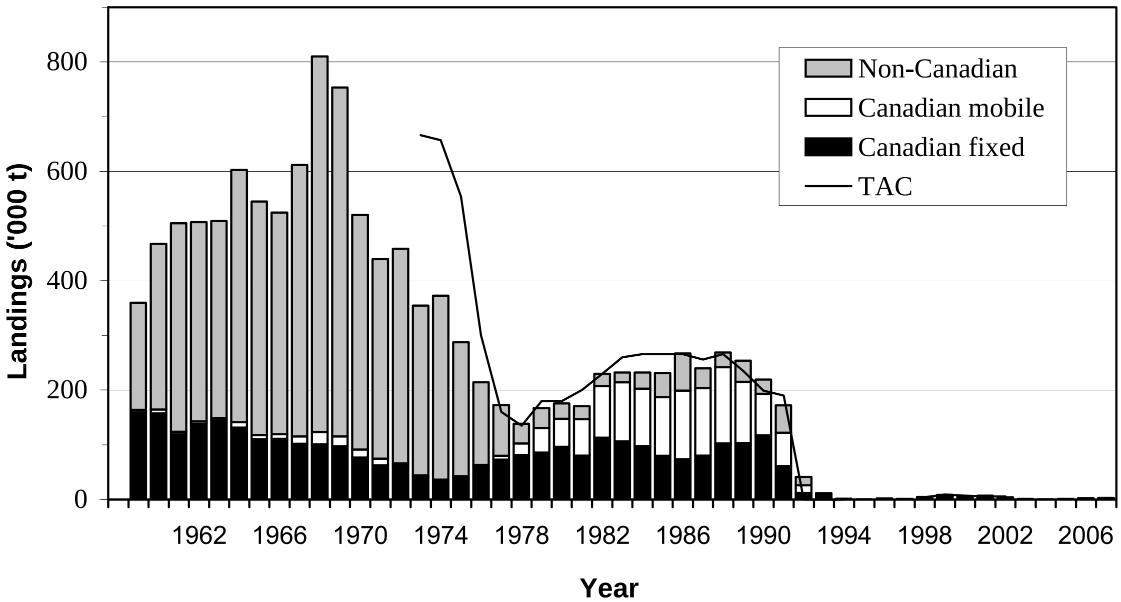


Figure 2. Total allowable catches (TACs) and reported landings (thousands of tons) of cod from 2J3KL by non-Canadian fleets and Canadian mobile gear (offshore) and Canadian fixed gear (mainly inshore).

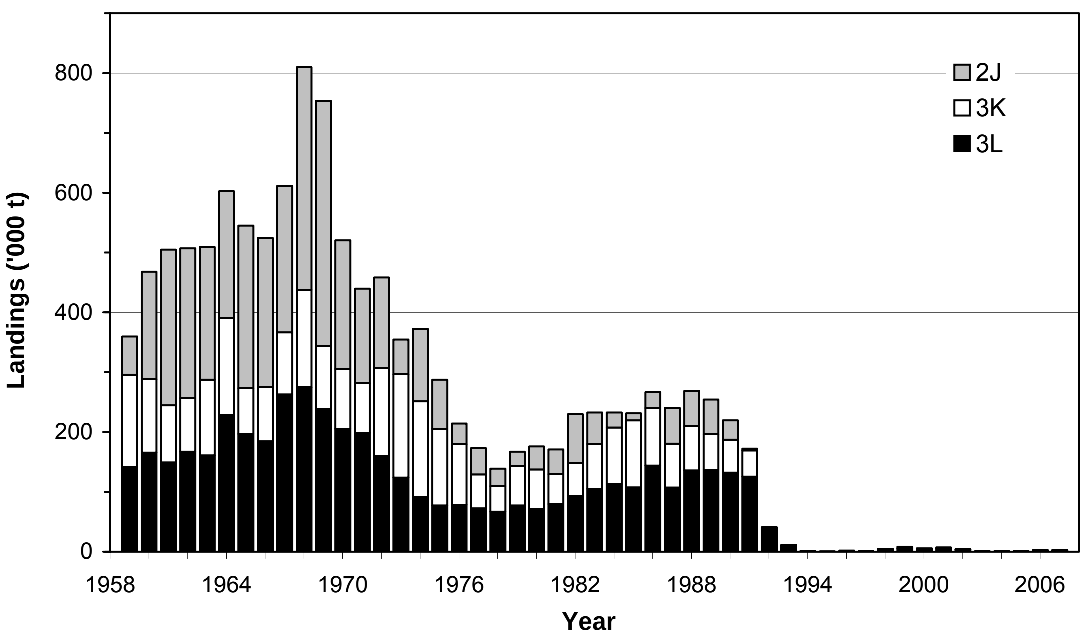


Figure 3. Reported landings of cod (thousands of tons) from 2J3KL by NAFO Division.

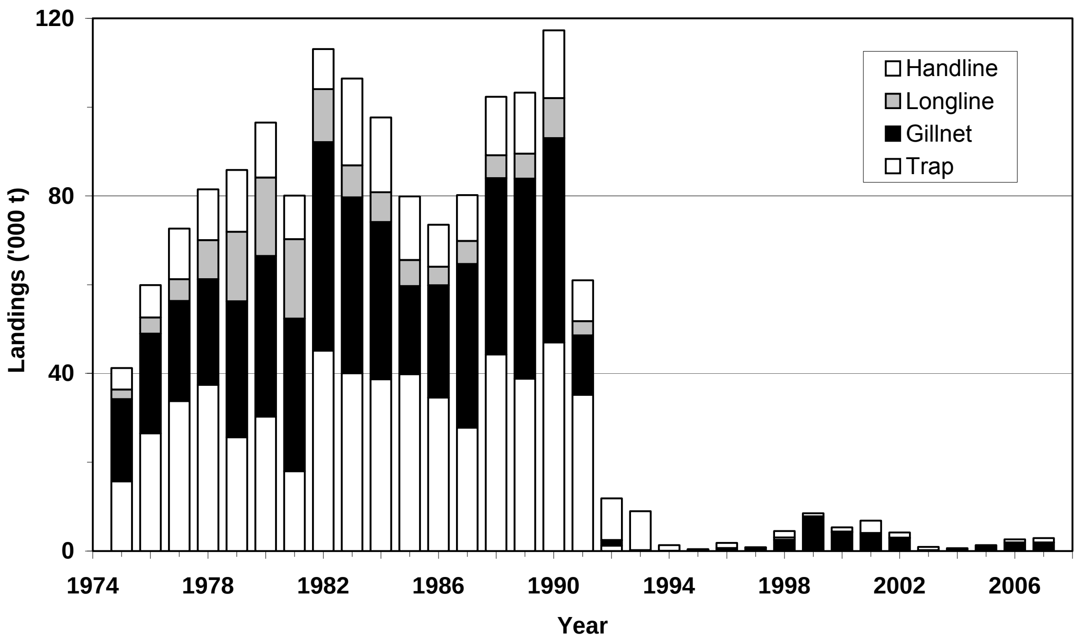


Figure 4. Reported fixed gear landings (thousands of tons) of cod from 2J3KL by gear type.

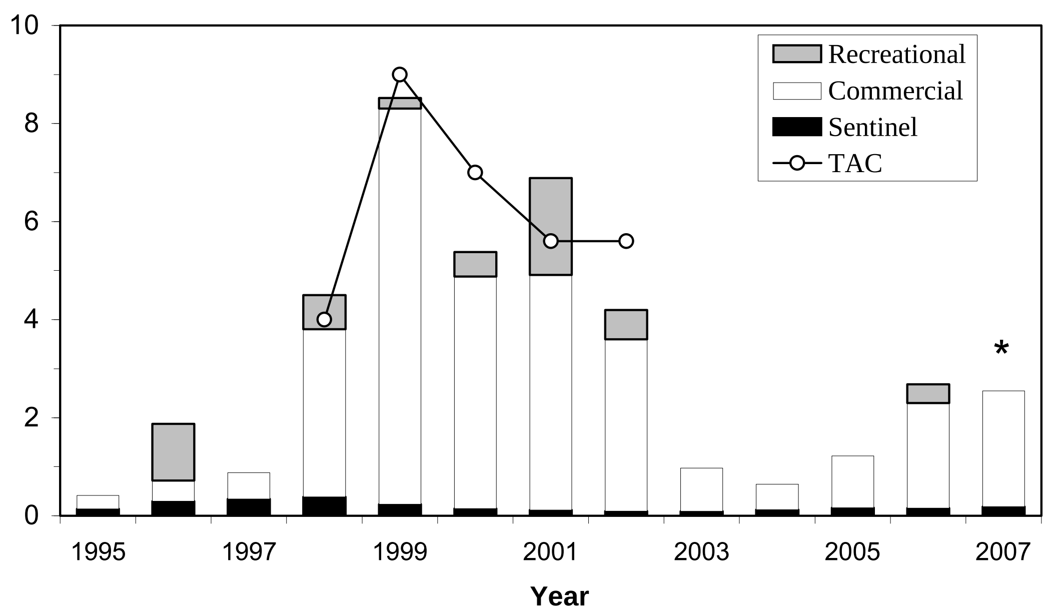


Figure 5. Total allowable catches (TACs) and reported inshore fixed-gear landings (thousands of tons) of cod from 2J3KL for the inshore fishery (1995-2007). Most of the landings in 2003 came from a mass mortality of cod in Smith Sound, Trinity Bay in April. The asterisk indicates that the 2007 value excludes the recreational catch which has not been determined.

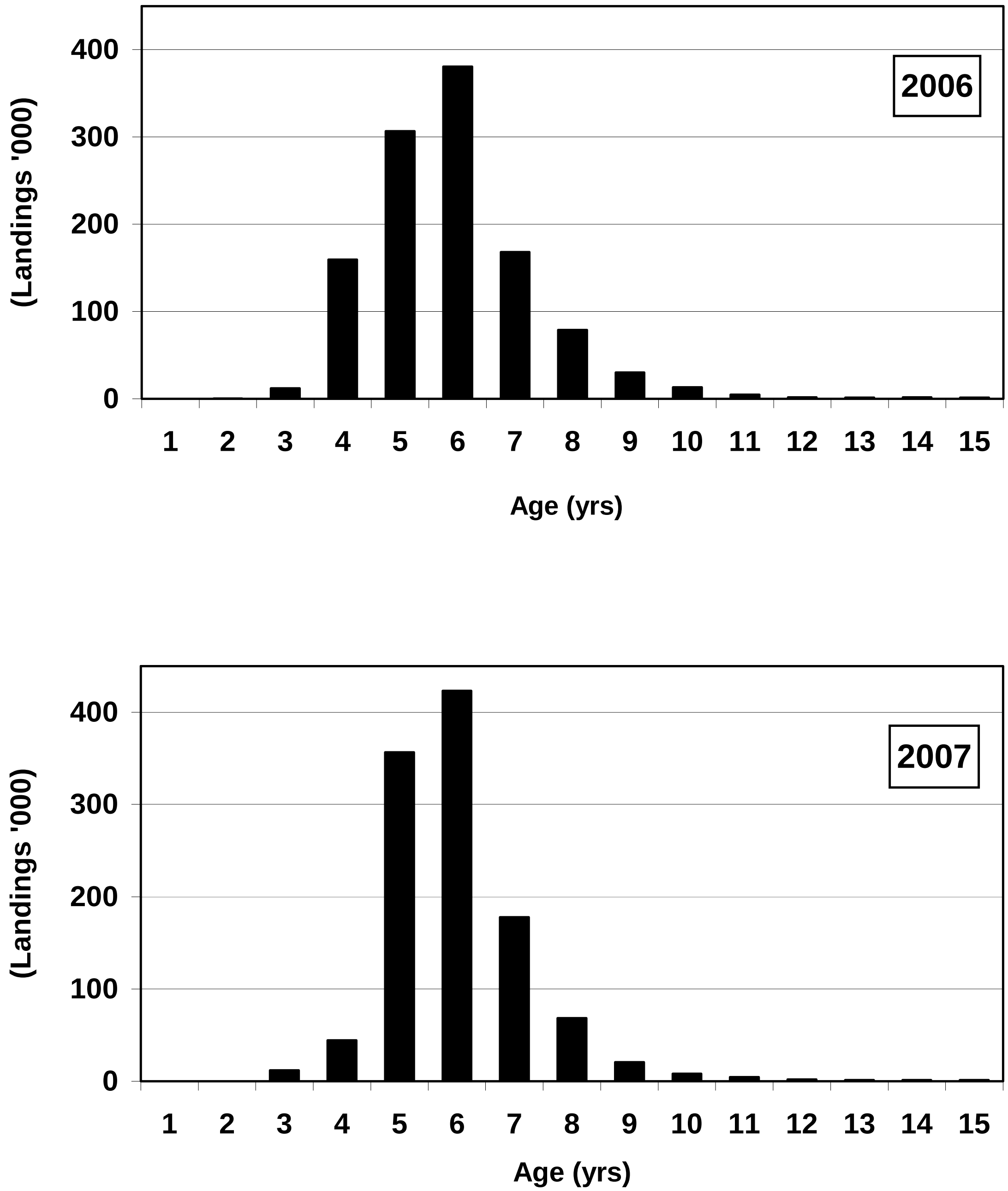
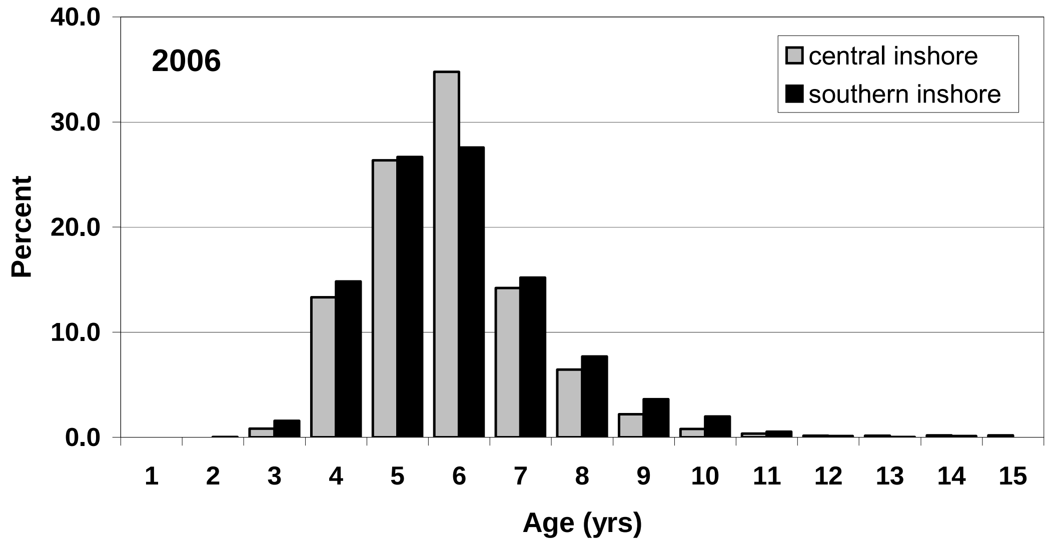


Figure 6. The estimated catch at age for cod in 2J3KL from all gears combined during 2006 (upper panel) and 2007 (lower panel).



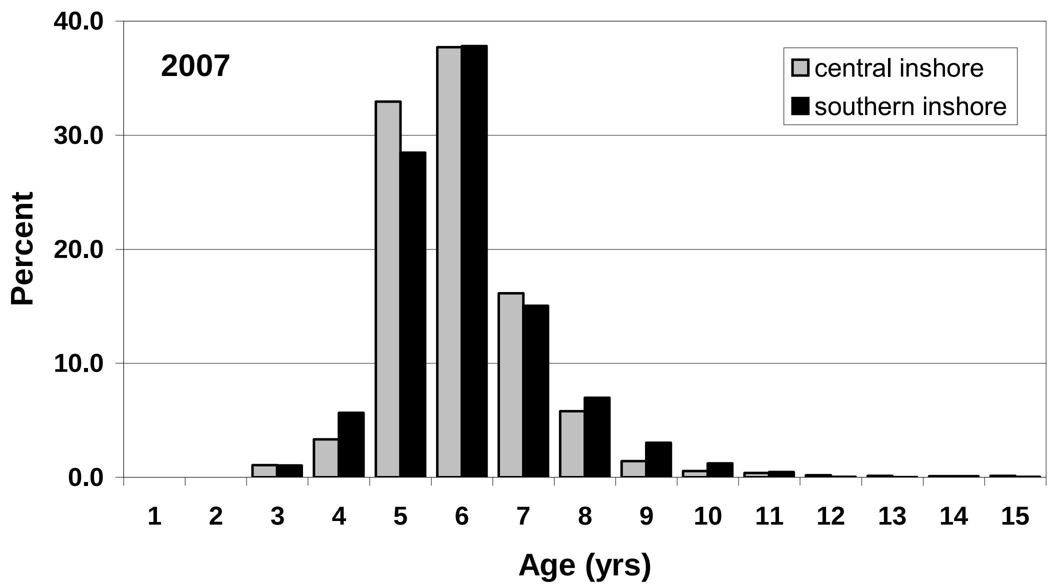


Figure 7. Comparison of catch at age for cod from the inshore central area versus inshore southern area during 2006 and 2007.

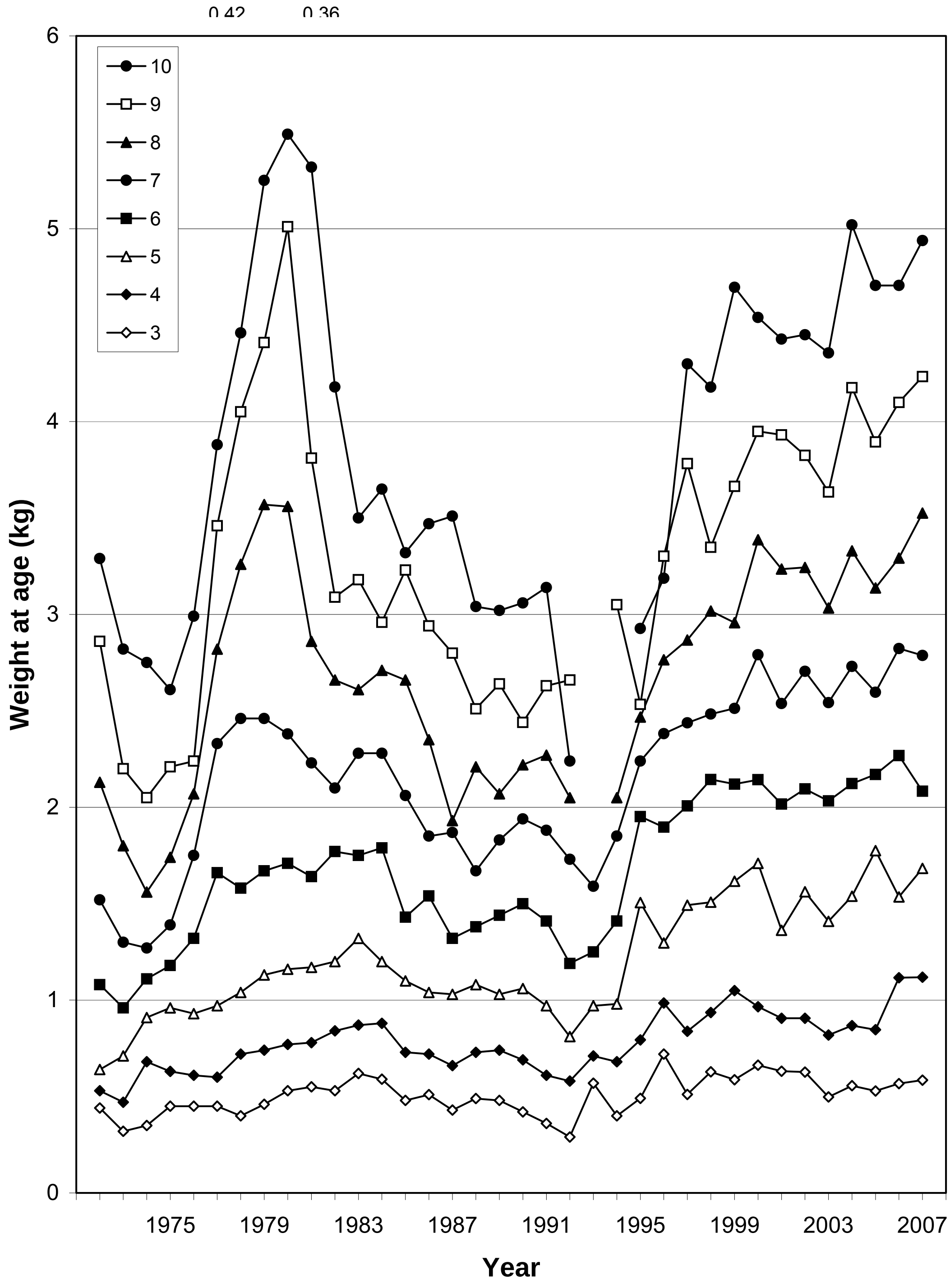


Figure 8. Mean weights-at-age of cod from 2J3KL calculated from mean lengths-at-age in the catch from 1972 onwards. Values for 8 and 9 yrs in 1993 were anomalous and are omitted. Note that much of the landings prior to the 1993 moratorium came from otter trawling offshore early in the year, but since the moratorium most of the catch has come from fixed gear inshore in the second half of the year.

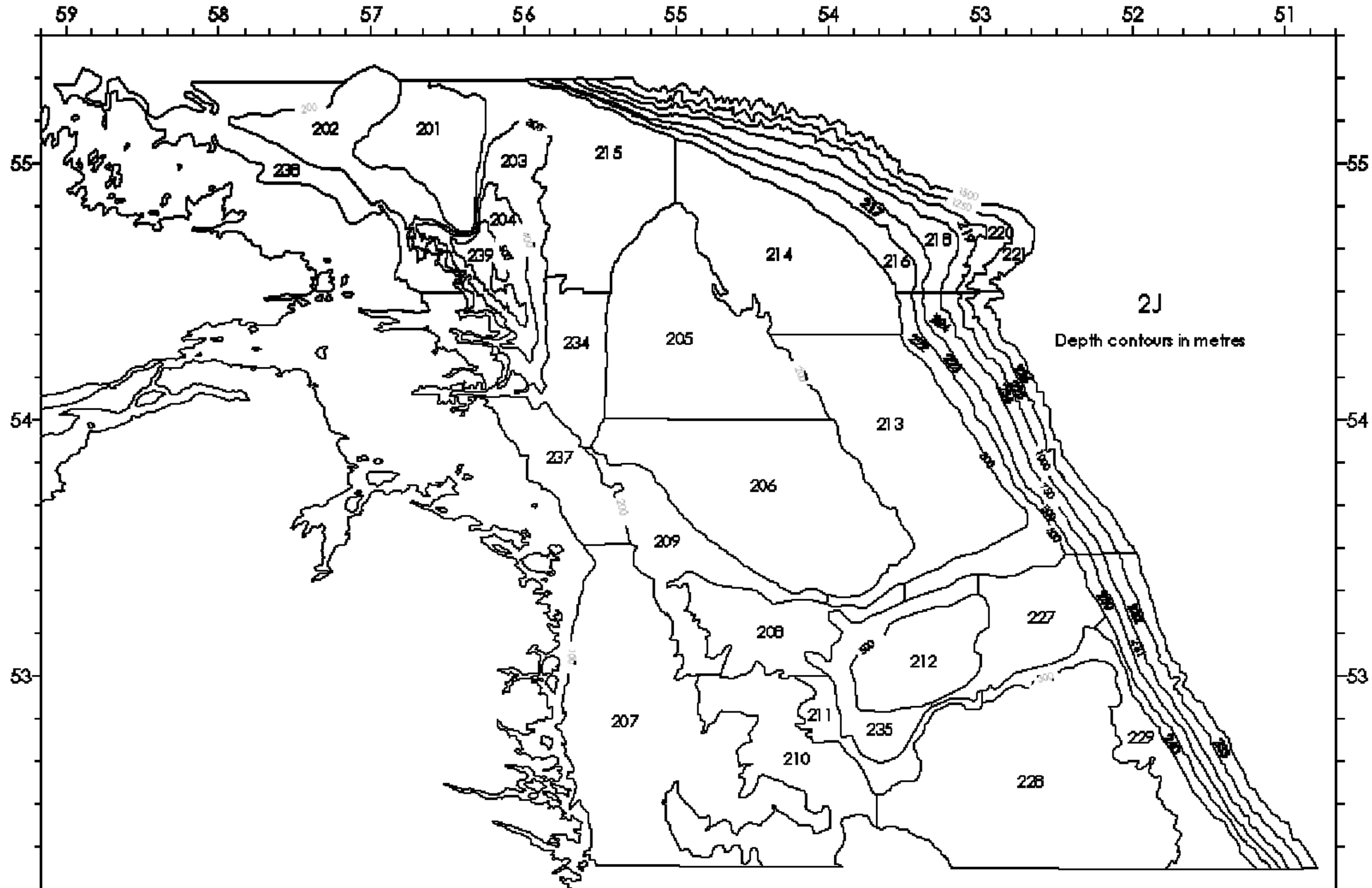


Figure 9. Boundaries and of strata used in research bottom-trawl surveys in NAFO Division 2J.

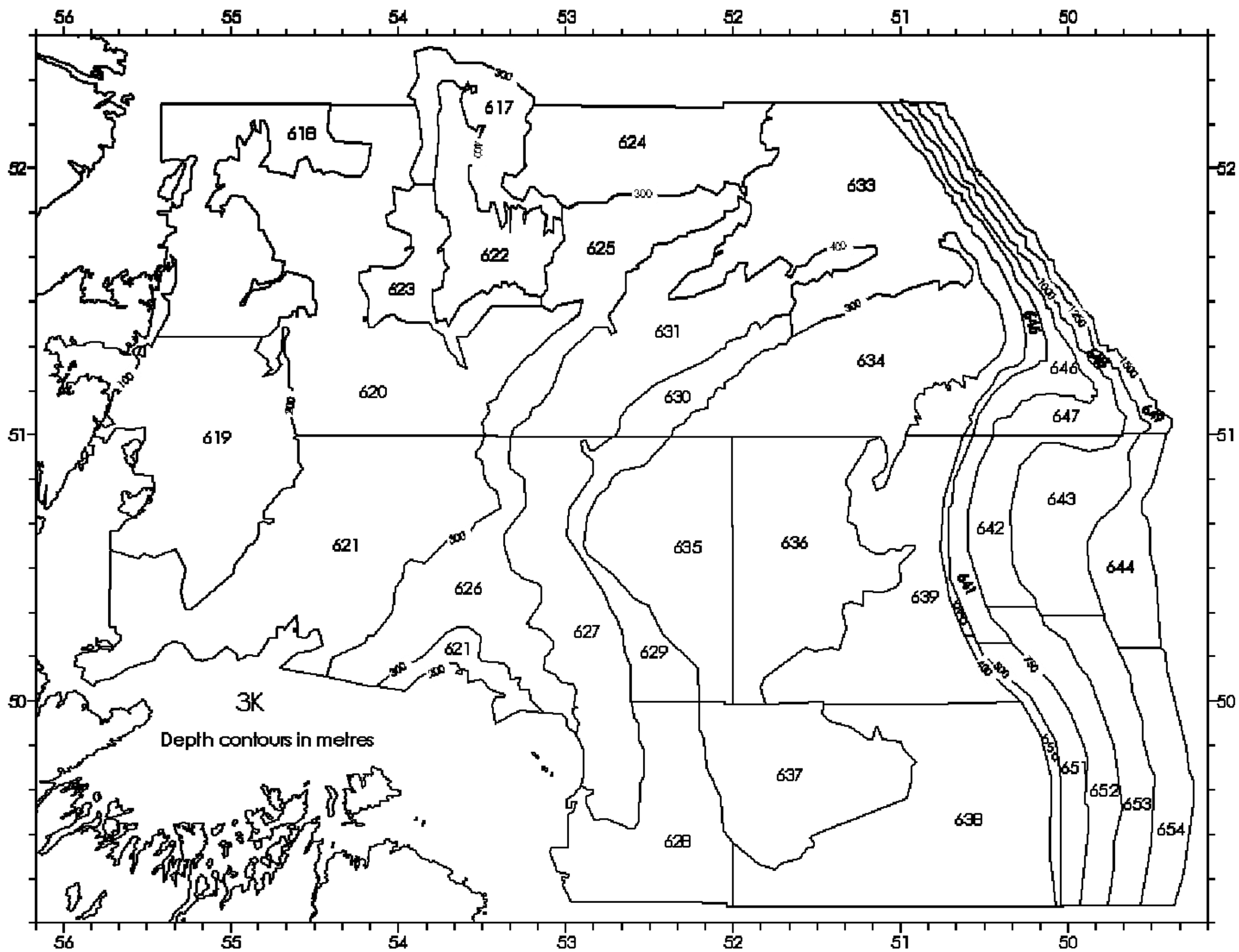


Figure 10. Boundaries of strata used in research bottom-trawl surveys in NAFO Division 3K.

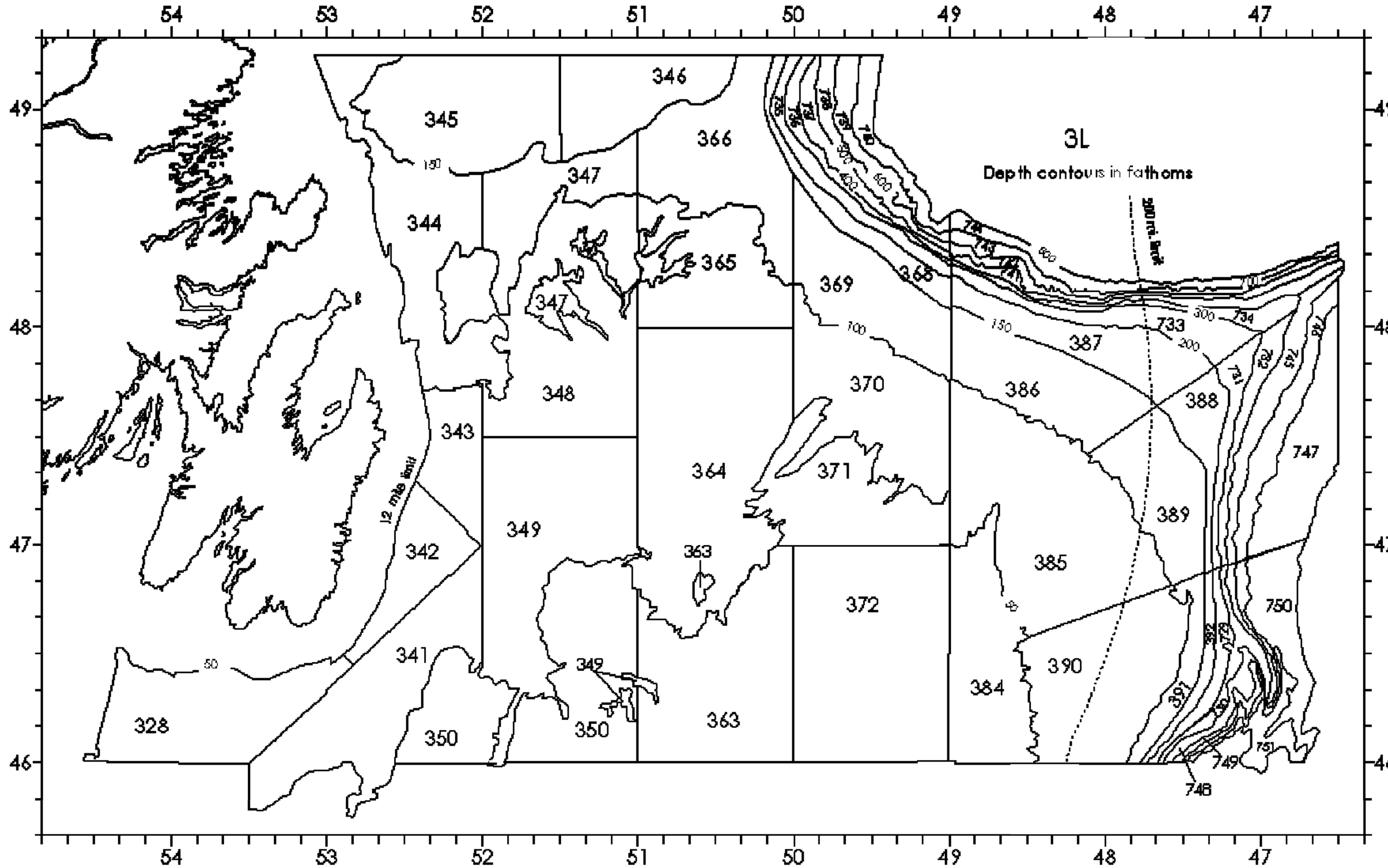


Figure 11. Boundaries of strata used in research bottom-trawl surveys in NAFO Division 3L.

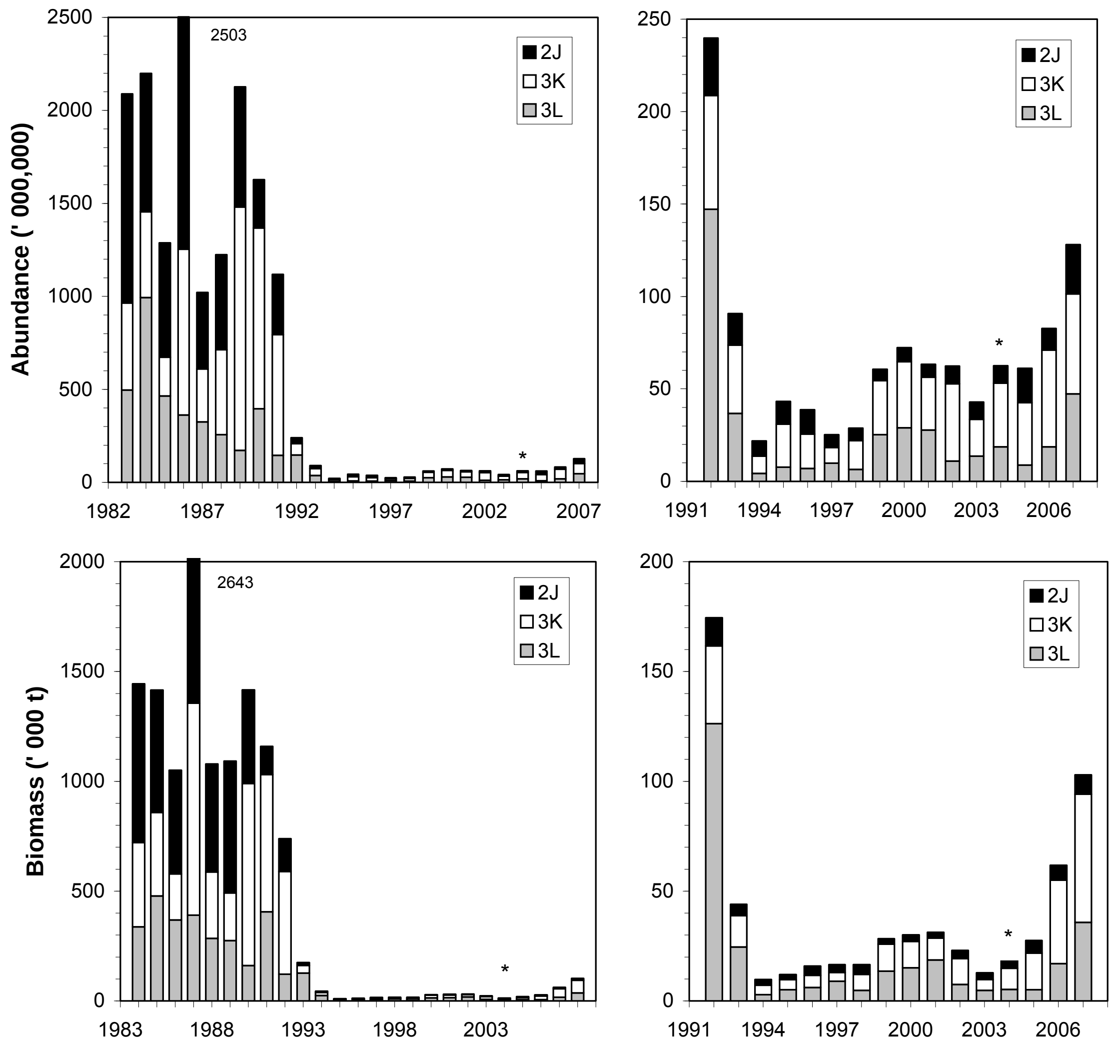


Figure 12. Trends in offshore indices of abundance (upper panels) and biomass (lower panels) of cod in NAFO Divs 2J3KL from autumn bottom trawl surveys. The right panels are expanded to show trends from 1992 onwards. Asterisks indicate partial estimates from incomplete survey coverage in 3L in 2004.

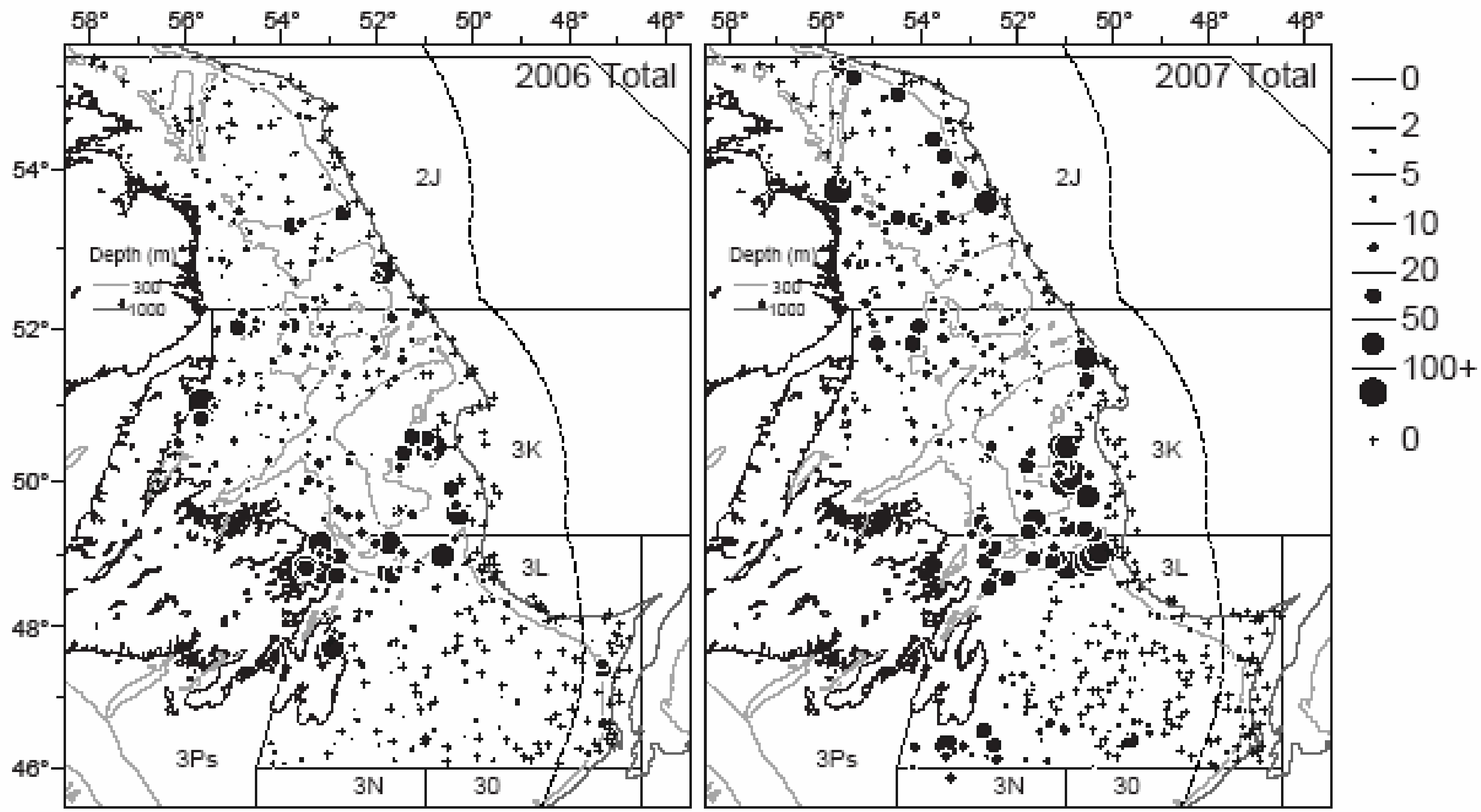


Figure 13. Cod distribution (number per standard tow) during the autumn research survey in NAFO Divs 2J+3KL in 2006 and 2007.

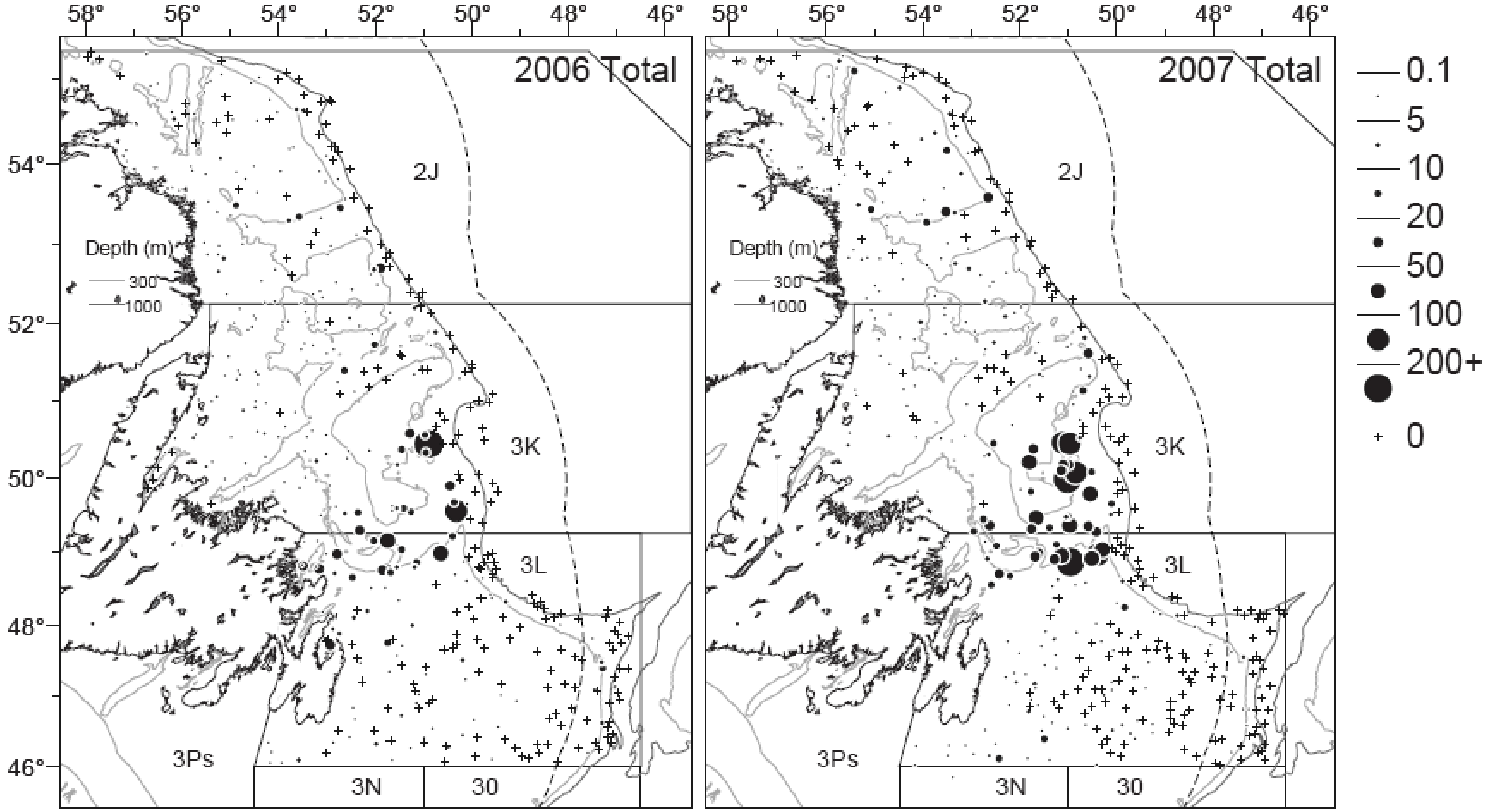


Figure 14. Cod distribution (total weight [kg] per standard tow) during the autumn research survey in NAFO Divs 2J+3KL in 2006 and 2007.

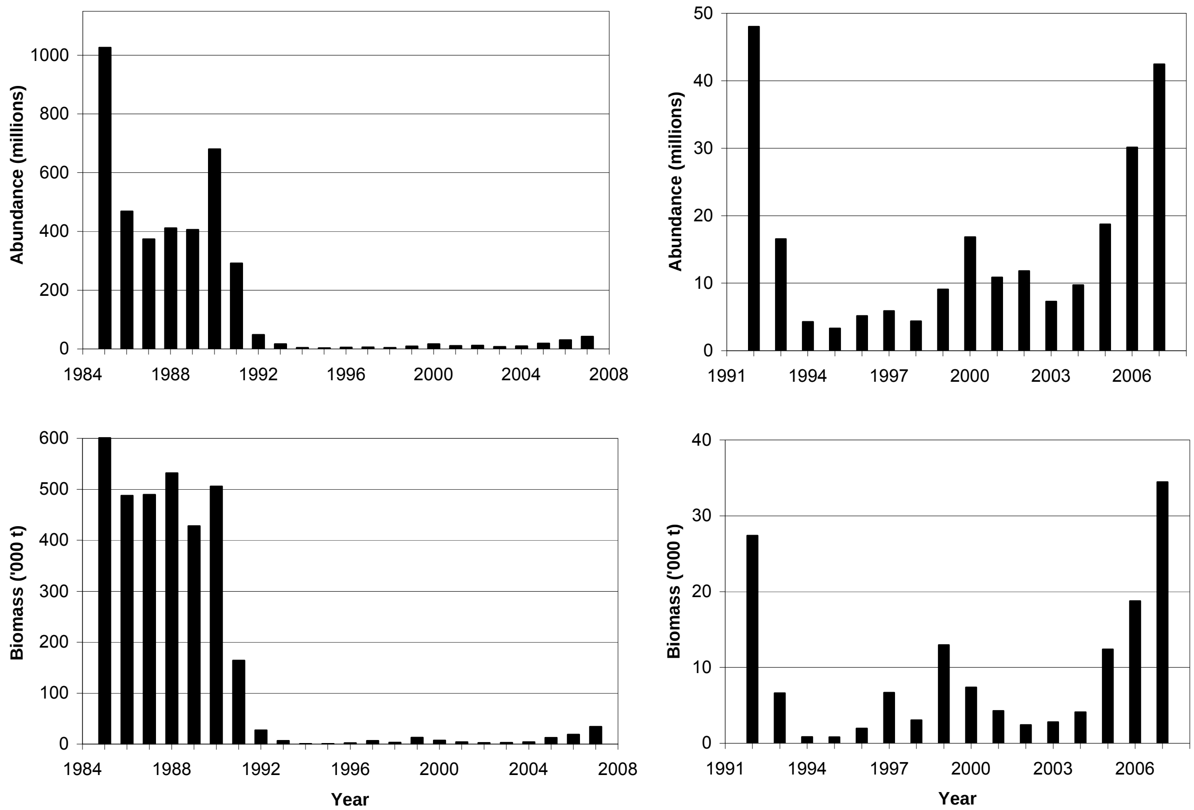
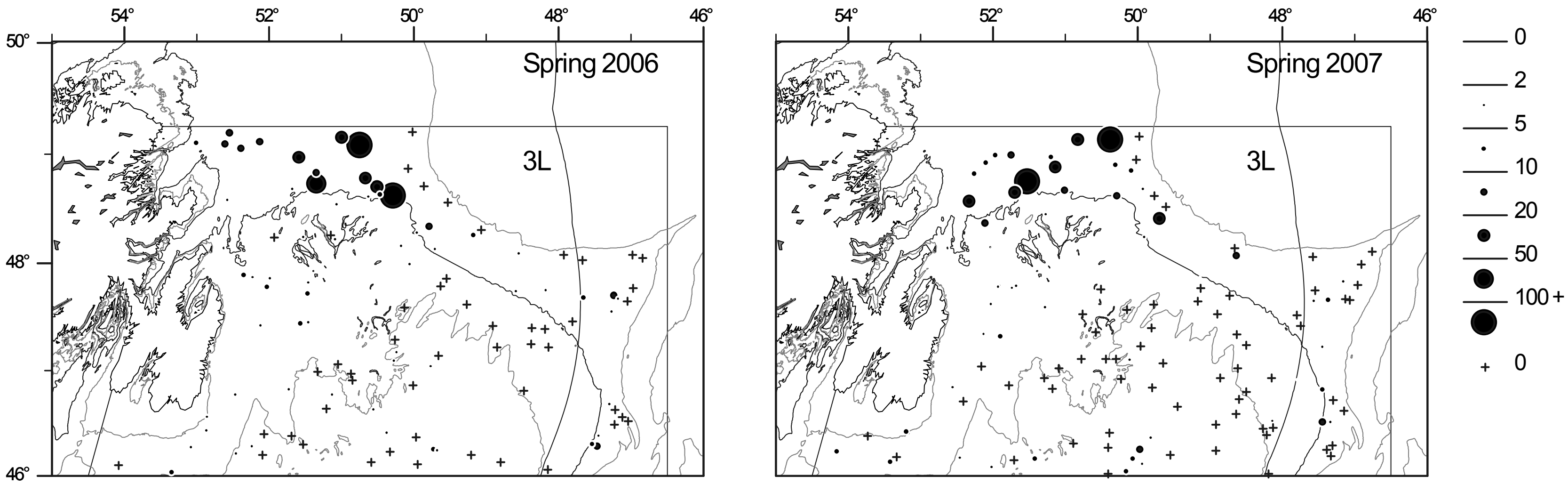


Figure 15. Indices of abundance (upper panels) and biomass (lower panels) from spring bottom-trawl surveys in NAFO Div. 3L. The scales on the right panels are expanded to show trends from 1992 onwards.

Figure 16. Cod distribution (number per standard tow) during the spring research survey in NAFO Div. 3L in 2006 and 2007.



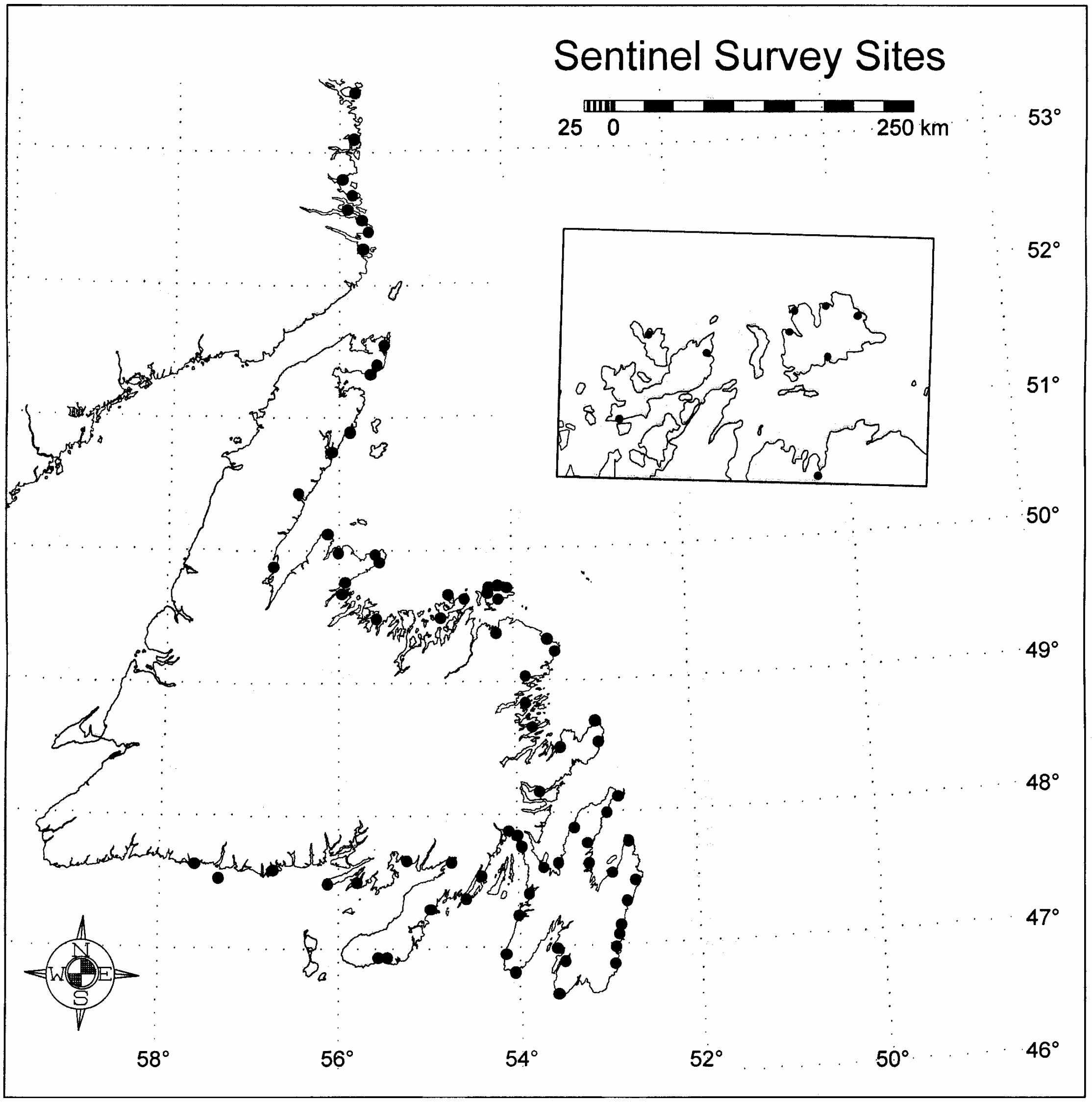


Figure 17. Sentinel survey sites around eastern and southern Newfoundland and southern Labrador. The inset shows sites in the Twillingate-Fogo area.

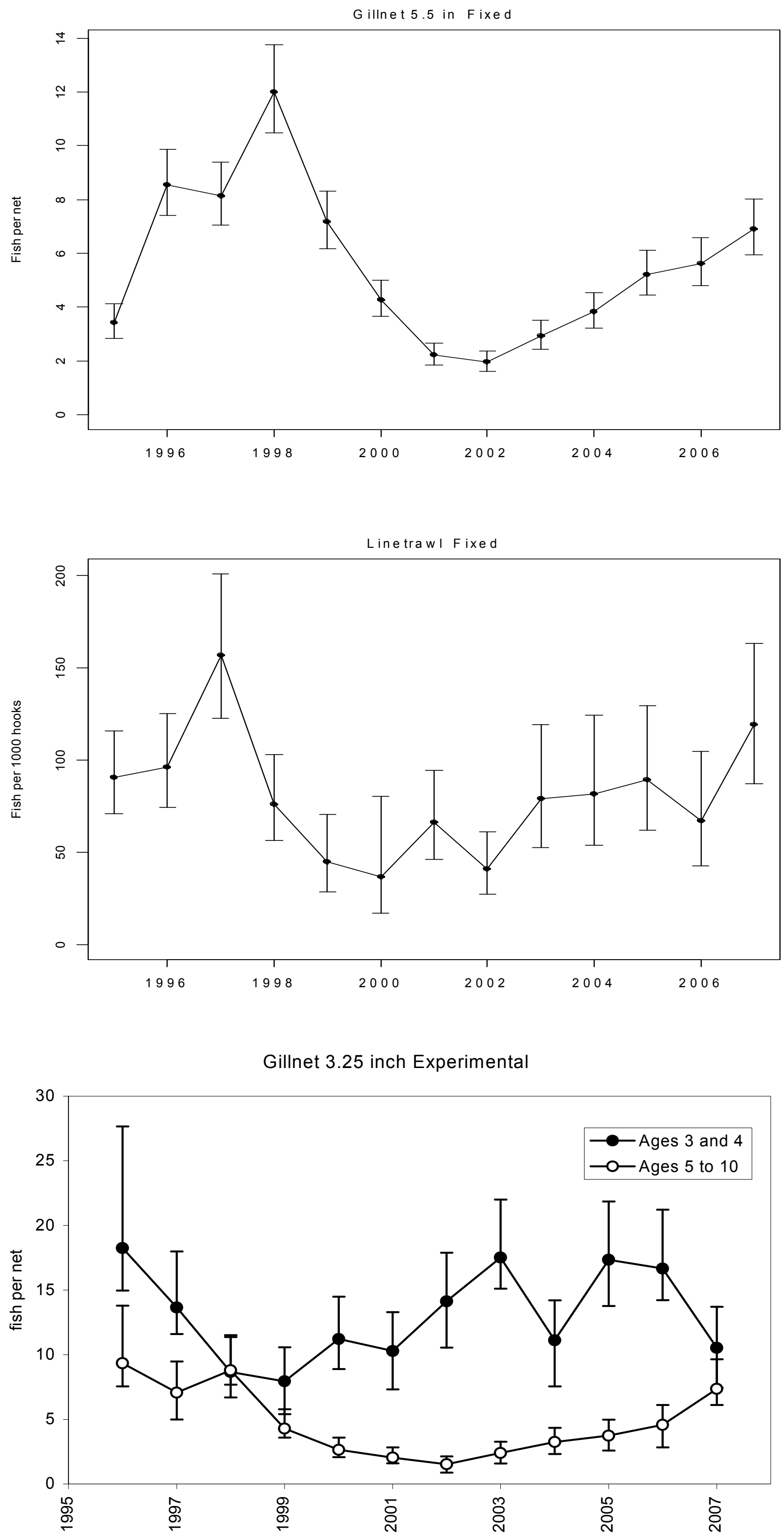


Figure 18. Standardized age-aggregated cod catch rate indices for gillnets (5½" mesh), linetrawls, and small mesh gillnets (3¼" mesh) (with 95% CL's) estimated using data from sentinel fishery sites in 2J3KL .

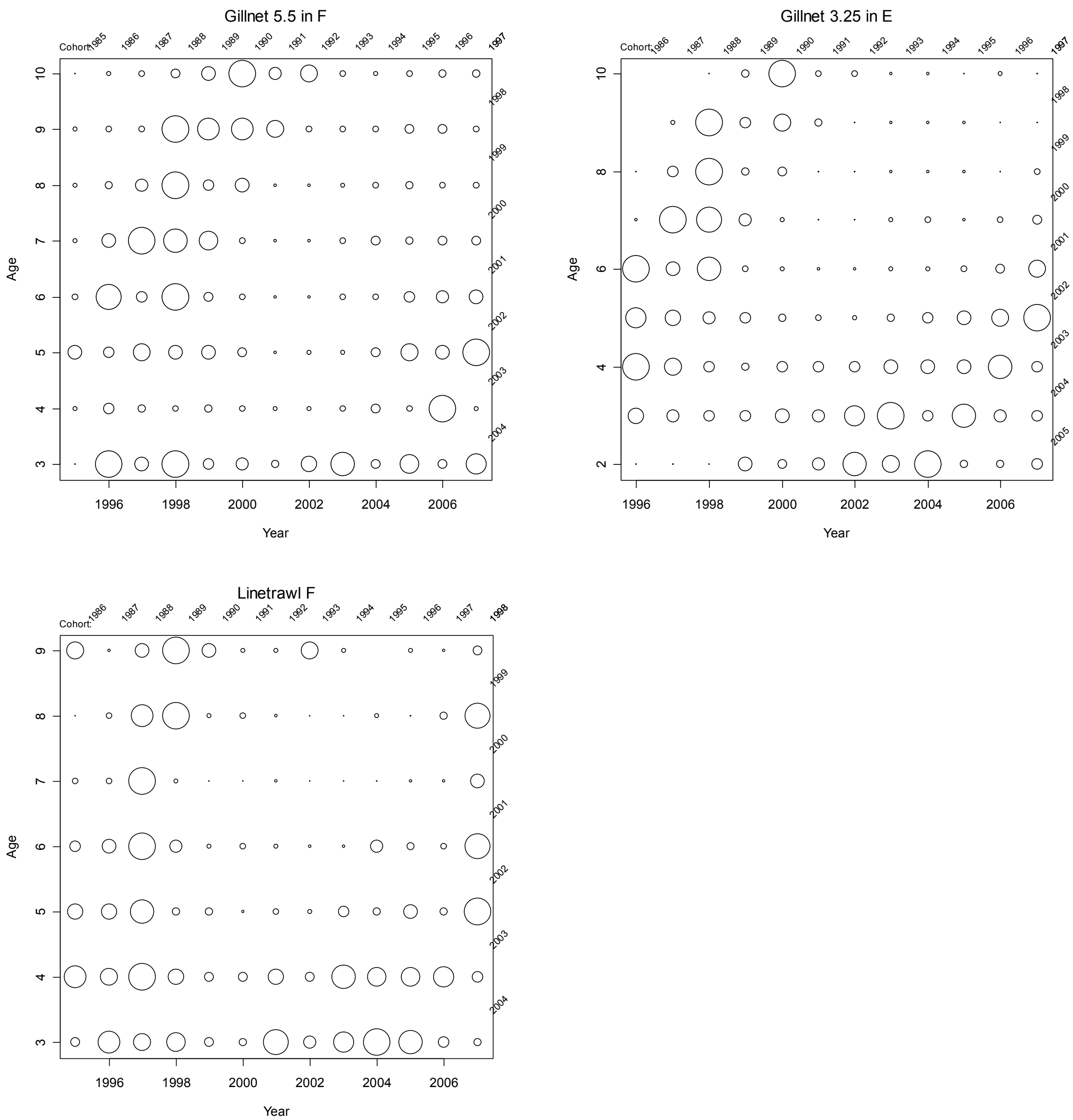


Figure. 19. Standardized age-disaggregated catch rate indices for gillnets (5½” mesh), linetrawls, and small mesh gillnets (3¼” mesh) estimated using data from sentinel fishery sites in 2J3KL. Catch rates are proportional to symbol area; values within each age were divided by the maximum within an age.

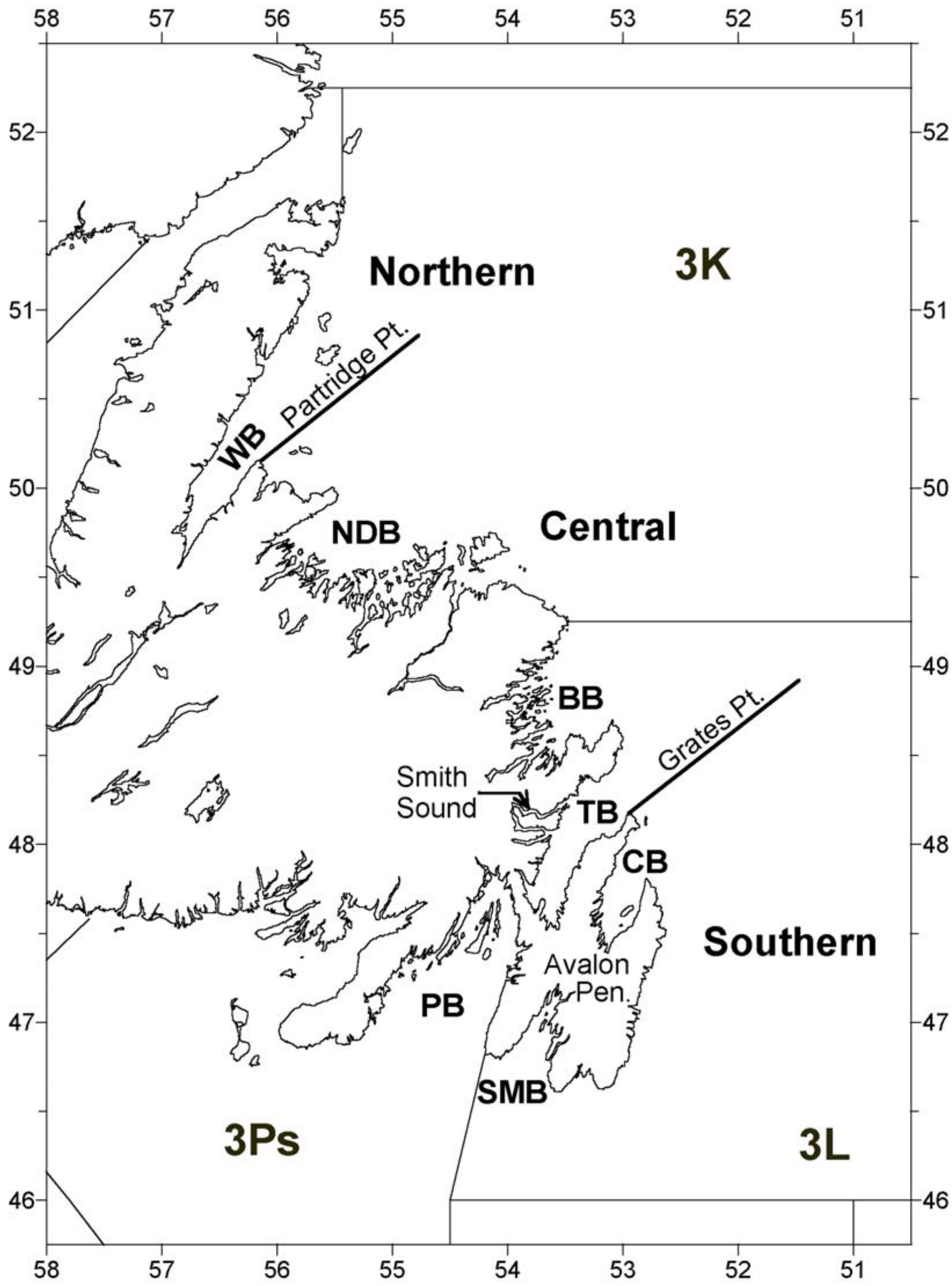


Figure 20. Eastern Newfoundland showing the boundaries of the inshore northern, inshore central and inshore southern areas as defined for the present assessment. WB=White Bay, NDB=Notre Dame Bay, BB=Bonavista Bay, TB=Trinity Bay, CB=Conception Bay and SMB=St. Mary's Bay; PB=Placentia Bay which is in Subdiv. 3Ps

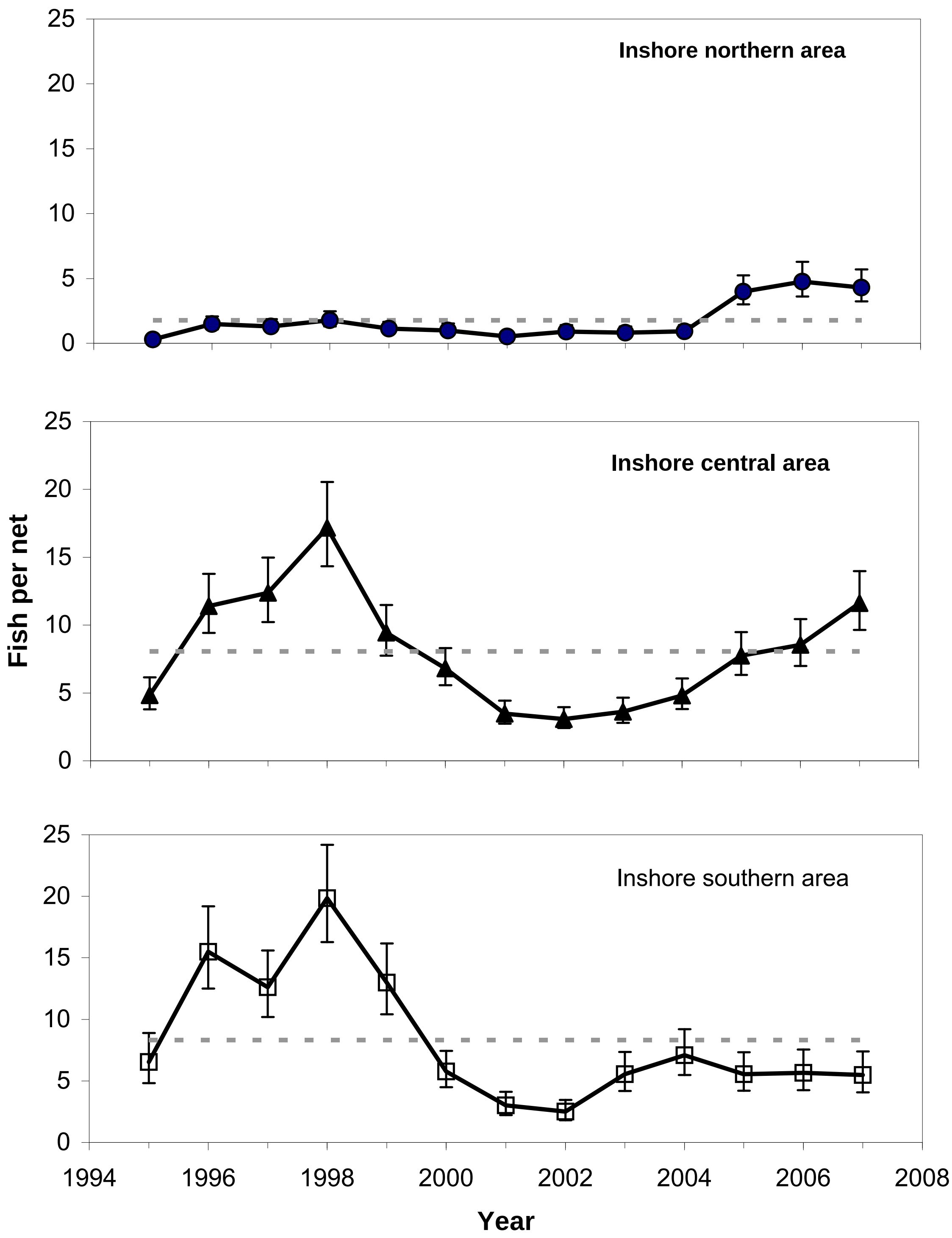


Figure 21. Comparison of standardized catch rates of cod (± 95% CL's) from sentinel surveys of three inshore regions of 2J3KL using 5½" mesh gillnets. Dashed grey lines indicate series means.

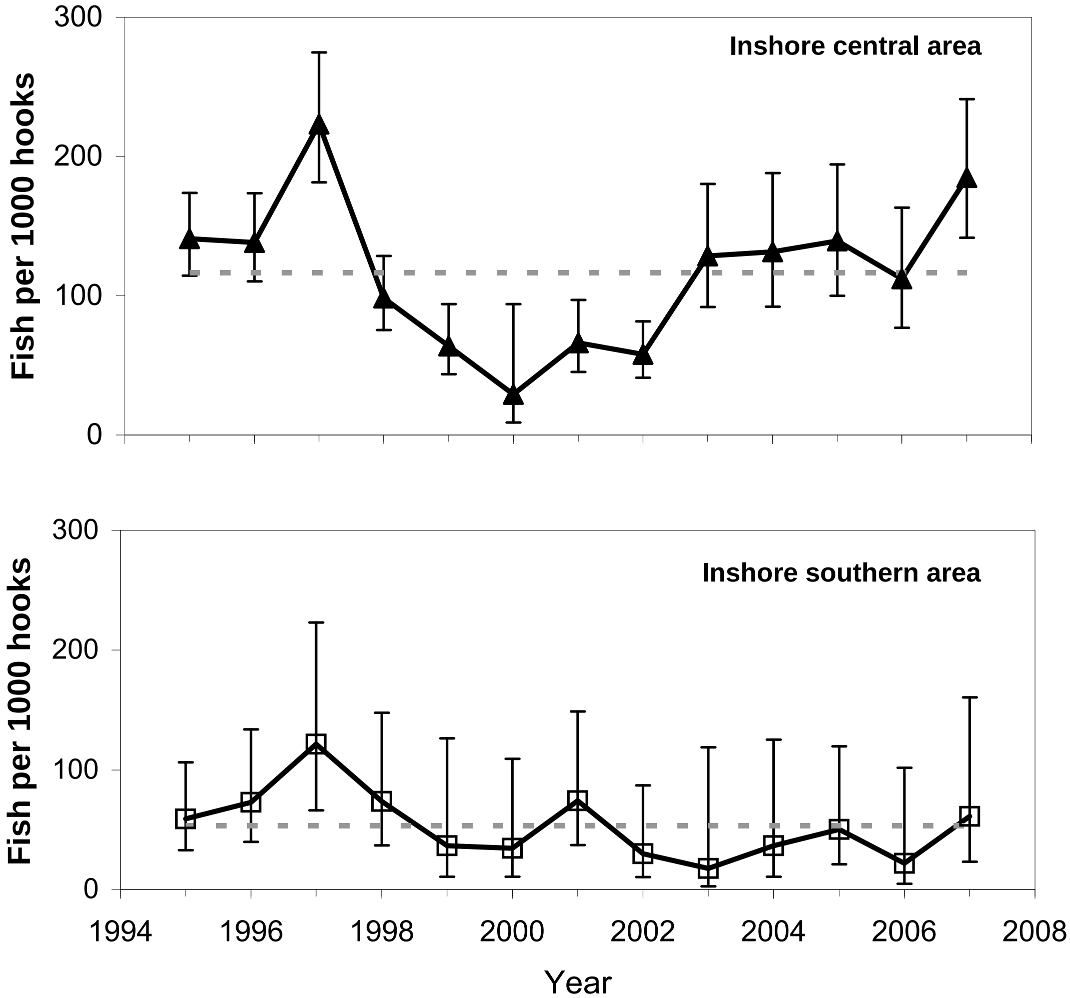


Figure 22. Comparison of standardized catch rates of cod (± 95% CL's) from sentinel surveys of two inshore regions of 3KL using linetrawls. Dashed grey lines indicate series means.

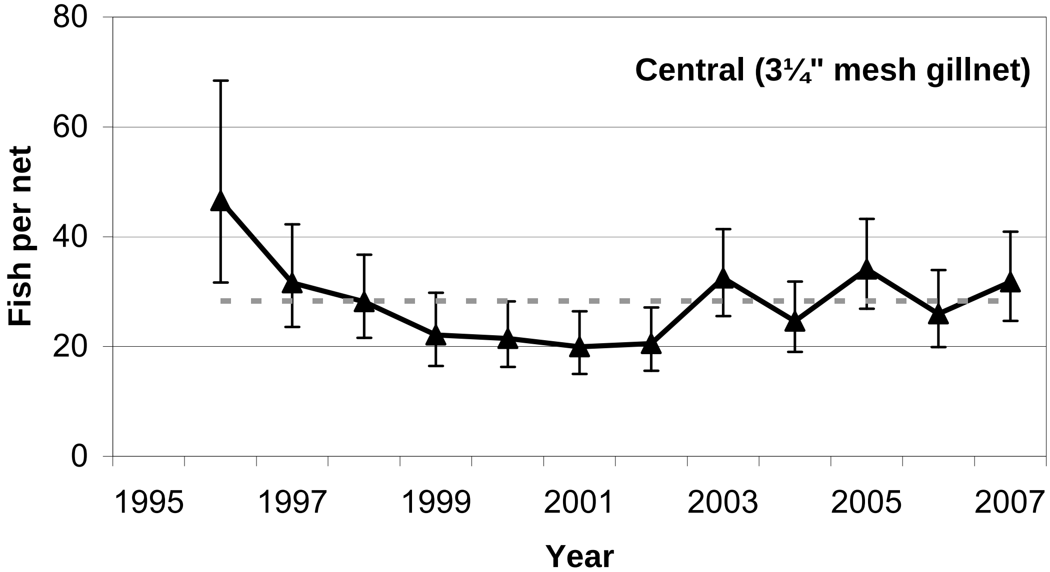


Figure 23: Standardized catch rates from sentinel surveys using small mesh (3¼ inch mesh) gillnets in the inshore central area**.**

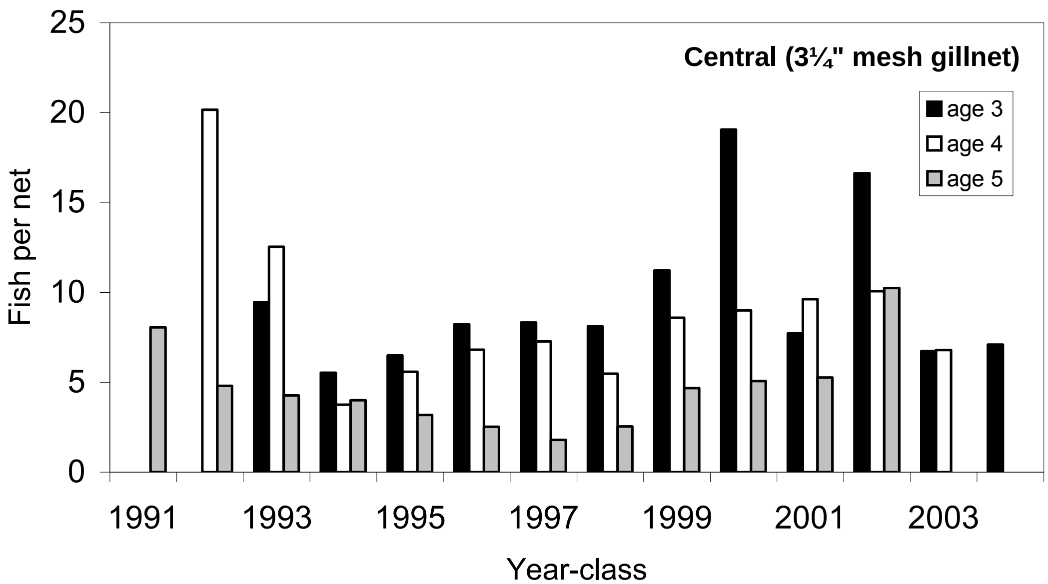
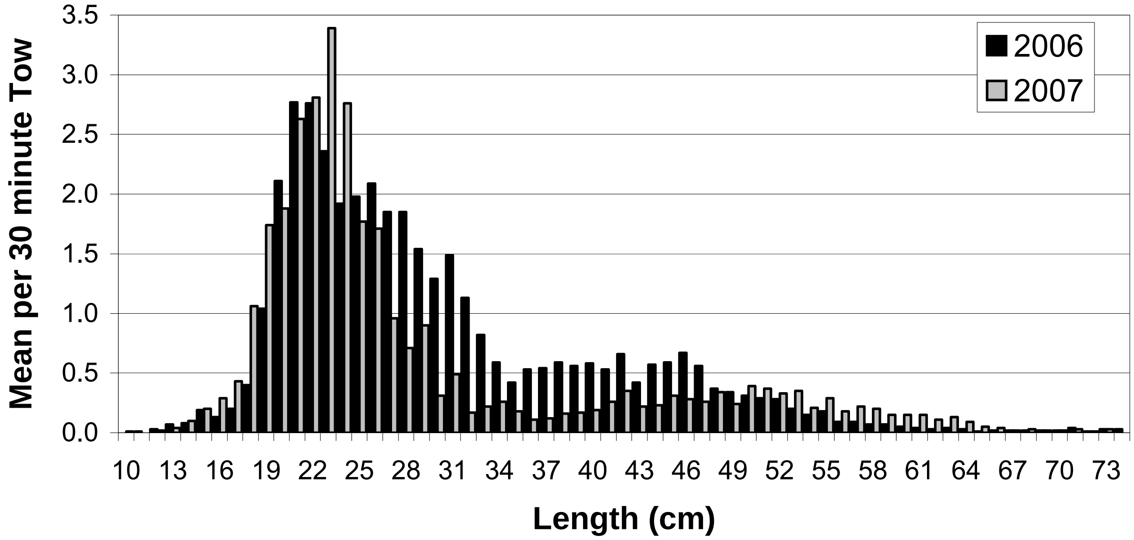


Figure 24. Standardized catch rates from sentinel surveys for ages 3-5 using small mesh (3¼”) gillnets for the inshore central area.

Figure 25. Trends in the numbers of age 1 cod from beach seine surveys in Newman Sound, Bonavista Bay.



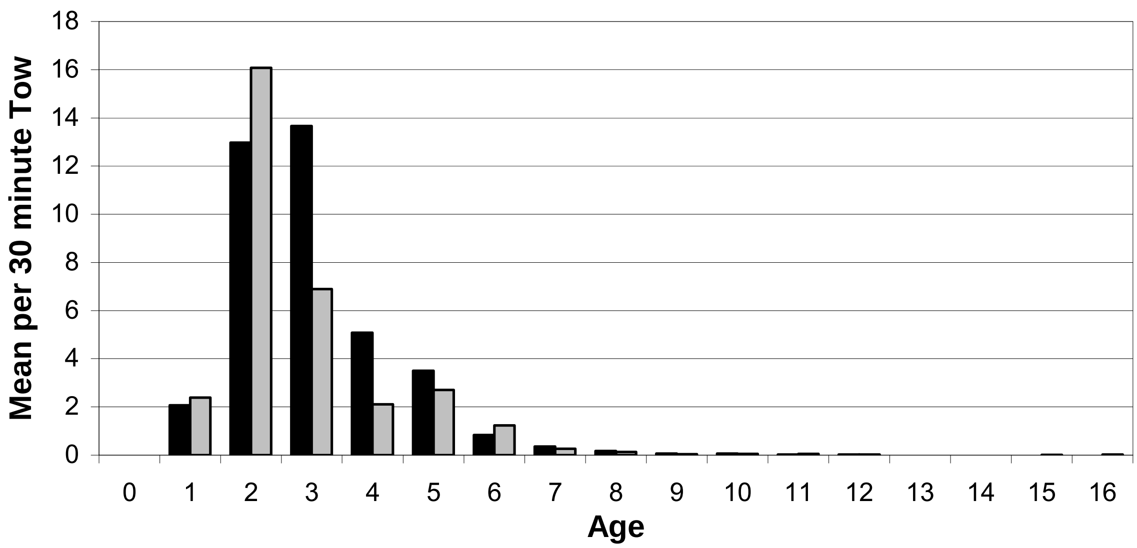


Figure 26. Comparison of the length composition (upper panel) and age composition (lower panel) of catches of cod from the DFO-Industry mobile gear survey of the near-shore of NAFO Div. 2J3KL during 2006 and 2007.

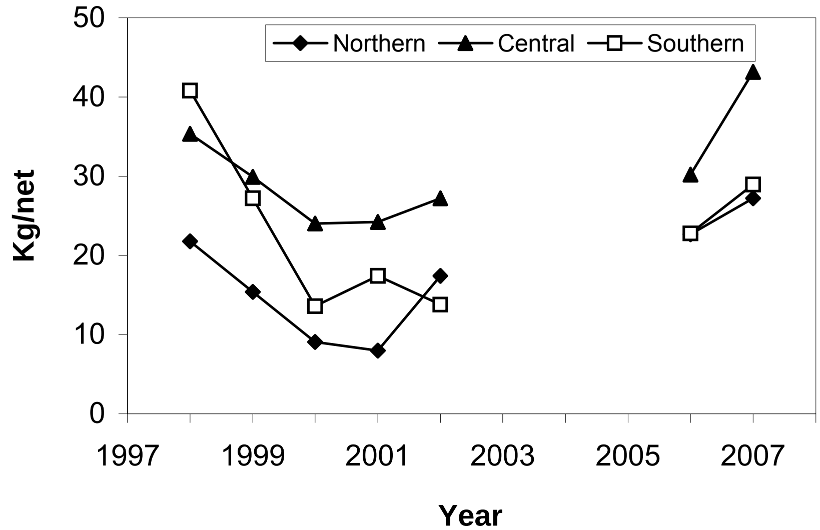


Figure 27: Median gillnet catch rates in three inshore areas from fixed gear logbooks. There was no directed cod fishery from 2003-2005.

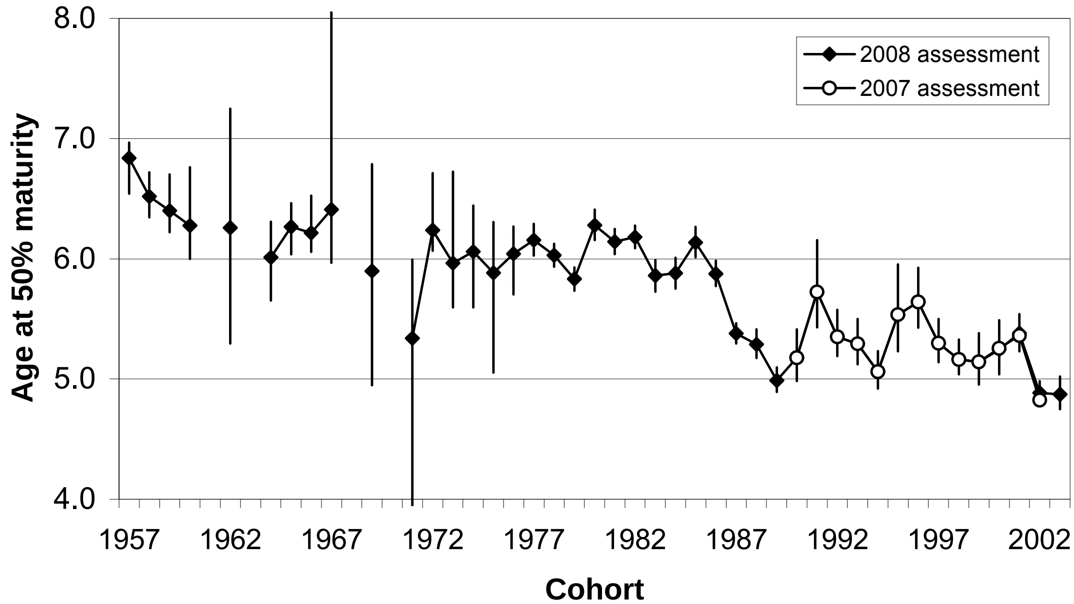


Figure 28. Age at 50% maturity (± 95% CI) by cohort for female cod in divisions 2J3KL combined based on sampling during autumn research bottom-trawl surveys. The open circles show the results from the previous assessment back to the 1990 cohort. See text for details

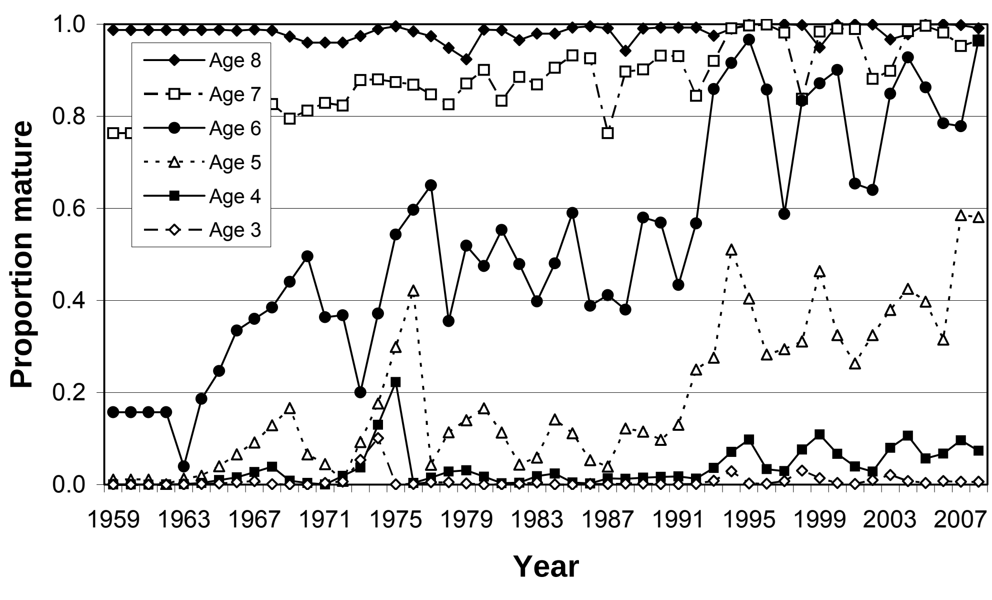


Figure 29. Estimated proportions mature at ages 3-8 for female cod from NAFO Div. 2J3KL combined. The percentage mature at age estimated from sampling during the autumn research bottom-trawl survey in year *t* is displayed for year *t*+1.

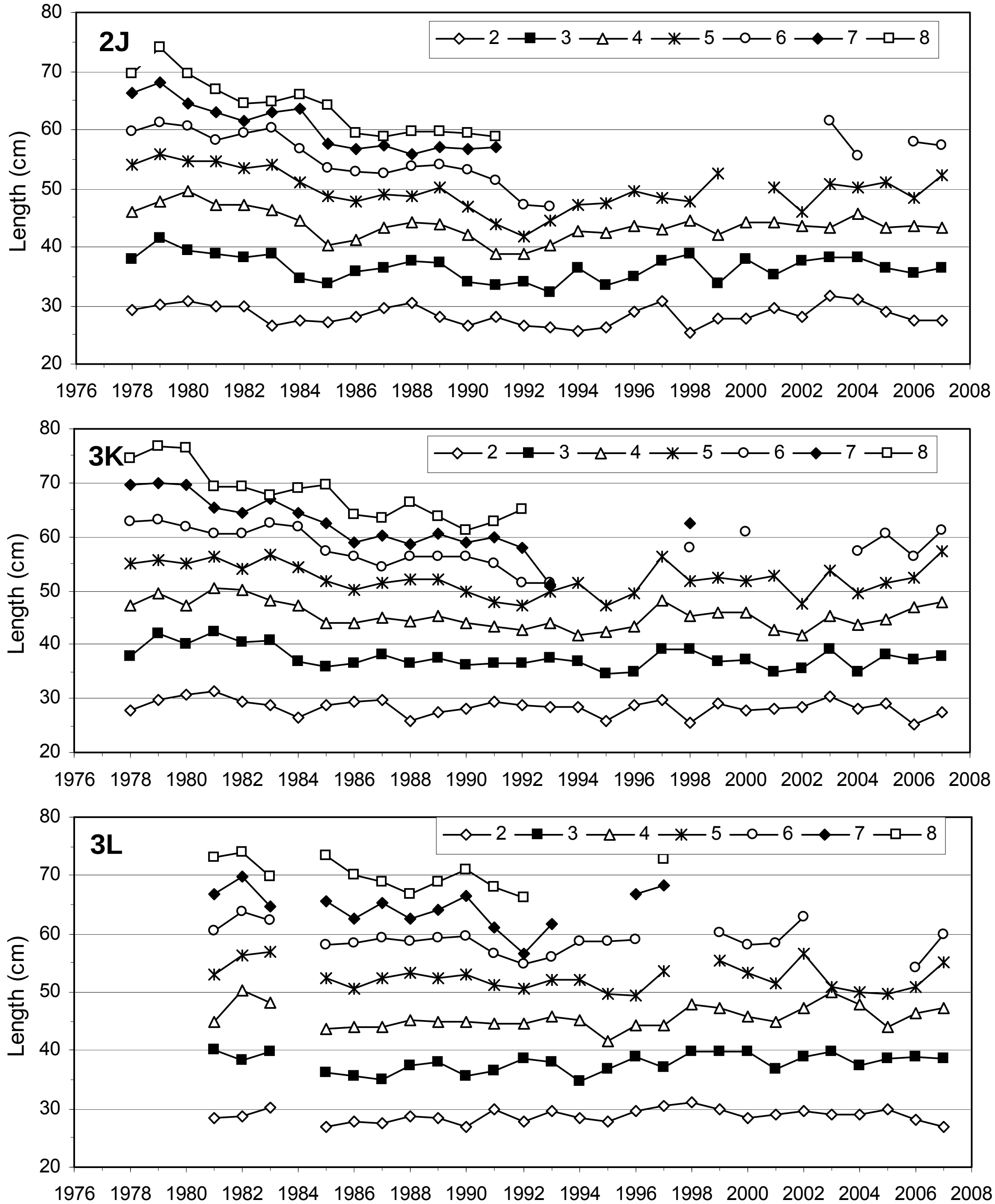


Figure 30a. Mean lengths (cm) at ages 2-8 of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

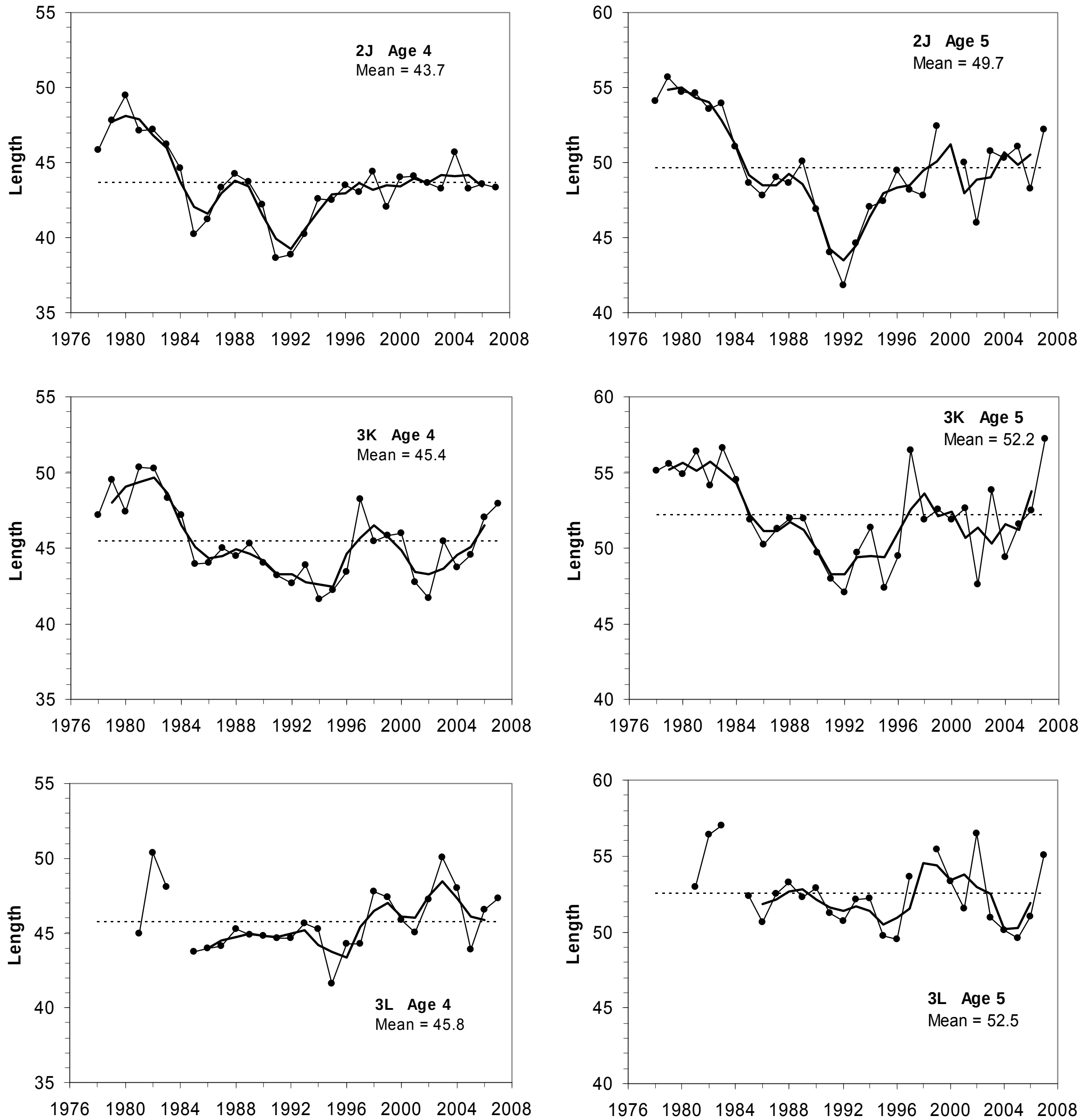


Figure 30b. Mean lengths (cm) at ages 4 and 5 of cod in Divisions 2J, 3K and 3L during 1978-2007 from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. The lines in each panel indicate the annual means (solid line with symbols), a 3-year moving average (heavy solid line) and the mean over all years for which there were observations (dashed line). There were no surveys in Division 3L in 1978-1980 and 1984.

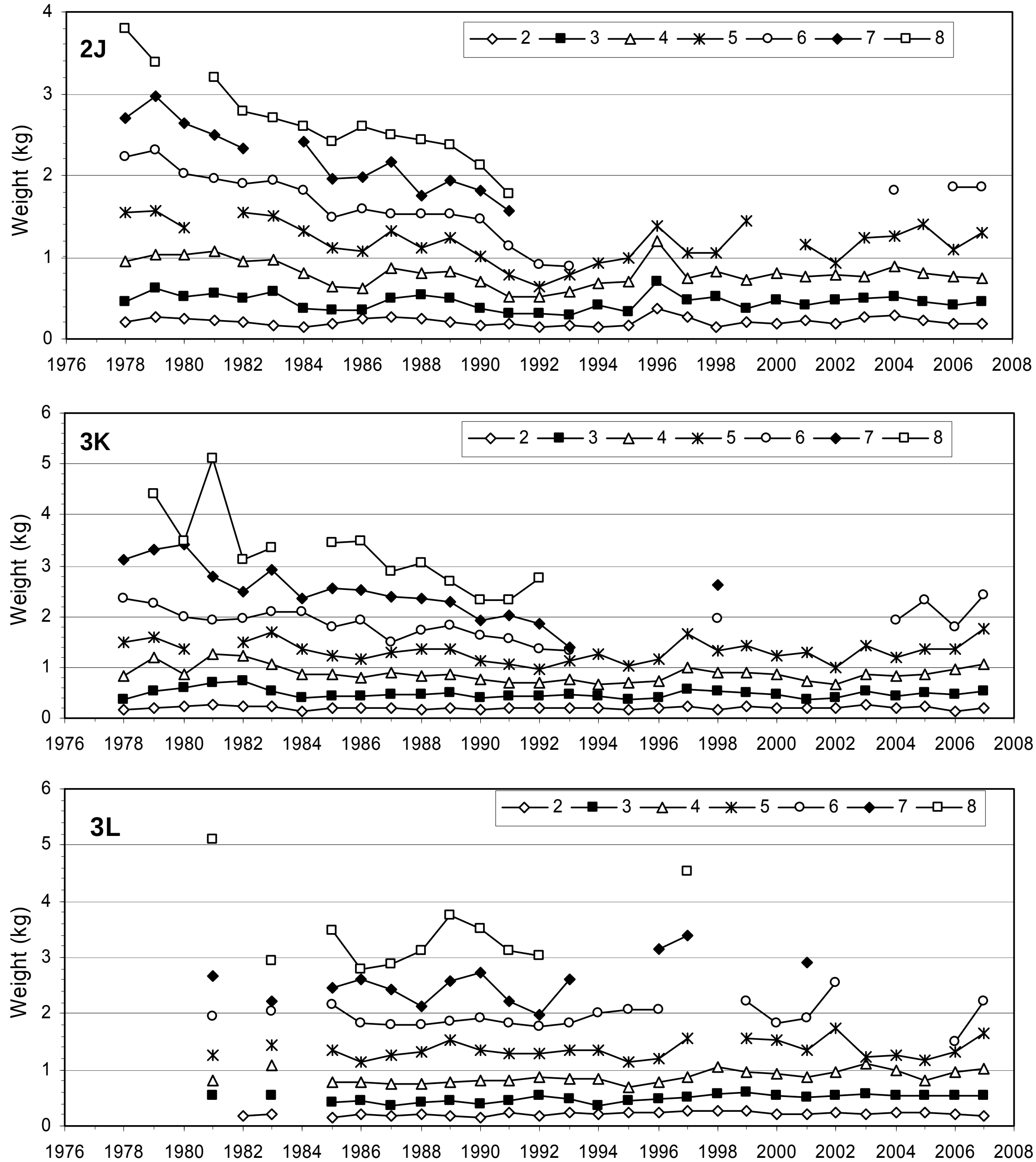
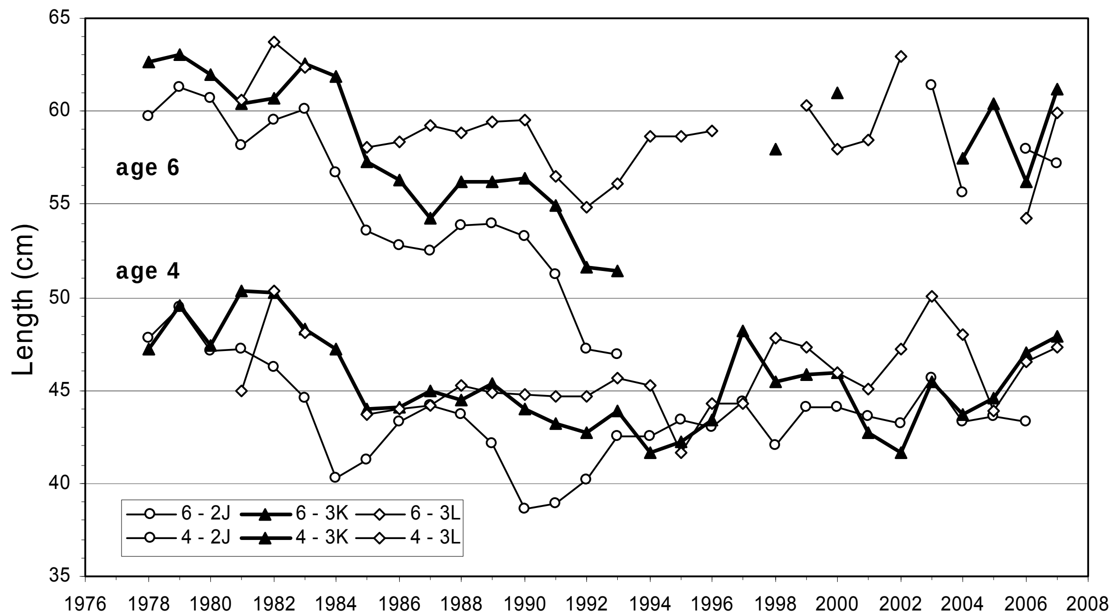


Figure 31. Mean weights at ages 2-8 of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.



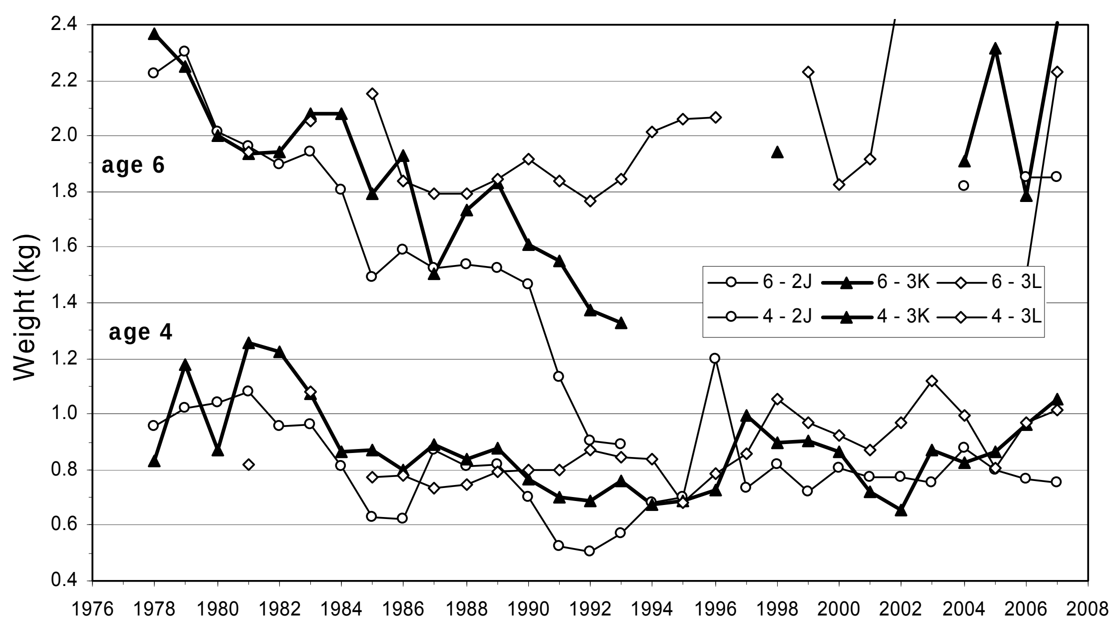


Figure 32. Mean lengths and weights at ages 4 and 6 of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984

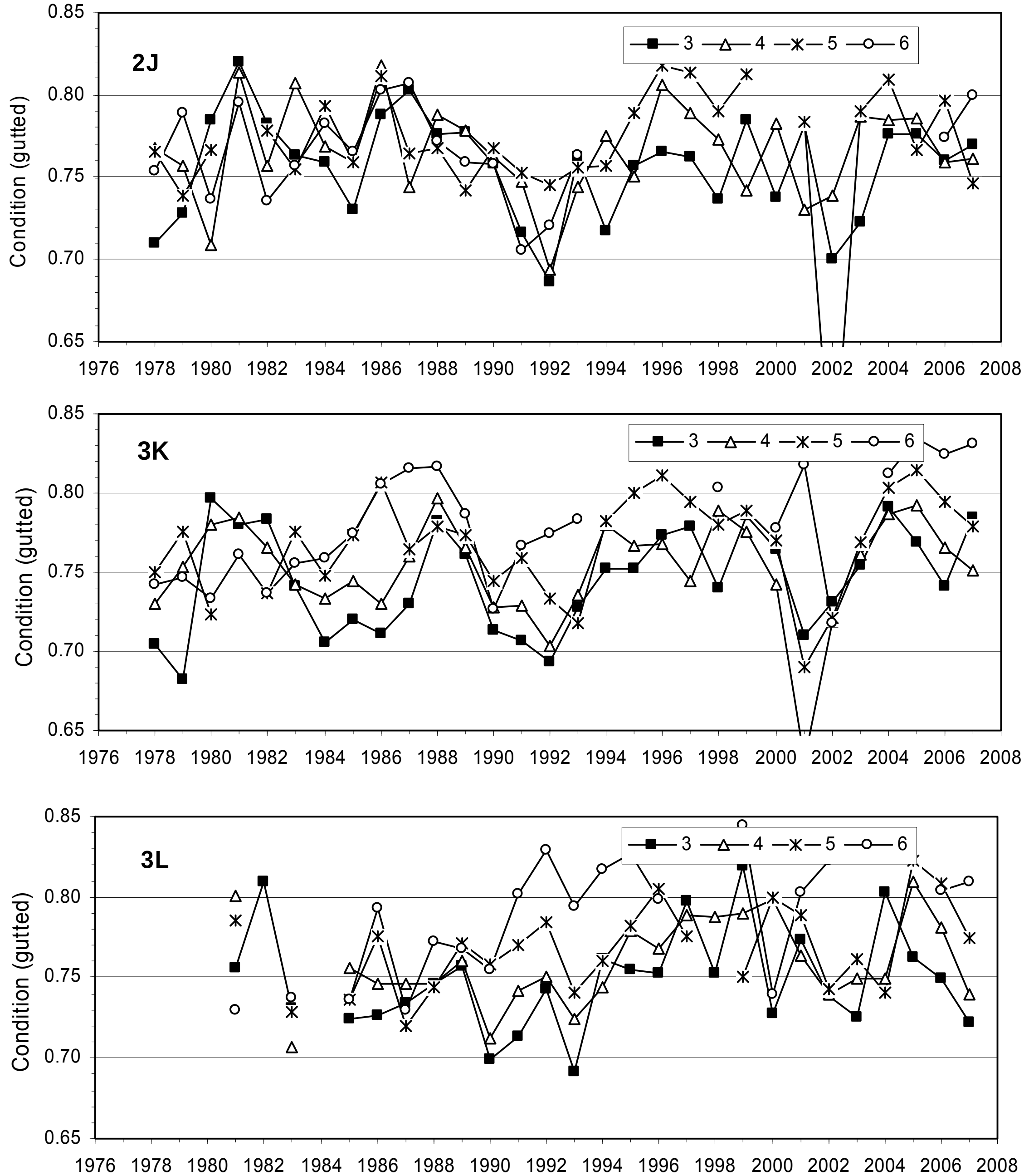


Figure 33. Mean Fulton's condition (gutted weight) at ages 3-6 of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

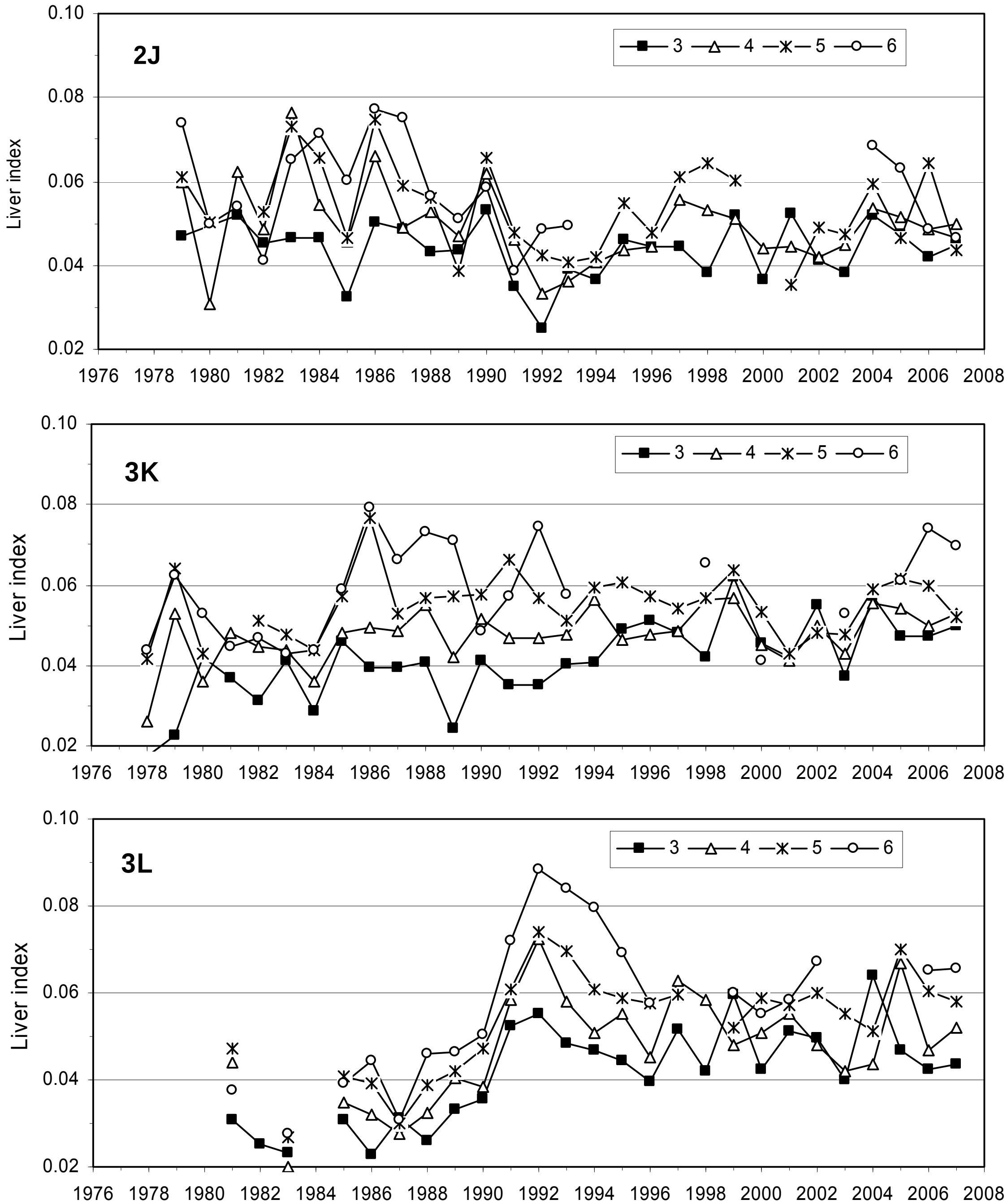


Figure 34. Mean liver index at ages 3-6 of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-1997 are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

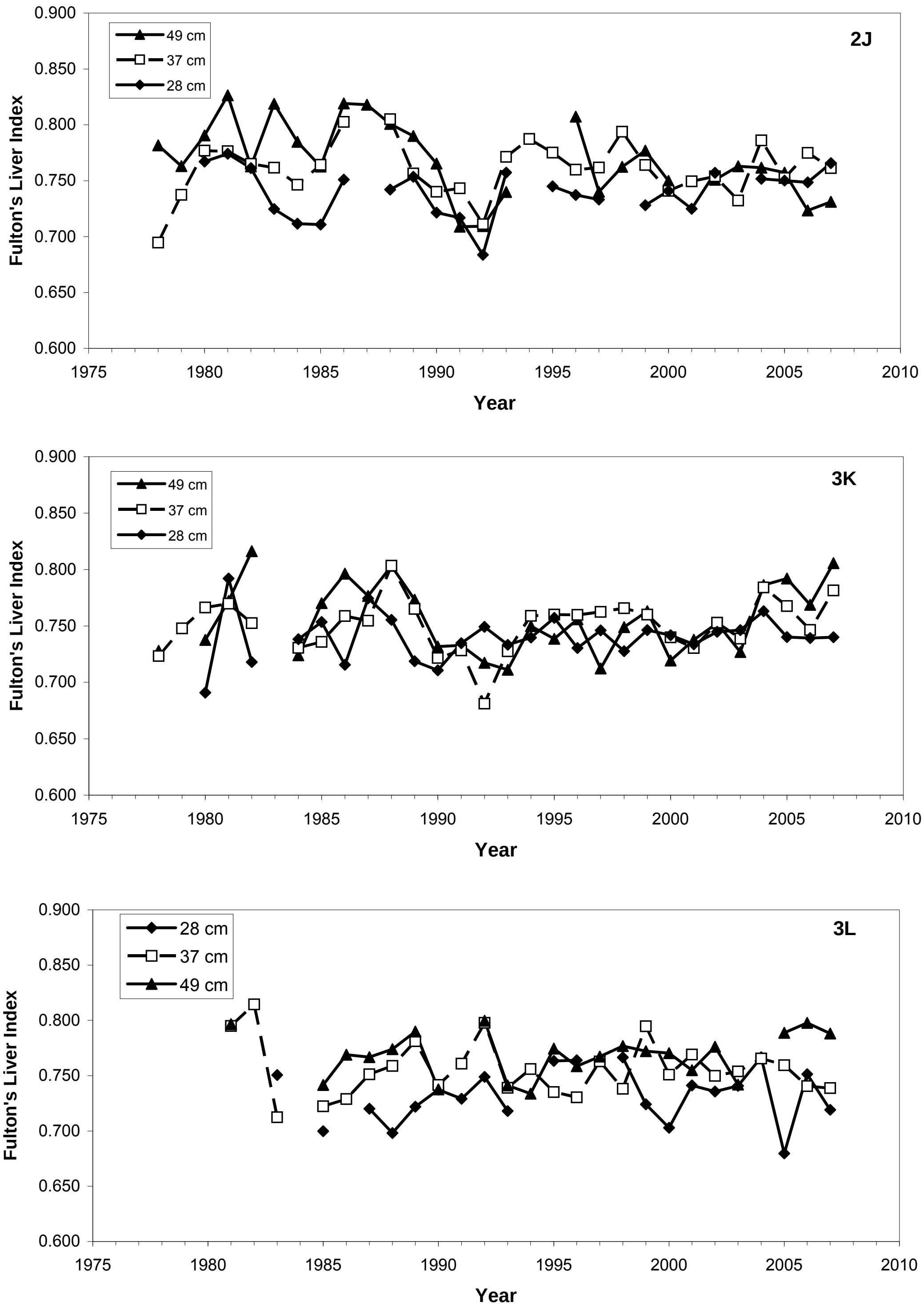


Figure 35. Mean gutted condition index at length classes 28 cm, 37 cm and 49 cm of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-1997 are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

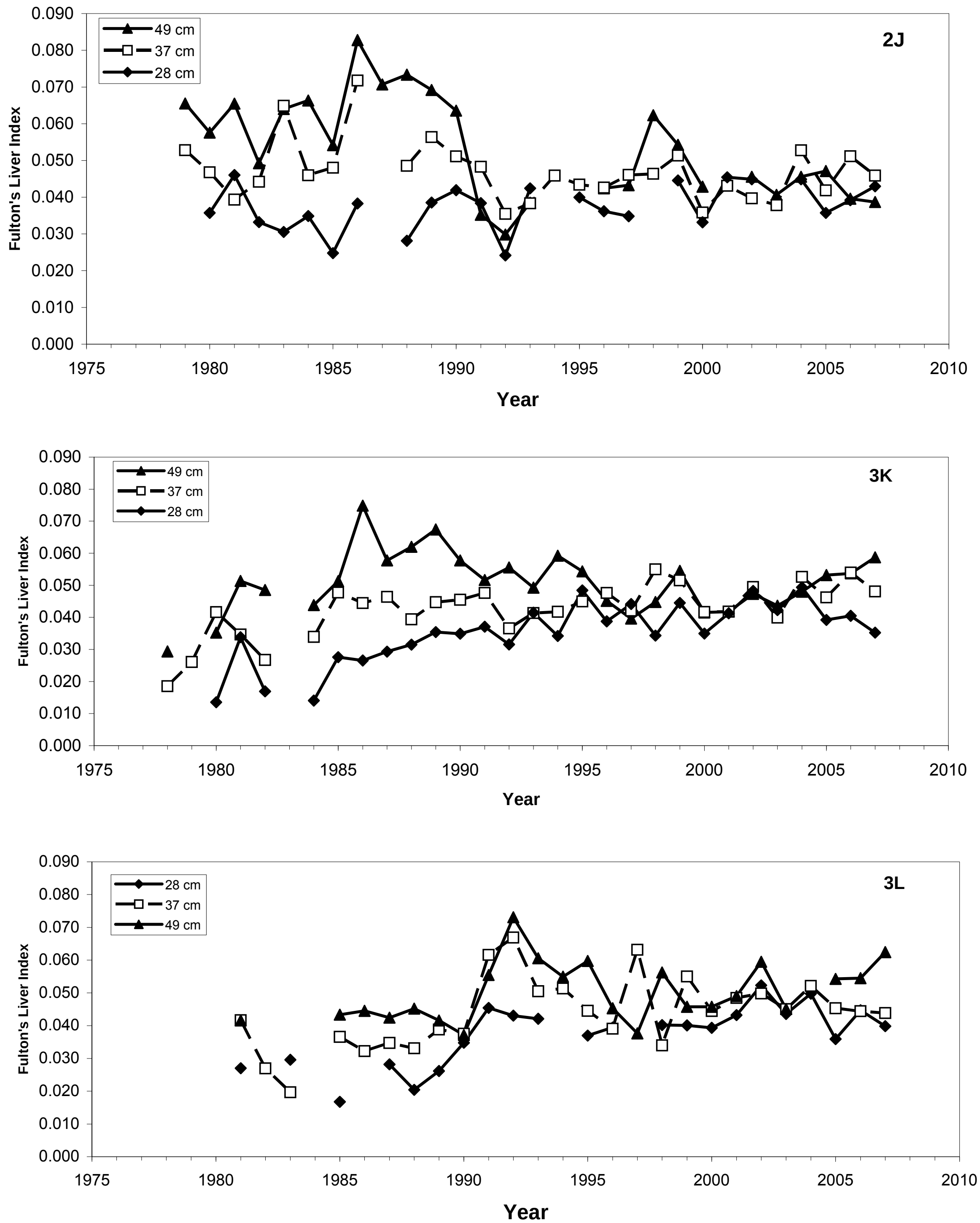


Figure 36. Mean liver index at length classes 28 cm, 37 cm and 49 cm of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-1997 are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

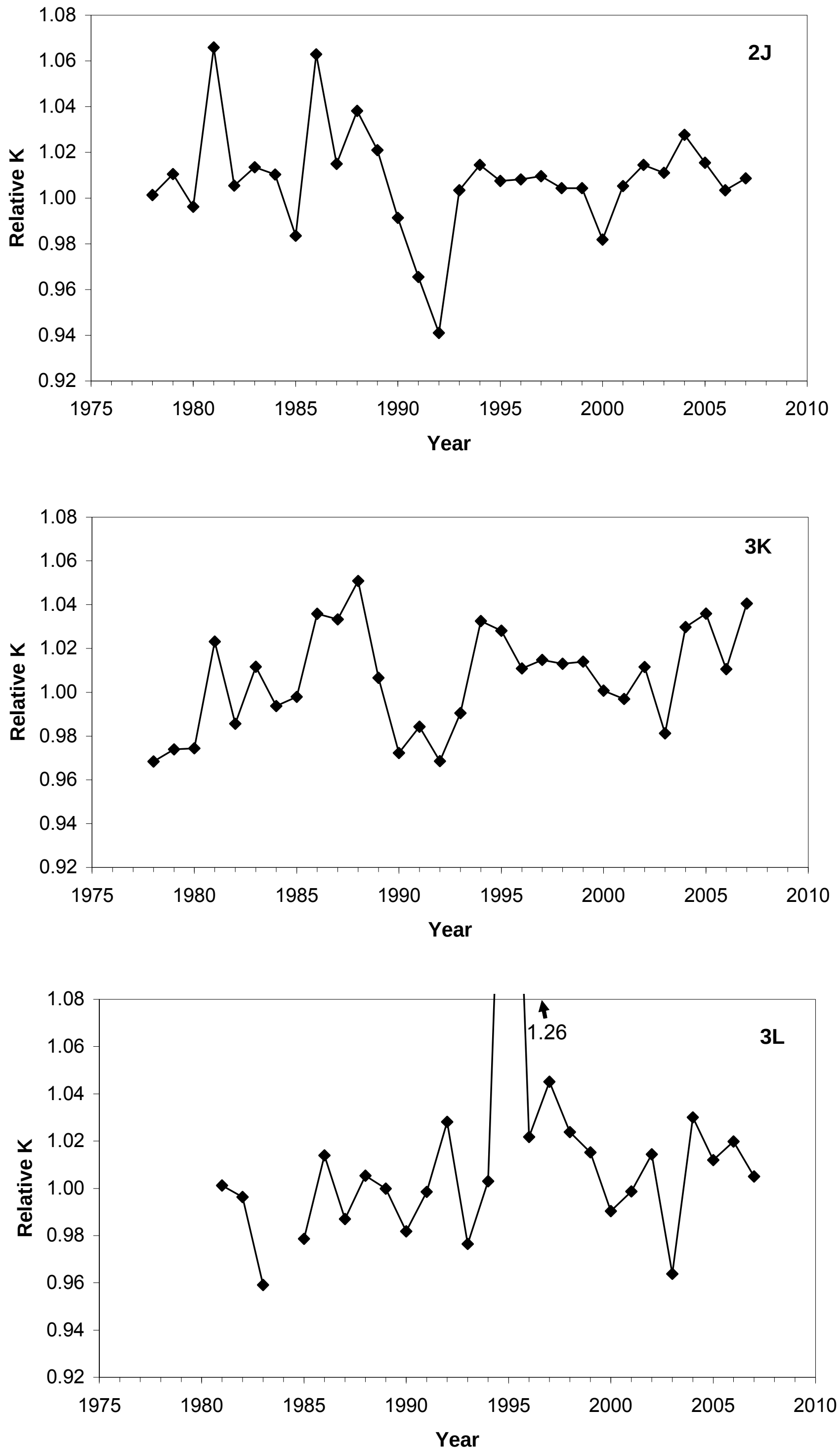


Figure 37a. Relative gutted condition of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-1997 are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

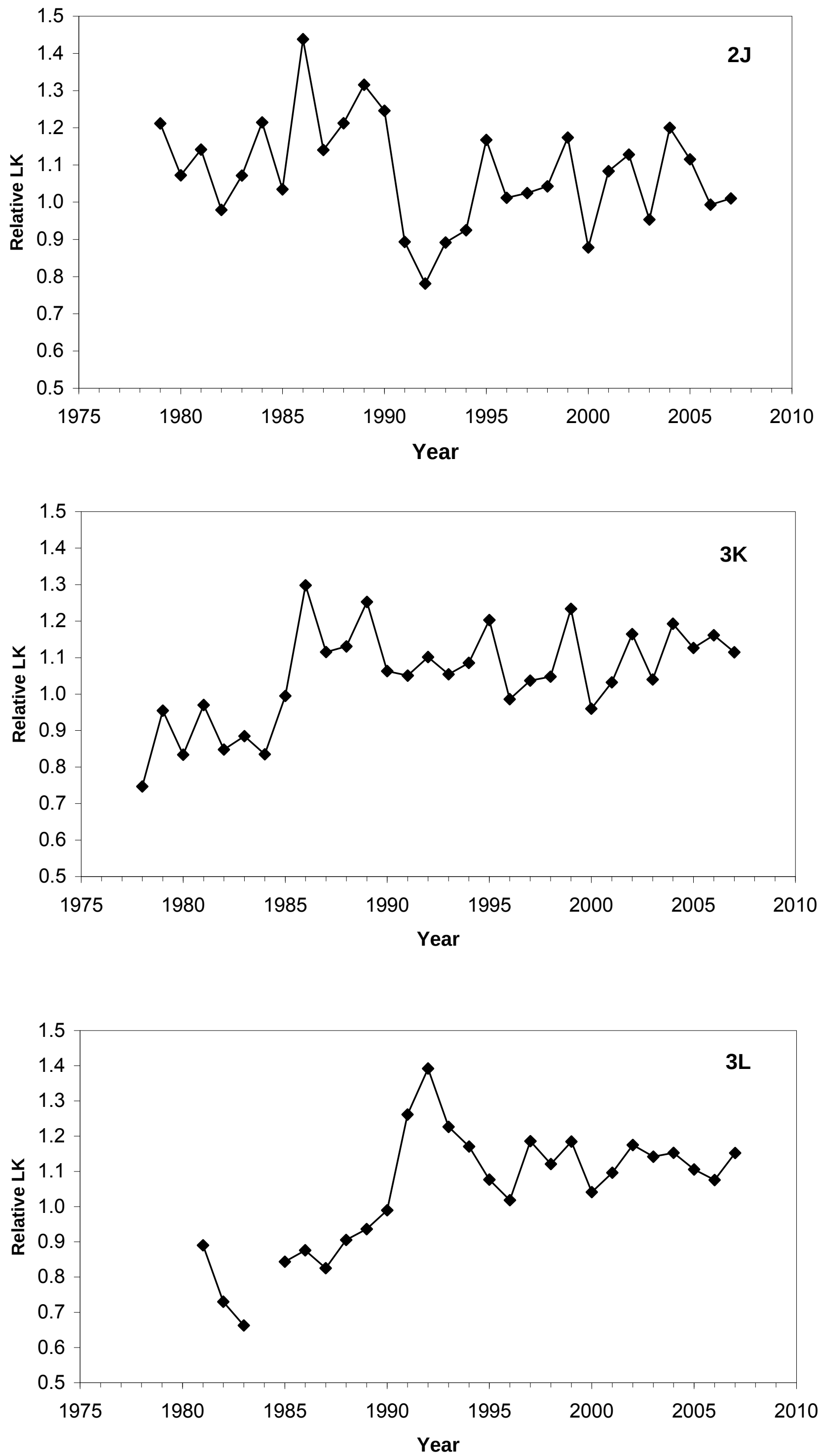


Figure 37b. Relative liver condition of cod in Divisions 2J, 3K and 3L in 1978-2007, as determined from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-1997 are not plotted. There were no surveys in Division 3L in 1978-1980 and 1984.

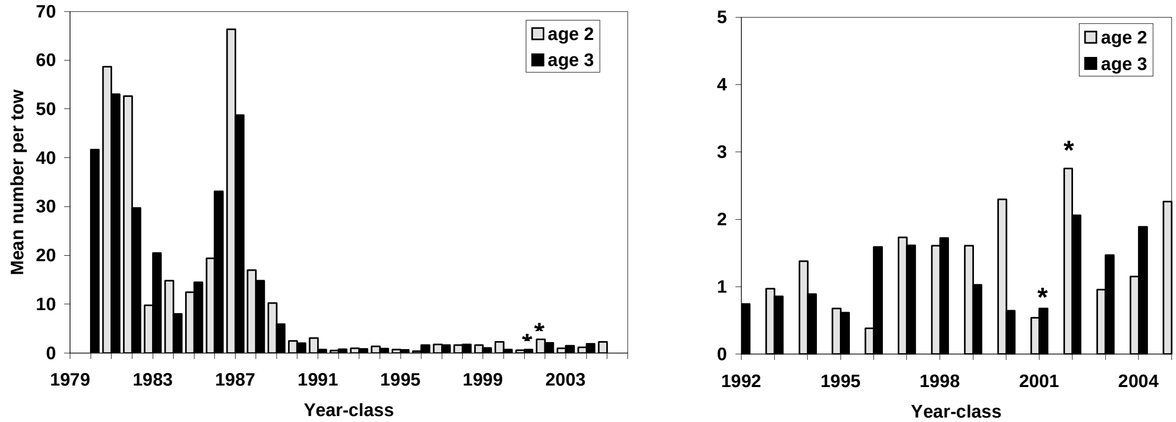


Figure 38. Abundance of the 1980-2005 year-classes in the offshore of 2J3KL from the autumn RV surveys. The right panel is expanded to show trends for the 1992 year-class onwards. Asterisks indicate partial estimates from incomplete survey coverage of 3L in 2004.

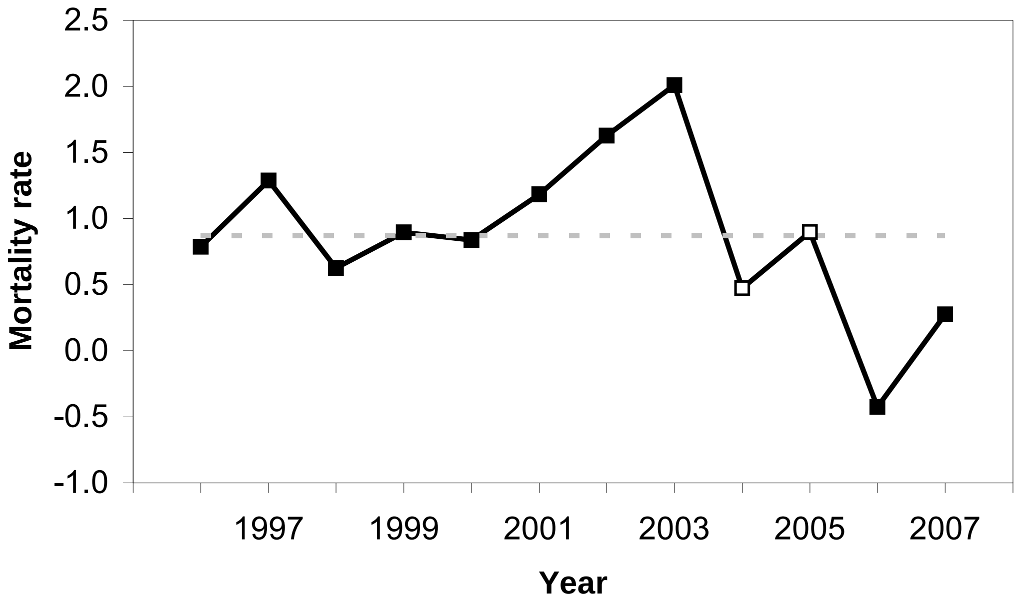


Figure 39. Total mortality rate (Z) of cod aged 4-6 calculated using data from the autumn RV surveys in the offshore of 2J3KL. For example, the value in 1996 is the mortality experienced by the 1991-1989 year-classes from ages 4-6 in 1995 to ages 5-7 in 1996. The dashed line is the average (Z=0.87, which corresponds to 58% mortality each year). Open symbols indicate estimates based on an incomplete survey in 2004.

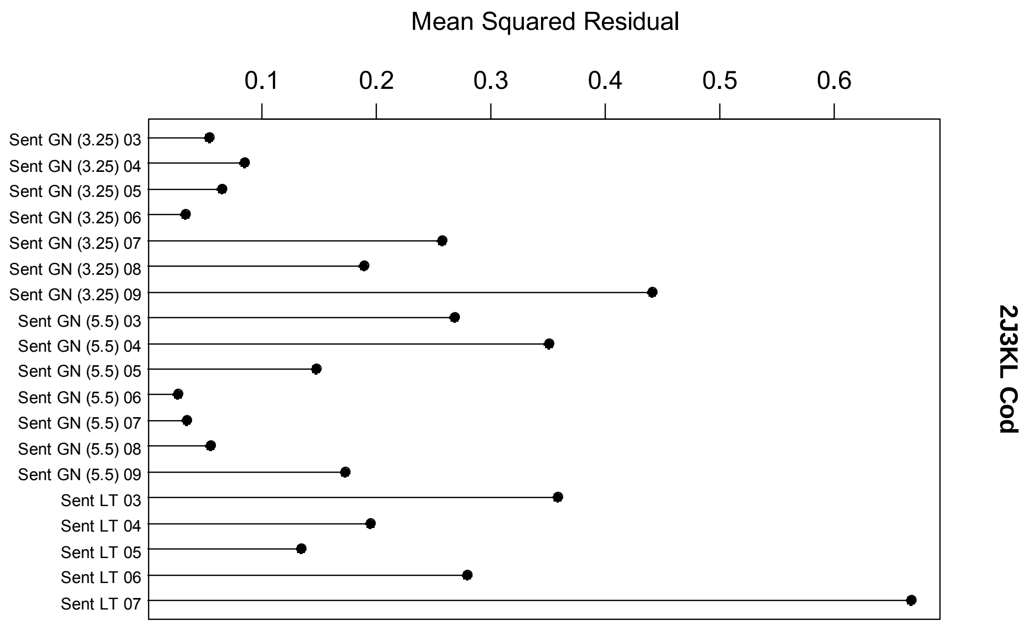


Figure 40. Mean squared residual for each index/age from the final ADAPT SPA formulation for the central inshore area.

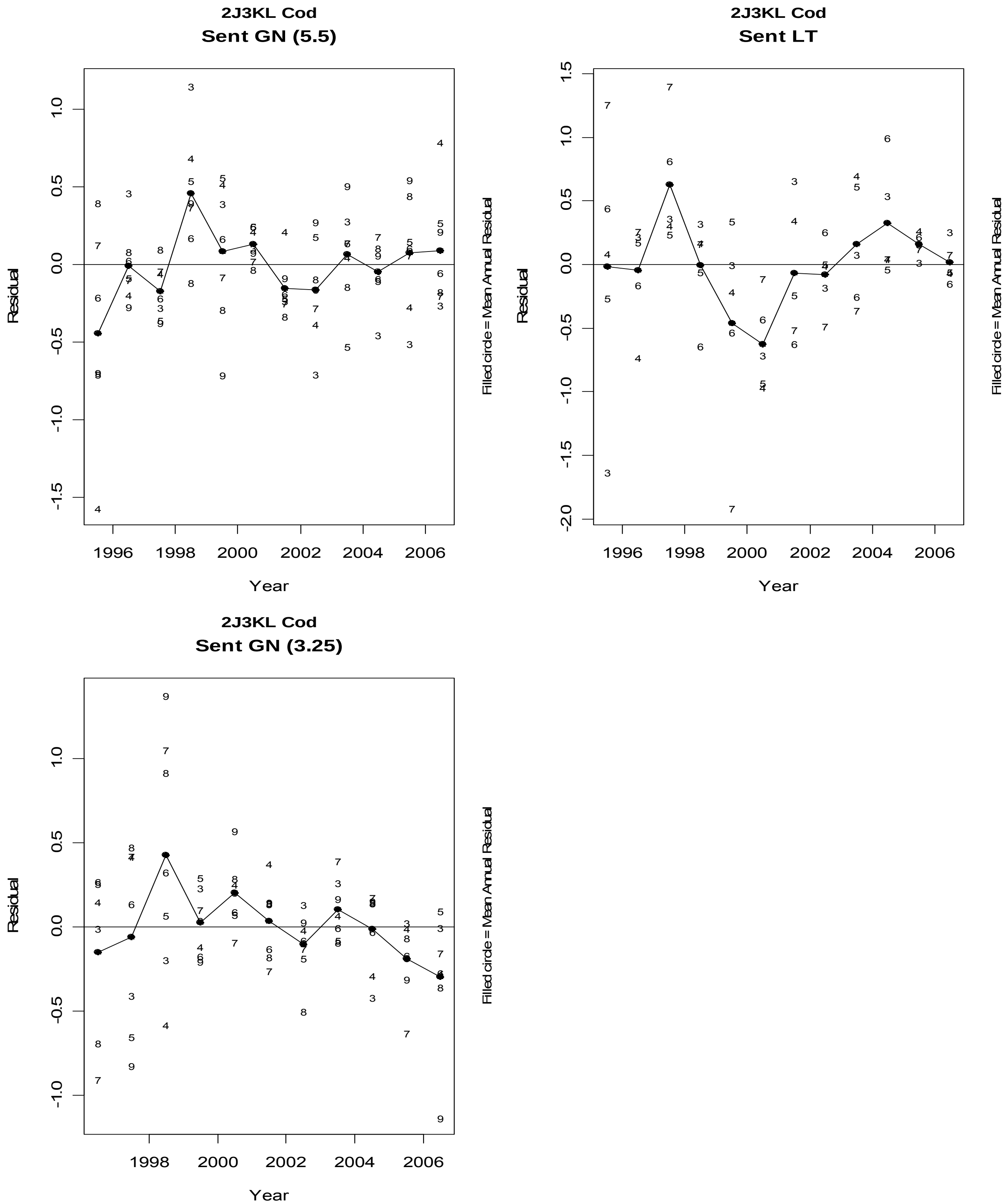
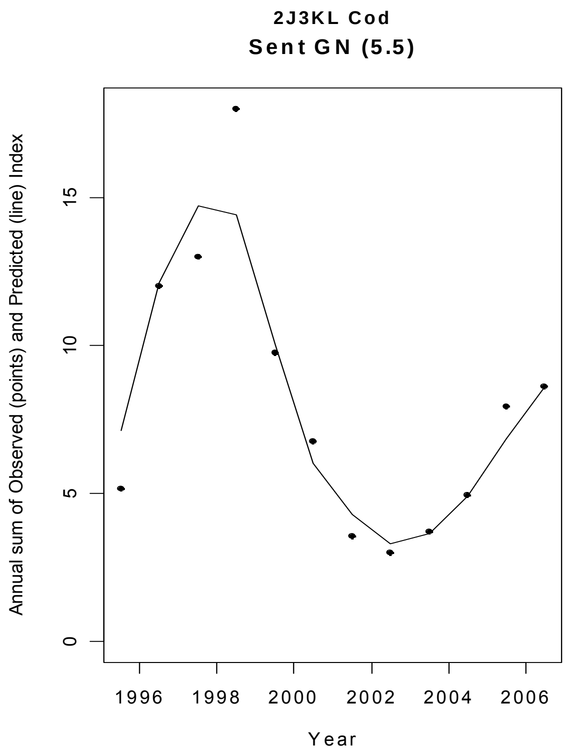
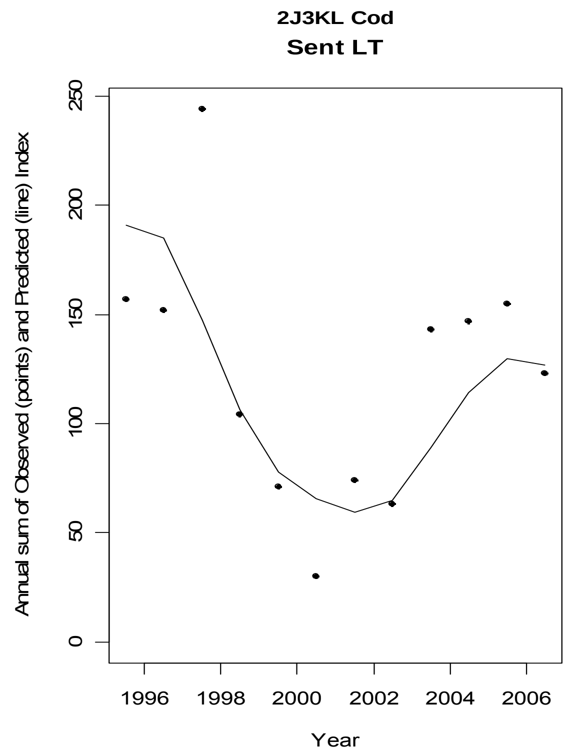


Figure 41. Trends in the mean annual residuals for each index (dots connected by lines) from the final ADAPT SPA formulation for the central inshore area. Numbers indicate values for individual ages.





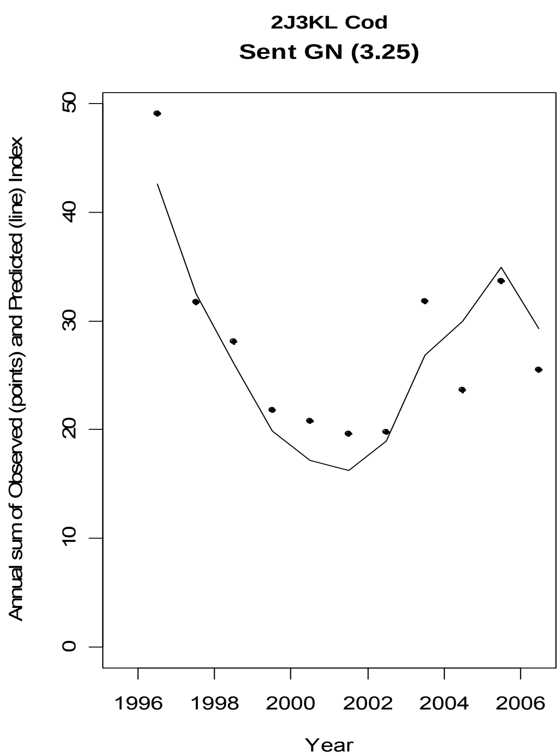


Figure 42. Observed (dots) and model predicted values for each index from the final ADAPT SPA formulation for the central inshore area.

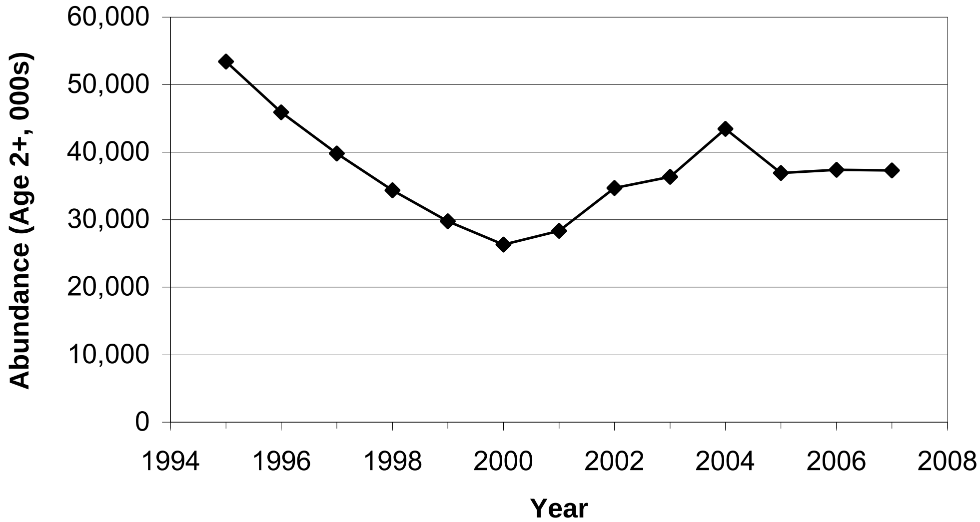


Figure 43. Estimated population abundance (age 2+, in thousands) from the final ADAPT SPA formulation for the central inshore area.

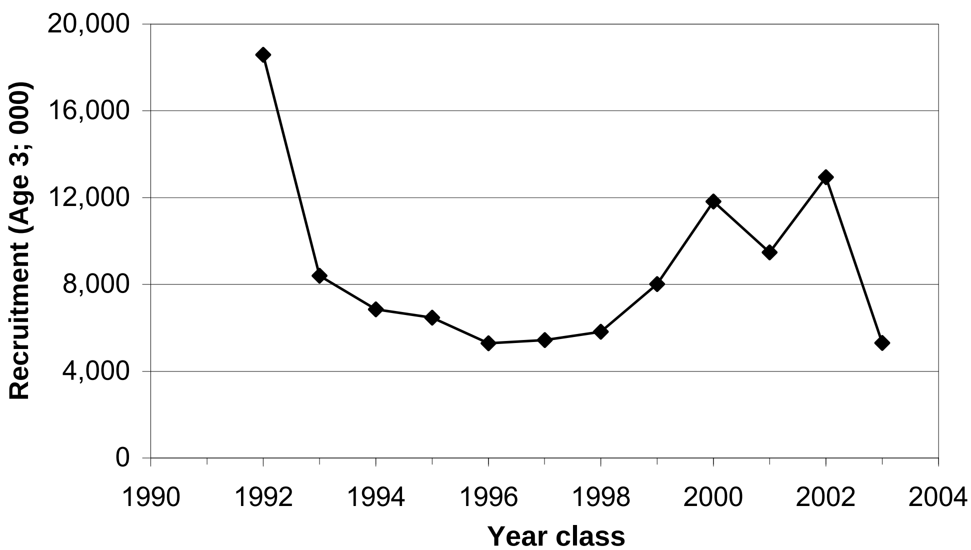


Figure 44. Estimated numbers of recruits (age 3, in thousands) from the final ADAPT SPA formulation for the central inshore area.

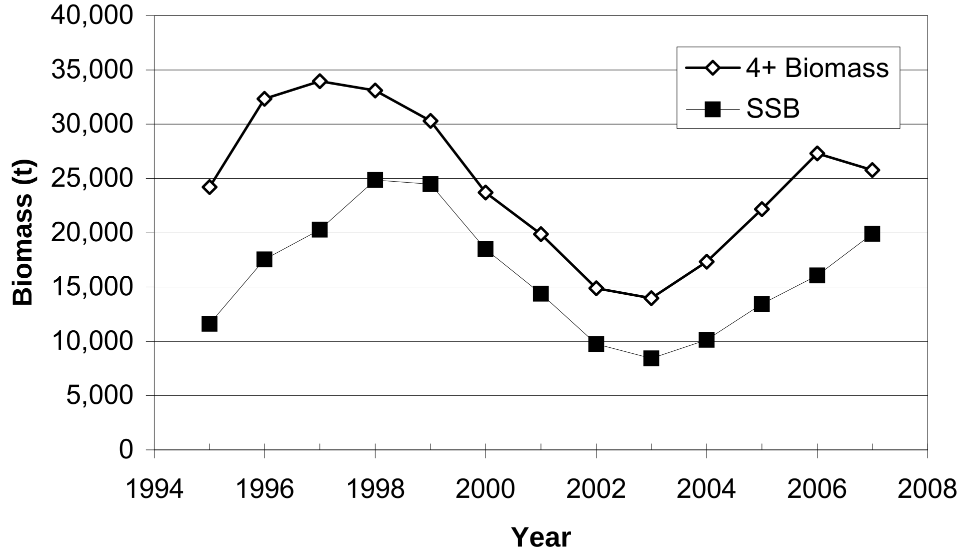


Figure 45. Estimated population (ages 4+) biomass and spawning stock biomass (SSB) from the final ADAPT SPA formulation for the central inshore area.

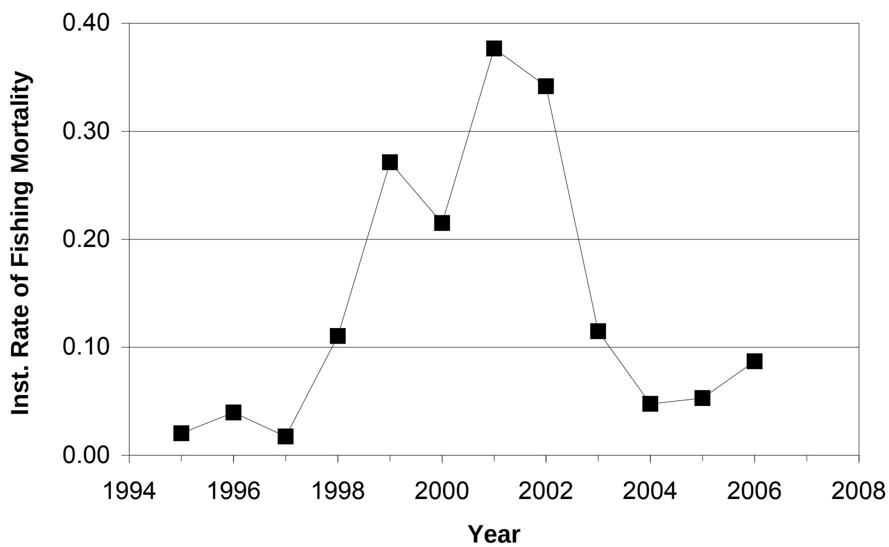


Figure 46. Estimated fishing mortality (average annual instantaneous rate for ages 5 -10+) from the final ADAPT SPA formulation for the central inshore area.

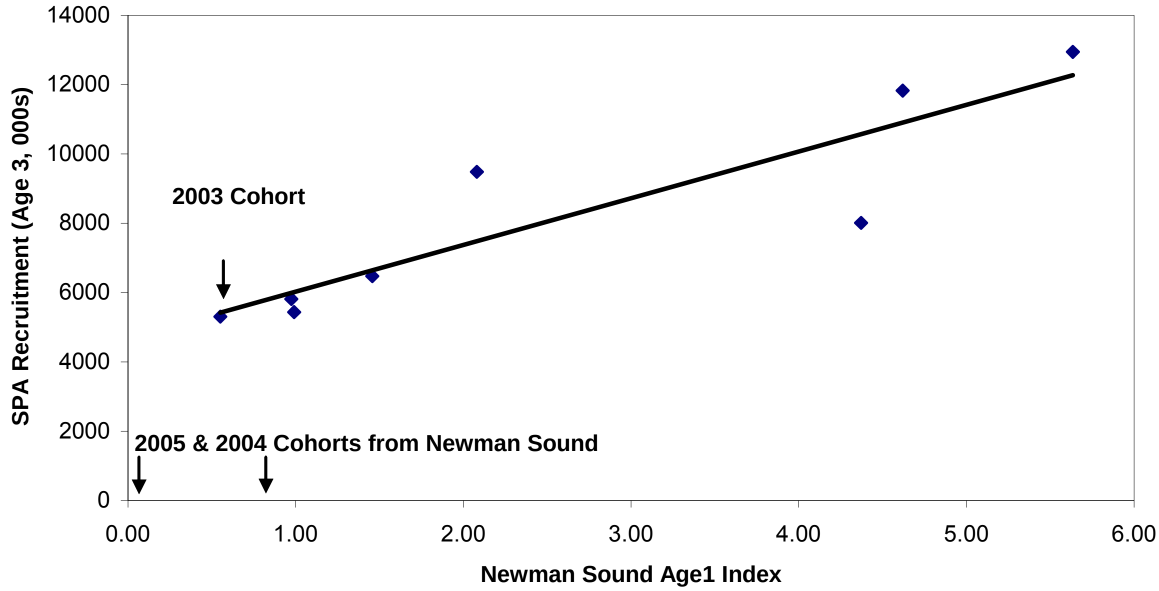


Figure 47. Estimates of recruitment from the Newman Sound beach seine pre-recruit index (age 1) and the SPA (abundance at age 3) for the inshore central area. The Newman Sound index values for the 2004 and 2005 cohorts are indicated on the horizontal axis.

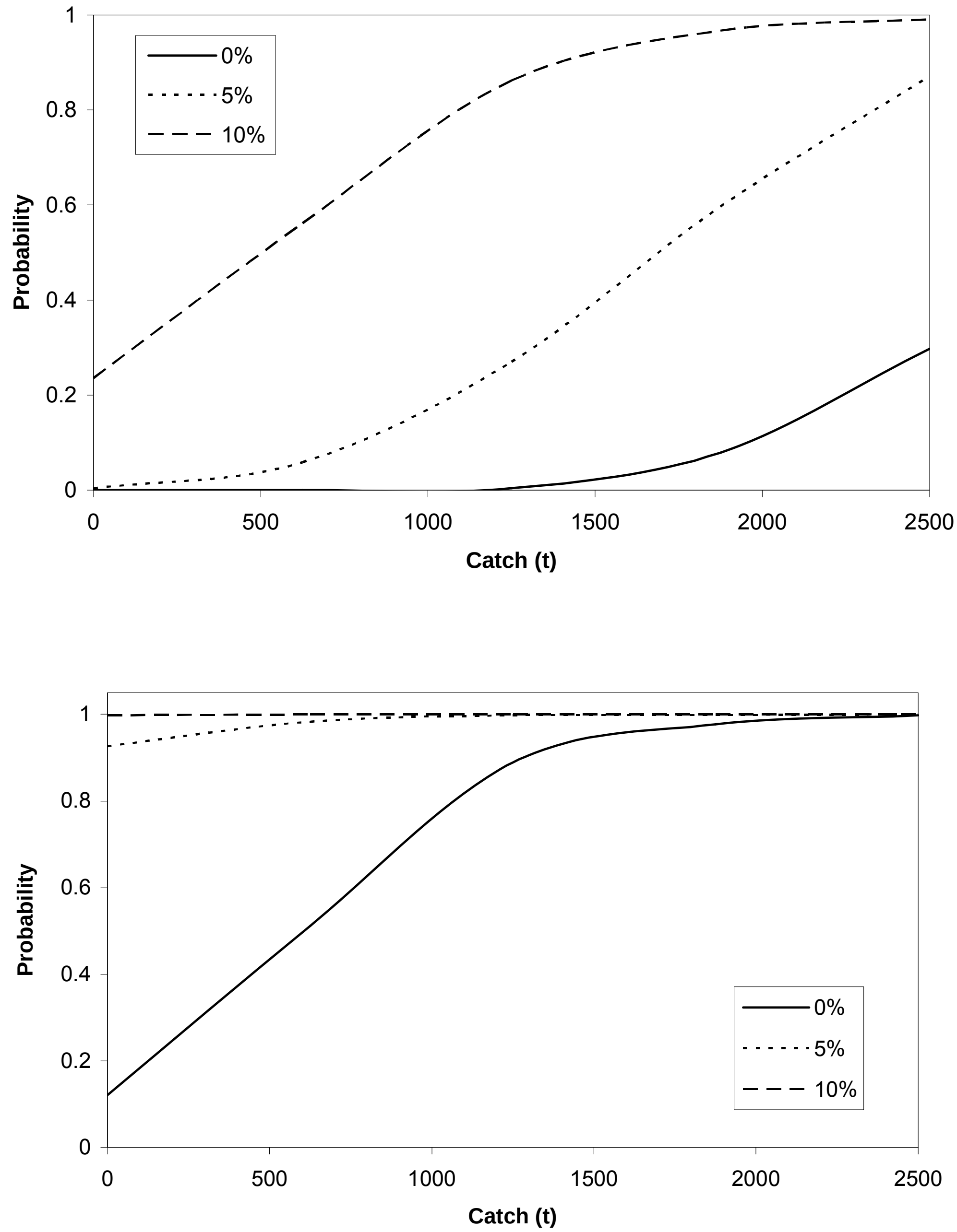


Figure 48. Probability that spawner stock biomass will not meet specified annual growth rates (0%, 5%, and 10%) for various catch options by 1 January 2008 (upper panel) and by 1 January 2010 (lower panel).

APPENDIX I

Terms of Reference

2007 assessment of 2J3KL cod

The status of Divisions 2J3KL cod was last assessed in 2006. The current assessment is requested by Fisheries and Aquaculture Management to provide the Minister with detailed advice on the status of the stock and the implications of a possible small scale cod fishery on the inshore portion of this stock in 2007.

Objectives

Full assessment of the stock status of the following resource will be reviewed:

- 2J3KL Cod

Specifically, the following objectives have been set:

- Assess the current status of offshore populations, inshore populations and the stock as a whole. In particular, assess current spawning biomass, total (age 3+) biomass, exploitation rate, natural mortality and biological characteristics (including age composition, size at age, age at maturity, and distribution). Describe these variables in relation to historic observations.
- Highlight major sources of uncertainty in the assessment, and where appropriate, consider alternative analytical formulations of the assessment.
- To the extent possible with available information, provide information on the strengths of year-classes expected to enter the exploitable populations in the next 1-3 years.
- Assess the implications to stock growth of inshore fishery removals varying from zero to 2,500 t in 2007 and annually in the medium term (2007-2009). Implications are to be assessed in terms of a risk analysis, specifically, the risk of the beginning of year SSB not meeting a growth rate of (0%, 5% and 10%) for inshore populations, offshore populations, and the stock as a whole where possible.
- Assess the implications of conducting an inshore fishery on a bay-by-bay basis.
- Assess the impact of the 2006 Inshore Fishery One Year Pilot Project on the stock population and prospects.

In addition, an overview of ocean climate conditions during 2006, in comparison to the historical record, will be presented.

Products

A Science Advisory Report (SAR) and associated research document(s) will be produced. A Proceedings Report will record the meeting discussions.

Participation

The following participants are expected to attend:

- DFO Science, Newfoundland and Labrador and NCR
- DFO Fisheries and Aquaculture Management, Newfoundland and Labrador Region
- Industry Representatives
- Non-Governmental Organizations
- Fish, Food and Allied Workers Representatives
- Provincial Department of Fisheries and Aquaculture
- Memorial University

APPENDIX II

Terms of Reference

2008 assessment of 2J3KL cod

The status of Divisions 2J3KL cod was last assessed in 2007. The current assessment is requested by Fisheries and Aquaculture Management to provide the Minister with detailed advice on the status of the stock.

Objectives

Full assessment of the stock status of the following resource will be reviewed:

- 2J3KL Cod

Specifically, the following objectives have been set:

- Assess the current status of offshore populations, inshore populations and the stock as a whole. In particular, assess current spawning biomass, total (age 3+) biomass, exploitation rate, natural mortality and biological characteristics (including age composition, size at age, age at maturity, and distribution). Describe these variables in relation to historic observations.
- Highlight major sources of uncertainty in the assessment, and where appropriate, consider alternative analytical formulations of the assessment.
- To the extent possible with available information, provide information on the strengths of year-classes expected to enter the exploitable populations in the next 1-3 years.
- Assess the implications to stock growth of inshore fishery removals varying from zero to 2500 t in 2008 and annually in the medium term (2008-2010). Implications are to be assessed in terms of a risk analysis, specifically, the risk of the beginning of year SSB not meeting a growth rate of (0%, 5% and 10%) for inshore populations, offshore populations, and the stock as a whole where possible.
- Assess the implications of conducting an inshore fishery on a bay-by-bay basis.

In addition, an overview of ocean climate conditions during 2007, in comparison to the historical record, will be presented.

Products

A Science Advisory Report (SAR) and associated research document(s) will be produced. A Proceedings Report will record the meeting discussions.

Participation

The following participants are expected to attend:

- DFO Science, Newfoundland and Labrador and NCR
- DFO Fisheries and Aquaculture Management, Newfoundland and Labrador Region
- Industry Representatives
- Non-Governmental Organizations
- Fish, Food and Allied Workers Representatives
- Provincial Department of Fisheries and Aquaculture
- Memorial University

APPENDIX III

Conservation Harvesting Plan
2J3KL cod fishery 2007

ELIGIBILITY

- Participation in the 2007 cod fishery will be restricted to groundfish licence holders with a homeport in NAFO division 2J3KL using a maximum vessel length <45’.
- Groundfish licence holders in 3KL will have the option to participate in this fishery or exercise their fishing privileges in NAFO sub-division 3Ps, but not both.

AREAS OF FISHING

- Groundfish licence holders will be required to harvest their cod IQ within the respective Cod Fishing Area of their homeport. The 10 Cod Fishing Areas are outlined below. Each area will be open from July 23 – Aug 4 for a 2-week period. An additional 4 weeks will be available during the period of Sept 7 and Oct 31. Dates will be set after discussions with industry.
    - Labrador – Division 2J
    - Northern Penninsula – Cape Bauld to Little Hr Deep Head
    - White Bay – Little Hr. Deep Head to Cape St. John
    - NDB – Cape St. John to Cape Freels
        - Cape St. John to Burlington
        - Middle Arm – Triton
        - Glovers Hr/Leading Tickles – Cape Freels

      (The complete area of Cape St. John – Cape Freels will be open each time.)
    - Bonavista Bay – Cape Freels to Cape Bonavista
    - Trinity Bay (excluding Smith Sound) – Cape Bonavista to Grates Point
    - Smith Sound – Bauld Head to South Head
    - Conception Bay/Northeast Avalon – Grates Pt to North Head Petty Hr
    - Southern Shore – North Head Petty Hr to Cape Race
    - St. Mary’s Bay – Cape Race to Cape St. Mary’s

- Fisher’s with a homeport immediately adjacent to the boundary separating two adjacent Cod Fishing Areas will be permitted to fish either their homeport or up to a radius of 5 nautical miles of the landward start of the boundary between the two adjacent Areas, but not both. Also, in order to fish in the adjacent area (up to 5 nautical miles), that cod fishing area must be open. Homeport adjacencies are defined as follows:
    - For the boundary at Cape Race separating Fishing Area 9 (St. Mary’s Bay) and F.A. 8 (Southern Shore) – no homeport adjacencies permitted.
    - North Head Petty Harbour (Conception Bay/Northeast Avalon) – homeport adjacencies are Blackhead, St. John’s, Petty Harbour, Maddox Cove, Goulds.
    - Grates Point separating F. A. 7 and F. A. 6 (Trinity Bay) – homeport adjacencies are Bay de Verde, Red Head Cove, Grates Cove, Daniel’s Cove and Old Perlican.
    - Cape Bonavista separating F. A. 6 and F. A. 5 (Bonavista Bay) – homeport adjacencies are Maberly, Elliston, Lancaster, Spillars Cove, Bonavista, Birchy Cove and Newmans Cove.
    - Cape Freels separating F. A. 5 and F. A. 4 (Notre Dame Bay) – No homeport adjacencies permitted.
    - Adjacencies will not be permitted for the Smith Sound Area.

  Once an eligible adjacent fisher commences his fishery in a Fishing Area, he will not be permitted to change Fishing Areas and will be subject to the season for the Fishing Area of commencement.

- Fishing for Cod will not be permitted outside Canada's Territorial Sea (the 12-mile limit).

- If an area is closed to fishing, fishers will not be permitted to harvest their individual quota (IQ) in another, open area.
- Fishing in Smith Sound will be restricted to those licence holders with a homeport between Bald Head (47 degrees 59.5'N, 53 38.2'W), and South Head (48 degrees 27.65'N, 53 03.2'W). A 5-mile buffer zone around Smith Sound will include the area bounded by the following co-ordinates in the order they appear:

  Bonaventure Head at
  48 degrees 16'54"N, 53 degrees 24'40"W then due south to
  48 degrees 10'31"N, 53 degrees 24'40"W then due west to land at
  48 degrees 10'31"N, 53 degrees 32'5"W.

SEASON

- There will be two seasons. They include:
  - July 23 – Aug 4,
  - The timing of the second (4-week) season will start after Sept 7 and may vary by area. Dates will be finalized after discussions with industry.

INDIVIDUAL QUOTAS (IQ):

- This fishery will be conducted by way of an individual quota (IQ). The IQ amount will be same for all fish harvesters. The IQ amount will be 2,500 pounds round weight.
- Once a fisher has caught his/her cod IQ, either **directed or by-catch**, they **shall cease fishing for all species of groundfish** in all areas of 2J3KL for the remainder of the calendar year.

FISHING GEAR

- Only one gear type combination, either Longlines and Handline, or Gillnets and Handline, may be used during one calendar week. (Monday – Sunday)

Gillnets

- A maximum of 6 nets of 50 fathoms each with a minimum of 5 1/2 inch mesh size and a maximum 6 1/2-inch mesh size.
- Gillnets may not be left unattended in the water for more than 48 hours;

Longlines

- The maximum number of hooks permitted is 2,000.

Handlines

- A handline is defined as a single-line fishing method to which a weight and a maximum of six, single baited or feathered hooks is attached.
- Jiggers and jigging are not permitted.

LICENSING POLICY

- There will be no buddy-up arrangements in this fishery.
- The existing vessel leasing policy will be applied.

SMALL FISH PROTOCOL

- The minimum size for cod is 45 cm (18 in). Areas will be closely monitored and closed when the number of cod <45cm long caught exceed 15% of the total number of cod caught.

- All groundfish caught, with the exception of those mentioned in Groundfish General conditions and species listed under the *Species at Risk Act* (northern and spotted wolfish) must be landed. No discarding at sea is permitted.

REPORTING AND MONITORING

- It is mandatory that fishers complete their respective log book. The <35' logbook will be distributed by the Science Branch and available in local DFO Licensing centers.
- The dockside monitoring program will apply to all landings, including personal use.
- Fishers will be required to land their catch at designated ports.
- Fishers will be required to keep catch from different gear types segregated while at sea.

BY-CATCHES

- Fishers will be restricted to 10% or 200lbs, whichever is greater, of any species that is incidental to the directed species. Incidental catch will be calculated as a percentage of the total directed species retained onboard.
- All cod caught, from any fishery in 2J3KL during the current management period, whether directed or incidental, will be charged against the IQ of the license holder. If a fisher exceeds their cod IQ level in another fishery, he/she will not be permitted to participate in the cod fishery.

ABORIGINAL – FOOD SOCIAL & CEREMONIAL (FSC)

- The Department will allocate 50t of cod to aboriginal groups for the FSC purposes.
- The same harvesting conditions will apply to the FSC licences.

MARINE PROTECTED AREA'S

- There will be no fishing activity in any designated Marine Protected Area (MPA), including Gilbert's Bay in southern Labrador and Duck Island/Round Island near the Eastport Peninsula.

SPECIES AT RISK ACT (SARA)

- Fishers will be required to release northern and spotted wolfish that are listed under SARA.

APPENDIX IV

Conservation Harvesting Plan
2J3KL cod fishery 2008

ELIGIBILITY

- Participation in the 2J3KL stewardship cod fishery will be restricted to groundfish licence holders with a homeport in NAFO division 2J3KL using a maximum vessel length <45'.
- Groundfish licence holders in 3KL will have the option to participate in this fishery or exercise their fishing privileges in NAFO sub-division 3Ps, but not both.

AREAS OF FISHING

- Groundfish licence holders will be required to harvest their cod IQ within the respective Cod Fishing Area of their homeport. The specific cod fishing areas are outlined below. Each area was provided with the option of either:
  - 2 weeks in the summer or
  - 4 weeks in the fall.
- Due to water temperatures and quality, there will be limited fishing in August.

Fishing Areas

- Labrador (Division 2J):
- Northern Penninsula (Cape Bauld to Little Hr Deep Head):
- White Bay (Little Hr. Deep Head to Cape St. John):
- NDB – Cape St. John to Cape Freels
  - Cape St. John to Burlington:
  - Middle Arm – Triton:
  - Glovers Hr/Leading Tickles – Deadman's Bay
  - Deadman's Bay - Cape Freels:

  (The complete area of Cape St. John – Cape Freels will be open each time.)
- Bonavista Bay (Cape Freels to Cape Bonavista):
- Trinity Bay, excluding Smith Sound (Cape Bonavista to Grates Point):
- Smith Sound (Bauld Head to South Head):
- Conception Bay/Northeast Avalon (Grates Pt to North Head/Petty Hr):
- Southern Shore (North Head Petty Hr to Cape Race):
- St. Mary's Bay (Cape Race to Cape St. Mary's):

- Fisher's with a homeport immediately adjacent to the boundary separating two adjacent Cod Fishing Areas will be permitted to fish either their homeport or up to a radius of 5 nautical miles of the landward start of the boundary between the two adjacent Areas, but not both. Also, in order to fish in the adjacent area (up to 5 nautical miles), that cod fishing area must be open. Homeport adjacencies are defined as follows:
  - ❖ For the boundary at Cape Race separating Fishing Area 9 (St. Mary's Bay) and F.A. 8 (Southern Shore) – no homeport adjacencies permitted.
  - ❖ North Head Petty Harbour (Conception Bay/Northeast Avalon) – homeport adjacencies are Blackhead, St. John's, Petty Harbour, Maddox Cove, Goulds.
  - ❖ Grates Point separating F. A. 7 and F. A. 6 (Trinity Bay) – homeport adjacencies are Bay de Verde, Red Head Cove, Grates Cove, Daniel's Cove and Old Perlican.
  - ❖ Cape Bonavista separating F. A. 6 and F. A. 5 (Bonavista Bay) – homeport adjacencies are Maberly, Elliston, Lancaster, Spillars Cove, Bonavista, Birchy Cove and Newmans Cove.
  - ❖ Cape Freels separating F. A. 5 and F. A. 4 (Notre Dame Bay) – No homeport adjacencies permitted.

- ✣ Adjacencies will not be permitted for the Smith Sound Area.

  Once an eligible adjacent fisher commences his fishery in a Fishing Area, he will not be permitted to change Fishing Areas and will be subject to the season for the Fishing Area of commencement.

- o Fishing for Cod will not be permitted outside Canada's Territorial Sea (the 12-mile limit).

- o If an area is closed to fishing, fishers will not be permitted to harvest their individual quota (IQ) in another, open area.

- o Fishing in Smith Sound will be restricted to those licence holders with a homeport between Bald Head (47 degrees 59.5'N, 53 38.2'W), and South Head (48 degrees 27.65'N, 53 03.2'W). A 5-mile buffer zone around Smith Sound will include the area bounded by the following co-ordinates in the order they appear:
  Bonaventure Head at
  48 degrees 16'54"N, 53 degrees 24'40"W then due south to
  48 degrees 10'31"N, 53 degrees 24'40"W then due west to land at
  48 degrees 10'31"N, 53 degrees 32'5"W.

SEASON

- o There will be only one season in each of the respective areas. Fish harvesters had the option of 2 weeks in the summer or 4 weeks in the fall. Dates were established through consultation with local fish harvesters. Industry conducted a vote and the all areas voted for a fall fishery. Dates are attached.

INDIVIDUAL QUOTAS (IQ):

- o This fishery will be conducted by way of an individual quota (IQ). The IQ amount will be same for all fish harvesters. The IQ amount will be 3,250 pounds round weight.

- o Once a fisher has caught his/her cod IQ, either **directed or by-catch**, they **shall cease fishing for all species of groundfish** in all areas of 2J3KL for the remainder of the calendar year.

FISHING GEAR

- o Only one gear type combination, either Longlines and Handline, or Gillnets and Handline, may be used during one calendar week. (Monday – Sunday)

Gillnets

- o A maximum of 6 nets of 50 fathoms each with a minimum of 5 1/2 inch mesh size and a maximum 6 1/2-inch mesh size.
- o Gillnets may not be left unattended in the water for more than 48 hours;

Longlines

- o The maximum number of hooks permitted is 2,000.

Handlines

- o A handline is defined as a single-line fishing method to which a weight and a maximum of six, single baited or feathered hooks is attached.
- o Jiggers and jigging are not permitted.

LICENSING POLICY

- There will be no buddy-up arrangements in this fishery.
- The existing vessel leasing policy will be applied.

SMALL FISH PROTOCOL

- The minimum size for cod is 45 cm (18 in). Areas will be closely monitored and closed when the number of cod <45cm long caught exceed 15% of the total number of cod caught.
- All groundfish caught, with the exception of those mentioned in Groundfish General conditions and species listed under the *Species at Risk Act* (northern and spotted wolfish) must be landed. No discarding at sea is permitted.

REPORTING AND MONITORING

- It is mandatory that fishers complete their respective log book. The <35' logbook will be distributed by the Science Branch and available in local DFO Licensing centers.
- The dockside monitoring program will apply to all landings, including personal use.
- Fishers will be required to land their catch at designated ports.
- Fishers will be required to keep catch from different gear types segregated while at sea.

BY-CATCHES

- Fishers will be restricted to 10% or 200lbs, whichever is greater, of any species that is incidental to the directed species. Incidental catch will be calculated as a percentage of the total directed species retained onboard.
- All cod caught, from any fishery in 2J3KL during the current management period, whether directed or incidental, will be charged against the IQ of the license holder. If a fisher exceeds their cod IQ level in another fishery, he/she will not be permitted to participate in the cod fishery.

MARINE PROTECTED AREA'S

- There will be no fishing activity in any designated Marine Protected Area (MPA), including Gilbert's Bay in southern Labrador and Duck Island/Round Island near the Eastport Peninsula.

SPECIES AT RISK ACT (SARA)

- Fishers will be required to release northern and spotted wolfish that are listed under SARA.