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# Assessment of the cod (*Gadus morhua*) stock in NAFO Divisions 2J+3KL in 2010

# Évaluation du stock de morue (*Gadus morhua*) dans les divisions 2J et 3KL de l'OPANO en 2010

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## TABLE OF CONTENTS

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## ABSTRACT

The status of the northern cod (*Gadus morhua*) stock in NAFO Div. 2J+3KL was assessed through a Regional Assessment Process (RAP) held in St. John's, NL during 15-19 March and 22-23 March 2010. A directed commercial cod fishery and a recreational fishery were re-opened in the inshore during 2006 and continued in 2007-2009; the offshore remained closed to directed fishing. There was no formal TAC during 2006-2009, but commercial fishers were permitted an annual allowance (3,750 lb per license holder in 2009). Recreational fishers were permitted 5 fish per person per day, up to a maximum of 15 fish per boat. Total catch in 2009 is uncertain. Reported landings in 2009 were 3,098 t, including 2,832 t in the stewardship fishery, 216 t in the sentinel surveys, and 50 t taken as by-catch, but excluding recreational fishery removals. There are no direct estimates of recreational landings for 2009. However, analysis of tag returns suggests that recreational fishery removals during 2009 could be 64% of reported stewardship fishery removals.

In the absence of reliable catch information the assessment was based mainly on a cohort analysis of the autumn DFO research vessel (RV) trawl survey data and tagging. The cohort analysis provided relative estimates of stock size and absolute estimates of total mortality (Z). For the recent period (2008-2009) estimates of fishing mortality (F) obtained from tagging and acoustic telemetry data were used to partition Z into F and natural mortality (M). Total biomass has increased (23% per year) since 2004. Spawning stock biomass (SSB) increased (83% per year) from 2004 to 2008, but the 2009 value was similar to 2008. Total mortality in the offshore was high (Z=1.0 to 1.5) during 1996-2002, but has subsequently declined in spite of the re-opening of directed fishing in the inshore during 2006-2009. Average annual Z during 2007-2009 (ages 4-8) was 0.42 (=35% mortality per year). Analysis of tagging data indicated that fishing mortality (F) on offshore cod during 2008 and 2009 was 0.06 and 0.02 (=5% and 2% per year), respectively. Similar estimates of F were obtained for cod tagged inshore during 2007-2009 (range 0.02 to 0.10), suggesting that recent fishing mortality has been a small component of total Z. The 2003 and 2004 year-classes are weaker than those produced in 1998-2002 and have now entered the SSB; consequently, the recent rate of stock growth is unlikely to continue in the short term. Subsequent year classes (2005 and 2006) appear average for the 1993-2007 period.

In the inshore, analysis of age-disaggregated sentinel catch rate data indicate that exploitable biomass increased in the central inshore area during 2003-2008, but was lower in 2009 than in 2008 in all inshore areas. The 2003 and 2004 year-classes are notably weaker than those that have supported recent fisheries (2000 and 2002 year classes). Consequently, exploitable biomass is likely to decrease further in 2010 even with no removals. If current levels of removals are maintained then exploitation rates are expected to increase in 2010.

Overall, the status of the stock has improved, particularly during 2004-2008. The average autumn survey SSB index over the last 3 years (2007-2009) is 10% of the average during the 1980's. However, the improvements are limited to areas adjacent to the 3KL border and the central portion of the inshore. The stock has not increased across much of the historical geographic range. Recruitment has not improved in spite of recent increases in stock size.

Although specific limit reference points for this stock have not been established, overall the stock is well below any reasonable limit reference point and remains in the critical zone with respect to the precautionary approach (PA). Application of the PA would require that any catch in 2010 be at the lowest possible level. This would include no directed fishing and measures to reduce cod by-catch in other fisheries. Management should focus on promoting further increases in SSB and improved recruitment until the stock is more resilient to the effects of fishing.

## RÉSUMÉ

L'état du stock de morue franche (*Gadus morhua*) dans les divisions 2J et 3KL de l'OPANO a été évalué grâce au processus d'évaluation régional mené à St. John's (Terre-Neuve), du 15 au 19 mars et les 22 et 23 mars 2010. Une pêche commerciale dirigée de la morue et une autre de pêche récréative ont été rouverts dans la zone côtière en 2006, et cela a continué en 2007-2009. Les eaux extracôtières sont demeurées fermées à la pêche dirigée. Aucun total autorisé des captures officiel n'était en vigueur de 2006 à 2009, mais les pêcheurs commerciaux ont eu droit à une capture annuelle (3 750 lb par détenteur de permis en 2009). Les pêcheurs récréatifs avaient droit à cinq poissons par personne par jour, jusqu'à un maximum de 15 poissons par bateau. La prise totale pour 2009 est incertaine. En 2009, les débarquements déclarés se sont élevés à 3 098 t, soit 2 832 t pour la pêche d'intendance, 216 t pour les relevés sentinelles et 50 t sous forme de prise accessoire. Par contre, cela excluait les prélèvements de la pêche récréative. On ne dispose d'aucune estimation directe des débarquements récréatifs pour 2009. Par contre, l'analyse des étiquettes récupérées donne à penser que les prélèvements de la pêche récréative, en 2009, pourraient représenter 64 % des prélèvements de la pêche d'intendance déclarés.

En l'absence d'information fiable sur les captures, l'évaluation s'est fondée principalement sur une analyse de la cohorte des données et de l'étiquetage du relevé au chalut, obtenue à l'automne grâce au navire de recherche du ministère des Pêches et des Océans. L'analyse de la cohorte a fourni des estimations relatives de la taille des stocks et des estimations absolues de la mortalité totale (Z). Pour ce qui est de la période récente (2008-2009), les estimations de la mortalité par pêche (F) obtenues grâce aux données d'étiquetage et de télémétrie acoustique ont été utilisées pour répartir Z entre F et la mortalité naturelle (M). La biomasse totale a augmenté (de 23 % par année) depuis 2004. La biomasse du stock reproducteur (BSR) a connu une croissance (de 83 % par année) de 2004 à 2008; par contre, la valeur de 2009 est semblable à celle de 2008. La mortalité totale dans les eaux extracôtières a été élevée (Z = de 1,0 à 1,5) de 1996 à 2002 pour ensuite diminuer, malgré la réouverture de la pêche dirigée dans la zone côtière de 2006 à 2009. La Z annuelle moyenne, de 2007 à 2009 (âge : de 4 à 8 ans) a été de 0,42 (= mortalité de 35 % par année). L'analyse des données de l'étiquetage a indiqué que la F, chez la morue des eaux extracôtières, en 2008 et 2009, a été de 0,06 et de 0,02 (= 5 % et 2 % par année), respectivement. Des estimations semblables de la F ont été obtenues concernant la morue étiquetée dans la zone côtière de 2007 à 2009 (variation de 0,02 à 0,10). Cela donne à penser que la F récente a représenté une petite composante de la Z. Les classes d'âge de 2003 et 2004 sont plus faibles que celles produites de 1998 à 2002 et sont maintenant entrées dans la BSR. Par conséquent, il est peu probable que le taux récent de croissance des stocks enregistré se maintienne à court terme. Les classes d'âge suivantes (2005 et 2006) semblent se situer autour de la moyenne pour la période allant de 1993 à 2007.

Dans la zone côtière, l'analyse des données des taux de prise des pêches sentinelles désagrégées à l'âge indique que la biomasse exploitable a augmenté dans la zone côtière centrale de 2003 à 2008, mais était moindre en 2009 qu'en 2008 dans toute la zone côtière. De façon notable, les classes d'âge de 2003 et de 2004 sont plus faibles que celles qui ont soutenu les pêches récentes (classes d'âge de 2000 et de 2002). Par conséquent, il est probable que la biomasse exploitable diminue encore en 2010, même sans prélèvement. Si les niveaux actuels de prélèvement sont maintenus, les taux d'exploitation devraient augmenter en 2010.

Dans l'ensemble, l'état du stock s'est amélioré, particulièrement pour la période allant de 2004 à 2008. Le relevé d'automne a permis d'établir que l'indice moyen de la BSR, pour les trois dernières années (de 2007 à 2009) correspond à 10 % de la moyenne observée au cours des années 1980. Par contre, les améliorations se limitent aux zones adjacentes à la frontière de la

division 3KL et à la partie centrale de la zone côtière. Le stock n'a pas enregistré de croissance dans la majeure partie de l'aire de répartition géographique historique. Le recrutement ne s'est pas amélioré malgré les augmentations récentes de la taille des stocks. Aucun point de référence limite précis n'a été établi pour ces stocks. Cependant, dans l'ensemble, le stock se situe bien au-dessous de tout point de référence limite raisonnable et demeure dans la zone critique pour ce qui est du principe de précaution. L'application de ce principe exigerait que le niveau de toute prise, en 2010, soit le plus bas possible. Cela interdirait la pêche dirigée et entraînerait des mesures de réduction des prises accessoires de morue des autres pêches. La gestion devrait se concentrer sur la promotion d'une augmentation accrue de la BSR et des recrues jusqu'à ce que le stock soit plus résilient aux effets de la pêche.

## INTRODUCTION

This document gives an account of the 2010 assessment of the northern (NAFO Div. 2J+3KL) cod (*Gadus morhua*) stock that inhabits waters off southern Labrador and eastern Newfoundland eastward to the edge of the continental shelf (Figs. 1a-1c). The current evaluation of the stock was conducted through a Regional Assessment Process (RAP) conducted during 15-19 March and 22-23 March 2010 in St. John's, NL. A Science Advisory Report (SAR) for the 2J3KL stock has also been produced (DFO 2010). Details of previous assessments are reported elsewhere (Bishop 1994; Bishop and Shelton 1997; Bishop et al. 1993, 1994, 1995; Shelton et al. 1996; Lilly et al. 1998a; 1999, 2000, 2001, 2003, 2004, 2005; 2006; Brattey et al. 2008a, 2009).

Data from several sources were reviewed. Oceanographic information was presented (Colbourne et al. 2008, 2009, 2010; DFO 2008a, b). Broad-scale changes in some major ecosystem components as well as potential key predators and prey were also reviewed. Commercial catch information was examined. 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 (1983-2009). Information on recruitment and total mortality is obtained from catch rate at age in the autumn surveys. Recaptures of conventionally tagged and detections of acoustically tagged offshore cod released during February-March 2007 and March 2008 were used to provide information on the distribution, abundance, and subsequent movements of cod from a 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 (1995-2009), which are conducted using two traditional gears, gillnets of 5½ inch mesh and line-trawls, and a non-traditional 3¼ inch mesh gillnet (1996-2009), which is intended to provide information on young fish. Logbooks from vessels <35 ft for the fisheries in 1998-2002 and 2006-09 were examined for catch rate information. Inshore tagging studies provide information on exploitation, distribution and migration; these were initiated in 1997 and were continued in 2006-09. Acoustic telemetry studies were also conducted in 2005-09 to investigate cod movement patterns and survival. Winter hydro-acoustic surveys (Rose 2003) of an over-wintering inshore aggregation in Smith Sound, Trinity Bay were conducted during 1997-2004 and in 2006-09. Annual telephone surveys of fish harvesters' observations are conducted by the Fish, Food and Allied Workers (FFAW) Union and results for the fisheries in 2009 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 1996-2009. 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. DFO-Industry bottom-trawl surveys were conducted during July-August 2006-2009 using small (<65 ft) commercial vessels. 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.

## ECOSYSTEM INFORMATION

Ecosystem information was presented in the form on an overview of major signals and trends in various components of the marine fish and shellfish community off Newfoundland and Labrador. These findings are part of an ecosystem research initiative (ERI) which is part of a major focus of DFO Science activities (see http://www.dfo-mpo.gc.ca/science/Publications/index-eng.htm). Trends in biomass (B), abundance (A) and BA ratios of key species groups were examined based mainly on time series of catch data (1981-2009) from autumn research vessel (RV) surveys. Fish species were grouped into six major functional groups, namely: small benthivores [45 species] (max size <45 cm, e.g., alligator fish [*Aspidophoroides* sp., sculpins [*Myoxocephalus* spp.]), medium benthivores [34 species] (45 cm<max size <80 cm, e.g., yellowtail flounder [*Limanda ferruginea*], lumpfish [*Cyclopterus lumpus*]), large benthivores [29 species] (max size >80 cm, e.g., American plaice [*Hippoglossoides platessoides*), piscivores [31 species] (e.g., Atlantic cod, turbot [*Reinhardtius hippoglossoides*], Atlantic halibut [*Hippoglossus hippoglossus*]), plankton-piscivores [8 species] (e.g., redfish [*Sebastes* spp.], Arctic cod [*Boreogadus saida*]), planktivores [14 species] (e.g., capelin [*Mallotus villosus*], herring [*Clupea harengus*], butterfish [*Peprilus triacanthus*]). Biomass time-series for *Pandalus* shrimps and Snow crab (*Chionoecetes opilio*] were examined. 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.

During the late 1980s and early 1990s the fish community in the Newfoundland and Labrador large marine ecosystem collapsed. This collapse was more dramatic in the northern regions and involved commercial and non-commercial species. Most fish functional groups showed significant declines in their BA ratio, which generally indicates loss of large fish. During the late 1980's and early 1990's there was an increasing trend in the population size of harp seals and a build-up of shrimp biomass; since the mid-1990s harp seals and shrimp have maintained a high population size. Since 2002-03 there is an increasing trend in the fish biomass, more so in 2J3KL than for 3NO. Abundance is also increasing, but the trend is less pronounced compared to biomass. The BA trends also show an increasing trend in some functional groups in 2J3KL. Some components of the fish community (e.g., piscivores such as Atlantic cod, turbot, and Atlantic halibut) and large benthivores (e.g., American plaice) appear to be showing some positive signals, but still remain at a significantly lower level in comparison to the pre-collapse period. These are the first significant changes observed in ecosystem structure since the collapse. However, the most recent ecosystem information is less optimistic and trends in components of the fish community in 2009 are more variable.

## OCEANOGRAPHY

Oceanographic information (Colbourne et al. 2008, 2009, 2010; DFO, 2008a, 2008b) indicates that the marine environment off Labrador and eastern Newfoundland experienced considerable variability since the start of standardized measurements in the mid-1940s. A general warming phase reached its maximum by the mid-1960s. Beginning in the early 1970s there was a general downward trend in ocean temperatures, with particularly cold periods in the early 1970s, early to mid-1980s and early 1990s. Ocean temperatures have been above normal for the past decade, with 2006 at a record high, but subsequently temperatures have declined slightly and in 2009 were close to nearer normal values.

Cod in the 2J3KL stock area may be more productive when water temperatures are toward the warm end of the regional norm; consistent with this observation cod in the offshore have shown improved growth rates since the low values of the early 1990s when water temperatures were low, although growth and condition in 2009 were lower than those observed in the mid 2000s.

Recent environmental indicators for the 2J3KL stock area are generally positive. Water temperatures are close to average and were recently at the high end of historic range; nutrient and phytoplankton inventories have been variable with no clear trend over time. Secondary productivity shows signs of improvement with the overall abundance of zooplankton species above the long-term mean after 2004. Recent trends in these indicators coincide with the recent increases in cod abundance and biomass in the offshore; though it is noteworthy that there are as yet no clear signs of improved cod recruitment in the 2J3KL area.

## PREDATORS

Some species of marine mammal (seals and cetaceans) are abundant in the 2J3KL stock area at certain times of year and these have the potential to exert a strong influence on ecosystem dynamics directly through predation (DFO, 2010a). Some studies indicated an increase in the amount of cod consumed by harp seals since the late 1980s due, primarily, to increased occurrence of Atlantic cod in near shore diet samples. Estimates of total 2J3KL cod consumption by harp seals are imprecise. Analyses presented in 2001 indicated that harp seals may have an impact on the recovery of 2J3KL cod; however, ongoing analyses from a simple biomass-based model exploring the impact of harp seals on cod under a wide range of consumption estimates suggests that harp seal predation is not a significant factor in the lack of recovery to date.

Hooded seals and cetaceans are also found in significant numbers in the 2J3KL stock area; diet studies indicate that cod are eaten by hooded seals and some cetacean species but the overall impacts of these predators on cod are not known.

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

### PREY

Capelin is a key prey item for cod. An index of offshore capelin biomass, based on hydro-acoustic surveys, indicates that capelin biomass was high in the 1980s, but dropped dramatically in the early 1990s and remained low for several years (DFO, 2008c). There was an increase in capelin biomass offshore in 2007, but the index has subsequently remained unchanged. In the inshore, indices of capelin biomass did not show such extensive declines in the early 1990's; inshore indices are no longer available. Overall, the status of capelin appears to have improved then stabilized; the timing of improvement coincides with the recent increases observed in the biomass of cod in portions of the offshore. Capelin arrived inshore later in 2009 than 2008 and were smaller.

## REPORTED LANDINGS OF COD

Reported landings from this stock from the 1950's until 2005 are described in detail in Lilly et al. (2006) and to 2008 in Brattey et al. (2009). An updated table of the entire time-series of landings is provided herein (Table 1, Figs. 2, 3). Fixed gear landings from 1975 to 2009 are also summarized (Table 2, Fig. 4) and these show that most of the catch during 2006-2009 was taken by gillnets. New landings information is described here for the stewardship fishery in 2009 (Table 3) and revised estimates for recreational landings for 2008 are given (see below).

### REPORTED LANDINGS DURING 2009

During the 2009 "stewardship" fishery the offshore remained closed to directed fishing. There was no formal TAC; commercial fishers were permitted an allowance of 3,750 lb of cod per license holder. Recreational fishers were permitted 5 groundfish per person day, and no more than 15 fish per boat.

Total catch in 2009 is uncertain. Reported landings in 2009 were 3,098 t (Table 1 and Table 3, Fig. 5); this included 2,832 t in the stewardship fishery, 216 t in the sentinel surveys, and 50 t taken as by-catch, but excludes recreational fishery removals. There are no direct estimates of recreational landings for 2009. However, analysis of tag returns (see Tagging and Telemetry Section) suggests that removals from recreational fisheries during 2009 could be 64% of reported stewardship fishery removals.

Samples of the lengths of cod captured during the recreational fishery were taken by fisheries officers who measure cod at sea (on board recreational vessels) and at the dock in various communities. Mean lengths tended to vary among regions and were generally highest (~ 60 cm) in

Fogo-Twillingate, Bonavista Bay and Trinity Bay and lowest (< 53 cm) in areas further north (3Kd, western Notre Dame Bay) and southward in Conception Bay (3Lf). The mean lengths of cod sampled at the dock were compared with those sampled at sea by unit area for both the 2008 and 2009 recreational fishery. Samples were not available for all areas in all years. In 2008 there was no consistent difference in the means (Fig. 6, upper panel). However, in 2009 mean lengths of cod sampled at the dock during the recreational fishery were higher than those sampled at sea in all areas (Fig. 6, lower panel), suggesting widespread discarding of small fish during the 2009 recreational fishery.

The estimate of landings from the 2008 recreational fishery was revised from 818 t to 1,089 t using area-specific average weights based on actual sampling of 2008 recreational fishery catches, rather than an average weight of 1.5 kg per fish. Further information on landings from the 2008 fishery, based on tag returns, is given later in this document (see Tagging and Telemetry section).

Estimates of commercial catch are also uncertain. Commercial fishers have commented at previous 2J3KL cod assessments and at recent public consultations that commercial landings are underestimated. They also commented that some recreational fishers were making multiple trips per day and thereby exceeding the daily limit.

An estimate is not yet available for the 2009 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) reported that the annual catch of cod in the regulatory area during 2000-2008 was 82 t or less and has been declining.

Most of the landings in 2009 were from the stewardship fishery which took place inshore during September and early October; catches in remaining months were mostly from the sentinel survey and by-catch (Table 3). Most of the catch was taken in Notre Dame Bay (3Kh/3Ki, >1,000 t), Bonavista Bay (3La, 608 t) and Trinity Bay (3Lb, 584 t). Catches and effort were much lower in the north (2J, 57 t) and in the extreme south (3Lq, 8 t).

## BY-CATCH OF COD IN OTHER FISHERIES

By-catches of cod occur in ongoing Canadian and non-Canadian fisheries. All recorded by-catch has been incorporated into the catch (Tables 1-3), but not all by-catch is recorded and this is another reason why total catch is considered uncertain.

In the offshore, some by-catches of cod are taken by Canadian fleets fishing for Greenland halibut (turbot), but cod by-catch is typically low in this deep water fishery. The experimental fishery for turbot at shallower depths (160-300 fathoms) in northern 3L during late summer and autumn (August-November) of 2004-2008 encountered significant by-catch of cod in those years (Brattey et al. 2009) but was not continued in 2009.

In the inshore, by-catches of cod 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). Reported cod by-catch in 2009 from all fisheries combined was 50 t.

## DISCARDS

No new information on discarding during commercial fisheries was presented at the 2009 RAP; however, there was evidence of widespread discarding of small cod during the recreational fishery in 2009 (see Fig. 6). Discarding of cod during the shrimp fishery was explored at the 2009 ZAP and was estimated at < 20 t per annum during 2004-2008.

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 linetrawl, as well as by hand-lining with baited and feathered hooks. Size based price-differentials are also an incentive for commercial 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, fall-out from gillnets) 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 1992.

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

## CATCH NUMBERS AT AGE

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

### Historic Pattern

The time-series of catch-at-age from the fishery for northern cod (inshore and offshore combined) extends from 1962 to 2009 (Table 4). Descriptions of the trends to 2007 and factors influencing them can be found in previous assessment reports (Lilly et al. 2006; Brattey et al. 2008a).

### *Catch At Age During 2009*

In the 2009 fishery, the age range represented in samples from the stewardship fishery catch extends to about age 13, but most of the catch consists of ages 5-8 (Tables 4 and 5) which is typical for a fishery dominated by gillnets (see Table 2). However, ages 6 and 7 (2002 and 2001 year-classes) make up most (57%) of the catch numbers in 2009. Comparison of the catch-at-age over the past four years (Fig. 7) is complicated by uncertainty in the estimate of recreational catch for 2007 and 2009; however, the 2002 year class tracks through the catch and is the strongest at ages 4, 5 and 6. The 2003 year-class looks much weaker at ages 4, 5 and 6 relative to the 2002 year class at the same ages. The 2004 year-class (5 yr olds in 2009) also looks relatively weak. The catch-at-age data are therefore consistent with recent information on recruitment from sentinel surveys and beach seine (see below) and suggest that the 2003 and 2004 year classes are much weaker than those that have supported recent inshore fisheries.

## 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 5, 6; Fig. 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; however, the 2003-2005 year classes at age 6, 5 and 4 in the 2009 survey have slightly lower mean weights at age. 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. The overall trend in weights at age suggests an improvement since the low point in the early 1990's, although the more recent values for ages 4-6 suggest the increasing trend may not continue.

There are 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.

## STAKEHOLDER PERSPECTIVE

Telephone surveys conducted by the Fish, Food and Allied Workers (FFAW) Union (Jarvis and Stead 2005) were continued following the fisheries in 2006-09 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

In contrast to the recreational fishery, the stewardship fishery for cod (as prosecuted by commercial fish harvesters) is a limited entry fishery with gear restrictions (amount and type of gear), seasonal and duration restrictions, and landings are closely monitored at sea and at dockside. Commercial fish harvesters feel that the data they collect during their participation in this fishery is very important to the continued monitoring of the recovery of this stock (inshore and offshore).

Fish harvesters feel that while the high catch rates during the late 1990's were largely driven by a narrow band of cod aggregations close to shore, much has changed in recent years. While current catch rates are about the same as those of the late 1990's cod are much more widely distributed over inshore and offshore fishing grounds in very shallow depths to depths of 150 fathoms. Harvesters feel that the current level of abundance combined with the current distribution and migration patterns that resemble historical patterns is evidence that a significant recovery has and is taking place. Based on observations of the range of year-classes and the level of abundance, harvesters feel that the current allowance can be increased and recovery can continue to take place.

## TELEPHONE SURVEY OF FISH HARVESTERS

Two hundred and eighty two 2J+3KL fish harvesters participated in a telephone questionnaire conducted by the FFAW in February 2010. Most harvesters felt that cod were more abundant during 2009 than during the 1980's. Most 3K and 3L harvesters felt cod abundance was better in 2009 than in the late 1980's. Harvesters in 2J+3KL found cod abundance in 2009 comparable or the same as 2008. Most harvesters felt that cod were distributed throughout their area and felt that condition and the health of cod were good. The majority of fish harvesters in all areas felt capelin, mackerel and squid abundance is at a low level and declining.

# INFORMATION FROM THE OFFSHORE

## 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 and the 2004 survey estimate is likely biased low. 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 largely omitted in 2007-2009. These issues add uncertainty to survey estimates of abundance, biomass, mortality rates and biological characteristics.

Spring surveys have been conducted by Canada in Div. 3L during the years 1971-82 and 1985-present. Spring survey data to 2007 are reported in Brattey et al. (2008a) and are updated with results from 2008 and 2009 surveys herein.

### Survey Design

Details of the stratified random trawl survey design are described in previous documents (Lilly et al. 2006; Brattey et al. 2008a). Additional information on surveys conducted by DFO since the introduction of the Campelen trawl in 1995 are provided by Brodie (2005) and Brodie and Stansbury (2007). The depth-based stratification scheme and location of numbered strata is illustrated by NAFO Division in Figs. 9-11.

### Autumn Surveys

*Autumn Abundance and Biomass Indices:* Indices of cod abundance and biomass are based on the strata-area weighted 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 along with the actual Campelen data from 1995-2007 in Brattey et al. (2008a). Data for 1993-2007 for Div. 2J are based on a revised stratification scheme introduced in 1993 (Bishop 1994). Many survey tables in Brattey et al. (2008a) for each NAFO Div. are divided into two parts; up to 1992 and from 1993 onwards. Estimates for surveys in Div. 3L are given separately for strata in depths <=200 fathoms (Tables 18-21 in Brattey et al. (2008a)) and for those in depths >200 fathoms (Tables 22-23 in Brattey et al. [2008a]). Estimates for inshore strata added to the surveyed area in 1996 are given in Tables 24 and 25 of Brattey et al. (2008a).

There have been some changes over time in the depths covered during the survey; consequently, trends 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 from 1996 onwards are not included in this index, nor are deep-water strata (>200 fathoms in Div. 3L, or >500 m in Div. 2J and 3K). Separate estimates of abundance and biomass by stratum have been calculated for the inshore and deep-water strata (see Brattey et al. 2008a), but coverage in these areas has been poor in the past few years. Lilly et al. (2006) provide details on the interpretation of the autumn survey data with respect to depth and timing of the survey.

For brevity, the full time series of tabulated autumn survey data is not repeated here; the data by NAFO Division and stratum are provided only for 2000 onwards, for Div. 2J (Tables 7a and 7b), 3K (Tables 8a and 8b), and 3L (Tables 9a, 9b, 10); the annual estimates for the abundance index and biomass index (from all offshore index strata combined) are highlighted in grey in these tables.

Overall, trends in the indices of abundance and biomass in the offshore index strata similar (Fig. 12), although for individual Divisions there are some differences that mostly reflect changes in the relative abundance of small and large fish. Of note are the strong positive anomalies 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 indices remained at low levels in all divisions for several years after 1993. The abundance index increased during 2003-2009; the biomass index increased during 2003-2008, but the 2009 value is a wee bit lower. Biomass has not increased markedly in 2J, and the overall increase is driven by changes in 3K and 3L. The average abundance index and average biomass index for 2J3KL during 2007-09 were 9% of the average of the 1980's. The 2009 survey abundance and biomass index values were 175 million fish and 143,000 t, respectively.

An index of spawning stock biomass (SSB) was also calculated using the product of numbers-at-age, survey mean weights-at-age, and cohort model estimates of proportion mature at age (see below) from offshore autumn survey. The index of SSB shows a similar trend to that of abundance and biomass, and remained extremely low for several years after 1993. An increasing trend is evident during 2005-08, but the 2009 value (76,000 t) was 29% lower than 2008 (Fig. 13). The average SSB index for 2J3KL during 2007-09 was 10% of the average of the 1980's.

*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 2009 by division and for all three divisions combined in Table 11. Mean catch per tow was low for each age in each Div. for several years relative to 1983-1991. There has been a slight increase in catches since 2003, particularly among ages 3-7; and a slight broadening of the age structure. In the 2009 survey, 3-5 yr olds are most strongly represented.

The relatively large catch rate at age zero in Div. 2J in 2008 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; a similar single large catch was observed in this area in 2005. There are no age zeros in the catch at age matrix prior to 1996 and generally few in subsequent years as these small cod not selected by the Engels gear and poorly selected by the Campelen gear.

Coverage of deep water strata (≥500 m in 2J and ≥200 fathoms in 3KL) has been inconsistent in recent years, but the available data indicate that cod are neither widespread nor abundant in deep water in recent years (Tables 7-10).

The time series of autumn survey mean catch at age per tow for 2J3KL combined is illustrated using "bubble" plots (Fig. 14); only ages 1-12 are shown. Note that the raw data are converted to proportions within an age (left panel) or within a year (right panel). In the right panel, the proportion of catch at each age is first computed and then the annual standardized deviations from the mean proportion for all years are plotted for each age. Negative deviations are shown as black circles and positive deviations are shown as grey symbols. The size (i.e. area) of each symbol is proportional to the absolute value of the deviation. The symbol sizes do not reflect the year to year changes in relative strength of year classes, but are useful for indicating how consistently individual year classes track through successive surveys.

The left panel of Figure 14 shows that prior to the early 1990's the numbers of cod in survey catches were much larger for all ages. The survey catches included a broad age structure which collapsed rapidly after 1990. Some larger than average year-classes tracked through successive surveys in the early part of the time-series as diagonals of large grey symbols, e.g., the 1981 and 1982 year classes at ages 2-8 and 1-8 respectively, and the 1987 year class at ages 1-4. In contrast, the 1977 and 1976 year classes appear as average (small dots) at ages 7-12 and 6-12 in successive surveys from 1983 to 1989. The standardized proportions of all ages from surveys from 1993 onwards appear as black symbols indicating they are lower than average. In the early to mid-1980s survey catches tended to be dominated by older cod (>age 4), whereas from 1993 onwards they are comprised mostly of younger cod (<= age 4). The 1994 year class is consistently well represented in survey catches at ages 1-4 from 1995-1998, but at older ages in subsequent surveys is poorly represented. In the recent period, the 2002 year class is well represented at ages 1-7 in several consecutive surveys (2003-2009), whereas the 2003 year-class is consistently below average. In contrast, the 2000 and 2001 year classes are inconsistent, the 2001 year class appears weak at ages 2-3 and age 8, but average or relatively strong at age 1 and ages 5-6. In the 2009 survey, the 2004-2006 year-classes are well represented at ages 5, 4, and 3, respectively, but were poorly represented at younger ages. The age structure of survey catches is expanding in recent years, mainly as a result of catches of 5-8 year old cod from the 2000-2002 year classes. Interpretation of how well year classes track through successive surveys is complicated by poor coverage in the 2004 survey, and differences in survey timing among years.

## Autumn Distribution

In previous documents, the distribution of cod in 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).

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 has been around Funk Island Bank (for location see Fig. 1b), particularly to the east and southeast. This pattern is evident in 2006-2007 (see Brattey et al. 2008a, 2009) and 2008-2009 (Figs. 15, 16) where some larger catches were taken in a broad 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 (see Fig. 1b for locations). In 2008 and 2009, some slightly larger catches (in terms of numbers) were also taken in 2J (Hawke Channel and Hamilton Bank) and outside the 200 nm limit on the “nose” of the Grand Banks. When the catches are illustrated in terms of weight (Fig. 16), larger catches are even more restricted, to the area south and east of Funk Island Bank, indicating that cod caught in this area were larger. Inshore strata were omitted or coverage was poor during 2007-2009, but some larger catches have been taken in the inshore strata in previous surveys (see Lilly et al. 2006).

Survey catches by stratum area (Tables 7-10) were analyzed further to determine what fraction of the total abundance and biomass from the index strata were found in the 3KL border and eastern Funk Island Bank area. The total area for strata 628, 636, 637, 638, and 639 in 3K (see Fig. 10 for stratum locations) and 344, 345, 346, and 366 in 3L (see Fig. 11 for stratum locations) was combined and accounted for approximately 14% of total area surveyed (offshore index strata only). Catches from these nine strata combined were found to comprise about 14% of the total survey biomass index and 11% of the total survey abundance index in the 1980’s; however, in the 2009 survey these values were 64% of the total survey biomass and 32% of the total survey abundance.

These survey data clearly indicate that the recent improvements in survey biomass and abundance in the offshore area are largely restricted to the area adjacent to the 3KL border and eastern Funk Island Bank. There are large offshore areas where cod are still scarce relative to the 1980s, particularly in 2J, northern 3K, and on the northern plateau of the Grand Banks in southern 3L. The area showing the most significant improvement in terms of survey catches is adjacent to the central inshore area where catch rates in recent (2006-09) inshore fisheries have been highest. This region of improved survey catches also overlaps the area of northern 3L where cod by-catch in the 2004-2008 turbot gillnet test fishery increased.

## 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 1995; 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 in terms of comparison to the actual Campelen results.

Trends in the catch rates of cod aged 2 and 3 (shown as year-classes, not survey years) show that all cohorts produced since the late 1980’s have been relatively weak (Fig. 17). The most recent information on offshore recruitment came from the 2009 autumn survey which provides information on 2-yr-old cod from the 2007 cohort and 3-yr-olds from the 2006 cohort. There is no information from the offshore on more recent cohorts which have yet to be sampled adequately by the Campelen gear. The number of age 2 and age 3 cod in the offshore survey throughout the 1990s and 2000s has consistently been much lower than during the 1980s (Fig. 17). There is no indication of any major improvement in recruitment in recent years (2006-2009) in spite of the increasing trend in the offshore abundance, biomass, and SSB indices. Furthermore, the 2003 and 2004 cohorts that will be age 6 and 7 during 2010 appear particularly weak.

## Trends in Mortality Rates in the Offshore

Instantaneous rates of total mortality (Z) were estimated from autumn research vessel survey catch rate data as described by Lilly et al. (2006). Only ages 4-6 were used in this analysis and the time-series was divided into two periods (pre- and post-1995) because a different type of trawl (Engels) was used in the earlier time-period, although the data for the earlier period have been converted to Campelen equivalents. Ages 4-6 are assumed to be fully recruited to the gear in this analysis. Older ages could not be included in this analysis because they were sporadic in the survey catches in the mid to late 1990's. Lilly et al. (2006) outlined many of the details and problems that can influence the outcome of this type of analysis.

The annual total mortality rate (Z) is variable, but increased to an extremely high level (>2.0) from 1989 to 1993 (Fig. 18). After the moratorium was imposed in 1992, Z remained high (~0.9) throughout the mid-1990`s and increased further during 2001-03, but subsequently 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, there are now three consecutive surveys that give low (<0.3) values of Z and data from other sources (see Brattey et al. 2009) also support the interpretation that the rate of total mortality in the offshore has decreased.

The reasons for the high Z throughout the 1990s and early 2000s are not well understood. Fishing has been restricted in much of this period, suggesting that the rate of natural mortality (M) has been high. The recent decline in Z and upward trend in offshore abundance and biomass occurred during the years after the inshore fishery re-opened (2006-2009) suggesting that the natural mortality rate has declined substantially in the recent period. High values for Z and/or M have been observed in many Canadian Atlantic stocks in the post-moratorium period, and various hypotheses have been proposed and investigated to account for this finding, including predation by marine mammals, unreported fishing, fishing by non-Canadian fleets (3L and 3NO), poor condition and associated high mortality, selection for early maturation and subsequent high post-spawning mortality (Sinclair 2001; Swain and Chouinard 2008; Trzcinski et al. 2006; Shelton et al. 2006; Fudge and Rose 2008, DFO, 2007a; Swain 2010). The reasons likely differ among populations, but remain contentious and are the subject of ongoing investigation in many of the Canadian Atlantic cod stocks.

## 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 in Brattey et al. (2008). These tables have been updated with results from 2008 and 2009 surveys, but for brevity only the data from 2000 onwards are reported herein (Tables 12a, b; 13) although results for the time series from 1985-2009 are illustrated in Fig. 19.

The spring 3L abundance and biomass indices have remained low since the mid-1990's (Fig. 19). Although the abundance index and biomass index increased during 2003-2007 the increasing trend has not continued and the index values for 2008 and 2009 are much lower. The average abundance index for 2007-2009 is only 6.5% of the average of 1986-89 and the 2009 value (17.6 million) is much lower than the 2007 value (42.4 million). The average biomass index for 2007-2009 is 3.6% of the average of 1986-89 and the 2009 value (7,600 t) is much lower than the 2007 index value (34,500 t). No SSB index was presented at the 2010 RAP, but current SSB is clearly a small fraction of the 1980s value.

Surveying in waters deeper than 200 fathoms in spring has shown that the proportion of the total survey catches found in the deep (200-300 fm) strata has been highly variable (see Brattey et al. 2008). 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 to zero in 2004 and has remained close to zero from 2004 to 2009 (Table 13).

*Spring 3L Mean Catch at Age Per Tow:* 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 increased slightly after 2003 and the 2007 value (8.36) was the highest observed since 1992. However, the catches have been lower in the past two surveys (4.1 and 3.5 fish per tow, Table 14).

There have some changes in the age distribution of spring survey catches since the collapse in the early 1990's; initially, this was 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. These disappeared during 2001 and 2002. In the more recent period (2004-2008) catches of cod aged 3-6 have improved slightly compared to the mid to late 1990's and early 2000's, but the survey catch in 2009 was more restricted with no fish older than age 9.

The recent portion (1993-2009) of the time series of spring survey mean catch at age per tow (ages 1-9) is illustrated using "bubble" plots (Fig. 20). The left panel shows intermittent appearance of old fish in the spring survey in the mid to late 1990s, and a large block of lower than average catches for ages 3-9 (large black symbols) during the early 2000s. The right panel shows that the 2002 year class is well represented in spring survey catches at most ages. In general, the 2000 and 2001 year classes are well represented in some years, but overall these plots reveal a lot of inconsistency in the age composition of the spring survey during the past 16 yrs. The spring survey does not appear to be tracking age classes well. This survey covers only the southern portion of the stock area and may be heavily influenced by annual changes in the distribution of the stock across the 3K/3L border to the north and possibly the 3L/3NO border to the south.

*Spring 3L Dstribution:* 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 2008 and 2009 reveal that cod were scarce on the shelf in both years but more so in 2009. Some modest catches were taken in the most northern region of 3L and outside the 200 nm limit on the "nose" of the Grand Banks (Fig. 21). Similar distributions are evident in spring surveys in 2006 and 2007 (Brattey et al. 2008).

## INFORMATION FROM THE INSHORE

### SENTINEL SURVEYS

Sentinel surveys for cod were conducted by fishing enterprises operating from many communities 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 the most recent accounts are provided by Maddock Parsons and Stead (2009a, b, 2010) who extend the time series to 2009.

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, 2006-09) 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 1998b; 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 surveys varied between 53 and 59 during 1995-2002, but was reduced to 42-45 in 2003-09. See Maddock Parsons and Stead (2009a, b, 2010) for additional details regarding fishing methods and sampling strategy.

Maddock Parsons and Stead (2009a, b) provided 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; data for individual sites are also given.

## Sentinel Standardized (Modeled) Catch Per Unit Effort (CPUE) by Area

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 (5½ inch mesh gillnet, 3¼ inch mesh gillnet and linetrawl), NAFO Div. (2J, 3K, 3L), statistical unit area (e.g., 3Ki, 3Lh), year (1995 onwards, or 1996 for 3¼ inch mesh gillnet) 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 survey and the fish harvesters measured the length of all the fish caught with line-trawl and gillnet, obtaining catch numbers-at-age was relatively straight forward [see Stansbury et al. (2000) for details].

Age-disaggregated CPUE 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 3-10 years for 5½ inch gillnets, 2-10 years for 3¼ inch gillnet and 3-9 years 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 2010 but are not shown here. Initially the data were grouped into three inshore areas as in previous assessments (Fig. 22); an inshore northern area (White Bay, the northern Peninsula and southern Labrador), an inshore central area (Notre Dame, Bonavista, and Trinity bays), and an inshore southern area (Conception Bay, eastern Avalon and St. Mary's Bay). The area boundaries were assigned based on catch rates and information from tag returns in the post-moratorium period. Standardized catch rate indices were computed for each of these inshore areas although for some area/gear combinations there were insufficient data.

## Sentinel Catch Rates Indices

The model adequately fitted the data from 5½" mesh gillnets for each of the three inshore areas, and for small-mesh gillnet and linetrawls from the central area only. Age-aggregated and age dis-aggregated indices were computed, the former by summing the age within year effects for each year (Tables 15a, b). The addition of one more year of data for 2009 did not markedly change the fits from the previous assessment.

The gillnet (5½ inch mesh) standardized catch rate indices show different trends in each inshore area (Fig. 23). In the northern area, catch rates with gillnets (5½ inch mesh) in 2009 were lower than those observed in 2008 and are now marginally above the average of the time series, but are lower than those in other areas. In the central area, catch rates decreased in 2009, remain above average, and are above those in other areas. Catch rates in 2009 are below the levels observed in the central area in 1998. In the southern area, catch rates have remained similar since 2003, and in 2009 are below average and below those observed in the central area.

In the central area, standardized catch-rate indices from line-trawls decreased during 2009 and are above the average of the time-series (Fig. 24). There are fewer data for linetrawls and the trends are more variable and confidence intervals larger than those observed for gillnets.

In the central area, standardized catch-rate indices for small-mesh gillnets are plotted separately for younger cod (ages 3 and 4) and older cod (ages 5-10; Fig. 25). The catch rates for younger cod are higher in most years. The trend for older fish declines to lowest values in 2002 and subsequently increased to 2007, whereas for younger fish there is no clear trend. Catch rates for 3-4 year old cod were lowest in 1998 and 1999, but higher in 1996, 2003 and 2005. The three most recent values for ages 3 and 4 are not high, suggesting that incoming recruitment is weaker.
Trends in the standardized age-disaggregated catch rates for each gear type from the central area (Tables 15a, b) are illustrated as "bubble" plots (Figs. 26, 27). Although there is some variability among gear types, in general 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 lower. However, catch rates at age started to increase again, particularly for the 2000-2002 year classes in consecutive years at ages 3-7. The catch rates of young cod (ages 3-4) in small mesh gillnet and line-trawl in 2006-09 are lower, suggesting that incoming recruitment after the 2002 year class is weaker.

Interpretation of the trends in catch rate indices from sentinel surveys is complicated because the time-series includes periods with and without commercial fisheries taking place at the same time. In some years, particularly 1998-2002, and 2006-09 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 survey 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.

## TAGGING AND TELEMETRY

*Conventional Tagging*: Mark-recapture studies of cod in the inshore of NAFO Div. 3KL using conventional Floy tags were started in the mid-1990's and continued in 2006-09. 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 investigate 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, 2007; Cadigan and Brattey 2000, 2003). Several thousand additional cod were tagged and released with external Floy tags in the inshore of 3KL during 2006-2009.

Tag returns from the recent fisheries were used to estimate exploitation (harvest) rates among cod released in four inshore unit areas (3Ki, 3La, 3Lb, 3Lj) and one offshore area (3Kg). The tagging study incorporated methods to estimate tagging mortality, tag loss, and reporting rates (Brattey and Cadigan 2004; Cadigan and Brattey, 2003, 2006, 2008).

Estimates of the fraction of tags returned by fishers are necessary to infer exploitation rates using tagging data, especially if the reporting rate changes over time. Cod tag reporting rates have been estimated using the proportion of low-reward tags returned from low-reward and high-reward tag releases and various methods of analyzing this type of data have been investigated (Cadigan and Brattey, 2003; 2006). The time-series of tag reporting rate data now extends over a period of 12 years (1997-2009). A newer approach that utilizes a mixed-effects logistic regression model (Cadigan and Brattey 2008) was used to estimate annual reporting rates, where rates for each region are decomposed into a main effect and a random year effect. Reporting rates were also estimated separately for commercial and recreational fisheries for the first time, and for the combined data from both fisheries. The overall reporting rate for single low reward tags in 3KL during 2009 was 0.57, slightly lower than the rate estimated for the 1997-2005 period (0.68-0.90)(Table 16, Fig. 28). The single tag reporting rate from recreational fishers shows no trend and has consistently been lower (range 0.46 – 0.54) than that for commercial fishers (range 0.66-0.90). There is no estimate from recreational fishers for some years (1997, 2004, and 2005) due to sparse numbers of returns. The reporting rate from commercial fishers shows a slight declining trend and the value for 2009 (0.66) is the lowest in the time-series.

To estimate exploitation rates, the instantaneous rate of natural mortality (M) was assumed to be 0.4 for cod tagged in 3K and 0.2 for those tagged in 3L in most analyses. Estimates were also computed for a range of assumed values of M (0.1, 0.2, and 0.4). Annual estimates of exploitation (percent harvested) were computed based on tagged cod >50 cm fork length (FL) and <=85 cm FL at release and recaptured within two years of release. In 2009, exploitation rates were low for cod tagged in all inshore areas and in the offshore area, ranging from 4 to 9% (Table 17). For 2007-2009, the estimates were all low and ranged from 3-10% (i.e.; these estimates included the aforementioned range of assumptions about the value of M. Exploitation rates have tended to remain stable or decline in the past four years, with the decline most evident in 3Ki.

In 2007 and 2008, cod were also tagged and released in the offshore of 3K on the continental slope edge during March; this is the first time offshore cod tagging has been conducted in 2J3KL since the early 1990's (Taggart et al. 1995). In 2007, a total 1,127 cod >45 cm FL were tagged and released but no recaptures were obtained in 2007 and only two were received in 2008 and none in 2009. These cod were captured using an otter trawl in extremely deep water (~430 m) and were assumed to have suffered high post-release mortality; consequently, the results were not used to estimate exploitation rates. In 2008, a total of 2,268 cod >45 cm fork length were tagged and released in the offshore of 3K about 25 nm northwest of the 2007 release site. The cod were captured using an otter trawl in shallower water (~340 m) than during the 2007 survey, but likely suffered considerable post-release mortality. In the summer and autumn of 2008, a total of 36 tagged cod were recaptured inshore during recreational and commercial fisheries, and 12 were returned in 2009. The inshore recaptures were widely distributed, throughout 3K and 3L as far south as Petty Harbour in 2008, but were more clustered in 2009 (Fig. 29). To estimate the exploitation rate of these offshore cod from the tagging data we used a higher estimate for the rate of tagging mortality (0.34) than was used for inshore cod (0.02 or 0.22 depending on temperature);

The higher estimate for offshore cod was based on the average mortality rate of cod trawled from deep (200 m) water in Smith Sound implanted with acoustic transmitters. This estimate is uncertain and difficult to determine; however, among the same batch of offshore cod released with conventional and acoustic tags (see below), to date 25% of the acoustically tagged ones have been detected inshore and must have survived the stress of capture, tagging surgery, and release. This gives a minimum estimate of the fraction of conventionally tagged cod that survived. The fraction is likely to be higher because of accumulated tag loss and natural mortality (M) and not all survivors would have been detected to date. A value of 0.34, though uncertain, seems reasonable for initial tagging mortality and is consistent with the available information. A range of assumed values for natural mortality were also used (see above), but these had little impact on the outcome; in the final analysis natural mortality was assumed to be 0.2 per yr (consistent with the DFO RV survey-based estimates of Z for 2007-2009). The annual tag reporting rate estimates for 2008 and 2009 (0.64 and 0.57, respectively; Table 16) for inshore 3KL were also used. Using these values and model estimates of tag loss rates based on double-tagging, the exploitation rate of offshore cod in the inshore was estimated to be 5% in 2008 and 2% in 2009 (Table 17) which corresponds to fishing mortalities (Fs) of 0.06 and 0.02.

The distribution of recaptured tagged cod was similar to that from previous (1997-2002) inshore cod tagging experiments and indicated that cod tagged inshore in early spring or late fall tended to remain inshore, with considerable movement among adjacent bays. Cod tagged and released inshore in 3Ki, 3La, 3Lb tended to be recaptured within an area bounded by the 3Kd/3Ki border in the north and the 3Lb/3Lf border to the south (see Fig. 1c for boundaries). Cod tagged in southern 3L (3Lj) were often recaptured either locally or to the south in the neighbouring 3Ps stock area.

During the 2010 assessment meeting, further analysis of the cod tag return information was requested to determine whether the number of reported tag recaptures could be used to estimate the magnitude of recreational fishery landings relative to reported commercial landings during 2007-2009. No direct estimates of recreational landings were provided by Fisheries and Aquaculture Management for the 2009 fishery. In this analysis, the annual estimates of tag reporting rates for each type of fishery (Table 16) were used to adjust the actual number of tags returned annually from each unit area by commercial and recreational fishers (Table 18). The adjustments were area-specific as the ratio of adjusted tag returns from recreational versus commercial fishers varied consistently among unit areas. The number of tags returned was sparse in some areas (3Kh, 3Lf), so data for each unit area were pooled across years for the period 2007-2009. Recreational tags comprised close to half (48%-58%) of the total tags returned from Bonavista Bay (3La), Trinity Bay (3Lb) and Conception Bay (3Lf), whereas in more northerly regions around Fogo, Twillingate, and Notre Dame Bay (3Ki, 3Kh) and southerly areas (3Lj) commercial fishers returned the largest percentage (73-76%)(Table 18). Annual estimates of the recreational landings were obtained by multiplying the reported commercial landings by the ratio of recreational to commercial tag returns, then summing across unit areas within each year. This analysis indicated that the recreational landings ranged from 61-64% of the reported commercial landings during 2007-2009. Note that commercial landings are underestimated so the sum of reported commercial plus estimated recreational landings underestimates total landings which remain uncertain. Nonetheless, this analysis suggests that recreational landings in the past three years are a substantial fraction of the reported commercial landings, especially in unit areas 3La, 3Lb, and 3Lf.

*Acoustic telemetry*: During March 2007, 164 cod were released in the offshore of 3K with surgically implanted acoustic transmitters. A further 147 acoustically tagged cod were released in March 2008; both these groups of cod were released with two external Floy tags (one low reward and one high reward) with a combined reward value of $110. Acoustically tagged cod were released along with conventionally tagged cod. Two sizes of transmitters were used, Vemco V13s in cod 40-60cm fork length (FL) and Vemco V16s in >60 cm FL cod. Preliminary results from this ongoing telemetry project, which includes inshore and offshore cod, were reported in Brattey et al. (2008, 2009).

A total of 3 (2%) of the offshore cod released in 2007 and 35 (24%) of those released in 2008 have subsequently been detected on receivers moored in the inshore. In addition, two acoustically tagged cod released in 2008 were recaptured inshore in 2008 and had not been detected; transmitters in both these fish were functioning normally at capture. No acoustically tagged cod were reported as recaptured in 2009. These data indicate that overall at least 37 (25%) of the cod released in March 2008 survived the stress of capture and migrated to the inshore during 2008 or 2009; whereas most of those released in 2007 appear to have died immediately after release. Among the cod with V16 transmitters released in 2008, four were detected inshore only in 2008, 5 in both 2008 and 2009, and 7 only in 2009. Batteries in V13 transmitters released in 2008 lasted only one year and gave no detections in 2009, whereas V13s released in 2007 and all V16s lasted at least two years.

The numbers of recaptured acoustically tagged cod relative to the numbers detected (i.e. available to the inshore fishery) also provides an estimate of the exploitation rate (% harvested) for acoustically tagged cod that migrated to the inshore. For 2008, two were captured and 26 were detected, therefore the estimate is 2/26=8% were harvested. Although based on a small sample size, this estimate agrees well with that obtained from conventionally tagged cod released at the same time (Table 17, 5%).

The numbers of offshore cod recaptured inshore each month (Fig. 30a) was compared with the numbers of acoustically tagged cod detected inshore (Fig. 30b). There was a distinct seasonal pattern in the both data sets; the timing of recapture of conventionally tagged cod was determined by fishing activity and all recaptured were taken during summer and fall when inshore fisheries were open. However, detections of offshore cod showed a similar pattern; offshore cod appeared inshore during summer and fall, but disappeared during winter during 2007/08 and 2008/09. The maximum number of offshore cod detected inshore in a single month was 14 in September 2008 (Fig 30a); this coincided with the month when the maximum numbers of conventionally tagged offshore cod were captured (21 in September 2008, Fig. 30b). The overall numbers of offshore cod captured or detected from the 2007 releases was much smaller than from the 2008 releases and this likely reflects the high initial tagging mortality of these cod described previously (see above). Cod released in 2008 with smaller V13 transmitters were detected only in summer and autumn 2008 because transmitter batteries had expired by summer 2009.

Acoustically tagged cod were detected on receivers moored at widely dispersed locations across the northeast coast, from Twillingate (array 2) southward to Cape Broyle (array 30) (Fig. 31). The maximum number of offshore cod detected on a single array was 5 on arrays 6, 15, and 27 which are located close to headlands. Only three cod from the 2007 releases were detected, but these cod were recorded at a total of thirteen arrays, mainly in northern 3L (arrays 7-9, 14-19, 20, 22, and 25) and southern 3K (array 6). One fish released offshore in 2007 was detected inshore in summer and autumn (July-November) 2007 on arrays in northwestern Trinity Bay (arrays 15, 16, 17, 19), but disappeared in November and was detected 160 km offshore in the vicinity of the release site in March 2008 (closed triangle, Fig. 31). The same fish was detected again inshore in northwestern Trinity Bay in summer 2008 (arrays 15, 16, 17, 18), disappeared in November 2008, but was detected inshore for a third consecutive summer (arrays 15, 16, 20, 22) in 2009.

Most of the arrays detected at least one offshore cod from the 2008 releases, indicating that offshore cod from a single release site dispersed widely around the northeast coast of Newfoundland during summer and autumn. A notable exception was three arrays within Smith Sound (arrays 17-19) where coastal cod are known to over-winter but no offshore cod from 2008 were detected. The recapture locations of conventionally tagged cod showed a similar pattern (Fig.

29) but were dispersed further northward than the most northerly receiver array. Consequently, some acoustically tagged offshore cod that migrated to these northerly inshore areas would not have been detected.

In 2008, the first offshore cod was detected on receivers in the inshore on 7 July, but the median date of first detection in 2008 was 12 August (Fig. 32). The cumulative date of first detection was protracted and extended to the end of the year, indicating that some offshore cod were not detected on the inshore arrays until late in the year. In 2009, there were fewer detections and the first offshore cod was detected inshore on 28 June; subsequent detection times initially overlapped with those from 2008 through July and August but were slightly earlier through September and ended sooner (in October) in 2009 compared to 2008. Overall, arrival dates in the inshore during 2008 and 2009 were mostly during mid- to late July and throughout August which is somewhat later than the traditional times observed in the 1980s when offshore cod would typically begin to appear inshore in late June. These findings indicate that sentinel and stewardship fishery catches may comprise different proportions of coastal and offshore components of the stock depending on when fishing occurs. Fishing prior to mid-July in the past two years would likely encounter mostly coastal cod, whereas later in the season a mixture of coastal and offshore components would be available.

Results for 2009 from ongoing acoustic telemetry of inshore cod (Brattey et al. 2008b) were not updated at the 2010 assessment as the transmitter batteries have now expired in most of the inshore cod released up to the end of 2007. In addition, many coastal receivers could not be retrieved due to adverse weather conditions in the autumn of 2009 and the data were not available.

## 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 (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 of the same individuals return to Smith Sound the following autumn or early winter (Brattey et al. 2008b).

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, and to 7,200 t in 2008. The estimated biomass from a survey in 2009 was 600 t, however, it is uncertain whether the results are comparable with previous years as the 2009 survey was conducted later (1-3 April) than those used to provide estimates for previous years. Biological 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 2009 was presented at the 2010 assessment.

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 useful 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. 33. 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, 2007b). Recent year-classes (2003-2006, 2008) are all weak at age 1 and the 2005 year-class is the lowest in the time-series. In recent years only the 2007 year class at age 1 is close to the average for year-classes produced during 1995-2008. Numbers of age 0 cod caught at Newman Sound and several other sites during 2009 surveys were higher than those observed in 2008. However, survival to age 1 can be highly variable; therefore, the strength of the 2009 year-class is currently uncertain.

## INSHORE TRAWL SURVEY

This joint industry-DFO survey was initiated in July-August 2006 and continued in August 2007, 2008, and 2009. 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 trawl 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 cod-end. 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 ft) 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 each year, with >=140 sets successfully completed.

For analysis, catches in each stratum were grouped into the same three inshore areas as described in the sentinel survey results, and strata within these three areas were further sub-divided into "inshore" (adjacent to land) and "perimeter strata", as described above. The "inshore" strata correspond to the area closest to shore where most fishing for cod has taken place in the post-moratorium period. These strata encompass a much smaller area than the perimeter strata in northern and southern areas, but a similar ratio in the central area; the area ratios for "inshore" versus "perimeter" strata for northern, central, and southern areas are 0.21, 1.16, and 0.39, respectively. Survey catches have often been more than ten times higher in the "inshore" strata (<50 m depth) compared to "perimeter" strata (depth 50 m to 200 m) and lowest in the northern area (Table 19). The results indicate that at the time of the survey in August, cod tend occur at much higher densities in the area closest to shore in all three regions. For each inshore area the time series is still rather short to interpret trends in catch rates or to use the data as an index of abundance or biomass; early indications are that this survey has high inter-annual variability, especially in the central and southern regions.

Lengths of cod sampled from the entire surveyed area ranged from 10 cm to >100 cm with strong modes at between 12 cm and 23 cm in most years; the exception was the 2009 survey when the length distribution has more larger (> 65 cm) fish and a smaller mode at about 20 cm (Fig. 34). The corresponding age distributions indicate a broad range of ages (1-10) in most years, extending to a maximum of age 17. Ages 1-3 are most strongly represented in 2006-2008, comprising about 70% of the numbers caught in those years. Age 1's in the 2008 survey (2007 year-class) were the most strongly represented overall, and these are relatively well represented at age 2 in the 2009 survey although the overall catch in 2009 was lower. The 2009 survey catch was unusual and comprised much larger proportions of older cod, especially age 7 (2002 year-class). The time-series of age compositions suggests a declining trend in the numbers of young fish (especially ages 2-3) and an increase in the numbers of older cod (ages 6-9) over the period 2006-2009. This is consistent with the trends seen in commercial and sentinel fishery catches over the same period.

A time-series of mean numbers per tow at age were also computed for the three inshore areas (northern, central, and southern) as defined in the sentinel fishery section. Only four years of data are available, but the results for each area are variable among regions and among years within regions (Table 20). The age structure is reasonably broad, extending up to age 8 in the northern area and to age 12 in most years in the central and southern areas. Catch rates are higher for almost all ages in central and southern areas relative to the northern area. Ages 1-3 are most strongly represented, especially in the southern area. However, there are no clear indications of individual cohorts tracking consistently through the time series in any of the regions.

## SCIENCE LOGBOOKS

Catch and effort data for the <35 ft sector from log-books for the 2008 and 2009 fisheries were presented at the 2010 assessment. Fishers that participate in the cod fishery are required to return logbooks which include information on the weight of fish caught and the type and amount of gear fished. The number of participants in the fishery has been similar over the past four years; the total number of < 35 ft vessels that fished for cod in 2J3KL was 1,847 in 2006, 2,092 in 2007, 2,048 in 2008 and 1,812 in 2009. The return rate for logbooks since the stewardship fishery opened in 2006 has declined slightly, from 89% in 2006 to 77% in 2009.

For gillnets, the number of fishing set records (amount of gear and catch weight) available to calculate catch rates now exceeds 75,800 for the 1998-2002 and 2006-2009 period combined. Within each inshore unit area (see Figure 1c) there are typically several hundred set records each year (Table 21) to investigate catch rate trends; the only exceptions are for inshore 2J during 1998-2002 and 3Lq during 2006-2009 where there are ≤15 records per year.

Median commercial gillnet catch rates were calculated separately for each unit area for years when the directed inshore cod fishery was open (Fig. 35). There were insufficient data to produce a time series for other gear types (i.e. line-trawl or hand-line) and there was no directed fishery for cod during 2003-05. Catch rates in the northern (2J, 3Ka, 3Kd) and southern unit areas (3Lf, 3Lj) have been lower than those in the central area (3Ki, 3La, 3Lb) after 1998, suggesting lower cod densities in these areas. Catch rates were increasing in all areas during 2006-2008 and continued to increase in 2009 in the 3La, 3Lb and 3Lf, but declined in the more northerly and southerly areas. Catch rates within each region were highly variable; for example, in 3La and 3Lb in 2007-2009 the upper $90^{th}$ percentile often exceeds 150 kg per net, whereas the lower $10^{th}$ percentile is often less than 20 kg per net in the same year. Areas 3La and 3Lb had the highest median catch rates in 2009, at 81 and 83 kg/net, respectively.

There have been many changes in the management plans for the recent inshore cod fisheries during 1998-2002 and 2006-09, 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.

The catch rate trends from log-book data can be compared in general terms with those from the sentinel fishery. However, the log-book catch rates are expressed in terms of weight, whereas sentinel catch rates are calculated in terms of numbers. Also, log-book data have been analyzed by unit area, whereas sentinel data are grouped into three broader regions. Nonetheless, the trends are broadly similar. In terms of overall catch rates the sentinel and log-book data are consistent in that catch rates are highest in unit areas in the central portion of the inshore and there has been an increasing trend in both series during 2006-2008. However, sentinel catch rates (in numbers) show a decline in all three regions in 2009, whereas log-books indicate a decline in the northern unit areas and southerly areas, but a continued increase in the central area. This difference may reflect the shift in age composition in 2009, with older heavier fish in the catch in 2009 (Fig. 7) compensating for the lower catch rates in terms of numbers in the central area, but not in the northern and southern areas where large cod are less abundant.

## RECRUITMENT INDEX

Information on changes in catch rates of young fish (≤ age 4) was examined to determine if a recruitment index could be developed for the inshore central area. For this area, a time-series of catch rate information is available from the beach seine survey, DFO-industry inshore mobile survey, sentinel line-trawl, sentinel 3¼” mesh gillnet, and sentinel 5½” mesh gillnet. Initially, a preliminary screening of pair-wise correlations of catch rates-at-age between surveys was examined. This revealed many inconsistencies in the data, with poor correlations between many of the pairs. The final input data set was restricted to:

i) Sentinel survey 3¼” mesh gillnet, ages 3 and 4, 1995-2009 (mean no. fish per net)

ii) Sentinel survey 5½” mesh gillnet, ages 3 and 4, 1995-2009 (mean no. fish per net)

A multiplicative model was used to estimate the relative year class strength from these data. Only year-classes with two or more observations were included in the input and one zero value for the 1992 year-class from sentinel 5½” mesh gillnet was excluded.

On a log-scale the model can be written as follows:

$$\log(I_{s,a,y}) = \mu + Y_y + (SA)_{s,a} + \varepsilon_{s,a,y} ,$$

where:
$\mu$ = overall mean
$s$ = survey subscript
$a$ = age subscript
$y$ = year class subscript
$I$ = Index (mean nos. per tow)
$Y$ = year class effect
$SA$ = Survey * Age effect, and
$\varepsilon$ = error term.

Estimation of model parameters was conducted using PROC MIXED in SAS/OR software. The input data were equally weighted. Each of the model terms (year-class and survey-age) was significant in all analyses. Residual plots (not shown here) indicated no trends. The estimated least-squares means are plotted in Fig. 36. The results indicate that the 1992, 2000 and 2002 year-classes are well above the average of those produced during 1992-2006. Among the four most recent year-classes 2004 is average and the others (2003, 2005, 2006) are estimated to be weaker than average. These year-classes are now the main contributors to the exploitable biomass. These results are generally consistent with recruitment information from the offshore.

Several additional exploratory analyses were also conducted, including a two-year retrospective analysis and including/excluding data on age 3 and age 4 from the DFO-industry inshore mobile survey and the sentinel line-trawl survey. These analyses generally gave poorer fits but similar trends to the final analyses depicted in Figure 36.

## 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 thereafter (Fig. 37).

Age at maturity has remained low but variable (4.9-5.7) for the 1990-2005 cohorts, with no clear trend. Estimates for the last three cohorts (2003-05) are more uncertain because only younger ages are available to estimate A50. Estimates of A50 for the 1990 cohort onwards from the 2009 assessment are overlaid on the 2010 assessment results (Fig. 37). This comparison shows that the addition of one more year of data mainly influences the most recent cohorts (2004 and 2005) for which there is less data. Males show a similar trend in A50 over time (data not shown), but tend to mature about one year earlier than females.

The proportion of female cod that are mature at young ages has increased over time particularly among cohorts produced from the late 1980s onward (Table 22, Fig. 38). For example, the percentage of age 6 cod that are mature averaged about 50% in the 1980's, but has increased to about 80% since the early 1990s. The estimates show considerable inter-annual variability, notably for ages 5 and 6. Values for age at maturity among recent cohorts (2002-2005) show a slight trend towards maturation at older ages but are more uncertain.

The number of cod older than age 6 in the offshore has increased in the past 2-3 years, but the age composition of the offshore components of 2J3KL cod remains extremely contracted 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) found that there was no consistent relationship between age-composition of the spawning stock and recruitment in three populations of cod including those in 2J3KL. To date, the increase in SSB in the offshore has not translated into a notable improvement in recruitment.

## GROWTH

The mean lengths-at-age and mean weights-at-age of cod sampled during the autumn surveys (Tables 23, 24; Figs. 39ab, 40ab) illustrate that the changes in weights and lengths varied with Division. There was a strong decline in Division 2J and Division 3K from the late 1970's to the early 1990's followed by an increase in length-at-age, while there was little or no decline in Division 3L over that period. In 3K ages 4 to 6 and in 3L ages 4 to 7 were all smaller at age in 2009 than in 2007 and 2008.

Weight-at-age also showed a steep decline in Division 2J and 3K during the same period that lengths were declining and as with length-at-age there was less of a trend in Division 3L. In Division 3K and 3L weights at ages 4-7 were substantially less in 2009 than they had been in 2007 or 2008.

To examine whether there has been significant change in growth length and weight increments were calculated from mean length (or weight) at age a-1 in year y-1 to length (or weight) at age a in year y. The growth increments were first modeled as a function of age

$$Ln(\Delta G_{a,y}) = \tau + \beta_a + \varepsilon$$

where $\Delta G_{a,y}$ is the length (or weight) increment for a cohort at age *a* in year *y*, τ is the intercept, $\beta_a$ is the age effect and ε is normally distributed error. The residuals from this fitted model were then tested for a significant effect of year using a generalized linear model with an identity link and normal error. For 2J and 3K ages 2 to 6 over 1978 to 2009 were used and for 3L ages 2 to 7 were used over the 1985 to 2009 period. In all Divisions there was a significant year effect on growth in length (2J, $\chi^2$=63, df=30, p<0.0005; 3K, $\chi^2$=123, df=30, p<0.0001; 3L, $\chi^2$=42, df=23, p<0.01) and weight (2J, $\chi^2$=116, df=30, p<0.0001; 3K, $\chi^2$=114, df=30, p<0.0001; 3L, $\chi^2$=41.5, df=33, p<0.02). Growth in length was significantly less in 2009 (from fall 2008 to fall 2009) than in 2007 in Divisions 3K and 3L and greater in 2009 than in 2008 in Division 2J. The length increments in 2007 in Divisions 3K and 3L were among the highest observed. Growth in weight was significantly less in Divisions 3K in 2009 than in 2007 or 2008 and in 3L in 2009 than 2007. Growth in weight in 2007 was amongst the highest observed in these Divisions.

## CONDITION

Information on condition is obtained from sampling during the autumn survey and it should be noted that there is a strong seasonal cycle in condition of cod, with lowest values typically occurring in spring just after spawning. Values reported here are based on sampling when condition would be near the high end of the seasonal cycle.

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. Gutted condition and liver indices were calculated for each Division for 3 length classes (27-29 cm, 36-38 cm and 48-50 cm)(Tables 25, 26; Figs. 41, 42). In Divisions 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 Division 3L (Fig. 41). In both Division 3K and 3L there was a decline in gutted condition in 2009 compared to 2008. For Division 3K and 3L, liver condition increased up to the early 1990's. Liver condition has declined in 2009 in these Divisions. In Division 2J, there is an indication of lower liver condition after the 1990's, particularly for bigger fish (Fig. 42).

Another way to examine condition without an effect of length is to calculate relative condition (relative K). A length versus gutted weight regression was fit 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 and a gamma error, with year as a class variable (Figs. 43 and 44). Both Division 2J and 3K show lower relative K in the early 1990's. There is little trend in Division 3L, but condition is estimated to have been high in 1995. The cause of this large estimate has not been examined. Relative K declined in all Divisions in 2009. There was a significant year effect in all three Divisions and relative K was significantly less in 2009 than in 2008 in both Division 3K and 3L. Relative LK showed a decline in the late 1980's early 1990's in Division 2J. Relative LK subsequently increased but did not reach the levels of the early 1980's. However, in all Divisions there has been a decline over the last 2 to 3 years. In each Division there was a significant year effect. Relative LK was significantly lower in 2009 than in 2008 or 2007 in all three Divisions. In 2J this continues a trend to lower relative LK. In Division 3K relative LK was the lowest since 1985 in 2009 and since 1990 in Division 3L.

In conclusion, in 2009 growth and condition were lower than in recent years particularly in Divisions 3K and 3L. Fish were smaller at age and weighed less in 2009 after a couple of years of very good growth. In addition body and liver condition were also less. Relative liver condition was the lowest it has been since the late 1980's in both 3K and 3L.

Overall, the biological data based on sampling during the autumn research surveys indicate that aspects of stock productivity such as growth and condition have improved over values in the 1990s, but are below the peak values observed in the early part of the time series. Growth and condition declined in 2009, notably in 3K and 3L. The apparent lack of a strong improvement in growth rates in spite of greatly reduced population size suggests that the stock is not as productive as it was in the past. Age-at-maturation also remains low which suggests the population may not be as effective at producing recruitment as it was in the past. Recruitment has not improved significantly, although SSB has increased and the age structure in the offshore has expanded.

## POPULATION ANALYSIS

There have been no accepted population models that capture the dynamics of the 2J3KL 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 were showing different dynamics; furthermore, the dynamics also appear to differ north to south along the coastal region of 2J3KL (i.e., Fig. 23). An analytic model (ADAPT) that attempted to capture the dynamics of the inshore components 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; in these analyses the offshore components of the stock were at very low levels and were assumed to be contributing little to catches and indices in the inshore. The "inshore" SPA was refined to capture the dynamics of the inshore components of the stock inhabiting only the central inshore region (i.e., 3Ki, 3La, 3Lb) where resident inshore cod appeared to be most abundant. These analyses were not continued in the 2008 assessment partly because the total catch from the inshore fishery in 2007 was unknown. Evidence from tagging and telemetry also indicated that the inshore fishery catch in 2008, and hence the indices available to tune an inshore SPA, likely included increasing numbers of fish from the offshore (Brattey et al. 2009). In light of these findings, and the lack of reliable catch information, the modeling approach described above to capture the dynamics of the inshore component in the central area was abandoned.

The lack of reliable information on total catch for many stocks has led to the development of fishery independent assessment methods such as SURBA (Beare et al. 2005; Needle, 2008; Mesnil et al.

2009). SURBA is based on the separable mortality model developed by Cook (1997) and incorporates a cohort model in which annual age-specific total mortality rates are divided into age effects and year effects. The mortality rates can be accumulated along a cohort and applied to estimates of recruitment to generate age-based estimates of stock size. Surveys generally provide relative estimates of stock size; consequently, SURBA can only provide relative estimates of stock size, but the approach provides absolute estimates of total mortality rates. The tagging studies are a useful complement to the SURBA approach as they can provide independent estimates of fishing mortality rates (F) which can be subtracted from Z to provide estimates of natural mortality (M).

Some exploratory analysis of the 2J3KL autumn survey data were conducted using SURBA and presented at the 2009 assessment, but these analyses were not used directly in the formulation of advice. More recently, Cadigan (2010) developed a SAS (Cary, NC) based implementation of the basic SURBA model that provides greater flexibility in model settings compared to the basic SURBA package. At the 2010 assessment this approach was applied to the autumn DFO RV survey index for cod. The input data included a vector of mean numbers per tow at age (1993-2009, ages 2-8) from the DFO RV autumn survey of the index strata of 2J3KL. The full time series of survey data could not be used in this analysis because of a change in the selectivity in the fishery before and after the moratorium. This analysis provided estimates of total mortality, relative recruitment strength, and relative estimates of total and spawning biomass for the portion of the stock present in the surveyed area (index strata).

Several SURBA formulations were presented during the assessment. These were conducted to examine the sensitivity of model results to the following: (i) differing assumptions about survey catchability at age (domed versus flat-topped), (ii) inclusion of 2004 survey results (which had incomplete coverage), (iii) the exclusion of the 1993 and 1994 survey results (which were based on Engels data converted to Campelen equivalents, whereas the remainder of the data were based on actual Campelen catches).

In the final SURBA analysis, survey data from 1993, 1994, and 2004 were excluded. This analysis indicated that total biomass was low throughout the 1990s and early 2000s, but has increased (23% per year) since 2004 (Fig. 45). Spawning stock biomass was extremely low throughout 1993-2004, but on average increased 83% per year from 2004 to 2008; the 2009 value was similar to 2008 (Fig. 45).

The relative strength of the 1998-2002 year-classes at age 2 are all above the 1993-2007 average, whereas the 1993-1996 and 2003-2004 year-classes are below average (Fig. 46). The confidence intervals for the 1998-2001 year classes are large and this is partly a reflection of their inconsistent appearance in fall survey catches (see Fig. 14). The strength of the most recent year class (2007) is uncertain as it is based on only two data points, i.e. catches at age 1 and age 2 in the 2008 and 2009 autumn surveys, respectively. The trends in post-moratorium recruitment from the SURBA analysis generally agree with the recruitment index based on data on ages 3 and 4 from the inshore.

The recent increases in offshore biomass and SSB were mostly due to improved survival and growth of the 1998-2002 year-classes which are generally above the average for the post-moratorium period. The 2003 and 2004 year-classes are weaker and these have now entered the SSB; consequently, the recent rate of stock growth is unlikely to continue in the short term. The lack of increase in SSB in 2009 may be reflecting the influence of these weaker year classes. In addition, subsequent year classes (2005 and 2006) that are entering the SSB in 2010 (at ages 5 and 4) and are estimated at about the 1993-2007 average.

Estimates of the total mortality rate (Z) from the cohort analysis (ages 4-8) indicate that the annual instantaneous rate of mortality was high (~1.0) during 1995-1999, increased further to 1.5 during

2002, but declined substantially during 2003-2006 (Fig. 47). The average value for 2007-2009 is 0.42 which corresponds to 35% mortality per year. The average value of Z for 2007-2009 from the SURBA analyses is slightly higher than the direct estimates (0.28) from survey data (see Fig. 18) because the SURBA analyses includes older ages which tend to have higher Z values. Overall, the total mortality rate has not increased in the recent period (2006-2009) in spite of re-opening of the fishery in the inshore; this suggests that the rate of natural mortality has declined substantially. The tagging studies indicated low exploitation rates for cod tagged offshore, and the annual percentages (harvest rates) given in Table 17 correspond to annual instantaneous rates for F of 0.06 (2008) and 0.02 (2009). This suggests that in the past two years the portion of total Z (=0.42) that can be accounted for by fishing is small.

In terms of providing information on trends in the stock as a whole, the SURBA analysis uses survey information from index strata only and assumes that the fraction of the stock in the index strata at the time of the survey is representative of the whole stock and is constant over time. This validity of this assumption is difficult to evaluate as there are few time-series data on the abundance of cod outside the index strata. Deep-water strata are also fished during the autumn survey, but catches of cod in deep water in the past nine years have been low (Table 10). Inshore strata were added to the overall surveyed area during 1995, but these have not been fished consistently enough to be informative about this assumption. The time series of acoustic estimates of over-wintering biomass for cod in Smith Sound, Trinity Bay, provides some inshore data and shows a progressive decline from a high of 26,000 t in 2001 to much lower values in the recent period. Tagging and telemetry data (Brattey et al. 2008b) suggest that this decline is not due to high mortality through fishing or natural causes, but more likely represents a redistribution of over-wintering inshore cod to other inshore areas that were not surveyed in winter, or to the offshore. Consequently, some of the recent increase evident in the offshore survey time-series (and decline in Z) could be due to immigration of coastal cod that have changed their migration patterns. This issue was discussed in detail at the 2009 assessment and it was inferred that while some movement from inshore was possible, it could not account for the large increases observed in the offshore (Brattey et al. 2009). In the late 1990's and early 2000s when offshore abundance and biomass indices were at a very low level, aggregations of large cod were observed inshore of the surveyed area during winter, whereas larger, older cod (>age 6) were rarely encountered in offshore survey catches. During this period, the fraction of the total stock that was outside the index strata was likely greater than observed currently. Consequently, the SURBA analysis likely underestimates overall stock size for that period, particularly with respect to SSB. Although data on cod abundance in the inshore in winter are limited, most of the stock now appears to be offshore and for the most recent period (2006-2009) the autumn survey has provided information on trends in the stock as a whole.

## PRECAUTIONARY APPROACH

Under the DFO precautionary approach (PA) framework, upper and lower (limit) reference points need to be determined with regard to spawner biomass in order to define the boundaries of the Cautious, Critical and Healthy zones (Shelton and Sinclair 2008). In the 2003 Zonal assessment of cod stocks it was determined that a spawner biomass of 150,000 t represented a milestone for 2J3KL stock recovery, at which point it may be possible to determine an appropriate limit reference point for the 2J3KL stock as a whole. It was considered that an appropriate limit reference point would be a level greater than 300,000 t of SSB and that recovery to this level would likely take several years. Subsequent assessments considered the status of inshore and offshore components separately as they were showing different dynamics, and there were no requests regarding the PA in the Terms of Reference (ToR) for assessments in 2006 or 2007. At the 2009 ZAP, the PA issue was re-introduced in the ToR and there were several presentations regarding the PA (see DFO 2009b). However, no further analysis regarding the 2J3KL cod stock as a whole with respect to the PA was presented at the 2010 RAP. Nonetheless, the 2010 RAP concluded that although no specific limit reference point had been established, the 2J3KL stock was well below any reasonable value and remains in the critical zone. If management wished to adhere strictly to principles of the PA, this would require that catches in 2010 would be at the lowest possible level. This would include no directed fishing and measures to reduce cod by-catch in other fisheries.

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*Table 1. Reported 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 |
| 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 |

*Cont'd:-*

*Table 1. (Cont'd.)*

| Year | 2J Offshore mobile gear Canada | 2J Offshore mobile gear Other | 2J Fixed gear Canada | 2J Total | 3K Offshore mobile gear Canada | 3K Offshore mobile gear Other | 3K Fixed gear Canada | 3K Total | 3L Offshore mobile gear Canada | 3L Offshore mobile gear Other | 3L Fixed gear Canada | 3L Total | 2J3KL Total Canada | 2J3KL Total Other | 2J3KL Total | TAC (000's) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 [12] | 482 | 494 | 643 | 6 | 649 | 0 |
| 2005 [1] | 0 | 0 | 6 | 6 | 1 | 0 | 555 | 556 | 1 | 1 [12] | 767 | 769 | 1330 | 1 | 1331 | 0 |
| 2006 [1] | 0 | | 65 | 65 | 5 | 0 | 1103 | 1109 | 0 | 22 [12] | 1506 | 1528 | 2679 | 22 | 2701 | 0 [14] |
| 2007 [1] | 0 | | 71 | 71 | 0 | 0 | 1178 | 1178 | 0 | 13 [12] | 1668 | 1682 | 2918 | 13 | 2931 | 0 [14, 15] |
| 2008 [1] | | | 71 | 71 | 0 | | 1518 | 1518 | 3 | 42 [12] | 1750 | 1795 | 3343 | | 3385 | 0 [14, 15] |
| 2009 [1] | | | 57 | 57 | | | 1186 | 1186 | 0 | | 1856 | 1856 | 3098 | | 3098 | 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 additional 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 2006-2009 but an annual allowance 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, LT=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] |
| 2008 | 0 | 38 | 2 | 32 | 71 | 0 | 1260 | 25 | 233 | 1518 | 6 | 1407 | 25 | 312 | 1750 | 3340 [6] |
| 2009 | 0 | 24 | 3 | 30 | 57 | 0 | 818 | 29 | 335 | 1182 | 0 | 1476 | 35 | 345 | 1855 | 3094 [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 3. Reported landings (t) of cod in NAFO Div. 2J+3KL during 2009 (excluding recreational fishery) by unit area and month.*

| Div/Unit Area | MAY | JUN | JUL | AUG | SEP | OCT | NOV | Totals |
|---|---|---|---|---|---|---|---|---|
| 2JD | . | . | . | . | 0.8 | . | . | 0.8 |
| 2JM | . | . | 0.1 | 1.0 | 49.7 | 5.2 | . | 56.0 |
| 3KA | . | . | 0.1 | 2.2 | 24.0 | 1.7 | . | 28.0 |
| 3KB | . | . | . | . | 2.7 | 0.2 | . | 2.9 |
| 3KD | . | 0.0 | 2.7 | 13.2 | 68.5 | 6.1 | . | 90.5 |
| 3KH | . | 0.7 | 5.5 | 11.1 | 193.5 | 56.9 | 1.6 | 269.4 |
| 3KI | . | 3.8 | 55.8 | 54.5 | 632.4 | 46.9 | 1.6 | 795.0 |
| 3LA | . | 2.5 | 29.6 | 54.8 | 478.4 | 37.5 | 5.3 | 608.0 |
| 3LB | . | 7.6 | 19.0 | 33.0 | 497.4 | 26.6 | . | 583.6 |
| 3LD | . | . | 2.4 | 1.0 | 1.8 | . | . | 5.1 |
| 3LF | 0.5 | 0.8 | 23.0 | 22.8 | 343.8 | 25.2 | . | 416.3 |
| 3LG | . | . | 0.9 | 4.7 | 5.9 | . | . | 11.5 |
| 3LJ | 0.0 | 0.3 | 2.3 | 5.7 | 192.6 | 22.5 | . | 223.4 |
| 3LQ | . | 0.3 | 2.7 | 0.2 | 4.5 | 0.0 | . | 7.6 |
| 3LR | . | 0.0 | . | 0.1 | . | . | . | 0.1 |
| Total | 0.5 | 16.0 | 144.2 | 204.4 | 2496.0 | 228.6 | 8.4 | 3098.2 |

*Table 4. Annual 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 | 606 | 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* | 2008* | 2009* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 0 | 0 | 1 | 0 | 3 | 7 | 5 | 10 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 3 | 105 | 12 | 35 | 12 | 96 | 70 | 141 | 249 | 166 | 9 | 10 | 16 | 12 | 12 | 11 | 25 |
| 4 | 379 | 41 | 157 | 39 | 229 | 238 | 258 | 778 | 296 | 11 | 24 | 27 | 159 | 44 | 84 | 96 |
| 5 | 575 | 93 | 304 | 92 | 395 | 638 | 419 | 710 | 399 | 19 | 33 | 137 | 307 | 357 | 172 | 124 |
| 6 | 177 | 76 | 401 | 95 | 689 | 795 | 437 | 611 | 335 | 53 | 47 | 182 | 381 | 423 | 649 | 170 |
| 7 | 74 | 25 | 131 | 148 | 384 | 1157 | 328 | 365 | 235 | 44 | 59 | 101 | 168 | 178 | 422 | 410 |
| 8 | 22 | 10 | 24 | 35 | 236 | 370 | 294 | 190 | 124 | 28 | 32 | 51 | 79 | 69 | 147 | 248 |
| 9 | 2 | 2 | 7 | 5 | 74 | 253 | 151 | 272 | 77 | 22 | 14 | 19 | 30 | 21 | 37 | 68 |
| 10 | 0 | 0 | 2 | 2 | 10 | 52 | 136 | 80 | 113 | 9 | 7 | 7 | 13 | 8 | 12 | 15 |
| 11 | 0 | 0 | 0 | 0 | 5 | 13 | 33 | 117 | 50 | 32 | 3 | 4 | 5 | 5 | 6 | 5 |
| 12 | 0 | 0 | 0 | 0 | 2 | 3 | 5 | 33 | 52 | 20 | 5 | 2 | 2 | 2 | 2 | 1 |
| 13 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 3 | 10 | 27 | 2 | 2 | 1 | 1 | 1 | 1 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 7 | 2 | 1 | 2 | 1 | 1 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 1 | 1 | 1 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 19 | 0 | 0 | 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 | . | 0 | 0 |
| Total | 1334 | 259 | 1062 | 429 | 2125 | 3596 | 2210 | 3418 | 1866 | 286 | 241 | 550 | 1161 | 1122 | 1549 | 1164 |

**The 2007-2009 values exclude the recreational fishery catch. Most of the catch in 2003 came from a mass mortality of cod in Smith Sound, Trinity Bay.*

*Table 5. Estimated average weight (kg), length (cm) and number (000's, plus standard error and coefficient of variation) of cod for the 2009 catch-at-age from Div. 2J3KL (excluding the recreational fishery catch).*

| | AVERAGE | | | | |
|---|---|---|---|---|---|
| | WEIGHT | LENGTH | | Nos. | |
| AGE | (kg.) | (cm.) | (000'S) | STD ERR. | CV |
| 1 | 0.00 | 0.00 | . | . | . |
| 2 | 0.32 | 33.35 | 0.1 | 0.03 | 0.18 |
| 3 | 0.60 | 41.16 | 24.6 | 3.44 | 0.14 |
| 4 | 0.90 | 46.75 | 96.1 | 6.07 | 0.06 |
| 5 | 1.42 | 54.00 | 123.7 | 7.20 | 0.06 |
| 6 | 2.09 | 61.21 | 170.3 | 8.33 | 0.05 |
| 7 | 2.85 | 67.90 | 410.0 | 10.60 | 0.03 |
| 8 | 3.36 | 71.55 | 248.0 | 8.13 | 0.03 |
| 9 | 4.15 | 76.49 | 68.1 | 4.46 | 0.07 |
| 10 | 5.15 | 82.05 | 15.2 | 1.65 | 0.11 |
| 11 | 5.10 | 81.68 | 5.0 | 1.16 | 0.23 |
| 12 | 6.69 | 89.49 | 1.1 | 0.22 | 0.20 |
| 13 | 7.24 | 91.40 | 0.8 | 0.21 | 0.26 |
| 14 | 7.74 | 94.23 | 0.3 | 0.11 | 0.35 |
| 15 | 8.76 | 98.22 | 0.1 | 0.07 | 0.49 |
| 16 | 6.22 | 88.00 | 0.1 | 0.07 | 0.60 |
| 17 | 0.00 | 0.00 | 0.0 | 0.00 | |
| 18 | 7.62 | 94.00 | 0.0 | 0.03 | 0.84 |
| 19 | 6.65 | 89.70 | 0.1 | . | |
| 20 | 0.00 | 0.00 | 0.0 | . | |

*Table 6. 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* | 2008* | 2009* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.38 | 0.32 |
| 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 | 0.62 | 0.60 |
| 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 | 1.05 | 0.90 |
| 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 | 1.66 | 1.42 |
| 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 | 2.34 | 2.09 |
| 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 | 2.87 | 2.85 |
| 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 | 3.44 | 3.36 |
| 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 | 4.24 | 4.15 |
| 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 | 5.48 | 5.15 |
| 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 | 6.29 | 5.10 |
| 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 | 6.57 | 6.69 |
| 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 | 8.44 | 7.24 |
| 14 | . | . | 4.46 | . | . | 7.66 | 4.80 | 5.46 | 5.70 | 6.07 | 6.56 | 6.69 | 7.19 | 7.57 | 7.86 | 7.74 |
| 15 | . | . | . | . | . | . | 9.42 | 7.62 | 6.10 | 5.38 | 6.81 | 7.73 | 6.75 | 7.98 | 10.29 | 8.76 |
| 16 | . | . | . | . | . | . | . | . | . | . | . | 8.26 | 7.62 | 8.01 | 9.06 | 6.22 |
| 17 | . | . | . | . | . | . | 11.28 | . | . | 6.90 | . | 8.43 | 7.86 | 9.21 | 7.31 | 0.00 |
| 18 | . | . | . | . | . | . | . | . | 8.40 | . | . | . | 7.52 | 12.45 | 8.66 | 7.62 |
| 19 | . | . | . | . | . | . | . | . | . | . | . | . | . | 6.42 | . | 6.65 |
| 20 | . | . | . | . | . | . | . | . | . | . | . | . | 7.62 | . | . | . |

** note that 2007-2009 values exclude the recreational fishery catch.*

*Table 7a. Annual estimates of cod abundance (000's) from autumn surveys in NAFO Div. 2J during 2000-09 (in Campelen units) (nf=stratum not fished). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Stratum | Stratum | Area sq. | Tel. | Tel. 361 | Tel. 415,454, | Tel. | Tel. | Tel. 611,612 | Tel. | Tel. 802 | Wt 839-840 | Tel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| depth | number | nautical | 340-343 | AN 399-400 | 457 | 509-510 | 537-539 | WT 632 | 680-682 | 752-753 | Tel 820 | 896 897 |
| (meters) | | miles | 2000 | 2001 | 2002 | 2003 | 2004 | 2005-6 | 2006 | 2007 | 2008 | 2009 |
| Mean survey date | | | 7-Nov-00 | 28-Nov-01 | 24-Dec-02 | 8-Dec-03 | 10-Nov-04 | 27-Nov-05 | 2-Nov-06 | 15-Nov-07 | 23-Nov-08 | 13-Nov-09 |
| 101-200 | 201 | 633 | 0 | 0 | 0 | 44 | 44 | 0 | 121 | 0 | 44 | 0 |
| | 205 | 1594 | 37 | 37 | 0 | 0 | 37 | 37 | 73 | 0 | 132 | 232 |
| | 206 | 1870 | 115 | 171 | 37 | 110 | 220 | 37 | 514 | 992 | 886 | 686 |
| | 207 | 2246 | 1280 | 447 | 1032 | 1122 | 623 | 623 | 835 | 2566 | 22946 | 1479 |
| | 237 | 733 | 101 | 25 | 307 | 2041 | 178 | 7125 | 571 | 5042 | 134 | 50 |
| | 238 | 778 | 0 | 36 | 0 | 306 | 41 | 0 | 0 | 0 | 36 | 36 |
| 201-300 | 202 | 621 | 0 | 0 | 0 | 0 | 0 | 0 | 85 | 0 | 0 | 0 |
| | 209 | 680 | 187 | 28 | 218 | 258 | 234 | 31 | 699 | 1350 | 504 | 140 |
| | 210 | 1035 | 676 | 261 | 269 | 473 | 570 | 249 | 320 | 854 | 886 | 522 |
| | 213 | 1583 | 1161 | 416 | 954 | 1327 | 617 | 1716 | 2178 | 5807 | 5004 | 2090 |
| | 214 | 1341 | 517 | 823 | 833 | 148 | 1402 | 369 | 221 | 2675 | 2324 | 1291 |
| | 215 | 1302 | 609 | 191 | 466 | 1197 | 2006 | 1075 | 537 | 1648 | 1209 | 985 |
| | 228 | 2196 | 944 | 1847 | 1729 | 874 | 1284 | 2228 | 1020 | 1635 | 3428 | 1165 |
| | 234 | 530 | 36 | 36 | 146 | 0 | 146 | 36 | 49 | 0 | 450 | 231 |
| 301-400 | 203 | 487 | 0 | 0 | 33 | 0 | 67 | 167 | 0 | 38 | 1191 | 91 |
| | 208 | 588 | 335 | 144 | 0 | 352 | 243 | 1213 | 324 | 337 | 1762 | 1537 |
| | 211 | 251 | 533 | 78 | 72 | 104 | 138 | 173 | 104 | 161 | 2164 | 155 |
| | 216 | 360 | 198 | 303 | 297 | 57 | 371 | 891 | 297 | 322 | 338 | 176 |
| | 222 | 450 | 495 | 954 | 836 | 340 | 464 | 248 | 743 | 2569 | 990 | 2096 |
| | 229 | 536 | 184 | 1180 | 885 | 442 | 332 | 1548 | 2618 | 221 | 655 | 1917 |
| 401-500 | 204 | 288 | 0 | 0 | 20 | 0 | 0 | 0 | 198 | 20 | 95 | 20 |
| | 217 | 241 | 33 | 15 | 715 | 38 | 83 | 215 | 17 | 0 | 116 | 0 |
| | 223 | 158 | **nf** | 0 | 73 | 54 | 54 | 33 | 22 | 22 | 68 | 75 |
| | 227 | 598 | 55 | 0 | 329 | 0 | 247 | 247 | 165 | 370 | 146 | 0 |
| | 235 | 414 | 0 | 0 | 159 | 28 | 85 | 111 | 28 | 28 | 76 | 256 |
| | 240 | 133 | 18 | 42 | 125 | 0 | 18 | 146 | 0 | 0 | 0 | 18 |
| total strata fished <= 500 m | | | 7516 | 7033 | 9534 | 9315 | 9503 | 18519 | 11739 | 26656 | 45583 | 15250 |
| upper | | | 10007 | 9222 | 12588 | 13125 | 11582 | 50073 | 19669 | 42992 | 95778 | 21044 |
| t-value | | | 2.200 | 2.140 | 2.090 | 2.365 | 2.050 | 4.300 | 4.300 | 2.780 | 2.360 | 3.170 |
| 1 STD strata fished <= 500 m | | | 1132 | 1023 | 1461 | 1611 | 1014 | 7338 | 1844 | 5876 | 21269 | 1828 |
| 501-750 | 212 | 557 | 38 | 0 | 72 | 82 | 0 | 38 | 0 | 88 | 34 | 77 |
| | 218 | 362 | 0 | 0 | 100 | 0 | 25 | 0 | 0 | 0 | 0 | 25 |
| | 224 | 228 | 0 | 0 | 233 | 47 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 230 | 185 | 13 | 0 | 480 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 239 | 120 | 0 | 7 | 8 | 0 | 8 | 8 | 25 | 17 | 18 | 47 |
| 751-1000 | 219 | 283 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | **0** |
| | 231 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 236 | 193 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | |
| 1001-1250 | 220 | 330 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | **0** |
| | 225 | 195 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 232 | 228 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001-1250[1] | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1251-1500 | 221 | 330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | **0** |
| | 226 | 201 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | **0** |
| | 233 | 237 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1251-1500[1] | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| total strata fished > 500 m | | | 51 | 7 | 893 | 129 | 33 | 46 | 25 | 105 | 52 | 149 |
| total all strata fished | | | 7567 | 7040 | 10427 | 9445 | 9536 | 18465 | 11764 | 26760 | 45635 | 15399 |
| upper | | | 10060 | 9230 | 13495 | 13254 | 11615 | 50120 | 19695 | 43098 | 95831 | 21194 |
| t-value | | | 2.2 | 2.14 | 2.09 | 2.365 | 2.05 | 4.3 | 4.3 | 2.78 | 2.36 | 3.17 |
| 1 STD all strata fished | | | 1133 | 1023 | 1468 | 1611 | 1014 | 7362 | 1844 | 5877 | 21269 | 1828 |

*Table 7b. Annual estimates of cod biomass (t) from autumn surveys in NAFO Division 2J during 2000-09 (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Stratum depth (meters) | Stratum number | Area sq. nautical miles | 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 | Wt 839-840 Tel 820 2008 | Tel 896 897 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean survey date | | | 7-Nov-00 | 28-Nov-01 | 24-Dec-02 | 8-Dec-03 | 10-Nov-04 | 27-Nov-05 | 2-Nov-06 | 15-Nov-07 | 23-Nov-08 | 13-Nov-09 |
| 101-200 | 201 | 633 | 0 | 0 | 0 | 44 | 24 | 0 | 115 | 0 | 4 | 0 |
| | 205 | 1594 | 42 | 41 | 0 | 0 | 5 | 39 | 7 | 0 | 61 | 95 |
| | 206 | 1870 | 47 | 90 | 20 | 7 | 76 | 34 | 246 | 332 | 284 | 232 |
| | 207 | 2246 | 220 | 107 | 26 | 204 | 114 | 118 | 349 | 510 | 573 | 265 |
| | 237 | 733 | 3 | 8 | 2 | 23 | 22 | 65 | 252 | 40 | 40 | 5 |
| | 238 | 778 | 0 | 11 | 0 | 2 | 59 | 0 | 0 | 0 | 14 | 1 |
| 201-300 | 202 | 621 | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 |
| | 209 | 680 | 60 | 7 | 56 | 82 | 79 | 19 | 458 | 794 | 123 | 103 |
| | 210 | 1035 | 271 | 77 | 72 | 121 | 254 | 59 | 193 | 145 | 409 | 139 |
| | 213 | 1583 | 398 | 208 | 389 | 715 | 410 | 817 | 956 | 2183 | 1708 | 960 |
| | 214 | 1341 | 303 | 355 | 460 | 122 | 878 | 194 | 111 | 817 | 1217 | 562 |
| | 215 | 1302 | 436 | 88 | 371 | 646 | 1207 | 736 | 378 | 822 | 718 | 418 |
| | 228 | 2196 | 433 | 514 | 613 | 329 | 572 | 924 | 667 | 1070 | 1462 | 454 |
| | 234 | 530 | 3 | 17 | 31 | 0 | 54 | 3 | 11 | 0 | 203 | 47 |
| 301-400 | 203 | 487 | 0 | 0 | 23 | 0 | 26 | 148 | 0 | 19 | 747 | 16 |
| | 208 | 588 | 268 | 63 | 0 | 149 | 142 | 229 | 206 | 31 | 533 | 896 |
| | 211 | 251 | 208 | 36 | 17 | 27 | 43 | 60 | 30 | 59 | 605 | 25 |
| | 216 | 360 | 95 | 148 | 134 | 33 | 186 | 515 | 298 | 300 | 219 | 97 |
| | 222 | 450 | 193 | 363 | 374 | 257 | 297 | 142 | 412 | 1300 | 696 | 975 |
| | 229 | 536 | 63 | 469 | 339 | 216 | 190 | 984 | 1760 | 109 | 321 | 960 |
| 401-500 | 204 | 288 | 0 | 0 | 25 | 0 | 0 | 0 | 118 | 1 | 79 | 19 |
| | 217 | 241 | 7 | 10 | 401 | 37 | 40 | 121 | 12 | 0 | 144 | 0 |
| | 223 | 158 | **nf** | 0 | 47 | 43 | 42 | 28 | 22 | 35 | 66 | 50 |
| | 227 | 598 | 23 | 0 | 146 | 0 | 115 | 224 | 102 | 165 | 71 | 0 |
| | 235 | 414 | 0 | 0 | 58 | 8 | 74 | 121 | 57 | 26 | 130 | 128 |
| | 240 | 133 | 10 | 32 | 77 | 0 | 13 | 140 | 0 | 0 | 0 | 26 |
| total strata fished <= 500 m | | | 3082 | 2646 | 3680 | 3065 | 4921 | 5719 | 6818 | 8755 | 10429 | 6473 |
| upper | | | 4171 | 3345 | 4790 | 4226 | 5996 | 7650 | 26037 | 12633 | 13742 | 9350 |
| t-value | | | 2.23 | 2.09 | 2.13 | 2.262 | 2.07 | 2.26 | 12.71 | 2.57 | 2.12 | 2.57 |
| 1 STD strata fished <= 500 m | | | 488 | 334 | 521 | 513 | 519 | 854 | 1512 | 1509 | 1563 | 1119 |
| 501-750 | 212 | 557 | 10 | 0 | 45 | 115 | 0 | 63 | 0 | 5 | 2 | 33 |
| | 218 | 362 | 0 | 0 | 77 | 0 | 31 | 0 | 0 | 0 | 0 | 17 |
| | 224 | 228 | 0 | 0 | 152 | 68 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 230 | 185 | 6 | 0 | 307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 239 | 120 | 0 | 1 | 7 | 0 | 1 | 11 | 15 | 8 | 7 | 34 |
| 751-1000 | 219 | 283 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 231 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 236 | 193 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| 1001-1250 | 220 | 330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 225 | 195 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 232 | 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001-1250[1] | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1251-1500 | 221 | 330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 226 | 201 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 233 | 237 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1251-1500[1] | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| total strata fished > 500 m | | | 16 | 1 | 588 | 183 | 32 | 74 | 15 | 13 | 9 | 84 |
| total all strata fished | | | 3098 | 2647 | 4270 | 3248 | 4953 | 5793 | 6833 | 8768 | 10439 | 6558 |
| upper | | | 4187 | 3346 | 5387 | 4411 | 6028 | 7730 | 26053 | 12646 | 13750 | 9436 |
| t-value | | | 2.23 | 2.09 | 2.12 | 2.262 | 2.07 | 2.26 | 12.71 | 2.57 | 2.12 | 2.57 |
| 1 STD all strata fished | | | 488 | 334 | 527 | 514 | 519 | 857 | 1512 | 1509 | 1562 | 1120 |

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

*Table 8a. Annual estimates of cod abundance (000's) from autumn surveys of NAFO Division 3K during 2000-09 (in Campelen units) Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Depth range meters | Stratum number | Stratum area sq. mi. | Tel. 340-343 2000 | WT 376, 398 Tel. 362, 397 AN 399 2001 | Tel. 415,457 WT431, 455 WT 456 2002-3 | Tel. 509,510 513,514 WT 511, 515 2003-4 | Tel. 539-542 WT 588 2004-5 | Tel. 611, 662 WT 631-632 WT 660 2005-6 | Tel. 681-682 684, 733 WT 707-708 2006 | Tel. 755,802 WT 774 2007 | Vt 838-841 \n 868-869 Tel 821 2008 | \N 917 918 TEL 897 TEL 898 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean survey date | | | 23-Nov-00 | 8-Dec-01 | 20-Dec-02 | 15-Jan-04 | 14-Dec-04 | 24-Dec-05 | 30-Nov-06 | 6-Dec-07 | 1-Dec-08 | 2-Dec-09 |
| 101-200 | 618 | 1347 | 2038 | 812 | 388 | 1346 | 1544 | 813 | 1746 | 1863 | 3533 | 642 |
| | 619 | 1753 | 2097 | 1021 | 512 | 1131 | 693 | 586 | 5899 | 864 | 586 | 69 |
| 201-300 | 620 | 2545 | 3383 | 3172 | 1246 | 3214 | 2976 | 1641 | 2741 | 3701 | 3151 | 620 |
| | 621 | 2736 | 1700 | 1196 | 988 | 979 | 3403 | 761 | 966 | 748 | 1835 | 1645 |
| | 624 | 1105 | 456 | 1277 | 924 | 213 | 730 | 790 | 517 | 1009 | 1115 | 0 |
| | 634 | 1555 | 616 | 1497 | 937 | 299 | 1176 | 4054 | 250 | 3212 | 297 | 36 |
| | 635 | 1274 | 361 | 70 | 257 | 70 | 0 | 208 | **nf** | 1928 | 136 | 436 |
| | 636 | 1455 | 291 | 392 | 371 | 272 | 534 | 271 | 4937 | 9807 | 7628 | 2165 |
| | 637 | 1132 | **nf** | 352 | 775 | 436 | 799 | 1017 | 1393 | 3956 | 2876 | 2061 |
| 301-400 | 617 | 593 | 1332 | 2882 | 236 | 109 | 1224 | 979 | 1097 | 530 | 2202 | 489 |
| | 623 | 494 | 136 | 1446 | 755 | 442 | 1665 | 238 | 815 | 748 | 4153 | 166 |
| | 625 | 888 | 275 | 912 | 1000 | 92 | 1530 | 366 | 702 | 580 | 1032 | 244 |
| | 626 | 1113 | 1217 | 3253 | 2927 | 1654 | 7196 | 2616 | 1014 | 732 | 2812 | 1554 |
| | 628 | 1085 | 2478 | 1791 | 2047 | 1944 | 2158 | 1970 | 1918 | 3134 | 1488 | 2066 |
| | 629 | 495 | 393 | 230 | 847 | 306 | 180 | 613 | 375 | 454 | 163 | 291 |
| | 630 | 332 | 95 | 15 | 0 | 0 | 23 | 0 | 20 | 0 | 180 | 23 |
| | 633 | 2067 | 853 | 876 | 2428 | 903 | 2514 | 2537 | 2085 | 1294 | 1580 | 1434 |
| | 638 | 2059 | 7308 | 5119 | 13407 | 3191 | 3682 | 5490 | 9045 | 10284 | 12742 | 13961 |
| | 639 | 1463 | 786 | 690 | 7864 | 973 | 738 | 993 | 14960 | 8151 | 6574 | 18787 |
| 401-500 | 622 | 691 | 665 | 602 | 383 | 289 | 475 | 2743 | 475 | 634 | 444 | 172 |
| | 627 | 1255 | 9091 | 699 | 1746 | 886 | 863 | 3061 | 623 | 345 | 2494 | 1027 |
| | 631 | 1321 | 54 | 99 | 199 | 346 | 91 | 1296 | 683 | 30 | 5723 | 36 |
| | 640 | 69 | 47 | 19 | 71 | 100 | 20 | 394 | 0 | 28 | 4 | 24 |
| | 645 | 216 | 104 | 66 | 45 | 178 | 193 | 158 | 15 | 15 | 92 | 0 |
| | 650 | 134 | **nf** | 46 | 1501 | 535 | 65 | 238 | 9 | 74 | 8 | 0 |
| total strata fished <= 500 m | | | 35776 | 28534 | 41854 | 19908 | 34468 | 33834 | 52285 | 54122 | 62848 | 47949 |
| upper | | | 59488 | 35927 | 64414 | 23813 | 41996 | 41953 | 97712 | 72011 | 84018 | 82043 |
| t-value | | | 2.78 | 2.13 | 2.2 | 2.017 | 2.12 | 2.06 | 3.18 | 2.18 | 2.57 | 2.45 |
| 1 STD strata fished <= 500 m | | | 8529 | 3471 | 10255 | 1936 | 3551 | 3941 | 14285 | 8206 | 8237 | 13916 |
| 501-750 | 641 | 230 | **nf** | 16 | 662 | 158 | 16 | 253 | 0 | 0 | 0 | 0 |
| | 646 | 325 | 0 | 0 | 45 | 224 | 1565 | 0 | 0 | 0 | 0 | 0 |
| | 651 | 359 | **nf** | 28 | 85 | 1580 | 0 | 25 | 0 | 0 | 0 | 0 |
| 751-1000 | 642 | 418 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 647 | 360 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 652 | 516 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001-1250 | 643 | 733 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 648 | 228 | | 16 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 653 | 531 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001-1250[3] | | 1492 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1251-1500 | 644 | 474 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 649 | 212 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 654 | 479 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| 1251-1500[3] | | 1165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| total strata fished > 500 m | | | 0 | 60 | 792 | 1962 | 1581 | 278 | 0 | 0 | 0 | 0 |
| total all strata fished | | | 39110 | 28595 | 42644 | 21868 | 36049 | 34112 | 52285 | 54122 | 62848 | 47949 |
| upper | | | 61174 | 35987 | 65206 | 25860 | 44372 | 42248 | 97712 | 72011 | 84018 | 82403 |
| t-value | | | 2.57 | 2.13 | 2.2 | 2.014 | 2.14 | 2.06 | 3.18 | 2.18 | 2.57 | 2.45 |
| 1 STD all strata fished | | | 8585 | 3470 | 10255 | 1982 | 3889 | 3950 | 14285 | 8206 | 8237 | 14063 |

**[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/gear no attempt has been made to use a multiplicative model to fill strata which were not fished.**

*Table 8b. Annual estimates of cod biomass (t) from autumn surveys of NAFO Division 3K during 2000-09 (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Depth<br>range<br>meters | Stratum<br>number | Stratum<br>area<br>sq. mi. | Tel.<br>340-343<br>2000 | WT 376, 398<br>Tel. 362 397<br>AN 399<br>2001 | Tel. 415,457<br>WT431,455<br>WT 456<br>2002-3 | Tel. 509,510<br>513,514<br>WT 511, 515<br>2003-4 | Tel. 539-542<br>WT 588<br>2004-5 | Tel. 611, 662<br>Wt 631-632<br>WT 660<br>2005-6 | Tel. 681-682<br>684, 733<br>Wt 707-708<br>2006 | Tel. 755,802<br>Wt 774<br>2007 | Vt 838-841<br>\n 868-869<br>Tel 821<br>2008 | \N 917 918<br>TEL 897<br>TEL 898<br>2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean survey date | | | 23-Nov-00 | 8-Dec-01 | 20-Dec-02 | 15-Jan-04 | 14-Dec-04 | 24-Dec-05 | 30-Nov-06 | 6-Dec-07 | 1-Dec-08 | 2-Dec-09 |
| 101-200 | 618 | 1347 | 252 | 99 | 72 | 85 | 170 | 138 | 166 | 246 | 366 | 113 |
| | 619 | 1753 | 154 | 97 | 101 | 38 | 80 | 82 | 178 | 73 | 108 | 16 |
| 201-300 | 620 | 2545 | 415 | 649 | 164 | 595 | 671 | 443 | 364 | 659 | 481 | 181 |
| | 621 | 2736 | 397 | 169 | 186 | 44 | 567 | 129 | 254 | 100 | 542 | 237 |
| | 624 | 1105 | 225 | 492 | 364 | 64 | 342 | 430 | 191 | 263 | 320 | 0 |
| | 634 | 1555 | 152 | 637 | 424 | 219 | 481 | 2400 | 48 | 1354 | 408 | 201 |
| | 635 | 1274 | 104 | 17 | 82 | 6 | 0 | 122 | **nf** | 1056 | 118 | 156 |
| | 636 | 1455 | 260 | 96 | 93 | 49 | 131 | 107 | 4136 | 16783 | 14582 | 2102 |
| | 637 | 1132 | **nf** | 168 | 235 | 109 | 253 | 410 | 1127 | 5855 | 4155 | 1223 |
| 301-400 | 617 | 593 | 237 | 748 | 97 | 53 | 306 | 407 | 212 | 145 | 867 | 142 |
| | 623 | 494 | 41 | 309 | 153 | 107 | 272 | 119 | 115 | 177 | 853 | 32 |
| | 625 | 888 | 173 | 296 | 342 | 75 | 658 | 192 | 226 | 311 | 372 | 58 |
| | 626 | 1113 | 259 | 716 | 543 | 156 | 1366 | 574 | 347 | 197 | 1040 | 405 |
| | 628 | 1085 | 524 | 953 | 588 | 171 | 554 | 837 | 2116 | 2381 | 2620 | 882 |
| | 629 | 495 | 192 | 97 | 176 | 69 | 21 | 220 | 266 | 236 | 335 | 55 |
| | 630 | 332 | 38 | 8 | 0 | 0 | 3 | 0 | 9 | 0 | 210 | 71 |
| | 633 | 2067 | 615 | 543 | 1105 | 534 | 1114 | 1833 | 1280 | 1116 | 1255 | 748 |
| | 638 | 2059 | 3974 | 2863 | 3385 | 1080 | 1691 | 3259 | 9824 | 14139 | 22570 | 16270 |
| | 639 | 1463 | 780 | 418 | 2542 | 422 | 265 | 550 | 16979 | 12753 | 13695 | 27763 |
| 401-500 | 622 | 691 | 138 | 214 | 70 | 218 | 106 | 1580 | 143 | 78 | 101 | 44 |
| | 627 | 1255 | 2917 | 135 | 438 | 194 | 166 | 1295 | 335 | 244 | 1604 | 376 |
| | 631 | 1321 | 27 | 59 | 36 | 218 | 36 | 827 | 340 | 15 | 4607 | 2 |
| | 640 | 69 | 37 | 13 | 35 | 58 | 29 | 275 | 0 | 49 | 6 | 27 |
| | 645 | 216 | 84 | 63 | 48 | 111 | 254 | 220 | 46 | 31 | 110 | 0 |
| | 650 | 134 | **nf** | 30 | 613 | 236 | 72 | 245 | 8 | 166 | 6 | 0 |
| total strata fished <= 500 m | | | 11994 | 9890 | 11889 | 4912 | 9609 | 16696 | 38709 | 58427 | 71329 | 51106 |
| upper | | | 19284 | 12834 | 18138 | 6118 | 11713 | 21527 | 104979 | 85973 | 100136 | 111131 |
| t-value | | | 2.45 | 2.14 | 2.18 | 2.023 | 2.05 | 2.07 | 4.3 | 2.26 | 2.45 | 2.57 |
| 1 STD strata fished <= 500 m | | | 2976 | 1376 | 2867 | 596 | 1026 | 2334 | 15412 | 12188 | 11758 | 23356 |
| 501-750 | 641 | 230 | **nf** | 14 | 438 | 175 | 17 | 329 | 0 | 0 | 0 | 0 |
| | 646 | 325 | 0 | 0 | 41 | 208 | 749 | 0 | 0 | 0 | 0 | 0 |
| | 651 | 359 | **nf** | 35 | 78 | 1274 | 0 | 12 | 0 | 0 | 0 | 0 |
| 751-1000 | 642 | 418 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 647 | 360 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 652 | 516 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001-1250 | 643 | 733 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 648 | 228 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 653 | 531 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001-1250[3] | | | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1251-1500 | 644 | 474 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 649 | 212 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| | 654 | 479 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **nf** | 0 |
| 1251-1500[3] | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| total strata fished > 500 m | | | 0 | 56 | 557 | 1657 | 766 | 341 | 0 | 0 | 0 | 0 |
| total all strata fished | | | 12585 | 9946 | 12446 | 6569 | 10375 | 17038 | 38709 | 58427 | 71329 | 51148 |
| upper | | | 19889 | 12892 | 18696 | 8435 | 13381 | 21904 | 104979 | 85973 | 100136 | 111173 |
| t-value | | | 2.45 | 2.14 | 2.18 | 2.365 | 2.36 | 2.07 | 4.3 | 2.26 | 2.45 | 2.57 |
| 1 STD all strata fished | | | 2981 | 1377 | 2867 | 789 | 1274 | 2351 | 15412 | 12188 | 11758 | 23356 |

*Table 9a. Annual estimates of cod abundance (000's) from autumn surveys of NAFO Division 3L during 2000-09 in depths <= 200 fathoms (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Stratum depth (fath) | Stratum number | Area sq. nautical miles | WT 321-323 Tel 342-343 | AN 399, WT 373-376, Tel. 357-358, 361 | Tel 412 ,413 Tel 415 WT 428-431 | Tel 513 WT 487-489 WT 511 | WT 558-559 WT 587 Tel 540 | Tel 662 WT 628-630, 637 AN 657-658 | Tel 682-684 Wt 705-707 | Wt 772-773, 804, Tel 751 Tel 752, 803 | Vt 837-838 \n 867-868 | AN 916-918 Tel 895-899 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2000 | 2001 | 2002-03 | 2003 | 2004 | 2005-06 | 2006 | 2007 | 2008 | 2009 |
| Mean survey date | | | 28-Nov-00 | 15-Nov-01 | | 5-Dec-03 | 5-Dec-04 | 14-Nov-05 | 10-Nov-06 | 21-Nov-07 | 7-Nov-08 | 23-Nov-09 |
| 31-50 | 350 | 2071 | 936 | 1420 | 512 | 692 | 1750 | 163 | 413 | 2754 | 624 | 1055 |
| | 363 | 1780 | 184 | 245 | 408 | 245 | 542 | 77 | 740 | 77 | 1777 | 239 |
| | 371 | 1121 | 0 | 0 | 77 | 77 | 77 | 0 | 121 | 154 | 59 | 51 |
| | 372 | 2460 | 1523 | 926 | 550 | 296 | 296 | 254 | 350 | 1747 | 338 | 97 |
| | 384 | 1120 | 77 | 0 | 39 | 0 | 77 | 0 | 0 | 0 | 103 | 154 |
| 51-100 | 328 | 1519 | 209 | 5391 | 775 | 3636 | 1319 | 251 | 478 | 4681 | 1562 | 2989 |
| | 341 | 1574 | 476 | 1261 | 558 | 693 | 1291 | 396 | 173 | 2737 | 179 | 755 |
| | 342 | 585 | 201 | 188 | 40 | 201 | 483 | 0 | 40 | 1006 | 0 | 501 |
| | 343 | 525 | 397 | 36 | 36 | 144 | 144 | 29 | 217 | 253 | 100 | 289 |
| | 348 | 2120 | 292 | 1333 | 287 | 329 | 1280 | 208 | 833 | 542 | 826 | 808 |
| | 349 | 2114 | 614 | 706 | 291 | 706 | 1015 | 412 | 83 | 831 | 339 | 587 |
| | 364 | 2817 | 1163 | 388 | 172 | 400 | 2177 | 560 | 301 | 464 | 678 | 377 |
| | 365 | 1041 | **nf** | 95 | 239 | 0 | **nf** | 143 | 143 | 180 | 48 | 0 |
| | 370 | 1320 | 257 | 45 | 40 | 52 | **nf** | 0 | 0 | 45 | 0 | 91 |
| | 385 | 2356 | 0 | 162 | 0 | 0 | 41 | 41 | 0 | 0 | 41 | 0 |
| | 390 | 1481 | 0 | 0 | 0 | 41 | 41 | 0 | 0 | 0 | 51 | 0 |
| 101-150 | 344 | 1494 | 2023 | 968 | 1219 | 2089 | 4091 | 1169 | 1878 | 3863 | 7351 | 1396 |
| | 347 | 983 | 371 | 496 | 225 | 406 | 406 | 90 | 1467 | 135 | 4804 | 545 |
| | 366 | 1394 | 671 | 5420 | 3209 | 920 | **nf** | 107 | 2685 | 17148 | 18856 | 4787 |
| | 369 | 961 | 0 | 176 | 44 | 176 | **nf** | 32 | 157 | 416 | 365 | 78 |
| | 386 | 983 | 0 | 45 | 45 | 0 | **nf** | 0 | 0 | 85 | 240 | 0 |
| | 389 | 821 | 113 | 38 | 0 | 0 | 225 | 38 | 33 | 38 | 56 | 51750 |
| | 391 | 282 | 19 | 0 | 17 | 19 | 39 | 39 | 190 | 205 | 1138 | 78 |
| 151-200 | 345 | 1432 | 4436 | 3467 | 1055 | 1435 | 2272 | 630 | 4982 | 5117 | 8405 | 7894 |
| | 346 | 865 | 4557 | 3570 | 806 | 535 | 801 | 920 | 1446 | 3799 | 2935 | 35010 |
| | 368 | 334 | 9396 | 694 | 184 | 436 | **nf** | 49 | 296 | 431 | 435 | 449 |
| | 387 | 718 | 494 | 329 | 88 | 99 | **nf** | 0 | 88 | 280 | 1207 | 483 |
| | 388 | 361 | 472 | 221 | 50 | 0 | 199 | 3129 | 1473 | 221 | 1280 | 1280 |
| | 392 | 145 | 130 | 104 | 18 | 9 | 38 | 44 | 124 | 40 | 160 | 38 |
| total strata fished <= 200 fath. | | | 29010 | 27724 | 10984 | 13638 | 18605 | 8780 | 18711 | 47249 | 53957 | 111782 |
| ADJUSTED | | | 29010 | 27724 | 10984 | 13638 | | 8780 | 18711 | 47249 | 53597 | 111782 |
| upper | | | 52913 | 42861 | 15550 | 18275 | 22936 | 49867 | 25842 | 62123 | 109902 | 792411 |
| t-value | | | 4.3 | 2.23 | 2.36 | 2.365 | 2.06 | 12.71 | 2.2 | 2.36 | 3.18 | 12.71 |
| 1 STD strata fished <= 200 fatl | | | 5559 | 6788 | 1935 | 1961 | 2102 | 3233 | 3241 | 6303 | 17593 | 53551 |

[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 9b. Annual estimates of cod biomass (t) from autumn surveys of NAFO Division 3L during 2000-09 in depths <= 200 fathoms (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Stratum depth (fath) | Stratum number | Area sq. nautical miles | WT 321-323<br>Tel 342-343 | AN 399<br>WT 373-376<br>TEL 357-358 361 | Tel 412 ,413<br>Tel 415<br>WT 428-431 | Tel 513<br>WT 487-489<br>WT 511 | WT 558,559<br>WT 587<br>Tel 540 | Tel 662; WT<br>628-630, 637<br>AN 657-658 | Tel 682-684<br>Wt 705-707 | Wt 772-773,<br>804 , Tel 751<br>Tel 752 , 803 | Vt 837-838<br>\n 867-868 | AN 916-918<br>Tel 895-899 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2000 | 2001 | 2002-3 | 2003 | 2004 | 2005/6 | 2006 | 2007 | 2008 | 2009 |
| Mean survey date | | | 28-Nov-00 | 15-Nov-01 | 12-Nov-02 | 5-Dec-03 | 5-Dec-04 | 14-Nov-05 | 10-Nov-06 | 21-Nov-07 | 7-Nov-08 | 23-Nov-09 |
| 31-50 | 350 | 2071 | 842 | 2442 | 367 | 1181 | 179 | 39 | 299 | 1595 | 266 | 926 |
| | 363 | 1780 | 28 | 588 | 1230 | 232 | 42 | 36 | 301 | 62 | 1953 | 191 |
| | 371 | 1121 | 0 | 0 | 73 | 51 | 11 | 0 | 42 | 70 | 9 | 23 |
| | 372 | 2460 | 66 | 1303 | 1074 | 49 | 127 | 165 | 201 | 208 | 577 | 718 |
| | 384 | 1120 | 4 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 7 | 104 |
| 51-100 | 328 | 1519 | 41 | 3995 | 145 | 407 | 394 | 190 | 609 | 370 | 1519 | 299 |
| | 341 | 1574 | 120 | 475 | 272 | 304 | 181 | 101 | 160 | 136 | 172 | 202 |
| | 342 | 585 | 135 | 79 | 13 | 74 | 54 | 0 | 40 | 73 | 0 | 83 |
| | 343 | 525 | 130 | 5 | 6 | 44 | 31 | 10 | 51 | 11 | 20 | 243 |
| | 348 | 2120 | 55 | 583 | 174 | 122 | 300 | 123 | 1207 | 315 | 869 | 289 |
| | 349 | 2114 | 228 | 658 | 114 | 88 | 313 | 254 | 61 | 892 | 164 | 255 |
| | 364 | 2817 | 403 | 59 | 82 | 97 | 712 | 325 | 276 | 102 | 333 | 134 |
| | 365 | 1041 | **nf** | 72 | 72 | 0 | | 35 | 11 | 155 | 3 | 0 |
| | 370 | 1320 | 107 | 17 | 22 | 2 | | 0 | 0 | 10 | 0 | 69 |
| | 385 | 2356 | 0 | 77 | 0 | 0 | 2 | 13 | 0 | 0 | 7 | 0 |
| | 390 | 1481 | 0 | 0 | 0 | 8 | 16 | 0 | 0 | 0 | 38 | 0 |
| 101-150 | 344 | 1494 | 908 | 274 | 601 | 765 | 1343 | 741 | 1987 | 3425 | 12809 | 562 |
| | 347 | 983 | 87 | 224 | 175 | 109 | 144 | 22 | 1483 | 32 | 6152 | 192 |
| | 366 | 1394 | 321 | 2527 | 1572 | 292 | | 57 | 2242 | 17434 | 20062 | 1501 |
| | 369 | 961 | 0 | 64 | 15 | 71 | | 17 | 29 | 864 | 72 | 58 |
| | 386 | 983 | 0 | 18 | 10 | 0 | | 0 | 0 | 112 | 94 | 0 |
| | 389 | 821 | 54 | 9 | 0 | 0 | 102 | 37 | 3 | 2 | 163 | 36479 |
| | 391 | 282 | 1 | 0 | 31 | 6 | 4 | 16 | 45 | 51 | 266 | 16 |
| 151-200 | 345 | 1432 | 1299 | 2178 | 709 | 658 | 627 | 449 | 5312 | 3559 | 14501 | 4848 |
| | 346 | 865 | 1359 | 2350 | 394 | 77 | 618 | 487 | 1701 | 5328 | 4459 | 36868 |
| | 368 | 334 | 8268 | 290 | 169 | 201 | | 97 | 158 | 268 | 460 | 125 |
| | 387 | 718 | 227 | 180 | 30 | 2 | | 0 | 99 | 430 | 695 | 164 |
| | 388 | 361 | 335 | 140 | 97 | 0 | 23 | 1887 | 571 | 221 | 662 | 1047 |
| | 392 | 145 | 51 | 97 | 10 | 7 | 11 | 16 | 97 | 47 | 69 | 15 |
| total strata fished <= 200 fath( | | | 15070 | 18706 | 7460 | 4849 | 5266 | 5118 | 16985 | 35772 | 66401 | 85411 |
| ADJUSTED | | | 15070 | 18706 | 7460 | 4849 | | 5118 | 16985 | 35772 | 66401 | 85411 |
| upper | | | 83892 | 27204 | 10528 | 7539 | 6640 | 29932 | 23443 | 54137 | 121799 | 587251 |
| t-value | | | 12.71 | 2.12 | 2.13 | 2.228 | 2.09 | 12.71 | 2.2 | 2.57 | 2.78 | 12.71 |
| 1 STD strata fished <= 200 fa | | | 5415 | 4008 | 1440 | 1207 | 657 | 1952 | 2935 | 7146 | 19927 | 39484 |

[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 10. Annual estimates of cod abundance (000's) and biomass (t) from autumn surveys of NAFO Division 3L during 2000-09 in depths >200 fathoms (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Stratum depth (fathoms) | Stratum number | Area sq. nautical miles | WT 321-323 Tel 342-343 | AN 399 WT 373-376 TEL 357-358 361 | Tel 412 ,413 Tel 415 WT 428-431 | Tel 513 WT 487-489 WT 511 | WT 558-559 WT 587 Tel 540 | Tel 662, WT 628-630, 637 AN 657-658 | Tel 682-684 Wt 705-707 | Wt 772-773, 804, Tel 751 Tel 752 , 803 | Wt 837-838 An 867-868 | AN 916-918 Tel 895-899 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2000 | 2001 | 2002-3 | 2003 | 2004 | 2005/6 | 2006 | 2007 | 2008 | 2009 |
| Mean survey date | | | 28-Nov-00 | 15-Nov-01 | 12-Nov-02 | 5-Dec-03 | 5-Dec-04 | 14-Nov-05 | 10-Nov-06 | 21-Nov-07 | 7-Nov-08 | 23-Nov-09 |
| | | | | | | | | **ABUNDANCE** | | | | |
| 201-300 | 729 | 186 | 0 | 38 | 0 | 13 | 36 | 0 | 0 | 23 | 0 | 13 |
| | 731 | 216 | 208 | 106 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 |
| | 733 | 468 | 101 | 444 | 29 | 322 | 0 | 0 | 0 | 0 | 86 | 0 |
| | 735 | 272 | 3528 | 692 | 83 | 337 | **nf** | 33 | 50 | 0 | 0 | 56 |
| 301-400 | 730 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 732 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 734 | 228 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | 0 | 0 |
| | 736 | 175 | 0 | 12 | 0 | 139 | **nf** | 0 | 0 | 0 | 0 | 0 |
| 401-500 | 737 | 227 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| | 741 | 223 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 745 | 348 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 748 | 159 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| 401-500 | | 957 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| 501-600 | 738 | 221 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 742 | 206 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 746 | 392 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 749 | 126 | 0 | 0 | 0 | 0 | **nf** | **nf** | **nf** | 0 | **nf** | 0 |
| 501-600 | | 945 | 0 | 0 | 0 | 0 | **nf** | **nf** | | 0 | **nf** | 0 |
| 601-700 | 739 | 254 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| | 743 | 211 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 747 | 724 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 750 | 556 | 0 | 0 | 0 | 0 | **nf** | **nf** | **nf** | 0 | **nf** | 0 |
| 601-700 | | 1745 | 0 | 0 | | | **nf** | 0 | 0 | 0 | **nf** | |
| 701-800 | 740 | 264 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| | 744 | 280 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 751 | 229 | 0 | 0 | 0 | 0 | **nf** | **nf** | **nf** | 0 | **nf** | 0 |
| 701-800 | | 773 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| total strata fished > 200 fathom | | | 3837 | 1292 | 112 | 811 | 53 | 33 | 50 | 23 | 86 | 69 |
| total all strata fished offshore | | | 32846 | 29017 | 11096 | 14448 | 18657 | 8813 | 18761 | 47271 | 54044 | 111851 |
| upper | | | 58560 | 44211 | 15667 | 19068 | 22989 | 49903 | 25892 | 62145 | 109989 | 792480 |
| t-value | | | 4.3 | 2.23 | 2.36 | 2.306 | 2.06 | 12.71 | 2.2 | 2.36 | 3.18 | 12.71 |
| 1 STD all strata fished offshore | | | 5980 | 6813 | 1937 | 2003 | 2103 | 3233 | 3241 | 6303 | 17593 | 53551 |
| | | | | | | | | **BIOMASS** | | | | |
| 201-300 | 729 | 186 | 0 | 45 | 0 | 42 | 30 | 0 | 0 | 23 | 0 | 13 |
| | 731 | 216 | 165 | 108 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| | 733 | 468 | 110 | 261 | 36 | 156 | 0 | 0 | 0 | 0 | 113 | 0 |
| | 735 | 272 | 3973 | 697 | 155 | 226 | **nf** | 43 | 87 | 0 | 0 | 22 |
| 301-400 | 730 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 732 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 734 | 228 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | 0 | 0 |
| | 736 | 175 | 0 | 7 | 0 | 164 | **nf** | 0 | 0 | 0 | 0 | 0 |
| 401-500 | 737 | 227 | 0 | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| | 741 | 223 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 745 | 348 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 748 | 159 | 0 | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| 401-500 | | 957 | 0 | 0 | 0 | 0 | **nf** | | 0 | 0 | **nf** | 0 |
| 501-600 | 738 | 221 | | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 742 | 206 | | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 746 | 392 | | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 749 | 126 | | 0 | 0 | 0 | **nf** | **nf** | **nf** | 0 | **nf** | 0 |
| 501-600 | | 945 | 0 | 0 | 0 | 0 | **nf** | | | 0 | **nf** | 0 |
| 601-700 | 739 | 254 | | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| | 743 | 211 | | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 747 | 724 | | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 750 | 556 | | 0 | 0 | 0 | **nf** | **nf** | **nf** | 0 | **nf** | 0 |
| 601-700 | | 1745 | 0 | 0 | 0 | 0 | **nf** | | 0 | 0 | **nf** | |
| 701-800 | 740 | 264 | | 0 | 0 | 0 | **nf** | 0 | 0 | 0 | **nf** | 0 |
| | 744 | 280 | | 0 | 0 | 0 | **nf** | **nf** | 0 | 0 | **nf** | 0 |
| | 751 | 229 | | 0 | 0 | 0 | **nf** | **nf** | **nf** | 0 | **nf** | 0 |
| 701-800 | | 773 | 0 | 0 | 0 | 0 | **nf** | | 0 | 0 | **nf** | 0 |
| total strata fished > 200 fath. | | | 4248 | 1118 | 191 | 588 | 34 | 43 | 87 | 23 | 113 | 35 |
| total all strata fished offshore | | | 19318 | 19824 | 7652 | 5438 | 5300 | 5161 | 17072 | 35794 | 66513 | 85445 |
| upper | | | 91155 | 28382 | 10721 | 8157 | 6675 | 29981 | 23533 | 54160 | 121913 | 587285 |
| t-value | | | 12.71 | 2.12 | 2.12 | 2.201 | 2.09 | 12.71 | 2.2 | 2.57 | 2.78 | 12.71 |
| 1 SD all strata fished offshore | | | 5652 | 4037 | 1448 | 1235 | 658 | 1953 | 2937 | 7146 | 19928 | 39484 |

**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 11. Mean number of cod per tow at age in the index strata (adjusted for missing strata) for the autumn DFO RV bottom-trawl survey 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 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 7.12 | 0.01 |
| 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 | 1.48 | 0.69 |
| 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 | 1.98 | 1.86 |
| 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 | 3.18 | 1.45 |
| 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 | 0.97 | 0.91 |
| 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 | 0.40 | 0.17 |
| 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 | 0.13 | 0.02 |
| 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 | 0.03 | 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 | 0.00 | 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 | 0.01 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 15.30 | 5.12 |

**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 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.01 | 0.07 |
| 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 | 2.58 | 0.61 |
| 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 | 2.72 | 2.28 |
| 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 | 2.90 | 2.17 |
| 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 | 2.47 | 2.44 |
| 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 | 1.48 | 2.27 |
| 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 | 2.03 | 0.88 |
| 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 | 1.09 | 0.94 |
| 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 | 0.20 | 0.29 |
| 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 | 0.13 | 0.06 |
| 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 | 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 | 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 | 0.01 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 15.62 | 12.02 |

*cont'd.*

*Table 11 (Cont'd.)*

**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 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 0.01 | 0.03 |
| **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 | 0.43 | 0.60 |
| **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 | 1.70 | 3.17 |
| **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 | 2.55 | 8.09 |
| **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 | 1.97 | 5.99 |
| **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 | 1.31 | 2.68 |
| **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 | 1.77 | 0.79 |
| **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 | 0.58 | 0.56 |
| **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 | 0.17 | 0.10 |
| **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 | 0.08 | 0.01 |
| **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 | 0.00 | 0.00 |
| **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 | 0.04 | 0.01 |
| **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 | 0.02 | 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 | 0.01 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 10.64 | 22.04 |

**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 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 1.76 | 0.04 |
| **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 | 1.41 | 0.63 |
| **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 | 2.11 | 2.55 |
| **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 | 2.82 | 4.48 |
| **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 | 1.89 | 3.55 |
| **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 | 1.14 | 1.93 |
| **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 | 1.45 | 0.63 |
| **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 | 0.61 | 0.55 |
| **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 | 0.14 | 0.14 |
| **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 | 0.08 | 0.02 |
| **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 | 0.00 | 0.00 |
| **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 | 0.02 | 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 | 0.01 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 13.45 | 14.53 |

*Table 12a. Annual estimates of cod abundance (000's) from spring surveys of NAFO Division 3L during 2000-09 in depths <= 200 fathoms (in Campelen units)(NF=stratum not fished). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Depth range (fath) | Stratum number | Stratum area sq mi. | 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 Wt 762 ,800 2007 | Tel 864 Wt 829 2008 | Tel 885 AN 906 927 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Date | | | 17-Jun-00 | 11-Jun-01 | 10-Jun-02 | 15-Jun-03 | 16-Jun-04 | 20-Jun-05 | 19-Jun-06 | 27-Jun-07 | 18-Jun-08 | 3-Jun-09 |
| 31-50 | 350 | 2071 | 71 | 297 | 81 | 163 | 285 | 570 | 366 | 581 | 2137 | 0 |
| | 363 | 1780 | 420 | 82 | 0 | 41 | 122 | 147 | 245 | 740 | 392 | 286 |
| | 371 | 1121 | 0 | 39 | 39 | 0 | 39 | 62 | 193 | 39 | 77 | 0 |
| | 372 | 2460 | 1203 | 42 | 0 | 42 | 381 | 169 | 435 | 931 | 387 | 323 |
| | 384 | 1120 | 77 | 0 | 0 | 39 | 0 | 39 | 116 | 0 | 0 | 0 |
| 51-100 | 328 | 1519 | 1254 | 139 | 84 | 507 | 79 | 279 | 167 | 788 | NF | 612 |
| | 341 | 1574 | 476 | 909 | 43 | 173 | 433 | 379 | 520 | 136 | 433 | 308 |
| | 342 | 585 | 322 | 241 | 40 | 80 | 201 | 201 | 172 | 161 | 322 | 241 |
| | 343 | 525 | 72 | 36 | 0 | 0 | 144 | 401 | 108 | 193 | 144 | 169 |
| | 348 | 2120 | 109 | 0 | 167 | 333 | 232 | 500 | 596 | 583 | 194 | 167 |
| | 349 | 2114 | 332 | 249 | 166 | 249 | 291 | 872 | 374 | 291 | 598 | 162 |
| | 364 | 2817 | 155 | 254 | 129 | 0 | 43 | 48 | 406 | 86 | 484 | 86 |
| | 365 | 1041 | 0 | 48 | 48 | 0 | 95 | 143 | 245 | 199 | 143 | 0 |
| | 370 | 1320 | 36 | 0 | 0 | 0 | 0 | 182 | 45 | 45 | 272 | 45 |
| | 385 | 2356 | 81 | 46 | 41 | 0 | 81 | 216 | 41 | 36 | 324 | 0 |
| | 390 | 1481 | 0 | 122 | 0 | 0 | 0 | 36 | 163 | 81 | 634 | 0 |
| 101-150 | 344 | 1494 | 260 | 392 | 485 | 870 | 575 | 1212 | 1045 | 3319 | 381 | 172 |
| | 347 | 983 | 135 | 676 | 45 | 180 | 90 | 1713 | 4101 | 19781 | 180 | 1590 |
| | 366 | 1394 | 1630 | 230 | 3545 | 652 | 1432 | 1142 | 8821 | 6834 | 336 | 4142 |
| | 369 | 961 | 132 | 196 | 206 | 264 | 118 | 1586 | 925 | 1464 | 428 | 88 |
| | 386 | 983 | 406 | 260 | 45 | 0 | 40 | 130 | 406 | 85 | 225 | 0 |
| | 389 | 821 | 1412 | 1016 | 75 | 0 | 376 | 565 | 75 | 167 | 100 | 129 |
| | 391 | 282 | 0 | 78 | 19 | 39 | 0 | 466 | 183 | 345 | 614 | 17 |
| 151-200 | 345 | 1432 | 2151 | 2053 | 2403 | 906 | 2430 | 2114 | 2758 | 2075 | 1822 | 1248 |
| | 346 | 865 | 948 | 996 | 2248 | 1282 | 363 | 1547 | 6425 | 2380 | 2340 | 3162 |
| | 368 | 334 | 863 | 1330 | 578 | 347 | 523 | 712 | 158 | 204 | 684 | 2297 |
| | 387 | 718 | 3556 | 307 | 285 | 198 | 1054 | 1564 | 592 | 593 | 5054 | 1235 |
| | 388 | 361 | 564 | 695 | 290 | 770 | 221 | 1324 | 323 | 276 | 684 | 876 |
| | 392 | 145 | 195 | 150 | 748 | 140 | 70 | 417 | 120 | 30 | 239 | 247 |
| total strata fished <= 200 fath | | | 16860 | 10884 | 11810 | 7277 | 9718 | 18736 | 30125 | 42444 | 19630 | 17601 |
| ADJUSTED | | | 16860 | 10884 | 11810 | 7277 | 9718 | 18736 | 30125 | 42444 | 19630 | 17601 |
| upper | | | 52643 | 14422 | 16092 | 9317 | 14260 | 24225 | 47677 | 256007 | 68157 | 28950 |
| t-value | | | 12.71 | 2.31 | 2.33 | 2.12 | 2.26 | 2.31 | 2.31 | 12.71 | 12.71 | 2.45 |
| 1 STD strata fished <= 200 fath | | | 2815 | 1532 | 1838 | 962 | 2010 | 2376 | 7598 | 16803 | 3818 | 4632 |

**[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 12b. Annual estimates of cod biomass (t) from spring surveys of NAFO Division 3L during 2000-09 in depths <= 200 fathoms (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Depth range (fath) Mean Date | Stratum number | Stratum area sq mi. | 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 27-Jun-07 | Tel 864 Wt 829 2008 18-Jun-08 | Tel 885 AN 906 927 2009 3-Jun-09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31-50 | 350 | 2071 | 17 | 621 | 28 | 11 | 22 | 2142 | 204 | 506 | 1356 | 0 |
| | 363 | 1780 | 193 | 1 | 0 | 3 | 1275 | 8 | 641 | 1544 | 1860 | 36 |
| | 371 | 1121 | 0 | 25 | 1 | 0 | 1 | 13 | 156 | 3 | 519 | 0 |
| | 372 | 2460 | 392 | 4 | 0 | 355 | 8 | 56 | 282 | 153 | 64 | 24 |
| | 384 | 1120 | 20 | 0 | 0 | 1 | 0 | 8 | 175 | 0 | 0 | 0 |
| 51-100 | 328 | 1519 | 89 | 37 | 3 | 129 | 61 | 318 | 216 | 251 | nf | 380 |
| | 341 | 1574 | 96 | 549 | 3 | 16 | 644 | 1911 | 89 | 9 | 442 | 145 |
| | 342 | 585 | 23 | 9 | 2 | 9 | 13 | 23 | 14 | 36 | 72 | 10 |
| | 343 | 525 | 27 | 0.361 | 0 | 0 | 11 | 173 | 36 | 28 | 18 | 6 |
| | 348 | 2120 | 10 | 0 | 14 | 16 | 20 | 204 | 550 | 143 | 18 | 12 |
| | 349 | 2114 | 615 | 26 | 5 | 113 | 34 | 551 | 278 | 191 | 549 | 8 |
| | 364 | 2817 | 43 | 15 | 3 | 0 | 3 | 75 | 953 | 14 | 820 | 21 |
| | 365 | 1041 | 0 | 17 | 1 | 0 | 8 | 37 | 80 | 14 | 11 | 0 |
| | 370 | 1320 | 1 | 0 | 0 | 0 | 0 | 59 | 34 | 39 | 196 | 9 |
| | 385 | 2356 | 2 | 4 | 42 | 0 | 3 | 86 | 12 | 13 | 184 | 0 |
| | 390 | 1481 | 0 | 5 | 0 | 0 | 0 | 9 | 54 | 22 | 105 | 0 |
| 101-150 | 344 | 1494 | 152 | 126 | 71 | 307 | 128 | 579 | 443 | 2828 | 35 | 8 |
| | 347 | 983 | 9 | 182 | 3 | 32 | 13 | 949 | 3557 | 17971 | 50 | 1134 |
| | 366 | 1394 | 210 | 25 | 292 | 130 | 396 | 424 | 3250 | 4182 | 15 | 1253 |
| | 369 | 961 | 218 | 159 | 10 | 60 | 93 | 976 | 306 | 816 | 158 | 4 |
| | 386 | 983 | 311 | 131 | 10 | 0 | 25 | 61 | 270 | 119 | 219 | 0 |
| | 389 | 821 | 587 | 440 | 83 | 0 | 137 | 237 | 9 | 228 | 6 | 13 |
| | 391 | 282 | 0 | 41 | 2 | 3 | 0 | 145 | 55 | 128 | 198 | 1 |
| 151-200 | 345 | 1432 | 956 | 725 | 605 | 327 | 349 | 918 | 1867 | 2597 | 670 | 510 |
| | 346 | 865 | 582 | 260 | 558 | 644 | 215 | 643 | 4583 | 2062 | 972 | 1999 |
| | 368 | 334 | 499 | 417 | 100 | 91 | 225 | 381 | 70 | 60 | 142 | 1481 |
| | 387 | 718 | 2057 | 191 | 112 | 34 | 325 | 604 | 332 | 333 | 1680 | 294 |
| | 388 | 361 | 251 | 176 | 147 | 497 | 67 | 571 | 187 | 141 | 243 | 153 |
| | 392 | 145 | 19 | 74 | 332 | 13 | 16 | 219 | 53 | 14 | 214 | 74 |
| total strata fished <= 200 fathoms | | | 7378 | 4262 | 2428 | 2794 | 4094 | 12377 | 18758 | 34445 | 10816 | 7577 |
| ADJUSTED | | | 7378 | 4262 | 2428 | 2794 | 4094 | 12377 | 18758 | 34445 | 10816 | 7577 |
| upper | | | 30307 | 6164 | 3040 | 4093 | 7427 | 18175 | 30571 | 223582 | 15450 | 12022 |
| t-value | | | 12.71 | 2.14 | 2.18 | 28 | 2.36 | 2.36 | 2.57 | 12.71 | 2.23 | 2.31 |
| 1 STD strata fished <= 200 fathoms | | | 1804 | 889 | 281 | 46 | 1412 | 2457 | 4596 | 14881 | 2078 | 1924 |

**[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 13. Annual estimates of cod abundance (000s) and biomass (t) from spring surveys of NAFO Division 3L during 2000-09 in depths > 200 fathoms (in Campelen units). Estimates for years prior to 2000 are given in Brattey et al. 2008a.*

| Depth range (fath) | Stratum number | Stratum area nautical miles | 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 Wt 762 ,800 2007 | Tel 864 Wt 829 2008 | Tel 885 \N 906 927 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Date | | | 17-Jun | 11-Jun | 10-Jun | 15-Jun | 16-Jun-04 | 20-Jun-05 | 19-Jun-06 | | 18-Jun-08 | 3-Jun-09 |
| **Abundance** | | | | | | | | | | | | |
| 201-300 | 729 | 186 | 2240 | 171 | 50 | 280 | 0 | 0 | 0 | 0 | 0 | 113 |
| | 731 | 216 | 155 | 409 | 272 | 1398 | 0 | 43 | 43 | 51 | 0 | 15 |
| | 733 | 468 | 315 | 626 | 1094 | 5565 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 735 | 272 | 580 | 3792 | 3138 | 3530 | 0 | 0 | 0 | 0 | 50 | 37 |
| 301-400 | 730 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 732 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 |
| | 734 | 228 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | **nf** | 235 |
| | 736 | 175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 401-500 | 737 | 227 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| | 741 | 223 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| | 745 | 348 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| | 748 | 159 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| Total >200 fathoms | | | 3290 | 4998 | 4554 | 10787 | 0 | 43 | 43 | 51 | 50 | 413 |
| Total all strata fished | | | 20150 | 15881 | 16364 | 18064 | 9718 | 18779 | 30168 | 42495 | 19680 | 18014 |
| upper | | | 58359 | 67976 | 60855 | 41584 | 14260 | 24268 | 47720 | 256059 | 68211 | 29378 |
| t-value | | | 12.706 | 12.706 | 12.71 | 4.303 | 2.26 | 2.31 | 2.31 | 12.71 | 12.71 | 2.45 |
| 1 STD all strata fished | | | 3007 | 4100 | 3500 | 5466 | 2010 | 2376 | 7598 | 16803 | 3818 | 4638 |
| **Biomass** | | | | | | | | | | | | |
| 201-300 | 729 | 186 | 858 | 78 | 15 | 108 | 0 | 0 | 0 | 0 | 0 | 44 |
| | 731 | 216 | 51 | 321 | 117 | 1588 | 0 | 18 | 36 | 41 | 0 | 6 |
| | 733 | 468 | 172 | 290 | 351 | 2071 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 735 | 272 | 270 | 2557 | 1877 | 1486 | 0 | 0 | 0 | 0 | 250 | 29 |
| 301-400 | 730 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 732 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 734 | 228 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | **nf** | **294** |
| | 736 | 175 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| 401-500 | 737 | 227 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| | 741 | 223 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| | 745 | 348 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| | 748 | 159 | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** | **nf** |
| Total >200 fathoms | | | 1351 | 3246 | 2360 | 5303 | 0 | 18 | 36 | 41 | 250 | 373 |
| Total all strata fished | | | 8728 | 7507 | 4788 | 8097 | 4094 | 12395 | 18794 | 34486 | 11067 | 7951 |
| upper | | | 32059 | 41939 | 27442 | 16216 | 7427 | 18193 | 30607 | 223624 | 15665 | 12339 |
| t-value | | | 12.706 | 12.706 | 12.71 | 3.182 | 2.36 | 2.36 | 2.57 | 12.71 | 2.26 | 2.31 |
| 1 STD all strata fished | | | 1836 | 2710 | 1782 | 2552 | 1412 | 2457 | 4596 | 14881 | 2035 | 1900 |

**Note: nf=not fished. Strata not fished in the greater than 200 fathom depth range have not been filled using a multiplicative model.**

*Table 14. Mean number of cod per tow at age in the index strata (adjusted for missing strata) from the spring DFO RV bottom-trawl survey of NAFO Div. 3L.*

| Age | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 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 | 0.30 | 0.08 |
| 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 | 1.01 | 0.78 |
| 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 | 1.60 | 1.43 |
| 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 | 0.68 | 0.50 |
| 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 | 0.22 | 0.44 |
| 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 | 0.10 | 0.12 |
| 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 | 0.02 | 0.09 |
| 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 | 0.02 | 0.02 |
| 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 | 0.00 | 0.01 |
| 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 | 0.02 | |
| 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 | 0.03 | |
| 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 | 0.03 | |
| 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 | 0.00 | |
| 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 | | 0.00 | |
| 15 | 0.06 | 0.06 | 0.05 | 0.10 | 0.13 | 0.13 | 0.02 | | | | | | | | | | | | | 0.00 | 0.02 | 0.00 | | 0.00 | |
| 16 | 0.01 | 0.02 | 0.01 | 0.04 | 0.04 | 0.07 | 0.00 | | | | | | | | | | | | | 0.01 | | | | 0.01 | |
| 17 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.05 | 0.00 | | | | | | | | | | | | | | | | | 0.00 | |
| 18 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.00 | | | | | | | | | | | | | | | | | 0.01 | |
| 19 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | | | | | | | | | | | | | | | | | | |
| 20 | 0.01 | 0.00 | | 0.01 | | | 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 | 4.05 | 3.47 |

*Table 15a. Sentinel survey standardized catch rate-at-age indices (fish per net) for 5½" mesh gillnets for three inshore areas.*

Inshore Northern area

| Yr\Age | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|
| 1995 | 0.00 | 0.04 | 0.21 | 0.04 | 0.03 | 0.01 | 0.00 | 0.00 |
| 1996 | 0.01 | 0.02 | 0.26 | 1.17 | 0.19 | 0.04 | 0.01 | 0.00 |
| 1997 | 0.02 | 0.05 | 0.20 | 0.59 | 0.55 | 0.07 | 0.00 | 0.01 |
| 1998 | 0.01 | 0.06 | 0.27 | 0.75 | 0.70 | 0.21 | 0.04 | 0.01 |
| 1999 | 0.00 | 0.03 | 0.27 | 0.39 | 0.36 | 0.15 | 0.04 | 0.03 |
| 2000 | 0.03 | 0.06 | 0.14 | 0.36 | 0.33 | 0.16 | 0.03 | 0.01 |
| 2001 | 0.01 | 0.05 | 0.12 | 0.15 | 0.15 | 0.06 | 0.04 | 0.01 |
| 2002 | 0.11 | 0.19 | 0.27 | 0.24 | 0.14 | 0.07 | 0.01 | 0.01 |
| 2003 | 0.03 | 0.06 | 0.18 | 0.32 | 0.24 | 0.07 | 0.04 | 0.00 |
| 2004 | 0.02 | 0.04 | 0.16 | 0.36 | 0.32 | 0.11 | 0.03 | 0.01 |
| 2005 | 0.04 | 0.12 | 1.00 | 1.66 | 1.26 | 0.39 | 0.16 | 0.03 |
| 2006 | 0.02 | 0.28 | 1.05 | 2.28 | 1.15 | 0.43 | 0.19 | 0.07 |
| 2007 | 0.02 | 0.06 | 0.95 | 2.11 | 1.18 | 0.44 | 0.09 | 0.06 |
| 2008 | 0.01 | 0.10 | 0.33 | 2.52 | 2.07 | 0.61 | 0.15 | 0.05 |
| 2009 | 0.03 | 0.07 | 0.24 | 0.65 | 1.56 | 0.79 | 0.24 | 0.06 |

Inshore Central area

| Yr\Age | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|
| 1995 | 0.00 | 0.05 | 1.88 | 1.84 | 0.85 | 0.22 | 0.03 | 0.00 |
| 1996 | 0.05 | 0.16 | 1.45 | 7.54 | 1.87 | 0.40 | 0.05 | 0.03 |
| 1997 | 0.01 | 0.09 | 1.18 | 3.44 | 6.61 | 1.07 | 0.10 | 0.03 |
| 1998 | 0.07 | 0.11 | 1.32 | 5.77 | 5.66 | 3.55 | 0.76 | 0.07 |
| 1999 | 0.02 | 0.16 | 1.42 | 2.24 | 3.46 | 1.09 | 0.73 | 0.16 |
| 2000 | 0.02 | 0.10 | 1.12 | 1.88 | 1.07 | 1.50 | 0.69 | 0.41 |
| 2001 | 0.02 | 0.08 | 0.49 | 1.29 | 0.76 | 0.28 | 0.45 | 0.14 |
| 2002 | 0.01 | 0.05 | 0.59 | 0.95 | 0.78 | 0.25 | 0.18 | 0.28 |
| 2003 | 0.05 | 0.13 | 0.56 | 1.42 | 1.00 | 0.29 | 0.12 | 0.06 |
| 2004 | 0.02 | 0.17 | 1.19 | 1.74 | 1.13 | 0.41 | 0.17 | 0.06 |
| 2005 | 0.03 | 0.09 | 2.41 | 3.38 | 1.26 | 0.47 | 0.16 | 0.07 |
| 2006 | 0.02 | 0.50 | 1.66 | 4.03 | 1.90 | 0.49 | 0.16 | 0.09 |
| 2007 | 0.05 | 0.10 | 3.82 | 4.81 | 2.29 | 0.65 | 0.19 | 0.08 |
| 2008 | 0.04 | 0.12 | 0.69 | 7.55 | 4.28 | 1.31 | 0.33 | 0.10 |
| 2009 | 0.03 | 0.07 | 0.43 | 1.38 | 4.97 | 2.80 | 0.71 | 0.18 |

Inshore Southern area

| Yr\Age | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|
| 1995 | 0.01 | 0.06 | 0.79 | 2.92 | 0.94 | 1.18 | 0.35 | 0.08 |
| 1996 | 0.04 | 0.25 | 1.01 | 6.57 | 4.94 | 1.67 | 0.43 | 0.09 |
| 1997 | 0.03 | 0.14 | 3.12 | 2.46 | 4.28 | 1.79 | 0.28 | 0.13 |
| 1998 | 0.01 | 0.09 | 1.84 | 10.34 | 4.11 | 1.83 | 0.81 | 0.14 |
| 1999 | 0.02 | 0.10 | 2.01 | 3.86 | 4.84 | 1.26 | 0.50 | 0.14 |
| 2000 | 0.02 | 0.08 | 0.85 | 1.31 | 1.26 | 1.38 | 0.60 | 0.16 |
| 2001 | 0.01 | 0.06 | 0.35 | 0.86 | 0.54 | 0.42 | 0.57 | 0.16 |
| 2002 | 0.01 | 0.05 | 0.54 | 0.65 | 0.59 | 0.36 | 0.14 | 0.10 |
| 2003 | 0.01 | 0.05 | 0.29 | 2.69 | 1.40 | 0.66 | 0.30 | 0.11 |
| 2004 | 0.01 | 0.16 | 0.82 | 1.83 | 3.04 | 0.85 | 0.26 | 0.06 |
| 2005 | 0.02 | 0.05 | 0.84 | 1.52 | 1.48 | 1.08 | 0.40 | 0.08 |
| 2006 | 0.00 | 0.27 | 0.95 | 2.20 | 1.14 | 0.61 | 0.41 | 0.07 |
| 2007 | 0.00 | 0.04 | 1.33 | 2.35 | 1.01 | 0.46 | 0.18 | 0.10 |
| 2008 | 0.00 | 0.03 | 0.36 | 3.75 | 2.74 | 0.77 | 0.26 | 0.05 |
| 2009 | 0.00 | 0.02 | 0.31 | 0.78 | 2.27 | 2.07 | 0.41 | 0.08 |

*Table 15b. Sentinel survey standardized catch rate-at-age indices for line-trawl (fish per 1000 hooks) and 3¼" gillnet (fish per net) for the inshore central area.*

Linetrawl

| Yr\Age | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|
| 1995 | 10.20 | 57.70 | 51.20 | 15.90 | 4.40 | 0.40 | 0.40 |
| 1996 | 24.00 | 39.90 | 51.10 | 24.70 | 2.80 | 0.40 | 0.10 |
| 1997 | 14.10 | 56.40 | 72.60 | 47.60 | 32.40 | 3.90 | 1.10 |
| 1998 | 18.10 | 32.00 | 25.60 | 20.30 | 6.40 | 8.20 | 1.20 |
| 1999 | 10.90 | 23.30 | 29.70 | 14.30 | 9.70 | 2.50 | 4.00 |
| 2000 | 14.70 | 53.40 | 25.60 | 17.20 | 8.20 | 4.50 | 3.00 |
| 2001 | 28.90 | 39.70 | 13.70 | 3.60 | 1.20 | 0.50 | 0.40 |
| 2002 | 16.30 | 26.70 | 16.10 | 6.60 | 1.30 | 0.20 | 1.50 |
| 2003 | 31.20 | 69.30 | 32.40 | 6.20 | 2.70 | 0.80 | 0.50 |
| 2004 | 32.10 | 52.30 | 34.70 | 21.20 | 1.40 | 1.00 | 0.00 |
| 2005 | 34.50 | 56.20 | 46.10 | 14.50 | 4.20 | 1.30 | 0.50 |
| 2006 | 14.60 | 50.10 | 32.20 | 17.40 | 3.30 | 1.50 | 0.10 |
| 2007 | 5.90 | 25.10 | 79.90 | 43.10 | 16.80 | 6.10 | 0.50 |
| 2008 | 8.90 | 40.60 | 48.50 | 49.90 | 34.20 | 7.30 | 0.50 |
| 2009 | 6.90 | 35.00 | 29.90 | 20.50 | 46.00 | 19.10 | 4.30 |

3 1/4" Gillnet

| Yr\Age | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.02 | 9.46 | 20.23 | 8.08 | 8.48 | 0.34 | 0.04 | 0.00 | 0.00 |
| 1997 | 0.01 | 5.80 | 13.16 | 5.04 | 4.82 | 3.90 | 0.41 | 0.02 | 0.00 |
| 1998 | 0.08 | 6.79 | 3.93 | 4.47 | 7.98 | 4.12 | 1.72 | 0.39 | 0.01 |
| 1999 | 0.38 | 8.47 | 5.76 | 4.11 | 1.70 | 1.79 | 0.33 | 0.20 | 0.05 |
| 2000 | 0.29 | 8.76 | 7.16 | 3.35 | 1.74 | 0.50 | 0.47 | 0.19 | 0.13 |
| 2001 | 0.25 | 8.50 | 7.61 | 2.65 | 1.33 | 0.31 | 0.09 | 0.13 | 0.03 |
| 2002 | 0.66 | 11.85 | 5.78 | 1.90 | 1.03 | 0.35 | 0.05 | 0.03 | 0.04 |
| 2003 | 0.47 | 20.13 | 9.07 | 2.69 | 1.31 | 0.52 | 0.08 | 0.03 | 0.01 |
| 2004 | 0.91 | 8.16 | 9.51 | 4.95 | 1.77 | 0.56 | 0.11 | 0.04 | 0.02 |
| 2005 | 0.23 | 17.58 | 10.17 | 5.36 | 2.23 | 0.35 | 0.12 | 0.03 | 0.00 |
| 2006 | 0.28 | 7.15 | 10.67 | 5.57 | 2.93 | 0.78 | 0.12 | 0.02 | 0.02 |
| 2007 | 0.35 | 7.51 | 7.18 | 10.84 | 6.09 | 1.27 | 0.34 | 0.02 | 0.01 |
| 2008 | 0.54 | 6.82 | 8.20 | 3.64 | 9.20 | 2.82 | 0.61 | 0.11 | 0.01 |
| 2009 | 0.13 | 5.37 | 8.21 | 5.07 | 3.66 | 4.83 | 1.97 | 0.33 | 0.09 |

*Table 16. Annual reporting rate estimates for single and double tagged cod from fisheries in the inshore of NAFO Divs. 3KL during 1997-2009 based on the high-reward tagging method. See text for details.*

| | Single tag reporting rates (NAFO Divs. 3KL) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Group** | **1997** | **1998** | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** |
| **All** | 0.70 | 0.68 | 0.79 | 0.70 | 0.90 | 0.73 | 0.73 | 0.68 | 0.68 | 0.61 | 0.62 | 0.64 | 0.57 |
| **Commercial** | 0.74 | 0.73 | 0.81 | 0.72 | 0.90 | 0.78 | 0.76 | 0.72 | 0.72 | 0.69 | 0.68 | 0.70 | 0.66 |
| **Recreational** | NA | 0.48 | 0.50 | 0.51 | 0.54 | 0.46 | 0.48 | NA | NA | 0.46 | 0.48 | 0.50 | 0.47 |

| | Double tag reporting rates (NAFO Divs. 3KL) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1997** | **1998** | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** |
| **All** | 0.80 | 0.78 | 0.86 | 0.80 | 0.94 | 0.82 | 0.82 | 0.79 | 0.78 | 0.73 | 0.74 | 0.75 | 0.70 |
| **Commercial** | 0.83 | 0.82 | 0.88 | 0.81 | 0.94 | 0.86 | 0.84 | 0.82 | 0.82 | 0.79 | 0.79 | 0.80 | 0.77 |
| **Recreational** | NA | 0.62 | 0.63 | 0.64 | 0.67 | 0.59 | 0.62 | NA | NA | 0.59 | 0.61 | 0.63 | 0.60 |

*Table 17. Estimates of annual mean exploitation rate (harvest rate, in percent) for cod tagged in NAFO Div. 3KL during 1997-2009. Shaded cells represent partial estimates as fishery in that year was already in progress. Boxed columns of cells indicate values used to compute annual means, weighted by numbers released. See text for details.*

| Unit area | Expt. number | Area of release | Nos tagged (50-85 cm) | Recapture year 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|
| 3KI | 2005002 | TOO GOOD ARM (HL) | 190 | 11.4 | 0.0 | | |
| 3KI | 2006006 | TOO GOOD ARM | 488 | 30.4 | 10.9 | 8.9 | |
| 3KI | 2006007 | TWILLINGATE | 1282 | 23.6 | 3.4 | 1.6 | |
| 3KI | 2006008 | FOGO | 941 | 9.0 | 8.6 | 3.7 | |
| 3KI | 2007-006 | TOO GOOD ARM | 403 | | 7.7 | 3.8 | 4.1 |
| 3KI | 2008-007 | TOO GOOD ARM | 490 | | | 10.6 | 6.9 |
| 3KI | 2008-008 | FOGO NORTH | 307 | | | 2.6 | 1.5 |
| 3KI | 2008-010 | TWILLINGATE | 184 | | | 11.6 | 0.0 |
| | | **Annual means** | | **19.2** | **7.6** | **4.5** | **4.0** |
| | | | | | | | |
| 3LA | 2006005 | BONAVISTA | 1345 | 5.0 | 6.5 | 3.9 | |
| 3LA | 2007012 | DEER HARBOUR BB | 50 | | 7.4 | 8.2 | 0.0 |
| 3LA | 2007015 | BONAVISTA BAY | 105 | | 0.0 | 0.0 | 2.7 |
| 3LA | 2008-003 | BONAVISTA | 512 | | | 3.5 | 4.8 |
| 3LA | 2009-004 | BONAVISTA | 517 | | | | 3.7 |
| | | **Annual means** | | **5.0** | **6.6** | **3.7** | **3.9** |
| | | | | | | | |
| 3LB | 2004001 | SMITH SOUND (HL) | 932 | 11.2 | | | |
| 3LB | 2005-001 | SMITH SOUND (HL) | 667 | 9.4 | 6.9 | | |
| 3LB | 2005-003 | SMITH SOUND (HL) | 110 | 13.9 | 11.1 | | |
| 3LB | 2005-009 | SMITH SOUND (HL) | 51 | 20.0 | 13.4 | | |
| 3LB | 2006-001 | SMITH SOUND (HL) | 384 | 9.1 | 5.8 | 4.0 | |
| 3LB | 2006-003 | SMITH SOUND (OT) | 25 | 25.1 | 0.0 | 0.0 | |
| 3LB | 2006-004 | SMITH SOUND HL | 390 | 9.4 | 7.2 | 7.5 | |
| 3LB | 2006009 | SMITH SOUND HL | 472 | 0.0 | 12.1 | 6.2 | |
| 3LB | 2006010 | SMITH SND CP | 264 | 0.0 | 16.7 | 8.0 | |
| 3LB | 2006011 | SMITH SND CP | 319 | 0.0 | 7.8 | 13.5 | |
| 3LB | 2006012 | SMITH SND HL | 637 | 0.0 | 5.9 | 5.6 | |
| 3LB | 2007-002 | SMITH SOUND OT | 73 | | 4.8 | 6.7 | 19.4 |
| 3LB | 2007-003 | SMITH SOUND HL | 202 | | 3.1 | 4.8 | 10.2 |
| 3LB | 2007-016 | SMITH SND CP | 860 | | 0.0 | 8.7 | 6.0 |
| 3LB | 2007-017 | SMITH SND HL | 52 | | 0.0 | 9.1 | 0.0 |
| 3LB | 2008-002 | SMITH SOUND | 49 | | | 5.4 | 8.8 |
| 3LB | 2008-011 | SMITH SOUND CP | 355 | | | 2.5 | 9.7 |
| 3LB | 2008-012 | SMITH SOUND CP | 401 | | | 0.0 | 10.2 |
| 3LB | 2008-013 | SMITH SOUND HL | 105 | | | 0.0 | 3.6 |
| 3LB | 2009001 | SMITH SOUND CP | 53 | | | | 8.1 |
| 3LB | 2009002 | SMITH SOUND HL | 1137 | | | | 5.0 |
| | | | **Annual means** | **10.6** | **9.8** | **7.3** | **7.0** |
| | | | | | | | |
| 3LJ | 2007-009 | PETTY HARBOUR | 523 | | 7.6 | 8.8 | 7.7 |
| 3LJ | 2008-009 | PETTY HARBOUR | 414 | | | 7.9 | 11.2 |
| 3LJ | 2009-006 | PETTY HARBOUR | 216 | | | | 26.0 |
| | | | **Annual means** | | **7.6** | **8.4** | **9.2** |
| | | | | | | | |
| 3KG | 2007001 | OFFSHORE 3K | 871 | | | 0.4 | 0 |
| 3KG | 2008001 | OFFSHORE 3K | 1758 | | | 5.3 | 2.2 |
| | | | **Annual means** | | | **5.3** | **2.2** |

*Table 18. Tag return and commercial landings data by unit area used to estimate the ratio of commercial to recreational fishery landings during 2007-2009.*

| Unit Area | Adjusted tag returns | Proportions Commercial | Proportions Recreational | Reported commercial landings (t) 2007 | 2008 | 2009 | Estimated recreational landings (t) 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|
| 3Kh | 17 | 0.76 | 0.24 | 286 | 397 | 269 | 90 | 125 | 84 |
| 3Ki | 150 | 0.73 | 0.27 | 553 | 817 | 526 | 207 | 306 | 197 |
| 3La | 117 | 0.58 | 0.42 | 361 | 509 | 608 | 263 | 371 | 443 |
| 3Lb | 294 | 0.51 | 0.49 | 359 | 491 | 584 | 346 | 473 | 563 |
| 3Lf | 15 | 0.48 | 0.52 | 257 | 326 | 416 | 282 | 357 | 456 |
| 3Lj | 87 | 0.76 | 0.24 | 218 | 236 | 639 | 68 | 74 | 200 |
| | | | | 2034 | 2776 | 3042 | 1256 | 1706 | 1943 |

*Table 19. Time series of estimates of mean numbers per tow, abundance (000s) and biomass ( t) for the DFO-industry inshore mobile gear survey of near-shore areas of NAFO Div. 2J3KL in 2006-09. Values are given for inshore and perimeter portions of three areas (Northern, Central, and Southern) that correspond to those defined for the sentinel survey (see Fig. 22). Inshore encompasses strata adjacent to land (depth < 50 m) and perimeter is strata seaward of inshore strata (depth 50-200 m).*

| | Area | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| **Mean no. per tow** | **Northern inshore** | 4.7 | 10.0 | 8.3 | 1.7 |
| | **Northern perimeter** | 2.2 | 1.6 | 1.4 | 0.7 |
| | **Central inshore** | 175.2 | 34.9 | 78.2 | 144.1 |
| | **Central perimeter** | 3.7 | 7.1 | 6.3 | 2.5 |
| | **Southern inshore** | 171.7 | 529.8 | 802.7 | 65.5 |
| | **Southern perimeter** | 13.4 | 2.5 | 6.1 | 2.4 |
| | | | | | |
| **Abundance** | **Northern inshore** | 502 | 1,066 | 757 | 183 |
| | **Northern perimeter** | 1,116 | 789 | 712 | 368 |
| | **Central inshore** | 32,279 | 6,563 | 14,685 | 29,308 |
| | **Central perimeter** | 596 | 1,149 | 1,021 | 398 |
| | **Southern inshore** | 8,512 | 26,884 | 40,732 | 4,261 |
| | **Southern perimeter** | 1,721 | 317 | 779 | 305 |
| | | | | | |
| **Biomass** | **Northern inshore** | 268 | 177 | 109 | 134 |
| | **Northern perimeter** | 1,254 | 685 | 667 | 238 |
| | **Central inshore** | 12,917 | 7,135 | 3,809 | 56,721 |
| | **Central perimeter** | 748 | 1,549 | 1,369 | 684 |
| | **Southern inshore** | 2,543 | 4,315 | 27,761 | 2,195 |
| | **Southern perimeter** | 341 | 356 | 642 | 283 |

*Table 20. Time series of age-disaggregated mean numbers per tow for the DFO-industry inshore mobile gear survey of near-shore areas of NAFO Div. 2J3KL in 2006-09. Values are given for all strata in three areas that correspond to those defined for the sentinel survey (northern, central, and southern).*

**Northern**

| Age | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| 0 | . | . | . | . |
| 1 | 0.14 | 0.23 | 0.46 | 0.04 |
| 2 | 0.23 | 1.25 | 0.46 | 0.19 |
| 3 | 0.34 | 0.53 | 0.54 | 0.19 |
| 4 | 0.80 | 0.47 | 0.40 | 0.27 |
| 5 | 0.76 | 0.33 | 0.20 | 0.08 |
| 6 | 0.25 | 0.18 | 0.17 | 0.05 |
| 7 | 0.09 | 0.04 | 0.05 | 0.04 |
| 8 | 0.06 | 0.01 | 0.02 | 0.02 |
| 9 | 0.02 | . | . | 0.01 |
| 10 | 0.01 | . | . | . |
| 11 | . | . | . | . |
| 12 | . | . | . | . |
| 13 | . | . | . | . |
| 14 | . | . | . | . |
| 15 | . | . | . | . |
| 16 | . | . | . | . |
| 17 | . | . | . | . |
| | 2.70 | 3.04 | 2.30 | 0.89 |

**Central**

| Age | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| 0 | . | . | . | . |
| 1 | 3.98 | 0.48 | 21.10 | 2.59 |
| 2 | 28.30 | 1.86 | 10.27 | 13.03 |
| 3 | 37.77 | 4.07 | 7.05 | 3.81 |
| 4 | 13.71 | 4.60 | 2.41 | 5.81 |
| 5 | 8.56 | 7.08 | 1.33 | 11.86 |
| 6 | 1.79 | 3.04 | 1.71 | 9.22 |
| 7 | 0.80 | 0.55 | 0.86 | 16.39 |
| 8 | 0.30 | 0.31 | 0.42 | 12.64 |
| 9 | 0.04 | 0.07 | 0.13 | 3.79 |
| 10 | 0.13 | 0.04 | 0.04 | 1.47 |
| 11 | 0.06 | 0.06 | 0.03 | 0.40 |
| 12 | 0.10 | 0.04 | . | 0.21 |
| 13 | . | . | . | . |
| 14 | . | . | . | . |
| 15 | . | 0.02 | . | . |
| 16 | . | 0.07 | . | . |
| 17 | . | . | . | 0.13 |
| | 95.54 | 22.29 | 45.35 | 81.35 |

**Southern**

| Age | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| 0 | . | . | 0.28 | . |
| 1 | 5.16 | 13.78 | 69.64 | 4.66 |
| 2 | 28.63 | 96.39 | 36.24 | 7.84 |
| 3 | 14.65 | 34.81 | 31.07 | 2.97 |
| 4 | 3.66 | 3.00 | 24.54 | 2.57 |
| 5 | 3.27 | 2.51 | 21.20 | 2.19 |
| 6 | 1.01 | 1.44 | 27.47 | 1.24 |
| 7 | 0.40 | 0.56 | 13.14 | 1.16 |
| 8 | 0.30 | 0.26 | 5.04 | 0.76 |
| 9 | 0.22 | 0.10 | 1.39 | 0.16 |
| 10 | 0.12 | 0.24 | 1.16 | 0.03 |
| 11 | 0.06 | 0.17 | 0.30 | 0.01 |
| 12 | . | 0.11 | 0.12 | 0.01 |
| 13 | . | 0.03 | . | . |
| 14 | . | . | . | . |
| 15 | . | 0.03 | . | . |
| 16 | . | . | . | . |
| 17 | . | . | . | . |
| | 57.48 | 153.43 | 231.59 | 23.60 |

*Table 21. Number of gillnet set records by year and unit area from logbooks for vessels <35ft fishing the inshore of NAFO Divs. 2J3KL during 1998-2002 and 2006-2009. There was no directed fishery for cod during 2003-2005.*

| Unit area | 1998 | 1999 | 2000 | 2001 | 2002 | | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| **2J** | 0 | 0 | 0 | 0 | 0 | | 86 | 22 | 46 | 27 |
| **3Kd** | 485 | 585 | 118 | 73 | 16 | | 103 | 70 | 85 | 73 |
| **3Kh** | 2595 | 5577 | 1433 | 1092 | 582 | | 873 | 792 | 1225 | 705 |
| **3Ki** | 1571 | 5748 | 3732 | 3193 | 1288 | | 1079 | 641 | 808 | 818 |
| **3La** | 637 | 2593 | 2531 | 2602 | 2148 | | 722 | 482 | 557 | 487 |
| **3Lb** | 580 | 2342 | 2067 | 2218 | 1812 | | 906 | 602 | 706 | 590 |
| **3Lf** | 669 | 2004 | 1527 | 1428 | 864 | | 775 | 665 | 660 | 616 |
| **3Lj** | 330 | 1116 | 884 | 652 | 582 | | 609 | 560 | 533 | 357 |
| **3Lq** | 38 | 182 | 136 | 267 | 249 | | 5 | 15 | 2 | 1 |
| **Totals** | 6905 | 20147 | 12428 | 11525 | 7541 | | 5158 | 3849 | 4622 | 3674 |

*Table 22. Estimated proportions mature for female cod from NAFO Div. 2J+3KL from DFO autumn bottom trawl surveys from 1963 to 2009 projected forward to 2012 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 | 0.0011 | 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 | 0.0054 | 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 | 0.0255 | 0.0802 | 0.3797 | 0.8487 | 0.8985 | 0.9667 | 0.9999 | 1.0000 | 1.0000 | 0.9997 | 1.0000 | 1.0000 |
| 2004 | 0.0004 | 0.0003 | 0.0076 | 0.1125 | 0.4253 | 0.9279 | 0.9849 | 0.9778 | 0.9913 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 1.0000 |
| 2005 | 0.0008 | 0.0027 | 0.0044 | 0.0559 | 0.3800 | 0.8627 | 0.9963 | 0.9987 | 0.9955 | 0.9978 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 2006 | 0.0000 | 0.0044 | 0.0189 | 0.0722 | 0.3153 | 0.7478 | 0.9816 | 0.9998 | 0.9999 | 0.9991 | 0.9994 | 1.0000 | 1.0000 | 1.0000 |
| 2007 | 0.0004 | 0.0003 | 0.0225 | 0.1191 | 0.5757 | 0.7818 | 0.9348 | 0.9978 | 1.0000 | 1.0000 | 0.9998 | 0.9999 | 1.0000 | 1.0000 |
| 2008 | 0.0004 | 0.0025 | 0.0036 | 0.1072 | 0.4865 | 0.9594 | 0.9654 | 0.9858 | 0.9997 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 2009 | 0.0004 | 0.0025 | 0.0150 | 0.0354 | 0.3851 | 0.8692 | 0.9976 | 0.9954 | 0.9970 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 2010 | 0.0004 | 0.0025 | 0.0150 | 0.0872 | 0.2735 | 0.7656 | 0.9790 | 0.9999 | 0.9994 | 0.9994 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 2011 | 0.0004 | 0.0025 | 0.0150 | 0.0872 | 0.3817 | 0.7944 | 0.9446 | 0.9969 | 1.0000 | 0.9999 | 0.9999 | 1.0000 | 1.0000 | 1.0000 |
| 2012 | 0.0004 | 0.0025 | 0.0150 | 0.0872 | 0.3817 | 0.8097 | 0.9754 | 0.9889 | 0.9996 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

*Table 23. Mean length (cm) at age of cod sampled during autumn bottom-trawl surveys in divisions 2J, 3K and 3L in 1978-2009. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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** |
| 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** |
| 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 | | | |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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** |
| 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** |
| 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** |
| 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** | | |
| 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 | | | |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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** |
| 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** |
| 9 | 82.3 | 83.2 | 73.6 | | 72.7 | 73.2 | 75.3 | 69.6 | 74.9 | 75.2 | 71.4 | 77.4 | | |
| 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** | |
| 11 | **103.7** | 94.2 | 90.5 | | 86.8 | 81.5 | 88.0 | 88.9 | 87.7 | 82.6 | 74.5 | **73.7** | | |
| 12 | **119.2** | 110.1 | 85.0 | | 97.8 | 86.8 | 85.6 | 96.7 | 94.2 | 86.9 | 81.7 | **94.5** | | |

*Cont'd.*

*Table 23. Cont'd. (Mean length (cm) at age)*

**Division 2J**

| Age | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 22.1 | 20.9 |
| 2 | 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 | 27.9 | 29.4 |
| 3 | 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 | 35.8 | 37.2 |
| 4 | 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 | 45.0 | 44.2 |
| 5 | 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 | 43.8 | 52.5 |
| 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 | 59.2 | **57.7** |
| 7 | | **69.0** | | **51.0** | | | **57.0** | | | | **66.0** | | **62.0** | **59.4** | **59.0** |
| 8 | | | | | **79.0** | | | | | | | **74.0** | | | |
| 9 | | | | | | | | | | | | | | **67.0** | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

**Division 3K**

| Age | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 20.8 | 19.7 |
| 2 | 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 | 27.9 | 28.4 |
| 3 | 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 | 37.5 | 37.7 |
| 4 | 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 | 46.4 | 45.5 |
| 5 | 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 | 55.2 | 52.8 |
| 6 | **53.8** | **56.0** | | 57.9 | **55.8** | 61.0 | **55.4** | **56.7** | | 57.4 | 60.4 | 56.2 | 61.2 | 64.0 | 59.9 |
| 7 | | **69.0** | | 62.6 | **72.9** | | | **57.0** | | **60.5** | | **71.1** | 66.9 | 67.8 | 68.0 |
| 8 | | | **68.0** | **83.0** | | | **73.0** | | | **81.0** | | **65.6** | **74.0** | 66.7 | 75.9 |
| 9 | **68.0** | | | **80.0** | **81.0** | | **74.0** | | | | | | **90.0** | 71.3 | **73.2** |
| 10 | | | | | **89.0** | | | | | **58.0** | | | **80.0** | | **82.0** |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | **102.0** | |

**Division 3K**

| Age | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 19.2 | 19.5 |
| 2 | 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 | 29.4 | 28.8 |
| 3 | 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 | 36.9 | 39.0 |
| 4 | 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 | 46.6 | 43.5 |
| 5 | 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 | 53.9 | 50.3 |
| 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 | 62.1 | 58.4 |
| 7 | **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 | 67.6 | 64.8 |
| 8 | **74.0** | **70.0** | 72.8 | **75.8** | **72.9** | **77.9** | **67.9** | | | **57.0** | **65.7** | **63.0** | **78.1** | 67.8 | 73.9 |
| 9 | | **66.0** | **74.0** | **79.0** | **86.3** | **81.0** | **75.1** | | **71.0** | **69.0** | | **87.7** | **93.6** | | **77.0** |
| 10 | | | | | **90.7** | | | | | **82.0** | | **81.5** | **90.0** | 64.5 | |
| 11 | | | | **77.0** | **79.0** | | **91.0** | | **89.0** | | | | | **75.8** | **104.0** |
| 12 | | | | | **100.0** | | **101.0** | **97.0** | | | | **75.0** | **100.0** | **103.3** | **105.0** |

*Table 24. Mean weight (kg) at age of cod sampled during autumn bottom-trawl surveys in Divisions 2J, 3K and 3L in 1978-2009. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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** |
| 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** |
| 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 | | | |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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** |
| 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** |
| 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** |
| 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** | | |
| 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 | | | |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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** |
| 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** |
| 9 | | | | 6.01 | 6.16 | 4.18 | | 3.90 | 4.42 | 3.84 | 3.08 | 3.95 | 4.38 | 3.79 | 4.85 | | |
| 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** | |
| 11 | | | | **11.67** | 7.84 | 8.70 | | 5.69 | 4.64 | 7.43 | 7.25 | 7.53 | 6.07 | 4.81 | **4.53** | | |
| 12 | | | | **17.44** | **11.31** | **8.75** | | 11.49 | 10.88 | 6.08 | 9.48 | **10.20** | 7.29 | 6.06 | **8.81** | | |

*Cont'd.*

*Table 24. Cont'd. (Mean weight (kg) at age)*

Division 2J

| Age | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.09 | 0.074 |
| 2 | 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 | 0.20 | 0.225 |
| 3 | 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 | 0.41 | 0.451 |
| 4 | 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 | 0.85 | 0.792 |
| 5 | 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 | 0.93 | 1.293 |
| 6 | **1.78** | **2.19** | | **1.46** | **3.21** | **2.46** | **1.49** | **0.58** | **2.16** | 1.82 | **1.32** | 1.85 | 1.85 | 1.89 | **1.653** |
| 7 | | **2.15** | | **1.53** | | | **1.64** | | | | **2.67** | | **2.54** | **1.94** | **1.88** |
| 8 | | | | | **5.18** | | | | | | | **3.82** | | | |
| 9 | | | | | | | | | | | | | | **2.40** | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

Division 3K

| Age | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.07 | 0.06 |
| 2 | 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 | 0.21 | 0.20 |
| 3 | 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 | 0.48 | 0.48 |
| 4 | 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 | 1.01 | 0.85 |
| 5 | 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 | 1.68 | 1.32 |
| 6 | **1.50** | **1.64** | | 1.94 | **1.56** | **2.09** | **1.77** | **1.52** | | 1.91 | 2.32 | 1.78 | 2.41 | 2.64 | 1.93 |
| 7 | | **3.24** | | 2.61 | **3.74** | | | **1.71** | | **2.55** | | **3.40** | 3.11 | 3.24 | 2.91 |
| 8 | | | **2.61** | **6.32** | | | **3.45** | | | **4.57** | | **2.84** | **4.21** | 3.02 | 4.17 |
| 9 | **3.28** | | | **5.31** | **6.13** | | **3.71** | | | | | | **7.65** | 4.05 | **3.84** |
| 10 | | | | | **7.27** | | | | | **2.00** | | | **5.57** | | **5.60** |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | **12.15** | |

Division 3L

| Age | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.066 | 0.06 |
| 2 | 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 | 0.244 | 0.214 |
| 3 | 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 | 0.48 | 0.533 |
| 4 | 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 | 0.99 | 0.808 |
| 5 | 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 | 1.55 | 1.164 |
| 6 | 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 | 2.321 | 1.821 |
| 7 | **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 | 3.015 | 2.61 |
| 8 | **4.20** | **5.04** | 4.54 | **4.70** | **3.90** | **4.84** | **3.43** | | | **1.67** | **2.83** | **2.67** | 4.89 | 3.443 | 4.127 |
| 9 | | **3.20** | | 4.96 | **6.63** | **5.43** | **3.88** | | **3.64** | **3.87** | | **6.95** | **8.45** | 2.794 | **4.22** |
| 10 | | | | | **8.28** | | | | | **5.81** | | **6.06** | **8.07** | | |
| 11 | | | | **5.25** | **5.63** | | 8.26 | | **7.70** | | | | | **4.41** | **14.81** |
| 12 | | | | | **10.05** | | **12.80** | **9.95** | | | | **4.90** | **10.90** | **11.31** | **14.14** |

*Table 25. Mean gutted condition index at length classes 28 cm, 37 cm and 49 cm of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. Highlighted entries are based on fewer than 5 aged fish. There were no surveys in Division 3L in 1978-80 and 1984.*

Division 2J

| Lengthclass | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28** | **0.741** | **0.713** | 0.767 | 0.774 | 0.761 | 0.725 | 0.712 | 0.711 | 0.751 | **0.747** | 0.742 | 0.754 | 0.722 | 0.717 | 0.684 | 0.757 | **0.745** |
| **37** | 0.695 | 0.737 | 0.777 | 0.776 | 0.765 | 0.762 | 0.746 | 0.764 | 0.803 | **0.862** | 0.805 | 0.756 | 0.740 | 0.743 | 0.711 | 0.771 | 0.787 |
| **49** | 0.782 | 0.763 | 0.791 | 0.826 | 0.763 | 0.819 | 0.785 | 0.763 | 0.819 | 0.818 | 0.801 | 0.790 | 0.765 | 0.709 | 0.709 | 0.740 | **0.726** |

Division 3K

| Lengthclass | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28** | **0.676** | **0.668** | 0.691 | 0.792 | 0.718 | **0.733** | 0.738 | 0.754 | 0.715 | 0.774 | 0.755 | 0.719 | 0.711 | 0.735 | 0.749 | 0.733 | 0.740 |
| **37** | 0.723 | 0.748 | 0.766 | 0.770 | 0.752 | **0.758** | 0.730 | 0.736 | 0.759 | 0.755 | 0.803 | 0.765 | 0.721 | 0.728 | 0.681 | 0.727 | 0.759 |
| **49** | 0.728 | **0.766** | 0.738 | 0.772 | 0.816 | **0.793** | 0.724 | 0.770 | 0.796 | 0.777 | 0.803 | 0.773 | 0.732 | 0.733 | 0.717 | 0.711 | 0.750 |

Division 3L

| Lengthclass | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28** | | | | **0.752** | **0.670** | 0.751 | | 0.700 | **0.732** | 0.720 | 0.698 | 0.722 | 0.737 | 0.729 | 0.749 | 0.718 | **0.773** |
| **37** | | | | 0.795 | 0.815 | 0.712 | | 0.722 | 0.729 | 0.751 | 0.759 | 0.781 | 0.742 | 0.761 | 0.798 | 0.739 | 0.756 |
| **49** | | | | 0.797 | | **0.752** | | 0.742 | 0.769 | 0.767 | 0.774 | 0.790 | 0.738 | **0.744** | 0.800 | 0.741 | 0.734 |

Division 2J

| Lengthclass | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28** | 0.745 | 0.737 | 0.733 | **0.721** | 0.728 | 0.741 | 0.725 | 0.757 | **0.733** | 0.752 | 0.750 | 0.749 | 0.766 | 0.732 | 0.745 |
| **37** | 0.775 | 0.760 | 0.762 | 0.794 | 0.764 | 0.741 | 0.750 | 0.754 | 0.732 | 0.786 | 0.752 | 0.775 | 0.761 | 0.777 | 0.758 |
| **49** | **0.785** | 0.807 | 0.740 | 0.762 | 0.777 | 0.750 | **0.767** | 0.751 | 0.763 | 0.762 | 0.757 | 0.723 | 0.731 | 0.754 | 0.760 |

Division 3K

| Lengthclass | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28** | 0.757 | 0.730 | 0.746 | 0.728 | 0.746 | 0.742 | 0.734 | 0.745 | 0.746 | 0.763 | 0.740 | 0.739 | 0.74 | 0.762 | 0.730 |
| **37** | 0.760 | 0.760 | 0.763 | 0.766 | 0.760 | 0.740 | 0.730 | 0.753 | 0.739 | 0.784 | 0.768 | 0.746 | 0.781 | 0.807 | 0.763 |
| **49** | 0.739 | 0.756 | 0.712 | 0.749 | 0.763 | 0.719 | 0.738 | 0.752 | 0.727 | 0.786 | 0.792 | 0.769 | 0.806 | 0.834 | 0.750 |

Division 3L

| Lengthclass | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28** | 0.763 | 0.764 | **0.827** | 0.766 | 0.724 | 0.703 | 0.741 | 0.736 | 0.741 | 0.767 | 0.680 | 0.751 | 0.719 | 0.773 | 0.714 |
| **37** | 0.735 | 0.730 | 0.763 | 0.738 | 0.795 | 0.751 | 0.769 | 0.750 | 0.754 | 0.766 | 0.759 | 0.741 | 0.739 | 0.802 | 0.761 |
| **49** | 0.774 | 0.759 | 0.767 | 0.777 | 0.772 | 0.770 | 0.755 | 0.776 | 0.742 | **0.832** | 0.789 | 0.798 | 0.788 | 0.803 | 0.753 |

*Table 26. Mean liver index at length classes 28 cm, 37 cm and 49 cm of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. Highlighted entries are based on fewer than 5 aged fish. There were no surveys in Division 3L in 1978-80 and 1984.*

| | Division 2J | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lengthclass** | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| **28** | | **0.028** | 0.036 | 0.046 | 0.033 | 0.031 | 0.035 | 0.025 | 0.038 | **0.021** | 0.028 | 0.039 | 0.042 | 0.038 | 0.024 | 0.042 | **0.031** |
| **37** | | 0.053 | 0.047 | 0.039 | 0.044 | 0.065 | 0.046 | 0.048 | 0.072 | **0.063** | 0.049 | 0.056 | 0.051 | 0.048 | 0.036 | 0.038 | 0.046 |
| **49** | | 0.066 | 0.058 | 0.065 | 0.049 | 0.064 | 0.066 | 0.054 | 0.083 | 0.071 | 0.073 | 0.069 | 0.064 | 0.035 | 0.030 | 0.039 | **0.036** |
| | Division 3K | | | | | | | | | | | | | | | | |
| **Lengthclass** | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| **28** | **0.024** | **0.024** | 0.014 | 0.034 | 0.017 | **0.022** | 0.014 | 0.028 | 0.027 | 0.029 | 0.031 | 0.035 | 0.035 | 0.037 | 0.032 | 0.041 | 0.034 |
| **37** | 0.019 | 0.026 | 0.042 | 0.035 | 0.027 | **0.047** | 0.034 | 0.048 | 0.044 | 0.046 | 0.039 | 0.045 | 0.046 | 0.048 | 0.037 | 0.041 | 0.042 |
| **49** | 0.029 | **0.052** | 0.035 | 0.051 | 0.049 | **0.064** | 0.044 | 0.051 | 0.075 | 0.058 | 0.062 | 0.067 | 0.058 | 0.052 | 0.056 | 0.049 | 0.059 |
| | Division 3L | | | | | | | | | | | | | | | | |
| **Lengthclass** | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| **28** | | | | 0.027 | **0.011** | 0.030 | | 0.017 | **0.027** | 0.028 | 0.020 | 0.026 | 0.035 | 0.045 | 0.043 | 0.042 | **0.037** |
| **37** | | | | 0.042 | 0.027 | 0.020 | | 0.037 | 0.032 | 0.035 | 0.033 | 0.039 | 0.038 | 0.062 | 0.067 | 0.050 | 0.051 |
| **49** | | | | 0.042 | | **0.023** | | 0.043 | 0.045 | 0.042 | 0.045 | 0.042 | 0.037 | 0.055 | 0.073 | 0.061 | 0.055 |

| | Division 2J | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lengthclass** | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| **28** | 0.040 | 0.036 | 0.035 | **0.037** | 0.045 | 0.033 | 0.045 | 0.045 | **0.042** | 0.045 | 0.036 | 0.039 | 0.043 | 0.036 | 0.034 |
| **37** | 0.043 | 0.043 | 0.046 | 0.046 | 0.051 | 0.036 | 0.043 | 0.040 | 0.038 | 0.053 | 0.042 | 0.051 | 0.046 | 0.044 | 0.038 |
| **49** | **0.051** | 0.042 | 0.043 | 0.062 | 0.054 | 0.043 | **0.033** | 0.046 | 0.041 | 0.046 | 0.047 | 0.040 | 0.039 | 0.039 | 0.032 |
| | Division 3K | | | | | | | | | | | | | | |
| **Lengthclass** | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| **28** | 0.048 | 0.039 | 0.044 | 0.034 | 0.045 | 0.035 | 0.041 | 0.048 | 0.042 | 0.049 | 0.039 | 0.040 | 0.035 | 0.042 | 0.032 |
| **37** | 0.045 | 0.048 | 0.042 | 0.055 | 0.052 | 0.042 | 0.042 | 0.049 | 0.040 | 0.053 | 0.046 | 0.054 | 0.048 | 0.044 | 0.039 |
| **49** | 0.054 | 0.045 | 0.040 | 0.045 | 0.055 | 0.041 | 0.042 | 0.047 | 0.044 | 0.048 | 0.053 | 0.054 | 0.059 | 0.055 | 0.042 |
| | Division 3L | | | | | | | | | | | | | | |
| **Lengthclass** | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| **28** | 0.037 | 0.039 | **0.052** | 0.040 | 0.040 | 0.039 | 0.043 | 0.052 | 0.044 | 0.050 | 0.036 | 0.045 | 0.040 | 0.047 | 0.036 |
| **37** | 0.045 | 0.039 | 0.063 | 0.034 | 0.055 | 0.044 | 0.048 | 0.050 | 0.045 | 0.052 | 0.045 | 0.044 | 0.044 | 0.051 | 0.049 |
| **49** | 0.060 | 0.045 | 0.038 | 0.056 | 0.046 | 0.046 | 0.049 | 0.060 | 0.045 | **0.058** | 0.054 | 0.054 | 0.062 | 0.049 | 0.040 |

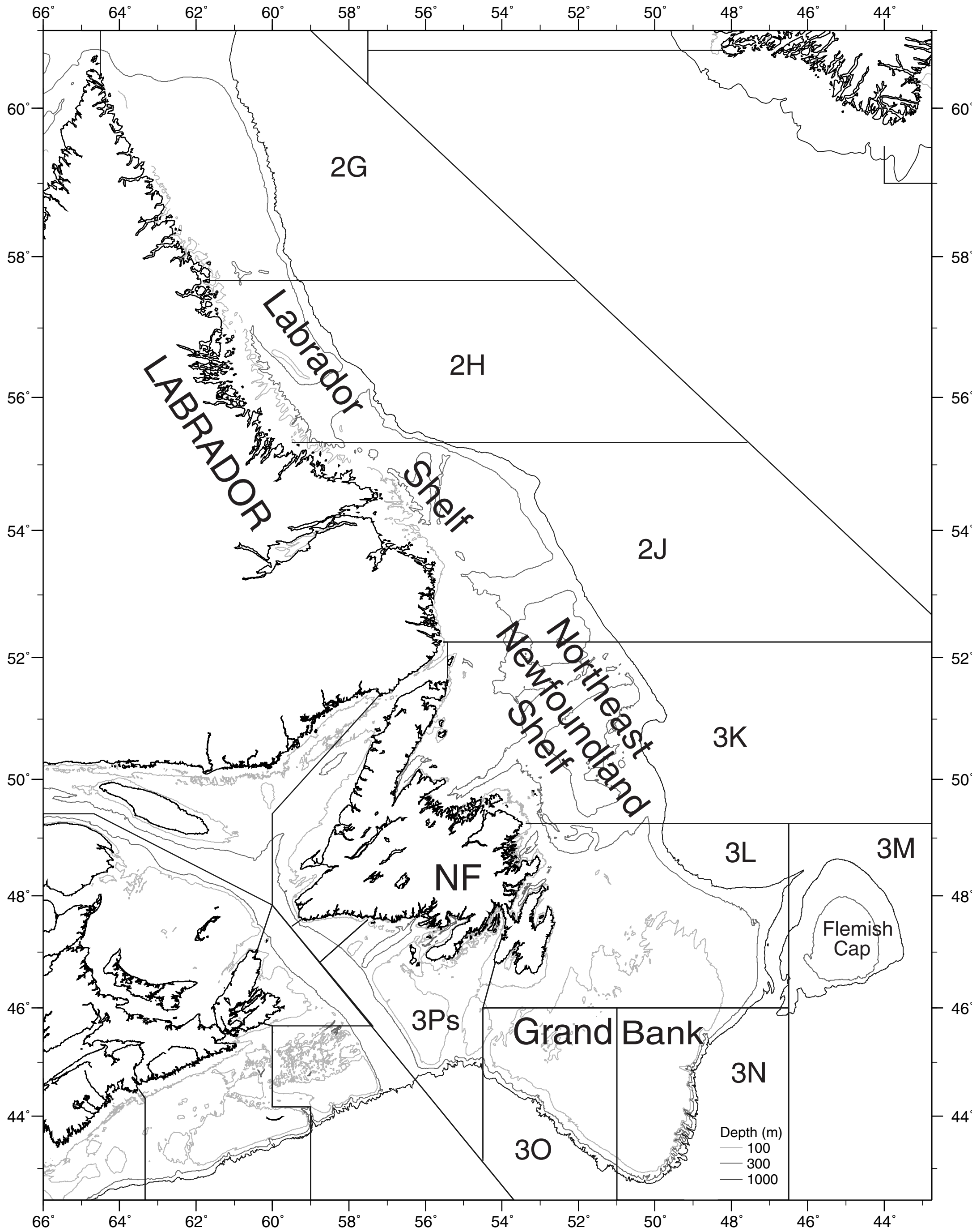



*Figure 1a. Major geographic features and NAFO Division and Subdivision boundaries around Newfoundland and Labrador.*

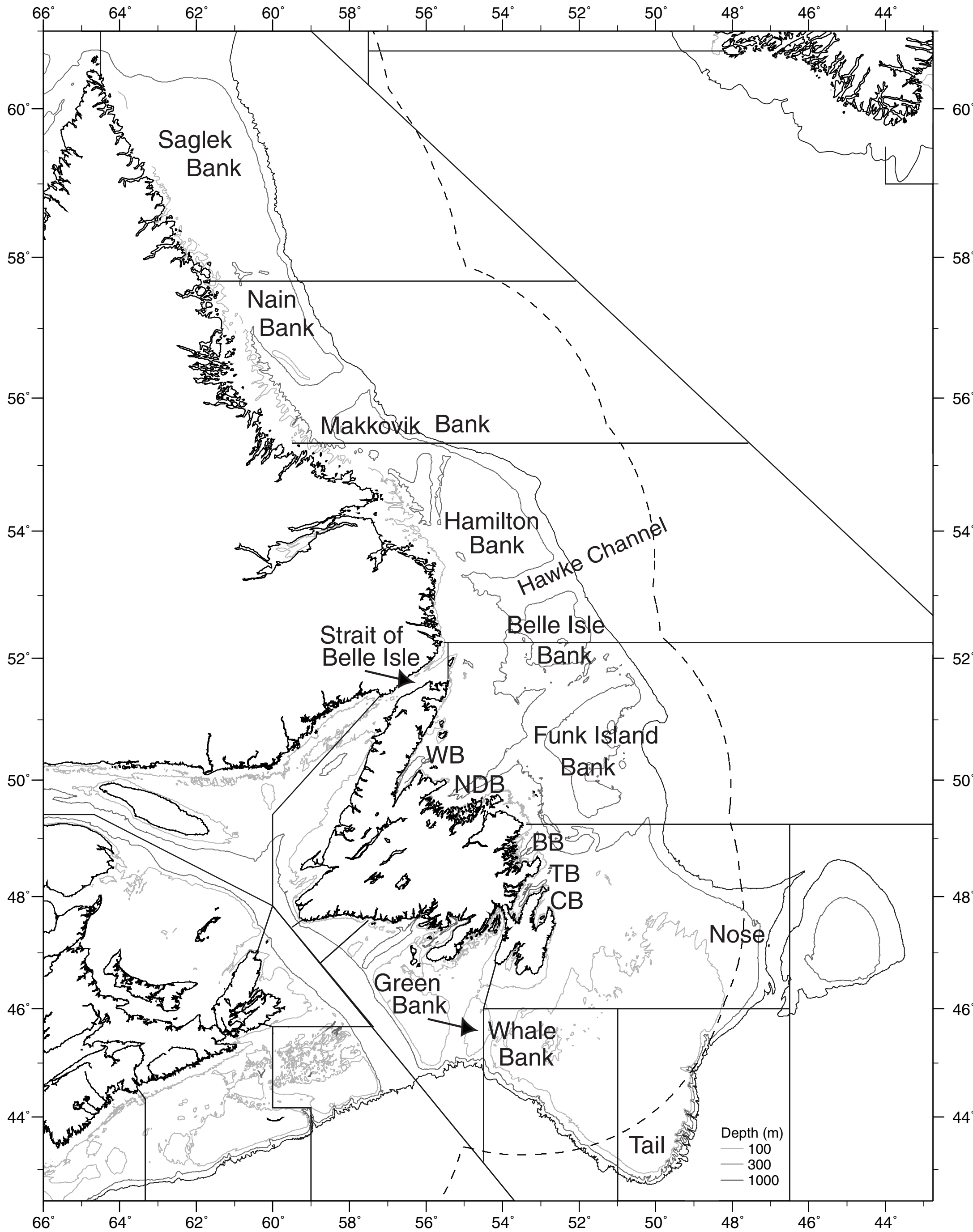



*Figure 1b. Bathymetry, fishing banks, and major bays around eastern Newfoundland and Labrador. The dashed line is Canada's 200 nautical mile limit. WB=White Bay, NDB=Notre Dame Bay, BB=Bonavista Bay, TB=Trinity Bay, and CB=Conception Bay.*

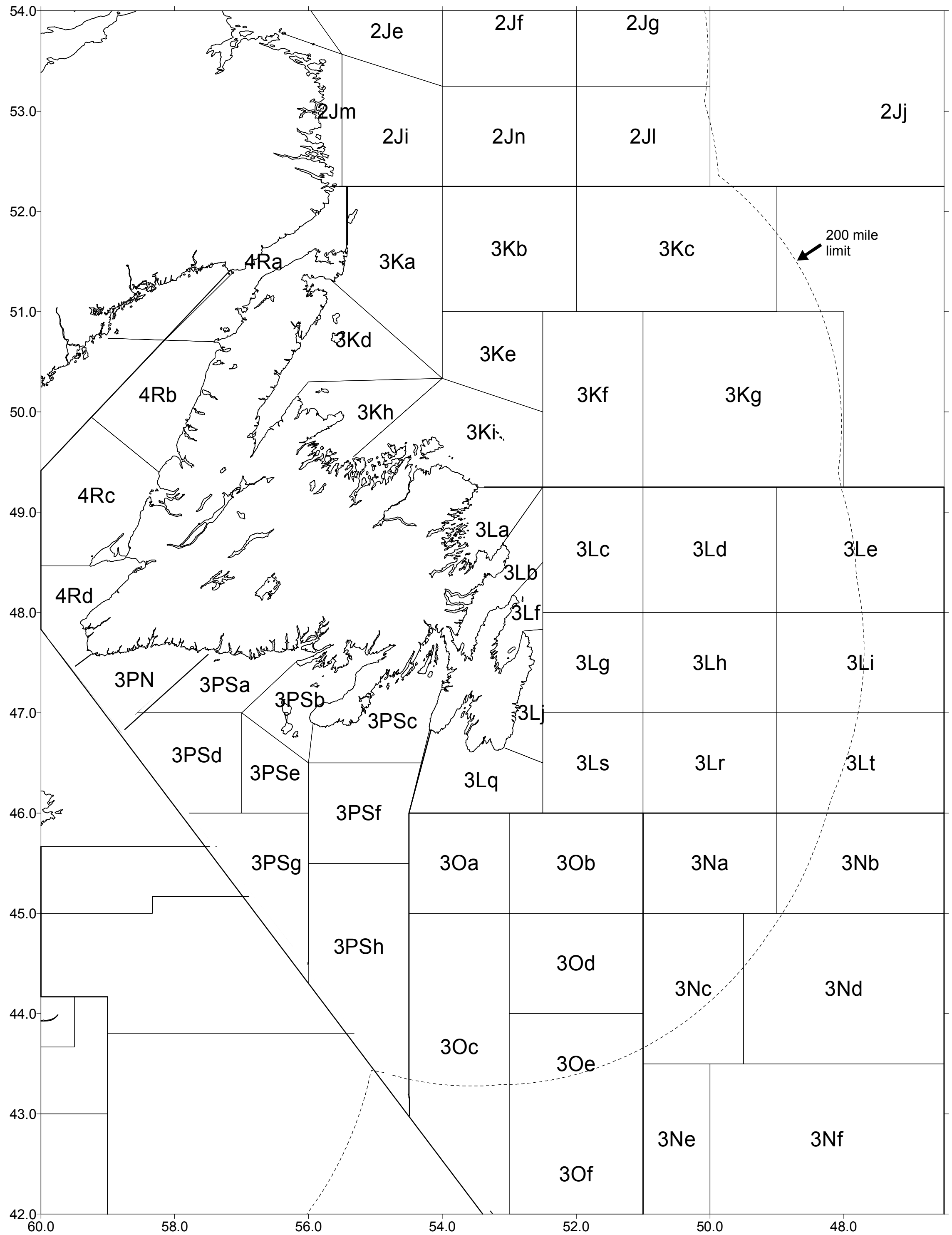



*Figure 1c. Boundaries of commercial fishery statistical unit areas and Canada's 200 nautical mile limit (dotted line).*

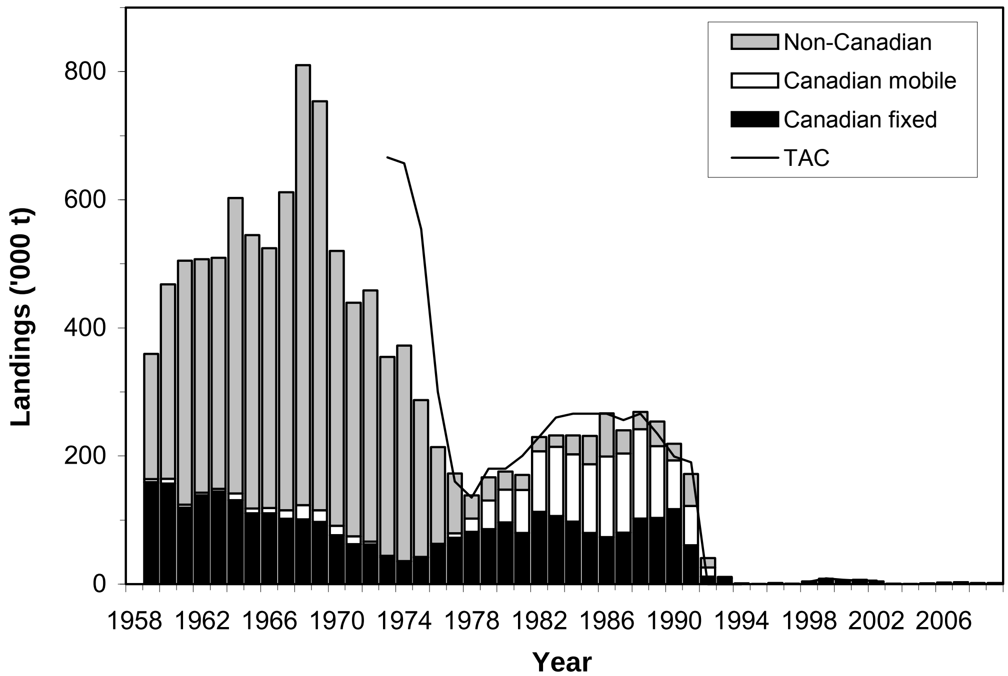



*Figure 2. Total allowable catches (TACs) and reported landings (thousands of tons) of cod from 2J3KL by non-Canadian fleets and Canadian mobile gear (offshore) and Canadian fixed gear (mainly inshore).*

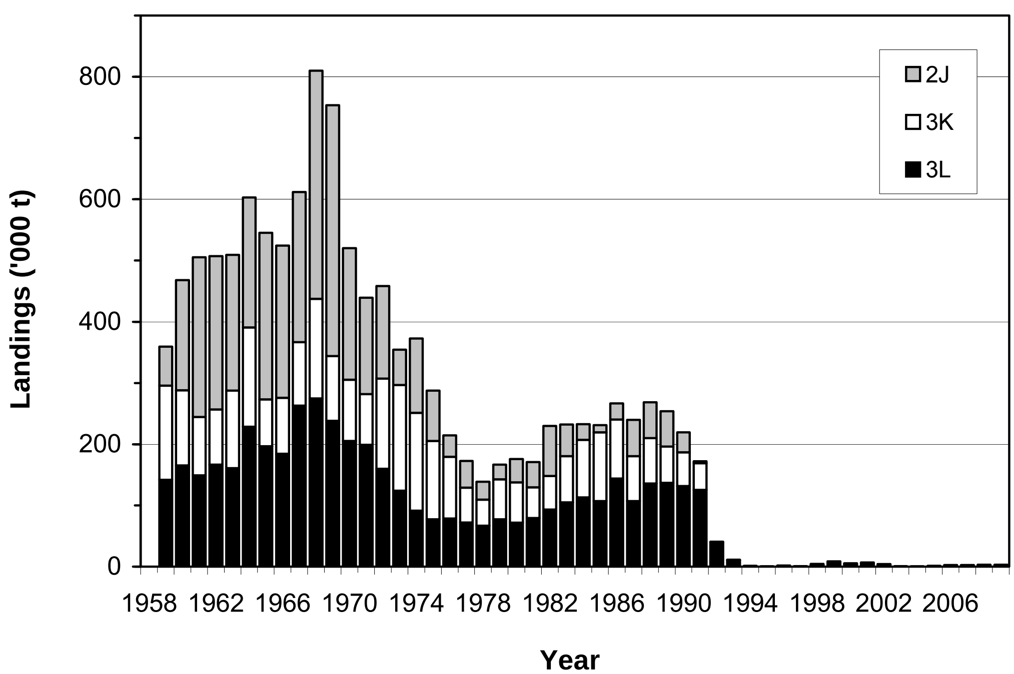



*Figure 3. Reported landings of cod (thousands of tons) from 2J3KL by NAFO Division.*

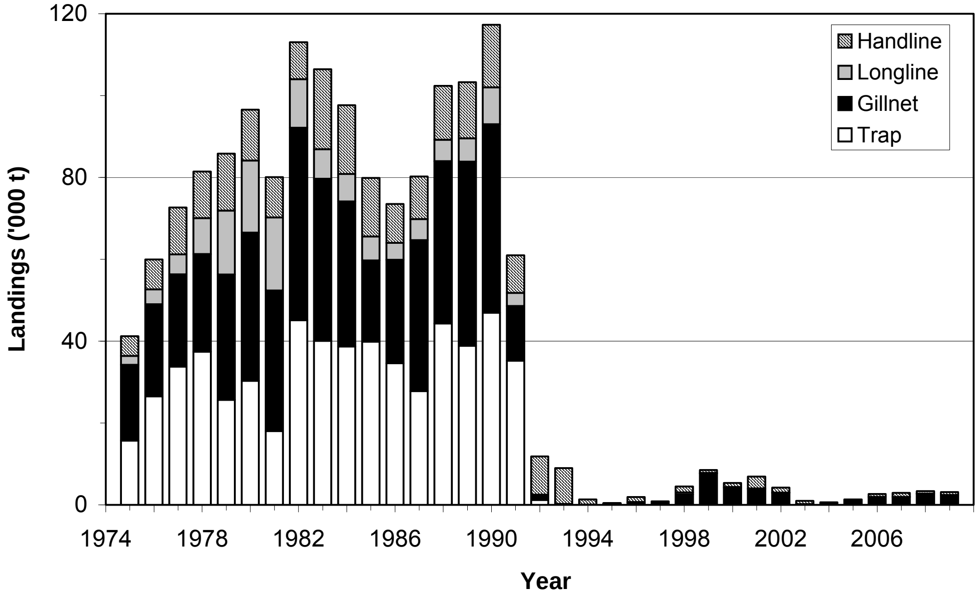



*Figure 4. Reported fixed gear landings (000s t) of cod from 2J3KL by gear type.*

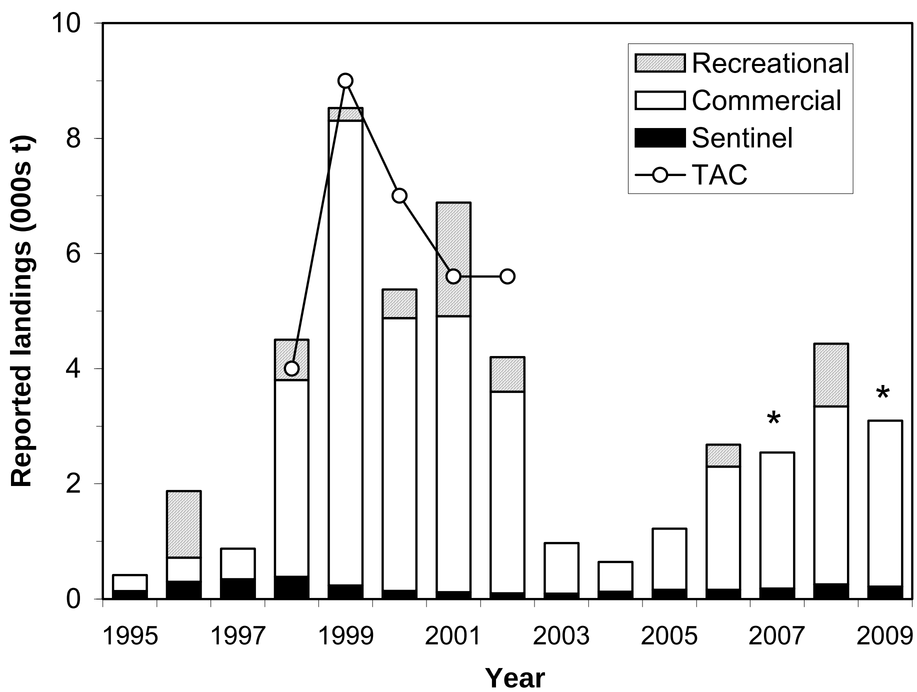
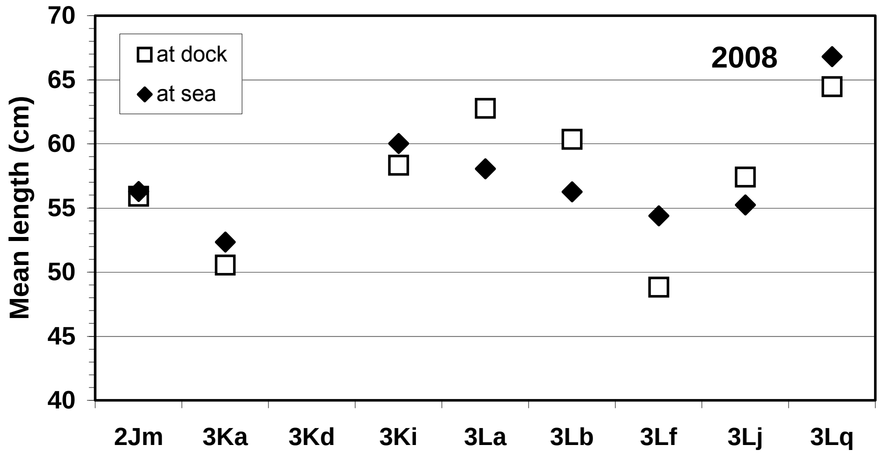
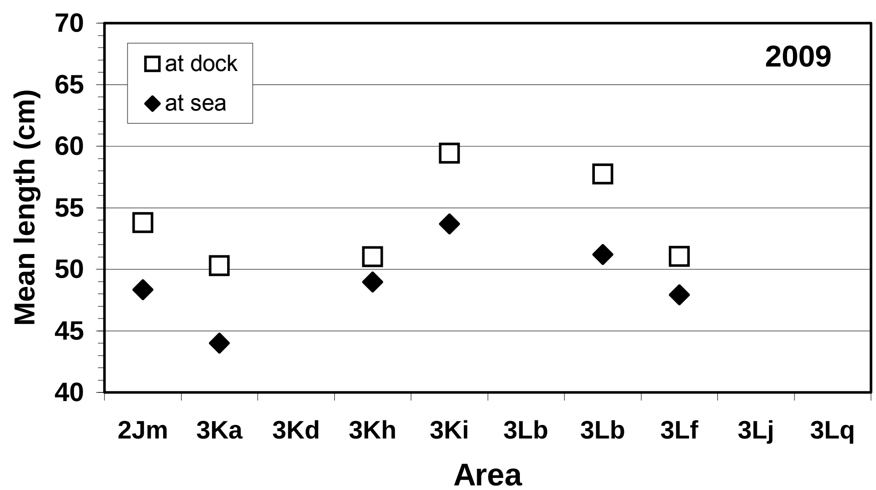



*Figure 5. Total allowable catches (TACs) and reported inshore fixed-gear landings (thousands of tons) of cod from 2J3KL for the inshore fishery (1995-2009). Most of the landings in 2003 came from a mass mortality of cod in Smith Sound, Trinity Bay in April. The asterisks indicates that the 2007 and 2009 values exclude the recreational catch which has not been determined.*




| Number of fish measured | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Area | 2Jm | 3Ka | 3Kd | 3Kh | 3Ki | 3La | 3Lb | 3Lf | 3Lj | 3Lq |
| dock | 10 | 41 | . | . | 328 | 907 | 594 | 338 | 399 | 64 |
| sea | 47 | 44 | . | . | 344 | 127 | 742 | 583 | 324 | 109 |




| Number of fish measured | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Area | 2Jm | 3Ka | 3Kd | 3Kh | 3Ki | 3La | 3Lb | 3Lf | 3Lj | 3Lq |
| dock | 10 | 68 | . | 166 | 649 | . | 604 | 235 | . | . |
| sea | 41 | 214 | . | 842 | 852 | . | 156 | 135 | . | . |

*Figure 6. Comparison of mean lengths (cm) by unit area for cod measured at sea and at the dock by fisheries officers during the recreational fishery for cod in 2J3KL during 2008 and 2009.*

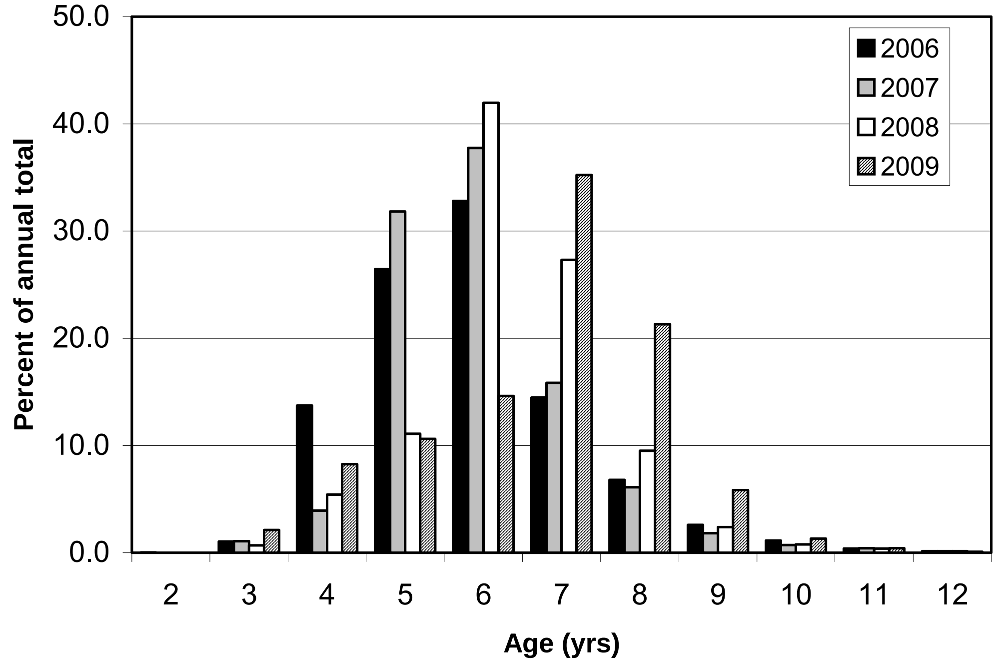



*Figure 7. Comparison of the catch at age (ages 2-12, in percents) of cod in 2J3KL during 2006-09.*

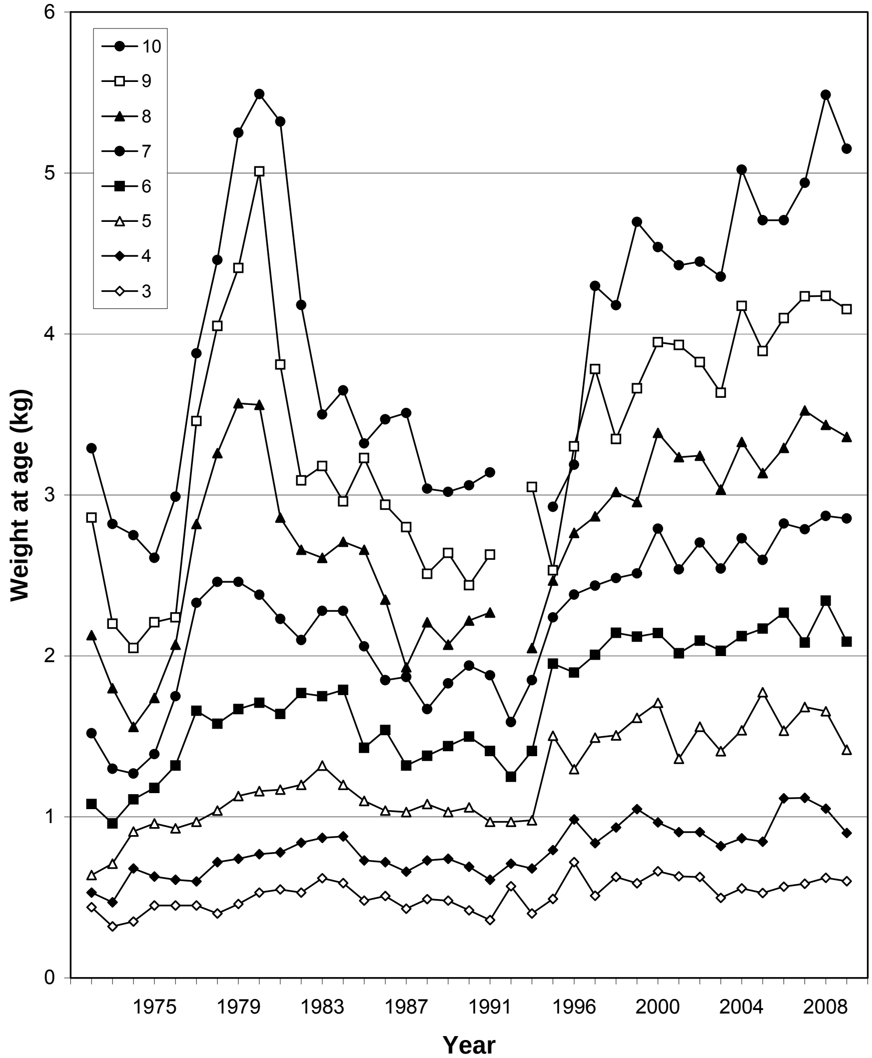



*Figure 8. Mean weights-at-age of cod from 2J3KL calculated from mean lengths-at-age in the catch from 1972 onwards. Values for 8 and 9 yr olds in 1993 were anomalous and are omitted. Landings prior to the 1993 moratorium were mostly from otter trawling offshore early in the year; since the moratorium most of the catch has come from fixed gear inshore in the second half of the year.*

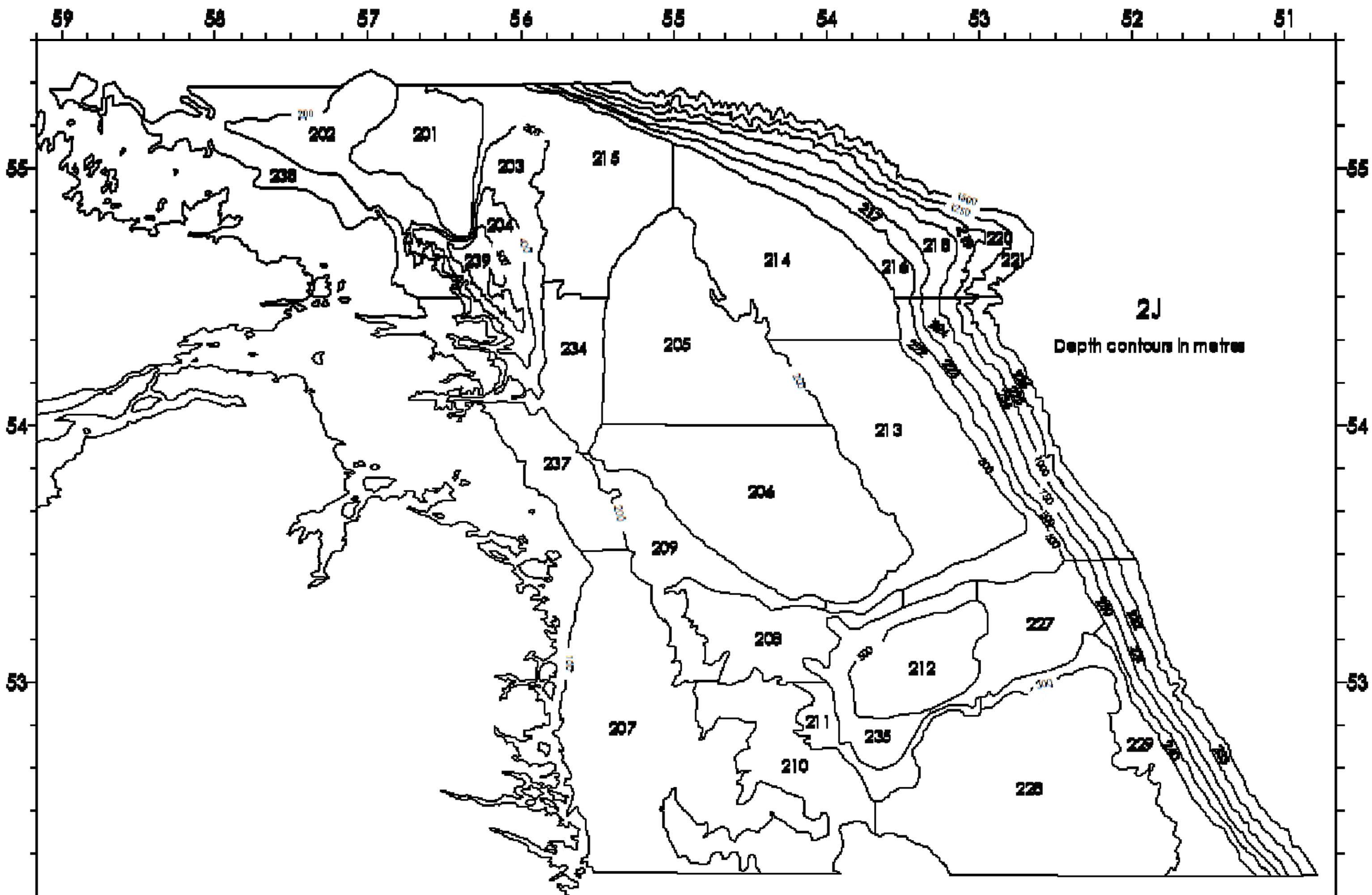



*Figure 9. Boundaries of strata used in research bottom-trawl surveys in NAFO Division 2J.*

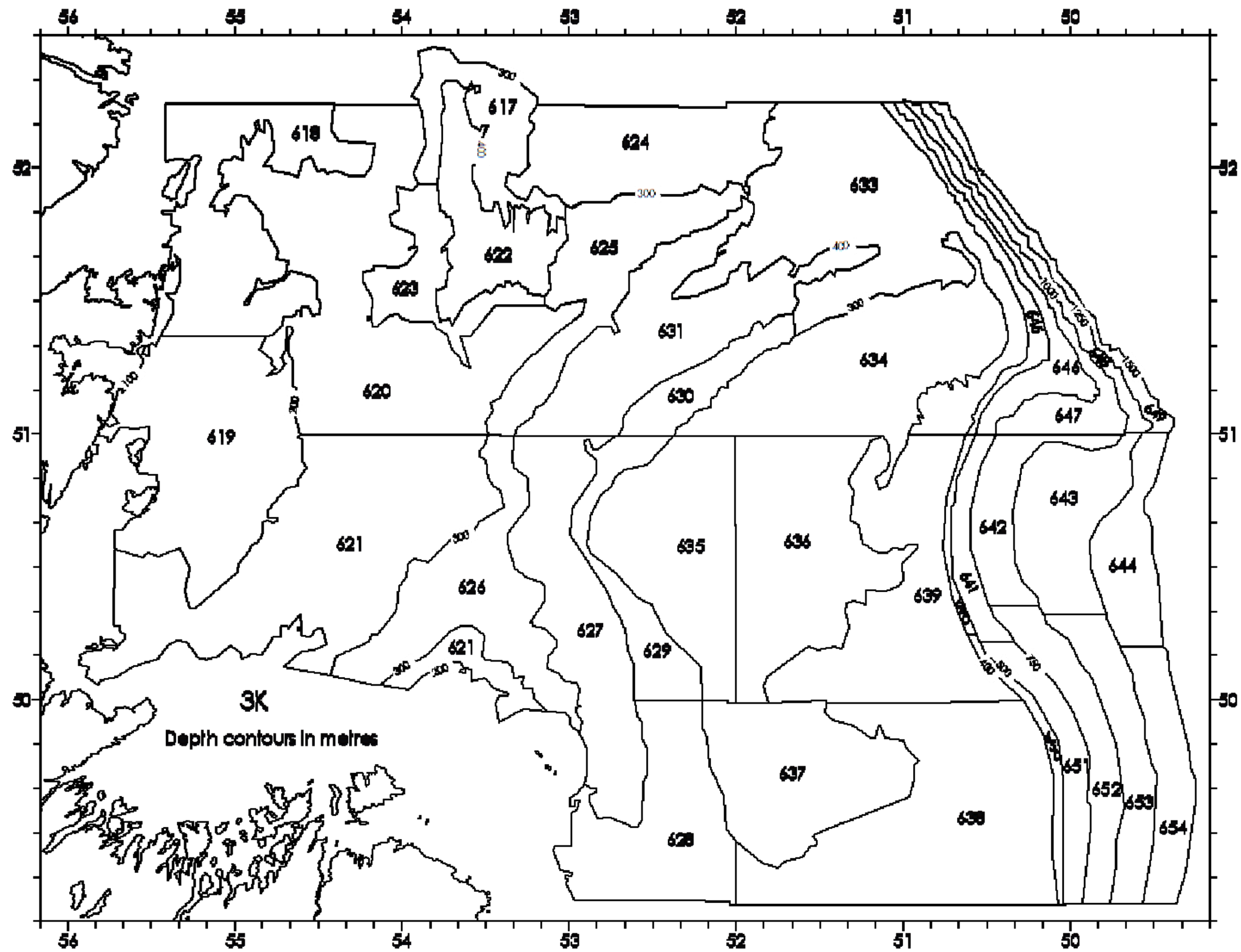



*Figure 10. Boundaries of strata used in research bottom-trawl surveys in NAFO Division 3K.*

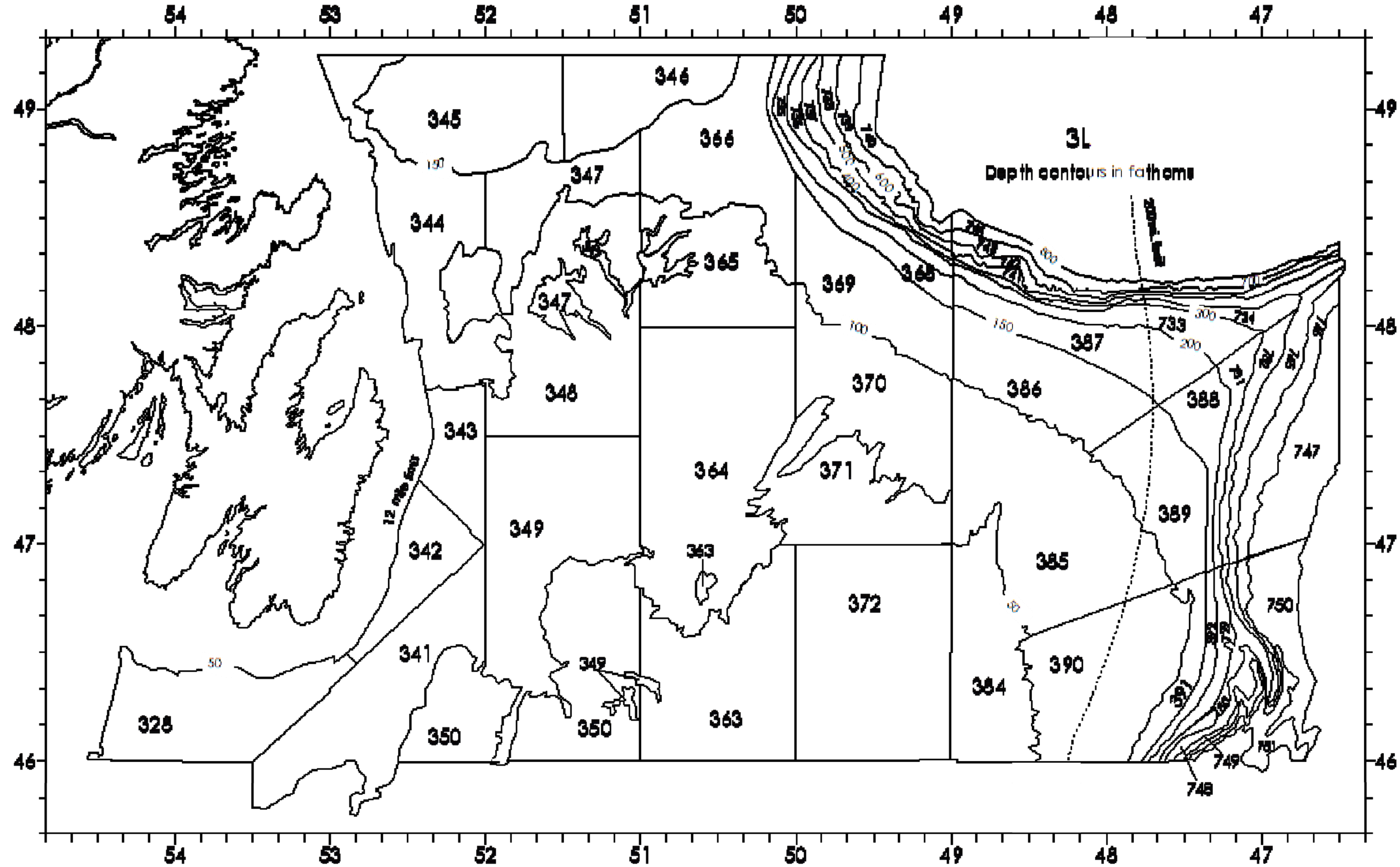



*Figure 11. Boundaries of strata used in research bottom-trawl surveys in NAFO Division 3L.*

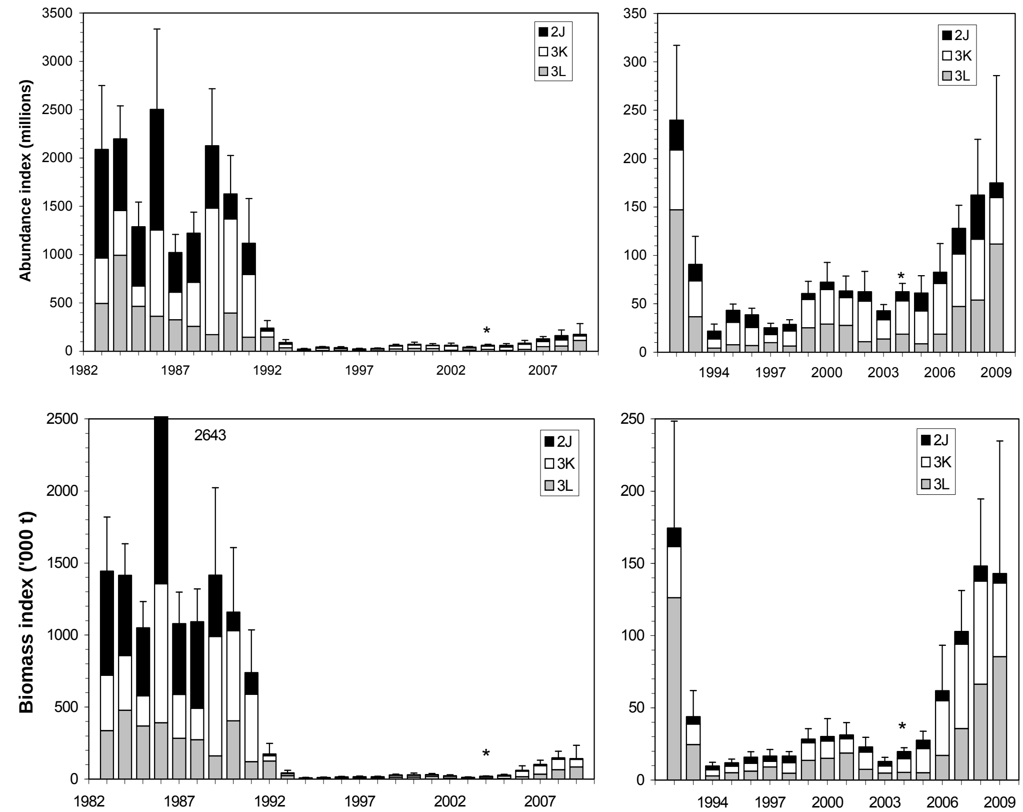



*Figure 12. Trends in offshore indices of abundance +2SE's (upper panels) and biomass +2SE's (lower panels) of cod in NAFO Divs 2J3KL from autumn bottom trawl surveys. The right panels are expanded to show trends from 1992 onwards. Asterisks indicate partial estimates from incomplete survey coverage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

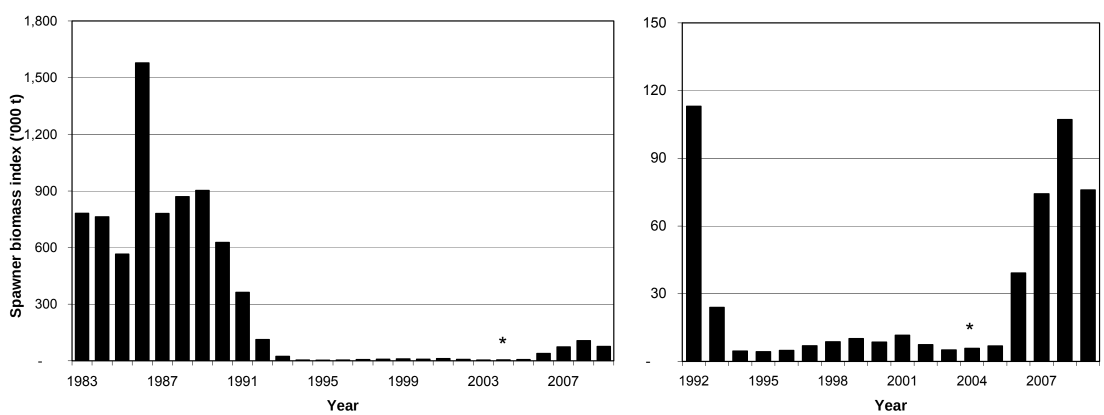



*Figure 13. Trends in offshore spawner biomass index for cod in NAFO Divs 2J3KL from autumn bottom trawl surveys. The right panels are expanded to show trends from 1992 onwards. Asterisks indicate partial estimates from incomplete survey coverage in 3L in 2004.*

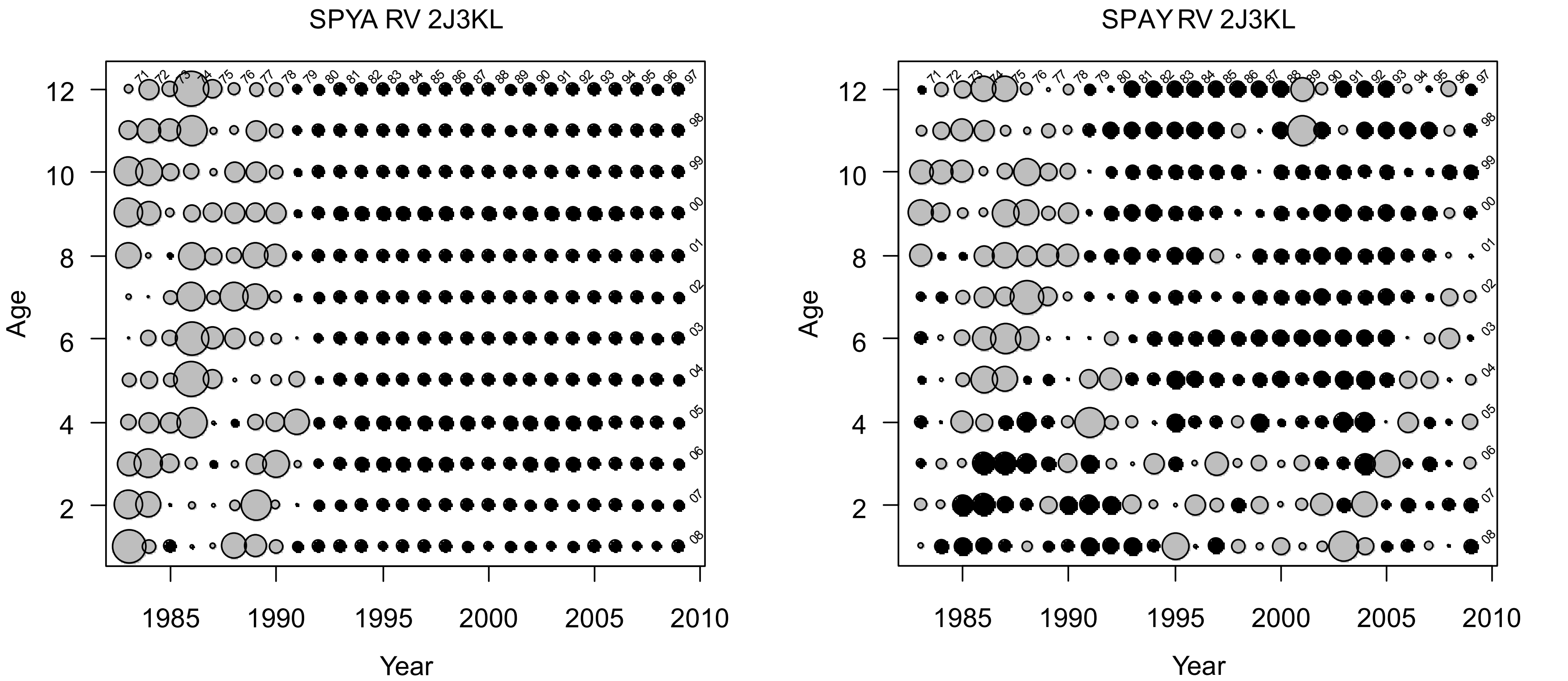



*Figure 14. Standardized age-disaggregated catch rates from the autumn bottom trawl survey of 2J3KL. Catch rates (mean nos per tow) were converted to proportions within an age (left panel) or within a year (right panel). Values were standardized by subtracting the mean proportion and dividing by the standard deviation of the proportions computed across years. Symbol sizes are scaled and values greater than average are shown as grey circles, average values are shown as small dots, and less than average values are shown as black circles. Cohorts are labeled down the diagonal.*

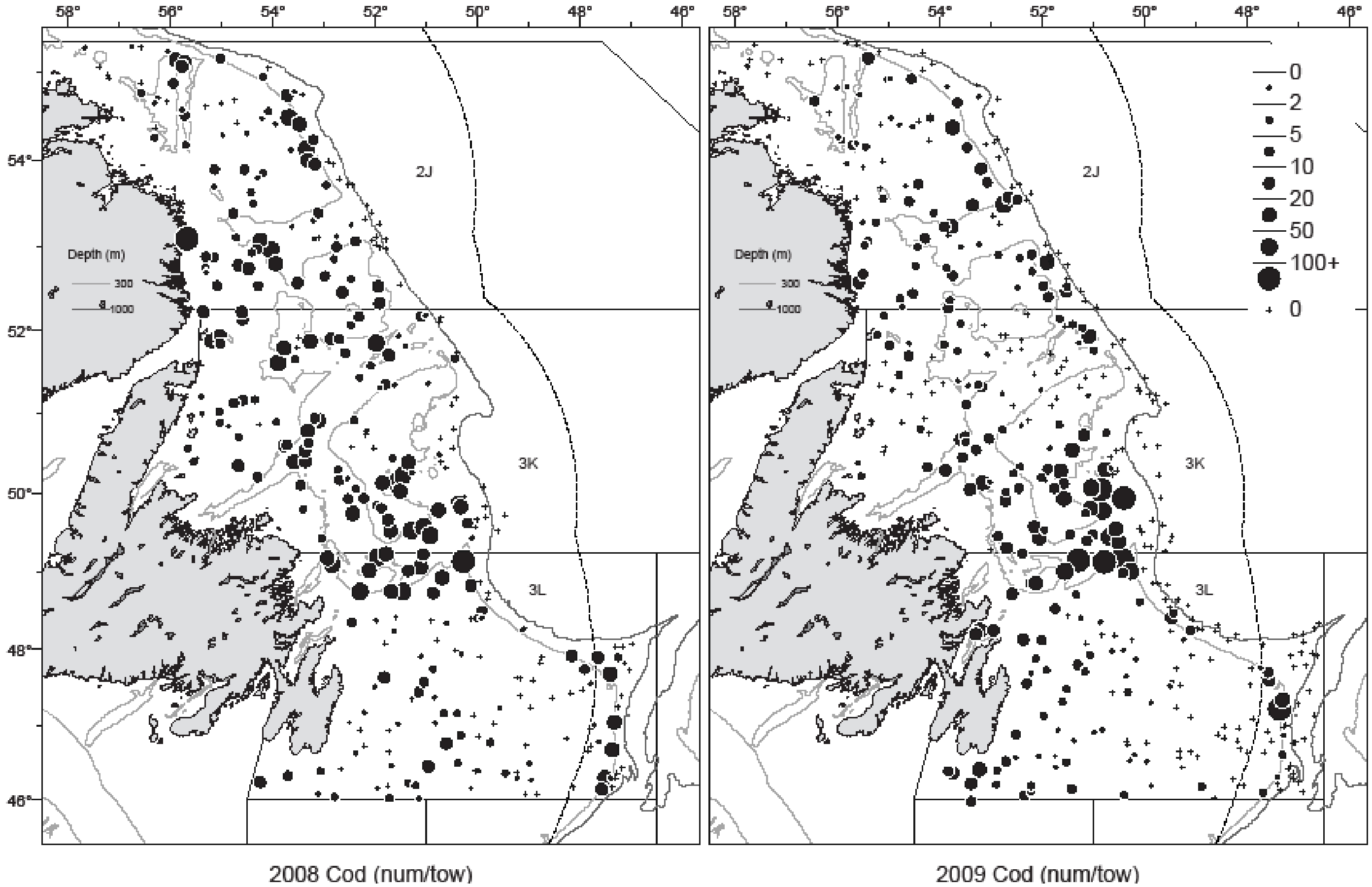



*Figure 15. Cod distribution (number per standard tow) during the autumn research survey in NAFO Divisions 2J+3KL in 2008 and 2009. Cohorts are labeled down the diagonal.*

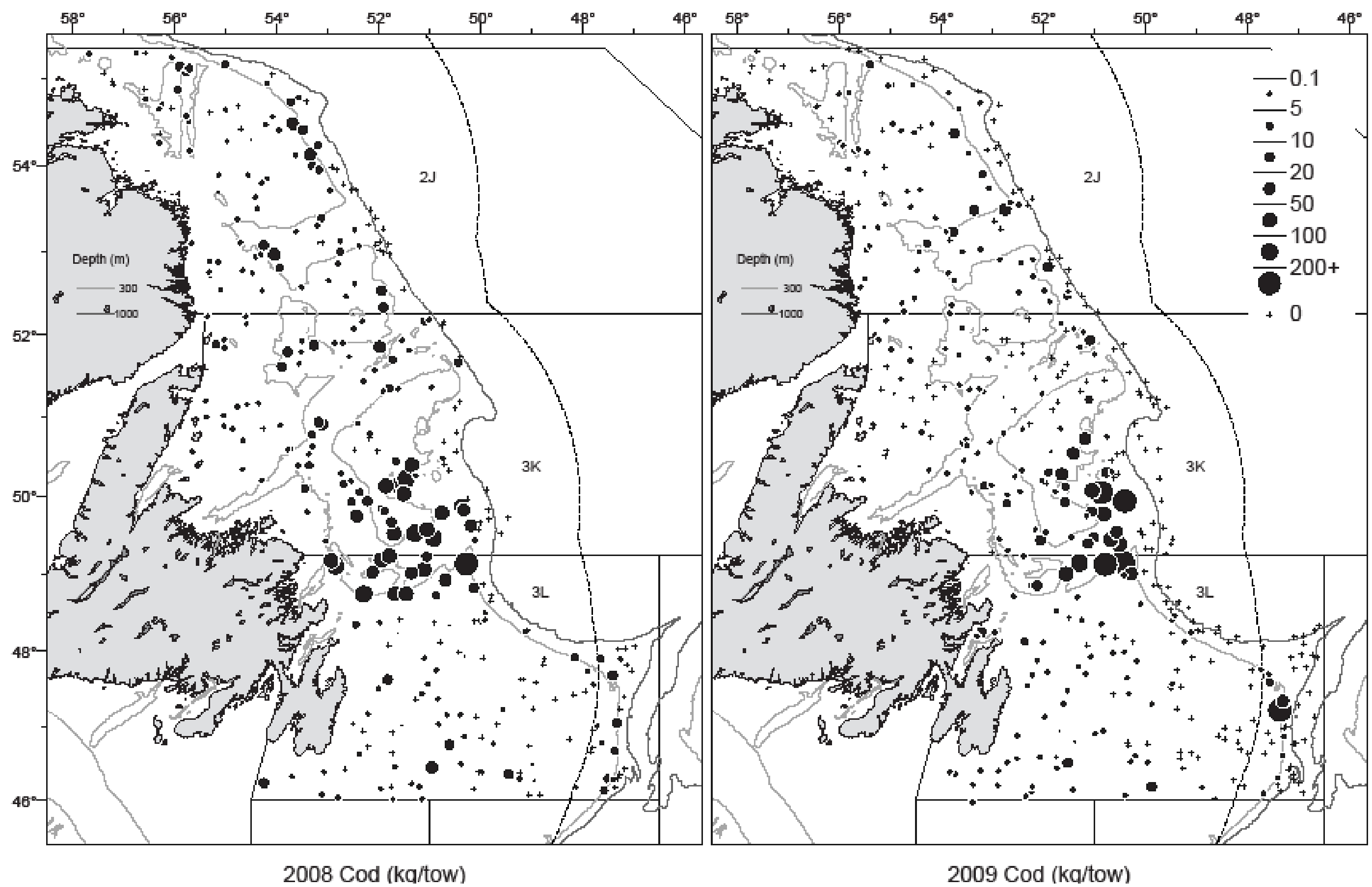



*Figure 16. Cod distribution (total weight [kg] per standard tow) during the autumn research survey in NAFO Divisions 2J+3KL in 2008 and 2009.*

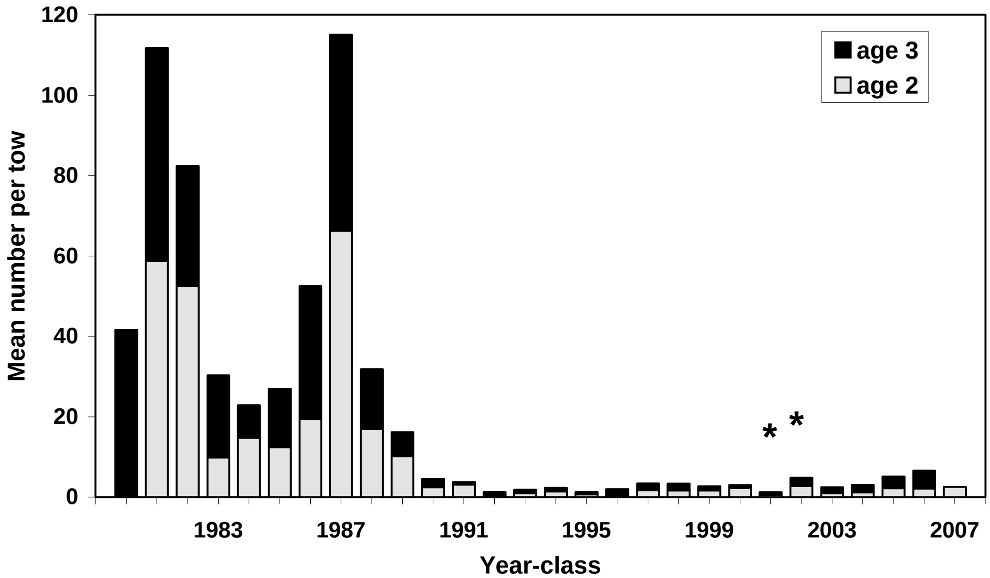



*Figure 17. Abundance of the 1980-2007 year-classes at age 2 and age 3 in the offshore of 2J3KL from the autumn RV surveys. Asterisks indicate partial estimates for the 2001 and 2002 year-classes from incomplete survey coverage of 3L in 2004.*

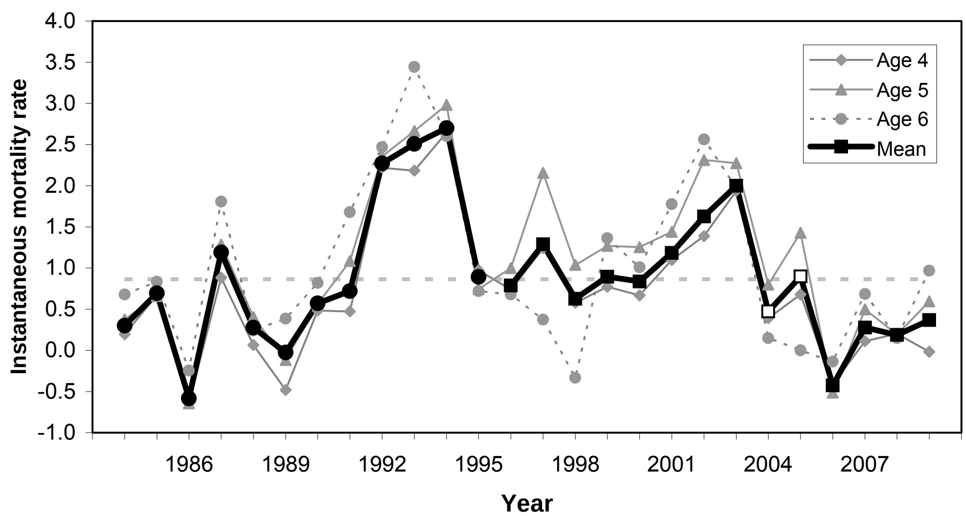



*Figure 18. Trends in the annual instantaneous mortality rate (Z) of cod aged 4-6 calculated using data from the autumn RV surveys of the offshore of 2J3KL. For example, the value in 1996 is the mortality experienced by the 1991-1989 year-classes from ages 4-6 in 1995 to ages 5-7 in 1996. The dashed line is the time-series average (Z=0.87, which corresponds to 58% mortality each year). Open symbols indicate estimates based on an incomplete survey in 2004.*

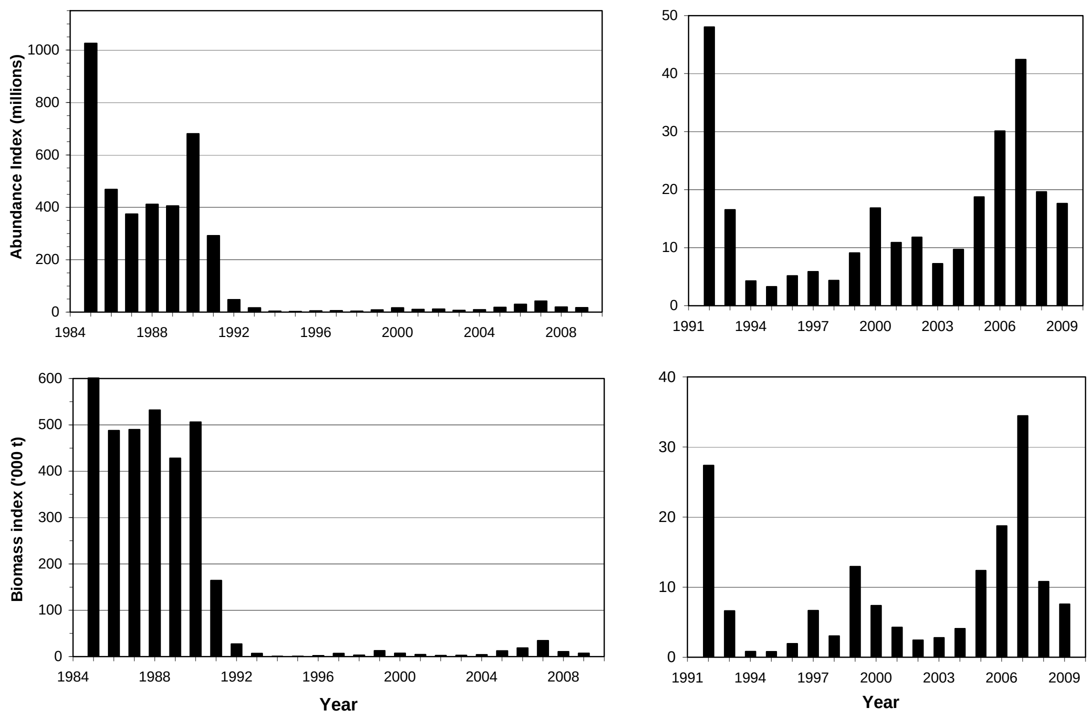



*Figure 19. Trends in offshore indices of abundance (upper panels) and biomass (lower panels) of cod in NAFO Div. 3L from spring bottom trawl surveys. The right panels are expanded to show trends from 1992 onwards.*

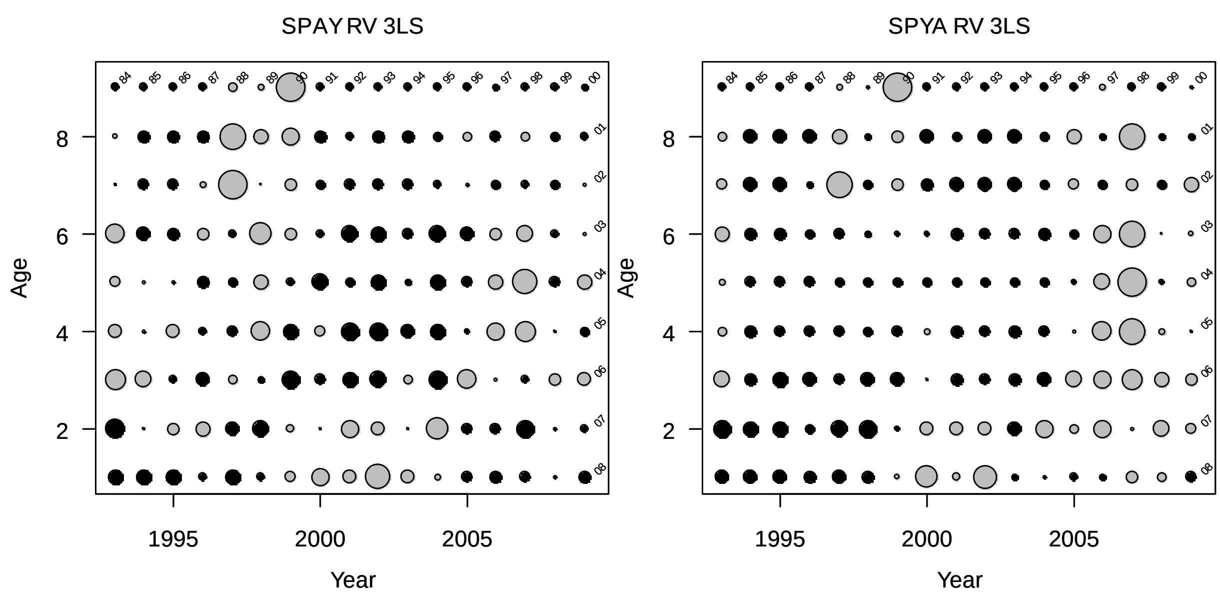



*Figure 20. Standardized age-disaggregated catch rates (ages 1-8) from the spring bottom trawl survey of 3L for the period 1993-2009. Catch rates (mean nos per tow) were converted to proportions within an age (left panel) or within a year (right panel). Values were standardized by subtracting the mean proportion and dividing by the standard deviation of the proportions computed across years. Symbol sizes are scaled and values greater than average are shown as grey circles, average values are shown as small dots, and less than average values are shown as black circles. Cohorts are labeled down the diagonal.*

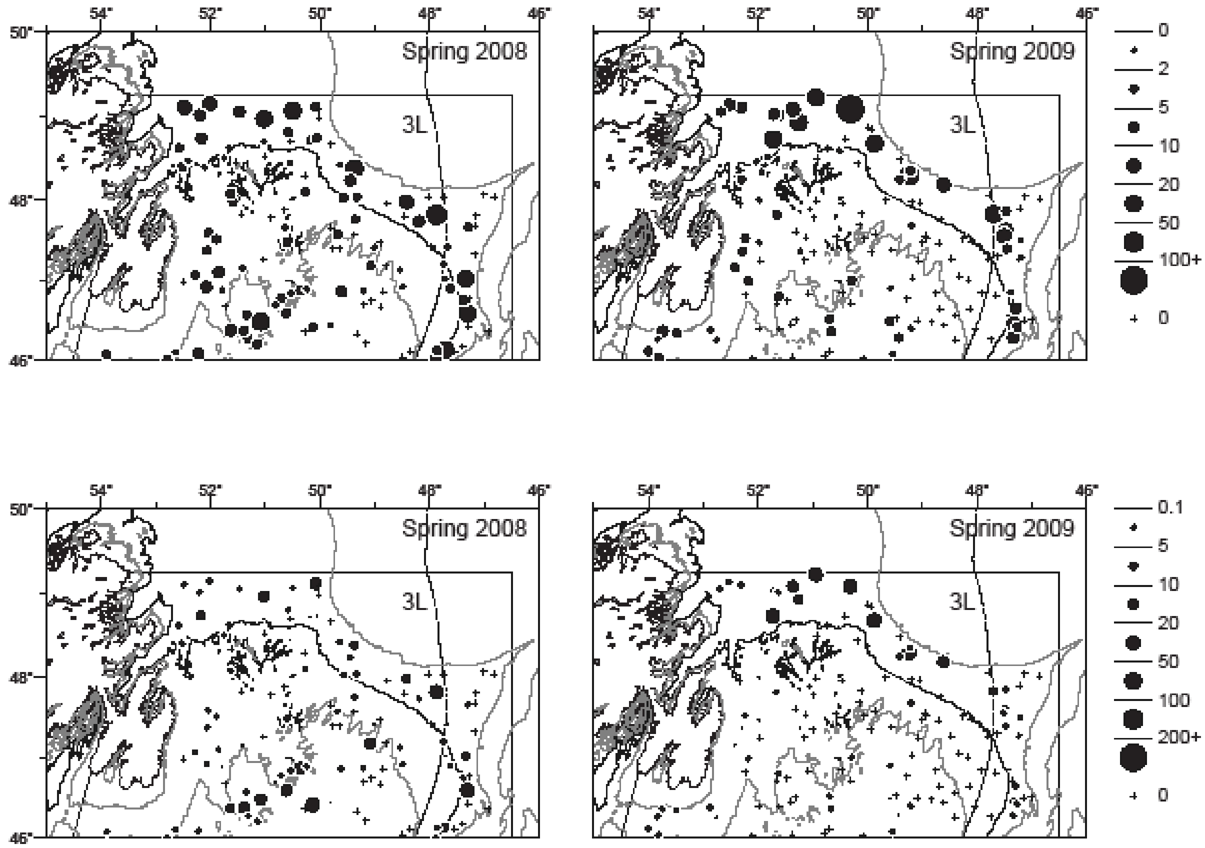



*Figure 21. Cod distribution (upper panels, number per standard tow; lower panels weight [kg] per standard tow) during spring research surveys in NAFO Div. 3L in 2008 and 2009.*

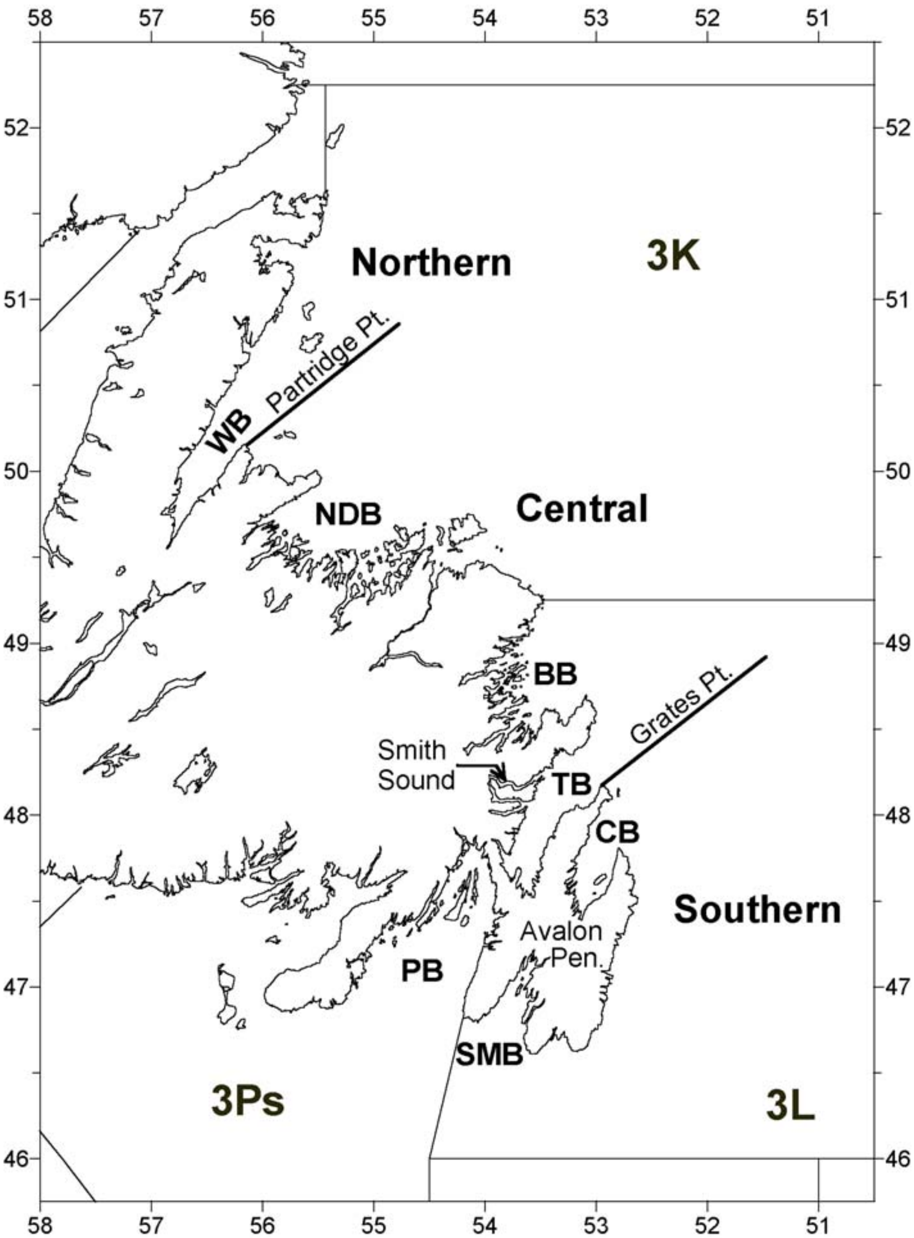



*Figure 22. Eastern Newfoundland showing the boundaries of the inshore northern, inshore central and inshore southern areas as defined for the present assessment. WB=White Bay, NDB=Notre Dame Bay, BB=Bonavista Bay, TB=Trinity Bay, CB=Conception Bay and SMB=St. Mary's Bay; PB=Placentia Bay which is in Subdiv. 3Ps*

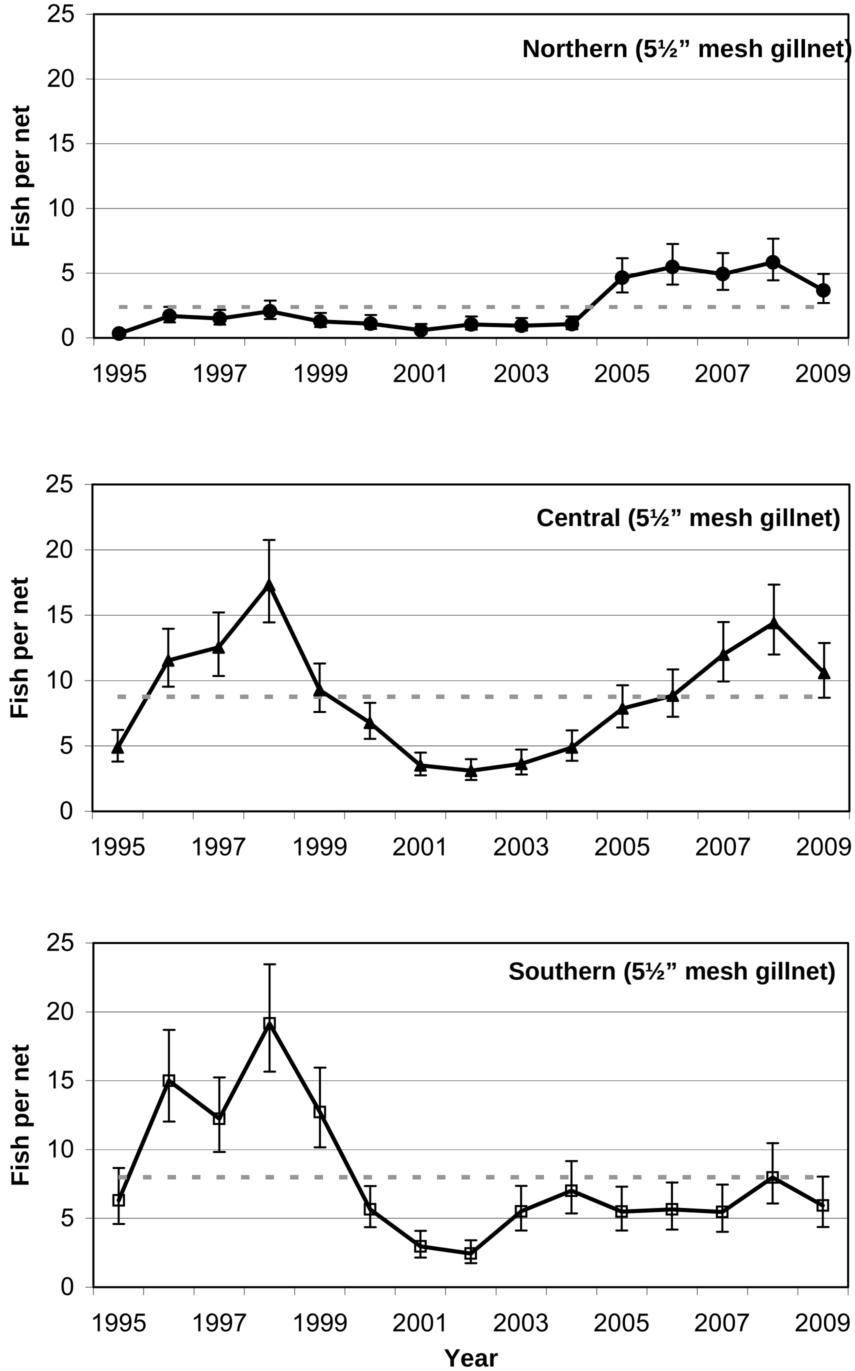



*Figure 23. Comparison of trends in standardized catch rates of cod (± 95% CL’s) from sentinel surveys of three inshore regions of 2J3KL using 5½” mesh gillnets. Dashed grey lines indicate series means.*

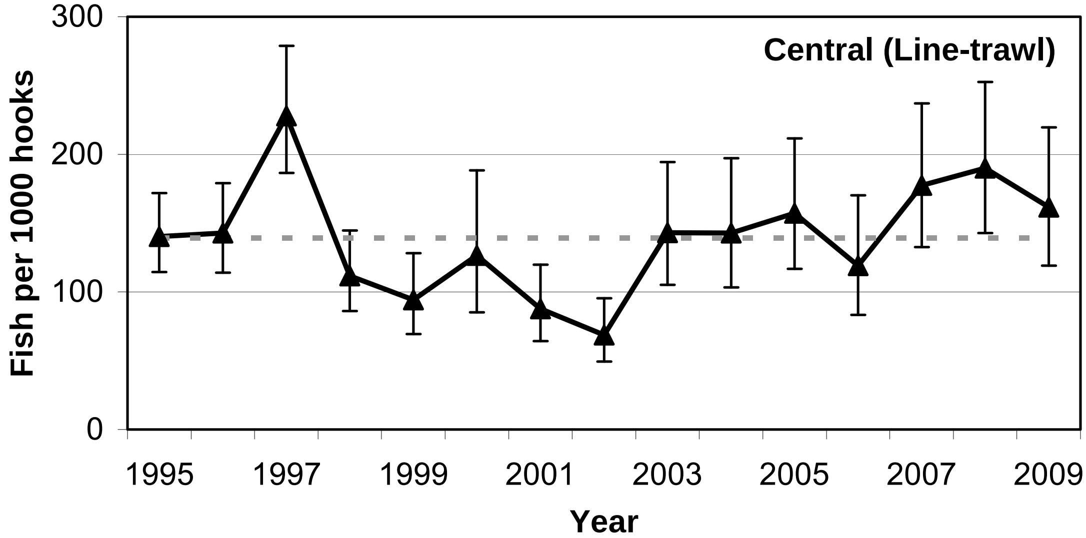



*Figure 24. Trends in standardized catch rates of cod (± 95% CL's) from sentinel surveys of the inshore central region of 3KL using linetrawls. Dashed grey lines indicate series means.*

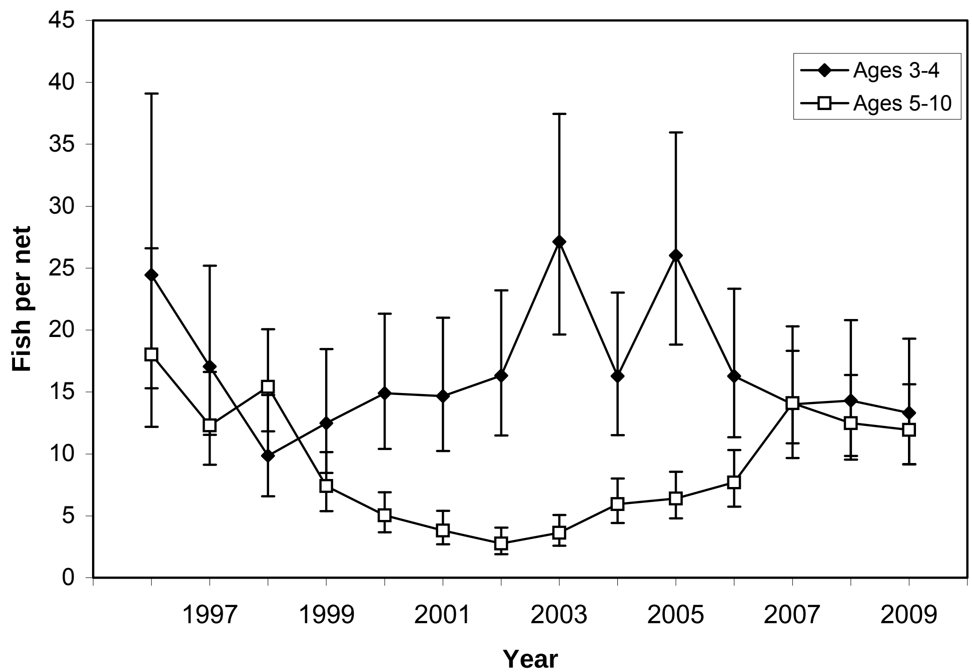



*Figure 25. Trends in standardized catch rates (with 95% confidence intervals) for two age groups of cod from sentinel surveys in the inshore central area of 3KL using small mesh (3¼) gillnets.*

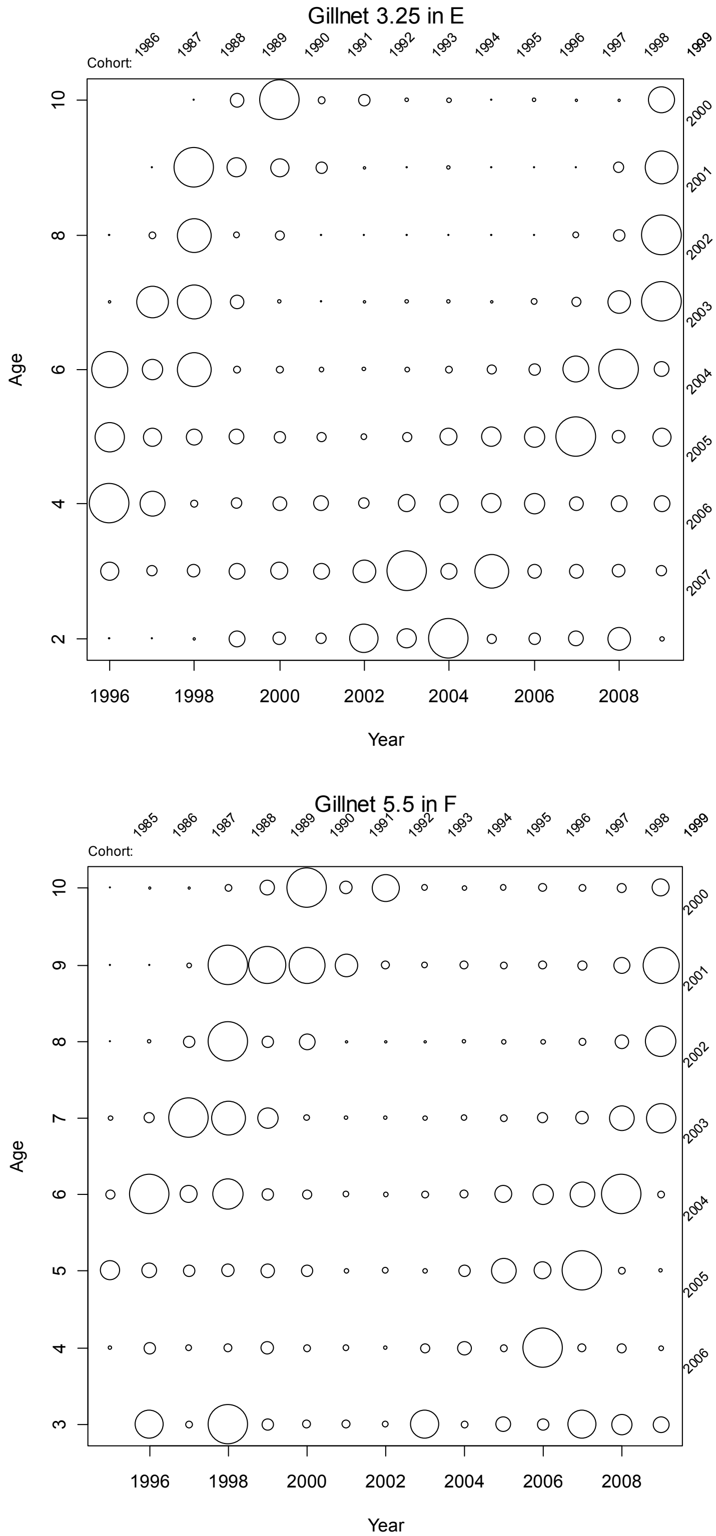



*Figure 26. Standardized age-disaggregated catch rate indices for small mesh (3¼") gillnets (upper panel) and 5½" mesh gillnets (lower panel) estimated using data from sentinel survey sites in the inshore central area of Divs. 3KL. Catch rates are proportional to symbol area; values within each age were divided by the maximum within an age. Cohorts are labeled down the diagonals.*

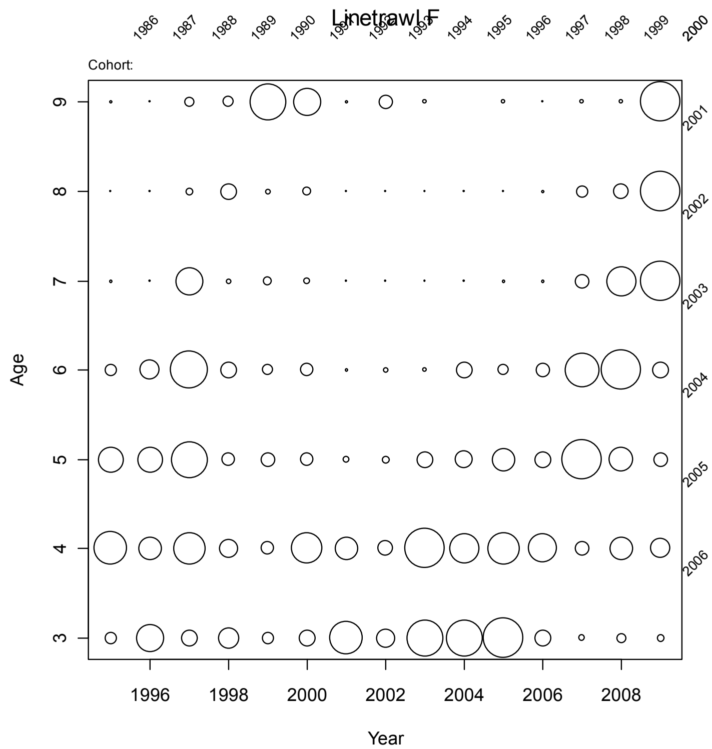



*Figure 27. Standardized age-disaggregated catch rate indices for linetrawls (lower panel) estimated using data from sentinel survey sites in the inshore central area of 3KL. Catch rates are proportional to symbol area; values within each age were divided by the maximum within an age. Cohorts are labeled down the diagonal.*

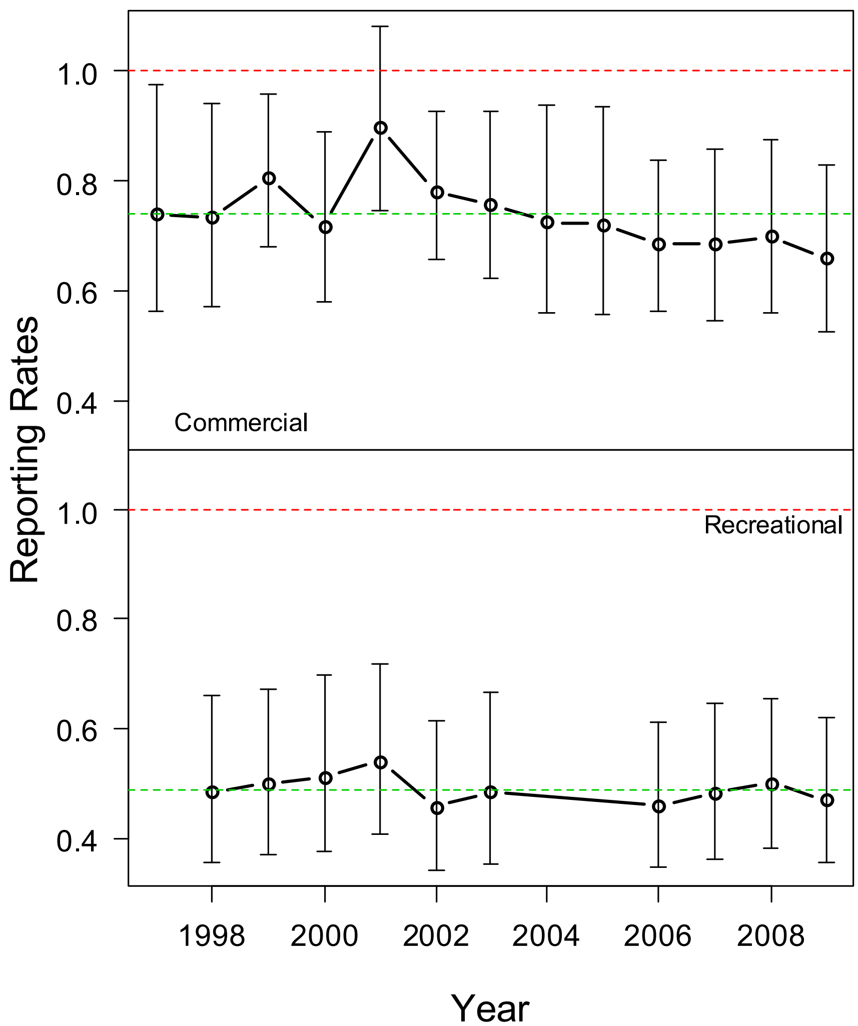



*Figure 28. Annual estimates of tag reporting rate for commercial and recreational fishers from the mixed-effects linear regression model (see text for details). Error bars are 95% confidence intervals. The upper dashed line at 1.0 in each panel is shown for reference (=100% reporting rate). The lower dashed line is the average of the series.*

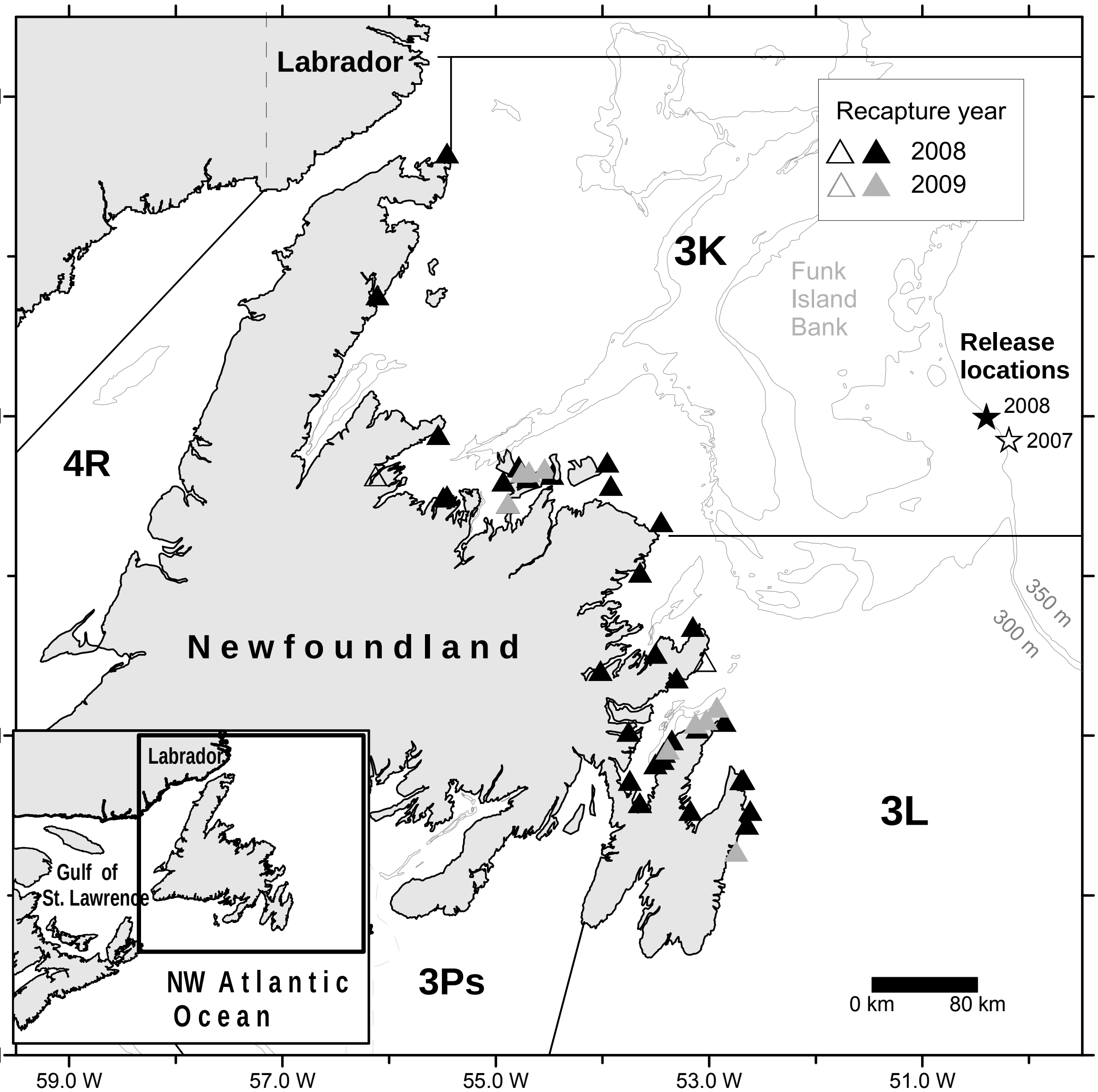



*Figure 29. Release sites and recapture locations for cod tagged in the offshore of 3K east of Funk Island Bank during March 2007 (open star) and 2008 (black star). Open triangles are recaptures from the 2007 release location, solid triangles from the 2008 release location; there were no recaptures in 2007. The 300 m and 350 m depth contours are also indicated.*

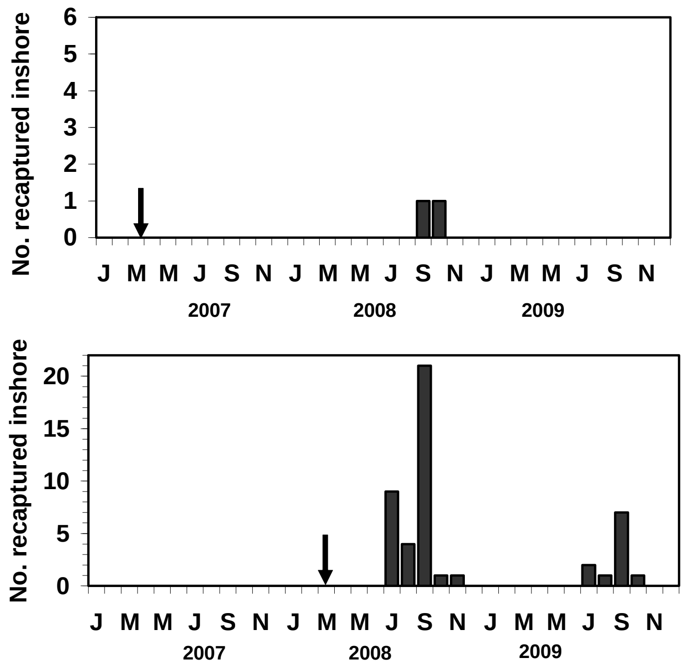



*Figure 30a. Monthly trends in the numbers of conventionally tagged offshore cod recaptured in the inshore of eastern Newfoundland during 2007-2009. The cod were captured, tagged, and released offshore in NAFO Div. 3K in March 2007 (arrow, upper panel) and March 2008 (arrow, lower panel).*

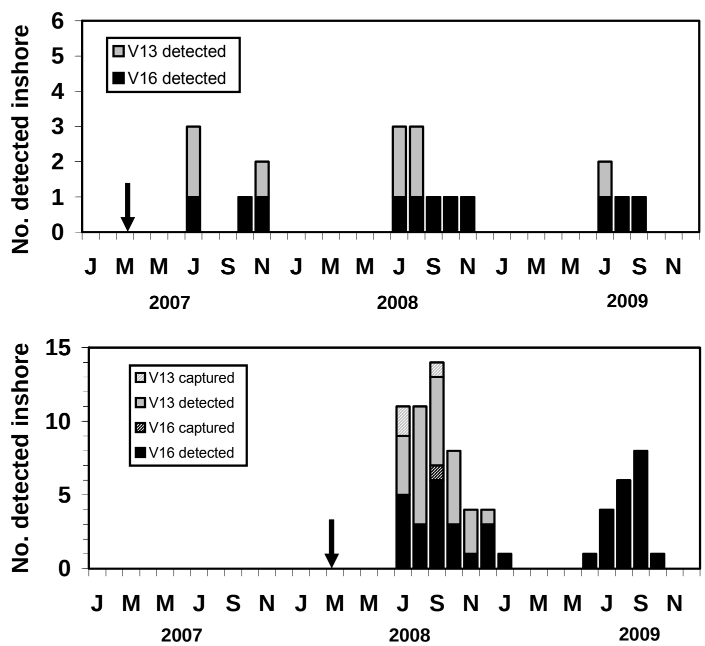



*Figure 30b. Monthly trends in the numbers of acoustically tagged offshore cod detected on inshore receiver arrays moored off the east coast of Newfoundland (or recaptured inshore). The cod were captured, acoustically and conventionally tagged, and released in the offshore of NAFO Div. 3K in March 2007 (arrow, upper panel) and March 2008 (arrow, lower panel).*

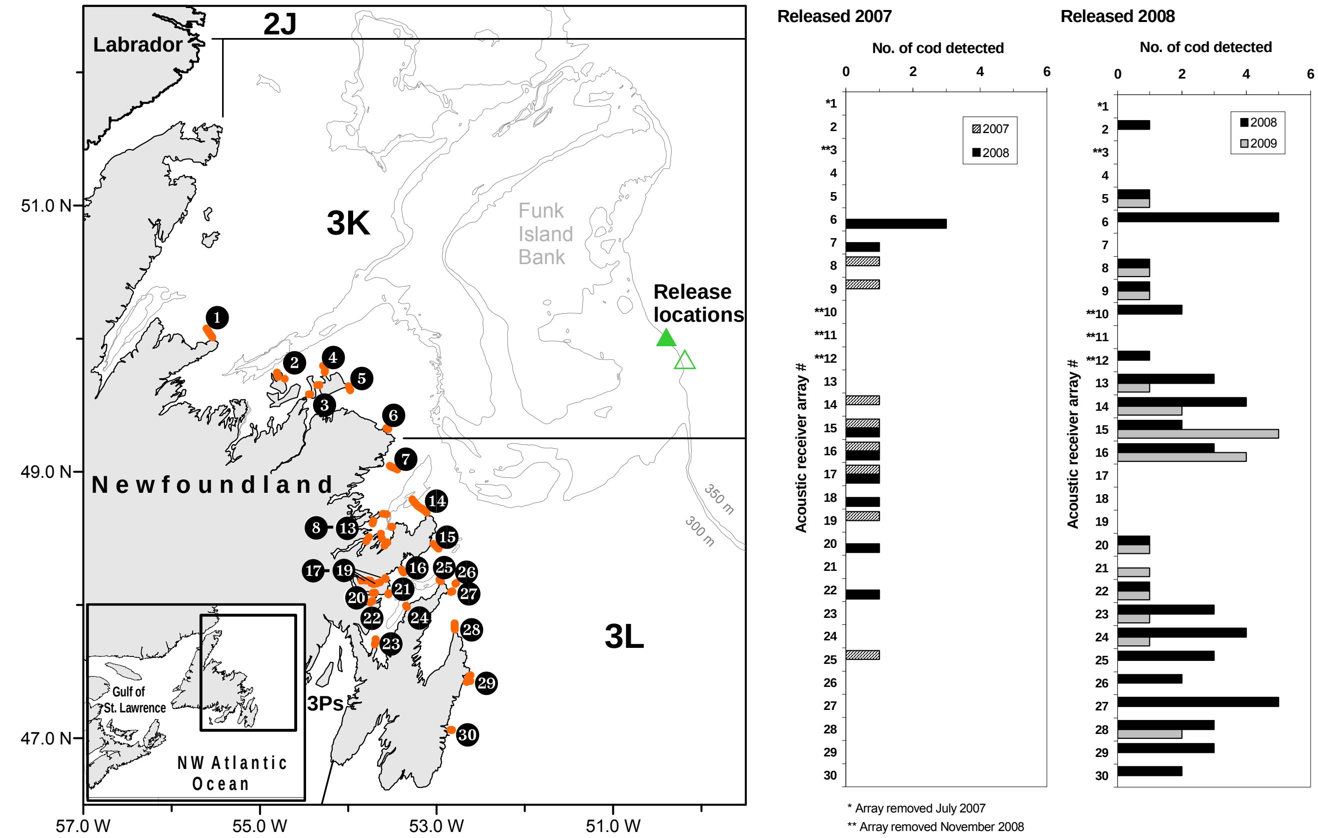



*Figure 31. Detections of acoustically tagged offshore cod on receiver arrays moored along the northeast coast of insular Newfoundland. The map indicates the release locations in March 2007 (open triangles) and 2008 (solid triangles) and positions of the arrays, numbered 1 to 30 anti-clockwise (from north to south). The horizontal bar charts show annual total numbers of acoustically tagged offshore cod detected on each receiver array for cod released in 2007 (left panel) and 2008 (right panel). Detection data for 2009 may be incomplete for arrays 4, 5, 6, 24-27, and 30 as these arrays have not been retrieved since early summer 2009.*

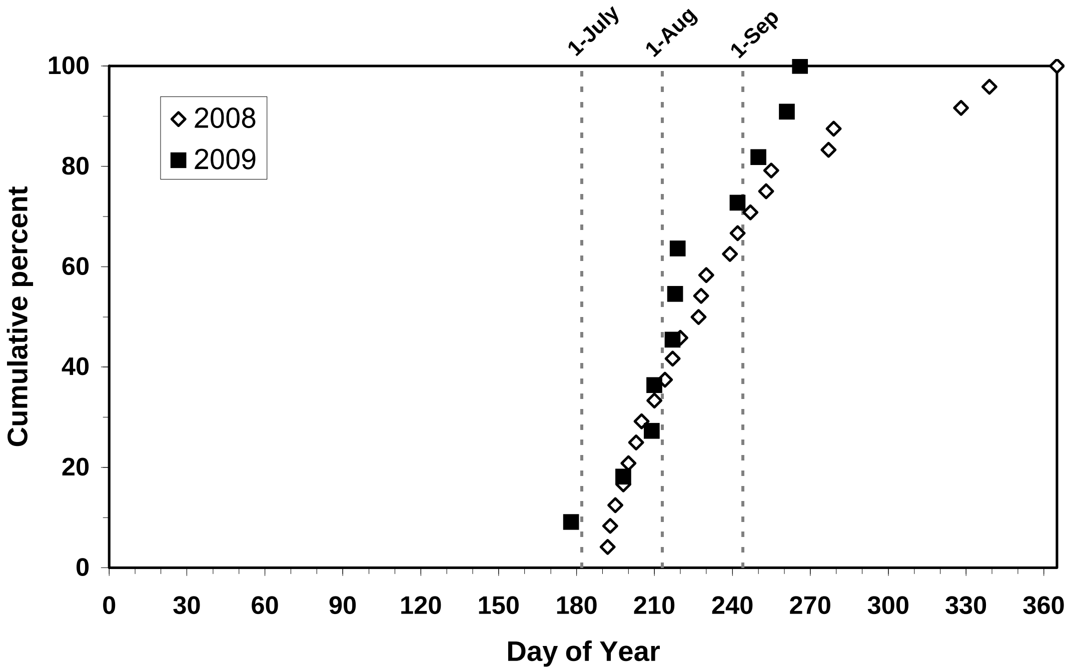



*Figure 32. Cumulative annual dates of first detection of acoustically tagged offshore cod at inshore receiver arrays during 2008 and 2009. Day 182 (1 July), day 213 (1 August), and day 244 (1 September) are shown as vertical dashed lines for reference.*

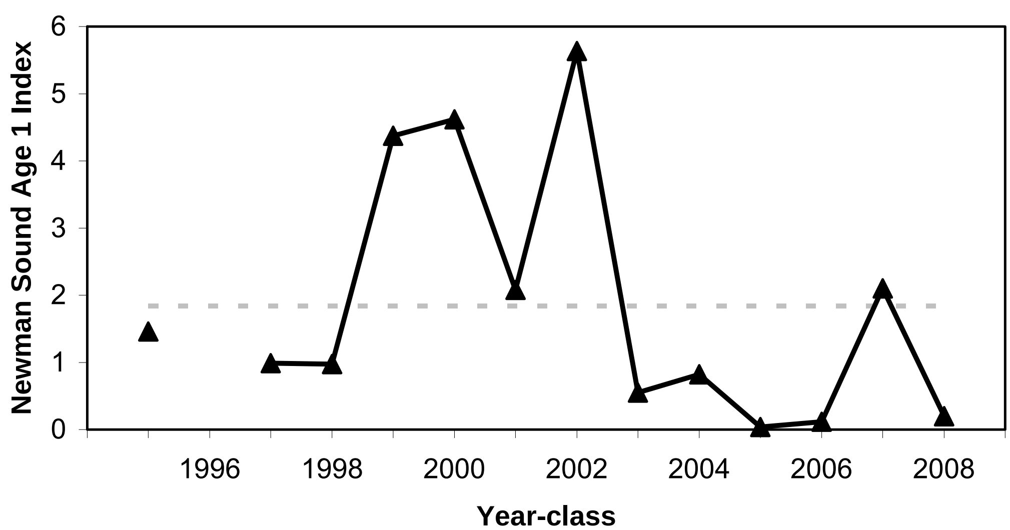



*Figure 33. Trends in the numbers of age 1 cod from beach seine surveys in Newman Sound, Bonavista Bay.*

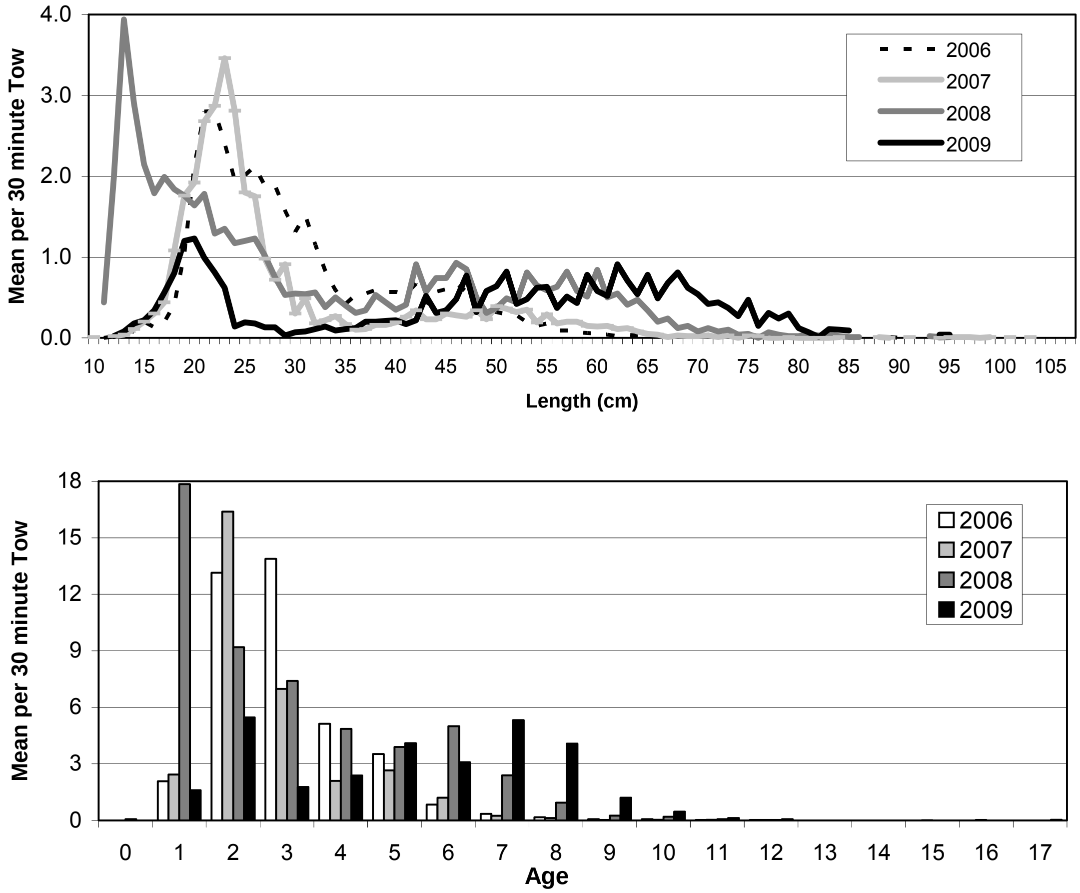



*Figure 34. Comparison of the length composition (upper panel) and age composition (lower panel) of the catch of cod from the DFO-Industry mobile gear survey of the near-shore of NAFO Divisions 2J3KL during 2006-09.*

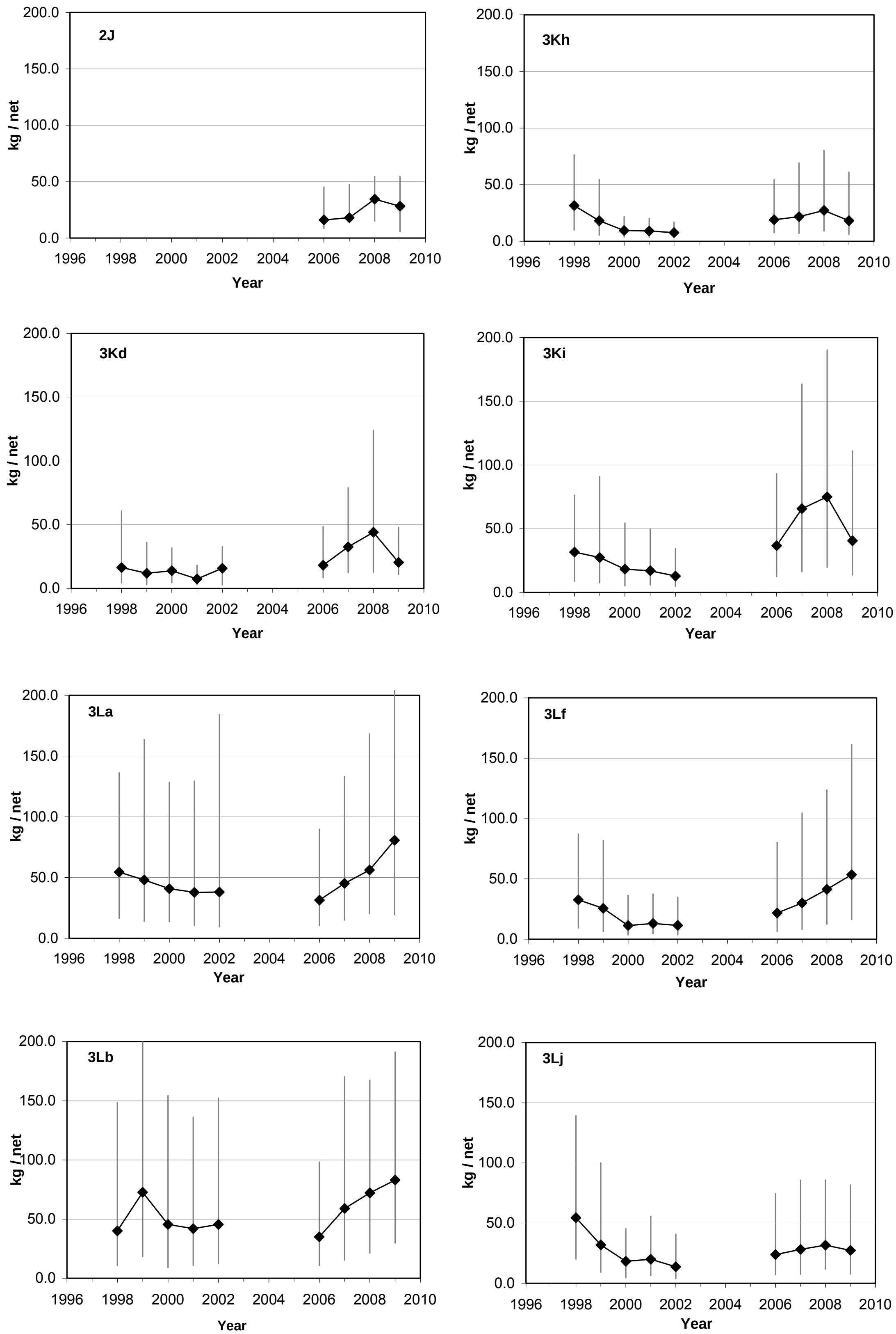



*Figure 35. Trends in median catch rates of cod (with 10th and 90th percentiles) by unit area from log-book data for vessels <35 ft. Unit area 3Lq (St. Mary's Bay) is not shown due to lack of data for the 2006-2009 period.*

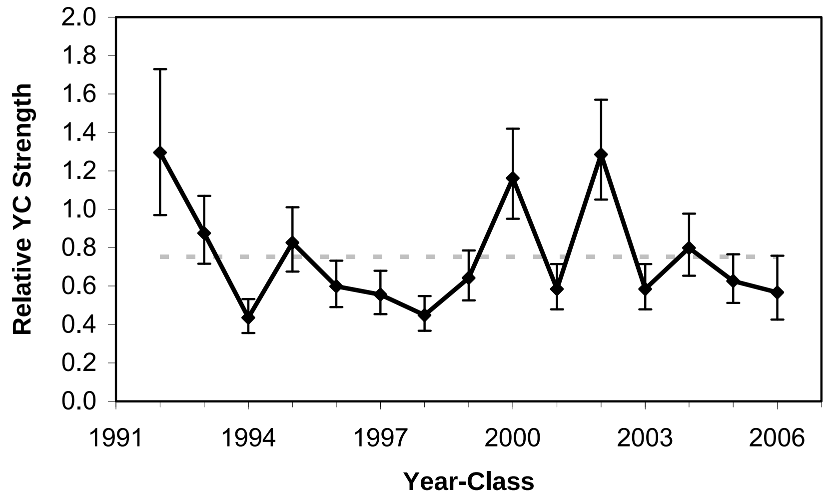



*Figure 36. Standardized year class strength from sentinel survey catch rate data for age 3 and age 4 using 3¼" mesh gillnet and 5½" mesh gillnet. The dashed grey line is the time series average, error bars are 95% confidence intervals.*

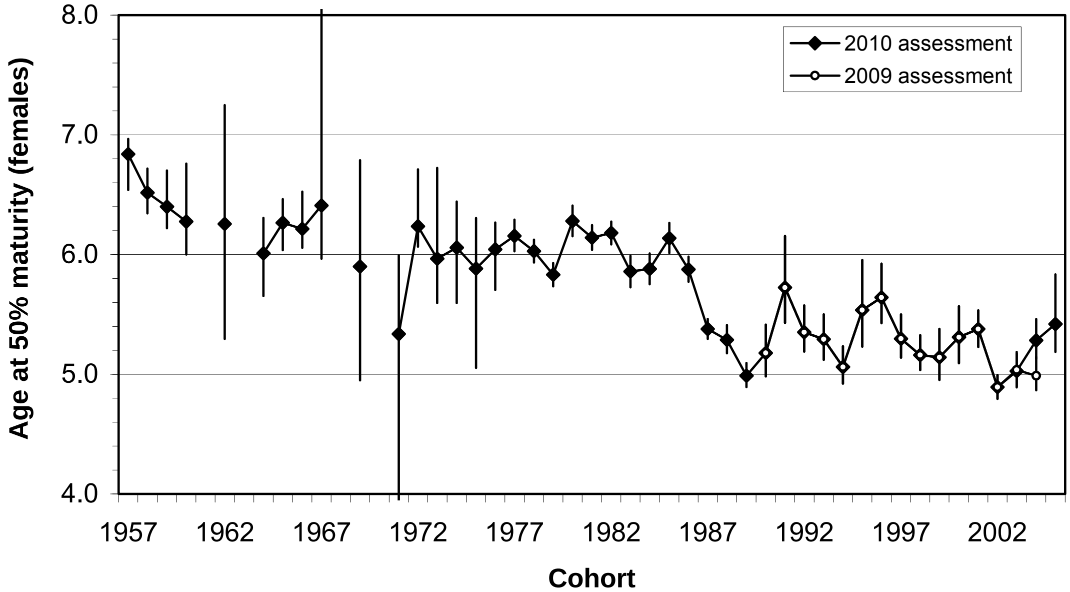



*Figure 37. Age at 50% maturity (± 95% CI) by cohort for female cod in Divisions 2J3KL combined based on sampling during autumn research bottom-trawl surveys. The open circles show the results from the previous assessment back to the 1990 cohort. See text for details.*

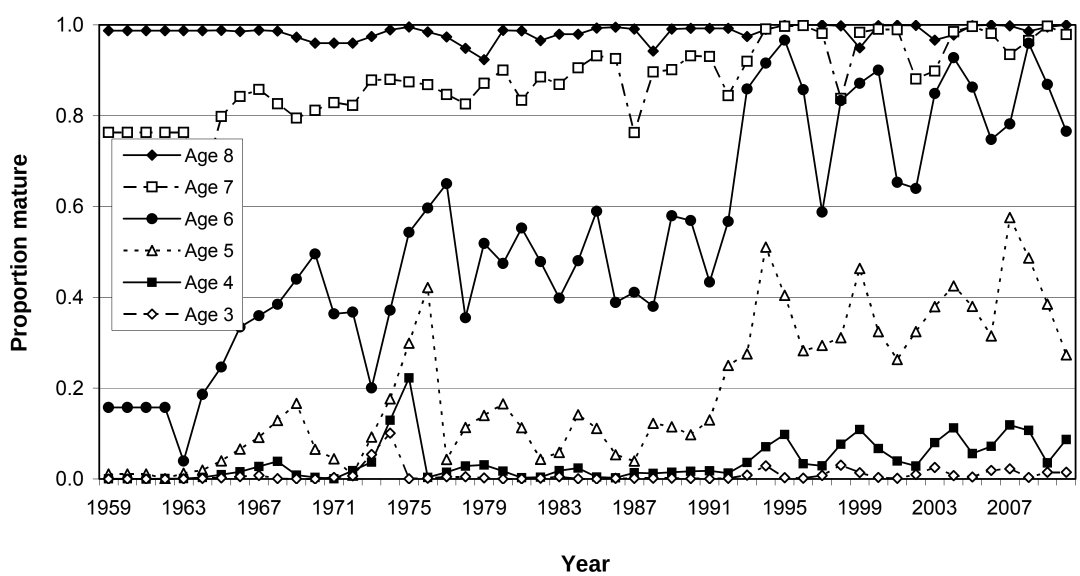



*Figure 38. Estimated proportions mature at ages 3-8 for female cod from NAFO Divisions 2J3KL combined. The percentage mature at age estimated from sampling during the autumn research bottom-trawl survey in year t is displayed for year t+1 as fish sampled during the autumn survey are maturing to spawn the following year.*

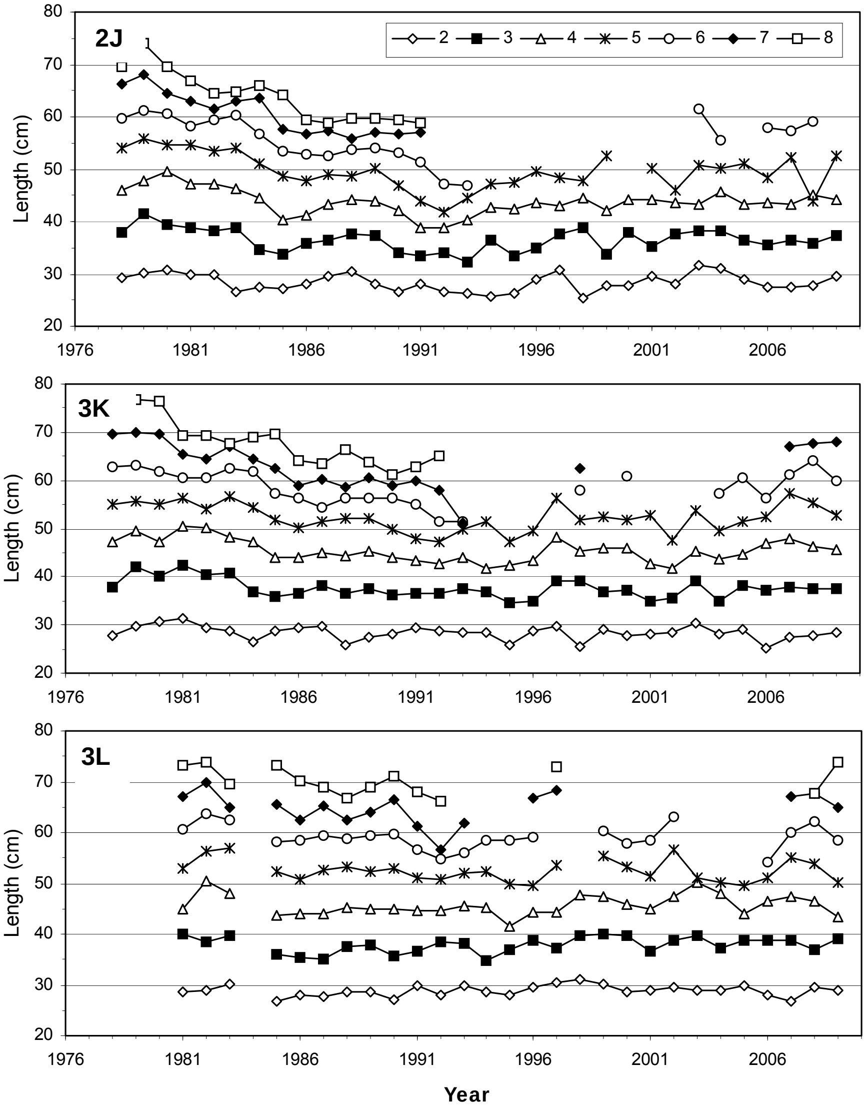



*Figure 39a. Mean lengths (cm) at ages 2-8 of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. There were no autumn surveys in Division 3L in 1978-80 and 1984.*

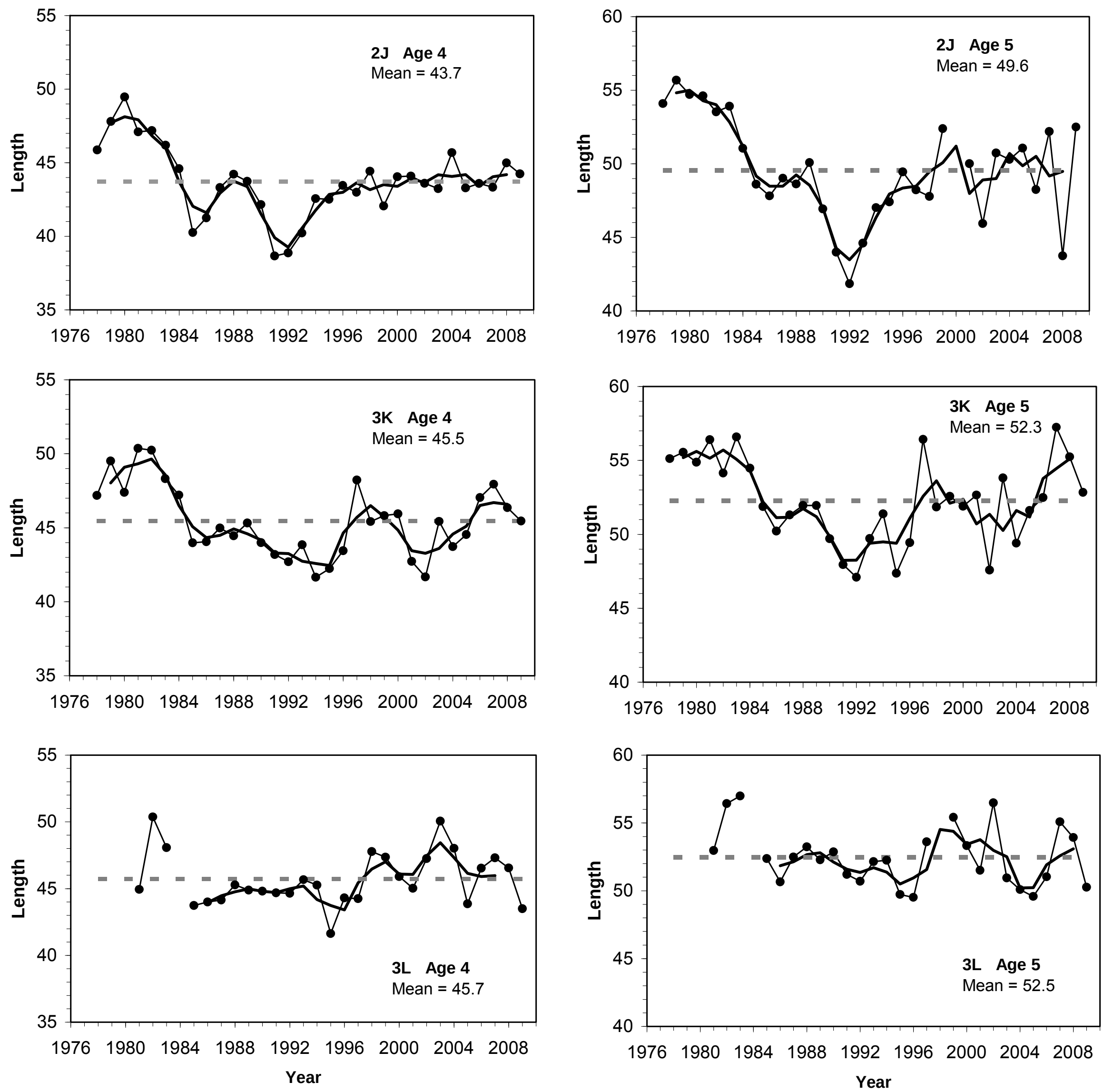



*Figure 39b. Mean lengths (cm) at ages 4 and 5 of cod in Divisions 2J, 3K and 3L during 1978-2009 from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. The lines in each panel indicate the annual means (solid line with symbols), a 3-year moving average (heavy solid line) and the mean over all years for which there were observations (dashed line). There were no autumn surveys in Division 3L in 1978-80 and 1984.*

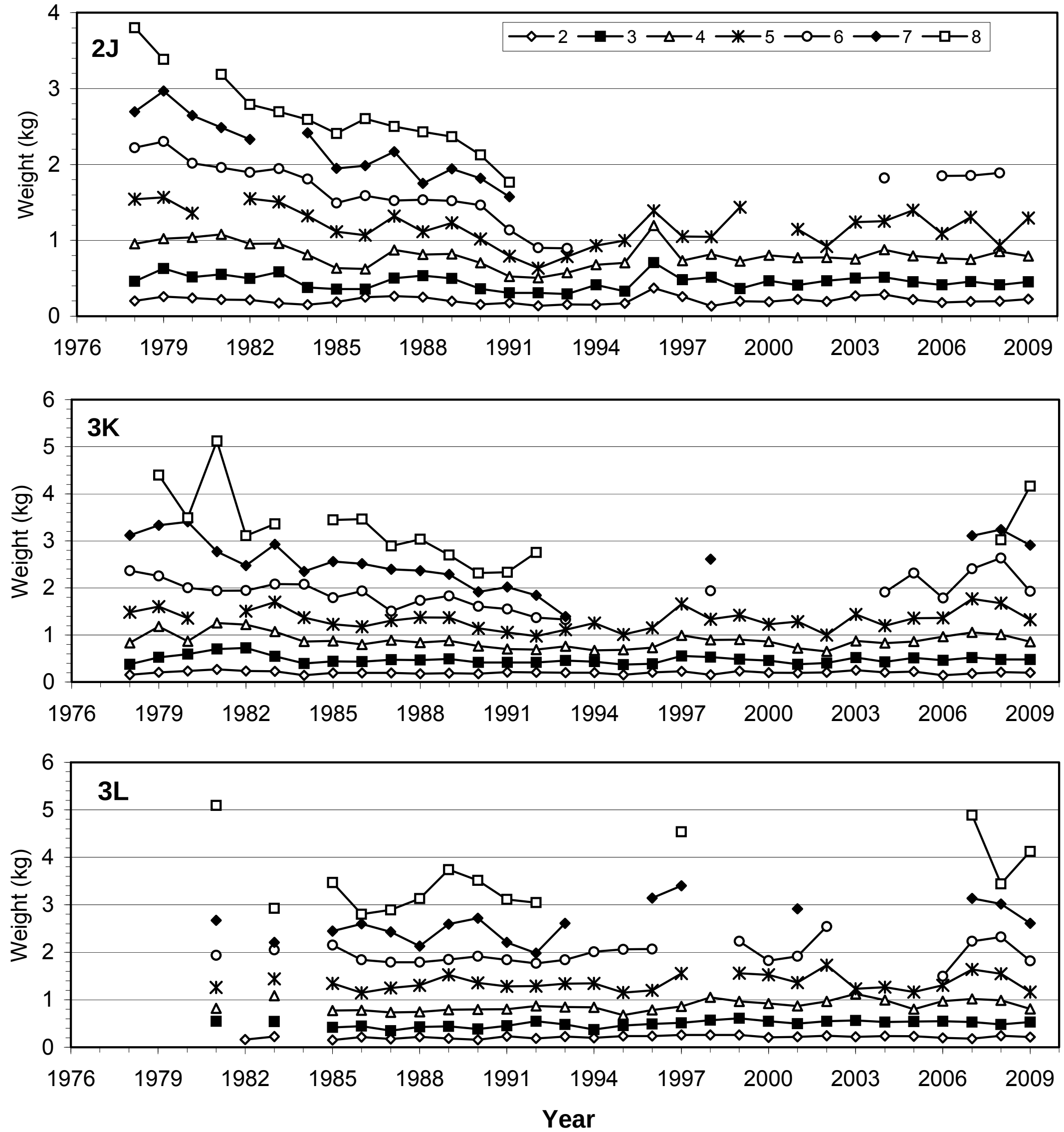



*Figure 40a. Mean weights at ages 2-8 of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. There were no autumn surveys in Division 3L in 1978-80 and 1984.*

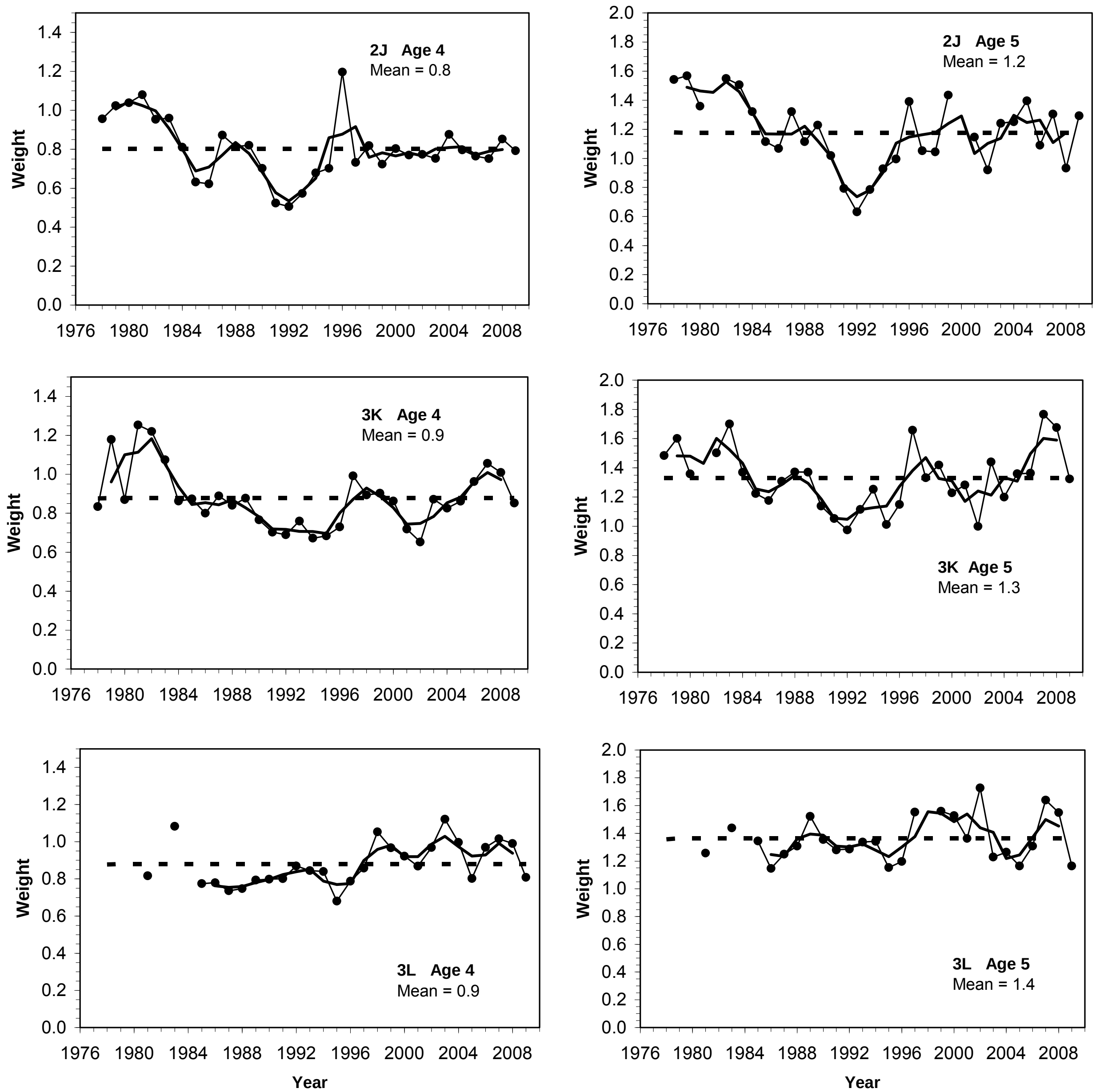



*Figure 40b. Mean weights (Kg) at ages 4 and 5 of cod in Divisions 2J, 3K and 3L during 1978-2009, from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish are not plotted. The lines in each panel indicate the annual means (solid line with symbols), a 3-year moving average (heavy solid line) and the mean over all years for which there were observations (dashed line). There were no autumn surveys in Division 3L in 1978-80 and 1984.*

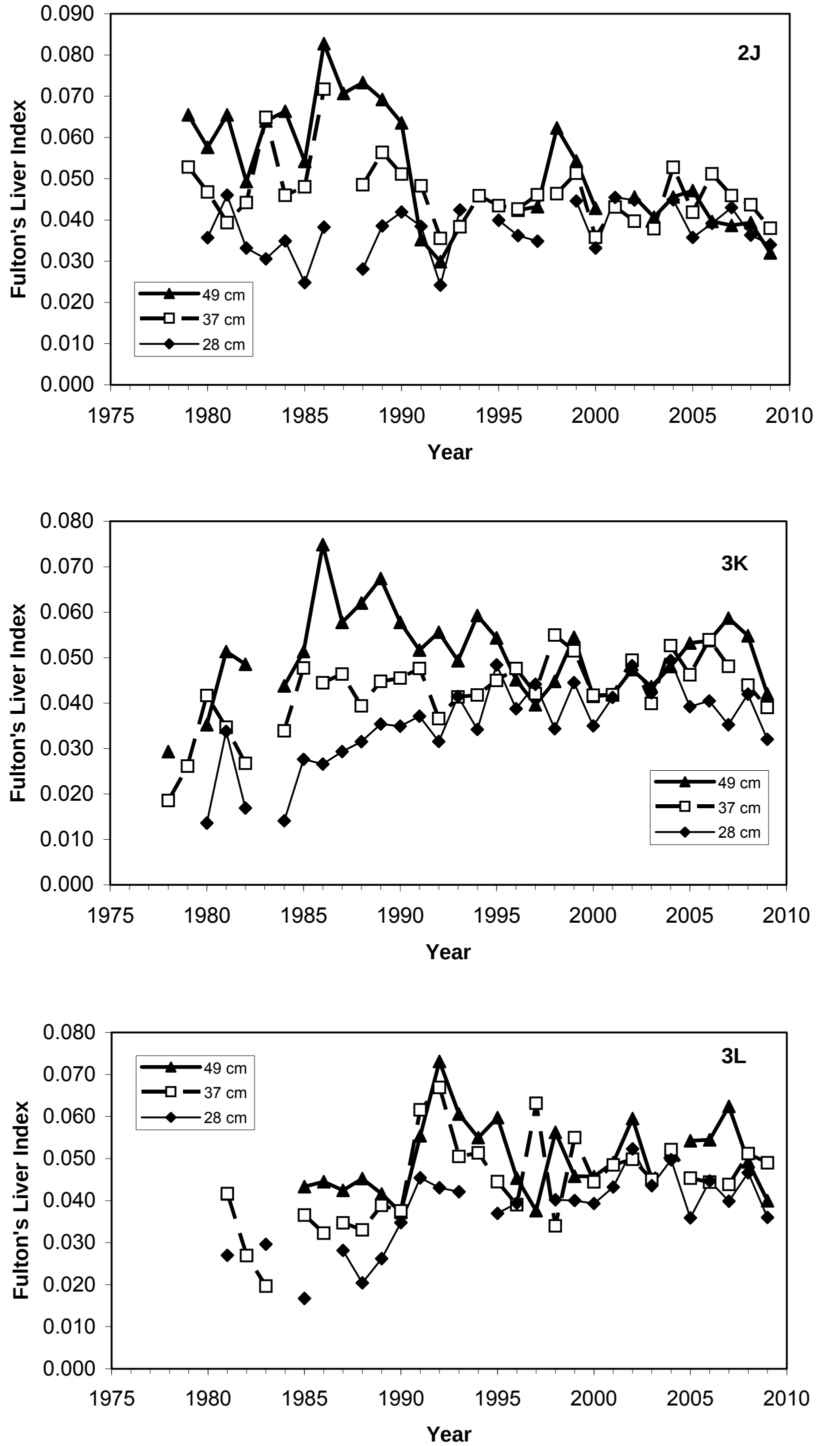



*Figure 41. Mean gutted condition index at length classes 28 cm, 37 cm and 49 cm of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-97 are not plotted. There were no autumn surveys in Division 3L in 1978-80 and 1984.*

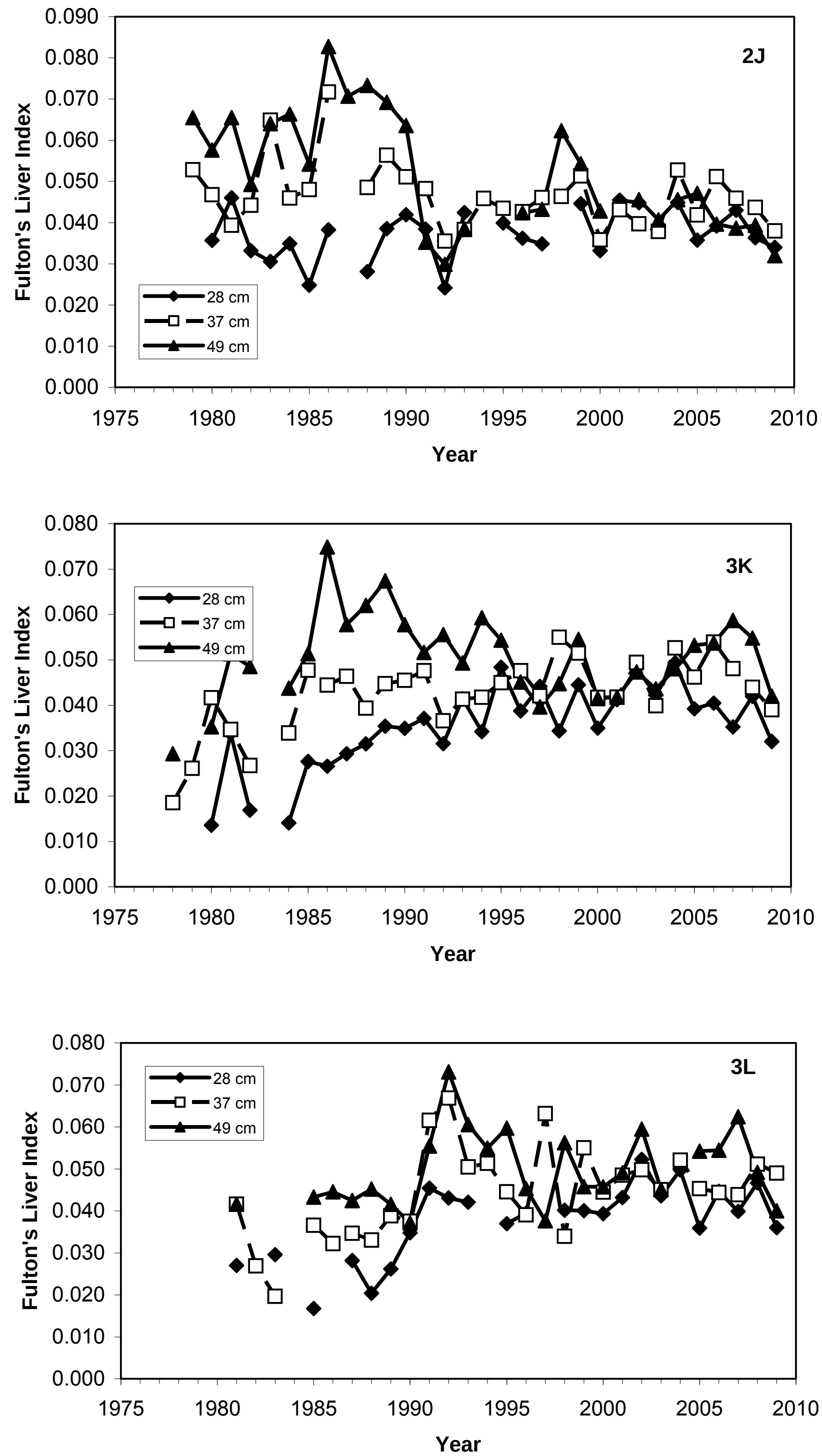



*Figure 42. Mean liver index at length classes 28 cm, 37 cm and 49 cm of cod in Divisions 2J, 3K and 3L in 1978-2009 from sampling during bottom-trawl surveys in autumn. Values calculated from fewer than 5 aged fish in 1995-97 are not plotted. There were no autumn surveys in Division 3L in 1978-80 and 1984.*

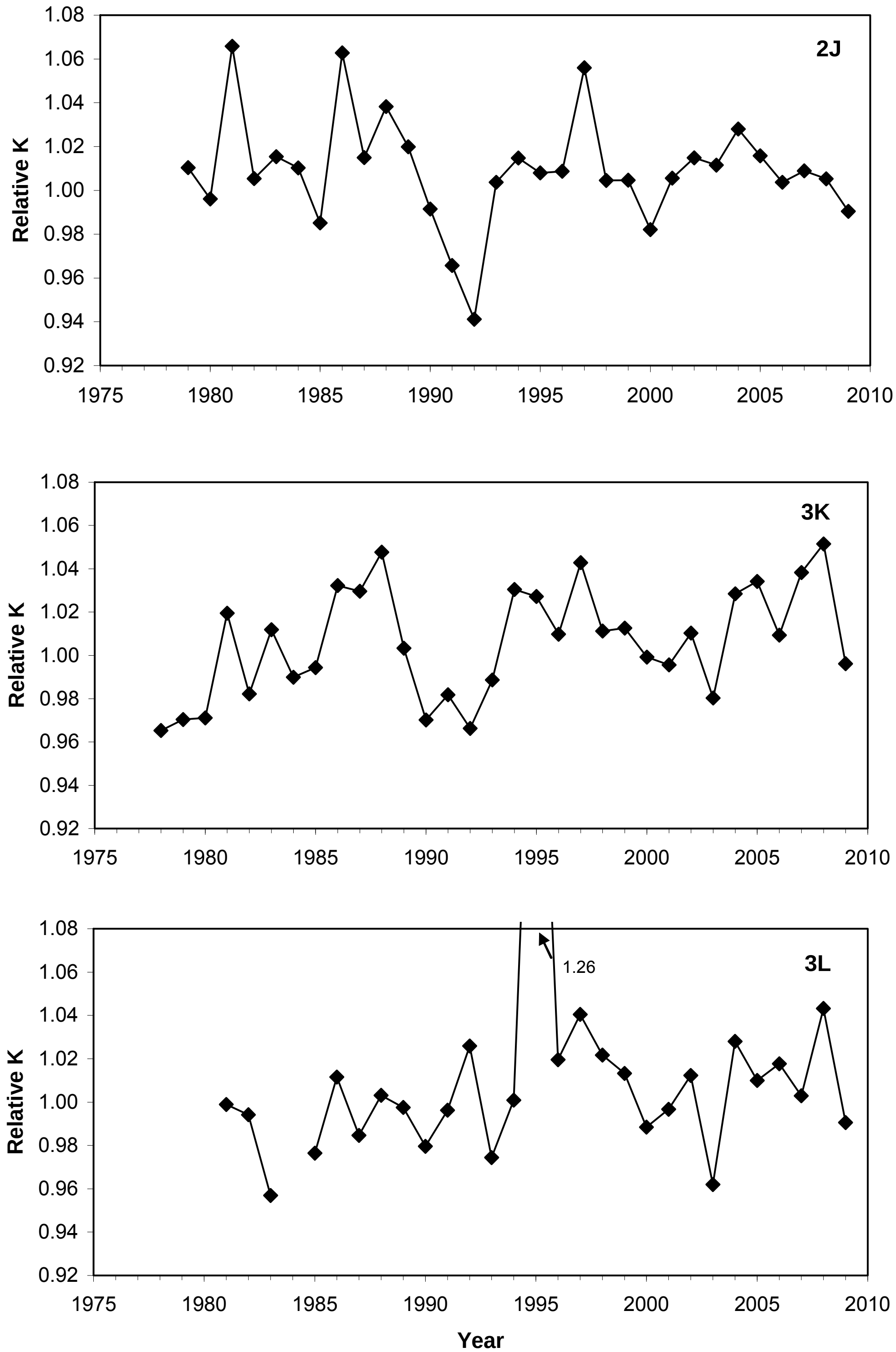



*Figure 43. Relative gutted condition of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. There were no autumn surveys in Division 3L in 1978-80 and 1984.*

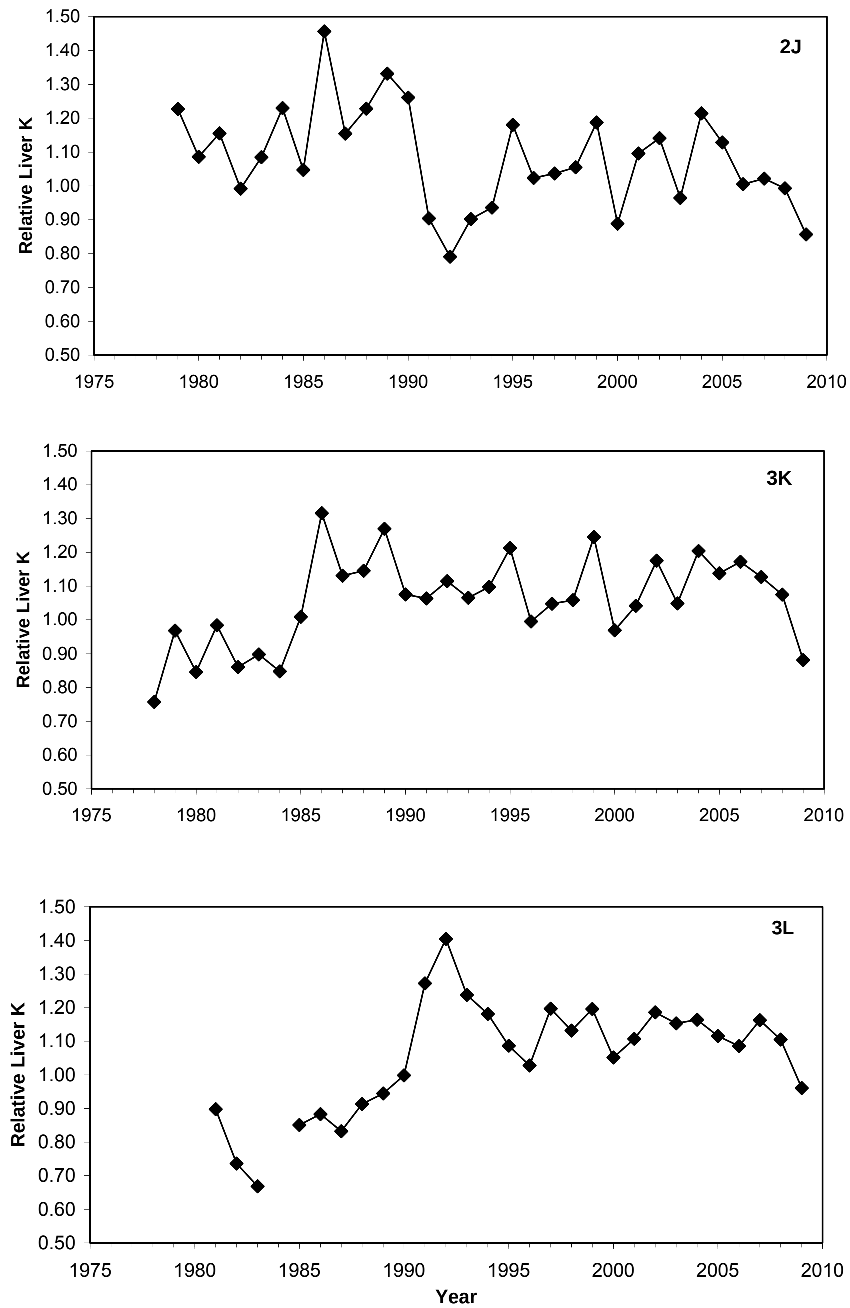



*Figure 44. Relative liver condition of cod in Divisions 2J, 3K and 3L in 1978-2009, from sampling during bottom-trawl surveys in autumn. There were no autumn surveys in Division 3L in 1978-80 and 1984.*

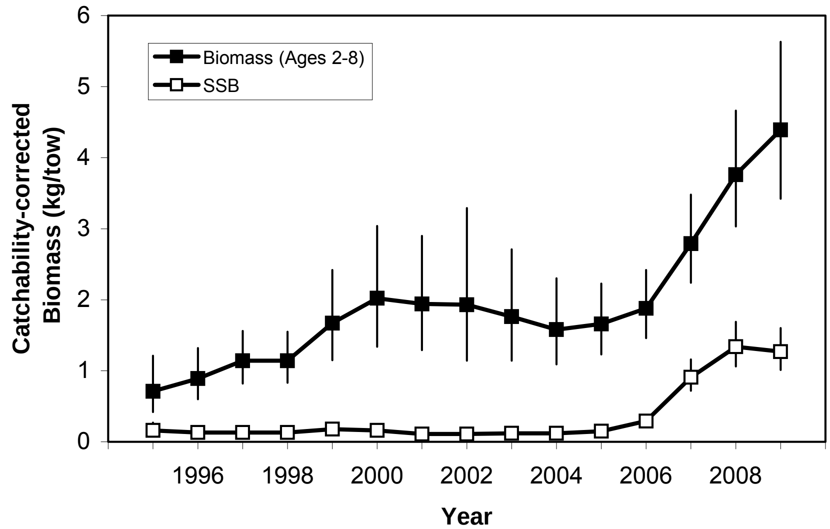



*Figure 45. Relative trends in biomass (ages 2-8) and spawning stock biomass (SSB) from cohort analysis of the DFO autumn survey data. Error bars are 95% confidence intervals.*

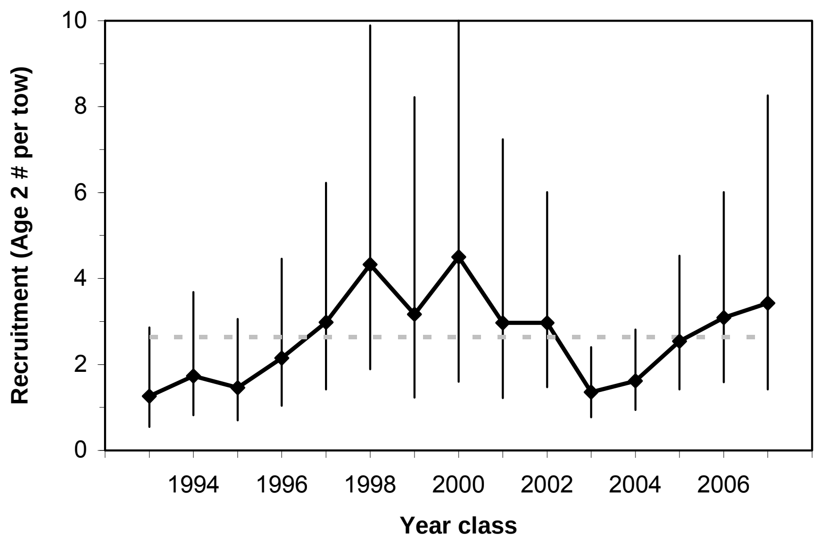



*Figure 46. Relative trends in recruitment (age 2) from cohort analysis of the DFO autumn survey data. Error bars are 95% confidence intervals.*

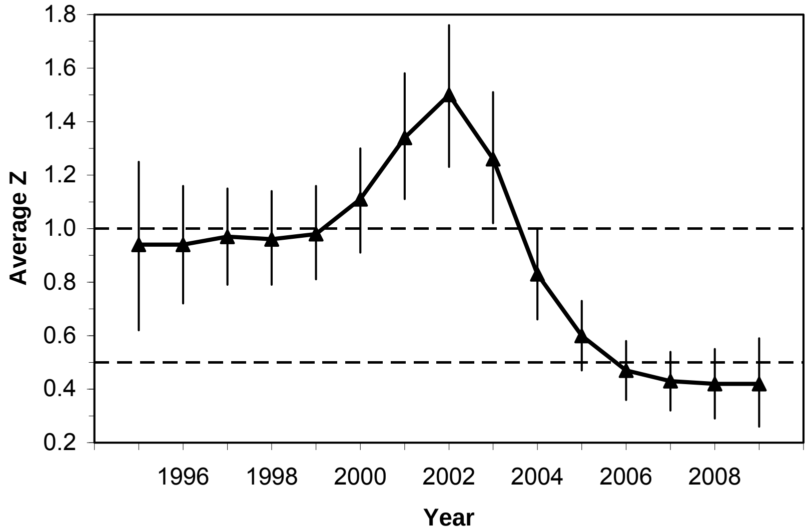



*Figure 47. Trends in the instantaneous total mortality rate (Z) of cod aged 4-8 estimated from cohort analysis of DFO autumn survey data. The dashed lines indicate values of Z=1.0 and Z=0.5 which correspond to annual mortality rates of 63% and 39%, respectively. Error bars are 95% confidence intervals.*