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**An exploratory analysis of the  
northern Gulf of St. Lawrence  
(3Pn4RS) Atlantic cod (*Gadus morhua*)  
tagging database**

**Analyse exploratoire de la base de  
données du marquage de la morue  
(*Gadus morhua*) du nord du Golfe du  
Saint-Laurent (3Pn4RS)**

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## Abstract

This document summarizes exploratory analysis of the northern Gulf of St. Lawrence cod (*Gadus morhua*) tagging database which contains information from about 44,500 releases and 2,371 (5.2%) reported recaptures of cod tagged and released in 3Pn4RS during 1995-2003. Recent catch data from 3Pn4RS cod are summarized to aid in the interpretation of tag returns; reported landings ranged from 3,100 to 6,930 t during 1997-2002. We provide some summaries of the tagging data along with suggestions on how the northern Gulf of St. Lawrence cod tagging study could be improved. The overall return rate of tagged cod is low and there is a strong seasonal pattern in the recovery rate depending on the time of release. Return rates (median percentage returned) was substantially lower (1-2%) for cod tagged in summer (July-September) when surface temperatures could be extremely warm, compared to those tagged during the cooler spring months (6-7%, April-May). There were many experiments with no recaptures and these included several with >100 releases, suggesting that initial tagging mortality was extremely high in some of the experiments; this contrasts with the results of a small number of experiments where tagged cod were held in submersible cages which showed high survival ( $\geq 82\%$ ). Over 2,000 double-tagged cod were released, but the low overall return rate resulted in too few recoveries (215 over 8 yrs) to estimate the parameters of the Kirkwood tag loss model which has been shown to adequately describe the rate of loss of t-bar anchor tags in cod. However, annual grouping of the recapture data from double tagged cod suggested that the rate of loss was not inconsistent with that reported for cod tagged in the adjacent 3Ps stock area. Data from one experiment involving simultaneous release of single-tagged and high-reward tagged cod provided a reporting rate estimate for single tagged cod of 0.38 for 2001. Annual exploitation rates calculated using the methods described by Brattey and Healey (2003) suggest high exploitation rates for cod tagged in some areas, notably 3Pn (typically 12-23% harvested per year), 4Rc (12-18%), 4Rb (5.4-18.7%), but low (4Sw) or variable rates elsewhere (4Ra, 4Rd). These estimates have considerable uncertainty because of the sparseness of the data available to estimate initial tagging mortality, tag loss, and tag reporting rate. The study could be improved by more rigorous training of fishers involved in tagging, combined with simultaneous release of batches of cod with single, double, and high reward tags at several sites throughout the stock area. Much higher proportions of double tags should be used (40%). Cage experiments to monitor initial tagging mortality should be repeated over a wider range of conditions and by the same individuals conducting the field tagging.

## Résumé

Ce document présente un résumé de l'analyse exploratoire de la base de données du marquage de la morue (*Gadus morhua*) du nord du golfe du Saint-Laurent qui contient des données sur environ 44 500 morues marquées et 2 371 (5,2 %) recaptures déclarées de morues marquées et relâchées dans 3Pn4RS entre 1995 et 2003. Nous résumons des données récentes de captures de morues dans 3Pn4RS afin de faciliter l'interprétation des données de recapture. De 1997 à 2002, les débarquements déclarés se sont chiffrés entre 3 100 et 6 930 t. Nous présentons certains résumés des données de marquage ainsi que des suggestions pour améliorer l'étude de marquage de la morue du nord du golfe du Saint-Laurent. Le taux global de recapture de morues marquées est bas et il varie grandement en fonction des saisons, selon le moment du marquage. Le taux de recapture (médiane du pourcentage de retours) a été considérablement plus bas (de 1 à 2 %) pour les morues marquées en été (entre juillet et septembre), période où la température en surface peut être très élevée, que pour les morues marquées au printemps (de 6 à 7 %, en avril ou mai). Aucune morue n'a été recapturée dans nombre d'expériences, dont plusieurs comptaient plus de 100 poissons marqués, ce qui suggère que la mortalité initiale due au marquage était extrêmement élevée dans certaines expériences. Ces résultats contrastent avec ceux d'un petit nombre d'expériences au cours desquelles des morues marquées ont été placées dans des cages submersibles et le taux de survie de ces morues a été élevé ( $\geq 82$  %). Plus de 2 000 morues à marques doubles ont été remises à l'eau, mais le faible taux global de recapture (215 recaptures en 8 ans) a fait en sorte qu'il a été impossible d'estimer les paramètres du modèle de perte de marques de Kirkwood, dont l'efficacité à décrire le taux de perte de marques à ancrage en T chez la morue a été démontrée. Cependant, le groupement par année des données de recapture de morues à marques doubles a suggéré que le taux de perte de marques était compatible avec celui observé dans la zone 3Ps adjacente. Les données d'une expérience portant sur la remise à l'eau simultanée de morues à marque simple et à marque à récompense élevée ont permis d'estimer un taux de déclaration des prises de morues à marque simple de 0,38 pour 2001. Les taux d'exploitation annuels calculés à l'aide des méthodes décrites par Bratney et Healey (2003) sont élevés pour les morues marquées dans certaines zones, notamment 3Pn (habituellement de 12 à 23 % par année), 4Rc (de 12 à 18 %), 4Rb (de 5,4 à 18,7 %), mais faibles (4Sw) ou variables ailleurs (4Ra et 4Rd). Une grande incertitude est liée à ces estimations en raison du nombre peu élevé de données disponibles pour estimer les taux de mortalité initiale due au marquage, de perte de marques et de déclaration des prises. L'étude pourrait être améliorée par une formation plus rigoureuse des pêcheurs qui participent au marquage et en libérant simultanément des lots de morues à marques simples, doubles et à marques à récompense élevée, à plusieurs sites dans l'ensemble de la zone du stock. Beaucoup plus de marques doubles devraient être utilisées (40 %). Les expériences en cage pour surveiller la mortalité initiale due au marquage devraient être répétées dans une vaste gamme de conditions par les mêmes personnes qui effectuent le marquage.

## **Introduction**

This document summarizes exploratory analysis of the northern Gulf of St. Lawrence cod tagging database and investigates whether the data could be used to estimate exploitation rates. This database comprises information on cod tagged in 3Pn4RS during 1995-2003. The data collected up to July 2000 have undergone some preliminary analysis to investigate mixing with cod in Subdiv. 3Ps (Bérubé and Fréchet 2001). However, there have been no detailed quantitative analyses of the northern Gulf of St. Lawrence cod tagging data. Here we examined the database along with additional information from field studies to determine whether we could produce reasonable estimates of important tagging parameters, i.e. tagging mortality, tag loss, and reporting rates, and thereby estimate annual exploitation rates. Recent catch data from 3Pn4RS cod are summarized briefly to aid in the interpretation of tag returns. We also provide some summaries of the recaptures from the cod tagging study and discuss limitations in analyzing the data. Suggestions on how the study could be improved are also given. Data from tagging experiments conducted in the northern Gulf of St. Lawrence prior to 1995 are summarized elsewhere (Minet 1975, 1977; Gascon et al. 1990; Moguedet 1994; Taggart et al. 1995; Gagnon 1996).

## **Materials and Methods**

Details of the methods used to tag and release fish in 3Pn4RS are given in Bérubé and Fréchet (2001). Most of the tagging was conducted by fishers who were provided with protocols and training in tagging methodology. The fish were tagged with Floy t-bar anchor tags inserted at the base of the first dorsal fin. Cod for tagging were caught with various gears (mostly hand-line and long-line, with some otter trawl and cod-trap). The tags were mostly yellow or orange in colour and bore a unique serial number and return address. Fishers were encouraged to return tags by a well-advertised lottery system, although some high-reward (\$100) tags were released in 2000 and 2001. A \$10 reward for all regular tags has been in effect since 2001.

A copy of the northern Gulf of St. Lawrence cod tagging database was provided to us in Microsoft (MS) Access97 format; this was converted to a MS Excel file with one record per tagged fish. After various error checks and editing, the database consisted of 59,525 records. After removing records where the length at tagging was <40 cm, and those where the release length, year of tagging, area of release, depth of release, or capture latitude and capture longitude were not known there were 44,524 records. For ease of analysis, all available variables were reformatted to be consistent with those used in analysis of the cod tagging database held at by the Groundfish Section of DFO in St. John's, NL. There were no experiment numbers in the northern Gulf of St. Lawrence cod tagging database and these were assigned by grouping cod caught in the same year, unit area, month, and capture gear, provided the longitude did not change by more than 0.5°(decimal), or the longitude by 0.75°(decimal), and the depth did not change by more than 150 m. Experiment numbers were assigned using year of release and sequential 3-digit numbers beginning at 001 each year.

### **Data analysis**

For many of the analyses data was grouped by unit area (see Fig. 1). The methods used to compute exploitation rates are described in detail in Bratley and Healey (2003). As in previous analyses of cod

tagging data from Subdiv. 3Ps (Brattey and Healey 2003), we did not attempt to estimate population sizes using tag returns and commercial catches in this analysis, because typically some harvesting occurs in an area different from where fish were tagged; this makes it difficult to convert local catches to local population biomass. Initially we explored the available data for information on three important tagging parameters, namely initial tagging mortality, the rate of tag loss, and rate at which tags are reported. We also provide some simple summaries of the available data to show how the distribution of recaptures is affected by factors such as year, month, area, tag type, and depth.

### **Initial tagging mortality**

Information on tagging mortality is particularly important to obtain in tagging studies. If a significant portion of cod die due to the stress of capture, handling, tagging, and release, then there may be substantially fewer tagged cod available for subsequent recapture; if these losses are not accounted for this can result in a significant negative bias in the estimates of exploitation rate. Estimates of initial tagging mortality ( $\tau$ ) were obtained from various sources. Brattey and Cadigan (2004) explored tagging mortality among 3Ps cod by retaining batches of tagged cod in submersible enclosures at various times of year and monitoring their survival. This analysis showed a significant seasonal tagging mortality effect which appears to be related to water temperature. Tagging mortality among cod > 45 cm was low (0.03) during spring and higher (0.25) during late summer and fall (August-November). Seasonal estimates of tagging mortality ( $\tau$ ) were obtained from this analysis based on the month of release of tagged cod; values of 0.03 used for cod tagged in December-June and 0.25 for cod tagged in July-November. In addition, the cod in the survival experiments in 3Ps were tagged by the same two individuals who conducted most (~65%) of the field tagging experiments in 3Ps. Brattey and Cadigan (2004) also found no evidence of differences in return rate among cod caught for tagging with different gears (hand-line versus line-trawl, cod trap, and otter trawl) at depths <200m.

### **Reporting rates**

There are three sources of information available to estimate the fraction of tags found that are actually returned. The first is based on a high-reward tagging study, described in detail in Cadigan and Brattey (2003) and updated with recent recaptures from cod released in 3Ps, but recaptured in 3Pn4RS. The second estimate is based on the same method, but uses data from single, double, and high-reward tags released in one experiments conducted in 3Pn4RS during 2001. The third is based on a questionnaire conducted by the Fish Food and Allied Workers Union (FFAW) in 2002, the results of which were presented at the Zonal Assessment Meeting in March 2003.

### **Tag loss rates**

In the 3Ps cod tagging study, tag retention rates ( $\phi$ ) were estimated from a double-tagging study (see Cadigan and Brattey 2003), which showed that tag loss mostly occurred in the first 3-4 months after release with only minimal losses (1-2% per year) thereafter. The model proposed by Kirkwood (1981) was used to estimate tag loss rates

$$\phi_t = ((\beta_0 / (\beta_0 + \beta_1 t))^{\beta_0}; \beta_0, \beta_1 \geq 0$$

where  $t$  is the time at liberty. Cadigan and Brattey (2003) show that this model is more suitable than the proportional tag loss model proposed by Barrowman and Myers (1996).

Cadigan and Brattey (2003) also found that the rate of loss of tags depends on position and that the front tag of a double tagged fish is lost at a faster rate than the back tag; thus, there are three types of recapture from a double tagged fish: (the front tag only, the back tag only, or both tags). The tag loss model was used to compute the proportion of initial number of tags applied that were retained at the median date of recapture for each recapture year. This was done separately for each type of tag return. In the 3Ps/3KL cod study, over 2,600 recaptures from double tagged fish released over a three year period and recaptured during 1997-2003 were available to estimate tag loss rates. We attempted a similar analysis using returns of double-tagged cod released in the 3Pn4RS cod tagging study.

### Estimation of exploitation rates

To estimate exploitation annually, we tracked the numbers of fish available for capture in each year, accounting for tag loss and assumed natural mortality. The recaptures from each region ( $R$ ) were adjusted by the estimated reporting rate; most of the 3Pn4RS releases were recaptured within this area. Thus the reporting rate estimate from the northern Gulf high-reward tagging data was used (see Results). In the year of release, we immediately removed those cod that die “instantly” due to tagging mortality ( $\tau$ ). The estimates of loss are computed from estimated retention rates ( $\phi$ ) using Kirkwood’s model and apportioned by the time at liberty. For each recapture year and tagging experiment, a time at liberty was computed, which in the first year corresponds to the number of weeks between the median date of release of tagged fish and the median recapture date of tagged individuals in the year of release. For subsequent years, time at liberty ( $w$ ) is calculated by incrementing the number of weeks between the annual median dates of recapture. Natural mortality ( $m$ ) was also apportioned by the time-at-liberty, i.e.  $e^{-m(w/52)}$  and  $m$  was assumed to be 0.4 per year, i.e. the value assumed in recent assessments of northern Gulf cod (Fr chet et al. 2003). Some analyses were also run with  $m$  at 0.2 per year. The methods used to keep track of the numbers of each tag type available for capture in the year of release and subsequent years are described in Brattey and Healey (2003)

The exploitation rate  $\mu(t)$  in year  $t$  for each experiment is estimated by summing the adjusted number of recaptures across tag types and dividing by the summed numbers of each tag type available to the fishery, i.e.:

$$\mu(t) = \frac{\sum_k R^*_{t(k)}}{\sum_k M_{eff(k)}(t)}.$$

The subscript  $k$  represents available tag types at time  $t$ .  $M_{eff(k)}$  is the number of type  $k$  tags available at the time of the fishery in each year.  $R^*$  is the number of reported recaptures adjusted by the reporting rate. Note that the annual median time at liberty is common across tag types within an experiment. Tagging experiments were conducted in consecutive years in some locations; thus multiple annual estimates of exploitation are given for some locations. Note that in many northern Gulf tagging experiments tagged fish were released during the fishery and the first estimate of exploitation for these releases accounts for only a portion of the total exploitation in that year. Also the tagged cod are unlikely to have dispersed widely soon after release which means the results for the year of release may have some negative or positive bias, depending on the dispersal behaviour of the fish and whether they were released in a heavily or lightly fished area.

## Results

### Spatial and temporal distribution of cod landings

Reported annual landings of cod from various unit areas in 3Pn4RS for 1997-2003 are summarized in Table 1 and Fig. 2 Total reported landings during 1997-2002 ranged from 3,100 t in 1998 to about 6,900 t in 2001. Reported landings were similar during 1999-2002 (6,500-6,900). The directed cod fishery was closed in 2003 and reported landings from by-catch and sentinel fisheries totaled only 276 t.

Landings have been well spread throughout the stock area, except in the more westerly unit areas of NAFO Div. 4S which typically have combined annual landings of less than 250 t (Table 1). Unit areas 4Rb, 4Ra and 3Pn have typically accounted for most of the landings, with 500-1,500 t reported annually from each of these unit areas in most years. Overall, the spatial distribution of landings has been similar with about 20% of the catch taken in each of 3Pn, 4Rb, and 4Rc and about 10% in 4Rd, 4Rc, and 4Sw. Excluding the 2003 landings, there is a slight trend toward higher landings in 3Pn and lower landings in 4Rd.

Monthly landings for the 2002 calendar year are summarized in Table 2. Most of the catch in the more northerly unit areas (4Rb, 4Ra, 4S) was taken in July and August, whereas the catch in the southerly areas (3Pn and 4Rd) was taken in the summer and fall (July-November) with highest monthly landings in October.

### Release information

The number of fish tagged annually in each region of the northern Gulf is summarized in Table 3. Tagging has generally been well spread throughout the stock area, particularly during 1996 and 1999-2002, but less so during 1995 and 1998. Most tags have been applied in 3Pn (17,144) followed by 4Ra (9,597) and 4S (7,174 for all unit areas combined). Tagging was continued in 3Pn and 4Rd in 2003 in spite of the closure of the directed cod fishery. There have also been small numbers of tags applied (191 and 71) in adjacent stock areas (3Ka and 3Psa, respectively).

The time of year that cod were tagged has varied by unit area and largely reflects the seasonal availability of cod throughout the stock area (Table 4). In 3Pn, some tagging has been conducted throughout April-December, but most tags have been applied in spring (April-May) and fall (October-December). In contrast, most tagging has been conducted during summer and early fall (June-October) in other areas (4Rc, 4Rb, 4Ra, and 4S). Note that much of the tagging has been conducted during the warmer summer months, often while the fishery was still in progress; the exception is in 3Pn where tagged cod have often been released in April-May which in some years was 1-2 months before the directed cod fishery opened.

Most cod (93%) have been tagged with single spaghetti t-bar anchor tags (Table 5). Double tags were also applied to about 5% of the tagged cod in most years. A total of 482 high reward (\$100) tags were available in this analysis, but these were applied only in 2000 (212) and 2001 (270).



## Recapture information

The annual numbers of recaptures from releases in each year is summarized in Table 6. Numbers tagged and reported landings have varied considerably during 1995-2003; consequently annual recaptures are quite variable. The data in Table 6 show that from the earliest releases recaptures extend over at least five years after release. The total number of recaptures has tended to increase over the past four years, from 179 in 1998 to 659 in 2002, mainly because the size of the tagged “population” available for capture has increased each year. The dramatic reduction in recaptures in 2003 reflects closure of the directed cod fishery.

The number of recaptures from each region is summarized in Table 7. The majority of recaptures (913) have come from Subdiv. 3Pn (where most cod were tagged, see Tables 3 and 4), followed by similar numbers of returns from the four unit areas in 4R. There have been few recaptures from within 4S in spite of the substantial numbers of fish tagged, notably in the warmer summer months (July-September); many of the fish tagged in this region may have died and not been available for subsequent recapture. There have been many recaptures (227) from inshore unit areas in 3Ps (3Psa/b/c) most notably from releases in 1996; only 6 cod tagged in the northern Gulf have been reported from offshore areas of 3Ps east and south of Burgeo (3Pse/f/g/h).

Recaptures by tag type are summarized in Table 8, with 2,371 of the single tags (5.6%), 215 of the doubles (8.6%), and 77 (16%) of the high-reward tags reported as recaptured.

A synopsis of details for the northern Gulf of St. Lawrence cod tagging data, based on assigned experiment numbers, is given in Table 9. There is a total of 197 tagging experiments with >25 tagged cod in the database; experiments with <25 releases are not shown. Thirty two (16.2%) of these 197 experiments had no recaptures; most of these are experiments with relatively small numbers of releases (<50), but there were some with larger numbers (>100) of releases (i.e. experiment #'s 1998-024, 1998-028, 1998-050, 1999-054, 2000-045, 2001-012, 2001-029). In unit area 4Sy there were no returns from over 600 tagged cod. This suggests high tagging mortality in some of the tagging experiments. In 30 (15.2%) of the experiments listed in Table 9 more than 10% of the tagged cod were subsequently reported as recaptured.

The median percentage recaptured from each experiment is also plotted by month of release (Fig. 3). Although there are fewer experiments conducted in spring, the comparison suggests that substantially fewer tagged cod are subsequently recaptured when the fish are released during the warmer months. The median percentages for April-June are substantially higher (5-6%) than those for July-October (1-2%); this likely reflects higher tagging mortality when surface water temperatures are warm in summer and early fall.

A summary of the annual numbers of recaptures from each tagging experiment (all tag types combined) is given in Table 10, with experiments grouped by unit area of release. Most of the experiments had small numbers of returns (<10) each year and the numbers tended to be highest in the year of release or subsequent year. Note that many of the experiments were conducted during the fishing season and so experienced only a portion of the fishery in that year. Most of the experiments with large numbers of releases and returns were conducted in 3Pn in early spring (April-May) or later in the fall (October).

## Initial tagging mortality

In the northern Gulf cod stock area, two sets of survival experiments have been conducted using tagged cod retained in submersible enclosures (J. Spingle, pers. comm); one in L'Anse au Loup Bay in September 1999 using 40 cod, and two in NAFO Div. 4S in August and September 2000 using 40 and 11 cod. Both experiments also had untagged controls. The 1999 experiments gave 100% survival (at temperatures < 6°C) and the 2000 experiments had survival rates of 90% and 82% (at temperatures of approximately 14°C and 9°C). The results indicate somewhat higher survival rates than those for comparable experiments conducted in 3Ps, although they are based on substantially smaller numbers of cage-held cod.

## Reporting rates

From the high-reward tagging study of cod in 3Ps it was possible to estimate the reporting rate for the northern Gulf area using recaptures from 3Pn4RS. Using these data, the estimate of reporting rate for 3Ps-tagged cod recaptured in 3Pn4RS was 0.52 (1997-2003 recaptures combined).

From the high-reward tagging study conducted within the northern Gulf during 2001, the estimate of reporting rate was 0.38. The reporting rates estimated from the questionnaire prepared by the FFAW were 59% for 4R and 73% for 3Pn (averaged for 1999-2002). We suspect that the questionnaire estimates will have a positive bias given that only about half the questionnaires were returned. The results from the 3Ps high-reward tag analyses are nonetheless reasonably similar.

## Tag loss rates

We attempted to analyse tag loss rates using in the northern Gulf cod tagging study using the methods described by Cadigan and Bratley (2003). In the northern Gulf, approximately 5% of the cod were initially tagged with double tags, but there were only about 215 recaptures from double tagged fish. The numbers returned and annual percentages that have lost a tag are summarized below:

|                         |    |    |    |    |
|-------------------------|----|----|----|----|
| <b>Years at liberty</b> | 0  | 1  | 2  | 3  |
| <b>Total recaptures</b> | 89 | 78 | 36 | 8  |
| <b>% lost one tag</b>   | 12 | 19 | 19 | 25 |

The raw data show that about 12% of double-tagged cod had lost a tag during the first year and about 20% by the end of the second year at liberty. Unfortunately, there were very few recaptures at > 2 years at liberty and overall the data were too sparse to fit the Kirkwood model, particularly when attempting to calculate separate loss rates for front and back tags. However, when the data in the table above are compared to Fig. 4 (which shows Kirkwood model loss rates for the front and back tag of double tagged cod in 3Ps/3KL) the results generally fall between the two lines; this suggests that tag loss rates for northern Gulf cod that are not inconsistent with those for cod tagged in 3Ps/3KL. Hence, from the available data it did not seem unreasonable to use the Kirkwood tag loss rate estimates from 3Ps to predict the number of tags retained over time for cod tagged in the northern Gulf. The estimates for the Kirkwood model parameters for single (front) tags were  $\beta_0=0.058$  and  $\beta_1=0.068$ . However, we emphasize it would be prudent to conduct much more extensive double tagging of northern Gulf cod as well as record the initials of the individuals applying the tags. This would permit more detailed analyses of overall tag loss rates as well as analyses of the effect of different individuals applying tags.

### **Exploitation estimates**

Estimates of annual exploitation (expressed as % of available numbers harvested) for each tagging experiment conducted since 2000 are summarized and grouped by unit area of release in Table 11; we did not attempt to estimate exploitation for experiments prior to 2000; we also assumed that reporting rates did not change between 2000 and 2002. Tagging has been conducted at many locations in some unit areas; consequently, there are multiple estimates of exploitation for some areas. Values for 2003 for all experiments tend to be much lower as the directed cod fishery was closed and reported landings were greatly reduced from preceding years. Note that the estimates in Table 11 do not reflect exploitation only from within the area of release; they reflect combined exploitation from all areas that generated recaptures from each experiment. The estimates using  $m=0.4$  are predictably somewhat higher than those where  $m=0.2$ , since for longer times at liberty the higher assumed value of  $m$  reduces the available tagged population substantially.

For cod tagged in 3Pn, the estimates of annual exploitation are high even at  $m$  of 0.2, ranging from 9.9 to 23% in 2001 and from 7.2 to 40% in 2002 (excluding estimates for experiments conducted during the fishing season). The averages for 3Pn in 2001 and 2002 are approximately 15-18% from total reported landings of under 7,000 t in each of these years. The estimates for cod tagged in 4Rc and 4Rb are broadly similar to those for 3Pn, whereas the estimates for 4Ra and 4Sw are substantially lower, and those for 4Rd are highly variable.

### **Spatial and temporal distribution of recaptures**

Annual summaries of the distribution of recaptures, grouped by unit area and year of release, are given in Table 12. For releases in most unit areas, over 50% of the returns come from within the area of release; however, many recaptures are quite well spread throughout the stock area even within the year of release. Cod tagged in 4S appear to show less dispersal, with most returns from within 4S and neighbouring 4Ra.

## Discussion

In our exploratory analysis of the northern Gulf cod tagging database we have attempted to produce some annual estimates of exploitation rate from the data using the methods described by Brattey and Healey (2003). For the northern Gulf cod tagging program the overall return rate of tags is quite low and the information available to estimate tagging mortality, tag loss and reporting rates is quite sparse; consequently, our estimates of these parameters have considerable uncertainty. Our main concern is with estimates of initial tagging mortality, particularly for cod tagged in the warmer summer months which includes most of the cod tagged in 4R and 4S. Brattey and Cadigan (2004) found much higher tagging mortality (25%) among cod tagged in summer and fall off the south and northeast coast of Newfoundland. Water temperatures in the Gulf during summer and fall can be substantially higher, which could result in much higher mortality. The lower rates of return for northern Gulf cod tagged in the warmer months and the presence of experiments with quite high numbers of releases, but no subsequent recaptures, suggests that initial tagging mortality may be very high in some experiments. The tagged cod survival experiments show high survival, but these may have been conducted by relatively few individuals who may have been more careful compared to some of the fishers that have conducted the tagging. Given that a large number of different individuals are conducting the tagging, it is important that in subsequent analysis the tagger is recorded in the database so that tagger effects can be quantified in subsequent analyses. It may be more prudent to have a small number of individuals in each region conducting tagging to minimize tagger effects as a source of variability.

Release of double tagged cod is an important component of quantitative tagging studies and provides information to evaluate tag loss rates. Our exploratory analysis suggests that the fraction of tagged fish that were given two tags was too small to evaluate tag loss rates effectively, particularly with the low overall return rates. In future, we would recommend that about 40% of the cod be tagged with double tags for at least a couple of years and that double tags be applied by all individuals conducting tagging. The double tags should be applied and recorded in a manner that allows them to be distinguished and the position of the returned tag should be recorded in subsequent tagging experiments, given that front and back tags have a different loss rate (Cadigan and Brattey 2004).

We have not been able to estimate reporting rates annually or assess how they may vary regionally within 3Pn4RS from the high-reward tag returns because the usable data were restricted to a single experiment conducted in 3Pn in 2001. Nonetheless, this experiment has proven extremely valuable and suggests that reward values have a considerable influence on the fishers willingness to return tags. We note that the estimate from this experiment is quite low relative to estimates for 3Ps, but is broadly consistent with the 3Pn4RS estimate from the Cadigan and Brattey (2003) study. Simultaneous release of cod with single, double and high-reward tags at several sites throughout the stock area would greatly improve the estimates of reporting rate.

It remains difficult to assess the validity of the assumption of a natural mortality rate of 0.4 per year for northern Gulf cod. However, as the time at liberty for tagged cod extends to several years the tagging data should provide some information about the validity of this assumption. If substantial numbers of returns come in after the tagged population is estimated to have declined to zero this may indicate that the assumed  $m$  is too high. Assumptions about  $m$  are confounded with the parameter for initial tagging mortality, so it is also important to conduct many more cage retention experiments over a wider range of environmental conditions, depths and capture gears. The tagging in such experiments should be conducted by individuals performing the mark/recapture experiments. The large number of very small cod that have been tagged that were omitted from the current analyses suggests that some taggers were

not following the protocols closely and are tagging fish that are too small, particularly during the early years of the tagging study (1995 and 1996).

We emphasize that the estimates we have produced for annual exploitation rates have considerable uncertainty. The data available from the northern Gulf study was too sparse to estimate some of the parameters required to estimate exploitation rates and we had to assume that some the values from the 3Ps tagging study could be applied here. However, within most unit areas of release the estimates of exploitation rate are broadly coherent among tagging experiments. The estimates for 3Pn in particular, as well as 4Rb and 4Rc, are high given the relatively small reported catches from the stock in 2000-2002 of around 6,500 t per year. For quantitative analysis, the study could be improved by more rigorous training of fishers involved in tagging, combined with simultaneous release of batches of cod with single, double, and high reward tags at several sites throughout the stock area. Much higher proportions of double tags should be used (40%) and cage experiments to monitor initial tagging mortality should be repeated over a wider range of conditions and by the same individuals conducting the field tagging.

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**Table 1. Annual reported landings of cod from 3Pn4RS during 1997-2003**

| Year | 3PN     | 4Rd   | 4Rc   | 4Rb     | 4Ra     | 4Sv   | 4Sw   | 4Sxyz | Totals  |
|------|---------|-------|-------|---------|---------|-------|-------|-------|---------|
| 1997 | 2,005.8 | 299.0 | 593.4 | 600.2   | 805.8   | 140.6 | 327.3 | 19.7  | 4,791.8 |
| 1998 | 870.1   | 635.8 | 281.3 | 366.6   | 386.5   | 60.6  | 476.3 | 33.2  | 3,110.6 |
| 1999 | 1,164.6 | 944.0 | 908.2 | 1,478.1 | 1,551.3 | 123.9 | 632.0 | 88.3  | 6,890.4 |
| 2000 | 1,478.5 | 800.1 | 728.4 | 1,438.8 | 1,215.0 | 179.6 | 660.1 | 139.9 | 6,640.3 |
| 2001 | 1,739.6 | 717.0 | 995.4 | 1,268.8 | 1,310.4 | 252.4 | 569.6 | 80.5  | 6,933.6 |
| 2002 | 1,712.8 | 590.8 | 794.9 | 1,376.5 | 1,172.3 | 123.1 | 686.1 | 69.4  | 6,526.0 |
| 2003 | 34.9    | 59.1  | 14.0  | 55.4    | 20.5    | 19.4  | 60.1  | 12.7  | 276.0   |

**Table 2. Reported monthly landings of cod (in metric tons) from 3Pn4RS by unit area during 2002.**

|               | 3Pn            | 4Rd          | 4Rc          | 4Rb            | 4Ra            | 4S           |
|---------------|----------------|--------------|--------------|----------------|----------------|--------------|
| Jan           | 0.6            | 0.0          | 0.0          | 0.0            | 0.0            | 0.0          |
| Feb           | 167.1          | 0.0          | 0.0          | 0.0            | 0.0            | 0.0          |
| Mar           | 5.6            | 0.0          | 0.0          | 0.0            | 0.0            | 0.0          |
| Apr           | 6.9            | 0.0          | 0.0          | 0.2            | 0.0            | 2.9          |
| May           | 105.2          | 28.5         | 2.4          | 5.6            | 3.5            | 27.2         |
| Jun           | 3.2            | 15.4         | 5.2          | 7.6            | 10.1           | 13.9         |
| Jul           | 191.5          | 124.7        | 512.5        | 632.9          | 488.3          | 557.3        |
| Aug           | 166.5          | 87.1         | 152.0        | 354.9          | 519.4          | 207.9        |
| Sep           | 174.8          | 110.6        | 87.7         | 273.8          | 141.0          | 63.7         |
| Oct           | 586.3          | 142.7        | 23.7         | 91.0           | 9.9            | 3.9          |
| Nov           | 298.5          | 81.7         | 11.5         | 10.5           | 0.0            | 1.9          |
| Dec           | 6.6            | 0.0          | 0.0          | 0.0            | 0.2            | 0.0          |
| <b>Totals</b> | <b>1,712.8</b> | <b>590.8</b> | <b>794.9</b> | <b>1,376.5</b> | <b>1,172.3</b> | <b>878.7</b> |

**Table 3. Numbers of cod (>40 cm) tagged and released in 3Pn4RS during 1995-2003.**

| Year/Area     | 3Psa       | 3Pn           | 4Rd          | 4Rc          | 4Rb          | 4Ra          | 3Ka       | 4S           | Totals        |
|---------------|------------|---------------|--------------|--------------|--------------|--------------|-----------|--------------|---------------|
| 1995          | 0          | 312           | 0            | 549          | 130          | 155          | 0         | 0            | 1,146         |
| 1996          | 175        | 3,858         | 715          | 913          | 1,148        | 2,558        | 71        | 1,133        | 10,571        |
| 1997          | 4          | 388           | 0            | 486          | 277          | 860          | 0         | 863          | 2,878         |
| 1998          | 0          | 176           | 0            | 0            | 0            | 299          | 0         | 2,325        | 2,800         |
| 1999          | 12         | 1,955         | 190          | 981          | 707          | 1,295        | 0         | 1,211        | 6,351         |
| 2000          | 0          | 2,898         | 605          | 613          | 718          | 1,437        | 0         | 784          | 7,055         |
| 2001          | 0          | 3,029         | 465          | 354          | 502          | 2,335        | 0         | 257          | 6,942         |
| 2002          | 0          | 3,404         | 173          | 450          | 182          | 658          | 0         | 601          | 5,468         |
| 2003          | 0          | 1,124         | 189          | 0            | 0            | 0            | 0         | 0            | 1,313         |
| <b>Totals</b> | <b>191</b> | <b>17,144</b> | <b>2,337</b> | <b>4,346</b> | <b>3,664</b> | <b>9,597</b> | <b>71</b> | <b>7,174</b> | <b>44,524</b> |

**Table 4. Numbers of cod tagged and released in each unit area by month.**

|               | 3Psa | 3Pn    | 4Rd   | 4Rc   | 4Rb   | 4Ra   | 4S    | 3Ka | Totals |
|---------------|------|--------|-------|-------|-------|-------|-------|-----|--------|
| Jan           | 4    | 0      | 0     | 0     | 0     | 0     | 0     | 0   | 4      |
| Feb           | 0    | 11     | 0     | 0     | 0     | 0     | 0     | 0   | 11     |
| Mar           | 0    | 0      | 0     | 0     | 0     | 0     | 0     | 0   | 0      |
| Apr           | 0    | 1,408  | 0     | 0     | 0     | 0     | 0     | 0   | 1,408  |
| May           | 0    | 4,110  | 0     | 1     | 0     | 0     | 0     | 0   | 4,111  |
| Jun           | 0    | 409    | 96    | 1,203 | 283   | 733   | 20    | 0   | 2,744  |
| Jul           | 0    | 151    | 292   | 819   | 502   | 2,758 | 1,102 | 32  | 5,656  |
| Aug           | 0    | 481    | 41    | 954   | 773   | 2,536 | 3,860 | 33  | 8,678  |
| Sep           | 0    | 724    | 189   | 574   | 1,023 | 2,267 | 2,074 | 6   | 6,857  |
| Oct           | 0    | 3,600  | 965   | 758   | 1,061 | 1,303 | 118   | 0   | 7,805  |
| Nov           | 120  | 4,629  | 738   | 37    | 22    | 0     | 0     | 0   | 5,546  |
| Dec           | 67   | 1,621  | 16    | 0     | 0     | 0     | 0     | 0   | 1,704  |
| <b>Totals</b> | 191  | 17,144 | 2,337 | 4,346 | 3,664 | 9,597 | 7,174 | 71  | 44,524 |

**Table 5. Numbers of cod tagged in 3Pn4RS by tag type.**

| Rel. year     | Single | Double | High-reward |
|---------------|--------|--------|-------------|
| 1995          | 1,146  | 0      | 0           |
| 1996          | 10,446 | 1,215  | 0           |
| 1997          | 2,846  | 32     | 0           |
| 1998          | 2,710  | 90     | 0           |
| 1999          | 5,822  | 529    | 0           |
| 2000          | 6,188  | 655    | 212         |
| 2001          | 6,085  | 587    | 270         |
| 2002          | 5,039  | 429    | 0           |
| 2003          | 1,255  | 58     | 0           |
| <b>Totals</b> | 41,537 | 2,505  | 482         |



**Table 6. Summary of recaptures of cod tagged and released in 3Pn4RS during 1995-2003**

| Year released | Nos. tagged   | Numbers reported recaptured/year |            |            |            |            |            |            |           | Totals      |
|---------------|---------------|----------------------------------|------------|------------|------------|------------|------------|------------|-----------|-------------|
|               |               | 1996                             | 1997       | 1998       | 1999       | 2000       | 2001       | 2002       | 2003      |             |
| 1995          | 1,146         | 16                               | 17         | 7          | 5          | 3          | 1          | 0          | 0         | 49          |
| 1996          | 10,571        | 33                               | 159        | 139        | 95         | 44         | 24         | 31         | 0         | 525         |
| 1997          | 2,878         | .                                | 29         | 28         | 34         | 15         | 11         | 4          | 1         | 122         |
| 1998          | 2,800         | .                                | .          | 5          | 26         | 22         | 16         | 7          | 0         | 76          |
| 1999          | 6,351         | .                                | .          | .          | 134        | 140        | 99         | 46         | 2         | 421         |
| 2000          | 7,055         | .                                | .          | .          | .          | 134        | 193        | 122        | 8         | 457         |
| 2001          | 6,942         | .                                | .          | .          | .          | .          | 151        | 221        | 19        | 391         |
| 2002          | 5,468         | .                                | .          | .          | .          | .          | .          | 228        | 37        | 265         |
| 2003          | 1,313         | .                                | .          | .          | .          | .          | .          | .          | 7         | 7           |
| <b>Totals</b> | <b>44,524</b> | <b>49</b>                        | <b>205</b> | <b>179</b> | <b>294</b> | <b>358</b> | <b>495</b> | <b>659</b> | <b>74</b> | <b>2313</b> |

**Table 7. Numbers of tagged cod reported as recapture by year and area from releases in 3Pn4RS during 1995-2003.**

| Recapture Year | Recapture region* |           |           |            |           |            |            |            |            |            |          |          |
|----------------|-------------------|-----------|-----------|------------|-----------|------------|------------|------------|------------|------------|----------|----------|
|                | 3Ps_off           | 3Psc      | 3Psb      | 3Psa       | 3Psd      | 3Pn        | 4Rd        | 4Rc        | 4Rb        | 4Ra        | 4S       | 4Tvn     |
| 1995           | 0                 | 0         | 1         | 4          | 0         | 10         | 5          | 22         | 5          | 6          | 0        | 0        |
| 1996           | 5                 | 37        | 22        | 38         | 7         | 228        | 41         | 46         | 52         | 43         | 2        | 1        |
| 1997           | 0                 | 5         | 1         | 8          | 1         | 23         | 12         | 22         | 19         | 22         | 0        | 1        |
| 1998           | 0                 | 0         | 0         | 0          | 0         | 21         | 0          | 2          | 5          | 23         | 1        | 0        |
| 1999           | 0                 | 5         | 1         | 38         | 1         | 128        | 42         | 47         | 64         | 64         | 3        | 1        |
| 2000           | 0                 | 6         | 2         | 28         | 2         | 149        | 66         | 74         | 63         | 47         | 0        | 0        |
| 2001           | 0                 | 4         | 1         | 10         | 2         | 184        | 31         | 43         | 44         | 35         | 2        | 0        |
| 2002           | 1                 | 1         | 1         | 13         | 6         | 168        | 10         | 17         | 30         | 7          | 0        | 0        |
| 2003           | 0                 | 0         | 1         | 0          | 0         | 2          | 0          | 1          | 2          | 1          | 0        | 0        |
| <b>Totals</b>  | <b>6</b>          | <b>58</b> | <b>30</b> | <b>139</b> | <b>19</b> | <b>913</b> | <b>207</b> | <b>274</b> | <b>284</b> | <b>248</b> | <b>8</b> | <b>3</b> |

\*145 recaptures with missing area

**Table 8. Numbers of recaptures of tagged cod from releases in 3Pn4RS by tag type.**

| Release year  | Reported recaptures |            |             |
|---------------|---------------------|------------|-------------|
|               | Single              | Double     | High-reward |
| 1995          | 54                  | 0          | 0           |
| 1996          | 568                 | 6          | 0           |
| 1997          | 127                 | 3          | 0           |
| 1998          | 76                  | 4          | 0           |
| 1999          | 424                 | 69         | 0           |
| 2000          | 458                 | 69         | 13          |
| 2001          | 392                 | 34         | 64          |
| 2002          | 265                 | 30         | 0           |
| 2003          | 7                   | 0          | 0           |
| <b>Totals</b> | <b>2,371</b>        | <b>215</b> | <b>77</b>   |

**Table 9. Summary of details for northern Gulf cod (3Pn4RS) tagging experiments conducted during 1995-2003 (LLS=longline, FPN=cod trap, GNS=gill net, LHP=hand-line, OTB= otter trawl). Only experiments with >25 tagged cod released are shown.**

| Expt. number | Release area | Date of release |           | Position of release |       |                  |       | Depth of capture |     | Gear type | Mean length (cm) | Number tagged | Number recaptured | Percent recaptured |
|--------------|--------------|-----------------|-----------|---------------------|-------|------------------|-------|------------------|-----|-----------|------------------|---------------|-------------------|--------------------|
|              |              | min             | max       | Latitude (dec.)     |       | Longitude (dec.) |       | min              | max |           |                  |               |                   |                    |
|              |              | min             | max       | min                 | max   | min              | max   | min              | max |           |                  |               |                   |                    |
| 1995001      | 3PN          | 11-Nov-95       | 30-Nov-95 | 47.50               | 47.55 | 58.72            | 59.17 | 47               | 174 | LLS       | 54.3             | 109           | 6                 | 5.5                |
| 1995002      | 3PN          | 13-Nov-95       | 30-Nov-95 | 47.56               | 47.57 | 58.59            | 58.73 | 25               | 70  | LLS       | 55.0             | 110           | 8                 | 7.3                |
| 1995003      | 3PN          | 4-Dec-95        | 6-Dec-95  | 47.51               | 47.57 | 58.64            | 59.12 | 44               | 144 | LLS       | 53.5             | 93            | 2                 | 2.2                |
| 1995004      | 4RA          | 17-Jul-95       | 21-Jul-95 | 51.40               | 51.40 | 56.56            | 56.56 | 11               | 11  | FPN       | 44.8             | 144           | 5                 | 3.5                |
| 1995006      | 4RB          | 15-Sep-95       | 25-Sep-95 | 49.59               | 49.59 | 57.94            | 57.94 | 18               | 18  | FPN       | 44.3             | 45            | 3                 | 6.7                |
| 1995007      | 4RB          | 2-Oct-95        | 2-Oct-95  | 49.59               | 49.59 | 57.94            | 57.94 | 9                | 9   | FPN       | 47.3             | 39            | 1                 | 2.6                |
| 1995008      | 4RB          | 22-Sep-95       | 22-Sep-95 | 49.66               | 49.66 | 58.01            | 58.01 | 40               | 40  | LLS       | 53.1             | 46            | 1                 | 2.2                |
| 1995010      | 4RC          | 26-Sep-95       | 28-Sep-95 | 49.14               | 49.15 | 58.40            | 58.43 | 37               | 45  | LLS       | 65.5             | 177           | 8                 | 4.5                |
| 1995011      | 4RC          | 2-Oct-95        | 21-Oct-95 | 49.09               | 49.21 | 58.29            | 58.43 | 37               | 52  | LLS       | 59.3             | 368           | 20                | 5.4                |
| 1996001      | 3KA          | 30-Jul-96       | 31-Jul-96 | 51.47               | 51.47 | 55.42            | 55.42 | 29               | 29  | LLS       | 48.8             | 32            | 0                 | 0.0                |
| 1996002      | 3KA          | 1-Aug-96        | 23-Aug-96 | 51.47               | 51.62 | 55.40            | 55.42 | 29               | 40  | LLS       | 46.0             | 33            | 0                 | 0.0                |
| 1996004      | 3PN          | 5-Aug-96        | 25-Aug-96 | 47.43               | 47.56 | 58.75            | 59.22 | 37               | 153 | LLS       | 56.9             | 167           | 21                | 12.6               |
| 1996005      | 3PN          | 12-Aug-96       | 22-Aug-96 | 47.63               | 47.65 | 58.15            | 58.21 | 15               | 51  | LLS       | 57.3             | 302           | 43                | 14.2               |
| 1996006      | 3PN          | 1-Sep-96        | 18-Sep-96 | 47.50               | 47.55 | 58.95            | 59.23 | 44               | 157 | LLS       | 51.9             | 237           | 22                | 9.3                |
| 1996007      | 3PN          | 17-Sep-96       | 17-Sep-96 | 47.56               | 47.56 | 58.06            | 58.06 | 201              | 201 | LLS       | 63.5             | 35            | 0                 | 0.0                |
| 1996008      | 3PN          | 20-Sep-96       | 22-Sep-96 | 47.57               | 47.57 | 58.74            | 58.89 | 101              | 120 | LLS       | 46.0             | 64            | 4                 | 6.3                |
| 1996009      | 3PN          | 18-Sep-96       | 18-Sep-96 | 47.57               | 47.57 | 58.08            | 58.08 | 82               | 82  | LLS       | 54.7             | 57            | 3                 | 5.3                |
| 1996010      | 3PN          | 30-Sep-96       | 30-Sep-96 | 47.58               | 47.58 | 58.86            | 58.86 | 80               | 80  | LLS       | 49.2             | 77            | 1                 | 1.3                |
| 1996011      | 3PN          | 2-Sep-96        | 8-Sep-96  | 47.63               | 47.63 | 58.23            | 58.28 | 18               | 29  | LLS       | 56.0             | 254           | 40                | 15.7               |
| 1996012      | 3PN          | 18-Oct-96       | 31-Oct-96 | 47.52               | 47.55 | 58.72            | 59.17 | 99               | 158 | LLS       | 55.1             | 184           | 16                | 8.7                |
| 1996013      | 3PN          | 28-Oct-96       | 28-Oct-96 | 47.56               | 47.56 | 58.07            | 58.07 | 144              | 144 | LLS       | 53.2             | 26            | 0                 | 0.0                |
| 1996014      | 3PN          | 9-Oct-96        | 28-Oct-96 | 47.56               | 47.56 | 58.70            | 58.87 | 130              | 150 | LLS       | 52.9             | 185           | 4                 | 2.2                |
| 1996016      | 3PN          | 8-Oct-96        | 30-Oct-96 | 47.58               | 47.63 | 58.29            | 58.72 | 20               | 129 | LLS       | 57.0             | 475           | 49                | 10.3               |
| 1996017      | 3PN          | 5-Nov-96        | 20-Nov-96 | 47.46               | 47.57 | 58.66            | 59.17 | 49               | 212 | LLS       | 54.0             | 832           | 37                | 4.4                |
| 1996018      | 3PN          | 14-Nov-96       | 14-Nov-96 | 47.57               | 47.57 | 58.07            | 58.07 | 156              | 156 | LLS       | 54.8             | 40            | 2                 | 5.0                |
| 1996019      | 3PN          | 5-Nov-96        | 25-Nov-96 | 47.57               | 47.69 | 58.06            | 58.86 | 10               | 140 | LLS       | 52.0             | 565           | 54                | 9.6                |
| 1996020      | 3PN          | 3-Dec-96        | 14-Dec-96 | 47.57               | 47.63 | 58.32            | 58.72 | 20               | 129 | LLS       | 46.8             | 251           | 9                 | 3.6                |
| 1996021      | 3PN          | 9-Oct-96        | 14-Oct-96 | 47.27               | 47.47 | 58.13            | 58.67 | 168              | 218 | OTB       | 53.0             | 48            | 2                 | 4.2                |
| 1996023      | 3PN          | 12-Oct-96       | 19-Oct-96 | 47.48               | 47.52 | 58.25            | 58.65 | 156              | 231 | OTB       | 54.3             | 28            | 1                 | 3.6                |
| 1996025      | 3PSA         | 6-Nov-96        | 23-Nov-96 | 47.53               | 47.55 | 57.67            | 57.68 | 30               | 95  | OTB       | 52.3             | 108           | 6                 | 5.6                |
| 1996026      | 3PSA         | 4-Dec-96        | 18-Dec-96 | 47.53               | 47.54 | 57.68            | 57.70 | 30               | 112 | OTB       | 50.1             | 67            | 2                 | 3.0                |
| 1996031      | 4RA          | 10-Sep-96       | 26-Sep-96 | 50.75               | 50.87 | 57.30            | 57.35 | 30               | 100 | GNS       | 59.4             | 62            | 5                 | 8.1                |
| 1996032      | 4RA          | 12-Aug-96       | 23-Aug-96 | 51.42               | 51.64 | 56.44            | 56.65 | 36               | 73  | LHP       | 49.3             | 65            | 2                 | 3.1                |
| 1996033      | 4RA          | 3-Sep-96        | 27-Sep-96 | 51.40               | 51.47 | 56.60            | 57.02 | 36               | 109 | LHP       | 46.8             | 293           | 6                 | 2.0                |
| 1996035      | 4RA          | 3-Aug-96        | 30-Aug-96 | 50.77               | 51.72 | 56.33            | 57.33 | 26               | 109 | LLS       | 49.7             | 988           | 25                | 2.5                |
| 1996036      | 4RA          | 2-Sep-96        | 30-Sep-96 | 50.80               | 51.52 | 56.65            | 57.32 | 13               | 111 | LLS       | 48.6             | 639           | 8                 | 1.3                |
| 1996038      | 4RA          | 4-Sep-96        | 30-Sep-96 | 51.64               | 51.68 | 56.43            | 56.54 | 40               | 80  | LLS       | 43.6             | 71            | 0                 | 0.0                |
| 1996039      | 4RA          | 2-Oct-96        | 22-Oct-96 | 50.73               | 51.08 | 57.05            | 57.50 | 18               | 128 | LLS       | 47.5             | 110           | 2                 | 1.8                |
| 1996040      | 4RA          | 2-Oct-96        | 17-Oct-96 | 51.24               | 51.66 | 56.43            | 57.04 | 24               | 114 | LLS       | 47.3             | 264           | 3                 | 1.1                |
| 1996043      | 4RB          | 7-Oct-96        | 10-Oct-96 | 49.60               | 49.60 | 57.95            | 57.95 | 20               | 20  | FPN       | 48.2             | 159           | 13                | 8.2                |
| 1996044      | 4RB          | 25-Aug-96       | 28-Aug-96 | 49.51               | 49.51 | 58.25            | 58.26 | 36               | 36  | GNS       | 49.7             | 139           | 6                 | 4.3                |
| 1996045      | 4RB          | 4-Sep-96        | 27-Sep-96 | 49.47               | 49.50 | 58.13            | 58.25 | 24               | 36  | GNS       | 48.4             | 121           | 6                 | 5.0                |
| 1996047      | 4RB          | 1-Aug-96        | 20-Aug-96 | 50.05               | 50.22 | 57.63            | 57.76 | 33               | 51  | LLS       | 53.8             | 40            | 2                 | 5.0                |
| 1996048      | 4RB          | 12-Sep-96       | 27-Sep-96 | 49.59               | 50.25 | 57.58            | 57.95 | 20               | 50  | LLS       | 47.7             | 438           | 21                | 4.8                |
| 1996049      | 4RB          | 1-Oct-96        | 3-Oct-96  | 49.59               | 49.59 | 57.95            | 57.95 | 20               | 20  | LLS       | 44.7             | 209           | 11                | 5.3                |
| 1996059      | 4RC          | 5-Aug-96        | 29-Aug-96 | 48.68               | 48.73 | 59.02            | 59.05 | 36               | 40  | LLS       | 50.6             | 251           | 15                | 6.0                |
| 1996060      | 4RC          | 6-Aug-96        | 28-Aug-96 | 49.14               | 49.19 | 58.40            | 58.47 | 40               | 53  | LLS       | 62.4             | 482           | 36                | 7.5                |
| 1996061      | 4RC          | 10-Sep-96       | 25-Sep-96 | 48.70               | 48.72 | 59.03            | 59.03 | 40               | 40  | LLS       | 59.2             | 62            | 1                 | 1.6                |
| 1996062      | 4RC          | 23-Oct-96       | 23-Oct-96 | 49.10               | 49.10 | 58.30            | 58.30 | 64               | 64  | LLS       | 60.0             | 27            | 3                 | 11.1               |
| 1996063      | 4RC          | 27-Nov-96       | 29-Nov-96 | 49.09               | 49.10 | 58.30            | 58.34 | 37               | 44  | LLS       | 57.8             | 37            | 1                 | 2.7                |
| 1996066      | 4RD          | 9-Sep-96        | 9-Sep-96  | 47.65               | 47.65 | 59.33            | 59.33 | 46               | 46  | LLS       | 54.9             | 30            | 2                 | 6.7                |
| 1996067      | 4RD          | 10-Sep-96       | 12-Sep-96 | 48.38               | 48.38 | 58.74            | 58.74 | 27               | 27  | LLS       | 65.8             | 27            | 1                 | 3.7                |
| 1996068      | 4RD          | 17-Sep-96       | 25-Sep-96 | 48.44               | 48.46 | 58.69            | 59.27 | 20               | 55  | LLS       | 55.3             | 52            | 6                 | 11.5               |
| 1996069      | 4RD          | 8-Oct-96        | 30-Oct-96 | 47.82               | 47.89 | 59.40            | 59.45 | 33               | 55  | LLS       | 53.5             | 315           | 25                | 7.9                |
| 1996071      | 4RD          | 12-Nov-96       | 30-Nov-96 | 47.87               | 47.87 | 59.42            | 59.42 | 13               | 33  | LLS       | 54.9             | 121           | 7                 | 5.8                |
| 1996073      | 4RD          | 13-Oct-96       | 13-Oct-96 | 48.20               | 48.22 | 59.32            | 59.47 | 101              | 128 | OTB       | 49.6             | 50            | 4                 | 8.0                |
| 1996075      | 4RD          | 13-Oct-96       | 13-Oct-96 | 48.30               | 48.48 | 59.42            | 59.68 | 111              | 176 | OTB       | 51.6             | 58            | 2                 | 3.4                |
| 1996077      | 4SW          | 25-Aug-96       | 28-Aug-96 | 51.30               | 51.30 | 57.79            | 57.79 | 30               | 32  | LHP       | 51.2             | 113           | 2                 | 1.8                |
| 1996078      | 4SW          | 27-Aug-96       | 31-Aug-96 | 51.33               | 51.38 | 57.24            | 57.58 | 19               | 47  | LHP       | 48.9             | 358           | 6                 | 1.7                |
| 1996079      | 4SW          | 2-Sep-96        | 23-Sep-96 | 51.28               | 51.31 | 57.78            | 57.80 | 28               | 47  | LHP       | 49.7             | 118           | 7                 | 5.9                |
| 1996080      | 4SW          | 1-Sep-96        | 18-Sep-96 | 51.32               | 51.39 | 57.19            | 57.58 | 12               | 50  | LHP       | 47.1             | 520           | 14                | 2.7                |

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**Table 9. Details of northern Gulf cod tagging experiments (cont'd).**

| Expt. number | Release area | Date of release |           | Position of release |       |                  |       | Depth of capture |     | Gear type | Mean length (cm) | Number tagged | Number recaptured | Percent recaptured |
|--------------|--------------|-----------------|-----------|---------------------|-------|------------------|-------|------------------|-----|-----------|------------------|---------------|-------------------|--------------------|
|              |              | min             | max       | Latitude (dec.)     |       | Longitude (dec.) |       | min              | max |           |                  |               |                   |                    |
| 1997002      | 3PN          | 11-Jun-97       | 24-Jun-97 | 47.54               | 47.57 | 58.86            | 58.95 | 120              | 140 | LLS       | 52.1             | 194           | 17                | 8.8                |
| 1997003      | 3PN          | 4-Nov-97        | 12-Nov-97 | 47.43               | 47.56 | 58.80            | 59.00 | 117              | 149 | LLS       | 55.0             | 183           | 11                | 6.0                |
| 1997005      | 4RA          | 26-Aug-97       | 28-Aug-97 | 51.22               | 51.43 | 56.82            | 56.87 | 34               | 51  | LLS       | 43.6             | 129           | 4                 | 3.1                |
| 1997006      | 4RA          | 1-Sep-97        | 26-Sep-97 | 51.05               | 51.52 | 56.77            | 57.27 | 10               | 106 | LLS       | 46.6             | 452           | 6                 | 1.3                |
| 1997007      | 4RA          | 1-Oct-97        | 16-Oct-97 | 51.24               | 51.51 | 56.77            | 57.04 | 26               | 93  | LLS       | 43.1             | 279           | 5                 | 1.8                |
| 1997008      | 4RB          | 3-Sep-97        | 17-Sep-97 | 50.25               | 50.25 | 57.60            | 57.60 | 31               | 31  | LLS       | 45.5             | 130           | 7                 | 5.4                |
| 1997009      | 4RB          | 7-Oct-97        | 7-Oct-97  | 50.25               | 50.25 | 57.60            | 57.60 | 31               | 31  | LLS       | 44.1             | 147           | 1                 | 0.7                |
| 1997011      | 4RC          | 25-Jun-97       | 30-Jun-97 | 48.70               | 48.70 | 59.05            | 59.05 | 40               | 40  | LLS       | 55.8             | 170           | 18                | 10.6               |
| 1997012      | 4RC          | 1-Jul-97        | 1-Jul-97  | 48.70               | 48.70 | 59.05            | 59.05 | 40               | 40  | LLS       | 58.3             | 98            | 6                 | 6.1                |
| 1997013      | 4RC          | 21-Aug-97       | 23-Aug-97 | 49.12               | 49.12 | 58.43            | 58.43 | 40               | 40  | LLS       | 48.8             | 198           | 21                | 10.6               |
| 1997021      | 4SW          | 21-Jul-97       | 30-Jul-97 | 51.31               | 51.38 | 57.23            | 57.71 | 13               | 40  | LHP       | 53.5             | 39            | 0                 | 0.0                |
| 1997022      | 4SW          | 1-Aug-97        | 28-Aug-97 | 51.28               | 51.39 | 57.22            | 57.81 | 13               | 40  | LHP       | 48.8             | 534           | 21                | 3.9                |
| 1997024      | 4SW          | 1-Sep-97        | 16-Sep-97 | 51.31               | 51.31 | 57.79            | 57.80 | 24               | 28  | LHP       | 49.2             | 56            | 2                 | 3.6                |
| 1997025      | 4SW          | 1-Sep-97        | 23-Sep-97 | 51.31               | 51.39 | 57.16            | 57.58 | 5                | 40  | LHP       | 48.3             | 183           | 1                 | 0.5                |
| 1998001      | 3PN          | 15-Dec-98       | 15-Dec-98 | 47.55               | 47.57 | 58.68            | 58.72 | 132              | 141 | LHP       | 52.6             | 45            | 0                 | 0.0                |
| 1998004      | 3PN          | 20-Nov-98       | 20-Nov-98 | 47.66               | 47.66 | 58.37            | 58.37 | 55               | 55  | LLS       | 50.3             | 113           | 15                | 13.3               |
| 1998005      | 4RA          | 27-Aug-98       | 31-Aug-98 | 51.62               | 51.64 | 56.45            | 56.53 | 60               | 60  | LHP       | 45.8             | 289           | 11                | 3.8                |
| 1998010      | 4SW          | 25-Jul-98       | 25-Jul-98 | 51.43               | 51.43 | 57.24            | 57.24 | 6                | 6   | FPN       | 49.1             | 57            | 7                 | 12.3               |
| 1998012      | 4SW          | 23-Jul-98       | 24-Jul-98 | 50.71               | 50.82 | 58.83            | 58.91 | 15               | 22  | LHP       | 43.3             | 60            | 1                 | 1.7                |
| 1998013      | 4SW          | 3-Jul-98        | 28-Jul-98 | 51.29               | 51.40 | 57.19            | 57.79 | 10               | 35  | LHP       | 48.9             | 175           | 4                 | 2.3                |
| 1998015      | 4SW          | 5-Aug-98        | 31-Aug-98 | 51.28               | 51.48 | 57.20            | 57.81 | 10               | 40  | LHP       | 45.2             | 1137          | 22                | 1.9                |
| 1998016      | 4SW          | 7-Sep-98        | 10-Sep-98 | 51.31               | 51.32 | 57.29            | 57.30 | 45               | 45  | LHP       | 44.3             | 52            | 0                 | 0.0                |
| 1998018      | 4SW          | 1-Sep-98        | 11-Sep-98 | 51.33               | 51.48 | 57.23            | 57.64 | 14               | 40  | LHP       | 45.9             | 464           | 10                | 2.2                |
| 1998024      | 4SY          | 6-Jul-98        | 15-Jul-98 | 49.72               | 49.83 | 62.77            | 63.23 | 161              | 198 | OTB       | 48.0             | 181           | 0                 | 0.0                |
| 1998028      | 4SY          | 7-Jul-98        | 7-Jul-98  | 50.07               | 50.08 | 64.70            | 64.85 | 134              | 153 | OTB       | 51.8             | 51            | 0                 | 0.0                |
| 1998030      | 4SY          | 7-Oct-98        | 7-Oct-98  | 50.05               | 50.07 | 64.50            | 64.72 | 156              | 166 | OTB       | 46.9             | 40            | 0                 | 0.0                |
| 1999001      | 3PN          | 5-May-99        | 30-May-99 | 47.53               | 47.61 | 58.38            | 59.23 | 25               | 137 | LLS       | 53.8             | 313           | 36                | 11.5               |
| 1999002      | 3PN          | 1-Jun-99        | 14-Jun-99 | 47.53               | 47.65 | 58.38            | 59.18 | 55               | 137 | LLS       | 50.9             | 185           | 12                | 6.5                |
| 1999003      | 3PN          | 4-Jul-99        | 21-Jul-99 | 47.56               | 47.68 | 58.20            | 58.86 | 55               | 120 | LLS       | 52.4             | 145           | 19                | 13.1               |
| 1999004      | 3PN          | 21-Oct-99       | 22-Oct-99 | 47.52               | 47.57 | 58.85            | 59.16 | 73               | 126 | LLS       | 54.1             | 467           | 50                | 10.7               |
| 1999005      | 3PN          | 28-Oct-99       | 28-Oct-99 | 47.61               | 47.61 | 58.19            | 58.19 | 120              | 120 | LLS       | 53.9             | 66            | 9                 | 13.6               |
| 1999006      | 3PN          | 6-Nov-99        | 24-Nov-99 | 47.53               | 47.57 | 58.80            | 59.13 | 73               | 117 | LLS       | 54.7             | 745           | 47                | 6.3                |
| 1999007      | 3PN          | 10-Dec-99       | 10-Dec-99 | 47.61               | 47.61 | 58.25            | 58.25 | 140              | 140 | LLS       | 49.7             | 34            | 1                 | 2.9                |
| 1999011      | 4RA          | 23-Jun-99       | 29-Jun-99 | 51.26               | 51.65 | 56.38            | 56.88 | 30               | 80  | LHP       | 53.1             | 391           | 31                | 7.9                |
| 1999012      | 4RA          | 10-Jul-99       | 28-Jul-99 | 51.11               | 51.68 | 56.43            | 57.17 | 32               | 70  | LHP       | 49.7             | 134           | 5                 | 3.7                |
| 1999014      | 4RA          | 1-Sep-99        | 30-Sep-99 | 51.36               | 51.66 | 56.38            | 56.96 | 25               | 82  | LHP       | 47.9             | 321           | 6                 | 1.9                |
| 1999015      | 4RA          | 1-Oct-99        | 1-Oct-99  | 51.40               | 51.40 | 57.03            | 57.03 | 27               | 27  | LHP       | 48.4             | 45            | 0                 | 0.0                |
| 1999016      | 4RA          | 27-Jun-99       | 30-Jun-99 | 50.75               | 51.26 | 56.78            | 57.35 | 56               | 90  | LLS       | 54.8             | 260           | 27                | 10.4               |
| 1999017      | 4RA          | 9-Jul-99        | 9-Jul-99  | 51.27               | 51.47 | 56.39            | 56.92 | 30               | 46  | OTB       | 52.5             | 91            | 5                 | 5.5                |
| 1999019      | 4RB          | 25-Jun-99       | 28-Jun-99 | 49.37               | 49.61 | 57.98            | 58.24 | 10               | 35  | LHP       | 53.9             | 164           | 10                | 6.1                |
| 1999020      | 4RB          | 23-Sep-99       | 27-Sep-99 | 50.28               | 50.28 | 57.60            | 57.60 | 46               | 46  | LHP       | 55.5             | 149           | 12                | 8.1                |
| 1999021      | 4RB          | 22-Oct-99       | 23-Oct-99 | 50.25               | 50.25 | 57.60            | 57.60 | 33               | 33  | LHP       | 54.2             | 86            | 4                 | 4.7                |
| 1999022      | 4RB          | 10-Jun-99       | 26-Jun-99 | 50.23               | 50.34 | 57.56            | 57.61 | 18               | 60  | LLS       | 55.0             | 222           | 14                | 6.3                |
| 1999024      | 4RB          | 8-Jul-99        | 8-Jul-99  | 49.79               | 50.38 | 57.64            | 58.11 | 55               | 179 | OTB       | 51.7             | 170           | 11                | 6.5                |
| 1999026      | 4RB          | 18-Oct-99       | 18-Oct-99 | 50.41               | 50.59 | 57.54            | 57.59 | 123              | 187 | OTB       | 52.0             | 64            | 3                 | 4.7                |
| 1999027      | 4RC          | 24-Jun-99       | 27-Jun-99 | 48.64               | 48.64 | 59.12            | 59.12 | 52               | 52  | LHP       | 54.0             | 162           | 17                | 10.5               |
| 1999028      | 4RC          | 29-Jun-99       | 29-Jun-99 | 49.14               | 49.14 | 58.41            | 58.41 | 38               | 38  | LHP       | 54.9             | 74            | 16                | 21.6               |
| 1999029      | 4RC          | 14-Jul-99       | 14-Jul-99 | 48.64               | 48.64 | 59.12            | 59.12 | 52               | 52  | LHP       | 48.2             | 58            | 6                 | 10.3               |
| 1999030      | 4RC          | 28-Jul-99       | 28-Jul-99 | 49.14               | 49.14 | 58.41            | 58.41 | 38               | 40  | LHP       | 56.5             | 119           | 24                | 20.2               |
| 1999032      | 4RC          | 28-Sep-99       | 30-Sep-99 | 48.70               | 48.70 | 59.05            | 59.05 | 46               | 46  | LLS       | 55.2             | 101           | 10                | 9.9                |
| 1999033      | 4RC          | 2-Oct-99        | 2-Oct-99  | 48.70               | 48.70 | 59.05            | 59.05 | 46               | 46  | LLS       | 57.9             | 120           | 12                | 10.0               |
| 1999034      | 4RC          | 7-Jul-99        | 7-Jul-99  | 48.84               | 48.97 | 59.06            | 59.27 | 48               | 90  | OTB       | 49.9             | 102           | 2                 | 2.0                |
| 1999035      | 4RC          | 8-Jul-99        | 8-Jul-99  | 49.04               | 49.29 | 59.05            | 59.24 | 125              | 275 | OTB       | 50.5             | 80            | 2                 | 2.5                |
| 1999036      | 4RD          | 28-Jun-99       | 28-Jun-99 | 47.82               | 47.82 | 59.43            | 59.43 | 53               | 53  | LHP       | 52.2             | 31            | 0                 | 0.0                |
| 1999038      | 4RD          | 16-Sep-99       | 29-Sep-99 | 48.43               | 48.48 | 59.02            | 59.15 | 46               | 57  | LHP       | 64.1             | 54            | 3                 | 5.6                |
| 1999039      | 4RD          | 2-Jun-99        | 2-Jun-99  | 47.66               | 47.66 | 59.35            | 59.35 | 70               | 70  | LLS       | 55.6             | 35            | 4                 | 11.4               |
| 1999040      | 4RD          | 22-Oct-99       | 22-Oct-99 | 47.76               | 47.86 | 59.41            | 59.48 | 79               | 99  | OTB       | 49.1             | 46            | 3                 | 6.5                |
| 1999045      | 4SW          | 5-Oct-99        | 5-Oct-99  | 51.43               | 51.43 | 57.63            | 57.63 | 15               | 50  | FPN       | 48.3             | 78            | 0                 | 0.0                |
| 1999046      | 4SW          | 1-Sep-99        | 1-Sep-99  | 51.34               | 51.34 | 57.31            | 57.31 | 40               | 40  | GNS       | 47.5             | 34            | 2                 | 5.9                |
| 1999047      | 4SW          | 9-Jul-99        | 28-Jul-99 | 51.36               | 51.40 | 57.45            | 57.63 | 54               | 68  | LHP       | 48.1             | 32            | 1                 | 3.1                |
| 1999049      | 4SW          | 2-Aug-99        | 30-Aug-99 | 51.31               | 51.40 | 57.22            | 57.59 | 35               | 100 | LHP       | 48.8             | 663           | 12                | 1.8                |
| 1999050      | 4SW          | 1-Sep-99        | 29-Sep-99 | 51.31               | 51.39 | 57.25            | 57.64 | 40               | 83  | LHP       | 46.9             | 169           | 0                 | 0.0                |
| 1999052      | 4SW          | 12-Aug-99       | 13-Aug-99 | 51.37               | 51.38 | 57.16            | 57.31 | 24               | 48  | LLS       | 44.7             | 30            | 0                 | 0.0                |
| 1999053      | 4SY          | 5-Jul-99        | 13-Jul-99 | 49.11               | 49.85 | 63.00            | 63.30 | 154              | 196 | OTB       | 45.0             | 55            | 0                 | 0.0                |
| 1999054      | 4SY          | 12-Jul-99       | 14-Jul-99 | 49.85               | 50.07 | 64.50            | 64.76 | 154              | 198 | OTB       | 49.1             | 123           | 0                 | 0.0                |

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**Table 9. Details of northern Gulf cod tagging experiments (cont'd).**

| Expt. number | Release area | Date of release |           | Position of release |       |                  |       | Depth of capture |     | Gear type | Mean length (cm) | Number tagged | Number recaptured | Percent recaptured |
|--------------|--------------|-----------------|-----------|---------------------|-------|------------------|-------|------------------|-----|-----------|------------------|---------------|-------------------|--------------------|
|              |              | min             | max       | Latitude (dec.)     |       | Longitude (dec.) |       | min              | max |           |                  |               |                   |                    |
| 2000001      | 3PN          | 26-Apr-00       | 29-Apr-00 | 47.53               | 47.57 | 58.87            | 58.98 | 108              | 132 | LLS       | 56.5             | 1034          | 128               | 12.4               |
| 2000002      | 3PN          | 3-May-00        | 23-May-00 | 47.52               | 47.61 | 58.39            | 58.94 | 110              | 132 | LLS       | 54.9             | 1181          | 100               | 8.5                |
| 2000003      | 3PN          | 20-Nov-00       | 29-Nov-00 | 47.52               | 47.54 | 59.11            | 59.14 | 64               | 110 | LLS       | 52.0             | 178           | 12                | 6.7                |
| 2000004      | 3PN          | 2-Dec-00        | 20-Dec-00 | 47.55               | 47.57 | 58.83            | 58.95 | 108              | 135 | LLS       | 49.5             | 505           | 17                | 3.4                |
| 2000005      | 4RA          | 20-Jun-00       | 21-Jun-00 | 51.42               | 51.46 | 56.88            | 56.89 | 46               | 51  | LHP       | 53.9             | 29            | 2                 | 6.9                |
| 2000006      | 4RA          | 27-Jul-00       | 27-Jul-00 | 50.71               | 50.71 | 57.41            | 57.41 | 46               | 46  | LHP       | 45.1             | 47            | 5                 | 10.6               |
| 2000007      | 4RA          | 11-Jul-00       | 26-Jul-00 | 51.39               | 51.68 | 56.42            | 56.88 | 25               | 110 | LHP       | 50.3             | 1100          | 43                | 3.9                |
| 2000008      | 4RA          | 2-Aug-00        | 30-Aug-00 | 50.73               | 51.42 | 56.65            | 57.39 | 46               | 82  | LHP       | 50.6             | 168           | 10                | 6.0                |
| 2000011      | 4RA          | 19-Oct-00       | 19-Oct-00 | 51.07               | 51.07 | 57.11            | 57.11 | 73               | 73  | LLS       | 51.7             | 37            | 1                 | 2.7                |
| 2000012      | 4RA          | 5-Jul-00        | 5-Jul-00  | 50.74               | 50.78 | 57.68            | 57.99 | 72               | 75  | OTB       | 46.9             | 37            | 0                 | 0.0                |
| 2000015      | 4RB          | 27-Jun-00       | 27-Jun-00 | 49.42               | 49.42 | 58.24            | 58.24 | 39               | 39  | LHP       | 53.1             | 34            | 3                 | 8.8                |
| 2000016      | 4RB          | 18-Jun-00       | 18-Jun-00 | 50.25               | 50.25 | 57.60            | 57.60 | 37               | 37  | LHP       | 58.8             | 27            | 5                 | 18.5               |
| 2000017      | 4RB          | 20-Jul-00       | 25-Jul-00 | 49.69               | 49.69 | 58.17            | 58.17 | 64               | 64  | LHP       | 49.2             | 63            | 2                 | 3.2                |
| 2000018      | 4RB          | 17-Jul-00       | 25-Jul-00 | 50.24               | 50.31 | 57.56            | 57.57 | 33               | 42  | LHP       | 56.6             | 151           | 6                 | 4.0                |
| 2000019      | 4RB          | 1-Aug-00        | 21-Aug-00 | 50.08               | 50.32 | 57.56            | 57.76 | 37               | 37  | LHP       | 48.0             | 92            | 4                 | 4.3                |
| 2000021      | 4RB          | 17-Oct-00       | 17-Oct-00 | 49.42               | 49.42 | 58.24            | 58.24 | 39               | 39  | LHP       | 55.4             | 124           | 8                 | 6.5                |
| 2000022      | 4RB          | 1-Oct-00        | 19-Oct-00 | 50.24               | 50.26 | 57.60            | 57.61 | 20               | 48  | LHP       | 51.7             | 46            | 2                 | 4.3                |
| 2000027      | 4RB          | 17-Oct-00       | 18-Oct-00 | 50.36               | 50.62 | 57.52            | 58.42 | 86               | 174 | OTB       | 53.9             | 112           | 1                 | 0.9                |
| 2000028      | 4RC          | 21-Jun-00       | 23-Jun-00 | 48.63               | 48.66 | 59.10            | 59.10 | 51               | 51  | LHP       | 56.4             | 181           | 10                | 5.5                |
| 2000029      | 4RC          | 26-Jul-00       | 26-Jul-00 | 49.11               | 49.11 | 58.43            | 58.43 | 26               | 46  | LHP       | 46.7             | 91            | 5                 | 5.5                |
| 2000030      | 4RC          | 15-Sep-00       | 27-Sep-00 | 49.11               | 49.11 | 58.43            | 58.43 | 33               | 33  | LHP       | 48.0             | 89            | 6                 | 6.7                |
| 2000031      | 4RC          | 21-Jul-00       | 27-Jul-00 | 48.63               | 48.66 | 59.10            | 59.10 | 55               | 55  | LLS       | 55.2             | 179           | 15                | 8.4                |
| 2000032      | 4RC          | 7-Jul-00        | 7-Jul-00  | 48.85               | 48.85 | 59.20            | 59.20 | 70               | 73  | OTB       | 53.9             | 61            | 5                 | 8.2                |
| 2000034      | 4RD          | 17-Jul-00       | 27-Jul-00 | 48.46               | 48.46 | 58.69            | 58.71 | 18               | 22  | LHP       | 56.5             | 292           | 42                | 14.4               |
| 2000037      | 4RD          | 5-Nov-00        | 6-Nov-00  | 47.81               | 47.94 | 59.40            | 59.44 | 35               | 92  | LHP       | 50.8             | 85            | 7                 | 8.2                |
| 2000038      | 4RD          | 5-Nov-00        | 5-Nov-00  | 47.80               | 47.94 | 59.40            | 59.44 | 92               | 92  | LLS       | 53.4             | 127           | 6                 | 4.7                |
| 2000039      | 4RD          | 18-Oct-00       | 18-Oct-00 | 48.38               | 48.48 | 59.15            | 59.30 | 60               | 87  | OTB       | 53.9             | 71            | 3                 | 4.2                |
| 2000041      | 4SW          | 24-Jul-00       | 24-Jul-00 | 51.37               | 51.37 | 57.17            | 57.17 | 10               | 10  | LHP       | 46.9             | 84            | 2                 | 2.4                |
| 2000043      | 4SW          | 7-Aug-00        | 30-Aug-00 | 51.27               | 51.48 | 57.25            | 57.82 | 5                | 109 | LHP       | 43.4             | 422           | 2                 | 0.5                |
| 2000044      | 4SW          | 3-Sep-00        | 7-Sep-00  | 51.33               | 51.36 | 57.31            | 57.65 | 15               | 95  | LHP       | 45.8             | 122           | 1                 | 0.8                |
| 2000045      | 4SW          | 23-Aug-00       | 30-Aug-00 | 51.33               | 51.39 | 57.26            | 57.33 | 48               | 70  | LLS       | 42.7             | 106           | 0                 | 0.0                |
| 2000046      | 4SW          | 4-Sep-00        | 7-Sep-00  | 51.36               | 51.40 | 57.32            | 57.34 | 52               | 54  | LLS       | 43.2             | 33            | 0                 | 0.0                |
| 2001001      | 3PN          | 1-May-01        | 4-May-01  | 47.56               | 47.56 | 58.85            | 58.95 | 119              | 128 | LLS       | 55.3             | 741           | 106               | 14.3               |
| 2001002      | 3PN          | 4-Oct-01        | 11-Oct-01 | 47.57               | 47.57 | 58.71            | 59.12 | 27               | 139 | LLS       | 52.3             | 589           | 78                | 13.2               |
| 2001003      | 3PN          | 12-Nov-01       | 30-Nov-01 | 47.55               | 47.60 | 58.27            | 58.93 | 113              | 146 | LLS       | 53.4             | 1046          | 51                | 4.9                |
| 2001004      | 3PN          | 3-Dec-01        | 10-Dec-01 | 47.55               | 47.57 | 58.81            | 58.95 | 119              | 146 | LLS       | 50.3             | 613           | 27                | 4.4                |
| 2001005      | 3PN          | 2-Oct-01        | 2-Oct-01  | 47.52               | 47.53 | 59.01            | 59.02 | 123              | 133 | OTB       | 58.7             | 40            | 7                 | 17.5               |
| 2001006      | 4RA          | 24-Jul-01       | 24-Jul-01 | 51.50               | 51.50 | 56.82            | 56.82 | 28               | 28  | FPN       | 46.1             | 289           | 7                 | 2.4                |
| 2001007      | 4RA          | 19-Jul-01       | 24-Jul-01 | 51.10               | 51.46 | 56.86            | 57.07 | 49               | 52  | LHP       | 47.5             | 585           | 14                | 2.4                |
| 2001008      | 4RA          | 19-Jul-01       | 19-Jul-01 | 51.58               | 51.58 | 55.75            | 55.75 | 20               | 20  | LHP       | 49.0             | 68            | 1                 | 1.5                |
| 2001009      | 4RA          | 20-Jul-01       | 28-Jul-01 | 51.66               | 51.69 | 56.44            | 56.57 | 24               | 60  | LHP       | 45.7             | 51            | 1                 | 2.0                |
| 2001010      | 4RA          | 13-Aug-01       | 21-Aug-01 | 51.35               | 51.44 | 56.57            | 56.83 | 67               | 78  | LHP       | 53.3             | 292           | 13                | 4.5                |
| 2001011      | 4RA          | 13-Sep-01       | 28-Sep-01 | 51.12               | 51.75 | 56.32            | 57.09 | 32               | 106 | LHP       | 45.4             | 397           | 2                 | 0.5                |
| 2001012      | 4RA          | 4-Oct-01        | 11-Oct-01 | 51.34               | 51.49 | 56.76            | 56.79 | 64               | 92  | LHP       | 45.8             | 171           | 0                 | 0.0                |
| 2001013      | 4RA          | 4-Oct-01        | 21-Oct-01 | 50.75               | 51.08 | 57.05            | 57.42 | 47               | 165 | LLS       | 51.3             | 357           | 3                 | 0.8                |
| 2001015      | 4RA          | 9-Jul-01        | 9-Jul-01  | 51.64               | 51.68 | 55.86            | 55.94 | 35               | 55  | OTB       | 54.1             | 103           | 10                | 9.7                |
| 2001016      | 4RB          | 13-Aug-01       | 22-Aug-01 | 49.41               | 50.30 | 57.56            | 58.23 | 31               | 36  | LHP       | 53.6             | 502           | 25                | 5.0                |
| 2001017      | 4RC          | 19-Jul-01       | 19-Jul-01 | 48.69               | 48.69 | 59.09            | 59.09 | 55               | 55  | LHP       | 55.3             | 27            | 6                 | 22.2               |
| 2001019      | 4RC          | 14-Sep-01       | 20-Sep-01 | 48.69               | 48.69 | 59.09            | 59.09 | 55               | 55  | LHP       | 54.4             | 145           | 6                 | 4.1                |
| 2001020      | 4RC          | 6-Oct-01        | 6-Oct-01  | 49.10               | 49.10 | 58.43            | 58.43 | 25               | 25  | LHP       | 52.0             | 159           | 7                 | 4.4                |
| 2001024      | 4RD          | 8-Oct-01        | 11-Oct-01 | 48.38               | 48.48 | 58.68            | 58.72 | 18               | 21  | LHP       | 55.6             | 195           | 10                | 5.1                |
| 2001025      | 4RD          | 14-Nov-01       | 14-Nov-01 | 48.48               | 48.48 | 58.68            | 58.68 | 24               | 24  | LHP       | 47.7             | 38            | 0                 | 0.0                |
| 2001026      | 4RD          | 26-Nov-01       | 26-Nov-01 | 47.83               | 47.83 | 59.44            | 59.44 | 87               | 87  | LLS       | 53.5             | 178           | 7                 | 3.9                |
| 2001027      | 4RD          | 2-Oct-01        | 2-Oct-01  | 47.74               | 47.88 | 59.39            | 59.48 | 59               | 110 | OTB       | 54.3             | 31            | 1                 | 3.2                |
| 2001028      | 4SW          | 18-Jul-01       | 22-Jul-01 | 51.36               | 51.36 | 57.58            | 57.58 | 80               | 80  | LHP       | 53.4             | 63            | 1                 | 1.6                |
| 2001029      | 4SW          | 1-Aug-01        | 30-Aug-01 | 51.36               | 51.37 | 57.27            | 57.58 | 48               | 90  | LHP       | 45.8             | 127           | 0                 | 0.0                |
| 2001031      | 4SW          | 4-Aug-01        | 17-Aug-01 | 51.29               | 51.40 | 57.28            | 57.80 | 30               | 49  | LLS       | 43.7             | 26            | 0                 | 0.0                |

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**Table 9. Details of northern Gulf cod tagging experiments (cont'd).**

| Expt. number | Release area | Date of release |           | Position of release |       |                  |       | Depth of capture |     | Gear type | Mean length (cm) | Number tagged | Number recaptured | Percent recaptured |
|--------------|--------------|-----------------|-----------|---------------------|-------|------------------|-------|------------------|-----|-----------|------------------|---------------|-------------------|--------------------|
|              |              | min             | max       | Latitude (dec.)     |       | Longitude (dec.) |       | min              | max |           |                  |               |                   |                    |
| 2002001      | 3PN          | 29-Apr-02       | 29-Apr-02 | 47.57               | 47.57 | 58.87            | 58.87 | 135              | 135 | LLS       | 54.3             | 374           | 16                | 4.3                |
| 2002002      | 3PN          | 1-May-02        | 28-May-02 | 47.56               | 47.59 | 58.54            | 58.88 | 120              | 152 | LLS       | 54.7             | 1670          | 118               | 7.1                |
| 2002004      | 3PN          | 9-Oct-02        | 14-Oct-02 | 47.55               | 47.57 | 58.69            | 59.10 | 90               | 156 | LLS       | 53.5             | 1183          | 72                | 6.1                |
| 2002005      | 3PN          | 11-Nov-02       | 12-Nov-02 | 47.56               | 47.56 | 58.93            | 58.93 | 110              | 110 | LLS       | 52.4             | 99            | 1                 | 1.0                |
| 2002006      | 3PN          | 20-Dec-02       | 20-Dec-02 | 47.56               | 47.57 | 58.89            | 58.95 | 100              | 100 | LLS       | 50.9             | 72            | 0                 | 0.0                |
| 2002007      | 4RA          | 28-Jun-02       | 28-Jun-02 | 50.79               | 50.79 | 57.25            | 57.25 | 62               | 62  | LHP       | 51.8             | 31            | 0                 | 0.0                |
| 2002008      | 4RA          | 25-Jul-02       | 25-Jul-02 | 51.41               | 51.41 | 56.93            | 56.93 | 57               | 57  | LHP       | 52.0             | 45            | 2                 | 4.4                |
| 2002009      | 4RA          | 14-Aug-02       | 28-Aug-02 | 51.45               | 51.51 | 56.76            | 56.87 | 59               | 106 | LHP       | 48.7             | 581           | 1                 | 0.2                |
| 2002011      | 4RB          | 26-Jul-02       | 26-Jul-02 | 50.32               | 50.32 | 57.58            | 57.58 | 55               | 55  | LHP       | 61.6             | 95            | 16                | 16.8               |
| 2002012      | 4RB          | 9-Sep-02        | 9-Sep-02  | 49.41               | 49.41 | 58.23            | 58.23 | 33               | 33  | LHP       | 54.4             | 79            | 0                 | 0.0                |
| 2002015      | 4RC          | 8-Jun-02        | 8-Jun-02  | 48.65               | 48.65 | 59.11            | 59.11 | 55               | 55  | LHP       | 54.0             | 180           | 13                | 7.2                |
| 2002016      | 4RC          | 19-Jun-02       | 29-Jun-02 | 48.65               | 48.67 | 59.09            | 59.11 | 55               | 55  | LLS       | 55.9             | 255           | 17                | 6.7                |
| 2002017      | 4RD          | 11-Oct-02       | 11-Oct-02 | 47.87               | 47.87 | 59.47            | 59.47 | 110              | 110 | LLS       | 54.0             | 173           | 3                 | 1.7                |
| 2002018      | 4SW          | 12-Jul-02       | 24-Jul-02 | 51.37               | 51.40 | 57.40            | 57.58 | 51               | 75  | LHP       | 52.9             | 97            | 1                 | 1.0                |
| 2002019      | 4SW          | 14-Aug-02       | 28-Aug-02 | 51.35               | 51.40 | 57.26            | 57.47 | 46               | 100 | LHP       | 43.9             | 286           | 0                 | 0.0                |
| 2002020      | 4SW          | 4-Sep-02        | 19-Sep-02 | 51.34               | 51.41 | 57.25            | 57.58 | 47               | 90  | LHP       | 43.8             | 211           | 0                 | 0.0                |
| 2003001      | 3PN          | 21-May-03       | 27-May-03 | 47.56               | 47.57 | 58.73            | 58.93 | 105              | 119 | LLS       | 54.9             | 205           | 4                 | 2.0                |
| 2003003      | 3PN          | 13-Oct-03       | 13-Oct-03 | 47.57               | 47.57 | 58.87            | 58.87 | 119              | 119 | LLS       | 51.5             | 286           | 2                 | 0.7                |
| 2003004      | 3PN          | 1-Nov-03        | 11-Nov-03 | 47.55               | 47.57 | 58.87            | 58.99 | 119              | 119 | LLS       | 51.7             | 609           | 0                 | 0.0                |
| 2003005      | 4RD          | 7-Nov-03        | 7-Nov-03  | 47.84               | 47.84 | 59.45            | 59.45 | 108              | 108 | LLS       | 55.3             | 189           | 0                 | 0.0                |

**Table 10. Annual summary of reported recaptures by experiment (all tag types combined) for cod tagged and released in 3Pn4RS during 1995-2003. Only experiments where >25 cod were tagged are shown.**

| Expt    | Area | Release date |           | Mean length (cm) | Number tagged | Recapture year |      |      |      |      |      |      |      |      |
|---------|------|--------------|-----------|------------------|---------------|----------------|------|------|------|------|------|------|------|------|
|         |      | min          | max       |                  |               | 1995           | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| 1995001 | 3PN  | 11-Nov-95    | 30-Nov-95 | 54.3             | 109           | 0              | 1    | 1    | 1    | 2    | 1    | 0    | 0    | 0    |
| 1995002 | 3PN  | 13-Nov-95    | 30-Nov-95 | 55.0             | 110           | 0              | 1    | 3    | 0    | 1    | 0    | 0    | 0    | 3    |
| 1995003 | 3PN  | 4-Dec-95     | 6-Dec-95  | 53.5             | 93            | 0              | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 1    |
| 1995004 | 4RA  | 17-Jul-95    | 21-Jul-95 | 44.8             | 144           | 0              | 0    | 2    | 1    | 0    | 1    | 1    | 0    | 0    |
| 1995006 | 4RB  | 15-Sep-95    | 25-Sep-95 | 44.3             | 45            | 0              | 0    | 1    | 1    | 0    | 1    | 0    | 0    | 0    |
| 1995007 | 4RB  | 2-Oct-95     | 2-Oct-95  | 47.3             | 39            | 0              | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    |
| 1995008 | 4RB  | 22-Sep-95    | 22-Sep-95 | 53.1             | 46            | 0              | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1    |
| 1995010 | 4RC  | 26-Sep-95    | 28-Sep-95 | 65.5             | 177           | 0              | 3    | 2    | 2    | 1    | 0    | 0    | 0    | 0    |
| 1995011 | 4RC  | 2-Oct-95     | 21-Oct-95 | 59.3             | 368           | 0              | 11   | 7    | 1    | 1    | 0    | 0    | 0    | 0    |
| 1996001 | 3KA  | 30-Jul-96    | 31-Jul-96 | 48.8             | 32            | .              | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996002 | 3KA  | 1-Aug-96     | 23-Aug-96 | 46.0             | 33            | .              | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996004 | 3PN  | 5-Aug-96     | 25-Aug-96 | 56.9             | 167           | .              | 1    | 9    | 3    | 2    | 0    | 1    | 0    | 5    |
| 1996005 | 3PN  | 12-Aug-96    | 22-Aug-96 | 57.3             | 302           | .              | 0    | 5    | 18   | 10   | 3    | 1    | 1    | 5    |
| 1996006 | 3PN  | 1-Sep-96     | 18-Sep-96 | 51.9             | 237           | .              | 7    | 8    | 4    | 0    | 1    | 0    | 1    | 1    |
| 1996007 | 3PN  | 17-Sep-96    | 17-Sep-96 | 63.5             | 35            | .              | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996008 | 3PN  | 20-Sep-96    | 22-Sep-96 | 46.0             | 64            | .              | 1    | 1    | 0    | 1    | 0    | 0    | 1    | 0    |
| 1996009 | 3PN  | 18-Sep-96    | 18-Sep-96 | 54.7             | 57            | .              | 1    | 1    | 0    | 1    | 0    | 0    | 0    | 0    |
| 1996010 | 3PN  | 30-Sep-96    | 30-Sep-96 | 49.2             | 77            | .              | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996011 | 3PN  | 2-Sep-96     | 8-Sep-96  | 56.0             | 254           | .              | 0    | 6    | 13   | 4    | 3    | 0    | 1    | 13   |
| 1996012 | 3PN  | 18-Oct-96    | 31-Oct-96 | 55.1             | 184           | .              | 0    | 7    | 2    | 2    | 3    | 0    | 1    | 1    |
| 1996014 | 3PN  | 9-Oct-96     | 28-Oct-96 | 52.9             | 185           | .              | 0    | 1    | 0    | 1    | 2    | 0    | 0    | 0    |
| 1996016 | 3PN  | 8-Oct-96     | 30-Oct-96 | 57.0             | 475           | .              | 1    | 17   | 13   | 5    | 2    | 2    | 4    | 5    |
| 1996017 | 3PN  | 5-Nov-96     | 20-Nov-96 | 54.0             | 832           | .              | 1    | 13   | 10   | 6    | 5    | 0    | 2    | 0    |
| 1996018 | 3PN  | 14-Nov-96    | 14-Nov-96 | 54.8             | 40            | .              | 0    | 2    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996019 | 3PN  | 5-Nov-96     | 25-Nov-96 | 52.0             | 565           | .              | 0    | 22   | 13   | 11   | 4    | 0    | 4    | 0    |
| 1996020 | 3PN  | 3-Dec-96     | 14-Dec-96 | 46.8             | 251           | .              | 0    | 1    | 2    | 5    | 1    | 0    | 0    | 0    |
| 1996021 | 3PN  | 9-Oct-96     | 14-Oct-96 | 53.0             | 48            | .              | 0    | 0    | 1    | 0    | 1    | 0    | 0    | 0    |
| 1996025 | 3PSA | 6-Nov-96     | 23-Nov-96 | 52.3             | 108           | .              | 1    | 2    | 0    | 1    | 1    | 0    | 1    | 0    |
| 1996026 | 3PSA | 4-Dec-96     | 18-Dec-96 | 50.1             | 67            | .              | 0    | 0    | 0    | 0    | 0    | 2    | 0    | 0    |
| 1996031 | 4RA  | 10-Sep-96    | 26-Sep-96 | 59.4             | 62            | .              | 0    | 1    | 1    | 0    | 1    | 1    | 0    | 1    |
| 1996032 | 4RA  | 12-Aug-96    | 23-Aug-96 | 49.3             | 65            | .              | 0    | 0    | 2    | 0    | 0    | 0    | 0    | 0    |
| 1996033 | 4RA  | 3-Sep-96     | 27-Sep-96 | 46.8             | 293           | .              | 1    | 1    | 2    | 1    | 0    | 0    | 1    | 0    |
| 1996035 | 4RA  | 3-Aug-96     | 30-Aug-96 | 49.7             | 988           | .              | 1    | 10   | 6    | 6    | 2    | 0    | 0    | 0    |
| 1996036 | 4RA  | 2-Sep-96     | 30-Sep-96 | 48.6             | 639           | .              | 0    | 0    | 1    | 0    | 2    | 0    | 3    | 2    |
| 1996038 | 4RA  | 4-Sep-96     | 30-Sep-96 | 43.6             | 71            | .              | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996039 | 4RA  | 2-Oct-96     | 22-Oct-96 | 47.5             | 110           | .              | 0    | 0    | 0    | 0    | 1    | 1    | 0    | 0    |
| 1996040 | 4RA  | 2-Oct-96     | 17-Oct-96 | 47.3             | 264           | .              | 0    | 0    | 0    | 0    | 0    | 1    | 2    | 0    |
| 1996043 | 4RB  | 7-Oct-96     | 10-Oct-96 | 48.2             | 159           | .              | 0    | 3    | 5    | 4    | 1    | 0    | 0    | 0    |
| 1996044 | 4RB  | 25-Aug-96    | 28-Aug-96 | 49.7             | 139           | .              | 0    | 0    | 2    | 3    | 0    | 1    | 0    | 0    |
| 1996045 | 4RB  | 4-Sep-96     | 27-Sep-96 | 48.4             | 121           | .              | 0    | 2    | 0    | 2    | 0    | 1    | 1    | 0    |
| 1996047 | 4RB  | 1-Aug-96     | 20-Aug-96 | 53.8             | 40            | .              | 0    | 0    | 0    | 1    | 1    | 0    | 0    | 0    |
| 1996048 | 4RB  | 12-Sep-96    | 27-Sep-96 | 47.7             | 438           | .              | 2    | 5    | 3    | 8    | 1    | 1    | 1    | 0    |
| 1996049 | 4RB  | 1-Oct-96     | 3-Oct-96  | 44.7             | 209           | .              | 3    | 0    | 3    | 2    | 1    | 0    | 0    | 2    |
| 1996059 | 4RC  | 5-Aug-96     | 29-Aug-96 | 50.6             | 251           | .              | 0    | 3    | 5    | 2    | 2    | 1    | 2    | 0    |
| 1996060 | 4RC  | 6-Aug-96     | 28-Aug-96 | 62.4             | 482           | .              | 8    | 11   | 10   | 1    | 2    | 1    | 1    | 2    |
| 1996061 | 4RC  | 10-Sep-96    | 25-Sep-96 | 59.2             | 62            | .              | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    |
| 1996063 | 4RC  | 27-Nov-96    | 29-Nov-96 | 57.8             | 37            | .              | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 0    |
| 1996066 | 4RD  | 9-Sep-96     | 9-Sep-96  | 54.9             | 30            | .              | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 0    |
| 1996068 | 4RD  | 17-Sep-96    | 25-Sep-96 | 55.3             | 52            | .              | 0    | 3    | 2    | 1    | 0    | 0    | 0    | 0    |
| 1996069 | 4RD  | 8-Oct-96     | 30-Oct-96 | 53.5             | 315           | .              | 3    | 2    | 8    | 5    | 1    | 1    | 3    | 2    |
| 1996071 | 4RD  | 12-Nov-96    | 30-Nov-96 | 54.9             | 121           | .              | 0    | 3    | 2    | 2    | 0    | 0    | 0    | 0    |
| 1996073 | 4RD  | 13-Oct-96    | 13-Oct-96 | 49.6             | 50            | .              | 1    | 1    | 0    | 0    | 0    | 2    | 0    | 0    |
| 1996075 | 4RD  | 13-Oct-96    | 13-Oct-96 | 51.6             | 58            | .              | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    |
| 1996077 | 4SW  | 25-Aug-96    | 28-Aug-96 | 51.2             | 113           | .              | 0    | 1    | 0    | 0    | 0    | 1    | 0    | 0    |
| 1996078 | 4SW  | 27-Aug-96    | 31-Aug-96 | 48.9             | 358           | .              | 0    | 0    | 1    | 3    | 0    | 2    | 0    | 0    |
| 1996079 | 4SW  | 2-Sep-96     | 23-Sep-96 | 49.7             | 118           | .              | 0    | 5    | 1    | 0    | 0    | 0    | 1    | 0    |
| 1996080 | 4SW  | 1-Sep-96     | 18-Sep-96 | 47.1             | 520           | .              | 0    | 3    | 3    | 2    | 0    | 3    | 0    | 3    |

cont'd.

Table 10. Annual summary of recaptures (cont.'d).

| Expt    | Area | Release date |           | Mean length (cm) | Number tagged | Recapture year |      |      |      |      |      |      |      |      |     |
|---------|------|--------------|-----------|------------------|---------------|----------------|------|------|------|------|------|------|------|------|-----|
|         |      | min          | max       |                  |               | 1995           | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | unk |
| 1997002 | 3PN  | 11-Jun-97    | 24-Jun-97 | 52.1             | 194           | .              | .    | 6    | 5    | 2    | 0    | 1    | 0    | 0    | 3   |
| 1997003 | 3PN  | 4-Nov-97     | 12-Nov-97 | 55.0             | 183           | .              | .    | 1    | 4    | 1    | 1    | 2    | 1    | 0    | 1   |
| 1997005 | 4RA  | 26-Aug-97    | 28-Aug-97 | 43.6             | 129           | .              | .    | 0    | 0    | 3    | 1    | 0    | 0    | 0    | 0   |
| 1997006 | 4RA  | 1-Sep-97     | 26-Sep-97 | 46.6             | 452           | .              | .    | 0    | 3    | 1    | 0    | 0    | 1    | 1    | 0   |
| 1997007 | 4RA  | 1-Oct-97     | 16-Oct-97 | 43.1             | 279           | .              | .    | 1    | 2    | 1    | 1    | 0    | 0    | 0    | 0   |
| 1997008 | 4RB  | 3-Sep-97     | 17-Sep-97 | 45.5             | 130           | .              | .    | 0    | 0    | 4    | 1    | 1    | 1    | 0    | 0   |
| 1997009 | 4RB  | 7-Oct-97     | 7-Oct-97  | 44.1             | 147           | .              | .    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0   |
| 1997011 | 4RC  | 25-Jun-97    | 30-Jun-97 | 55.8             | 170           | .              | .    | 8    | 3    | 3    | 2    | 0    | 1    | 0    | 1   |
| 1997012 | 4RC  | 1-Jul-97     | 1-Jul-97  | 58.3             | 98            | .              | .    | 5    | 1    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1997013 | 4RC  | 21-Aug-97    | 23-Aug-97 | 48.8             | 198           | .              | .    | 2    | 3    | 8    | 3    | 5    | 0    | 0    | 0   |
| 1997021 | 4SW  | 21-Jul-97    | 30-Jul-97 | 53.5             | 39            | .              | .    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1997022 | 4SW  | 1-Aug-97     | 28-Aug-97 | 48.8             | 534           | .              | .    | 3    | 3    | 9    | 5    | 1    | 0    | 0    | 0   |
| 1997024 | 4SW  | 1-Sep-97     | 16-Sep-97 | 49.2             | 56            | .              | .    | 0    | 0    | 1    | 1    | 0    | 0    | 0    | 0   |
| 1997025 | 4SW  | 1-Sep-97     | 23-Sep-97 | 48.3             | 183           | .              | .    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0   |
| 1998001 | 3PN  | 15-Dec-98    | 15-Dec-98 | 52.6             | 45            | .              | .    | .    | 0    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1998004 | 3PN  | 20-Nov-98    | 20-Nov-98 | 50.3             | 113           | .              | .    | .    | 0    | 9    | 5    | 1    | 0    | 0    | 0   |
| 1998005 | 4RA  | 27-Aug-98    | 31-Aug-98 | 45.8             | 289           | .              | .    | .    | 1    | 2    | 3    | 2    | 3    | 0    | 0   |
| 1998010 | 4SW  | 25-Jul-98    | 25-Jul-98 | 49.1             | 57            | .              | .    | .    | 0    | 3    | 1    | 3    | 0    | 0    | 0   |
| 1998012 | 4SW  | 23-Jul-98    | 24-Jul-98 | 43.3             | 60            | .              | .    | .    | 0    | 1    | 0    | 0    | 0    | 0    | 0   |
| 1998013 | 4SW  | 3-Jul-98     | 28-Jul-98 | 48.9             | 175           | .              | .    | .    | 0    | 3    | 0    | 0    | 1    | 0    | 0   |
| 1998015 | 4SW  | 5-Aug-98     | 31-Aug-98 | 45.2             | 1137          | .              | .    | .    | 1    | 3    | 7    | 8    | 3    | 0    | 0   |
| 1998016 | 4SW  | 7-Sep-98     | 10-Sep-98 | 44.3             | 52            | .              | .    | .    | 0    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1998018 | 4SW  | 1-Sep-98     | 11-Sep-98 | 45.9             | 464           | .              | .    | .    | 0    | 2    | 6    | 2    | 0    | 0    | 0   |
| 1998024 | 4SY  | 6-Jul-98     | 15-Jul-98 | 48.0             | 181           | .              | .    | .    | 0    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1998028 | 4SY  | 7-Jul-98     | 7-Jul-98  | 51.8             | 51            | .              | .    | .    | 0    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1998030 | 4SY  | 7-Oct-98     | 7-Oct-98  | 46.9             | 40            | .              | .    | .    | 0    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999001 | 3PN  | 5-May-99     | 30-May-99 | 53.8             | 313           | .              | .    | .    | .    | 17   | 8    | 7    | 3    | 0    | 1   |
| 1999002 | 3PN  | 1-Jun-99     | 14-Jun-99 | 50.9             | 185           | .              | .    | .    | .    | 10   | 0    | 2    | 0    | 0    | 0   |
| 1999003 | 3PN  | 4-Jul-99     | 21-Jul-99 | 52.4             | 145           | .              | .    | .    | .    | 15   | 2    | 2    | 0    | 0    | 0   |
| 1999004 | 3PN  | 21-Oct-99    | 22-Oct-99 | 54.1             | 467           | .              | .    | .    | .    | 6    | 18   | 21   | 5    | 0    | 0   |
| 1999005 | 3PN  | 28-Oct-99    | 28-Oct-99 | 53.9             | 66            | .              | .    | .    | .    | 2    | 2    | 3    | 2    | 0    | 0   |
| 1999006 | 3PN  | 6-Nov-99     | 24-Nov-99 | 54.7             | 745           | .              | .    | .    | .    | 1    | 22   | 15   | 9    | 0    | 0   |
| 1999007 | 3PN  | 10-Dec-99    | 10-Dec-99 | 49.7             | 34            | .              | .    | .    | .    | 0    | 1    | 0    | 0    | 0    | 0   |
| 1999011 | 4RA  | 23-Jun-99    | 29-Jun-99 | 53.1             | 391           | .              | .    | .    | .    | 13   | 9    | 7    | 2    | 0    | 0   |
| 1999012 | 4RA  | 10-Jul-99    | 28-Jul-99 | 49.7             | 134           | .              | .    | .    | .    | 0    | 4    | 0    | 1    | 0    | 0   |
| 1999014 | 4RA  | 1-Sep-99     | 30-Sep-99 | 47.9             | 321           | .              | .    | .    | .    | 2    | 2    | 1    | 0    | 0    | 1   |
| 1999015 | 4RA  | 1-Oct-99     | 1-Oct-99  | 48.4             | 45            | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999016 | 4RA  | 27-Jun-99    | 30-Jun-99 | 54.8             | 260           | .              | .    | .    | .    | 15   | 5    | 5    | 2    | 0    | 0   |
| 1999017 | 4RA  | 9-Jul-99     | 9-Jul-99  | 52.5             | 91            | .              | .    | .    | .    | 1    | 1    | 2    | 1    | 0    | 0   |
| 1999019 | 4RB  | 25-Jun-99    | 28-Jun-99 | 53.9             | 164           | .              | .    | .    | .    | 3    | 6    | 0    | 1    | 0    | 0   |
| 1999020 | 4RB  | 23-Sep-99    | 27-Sep-99 | 55.5             | 149           | .              | .    | .    | .    | 1    | 8    | 2    | 1    | 0    | 0   |
| 1999021 | 4RB  | 22-Oct-99    | 23-Oct-99 | 54.2             | 86            | .              | .    | .    | .    | 0    | 2    | 2    | 0    | 0    | 0   |
| 1999022 | 4RB  | 10-Jun-99    | 26-Jun-99 | 55.0             | 222           | .              | .    | .    | .    | 3    | 4    | 1    | 5    | 1    | 0   |
| 1999024 | 4RB  | 8-Jul-99     | 8-Jul-99  | 51.7             | 170           | .              | .    | .    | .    | 5    | 5    | 1    | 0    | 0    | 0   |
| 1999026 | 4RB  | 18-Oct-99    | 18-Oct-99 | 52.0             | 64            | .              | .    | .    | .    | 0    | 3    | 0    | 0    | 0    | 0   |
| 1999027 | 4RC  | 24-Jun-99    | 27-Jun-99 | 54.0             | 162           | .              | .    | .    | .    | 3    | 5    | 5    | 4    | 0    | 0   |
| 1999028 | 4RC  | 29-Jun-99    | 29-Jun-99 | 54.9             | 74            | .              | .    | .    | .    | 7    | 5    | 3    | 1    | 0    | 0   |
| 1999029 | 4RC  | 14-Jul-99    | 14-Jul-99 | 48.2             | 58            | .              | .    | .    | .    | 2    | 3    | 1    | 0    | 0    | 0   |
| 1999030 | 4RC  | 28-Jul-99    | 28-Jul-99 | 56.5             | 119           | .              | .    | .    | .    | 14   | 5    | 4    | 1    | 0    | 0   |
| 1999032 | 4RC  | 28-Sep-99    | 30-Sep-99 | 55.2             | 101           | .              | .    | .    | .    | 0    | 6    | 3    | 0    | 1    | 0   |
| 1999033 | 4RC  | 2-Oct-99     | 2-Oct-99  | 57.9             | 120           | .              | .    | .    | .    | 1    | 6    | 3    | 2    | 0    | 0   |
| 1999034 | 4RC  | 7-Jul-99     | 7-Jul-99  | 49.9             | 102           | .              | .    | .    | .    | 1    | 0    | 1    | 0    | 0    | 0   |
| 1999035 | 4RC  | 8-Jul-99     | 8-Jul-99  | 50.5             | 80            | .              | .    | .    | .    | 1    | 0    | 0    | 0    | 0    | 1   |
| 1999036 | 4RD  | 28-Jun-99    | 28-Jun-99 | 52.2             | 31            | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999038 | 4RD  | 16-Sep-99    | 29-Sep-99 | 64.1             | 54            | .              | .    | .    | .    | 1    | 2    | 0    | 0    | 0    | 0   |
| 1999039 | 4RD  | 2-Jun-99     | 2-Jun-99  | 55.6             | 35            | .              | .    | .    | .    | 3    | 0    | 1    | 0    | 0    | 0   |
| 1999040 | 4RD  | 22-Oct-99    | 22-Oct-99 | 49.1             | 46            | .              | .    | .    | .    | 0    | 1    | 2    | 0    | 0    | 0   |
| 1999045 | 4SW  | 5-Oct-99     | 5-Oct-99  | 48.3             | 78            | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999046 | 4SW  | 1-Sep-99     | 1-Sep-99  | 47.5             | 34            | .              | .    | .    | .    | 0    | 0    | 0    | 2    | 0    | 0   |
| 1999047 | 4SW  | 9-Jul-99     | 28-Jul-99 | 48.1             | 32            | .              | .    | .    | .    | 1    | 0    | 0    | 0    | 0    | 0   |
| 1999049 | 4SW  | 2-Aug-99     | 30-Aug-99 | 48.8             | 663           | .              | .    | .    | .    | 2    | 3    | 4    | 3    | 0    | 0   |
| 1999050 | 4SW  | 1-Sep-99     | 29-Sep-99 | 46.9             | 169           | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999052 | 4SW  | 12-Aug-99    | 13-Aug-99 | 44.7             | 30            | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999053 | 4SY  | 5-Jul-99     | 13-Jul-99 | 45.0             | 55            | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |
| 1999054 | 4SY  | 12-Jul-99    | 14-Jul-99 | 49.1             | 123           | .              | .    | .    | .    | 0    | 0    | 0    | 0    | 0    | 0   |

cont'd.

**Table 10. Annual summary of recaptures (cont.'d).**

| Expt    | Area | Release date |           | Mean length (cm) | Number tagged | Recapture year |      |      |      |      |      |      |      |      |     |
|---------|------|--------------|-----------|------------------|---------------|----------------|------|------|------|------|------|------|------|------|-----|
|         |      | min          | max       |                  |               | 1995           | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | unk |
| 2002001 | 3PN  | 29-Apr-02    | 29-Apr-02 | 54.3             | 374           | .              | .    | .    | .    | .    | .    | .    | 15   | 1    | 0   |
| 2002002 | 3PN  | 1-May-02     | 28-May-02 | 54.7             | 1670          | .              | .    | .    | .    | .    | .    | .    | 106  | 12   | 0   |
| 2002004 | 3PN  | 9-Oct-02     | 14-Oct-02 | 53.5             | 1183          | .              | .    | .    | .    | .    | .    | .    | 55   | 17   | 0   |
| 2002005 | 3PN  | 11-Nov-02    | 12-Nov-02 | 52.4             | 99            | .              | .    | .    | .    | .    | .    | .    | 0    | 1    | 0   |
| 2002006 | 3PN  | 20-Dec-02    | 20-Dec-02 | 50.9             | 72            | .              | .    | .    | .    | .    | .    | .    | 0    | 0    | 0   |
| 2002007 | 4RA  | 28-Jun-02    | 28-Jun-02 | 51.8             | 31            | .              | .    | .    | .    | .    | .    | .    | 0    | 0    | 0   |
| 2002008 | 4RA  | 25-Jul-02    | 25-Jul-02 | 52.0             | 45            | .              | .    | .    | .    | .    | .    | .    | 2    | 0    | 0   |
| 2002009 | 4RA  | 14-Aug-02    | 28-Aug-02 | 48.7             | 581           | .              | .    | .    | .    | .    | .    | .    | 1    | 0    | 0   |
| 2002011 | 4RB  | 26-Jul-02    | 26-Jul-02 | 61.6             | 95            | .              | .    | .    | .    | .    | .    | .    | 15   | 1    | 0   |
| 2002012 | 4RB  | 9-Sep-02     | 9-Sep-02  | 54.4             | 79            | .              | .    | .    | .    | .    | .    | .    | 0    | 0    | 0   |
| 2002015 | 4RC  | 8-Jun-02     | 8-Jun-02  | 54.0             | 180           | .              | .    | .    | .    | .    | .    | .    | 10   | 3    | 0   |
| 2002016 | 4RC  | 19-Jun-02    | 29-Jun-02 | 55.9             | 255           | .              | .    | .    | .    | .    | .    | .    | 16   | 1    | 0   |
| 2002017 | 4RD  | 11-Oct-02    | 11-Oct-02 | 54.0             | 173           | .              | .    | .    | .    | .    | .    | .    | 3    | 0    | 0   |
| 2002018 | 4SW  | 12-Jul-02    | 24-Jul-02 | 52.9             | 97            | .              | .    | .    | .    | .    | .    | .    | 0    | 1    | 0   |
| 2002019 | 4SW  | 14-Aug-02    | 28-Aug-02 | 43.9             | 286           | .              | .    | .    | .    | .    | .    | .    | 0    | 0    | 0   |
| 2002020 | 4SW  | 4-Sep-02     | 19-Sep-02 | 43.8             | 211           | .              | .    | .    | .    | .    | .    | .    | 0    | 0    | 0   |
| 2003001 | 3PN  | 21-May-03    | 27-May-03 | 54.9             | 205           | .              | .    | .    | .    | .    | .    | .    | .    | 4    | 0   |
| 2003003 | 3PN  | 13-Oct-03    | 13-Oct-03 | 51.5             | 286           | .              | .    | .    | .    | .    | .    | .    | .    | 2    | 0   |
| 2003004 | 3PN  | 1-Nov-03     | 11-Nov-03 | 51.7             | 609           | .              | .    | .    | .    | .    | .    | .    | .    | 0    | 0   |
| 2003005 | 4RD  | 7-Nov-03     | 7-Nov-03  | 55.3             | 189           | .              | .    | .    | .    | .    | .    | .    | .    | 0    | 0   |



**Table 11. Estimates of annual exploitation (harvest rate) by experiment (where n>50) for cod tagged in 3Pn4RS during 2000-2003. Recaptures were adjusted using estimated reporting rates (0.38) and releases were adjusted using estimates of initial tagging mortality (3% for release months December-June and 25% for July-November), and tag loss (Kirkwood model loss rates estimated from 3Ps cod tagging study). The rate of natural mortality (m) was assumed to be either 0.2 or 0.4 per year.**

| Expt    | Area | Release date |           | Number tagged | m=0.2                     |      |      |      | m=0.4                     |      |      |      |
|---------|------|--------------|-----------|---------------|---------------------------|------|------|------|---------------------------|------|------|------|
|         |      | min          | max       |               | Exploitation estimate (%) |      |      |      | Exploitation estimate (%) |      |      |      |
|         |      |              |           |               | 2000                      | 2001 | 2002 | 2003 | 2000                      | 2001 | 2002 | 2003 |
| 2000001 | 3PN  | 26-Apr-00    | 29-Apr-00 | 1034          | 16.9                      | 23.1 | 21.2 | 0.0  | 18.0                      | 29.6 | 37.5 | 0.0  |
| 2000002 | 3PN  | 3-May-00     | 23-May-00 | 1181          | 10.0                      | 12.6 | 13.1 | 1.7  | 10.6                      | 16.3 | 21.6 | 3.9  |
| 2000003 | 3PN  | 20-Nov-00    | 29-Nov-00 | 178           | 0.0                       | 23.0 | 12.9 | 0.0  | 0.0                       | 27.0 | 18.7 | 0.0  |
| 2000004 | 3PN  | 2-Dec-00     | 20-Dec-00 | 505           | 0.7                       | 9.9  | 7.2  | 1.8  | 0.7                       | 11.6 | 10.7 | 3.2  |
| 2001001 | 3PN  | 1-May-01     | 4-May-01  | 741           | .                         | 22.3 | 12.1 | 1.1  | .                         | 23.4 | 16.1 | 1.8  |
| 2001002 | 3PN  | 4-Oct-01     | 11-Oct-01 | 589           | .                         | 22.1 | 40.6 | 9.6  | .                         | 22.3 | 48.7 | 16.7 |
| 2001003 | 3PN  | 12-Nov-01    | 30-Nov-01 | 1046          | .                         | 0.0  | 21.1 | 3.0  | .                         | 0.0  | 24.1 | 4.5  |
| 2001004 | 3PN  | 3-Dec-01     | 10-Dec-01 | 613           | .                         | 0.0  | 18.6 | 3.3  | .                         | 0.0  | 21.3 | 4.9  |
| 2002001 | 3PN  | 29-Apr-02    | 29-Apr-02 | 374           | .                         | .    | 13.8 | 1.3  | .                         | .    | 14.8 | 1.7  |
| 2002002 | 3PN  | 1-May-02     | 28-May-02 | 1670          | .                         | .    | 20.4 | 3.0  | .                         | .    | 21.6 | 4.0  |
| 2002004 | 3PN  | 9-Oct-02     | 14-Oct-02 | 1183          | .                         | .    | 16.8 | 8.4  | .                         | .    | 17.0 | 10.4 |
| 2002005 | 3PN  | 11-Nov-02    | 12-Nov-02 | 99            | .                         | .    | 0.0  | 2.9  | .                         | .    | 0.0  | 3.5  |
| 2002006 | 3PN  | 20-Dec-02    | 20-Dec-02 | 72            | .                         | .    | 0.0  | 0.0  | .                         | .    | 0.0  | 0.0  |
| 2003001 | 3PN  | 21-May-03    | 27-May-03 | 205           | .                         | .    | .    | 5.6  | .                         | .    | .    | 5.8  |
| 2003003 | 3PN  | 13-Oct-03    | 13-Oct-03 | 286           | .                         | .    | .    | 2.6  | .                         | .    | .    | 2.7  |
| 2003004 | 3PN  | 1-Nov-03     | 11-Nov-03 | 609           | .                         | .    | .    | 0.0  | .                         | .    | .    | 0.0  |
|         |      |              |           |               |                           |      |      |      |                           |      |      |      |
| Expt    | Area | Release date |           | Number tagged | m=0.2                     |      |      |      | m=0.4                     |      |      |      |
|         |      | min          | max       |               | Exploitation estimate (%) |      |      |      | Exploitation estimate (%) |      |      |      |
|         |      |              |           |               | 2000                      | 2001 | 2002 | 2003 | 2000                      | 2001 | 2002 | 2003 |
| 2000007 | 4RA  | 11-Jul-00    | 26-Jul-00 | 1100          | 3.9                       | 7.4  | 9.3  | 1.5  | 4.0                       | 9.1  | 14.1 | 2.9  |
| 2000008 | 4RA  | 2-Aug-00     | 30-Aug-00 | 168           | 2.3                       | 18.7 | 9.5  | 3.8  | 2.4                       | 22.9 | 14.8 | 8.1  |
| 2001006 | 4RA  | 24-Jul-01    | 24-Jul-01 | 289           | .                         | 3.8  | 7.3  | 0.0  | .                         | 3.8  | 8.8  | 0.0  |
| 2001007 | 4RA  | 19-Jul-01    | 24-Jul-01 | 585           | .                         | 2.5  | 7.3  | 1.4  | .                         | 2.5  | 9.1  | 2.1  |
| 2001008 | 4RA  | 19-Jul-01    | 19-Jul-01 | 68            | .                         | 0.0  | 8.2  | 0.0  | .                         | 0.0  | 10.6 | 0.0  |
| 2001009 | 4RA  | 20-Jul-01    | 28-Jul-01 | 51            | .                         | 0.0  | 10.5 | 0.0  | .                         | 0.0  | 13.4 | 0.0  |
| 2001010 | 4RA  | 13-Aug-01    | 21-Aug-01 | 292           | .                         | 5.8  | 11.2 | 1.5  | .                         | 5.9  | 13.6 | 2.2  |
| 2001011 | 4RA  | 13-Sep-01    | 28-Sep-01 | 397           | .                         | 0.0  | 1.8  | 0.0  | .                         | 0.0  | 2.2  | 0.0  |
| 2001012 | 4RA  | 4-Oct-01     | 11-Oct-01 | 171           | .                         | 0.0  | 0.0  | 0.0  | .                         | 0.0  | 0.0  | 0.0  |
| 2001013 | 4RA  | 4-Oct-01     | 21-Oct-01 | 357           | .                         | 0.0  | 2.8  | 1.8  | .                         | 0.0  | 3.3  | 2.6  |
| 2001015 | 4RA  | 9-Jul-01     | 9-Jul-01  | 103           | .                         | 11.5 | 37.5 | 0.0  | .                         | 11.8 | 47.5 | 0.0  |
| 2002009 | 4RA  | 14-Aug-02    | 28-Aug-02 | 581           | .                         | .    | 0.7  | 0.0  | .                         | .    | 0.7  | 0.0  |
|         |      |              |           |               |                           |      |      |      |                           |      |      |      |
| 2000017 | 4RB  | 20-Jul-00    | 25-Jul-00 | 63            | 0.0                       | 0.0  | 20.7 | 0.0  | 0.0                       | 0.0  | 30.9 | 0.0  |
| 2000018 | 4RB  | 17-Jul-00    | 25-Jul-00 | 151           | 2.3                       | 10.4 | 8.9  | 0.0  | 2.3                       | 12.6 | 12.7 | 0.0  |
| 2000019 | 4RB  | 1-Aug-00     | 21-Aug-00 | 92            | 0.0                       | 11.3 | 16.1 | 0.0  | 0.0                       | 13.9 | 24.8 | 0.0  |
| 2000021 | 4RB  | 17-Oct-00    | 17-Oct-00 | 124           | 2.8                       | 8.4  | 27.8 | 0.0  | 2.9                       | 10.1 | 40.3 | 0.0  |
| 2000027 | 4RB  | 17-Oct-00    | 18-Oct-00 | 112           | 0.0                       | 0.0  | 5.4  | 0.0  | 0.0                       | 0.0  | 7.4  | 0.0  |
| 2001016 | 4RB  | 13-Aug-01    | 22-Aug-01 | 502           | .                         | 3.7  | 18.7 | 3.3  | .                         | 3.8  | 22.6 | 5.1  |
| 2002011 | 4RB  | 26-Jul-02    | 26-Jul-02 | 95            | .                         | .    | 61.5 | 15.3 | .                         | .    | 63.0 | 20.4 |
| 2002012 | 4RB  | 9-Sep-02     | 9-Sep-02  | 79            | .                         | .    | 0.0  | 0.0  | .                         | .    | 0.0  | 0.0  |

cont'd.-

**Table 11. Estimates of annual exploitation (harvest) rate (cont.'d.)**

| Expt    | Area | Release date |           | Number tagged | m=0.2                     |      |      |      | m=0.4                     |      |      |      |
|---------|------|--------------|-----------|---------------|---------------------------|------|------|------|---------------------------|------|------|------|
|         |      | min          | max       |               | Exploitation estimate (%) |      |      |      | Exploitation estimate (%) |      |      |      |
|         |      |              |           |               | 2000                      | 2001 | 2002 | 2003 | 2000                      | 2001 | 2002 | 2003 |
| 2000028 | 4RC  | 21-Jun-00    | 23-Jun-00 | 181           | 3.5                       | 14.4 | 7.4  | 0.0  | 3.7                       | 17.9 | 12.1 | 0.0  |
| 2000029 | 4RC  | 26-Jul-00    | 26-Jul-00 | 91            | 4.5                       | 11.8 | 12.1 | 0.0  | 4.8                       | 14.6 | 18.5 | 0.0  |
| 2000030 | 4RC  | 15-Sep-00    | 27-Sep-00 | 89            | 0.0                       | 16.1 | 16.6 | 12.2 | 0.0                       | 18.7 | 24.8 | 23.8 |
| 2000031 | 4RC  | 21-Jul-00    | 27-Jul-00 | 179           | 12.7                      | 13.0 | 24.6 | 0.0  | 12.9                      | 15.8 | 38.9 | 0.0  |
| 2000032 | 4RC  | 7-Jul-00     | 7-Jul-00  | 61            | 14.1                      | 9.8  | 27.7 | 0.0  | 15.3                      | 12.1 | 43.5 | 0.0  |
| 2001019 | 4RC  | 14-Sep-01    | 20-Sep-01 | 145           |                           | 2.7  | 17.9 | 0.0  |                           | 2.7  | 21.3 | 0.0  |
| 2001020 | 4RC  | 6-Oct-01     | 6-Oct-01  | 159           |                           | 4.9  | 16.2 | 0.0  |                           | 5.0  | 18.9 | 0.0  |
| 2002015 | 4RC  | 8-Jun-02     | 8-Jun-02  | 180           |                           |      | 17.0 | 8.9  |                           |      | 18.3 | 11.7 |
| 2002016 | 4RC  | 19-Jun-02    | 29-Jun-02 | 255           |                           |      | 19.5 | 1.1  |                           |      | 20.3 | 1.4  |
| 2000034 | 4RD  | 17-Jul-00    | 27-Jul-00 | 292           | 5.3                       | 41.7 | 43.5 | 16.7 | 5.5                       | 51.6 | 77.1 | 64.7 |
| 2000037 | 4RD  | 5-Nov-00     | 6-Nov-00  | 85            | 0.0                       | 13.0 | 3.2  | 0.0  | 0.0                       | 15.0 | 4.5  | 0.0  |
| 2000038 | 4RD  | 5-Nov-00     | 5-Nov-00  | 127           | 0.0                       | 7.4  | 2.0  | 0.0  | 0.0                       | 8.8  | 2.9  | 0.0  |
| 2000039 | 4RD  | 18-Oct-00    | 18-Oct-00 | 71            | 0.0                       | 14.0 | 10.7 | 0.0  | 0.0                       | 16.6 | 16.6 | 0.0  |
| 2001024 | 4RD  | 8-Oct-01     | 11-Oct-01 | 195           |                           | 0.0  | 23.6 | 0.0  |                           | 0.0  | 27.9 | 0.0  |
| 2001025 | 4RD  | 14-Nov-01    | 14-Nov-01 | 38            |                           | 0.0  | 0.0  | 0.0  |                           | 0.0  | 0.0  | 0.0  |
| 2001026 | 4RD  | 26-Nov-01    | 26-Nov-01 | 178           |                           | 0.0  | 16.1 | 3.9  |                           | 0.0  | 18.6 | 5.6  |
| 2002017 | 4RD  | 11-Oct-02    | 11-Oct-02 | 173           |                           |      | 6.5  | 0.0  |                           |      | 6.6  | 0.0  |
| 2003005 | 4RD  | 7-Nov-03     | 7-Nov-03  | 189           |                           |      |      | 0.0  |                           |      |      | 0.0  |
| 2000041 | 4SW  | 24-Jul-00    | 24-Jul-00 | 84            | 0.0                       | 6.4  | 8.6  | 0.0  | 0.0                       | 8.1  | 13.3 | 0.0  |
| 2000043 | 4SW  | 7-Aug-00     | 30-Aug-00 | 422           | 0.0                       | 0.0  | 3.1  | 0.0  | 0.0                       | 0.0  | 4.6  | 0.0  |
| 2000044 | 4SW  | 3-Sep-00     | 7-Sep-00  | 122           | 0.0                       | 0.0  | 5.0  | 0.0  | 0.0                       | 0.0  | 7.1  | 0.0  |
| 2000045 | 4SW  | 23-Aug-00    | 30-Aug-00 | 106           | 0.0                       | 0.0  | 0.0  | 0.0  | 0.0                       | 0.0  | 0.0  | 0.0  |
| 2001028 | 4SW  | 18-Jul-01    | 22-Jul-01 | 63            |                           | 6.0  | 0.0  | 0.0  |                           | 6.1  | 0.0  | 0.0  |
| 2001029 | 4SW  | 1-Aug-01     | 30-Aug-01 | 127           |                           | 0.0  | 0.0  | 0.0  |                           | 0.0  | 0.0  | 0.0  |
| 2002018 | 4SW  | 12-Jul-02    | 24-Jul-02 | 97            |                           |      | 0.0  | 5.2  |                           |      | 0.0  | 6.3  |
| 2002019 | 4SW  | 14-Aug-02    | 28-Aug-02 | 286           |                           |      | 0.0  | 0.0  |                           |      | 0.0  | 0.0  |
| 2002020 | 4SW  | 4-Sep-02     | 19-Sep-02 | 211           |                           |      | 0.0  | 0.0  |                           |      | 0.0  | 0.0  |

**Table 12. Annual distribution of recaptures for cod tagged in various regions of 3Pn4RS during 1995-2003. Recaptures were adjusted by annual and region-specific reporting rates estimated from a high-reward tagging study. Shaded cells give the percentage of tags returned from the area of release.**

| Release area | Release year | Number tagged | Recap. year | Number recaptured | Percent recaptured |        |      |        |      |      |      |       |       |       |      |       |       |      |     |     |
|--------------|--------------|---------------|-------------|-------------------|--------------------|--------|------|--------|------|------|------|-------|-------|-------|------|-------|-------|------|-----|-----|
|              |              |               |             |                   | 2J3KL              | 3Psg/h | 3Psd | 3Pse/f | 3Psc | 3Psb | 3Psa | 3Pn   | 4Rd   | 4Rc   | 4Rb  | 4Ra   | 4Svwy | 4TVn | Unk |     |
| 3PN          | 1995         | 312           | 1995        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1996        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1997        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 33.3  | 22.2  | 22.2  | 22.2 | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1998        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1999        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 66.7  | 33.3  | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2000        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          | 1996         | 3858          | 1996        | 23                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1997        | 174               | 0.0                | 0.0    | 0.0  | 0.6    | 3.4  | 3.4  | 6.9  | 64.4  | 8.6   | 4.6   | 3.4  | 1.1   | 3.4   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1998        | 143               | 1.4                | 0.0    | 0.0  | 0.0    | 4.2  | 4.2  | 11.9 | 67.1  | 7.0   | 1.4   | 1.4  | 1.4   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1999        | 79                | 2.5                | 1.3    | 0.0  | 0.0    | 22.8 | 10.1 | 8.9  | 34.2  | 0.0   | 10.1  | 10.1 | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2000        | 39                | 0.0                | 0.0    | 2.6  | 2.6    | 2.6  | 5.1  | 7.7  | 53.8  | 10.3  | 10.3  | 0.0  | 5.1   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2001        | 7                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 14.3 | 85.7  | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2002        | 27                | 0.0                | 0.0    | 0.0  | 0.0    | 3.7  | 3.7  | 0.0  | 77.8  | 7.4   | 0.0   | 0.0  | 0.0   | 7.4   | 0.0  | 0.0 | 0.0 |
| 3PN          | 1997         | 388           | 1997        | 18                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 5.6  | 83.3  | 11.1  | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1998        | 18                | 0.0                | 0.0    | 0.0  | 0.0    | 11.1 | 0.0  | 33.3 | 44.4  | 0.0   | 0.0   | 0.0  | 0.0   | 11.1  | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1999        | 5                 | 0.0                | 0.0    | 20.0 | 0.0    | 0.0  | 0.0  | 0.0  | 40.0  | 0.0   | 0.0   | 40.0 | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2000        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 100.0 | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2001        | 5                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 20.0 | 0.0   | 40.0  | 0.0   | 0.0  | 40.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2002        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          | 1998         | 176           | 1998        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 1999        | 21                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2000        | 8                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 75.0  | 0.0   | 25.0  | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          | 1999         | 1955          | 1999        | 85                | 1.2                | 0.0    | 0.0  | 0.0    | 1.2  | 0.0  | 12.9 | 80.0  | 2.4   | 2.4   | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2000        | 91                | 0.0                | 0.0    | 0.0  | 0.0    | 1.1  | 0.0  | 7.7  | 33.0  | 17.6  | 8.8   | 16.5 | 7.7   | 6.6   | 1.1  | 0.0 | 0.0 |
| 3PN          |              |               | 2001        | 91                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 2.2  | 52.7  | 13.2  | 11.0  | 7.7  | 8.8   | 4.4   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2002        | 33                | 0.0                | 0.0    | 0.0  | 0.0    | 3.0  | 0.0  | 0.0  | 39.4  | 18.2  | 6.1   | 15.2 | 6.1   | 12.1  | 0.0  | 0.0 | 0.0 |
| 3PN          | 2000         | 2898          | 2000        | 164               | 0.0                | 0.0    | 0.6  | 0.0    | 0.6  | 0.6  | 9.1  | 40.2  | 14.0  | 15.9  | 11.6 | 6.1   | 1.2   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2001        | 172               | 0.0                | 0.0    | 0.0  | 0.0    | 0.6  | 0.6  | 3.5  | 50.6  | 14.0  | 14.0  | 11.0 | 5.8   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2002        | 104               | 0.0                | 0.0    | 0.0  | 0.0    | 2.9  | 0.0  | 3.8  | 63.5  | 4.8   | 8.7   | 8.7  | 7.7   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2003        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 33.3  | 0.0   | 33.3  | 33.3 | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          | 2001         | 3029          | 2001        | 178               | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 3.4  | 64.6  | 3.9   | 12.4  | 7.3  | 5.1   | 3.4   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2002        | 230               | 0.0                | 0.0    | 0.0  | 0.0    | 0.9  | 0.0  | 0.4  | 63.9  | 8.3   | 9.1   | 5.7  | 9.1   | 2.6   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2003        | 15                | 0.0                | 0.0    | 0.0  | 0.0    | 6.7  | 0.0  | 0.0  | 73.3  | 0.0   | 20.0  | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          | 2002         | 3404          | 2002        | 315               | 0.0                | 0.0    | 1.3  | 0.0    | 0.3  | 0.0  | 1.6  | 75.2  | 3.8   | 6.0   | 6.3  | 4.1   | 1.3   | 0.0  | 0.0 | 0.0 |
| 3PN          |              |               | 2003        | 44                | 0.0                | 0.0    | 2.3  | 2.3    | 0.0  | 2.3  | 20.5 | 54.5  | 4.5   | 4.5   | 9.1  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 3PN          | 2003         | 1124          | 2003        | 13                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 7.7  | 0.0  | 30.8  | 0.0   | 15.4  | 30.8 | 15.4  | 0.0   | 0.0  | 0.0 | 0.0 |

cont'd.-

**Table 12. Distribution of recaptures of tagged cod (cont'd.).**

| Release area | Release year | Number tagged | Recap. year | Number recaptured | Percent recaptured |        |      |        |      |      |      |       |       |       |      |      |       |      |     |     |
|--------------|--------------|---------------|-------------|-------------------|--------------------|--------|------|--------|------|------|------|-------|-------|-------|------|------|-------|------|-----|-----|
|              |              |               |             |                   | 2J3KL              | 3Psg/h | 3Psd | 3Pse/f | 3Psc | 3Psb | 3Psa | 3Pn   | 4Rd   | 4Rc   | 4Rb  | 4Ra  | 4Svvy | 4TVn | Unk |     |
| 4RD          | 1996         | 715           | 1996        | 9                 | 0.0                | 0.0    | 11.1 | 0.0    | 0.0  | 0.0  | 0.0  | 22.2  | 66.7  | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 1997        | 25                | 0.0                | 0.0    | 0.0  | 0.0    | 12.0 | 0.0  | 0.0  | 40.0  | 32.0  | 8.0   | 0.0  | 8.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 1998        | 29                | 0.0                | 0.0    | 0.0  | 0.0    | 17.2 | 6.9  | 0.0  | 20.7  | 34.5  | 13.8  | 6.9  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 1999        | 11                | 18.2               | 0.0    | 9.1  | 0.0    | 0.0  | 0.0  | 0.0  | 36.4  | 18.2  | 0.0   | 18.2 | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2000        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2001        | 8                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 25.0  | 50.0  | 0.0   | 0.0  | 25.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 33.3  | 0.0   | 66.7  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          | 1999         | 190           | 1999        | 8                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 50.0 | 50.0  | 0.0   | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2000        | 5                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 20.0 | 0.0  | 0.0   | 40.0  | 0.0   | 0.0  | 0.0  | 0.0   | 40.0 | 0.0 | 0.0 |
| 4RD          |              |               | 2001        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 66.7  | 33.3  | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          | 2000         | 605           | 2000        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 16.7  | 33.3  | 50.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2001        | 62                | 0.0                | 0.0    | 0.0  | 0.0    | 1.6  | 0.0  | 1.6  | 4.8   | 56.5  | 21.0  | 9.7  | 4.8  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2002        | 24                | 0.0                | 0.0    | 4.2  | 0.0    | 0.0  | 0.0  | 0.0  | 33.3  | 37.5  | 25.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2003        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 100.0 | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          | 2001         | 465           | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          |              |               | 2002        | 34                | 0.0                | 0.0    | 2.9  | 0.0    | 0.0  | 0.0  | 0.0  | 26.5  | 47.1  | 5.9   | 5.9  | 5.9  | 5.9   | 5.9  | 0.0 | 0.0 |
| 4RD          |              |               | 2003        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 50.0  | 50.0  | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          | 2002         | 173           | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RD          | 2003         | 189           | 2003        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

| Release area | Release year | Number tagged | Recap. year | Number recaptured | Percent recaptured |        |      |        |      |      |      |      |       |       |       |      |       |      |     |     |
|--------------|--------------|---------------|-------------|-------------------|--------------------|--------|------|--------|------|------|------|------|-------|-------|-------|------|-------|------|-----|-----|
|              |              |               |             |                   | 2J3KL              | 3Psg/h | 3Psd | 3Pse/f | 3Psc | 3Psb | 3Psa | 3Pn  | 4Rd   | 4Rc   | 4Rb   | 4Ra  | 4Svwy | 4TVn | Unk |     |
| 4RC          | 1995         | 549           | 1995        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1996        | 26                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 3.8  | 0.0  | 0.0  | 7.7   | 88.5  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1997        | 18                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 22.2 | 11.1  | 55.6  | 11.1  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1998        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1999        | 3                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 33.3 | 0.0  | 0.0   | 66.7  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          | 1996         | 913           | 1996        | 15                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 13.3 | 0.0   | 86.7  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1997        | 29                | 0.0                | 0.0    | 3.4  | 0.0    | 0.0  | 3.4  | 0.0  | 44.8 | 6.9   | 41.4  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1998        | 29                | 0.0                | 0.0    | 0.0  | 3.4    | 6.9  | 6.9  | 0.0  | 27.6 | 6.9   | 34.5  | 13.8  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1999        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 33.3 | 0.0  | 0.0  | 0.0  | 22.2  | 22.2  | 0.0   | 0.0  | 22.2  | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2000        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 11.1 | 22.2 | 0.0   | 66.7  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 100.0 | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 66.7 | 0.0   | 33.3  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          | 1997         | 486           | 1997        | 27                | 0.0                | 0.0    | 0.0  | 0.0    | 3.7  | 0.0  | 3.7  | 14.8 | 7.4   | 48.1  | 22.2  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1998        | 20                | 0.0                | 0.0    | 0.0  | 0.0    | 10.0 | 0.0  | 10.0 | 0.0  | 30.0  | 10.0  | 20.0  | 10.0 | 10.0  | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 1999        | 22                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 9.1  | 18.2  | 36.4  | 27.3  | 9.1  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2000        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 11.1 | 0.0  | 0.0  | 22.2 | 0.0   | 66.7  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2001        | 10                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 20.0  | 40.0  | 40.0  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2002        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          | 1999         | 981           | 1999        | 48                | 0.0                | 0.0    | 0.0  | 0.0    | 2.1  | 0.0  | 10.4 | 25.0 | 12.5  | 33.3  | 16.7  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2000        | 61                | 0.0                | 0.0    | 0.0  | 0.0    | 1.6  | 0.0  | 4.9  | 11.5 | 18.0  | 50.8  | 9.8   | 0.0  | 3.3   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2001        | 33                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 9.1  | 27.3 | 24.2  | 24.2  | 15.2  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2002        | 15                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 46.7 | 0.0   | 13.3  | 26.7  | 0.0  | 13.3  | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2003        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          | 2000         | 613           | 2000        | 20                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 40.0 | 20.0  | 30.0  | 0.0   | 10.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2001        | 30                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 30.0 | 13.3  | 33.3  | 16.7  | 6.7  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2002        | 23                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 4.3  | 17.4 | 8.7   | 60.9  | 8.7   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2003        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          | 2001         | 354           | 2001        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 11.1 | 55.6 | 22.2  | 0.0   | 11.1  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2002        | 29                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 17.2 | 0.0   | 82.8  | 0.0   | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          | 2002         | 450           | 2002        | 49                | 0.0                | 0.0    | 4.1  | 0.0    | 0.0  | 0.0  | 2.0  | 57.1 | 8.2   | 16.3  | 12.2  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RC          |              |               | 2003        | 7                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 14.3 | 28.6 | 0.0   | 28.6  | 28.6  | 0.0  | 0.0   | 0.0  | 0.0 | 0.0 |

cont'd.-

**Table 12. Distribution of recaptures of tagged cod (cont'd.).**

| Release area | Release year | Number tagged | Recap. year | Number recaptured | Percent recaptured |        |      |        |      |      |      |      |       |      |       |       |       |      |     |
|--------------|--------------|---------------|-------------|-------------------|--------------------|--------|------|--------|------|------|------|------|-------|------|-------|-------|-------|------|-----|
|              |              |               |             |                   | 2J3KL              | 3Psg/h | 3Psd | 3Pse/f | 3Psc | 3Psb | 3Psa | 3Pn  | 4Rd   | 4Rc  | 4Rb   | 4Ra   | 4Svvy | 4TVn | Unk |
| 4RB          | 1995         | 130           | 1995        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 1997        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 0.0   | 100.0 | 0.0  | 0.0 |
| 4RB          |              |               | 1998        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 0.0   | 100.0 | 0.0  | 0.0 |
| 4RB          |              |               | 2000        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 100.0 | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          | 1996         | 1148          | 1996        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 1997        | 19                | 0.0                | 0.0    | 0.0  | 0.0    | 5.3  | 0.0  | 0.0  | 42.1 | 0.0   | 0.0  | 21.1  | 21.1  | 10.5  | 0.0  | 0.0 |
| 4RB          |              |               | 1998        | 24                | 0.0                | 0.0    | 0.0  | 0.0    | 8.3  | 0.0  | 0.0  | 8.3  | 0.0   | 8.3  | 75.0  | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 1999        | 31                | 3.2                | 0.0    | 3.2  | 0.0    | 3.2  | 0.0  | 3.2  | 0.0  | 0.0   | 0.0  | 67.7  | 12.9  | 6.5   | 0.0  | 0.0 |
| 4RB          |              |               | 2000        | 7                 | 0.0                | 0.0    | 0.0  | 0.0    | 14.3 | 0.0  | 0.0  | 28.6 | 28.6  | 28.6 | 0.0   | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2001        | 5                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2002        | 3                 | 0.0                | 0.0    | 0.0  | 33.3   | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 66.7  | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          | 1997         | 277           | 1997        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 1999        | 8                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 75.0  | 25.0  | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2000        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 100.0 | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2001        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 50.0  | 0.0  | 0.0   | 50.0  | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2002        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          | 1999         | 707           | 1999        | 15                | 0.0                | 0.0    | 6.7  | 0.0    | 0.0  | 0.0  | 20.0 | 26.7 | 0.0   | 13.3 | 20.0  | 13.3  | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2000        | 43                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 18.6 | 4.7   | 9.3  | 39.5  | 23.3  | 4.7   | 0.0  | 0.0 |
| 4RB          |              |               | 2001        | 11                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 9.1  | 18.2 | 0.0   | 0.0  | 54.5  | 18.2  | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2002        | 12                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 16.7 | 0.0   | 0.0  | 50.0  | 16.7  | 16.7  | 0.0  | 0.0 |
| 4RB          | 2000         | 718           | 2000        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 11.1 | 0.0  | 0.0   | 11.1 | 77.8  | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2001        | 21                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 81.0  | 9.5   | 9.5   | 0.0  | 0.0 |
| 4RB          |              |               | 2002        | 26                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 7.7  | 0.0   | 23.1 | 50.0  | 19.2  | 0.0   | 0.0  | 0.0 |
| 4RB          | 2001         | 502           | 2001        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 22.2 | 0.0   | 0.0  | 77.8  | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2002        | 33                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 6.1  | 81.8  | 6.1   | 6.1   | 0.0  | 0.0 |
| 4RB          |              |               | 2003        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          | 2002         | 182           | 2002        | 30                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 23.3 | 0.0   | 0.0  | 76.7  | 0.0   | 0.0   | 0.0  | 0.0 |
| 4RB          |              |               | 2003        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0   | 0.0  | 0.0 |

cont'd.-

**Table 12. Distribution of recaptures of tagged cod (cont'd.).**

| Release area | Release year | Number tagged | Recap. year | Number recaptured | Percent recaptured |        |      |        |      |      |      |      |      |       |      |       |       |      |     |     |
|--------------|--------------|---------------|-------------|-------------------|--------------------|--------|------|--------|------|------|------|------|------|-------|------|-------|-------|------|-----|-----|
|              |              |               |             |                   | 2J3KL              | 3Psg/h | 3Psd | 3Pse/f | 3Psc | 3Psb | 3Psa | 3Pn  | 4Rd  | 4Rc   | 4Rb  | 4Ra   | 4Svwy | 4TVn | Unk |     |
| 4RA          |              |               | 1997        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 |     |
| 4RA          |              |               | 1998        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 |     |
| 4RA          |              |               | 2000        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 |     |
| 4RA          |              |               | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 |     |
| 4RA          | 1996         | 2558          | 1996        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 50.0 | 50.0  | 0.0   | 0.0  | 0.0 |     |
| 4RA          |              |               | 1997        | 22                | 0.0                | 0.0    | 4.5  | 0.0    | 0.0  | 4.5  | 0.0  | 0.0  | 0.0  | 0.0   | 9.1  | 45.5  | 36.4  | 0.0  | 0.0 |     |
| 4RA          |              |               | 1998        | 22                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 9.1  | 9.1  | 0.0  | 0.0   | 27.3 | 22.7  | 31.8  | 0.0  | 0.0 |     |
| 4RA          |              |               | 1999        | 13                | 0.0                | 0.0    | 7.7  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 92.3  | 0.0   | 0.0  | 0.0 |     |
| 4RA          |              |               | 2000        | 12                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 16.7 | 0.0   | 33.3 | 33.3  | 16.7  | 0.0  | 0.0 |     |
| 4RA          |              |               | 2001        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 33.3 | 0.0   | 0.0  | 66.7  | 0.0   | 0.0  | 0.0 |     |
| 4RA          |              |               | 2002        | 12                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 33.3 | 0.0   | 33.3 | 0.0   | 0.0   | 33.3 | 0.0 | 0.0 |
| 4RA          | 1997         | 860           | 1997        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 100.0 | 0.0  | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 1998        | 10                | 0.0                | 0.0    | 0.0  | 0.0    | 20.0 | 0.0  | 0.0  | 20.0 | 0.0  | 0.0   | 0.0  | 20.0  | 40.0  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 1999        | 9                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 11.1 | 0.0  | 0.0  | 0.0  | 22.2  | 22.2 | 44.4  | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2000        | 4                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 50.0  | 50.0  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2002        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2003        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          | 1998         | 299           | 1998        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 100.0 | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 1999        | 3                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2000        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 66.7  | 33.3  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 100.0 | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 33.3 | 0.0   | 0.0  | 0.0   | 66.7  | 0.0  | 0.0 | 0.0 |
| 4RA          | 1999         | 1295          | 1999        | 55                | 1.8                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 7.3  | 3.6  | 0.0  | 0.0   | 20.0 | 61.8  | 5.5   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2000        | 39                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 2.6  | 5.1  | 15.4 | 0.0   | 15.4 | 46.2  | 15.4  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2001        | 31                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 12.9 | 12.9 | 0.0   | 25.8 | 41.9  | 6.5   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2002        | 12                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 16.7 | 16.7 | 0.0   | 0.0  | 50.0  | 16.7  | 0.0  | 0.0 | 0.0 |
| 4RA          | 2000         | 1437          | 2000        | 27                | 0.0                | 0.0    | 0.0  | 0.0    | 3.7  | 0.0  | 3.7  | 0.0  | 14.8 | 0.0   | 7.4  | 55.6  | 14.8  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2001        | 42                | 2.4                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 2.4  | 23.8 | 11.9 | 9.5   | 14.3 | 26.2  | 9.5   | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2002        | 31                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 32.3 | 0.0  | 0.0   | 0.0  | 41.9  | 25.8  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2003        | 5                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 60.0 | 0.0  | 0.0  | 0.0   | 40.0 | 0.0   | 0.0   | 0.0  | 0.0 | 0.0 |
| 4RA          | 2001         | 2335          | 2001        | 33                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 3.0  | 3.0  | 24.2 | 0.0  | 6.1   | 6.1  | 33.3  | 24.2  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2002        | 50                | 0.0                | 0.0    | 2.0  | 0.0    | 0.0  | 0.0  | 2.0  | 34.0 | 0.0  | 0.0   | 10.0 | 26.0  | 26.0  | 0.0  | 0.0 | 0.0 |
| 4RA          |              |               | 2003        | 7                 | 0.0                | 0.0    | 0.0  | 0.0    | 14.3 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 85.7  | 0.0  | 0.0 | 0.0 |
| 4RA          | 2002         | 658           | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 33.3 | 33.3 | 0.0   | 0.0  | 0.0   | 33.3  | 0.0  | 0.0 | 0.0 |

cont'd.-

**Table 12. Distribution of recaptures of tagged cod (cont'd.).**

| Release area | Release year | Number tagged | Recap. year | Number recaptured | Percent recaptured |        |      |        |      |      |      |       |      |      |     |       |       |       |     |     |
|--------------|--------------|---------------|-------------|-------------------|--------------------|--------|------|--------|------|------|------|-------|------|------|-----|-------|-------|-------|-----|-----|
|              |              |               |             |                   | 2J3KL              | 3Psg/h | 3Psd | 3Pse/f | 3Psc | 3Psb | 3Psa | 3Pn   | 4Rd  | 4Rc  | 4Rb | 4Ra   | 4Svwy | 4TVn  | Unk |     |
| 4SV          | 1996         | 24            | 1996        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SV          | 1997         | 19            | 1997        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SV          | 1998         | 14            | 1998        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SV          | 1999         | 17            | 1999        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SV          | 2000         | 16            | 2000        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SW          | 1996         | 1109          | 1996        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 1997        | 17                | 0.0                | 0.0    | 0.0  | 0.0    | 5.9  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 58.8  | 35.3  | 0.0 | 0.0 |
| 4SW          |              |               | 1998        | 10                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 20.0 | 0.0  | 0.0 | 0.0   | 20.0  | 60.0  | 0.0 | 0.0 |
| 4SW          |              |               | 1999        | 10                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 60.0  | 40.0  | 0.0 | 0.0 |
| 4SW          |              |               | 2001        | 12                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 33.3  | 0.0  | 0.0  | 0.0 | 0.0   | 50.0  | 16.7  | 0.0 | 0.0 |
| 4SW          |              |               | 2002        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 100.0 | 0.0   | 0.0 | 0.0 |
| 4SW          | 1997         | 826           | 1997        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 66.7  | 33.3  | 0.0 | 0.0 |
| 4SW          |              |               | 1998        | 5                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 20.0 | 0.0 | 0.0   | 80.0  | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 1999        | 20                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 45.0  | 50.0  | 5.0 | 0.0 |
| 4SW          |              |               | 2000        | 11                | 18.2               | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 18.2 | 0.0  | 0.0 | 0.0   | 63.6  | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 100.0 | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SW          | 1998         | 1967          | 1998        | 1                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 100.0 | 0.0 | 0.0 |
| 4SW          |              |               | 1999        | 22                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 9.1  | 0.0  | 0.0 | 18.2  | 45.5  | 27.3  | 0.0 | 0.0 |
| 4SW          |              |               | 2000        | 26                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 65.4  | 34.6  | 0.0 | 0.0 |
| 4SW          |              |               | 2001        | 25                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 8.0  | 0.0  | 8.0 | 16.0  | 28.0  | 40.0  | 0.0 | 0.0 |
| 4SW          |              |               | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 33.3  | 66.7  | 0.0 | 0.0 |
| 4SW          | 1999         | 1016          | 1999        | 5                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 40.0  | 60.0  | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 2000        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 66.7  | 33.3  | 0.0 | 0.0 |
| 4SW          |              |               | 2001        | 7                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 14.3  | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 85.7  | 0.0 | 0.0 |
| 4SW          |              |               | 2002        | 10                | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 20.0  | 60.0  | 20.0  | 0.0 | 0.0 |
| 4SW          | 2000         | 768           | 2000        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 100.0 | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 2002        | 6                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 33.3  | 66.7  | 0.0 | 0.0 |
| 4SW          | 2001         | 257           | 2001        | 2                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 100.0 | 0.0 | 0.0 |
| 4SW          | 2002         | 601           | 2002        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SW          |              |               | 2003        | 1                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 100.0 | 0.0 | 0.0 |
| 4SY          | 1997         | 18            | 1997        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SY          | 1998         | 344           | 1998        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |
| 4SY          | 1999         | 178           | 1999        | 0                 | 0.0                | 0.0    | 0.0  | 0.0    | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0 | 0.0   | 0.0   | 0.0   | 0.0 | 0.0 |



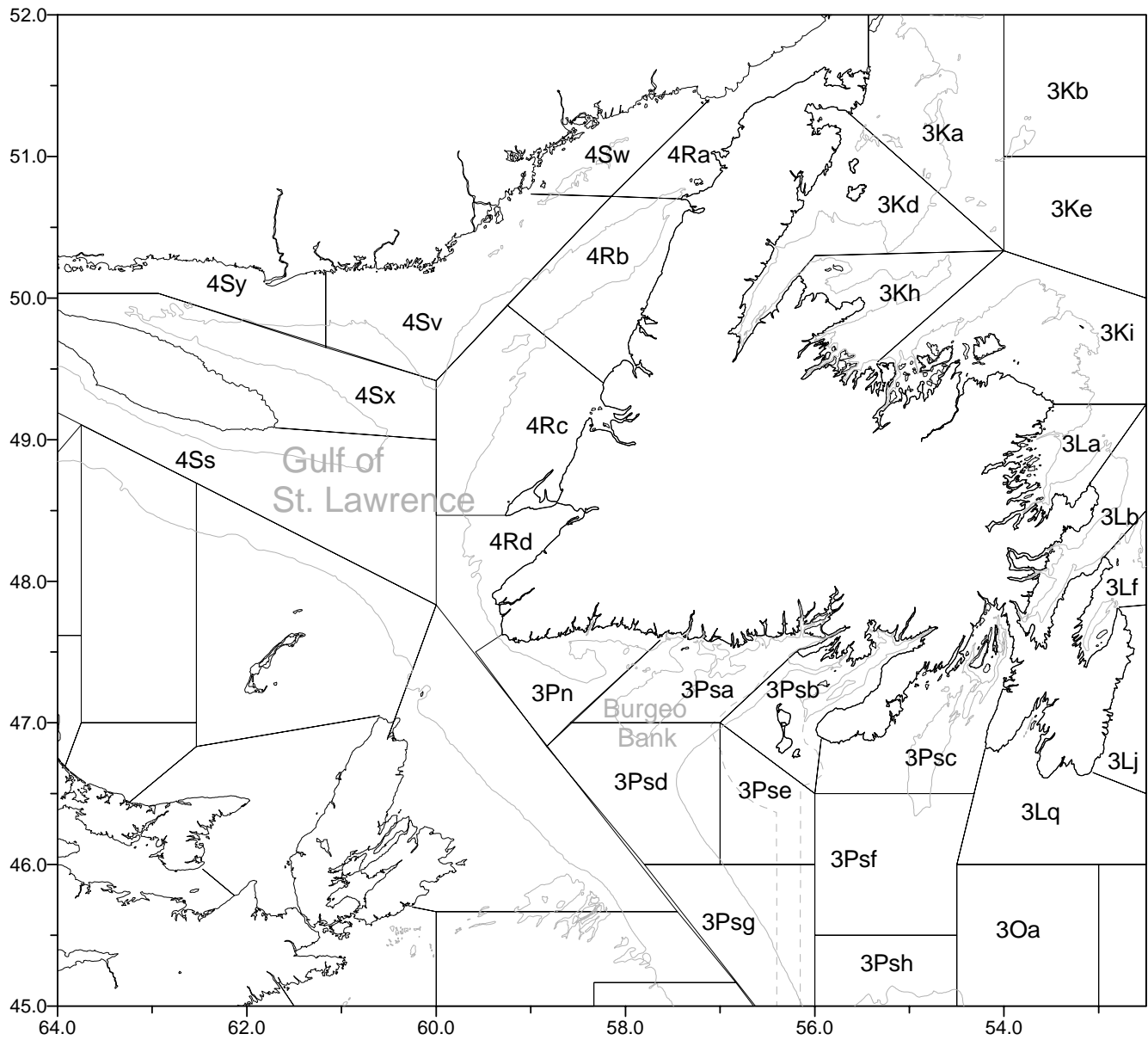


Fig. 1. Names and boundaries of NAFO statistical areas in the northern Gulf of St. Lawrence and off insular Newfoundland. Dashed line is the boundary of the French economic zone; grey line is the 200 m depth contour.

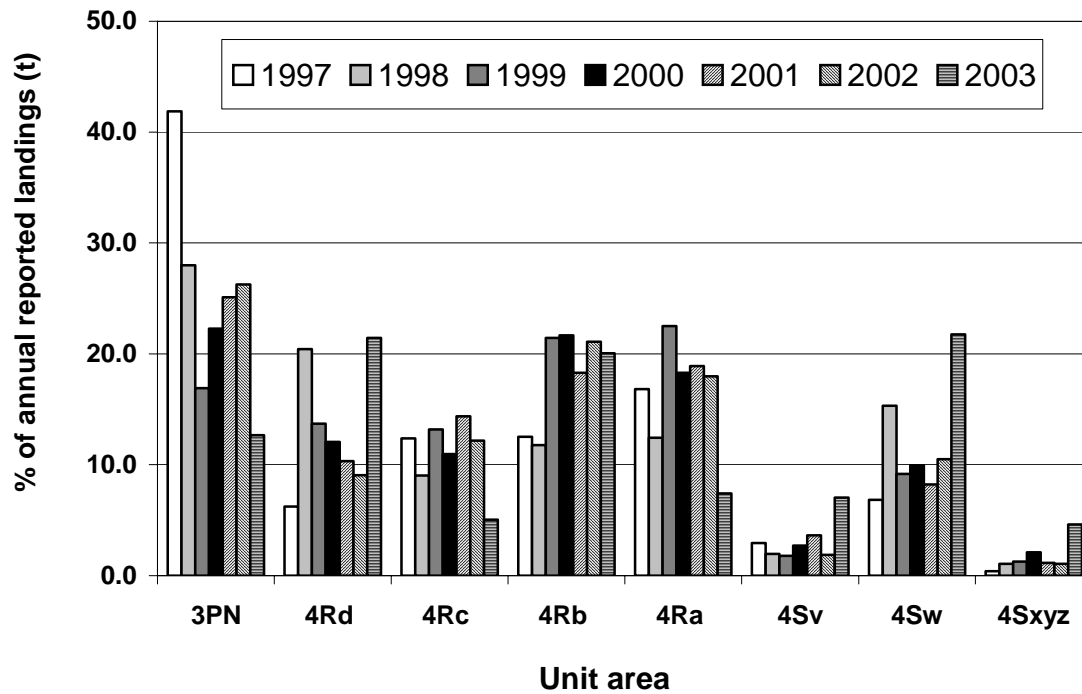
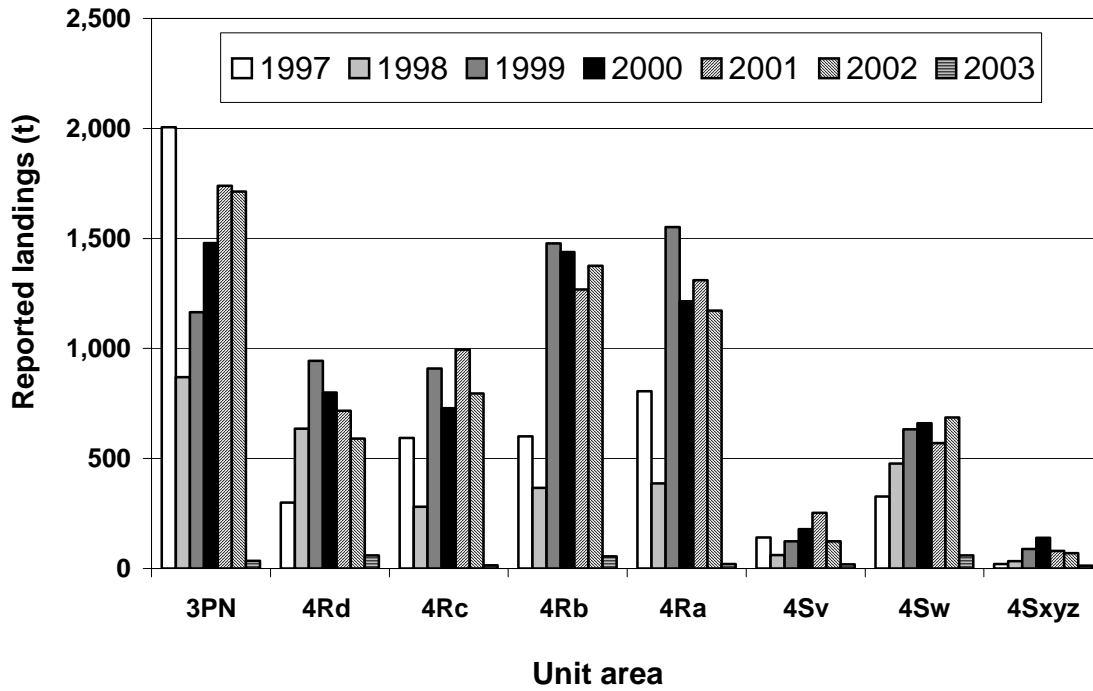


Fig. 2. Annual reported landings of cod from NAFO Divs. 3Pn4RS by unit area during 1997-2003.

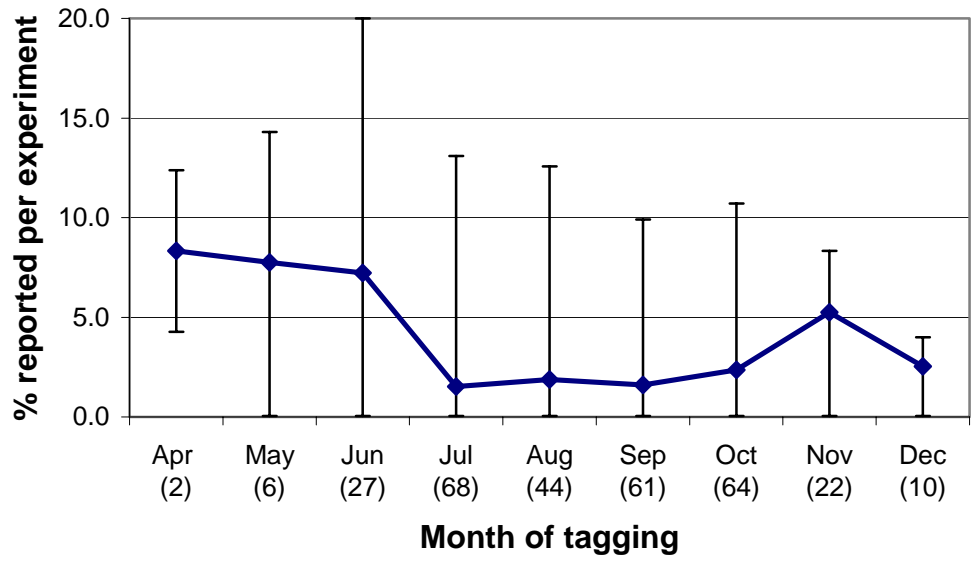


Fig. 3. Median percentage of tagged cod reported as recaptured per experiment (with 10th & 90th percentiles) by month of release for cod tagged in 3Pn4RS during 1995-2003. Values in parentheses are numbers of tagging experiments.

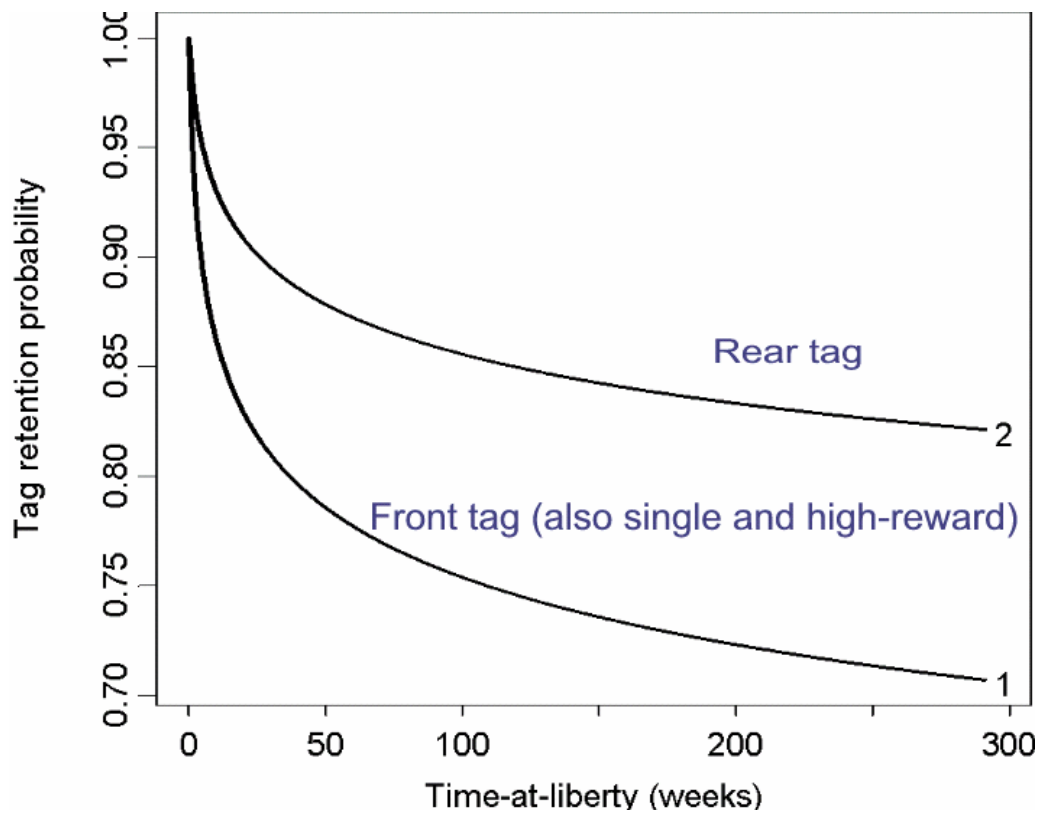


Fig. 4. Tag retention rates for cod tagged with single and double t-bar anchor tags, based on reported recaptures of about 2,670 initially double-tagged fish from 11,158 double-tag releases in 3Ps/3KL during 1997-2002 (from Cadigan and Bratley 2003).