



Catches, size, and age structure of the 2009–10 hoki fishery, and a summary of input data used for the 2011 stock assessment.

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EXECUTIVE SUMMARY

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This report summarises the catch by area and presents the length and age structure of hoki caught commercially during the 2009–10 fishing year. Length frequency and catch-at-age data from spawning and non-spawning fisheries are compared with those from previous years. Biomass indices from research surveys and results from other research on hoki in the last year are also briefly described. Data in this report were incorporated in the hoki stock assessment in 2011.

The total reported hoki catch in 2009–10 was 107 209 t, just below the TACC of 110 000 t, and 18 404 t higher than in 2008–09. Catches in 2009–10 increased in the western areas (west coast South Island, and Sub-Antarctic), and remained at similar levels to 2008–09 catches in the eastern areas (Chatham Rise, Cook Strait, Puysegur, and east coast South Island). The Chatham Rise was the largest hoki fishery for the fourth consecutive year, with 39 160 t taken from this area in 2009–10. The catch on the west coast South Island (WCSI) increased by about 16 000 t to 36 367 t in 2009–10. The catch from Cook Strait of 17 815 t was similar to that in 2008–09, with these two years having the lowest catch levels since 1989–90. The catch from the Sub-Antarctic increased by about 2 000 t to 12 289 t in 2009–10. As the hoki quota was almost fully caught before the end of the fishing year, catches in both Puysegur and east coast South Island (ECSI) in 2009–10 were relatively low, with 616 t taken from the ECSI and 273 t from Puysegur. About 48 929 t of the total catch was taken from western areas in 2009–10, close to the level of the industry-agreed catch split of 50 000 t from western areas; almost 60 000 t was taken from eastern areas.

Length frequencies and catch-at-age results from the commercial fishery show that most of the catch in 2009–10 was fish from the 2002–08 year-classes, aged 2–8 years. The 2005–07 year classes (ages 3–5) were relatively abundant in all areas. Widespread occurrence of young fish may indicate relatively good recent recruitment, or may be because there are fewer older fish remaining in the population. In 2009–10, 52% of hoki caught on the Chatham Rise and 42% of hoki in the Sub-Antarctic were smaller than 65 cm, a higher percentage of small fish than in 2008–09. Large fish (over 90 cm) were proportionately more abundant in Cook Strait, the Sub-Antarctic and on the WCSI than in the other areas.

There was only one fisheries-independent estimate of hoki abundance since the 2010 hoki assessment. The estimate of total hoki biomass from the Chatham Rise trawl survey in January 2011 was 93 900 t, a 4% decrease from 2010. The relative biomass index for hoki 3 years and older decreased, the estimate for age 2+ (2008 year-class) was average, and the estimate for age 1+ (2009 year-class) was above average.

1. INTRODUCTION

This report provides data relevant to the 2011 hoki stock assessment. Catch statistics and data from commercial sampling during the 2009–10 fishing year are presented and results from other research programmes since March 2010 are summarised. These include results of the trawl survey of the Chatham Rise in January 2011. Details of model structure, results, and yield estimates from the hoki stock assessment carried out in 2011 will be published separately.

This report provides the final reporting requirement for Objective 2 of HOK2007/01D ("Provide descriptive analysis of the hoki fishery in 2009–10 fishing year"), and Objectives 2 and 3 of MID2007/01C ("Estimation of length and age frequencies in the WCSI and Cook Strait spawning hoki fisheries in 2010"). There was no contract for the estimation of length and age frequencies in the Chatham Rise non spawning hoki fishery, and length frequencies in the Sub-Antarctic non spawning hoki fishery in 2010, but because of the desirability of it being in the hoki assessment it is presented here.

1.1 Stock structure

The hoki catch is currently managed under a single TACC which can be caught in all areas of the EEZ, excluding QMA 10 (Fishstock HOK 1). However, since 1990 the Hoki Working Group has assessed hoki as two stocks, "eastern" and "western" (Annala (1990) and subsequent Plenary Reports). Hoki on the west coast of the North and South Islands and in the area south of New Zealand, including Puysegur Bank, Snares Shelf, and Campbell Plateau, are assumed to be one stock unit, the "western stock". The east coast of the South Island, Mernoo Bank, Chatham Rise, Cook Strait, and the east coast of the North Island up to North Cape are assumed to contain the "eastern stock". Immature hoki (2–4 years) from both "stocks" occur together on the Chatham Rise.

Livingston (1997) reviewed the two-stock hypothesis originally adopted in 1990 (Livingston 1990) with respect to data collected in 1990–97, and concluded that this hypothesis was still a valid interpretation for hoki. Morphometric and ageing studies (Horn & Sullivan 1996, Livingston & Schofield 1996) have found consistent differences between adult hoki from the two main dispersed areas (Chatham Rise and Southern Plateau), and from the two main spawning grounds in Cook Strait and west coast South Island (WCSI). These differences demonstrate that there are two sub-populations of hoki. Whether they reflect genetic differences between the two sub-populations, or are the result of environmental differences between the Chatham Rise and Southern Plateau, is not known. The chemistry of otoliths from the WCSI and Cook Strait stocks is similar (Kalish et al. 1996), and no genetic differences were detected between spawning stocks (Smith et al. 1981, 1996).

From 2006 to 2007, the hoki stock assessment model had two variants which were associated with different stock structure hypotheses (Francis 2007, 2008). The original hypothesis (used before 2006 and since 2008) assumes natal fidelity: a fish that was spawned in one area will grow up to spawn in the same area (i.e., a fish is 'eastern' or 'western' from birth). The alternative hypothesis does not assume natal fidelity, so fish spawned in one area can themselves spawn in another area (i.e., a fish chooses to be 'eastern' or 'western' when it matures). Under both hypotheses, once a fish has spawned it shows site fidelity – it cannot change spawning grounds. All model runs since 2008 assumed natal fidelity because of technical problems concerning the definition of unfished biomass without this assumption (Francis 2009). Many of these problems are now resolved and model runs which do not assume natal fidelity will be available before the 2012 assessment (Andy McKenzie, NIWA, pers. comm.). Two pilot studies appeared to provide weak support for the hypothesis of natal fidelity for the western and eastern spawning stocks. Smith et al. (2001) found significant differences in gill raker counts, and Hicks & Gilbert (2002) found significant differences in measurements of otolith zones between samples of 3 year-old hoki from the 1997 year-class caught on the WCSI and in Cook Strait. However, when additional year-classes were sampled, differences were not always detected (Hicks et al. 2003).

1.2 Description of the hoki fishery

Historically, the main fishery for hoki has operated from late June to late August on the WCSI where hoki aggregate to spawn. The spawning aggregations begin to concentrate in depths of 300–700 m around the Hokitika Canyon from late June, and further north off Westport later in the season. Fishing in these areas continues into September in some years. In 1988 another fishery developed on large spawning aggregations of hoki in Cook Strait. The spawning season in Cook Strait runs from late June to mid September, peaking in July and August. Small catches of spawning hoki are taken from other grounds off the ECSI, and late in the season at Puysegur Bank. There are also anecdotal reports of spawning hoki being caught near the Snares Islands, Chatham Islands, and several other locations off the east coast North Island (ECNI).

Outside the spawning season, when hoki disperse to their feeding grounds, substantial fisheries have developed since the early 1990s on the Chatham Rise and in the Sub-Antarctic. These fisheries usually operate in depths of 300–800 m. The Chatham Rise fishery generally has similar catches over all months except in July–September, when catches are lower due to the fishery moving to the spawning grounds. In the Sub-Antarctic, catches have typically peaked in April–June. Out-of-season catches are also taken from Cook Strait and the east coast of the North Island, but these are small by comparison.

From 1986 to 1990 surimi vessels dominated the catches and took about 60% of the annual WCSI catch. However, since 1991, the surimi component of catches has decreased and processing to head and gut or to fillet product has increased, as has “fresher” catch for shore processing. The hoki fishery now operates throughout the year, producing high quality fillet product from both spawning and non-spawning fisheries. Twin-trawl rigs have been used in some hoki fisheries since 1998, and trawls made of spectra twine (a high strength twine with reduced diameter and therefore drag for fuel efficiencies) were introduced to some vessels in 2007–08.

The Hoki Fishery Management Company introduced a Code of Practice for hoki target trawling in 2001 with the aim of protecting small fish (less than 60 cm). The Code of Practice was significantly revised by the Deepwater Group from 1 October 2009, and now aims to manage and monitor fishing effort within four industry management areas, where there are thought to be high abundance of juvenile hoki (Narrows Basin of Cook Strait, Canterbury Banks, Mernoo, and Puysegur). These areas are closed to hoki target trawling by vessels larger than 28 m, with increased monitoring when targeting species other than hoki. There is also a general recommendation that vessels move from areas where catches of juvenile hoki (now defined as less than 55 cm total length) comprise more than 20% of the hoki catch by number.

1.3 Catch history

The total annual catches of hoki within the EEZ from 1969 to 2009–10 are given in Tables 1 and 2. The hoki fishery was developed by Japanese and Soviet vessels in the early 1970s (Table 1). Catches increased to 100 000 t in 1977, but dropped to less than 10 000 t in 1978 when the 200 n. mile Exclusive Economic Zone (EEZ) was declared and a quota limit of 60 000 t was introduced (Figure 1). Hoki remained a relatively small fishery of up to 50 000 t a year until 1986, when the TACC was increased. The fishery expanded to an estimated catch in 1987–88 of about 255 000 t (Table 2). Reported annual catches ranged between 175 000 and 215 000 t from 1988–89 to 1995–96, increasing to 246 000 t in 1996–97, and peaking at 269 000 t in 1997–98, when the TACC was over-caught by 19 000 t. The TACC was reduced to 90 000 t in 2008–08 and 2008–09 and catches declined (Table 2). From 1 October 2009 to 30 September 2010 the TACC was 110 000 t and hence catches in 2009–10 have increased. The TACC was further increased to 120 000 t from 1 October 2010.

Catches by area since 1988–89 are given in Table 3 and Figure 2. The pattern of fishing has changed markedly since 1988–89 when over 90% of the total catch was taken in the WCSI spawning fishery. This has been due to a combination of TAC changes and redistribution of fishing effort. The catch from the WCSI declined steadily from 1988–89 to 1995–96, increased again to between 90 000 and 107 000 t from

1996–97 until 2001–02, then dropped sharply over seven years, to 20 500 t in 2008–09. The WCSI catch increased to 36 400 t in 2009–10, which was about 34% of the total hoki catch in this year (Table 3). In Cook Strait, catches peaked at 67 000 t in 1995–96, but have been below 25 000 t for the last six years. The catch from Cook Strait in 2009–10 was 17 800 t and was similar to that in 2008–09, with these two years having the lowest catch levels since 1989–90. Non-spawning catches on the Chatham Rise increased from 1993–94, peaked at about 75 000 t in 1997–98 and 1998–99, then decreased to a low of 30 700 t in 2004–05. The Chatham Rise catch has increased over the past five years to 39 000 t in 2008–09 and 2009–10, and is now the largest hoki fishery in New Zealand, contributing about 36% of the total catch. Catches from the Sub-Antarctic peaked at over 30 000 t in 1999–00 to 2001–02, declined to a low of 6200 t in 2004–05 before increasing slowly to 12 200 t in 2009–10. Catches from other areas have remained at relatively low levels (Table 3).

From 1999–2000 to 2001–02, there was a redistribution in catch from eastern stock areas (Chatham Rise, ECSI, ECNI, and Cook Strait) to western stock areas (WCSI, Puysegur, and Sub-Antarctic) (Figure 2). This was initially due to industry initiatives to reduce the catch of small fish in the area of the Mernoo Bank, but from 1 October 2001 was part of an informal agreement with the Minister of Fisheries that 65% of the catch should be taken from the western fisheries to reduce pressure on the eastern stock. This agreement was removed following the 2003 hoki assessment in 2002–03, which indicated that the eastern hoki stock was less depleted than the western stock and effort was shifted back into eastern areas, particularly Cook Strait. From 2004–05 to 2006–07 there was a further agreement with the Minister that only 40% of the catch should be taken from western fisheries. From 1 October 2007 the target catch from the western fishing grounds was further reduced to 25 000 t within the overall TACC of 90 000 t. This target was exceeded in both 2007–08 and 2008–09, with about 30 000 t taken from western areas. In 2009–10, the target catch from the western fishing grounds was increased to 50 000 t within the overall TACC of 110 000 t, and catches were at about the industry-agreed catch split. In the current fishing year (2010–11), the target catch from the western fishing grounds has been increased to 60 000 t within the overall TACC of 120 000 t.

1.4 Recent hoki research

The importance of the hoki fishery and the complexity of the life cycle have resulted in a high level of research activity for over two decades. Research results presented in the past year are summarised here.

McKenzie (2011) reported the stock assessment carried out in 2010, using the Bayesian model developed in 2002 (Francis et al. 2003) and implemented in the general-purpose stock-assessment program CASAL (Bull et al. 2008). As in previous years, a number of initial exploratory runs were carried out to provide information about which assumptions should be carried forward and used in the final assessment. It was decided that additional weight should be given to all trawl-survey biomass estimates to ensure a good fit to the decline shown in the Sub-Antarctic survey series. However, no model runs were able to mimic the three-fold increase in the last three biomass estimates from this series. It was considered possible that this increase was due to a change in catchability (McKenzie 2011). The Hoki Working Group agreed on two final model runs, which were similar to the runs used in 2009 (McKenzie & Francis 2009). These two runs differed in the mechanism used to deal with the lack of old fish in the observations: either: a) allowing natural mortality to vary with age; or b) allowing a domed selectivity in spawning fisheries (McKenzie 2011). As an alternative to giving additional weight to the Sub-Antarctic trawl series, two sensitivity model runs were carried out for one of the base model runs. In these sensitivities the trawl survey data were not upweighted but two catchabilities were fitted to this series instead of just one. Under all model scenarios, hoki stocks were estimated to be increasing after reaching their lowest levels in 2005. The western stock was estimated to be 40–52 % B_0 and the eastern stock at 51–57 % B_0 . The western stock experienced an extended period of poor recruitment from 1995 to 2001, but there was some evidence of better (although still mostly below average) recruitment in 2002–08. Projections suggested that continued fishing at current levels would be likely to increase the biomass of the western stock, and that the eastern stock will either increase slightly or remain constant or decrease slightly (McKenzie 2011).

Results from a quantitative trophic study of hoki diet on the Chatham Rise were published (Connell et al. 2010). Prey was predominantly euphausiids, mesopelagic fishes and natant decapods. Diet varied in relation to fish size and area. Euphausiids and sternoptychid fishes were important for smaller hoki (26–55 cm TL), myctophid fishes and natant decapods for larger hoki, and macrourids for the largest hoki (more than 84 cm TL). The variability in diet suggested hoki forage opportunistically within their preferred habitat and biological limits.

Bottom-contact sensors and video were used to record the behaviour of the hoki trawl survey gear under a range of weather conditions during an experimental voyage to the north Chatham Rise in June 2010 (O'Driscoll 2010). Sensors and video confirmed that the hoki trawl maintained good bottom contact over the length of the groundrope, even under poor weather conditions. Opportunistic observations of fish behaviour showed some escapement of hoki and other species through the large (300 mm) mesh of the wings and between the bottom fishing line and top of the groundrope. Some measurements of acoustic target strength of hoki were also made during this voyage using a net-mounted acoustic-optical system (AOS).

The trawl survey of the Chatham Rise in January 2011 was the only new fisheries-independent estimate of hoki abundance since the 2010 hoki assessment. Results from this survey are summarised in Section 3.1.

2. HOKI FISHERY, 2009–10

2.1 Catch and effort information

2.1.1 Total Allowable Commercial Catch (TACC) and other management controls

In the 2009–10 fishing year the TACC for HOK1 was 110 000 t. This TACC applied to all areas of the EEZ except the Kermadec FMA which had a TACC of 10 t. There was an agreement with the Minister of Fisheries that only 50 000 t of the TACC should be taken from western stock areas.

Chartered vessels may not fish inside the 12-mile Territorial Sea and there are various vessel size restrictions around some parts of the coast. On the WCSI, a 25-mile line closes much of the hoki spawning area in the Hokitika Canyon and most of the area south to the Cook Canyon to vessels over 46 m overall length. In Cook Strait, the whole spawning area is closed to vessels over 46 m overall length.

An industry Code of Practice also exists, which aims to protect small fish (see Section 1.2). In 2009–10 the Code of Practice closed four areas (Narrows Basin of Cook Strait, Canterbury Banks, Mernoo, and Puysegur) to hoki target trawling by vessels larger than 28 m, with increased monitoring when targeting species other than hoki. There was a general recommendation that vessels move from areas where catches of juvenile hoki (defined as less than 55 cm total length) comprised more than 20% of the hoki catch by number.

2.1.2 Catch

The overall catch of 107 209 t was about 18 000 t higher than the 2008–09 catch and about 3000 t lower than the TACC (see Table 2). The total estimated catch from catch-effort-and-landing-return (CELR), lining-catch-effort-return (LCER), net-catch-effort-and-landing-return (NCELR), trawl-catch-effort-return (TCER), lining-trip-catch-effort-return (LTCER), tuna-long-lining-catch-effort-return (TLCER), and trawl-catch-effort-and-processing-return (TCEPR) data was 104 958 t. As the data extraction was done in mid December 2010, a small amount of data may still not have been entered into the database. As estimated catches did not match the total monthly harvest return (MHR) catch, estimated catches were scaled up to the MHR total catch of 107 209 t.

Catches in 2009–10 increased in the western areas (west coast South Island, and Sub-Antarctic), and

remained at similar levels to 2008–09 catches in the eastern areas (Chatham Rise, Cook Strait, Puysegur, and east coast South Island) (Figure 2a, Table 3). This was expected, given the increase in the target catch from western areas from 25 000 t in 2008–09 to 50 000 t in 2009–10. The Chatham Rise was the largest hoki fishery for the fourth consecutive year, with 39 160 t taken from this area in 2009–10. The catch on the west coast South Island (WCSI) increased by about 16 000 t to 36 367 t in 2009–10. Catches inside the 25 n. mile line made up 8% of the total WCSI catch in 2009–10, down from a peak of 41% of the catch in 2003–04 (Table A1). The catch from Cook Strait of 17 815 t was similar to that in 2008–09, with these two years having the lowest catch levels since 1989–90. The catch from the Sub-Antarctic increased by about 2 000 t to 12 289 t in 2009–10 (see Table 3). Catches from Puysegur decreased to 273 t in 2009–10. Catches in the eastern spawning fishery on the ECSI decreased from 2327 t in 2007–08 to 616 t in 2009–10. Overall, about 49 000 t of the total catch in 2009–10 was taken from western areas (Figure 2a), just below the level of the industry-agreed catch split. Most hoki catch was recorded on the TCEPR form (99 853 t), with the WCSI and Cook Strait the only areas where a substantial amount of catch was recorded on the TCER form (Table A1, Figure 2b).

Up until 2003–04 almost all of the hoki catch was from target hoki tows. Hoki targeting decreased, especially on the Sub-Antarctic, WCSI and Chatham Rise, until 2008–09 when only 86% of the overall hoki catch was from tows targeting hoki (Figure 3). With the increase in TACC in 2009–10, hoki targeting also increased, with 92% of the overall catch from hoki target tows (including 94% of the hoki catch on the WCSI, 85% on the Sub-Antarctic, and 91% on the Chatham Rise). There have been decreased hoki catches from tows targeting hake and ling on the WCSI, Sub-Antarctic and on the Chatham Rise; and there were increased hoki catches targeting silver warehou on the WCSI. Cook Strait remains almost exclusively a hoki target fishery.

A high proportion of the hoki catch in 2009–10 was taken during the spawning season from June to September (Figure 4). Peak catches on the WCSI and Cook Strait spawning grounds were in July and August, as in previous years (Figure 5). Most of the WCSI catch was taken by the first week of August, while catches from Cook Strait continued through to mid September. In Cook Strait, about 2100 t was caught outside the spawning season. Very little fishing occurred on the ECSI or at Puysegur during the spawning season (Figure 4). Outside the spawning season, most of the catch was taken from October 2009 to July 2010 on the Chatham Rise, and from October to December 2009 and May to June 2010 in the Sub-Antarctic, with small amounts of catch taken over the rest of the year in these areas (see Figures 4 and 5). Small catches were taken year-round from the ECNI (Figure 4).

2.1.3 CPUE analysis

Unstandardised catch and effort and standardised CPUE from TCEPR data for the six largest hoki fisheries (WCSI, Cook Strait, Chatham Rise, ECSI, Sub-Antarctic, and Puysegur) are summarised in Table A2, Table A3, Table A4, and Figure 6. There was not enough data to do standardised CPUE analyses for the ECSI and Puysegur areas in 2009–10. Catch rate analysis did not include data from CELR forms, which account for up to a third of the catch in Cook Strait and some catch from the WCSI, or the TCER forms as they have been in use for only one year. It also did not include data from the LCER, LTCER, TLCER or NCELR forms. Standardised analyses were carried out only to explore trends in catch rate. **CPUE indices are not regarded as providing reliable estimates of hoki abundance** and are not currently included in the hoki stock assessment. Changes in fleet structure (e.g. increased use of twin trawls), fishing practices (particularly target fishing), and the reliability of gear parameters recorded on the fishing returns are problems for CPUE analyses. There are also other effects on catching ability, such as improvements or changes in net and bottom rig design, and electronic equipment that cannot be quantified.

A lognormal linear model was used for all standardised analyses model following Dunn (2002). A forward stepwise Generalised Linear Model (Chambers & Hastie 1991) implemented in R code (R Development Core Team 2010) was used to select variables in the model. *Fishing year* was forced into the model as the first term, and the algorithm added variables based on changes in residual deviance. The explanatory power of a particular model is described by the reduction in residual

deviance relative to the null deviance defined by a simple intercept model. Variables were added to the model until an improvement of less than 1% of residual deviance explained was seen following inclusion of an additional variable. Variables were either categorical or continuous, with model fits to continuous variables being made as third-order polynomials. Categorical variables offered to the model included *vessel key*, *target species*, *primary method*, *month*, *vessel experience* (number of years vessel in the fishery), *twin vessel* (T/F variable for a vessel that has used a twin trawl), *statistical area*; continuous variables included *fishing duration*, *fishing distance* (calculated from positions at start and end of tow), *distance 2* (calculated as *fishing duration* x *speed*), *start latitude*, *start longitude*, *start time*, *mid time* (mid time of tow), *depth of bottom*, *effort depth* (depth of net), *depth above bottom* (*depth of bottom* minus *effort depth*), *effort width* (wing spread), *day of season*, and *effort height* (headline height). As the WCSI dataset included both midwater and bottom tows, nested effects between *method* and *effort duration*, *effort depth*, *effort height*, *effort speed*, *depth above bottom* and *effort width* were used. The dependent variable was the log-transformed estimated catch per tow with positive catches retained and zeros excluded. Vessels with minimal participation were excluded from the analyses as they would provide little information for the standardisations and could result in model over-fitting (Francis 2001). “Core” vessels were defined as those vessels which were involved in the fishery for at least four years, and reported about 90% of the catch (after Philips 2001). The standardised indices were calculated using GLM, with associated standard errors. Indices were presented using the canonical form (Francis 1999) so that the year effects for an area were standardised to have a geometric mean of 1. The c.v.s represent the ratio of the standard error to the index. The 95% confidence intervals are also calculated for each index.

For the WCSI, lognormal CPUE models were run for core vessels with either all target species or target hoki only tows; For Cook Strait lognormal CPUE models were run for core vessel midwater tows that targeted hoki; for the Chatham Rise and ECSI, or Sub-Antarctic lognormal CPUE models were run for core vessel bottom tows with either all target species or target hoki tows, and also excluding twin trawl tows (as identified by Hurst (2009)). Selected explanatory variables for each run are listed in Table 4.

Unstandardised catch rates for the WCSI are presented for both midwater and bottom trawls (Table A2). Midwater trawl catches accounted for 68% of the total spawning season catch on the WCSI in 2009–10. The unstandardised catch rate from all non-zero midwater tows in 2009–10 increased and was the highest in the series, with a median catch of 5.3 t per hour, and a median tow duration of 2.6 hours. Catch rates were similar (5.1 t per hour) for target hoki tows, with the same median tow duration of 2.6 hours. Catch rates in bottom trawls on the WCSI were lower than in midwater trawls, with a median catch rate of 0.9 t per hour for all non-zero hoki catches and 4.6 t per hour for target hoki tows. Median tow duration of bottom trawls decreased to 6.9 hours for all target species and 3.2 hours for target hoki only tows in 2009–10. From 1999–2000 to 2003–04, standardised catch rates from all non-zero tows showed a similar decline to non-standardised tows. Standardised indices have increased at a much higher rate than unstandardised indices since 2003–04 (Figure 6a). Core datasets for all target species or target hoki showed similar trends although the index in 2008–09 was higher for target hoki only tows (Figure 6b).

Midwater trawl catches accounted for 96% of the spawning season catch of 12 951 t reported on TCEPR forms from Cook Strait in 2009–10. A further 4864 t of catch was reported on TCER (see Figure 2b). Although non-standardised catch rates decreased in 2009–10, they continued to be high in Cook Strait, with a median catch rate of 15.4 t per hour in non-zero mid-water tows and an increased median tow duration of only 0.8 hours (equivalent to a median catch of 11.3 t per tow). Overall the non-standardised catch rates showed a slight increase from 1989–90 to 2009–10, whereas standardised catch rates showed a flat trend (Figure 6). Catch rates in Cook Strait appear to reflect a fishing strategy where vessels limit the size of catches to maintain fish quality.

Over 98% of the Chatham Rise catch in 2009–10 was taken in bottom trawls, with most of the catch reported on TCEPR forms (see Figure 2b). There has been a general increase in tow duration on the Chatham Rise since the 1990s, with a median tow duration of 4.5 h in 2009–10. The median non-standardised catch rate in bottom trawls on the Chatham Rise increased from 1.1 to 1.2 t per hour

from 2008–09 to 2009–10, the highest catch rate since 1989–90. The catch rate in hoki target trawls increased from 0.6 t per hour in 2002–03 to 1.7 t per hour in 2008–09, and decreased slightly to 1.5 t per hour in 2009–10. Standardised catch rates generally decreased from 1991–92 to 2003–04, increased to 2008–09, and decreased in 2009–10 (Figure 6a). Similar trends were observed for core vessels targeting hoki and core vessels excluding twin trawl vessel tows (Figure 6b).

Bottom trawl catches reported on TCEPR accounted for 94% of the catch take from the Sub-Antarctic in 2009–10 (see Figure 2b). Median tow duration increased slightly to 5.7 hours in 2009–10, but non-standardised catch rates in bottom trawls were the same as in 2007–08 and 2008–09 at 0.2 t per hour. Catch rates for hoki target bottom trawls were much higher, at 1.4 t per hour in 2009–10, but are still lower than target catch rates in the other hoki fisheries. Standardised catch rates generally decreased from 1996–97 to 2005–06 and increased to 2009–10 (Figure 6a). Core vessels targeting hoki and core vessels excluding twin trawl vessel showed similar trends (Figure 6b).

Spawning season catches from the ECSI were mainly reported on TCEPR (see Figure 2b). Bottom tow catch rates in 2009–10 were 2.9 t per hour, but there were not enough data to calculate midwater catch rates in 2008–09 or 2009–10. Similar catch rates were recorded for midwater and bottom tows of 2.7 t per hour and 2.5 t per hour respectively in 2007–08.

Too few tows were carried out from 2007–08 to 2009–10 at Puysegur to estimate catch rates.

Standardised indices for WCSI, Chatham Rise, and Sub-Antarctic all showed similar trends: decreasing from 1991–92 to 2003–04 and increasing to 2008–09 (Figure 6). In 2009–10 catch rates from the WCSI and Sub-Antarctic continued to increase while those from the Chatham Rise decreased (Figure 6).

2.1.4 Bycatch

Estimates of bycatch in the hoki fishery were determined from data collected by Ministry of Fisheries observers. For target hoki trawls, the observer data in 2009–10 represent about 46% of vessels, 8% of tows, and 13.5% of the total catch (Table 5). The bycatch rate (defined as the percentage of the hoki catch) was estimated for hake, ling, silver warehou, and spiny dogfish (Table 6), and also included javelinfish and rattails on the Chatham Rise, ECSI, and Sub-Antarctic. Other bycatch species are also taken, particularly in the non-spawning fisheries, but bycatch rates for these species are usually less than 1%. Note that some of the apparent changes in bycatch rates may have been related to changes in observer coverage between years (Livingston et al. 2002), so the data in Table 6 should be treated with caution. As there have been changes in the proportion of hoki target catches (see Figure 3, section 2.1.2), caution also needs to be made with interpretation of the definition of the hoki target fishery. A more comprehensive analysis of catch and discards in the hoki, hake and ling fishery from 2000–01 to 2006–07 is provided by Ballara et al. (2010).

Bycatch rates in the spawning areas in 2009–10 were generally low (less than 2%) for all species. The observed bycatch in the WCSI fishery in 2009–10 was similar to that in 2008–09, with hake (0.7%) and ling (1.4%) the major contributors. As in the past, there was very little bycatch in Cook Strait, with spiny dogfish having the largest observed bycatch rate (0.8%).

In the non-spawning areas bycatch rates in 2009–10 were also low for most species. Ling (9.5%) and javelinfish (5.1%) were the major bycatch species in the Sub-Antarctic. On the Chatham Rise javelinfish (9.4%), rattails (7.5%), ling (2.3%), silver warehou (4.3%), and hake (1.2%) were the main bycatch.

2.2 Size and age composition of commercial catches

Data to estimate length frequencies in 2009–10 were available from the Ministry's Observer Programme (OP) and shed sampling of landed fish by NIWA. The industry observer programme formerly run by the

Hoki Fishery Management Company (HMC) has been discontinued and no data have been provided since 2004–05.

Density plots of all commercial TCEPR and TCER trawls for which hoki was caught in 2009–10 are shown in Figure 7 with the observed position of all tows sampled for hoki length frequency distributions by the OP shown in the TCEPR plot. Hoki were measured by OP observers in 1094 tows, of which 291 came from the WCSI, 166 from Cook Strait, 341 from the Chatham Rise, 263 from the Sub-Antarctic, 10 from the ECSI, 5 from Puysegur, and 18 from ECNI. Shed samples from 27 landings of hoki from Cook Strait and 13 landings from the WCSI inside the 25 n. mile line were collected by NIWA in 2009–10 under Ministry of Fisheries Project MID2007/01C. Tables 7 and 8 describe observer trip and shed sampling timing in greater detail for the main areas sampled.

In winter 2006, during the shed sampling programme, NIWA was made aware that three larger vessels from one company were sorting fish (by size) at sea to decrease onshore processing time and improve product quality. From 2007–2009 vessels longer than 40 m were therefore no longer sampled by the NIWA shed sampling programme and the Ministry's Observer Programme undertook to sample these vessels at sea. This did not occur: no observer samples for vessels longer than 40 m were obtained from inside the 25 n. mile line on the WCSI in either 2006–07 or 2007–08; and in 2008–09, no information was available on size of hoki taken by this vessel class in Cook Strait for much of the season. The shed sampling programme for this vessel class was reinstated in 2009–10, with six samples taken from vessels longer than 40 m in Cook Strait, and two from the WCSI. However both shed samples from the WCSI were deemed unsuitable for inclusion in the analysis as one came from a catch sorted at sea and the other came from a trip that had tows both inside and outside the 25 n. mile line.

Length frequencies were estimated for each of the major fisheries as the weighted (by the catch or landing weight) average of individual length samples. Length frequency data from each area were post-stratified. Data from the WCSI were stratified by area (inside or outside 25 n. miles) and time. Data from outside the line were split into weekly time periods throughout the season, although adjacent weeks were combined if there were fewer than 10 OP length samples available. Observer data from inside the 25 n. mile line were stratified fortnightly where possible. Length frequencies from Cook Strait are normally stratified by month, island of landing, and vessel size. However, in 2010 there was only one market sample taken for vessels 30–40 m, and no market samples taken in Wellington, so Cook Strait stratification was by time periods depending on timing of samples, and vessel size. For large vessels in Cook Strait both market samples and observer samples were also used to stratify the catch due to lack of observer samples in August and September (Table 8). A regression tree method (described below) was used to stratify the two non-spawning fishing areas.

Catch-at-age from spawning fisheries was estimated using age-length keys derived from otolith ageing. Otoliths were available from the OP and from shed samples collected by NIWA. Sub-samples of 748 and 731 otoliths from Cook Strait and the WCSI respectively were selected, prepared, and read using the validated technique of Horn & Sullivan (1996) as modified by Cordue et al. (2000). Each sub-sample was derived by randomly selecting a set number of otoliths from each of a series of 5 cm length bins covering the bulk of the catch and then systematically selecting additional otoliths to ensure the tails of the length distribution were represented. The chosen sample sizes approximated those necessary to produce mean weighted c.v.s of less than 20% across all age classes, in each of the spawning areas.

Age-length keys were constructed for each spawning fishery and applied to the total length frequency to produce an age frequency for the catch for each sex separately. A single age-length key was applied to the WCSI with no distinction made between fish sampled inside the 25 n. mile line by NIWA shed samples and outside the line by OP observers. A preliminary analysis of otolith data from 2001 to 2003 suggested that the mean length at age was greater for hoki taken inside the line, but the difference in the fitted growth curves was not statistically significant (O'Driscoll et al. 2004). Likewise, a single age-length key was applied to Cook Strait otoliths with no distinction made between fish by NIWA shed samples and by OP observers. Catch-at-age estimates were determined using the 'catch.at.age' software (Bull & Dunn 2002). This software also incorporates data from otolith ring measurements using the consistency scoring method of Francis (2001) in the age-length key.

Catch-at-age in both the Chatham Rise and Sub-Antarctic fisheries was estimated by sampling directly for age. This continued the approach used since 1998–99 for the Chatham Rise (Francis 2002) and since 2000–01 for the Sub-Antarctic (Ballara et al. 2003). Sampling directly for age is necessary because a single age-length key is not appropriate in non-spawning fisheries. The fisheries are spread over much of the year and there will be substantial fish growth. This means that for any given length the proportions at age will change through the fishery. To sample directly for age, observer coverage must be sufficient to provide a random sample of otoliths from the fishery. Francis (2002) suggested that even a sample size of 1200 otoliths may not be sufficient to achieve a target c.v. of 0.20 in some years.

On the Chatham Rise in 2009–10, 1220 otoliths (including 554 males and 666 females) out of 3235 otoliths collected from 321 tows were selected as follows:

1. Reject all otoliths from tows catching less than 1 t of hoki.
2. For tows catching between 1 t and 4 t of hoki select at random one otolith from each tow.
3. For tows catching between 4 t and 7 t of hoki select at random two otoliths from each tow.
4. For tows catching between 7 t and 11 t of hoki select at random four otoliths from each tow.
6. For tows catching more than 11 t of hoki select at random six otoliths from each tow.

On the Sub-Antarctic in 2009–10, 1240 otoliths (including 419 males and 819 females) out of 1951 otoliths collected from 164 tows were selected as follows:

1. Reject all otoliths from tows catching less than 1 t of hoki.
2. For tows catching between 1 t and 2 t of hoki select at random three otoliths from each tow.
3. For tows catching between 2 t and 6.5 t of hoki select at random five otoliths from each tow.
4. For tows catching between 6.5 t and 12 t of hoki select at random nine otoliths from each tow.
6. For tows catching more than 12 t of hoki select at random ten otoliths from each tow.

The method to estimate catch-at-age for the Chatham Rise and Sub-Antarctic followed that of Francis (2002) as modified by Smith (2005). First, the regression tree method (Breiman et al. 1984) was used to stratify the two fishing areas by minimising the weighted least squares of the mean lengths (as a proxy for age) of fish in the observed tows (see Smith (2005) for details). Next, the estimated age frequencies by sex for the observed tows within each stratum were obtained by scaling the otolith ages and sexes up by the estimated numbers of hoki of each sex caught in the tow and averaging over all tows in the stratum. Finally, the number of fish caught in each stratum was estimated from the TCEPR data, and catch-at-age frequencies were calculated as the weighted average, over the strata, of the estimated age frequencies by sex. Numbers of fish were estimated from catch weights using the length-weight relationship of Francis (2003).

Estimates of catch-at-age before 1999–2000 in the Sub-Antarctic and up to 1997–98 on the Chatham Rise are based on an optimised length frequency model (OLF) described in detail by Hicks et al. (2002).

2.2.1 Size and age composition in spawning fisheries

West coast South Island

Most of the 2010 catch from the WCSI fishery was of fish from 55 to 100 cm (Figure 8) from the 2002–07 year classes (ages 3–7) (Figure 9). The main length mode for female hoki was centred at 90 cm (Figure 8), and was made up of hoki aged 6 and older (2003 year class and older), up to lengths of 110 cm. Female hoki from the 2006, 2007, and 2008 year-classes formed smaller modes centred at 75, 63, and 47 cm respectively (Figures 8 and 9). The male modes for different year-classes were more distinct: the 2006 year-class was centred at 71 cm, the 2007 year-class at 62 cm and the 2008 year-class at 46 cm (Figures 8 and 9). A few small (21–35 cm) male and female hoki from the 2009 year class were also caught.

From 2000 to 2004, the sex ratio of the WCSI catch was highly skewed (Figure 10a), with many more females caught than males. In 2005–10, as the catch of younger fish increased, the sex ratio has reversed with more males than females caught. In 2010, 38% of fish in the catch by numbers were

females (Figure 10a). However, there is still female dominance in the catch from the WCSI at older ages (Figure 10b). The observed percentage of males for fish aged 7 and older declined from about 40% in the late 1980s to less than 20% in 2003–04 to 2005–06, and increased to 22–26% in 2007–08 and 2008–09 respectively, and to 42% in 2009–10 (Figure 10b).

The percentage of male and female hoki aged 7 and older in the WCSI catch declined steeply from 68% in 2003–04 to 16% in 2005–06, but has increased to 33% in 2009–10 (Figure 10c). Conversely, the percentage of small fish (less than 65 cm, which is approximately equivalent to ages 3 years and younger) by number in the WCSI catch increased from 20% in 2006–07, to 31% in 2008–09, and decreased again in 2009–10 to 17% (Figure 10 d). Many of these small fish are spawning: 64% of the female fish less than 55 cm (i.e., mostly 2 year-olds from the 2008 year class) were in spawning condition, compared to 95% of all fish (Table 9). The spawning state of male hoki is not recorded by observers, but observations from research tows in other areas suggest that a higher proportion of small males than females would be mature.

There were differences in the length frequencies from shed samples of fish caught inside the 25 n. mile line and at-sea samples of fish outside this area in 2010, with a higher proportion of larger fish (greater than 70 cm) from samples taken inside the line (Figure 11). This pattern has also been reported in data from previous years (Figure 11). From 2004–06, there were differences between length distributions of hoki inside the line estimated from shed sampling and from samples collected by the OP on vessels fishing inside the line, with fewer small fish in shed samples (Figure 11). One potential explanation for these differences in length frequencies inside the line is high-grading (dumping of small fish on non-observed vessels at sea, so these are not present in shed samples). In 2009 the length distributions of hoki inside the line estimated from shed sampling and from samples collected by the OP on vessels fishing inside the line were similar (Figure 11). In 2010 there were no samples collected by the OP on vessels fishing inside the line.

The overall mean length of hoki from the WCSI during the 2010 spawning season remained the same from mid July to early August, but showed a decreasing trend during August (Figure 12). The pattern of declining mean length over the spawning season used to be a common feature of the WCSI fishery, but was not observed between 1999 and 2006. The large difference between the mean lengths of males and females seen in catches from the 2004 and 2005 seasons was reduced in 2006–10 (Figure 12).

The OP data used to estimate catch-at-age was reasonably representative of the overall spatial, depth, temporal and vessel length distribution of the catch in 2009–10 (Figure 13).

Cook Strait

The length distribution of female hoki from Cook Strait in 2010 mainly ranged from 50 to 110 cm, while males were 48–95 cm (see Figure 14). There was a broad age distribution of females from ages 3 to 14, while most males were ages 3–8 (see Figure 15). The modal age was 4 (2006 year-class) for males and 3 (2007 year-class) for females (see Figure 15). The mean length of hoki from Cook Strait in 2010 was 75 cm which was the same as in 2009 and slightly higher than in 2008, when the mean length of 73 cm was the lowest in the history of this fishery. Fewer fish from the 2008 year-class (age 2) were caught in Cook Strait than in the other fisheries, and only 2% of the catch was fish less than 60 cm in 2010, although 10% of the catch was fish less than 65 cm (see Figure 10d).

As for WCSI, the sex ratio of the Cook Strait catch was skewed towards females from 2001–05, then reversed as the number of males increased from 2006–09 (see Figure 10). In 2010 the sex ratio was almost even, with 49% males in the catch.

In 2010 market landings adequately covered the landings of vessels smaller than 40 m (Figure 16, see Table 8). For vessels greater than 40 m both market samples and observer samples were used to stratify the catch, as there was poor observer coverage in August and September for vessels larger than 40 m (Figure 16 and 17, see Table 8). Length frequencies by vessel showed that the size distribution of the

catch was broadly similar across the two vessel size categories, although there were some differences in size distribution of the catch in some strata (Figure 18). There was no clear trend in the mean length of hoki over the season (Figure 19).

Puysegur

In 2009–10, only four samples were collected from Puysegur from June to August 2010. These were mainly fish from 30–105 cm (Figure 20). Little can be concluded from this as the sample size was too small.

East coast South Island

Four samples were collected from the ECSI during the 2010 spawning season. Fish size distribution (Figure 21) was similar to those observed in the non-spawning fishery on the Chatham Rise although little can be concluded from this as the sample size was too small.

2.2.2 Size and age composition in non-spawning fisheries

Chatham Rise

About 88% of observer data and 86% of length frequencies in 2009–10 came from the hoki target fishery (Figure 22). There was no Chatham Rise 2009–10 ageing data. The tree-based regression split the OP data from the Chatham Rise fishery into three strata based on depth (Table 11). Mean length of hoki on the Chatham Rise was shorter in shallower water.

The length distribution of hoki from the Chatham Rise in 2009–10 was bimodal and similar for males and females (Figure 23) and the catch was dominated by small hoki from 50 to 80 cm from the 2005–08 year-classes (ages 2–5), with few larger, older fish caught. The 2008–09 fishery was also dominated by small hoki from (Figure 24) the 2005–07 year classes with the modal age of both males and females 2+ (the 2006 year-class). More females than males were caught in 2009–10, with males comprising 45% of the catch (see Figure 10a). There was a lower proportion of larger older fish (males and females) in the Chatham Rise than in other areas with only 7% of the catch aged 7 years or up (see Figure 10c). About 52% of the catch by number was less than 65 cm in 2009–10, an increase from 2008–09 when 43% of the catch was less than 65 cm (see Figure 10d).

The observer data used to estimate catch-at-age was reasonably representative of the overall spatial and temporal distribution of the catch in 2009–10 (Figure 25), although coverage was also lower than ideal in some months, especially February–April and June–July. The western side of the Chatham Rise was "over-sampled" and there was not enough coverage on the mid Chatham Rise (especially statistical areas 402 and 408) (Figure 25).

Sub-Antarctic

The percentage of observer data and otoliths from the hoki target fishery increased in 2009–10, with 85% of the commercial catch, 53% of observer length frequency data, and 86% of the available otoliths from target hoki tows (Figure 26). The remainder were from ling, southern blue whiting, scampi, squid or white warehou target tows. The tree-based regression split the OP data from the Sub-Antarctic fishery into four strata based on latitude, longitude, and depth (Table 12). Smaller fish were found on the Snares Shelf, especially in shallower water.

The catch of females consisted mainly of 40–105 cm fish, with the males having a narrower length range from 40–95 cm (Figure 27). Catch-at-age estimates showed the Sub-Antarctic catch, like that from the other areas, consisted mainly of fish from the 2000–08 year classes. There was a higher proportion of old fish caught in the Sub-Antarctic than on the Chatham Rise (Figure 28), but the catch of fish less than 65 cm increased markedly from 25% to 42% in 2009–10 (see Figure 10d). The percentage of

males in the catch was similar to the Chatham Rise, with 43% male in 2009–10 (see Figure 10a).

The observer sampling in the Sub-Antarctic was not very representative of the overall spatial or temporal distribution of the catch (Figure 29), with very little sampling from mid November to mid February or from mid April to mid May (see Table 7). Length frequencies by target species showed that small hoki were more likely to be caught in fisheries targeting hoki, squid or white warehou, while fisheries targeting ling or southern blue whiting caught larger hoki (Figure 30).

Problems with estimation of catch-at-age in non-spawning fisheries

In addition to the problems associated with whether observer coverage is representative of the catch (see above, and Figures 25 and 29), there is an on-going problem with selection of otoliths. Observer Programme observers collect otoliths from 10 fish out of the 50–150 sampled for length measurement (and otoliths from 3 fish on the spawning fisheries). As in previous years (e.g., Ballara et al. 2008), a rank sums test showed that the observers tended to select larger fish for extraction of otoliths from the Sub-Antarctic in 2009–10 (Figure 31). This introduces a bias into the age estimates which is difficult to correct.

Improved training of observers is required to ensure that otoliths are taken randomly. Electronic aids now being used to help Observers take random samples for otoliths may solve this problem.

2.2.3 Comparison of size and age composition between main areas

Length distributions from the main fisheries in 2009–10 are compared in Figure 32. The catch in all areas was dominated by fish from 45 to 90 cm (mainly 2002–08 year-classes, aged 2–7 years). The percentage of small fish in the catch from non-spawning areas was higher in 2009–10 than in 2008–09 (see Figure 10d), with 52% of hoki on the Chatham Rise, and 42% of hoki in the Sub-Antarctic less than 65 cm. Large fish (over 90 cm) were proportionately more abundant in Cook Strait, the Sub-Antarctic and on the WCSI.

3. HOKI RESEARCH

3.1 Resource surveys

3.1.1 Trawl surveys

Chatham Rise

The twentieth annual trawl survey of the Chatham Rise was completed between 2 and 28 January 2011, with 90 stations used for biomass estimation. The total biomass of all hoki in 2011 decreased by 4% to 93 900 t (Table 13). There was an 18% decrease in the biomass estimate for recruited hoki (3 years and older) from 49 600 t in 2010 to 40 700 t in 2011. The biomass estimate for age 2+ (2008 year-class) at 26 300 t was average, and the estimate for age 1+ (2009 year-class) at 26 900 t was above average (Table 13).

Hoki size and age frequencies from the 2011 Chatham Rise survey were dominated by the 1+ mode at 32–48 cm, the 2+ mode at 49–62 cm, and the 3+ mode at 63–71 cm, with only a few larger fish (Figures 33 and 34).

The 2011 Chatham Rise trawl survey included additional deepwater strata from 800–1300 m. Some large hoki (typically longer than 80 cm) were caught deeper than the core survey boundary at 800 m, but the deepwater strata contributed only 1.3% of the total hoki biomass.

4. CONCLUSIONS

The total reported hoki catch in 2009–10 was 107 209 t, just below the TACC of 110 000 t, and 18 000 t higher than the catch in 2008–09. Catches increased in the western areas (WCSI and Sub-Antarctic), and remained at similar levels to 2008–09 catches in the eastern areas (Chatham Rise, Cook Strait, Puysegur, and east coast South Island). For the fourth year in a row, the Chatham Rise was the largest hoki fishery, with 39 160 t taken from this area. With the increase in the western catch allocation to 50 000 t, the catch on the WCSI increased by about 16 000 t to 36 367 t, and the Sub-Antarctic catch increased by nearly 2000 t to 12 289 t in 2009–10.

Length frequencies and catch-at-age results from the commercial fishery show that most of the catch in 2009–10 was fish from the 2002–08 year-classes, aged 2–7 years. The percentage of small fish in the catch in 2009–10 was higher than in 2008–09 in the non-spawning areas. Widespread occurrence of young fish may indicate relatively good recent recruitment, or may be because there are fewer older fish remaining in the population. The largest average size of fish in 2009–10 was from the WCSI, Sub-Antarctic and Cook Strait.

Relative indices from the Chatham Rise trawl survey in 2011 decreased by 4%. The biomass estimate for recruited hoki decreased but estimates for upcoming year-classes were average (2008 year-class at age 2+) and above average (2009 year-class at age 1+). There were no other fisheries-independent survey estimates since the 2010 hoki assessment.

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Table 1: Reported trawl catches (t) from 1969 to 1987–88; 1969–83 by calendar year, 1983–84 to 1987–88 by fishing year (1 October to 30 September). Source, FSU data.

Year	U.S.S.R.	Japan	South Korea	New Zealand		Total
				Domestic	Chartered	
1969		95				95
1970		414				414
1971		411				411
1972	7 300	1 636				8 936
1973	3 900	4 758				8 658
1974	13 700	2 160		125		15 985
1975	36 300	4 748		62		41 110
1976	41 800	24 830		142		66 772
1977	33 500	54 168	9 865	217		97 750
1978*	2 028 +	1 296	4 580	678		8 581
1979	4 007	8 550	1 178	2 395	7 970	24 100
1980	2 516	6 554		2 658	16 042	27 770
1981	2 718	9 141	2	5 284	15 657	32 802
1982	2 251	7 591		6 982	15 192	32 018
1983	3 853	7 748	137	7 706	20 697	40 141
1983–84	4 520	7 897	93	9 229	28 668	50 407
1984–85	1 547	6 807	35	7 213	28 068	43 670
1985–86	4 056	6 413	499	8 280	80 375	99 623
1986–87	1 845	4 107	6	8 091	153 222	167 271
1987–88	2 412	4 159	10	7 078	216 680	230 339

* Catches for foreign licensed and New Zealand chartered vessels from 1978 to 1984 are based on estimated catches from vessel logbooks. Few data are available for the first three months of 1978 because these vessels did not begin completing these logbooks until 1 April 1978.

+ Soviet hoki catches are taken from the estimated catch records and differ from official MPI statistics. Estimated catches are used because of the large amount of hoki converted to meal and not recorded as processed fish.

Table 2: Reported catch (t) from QMS¹, estimated catch (t) data, and TACC (t) for HOK 1 from 1986–1987 to 2009–10. Estimated catches include TCEPR and CELR data (from 1989–90), LCER data (from 2003–04), NCELR data (from 2006–07), and TCER and LTCER data (from 2007–08).

Year	Estimated catch	Reported catch (MHR)		TACC
		Exclude HOKET	Include HOKET	
1986–87	175 000		158 171	250 000
1987–88	255 000		216 206	250 000
1988–89	210 000		208 500	250 000
1989–90	210 000		208 851	251 884
1990–91	215 000		212 720	201 897
1991–92	215 000		212 167	201 897
1992–93	195 000		191 994	202 155
1993–94	190 000		192 385	202 155
1994–95	168 000		176 787	220 350
1995–96	194 000		209 639	240 000
1996–97	230 000		246 756	250 000
1997–98	261 000		269 239	250 000
1998–99	234 000		244 528	250 000
1999–00	237 000		242 423	250 000
2000–01	224 618	229 858	229 858	250 000
2001–02	195 524	195 501	195 506	200 000
2002–03	180 092	184 660	184 668	200 000
2003–04	133 184	135 784	135 786	180 000
2004–05	102 057	104 364	106 189	100 000
2005–06	100 608	104 385	105 965	100 000
2006–07	97 713	101 010	102 861	100 000
2007–08	87 695	89 318	91 045	90 000
2008–09	87 527	88 805	89 476	90 000
2009–10	104 958	107 209	107 209	110 000

1. Discrepancies between QMS data and estimated catches from 1986 to 1990 arose from incorrect surimi conversion factors. The estimated catch in those years was corrected from conversion factors measured each year by Ministry observers on the WCSI fishery. Since 1990 the current conversion factor of 5.8 has been used, and the total catch reported to the QMS is considered to be more representative of the true level of catch. From 2000–01 MHR catches have been shown including and excluding HOKET catches (catches outside the EEZ).

Table 3: Estimated total catch (t) of hoki by area¹, 1988–89 to 2009–10. Estimated (TCEPR and CELR) catches were scaled to reported (QMR or MHR) catch totals. Data also includes LCER (from 2003–04), and NCELRL estimated data (from 2006–07), and TCER and LTCER data (from 2007–08).

Fishing Year	Spawning fisheries				Non-spawning fisheries					Total Catch
	WCSI	Puysegur	Cook Strait	ECSI	Sub-Antarctic	Chatham Rise and ECSI	ECNI	WCNI	Other ²	
1988–89	188 000	3 500	7 000	-	5 000	5 000	-	-	-	208 500
1989–90	165 000	8 000	14 000	-	10 000	13 000	-	-	-	210 000
1990–91	154 000	4 000	26 500	1 000	18 000	11 500	-	-	-	215 000
1991–92	105 000	5 000	25 000	500	34 000	45 500	-	-	-	215 000
1992–93	98 000	2 000	21 000	-	26 000	43 000	2 000	-	3 000	195 000
1993–94	113 000	2 000	37 000	-	12 000	24 000	2 000	-	1 000	191 000
1994–95	80 000	1 000	40 000	-	13 000	39 000	1 000	-	-	174 000
1995–96	73 000	3 000	67 000	1 000	12 000	49 000	3 000	-	2 000	210 000
1996–97	91 000	5 000	61 000	1 500	25 000	56 500	5 000	-	1 000	246 000
1997–98	107 000	2 000	53 000	1 000	24 000	75 000	4 000	-	3 000	269 000
1998–99	90 113	2 964	46 469	2 103	24 323	75 645	2 604	-	92	244 527
1999–00	101 127	2 947	43 165	2 419	34 172	56 500	1 444	-	516	242 420
2000–01	100 561	6 944	36 641	2 429	30 384	50 494	2 104	-	115	229 858
2001–02	91 223	5 447	24 201	2 890	30 453	39 628	1 177	-	-	195 501
2002–03	73 925	6 014	36 650	7 148	20 146	39 212	944	6	40	184 660
2003–04	45 171	1 156	40 901	2 145	11 661	33 646	900	5	-	135 784
2004–05	33 057	5 520	24 766	3 262	6 226	30 722	534	2	56	104 364
2005–06	38 920	1 500	21 748	677	6 726	34 061	733	8	-	104 385
2006–07	33 122	437	20 138	997	7 668	37 892	711	13	-	101 010
2007–08	20 960	322	18 383	2 327	8 707	37 973	629	17	1	89 319
2008–09	20 565	234	17 481	1 053	9 814	39 041	588	25	-	88 805
2009–10	36 367	273	17 815	661	12 289	39 160	616	28	-	107 209

¹ Estimated catches by area from TCEPR, CELR, LCER, NCELRL, and TCER adjusted pro rata to the total reported (QMR or MHR) catches (excluding HOKET catches) in Table 2.

² Area undefined because of missing positions or statistical areas.

- No catches

Table 4: Variables retained in order of decreasing explanatory value by each model for each area and the corresponding total R² value.

All target species		Target hoki	
Variable	R ²	Variable	R ²
WCSI spawning, core vessels			
Fishing year	5.2	Fishing year	4.9
Target	18.2	Month	14.4
Month	25.5	Vessel	23.7
Vessel	32.6	Mid time	26.7
Mid time	35.0	Method : Depth of net	28.4
Method : Depth of net	37.1		
Cook Strait spawning, core MW vessels			
		Fishing year	1.5
		Day of fishing year	20.0
		Vessel	23.4
Chatham Rise and ECSI Non-spawning, core BT vessels			
Fishing year	6.6	Fishing year	7.1
Target species	21.1	Vessel	11.1
Vessel	24.7	Mid time	14.4
Start time	27.4	Duration	17.1
Duration	29.8	Month	18.4
Month	30.8		
Sub-Antarctic non-spawning, core BT vessels			
Fishing year	4.0	Fishing year	3.7
Target species	12.8	Month	8.6
Month	16.8	Start time	12.7
Start time	20.8	Vessel	15.7
Duration	23.2	Duration	17.9
Vessel	25.3	Depth net	18.9
Depth net	26.5		

Table 5: Observer coverage 2009–10 for hoki target tows by area, BT, BPT, MW, MPT trawl methods only.

2009–10 target hoki tows

Area	TCEPR	TCER	Total	Number of vessels	
				Observed	Percent observed
Chatham Rise	22	3	25	12	48.0
Cook Strait	8	14	22	9	40.9
ECNI	9	11	20	-	0.0
ECSI	11	5	16	4	25.0
Macquarie	-	-	-	-	-
Puysegur	3	-	3	2	66.7
Sub-Antarctic	14	-	14	6	42.9
WCNI	2	1	3	-	0.0
WCSI	27	6	33	14	42.4
Total	38	27	65	30	46.2

Area	TCEPR	TCER	Total	Observed	Number of tows
					Percent observed
Chatham Rise	4 220	4	4 224	295	7.0
Cook Strait	1 232	439	1 671	164	9.8
ECNI	91	222	313	0	0.0
ECSI	314	18	332	8	2.4
Macquarie	-	-	-	-	-
Puysegur	5	-	5	2	40.0
Sub-Antarctic	1 306	-	1 306	140	10.7
WCNI	2	1	3	-	0.0
WCSI	1 860	234	2 094	265	12.7
Total	9 030	1 836	10 866	874	8.0

Area	TCEPR	TCER	Total	Observed	Catch (tonnes)
					Percent observed
Chatham Rise	34 556	14	34 570	3 194	9.2
Cook Strait	12 880	4 801	17 681	2 516	14.2
ECNI	103	154	258	-	0.0
ECSI	1 752	74	1 826	83	4.6
Macquarie	-	-	-	-	-
Puysegur	75	-	75	31	41.4
Sub-Antarctic	10 382	-	10 382	1 512	14.6
WCNI	21	-	21	0	0.0
WCSI	32 286	2 011	34 297	6 071	17.7
Total	92 056	7 054	99 110	13 406	13.5

Table 6: Bycatch rates on vessels with Observer Programme observers in the hoki fishery for tows targeting hoki from 1990–91 to 2009–10. The WCSI, Cook Strait, and ECSI data cover the spawning season (June–September) only. -, less than 0.1 t (except for Cook Strait 1994–95 and 1996–97, Puysegur 1997–98 to 2008–09, and ECSI 1994–95 and 1996–97 for which there are no observer data). Bycatch rates not calculated where observed hoki catch was less than 100 t.

(a) WCSI

	Catch in t (% of hoki catch)				
	HOK	HAK	LIN	SWA	SPD
1990–91	28 670	1 574 (5.5)	243 (0.8)	465 (1.6)	43 (0.1)
1991–92	18 674	152 (0.8)	141 (0.8)	156 (0.8)	98 (0.5)
1992–93	19 095	370 (1.9)	182 (1.0)	138 (0.7)	56 (0.3)
1993–94	32 568	217 (0.7)	167 (0.5)	614 (1.9)	215 (0.7)
1994–95	25 721	840 (3.3)	221 (0.9)	162 (0.6)	192 (0.7)
1995–96	17 706	1 409 (8.0)	279 (1.6)	472 (2.7)	315 (1.8)
1996–97	14 283	648 (4.5)	131 (0.9)	422 (3.0)	59 (0.4)
1997–98	18 655	1 077 (5.8)	327 (1.8)	445 (2.4)	245 (1.3)
1998–99	17 428	1 026 (5.9)	290 (1.7)	220 (1.3)	219 (1.3)
1999–00	18 762	1 081 (5.8)	291 (1.6)	384 (2.0)	110 (0.6)
2000–01	16 475	514 (3.1)	265 (1.6)	303 (1.8)	82 (0.5)
2001–02	16 668	1 460 (8.8)	513 (3.1)	124 (0.7)	119 (0.7)
2002–03	10 192	528 (5.2)	191 (1.9)	96 (0.9)	41 (0.4)
2003–04	8 431	817 (9.7)	507 (6.0)	269 (3.2)	51 (0.6)
2004–05	7 178	344 (4.8)	281 (3.9)	99 (1.4)	38 (0.5)
2005–06	9 525	404 (4.2)	232 (2.4)	97 (1.0)	62 (0.7)
2006–07	9 740	112 (1.2)	79 (0.8)	80 (0.8)	30 (0.3)
2007–08	7 774	47 (0.6)	73 (0.9)	53 (0.7)	48 (0.6)
2008–09	9 418	84 (0.9)	88 (0.9)	68 (0.7)	32 (0.3)
2009–10	11 620	87 (0.7)	167 (1.4)	65 (0.6)	79 (0.7)

(b) Cook Strait

	Catch in t (% of hoki catch)				
	HOK	HAK	LIN	SWA	SPD
1992–93	107	-	-	-	1 (0.6)
1993–94	495	-	6 (1.3)	-	1 (0.2)
1994–95	-	-	-	-	-
1995–96	734	-	2 (0.3)	-	13 (1.8)
1996–97	-	-	-	-	-
1997–98	3461	-	7 (0.2)	-	55 (1.6)
1998–99	4881	1	19 (0.4)	-	97 (2.0)
1999–00	3243	-	10 (0.3)	-	106 (3.3)
2000–01	4361	-	16 (0.4)	1 (0.0)	87 (2.0)
2001–02	2032	-	6 (0.3)	-	45 (2.2)
2002–03	2436	-	6 (0.2)	-	104 (4.3)
2003–04	2486	-	4 (0.2)	-	39 (1.5)
2004–05	2207	-	5 (0.2)	2 (0.1)	38 (1.7)
2005–06	1080	-	2 (0.2)	-	15 (1.4)
2006–07	2298	-	12 (0.5)	2 (0.1)	85 (3.7)
2007–08	3079	-	7 (0.2)	1 (0.0)	51 (1.6)
2008–09	2290	-	3 (0.1)	-	27 (1.2)
2009–10	3892	1	9 (0.2)	1 (0.0)	32 (0.8)

Table 6: continued.

(c) Puysegur

	Catch in t (% of hoki catch)				
	HOK	HAK	LIN	SWA	SPD
1990–91	986	3 (0.3)	25 (2.5)	1 (0.1)	1 (0.1)
1991–92	1028	27 (2.6)	431 (41.9)	2 (0.2)	4 (0.4)
1992–93	530	3 (0.6)	80 (15.0)	1 (0.2)	-
1993–94	959	-	8 (0.8)	7 (0.7)	6 (0.6)
1994–95	226	- (0.1)	8 (3.7)	0 (0.0)	-
1995–96	719	2 (0.2)	33 (4.6)	3 (0.4)	2 (0.3)
1996–97	455	- (0.1)	6 (1.3)	3 (0.7)	3 (0.8)
1997–98	226	4 (1.9)	25 (10.9)	6 (2.7)	9 (4.0)
1998–99	370	- (0.1)	25 (6.8)	17 (4.6)	7 (1.9)
1999–00	823	6 (0.7)	30 (3.6)	221 (6.9)	16 (1.9)
2000–01	561	- (0.1)	20 (3.5)	34 (6.1)	1 (0.2)
2001–02	678	2 (0.3)	52 (7.6)	25 (3.7)	2 (0.3)
2002–03	549	- (0.1)	32 (5.8)	14 (2.6)	2 (0.3)
2003–04	1237	1 (0.1)	20 (1.6)	1 (0.1)	11 (0.9)
2004–05	478	3 (0.5)	105 (22.0)	26 (5.4)	1 (0.2)
2005–06	10	- (0.2)	4 (38.5)	0 (0.0)	0 (0.5)
2006–07	31	- (0.5)	- (0.7)	1 (3.2)	-
2007–08	986	3 (0.3)	25 (2.5)	1 (0.1)	1 (0.1)
2008–09	1028	27 (2.6)	431 (41.9)	2 (0.2)	4 (0.4)
2009–10	530	3 (0.6)	80 (15.0)	1 (0.2)	-

(d) Sub-Antarctic

	Catch in t (% of hoki catch)						
	HOK	HAK	LIN	SWA	SPD	JAV	RAT
1990–91	1960	203 (10.4)	90 (4.6)	-	3 (0.2)	16 (0.8)	14 (0.7)
1991–92	3562	332 (9.3)	249 (7.0)	9 (0.3)	15 (0.4)	47 (1.3)	39 (1.1)
1992–93	3468	676 (19.5)	252 (7.3)	5 (0.1)	10 (0.3)	30 (0.9)	21 (0.6)
1993–94	1929	226 (11.7)	171 (8.9)	11 (0.6)	15 (0.8)	11 (0.6)	10 (0.5)
1994–95	882	24 (2.7)	64 (7.3)	-	15 (1.7)	14 (1.6)	12 (1.4)
1995–96	1080	32 (3.0)	146 (13.5)	8 (0.7)	6 (0.6)	9 (0.8)	15 (1.4)
1996–97	717	10 (1.4)	25 (3.5)	1 (0.1)	-	4 (0.6)	3 (0.4)
1997–98	1893	127 (6.7)	190 (10.0)	3 (0.2)	20 (1.1)	66 (3.5)	59 (3.1)
1998–99	4784	134 (2.8)	257 (5.4)	26 (0.5)	20 (0.4)	74 (1.5)	78 (1.6)
1999–00	5470	213 (3.9)	340 (6.2)	162 (3.0)	47 (0.9)	186 (3.4)	65 (1.2)
2000–01	4286	99 (2.3)	439 (10.2)	237 (5.5)	58 (1.4)	78 (1.8)	50 (1.2)
2001–02	3908	154 (3.9)	194 (5.0)	35 (0.9)	97 (2.5)	308 (7.9)	94 (2.4)
2002–03	2032	83 (4.1)	373 (18.4)	22 (1.1)	81 (4.0)	99 (4.9)	47 (2.3)
2003–04	781	37 (4.7)	326 (41.7)	54 (6.9)	171 (21.9)	36 (4.6)	16 (2.0)
2004–05	391	24 (6.1)	189 (48.3)	5 (1.3)	6 (1.5)	71 (18.2)	15 (3.8)
2005–06	1172	14 (1.2)	118 (10.1)	68 (5.8)	63 (5.4)	29 (2.5)	14 (1.2)
2006–07	1225	16 (1.3)	225 (18.4)	82 (6.7)	85 (6.9)	50 (4.1)	18 (1.5)
2007–08	3105	101 (3.3)	1004 (32.3)	13 (0.4)	30 (1.0)	176 (5.7)	28 (0.9)
2008–09	3070	93 (3.0)	361 (11.8)	52 (1.7)	83 (2.7)	130 (4.2)	40 (1.3)
2009–10	3260	73 (2.2)	309 (9.5)	26 (0.8)	73 (2.2)	166 (5.1)	93 (2.9)

Table 6: continued.

(e) Chatham Rise and ECSI (excluding ECSI from June–September).

	Catch in t (% of hoki catch)						
	HOK	HAK	LIN	SWA	SPD	JAV	RAT
1990–91	3328	132 (4.0)	157 (4.7)	210 (6.3)	24 (0.7)	142 (4.3)	102 (3.1)
1991–92	5011	64 (1.3)	145 (2.9)	28 (0.6)	5 (0.1)	70 (1.4)	129 (2.6)
1992–93	1321	59 (4.5)	12 (0.9)	9 (0.7)	3 (0.2)	38 ((2.9)	11 (0.8)
1993–94	4835	162 (3.4)	124 (2.6)	16 (0.3)	18 (0.4)	85 (1.8)	115 (2.4)
1994–95	2156	36 (1.7)	75 (3.5)	22 (1.0)	14 (0.6)	65 (3.0)	66 (3.1)
1995–96	5331	136 (2.6)	146 (2.7)	128 (2.4)	49 (0.9)	118 (2.2)	197 (3.7)
1996–97	1762	112 (6.4)	75 (4.3)	116 (6.6)	10 (0.6)	87 (4.9)	130 (7.4)
1997–98	8945	212 (2.4)	243 (2.7)	91 (1.0)	71 (0.8)	439 (4.9)	315 (3.5)
1998–99	7713	99 (1.3)	273 (3.5)	81 (1.1)	129 (1.7)	343 (4.4)	327 (4.2)
1999–00	3837	64 (1.7)	114 (3.0)	125 (3.3)	135 (3.5)	222 (5.8)	159 (4.1)
2000–01	5476	143 (2.6)	262 (4.8)	217 (4.0)	97 (1.8)	385 (7.0)	339 (6.2)
2001–02	4607	94 (2.0)	221 (4.8)	48 (1.0)	120 (2.6)	382 (8.3)	381 (8.3)
2002–03	2356	68 (2.9)	211 (9.0)	138 (5.9)	47 (2.0)	431 (18.3)	336 (14.3)
2003–04	2460	52 (2.1)	157 (6.4)	242 (9.8)	58 (2.4)	250 (10.2)	265 (10.8)
2004–05	4818	52 (1.1)	179 (3.7)	132 (2.7)	105 (2.2)	530 (11.0)	338 (7.0)
2005–06	5120	48 (0.9)	131 (2.6)	259 (5.1)	93 (1.8)	394 (7.7)	315 (6.2)
2006–07	5535	80 (1.4)	155 (2.8)	195 (3.5)	39 (0.7)	500 (9.0)	165 (3.0)
2007–08	5532	77 (1.4)	120 (2.2)	149 (2.7)	74 (1.3)	405 (7.3)	319 (5.8)
2008–09	4376	49 (1.1)	94 (2.1)	71 (1.6)	45 (1.0)	351 (8.0)	286 (6.5)
2009–10	5726	68 (1.2)	134 (2.3)	244 (4.3)	48 (0.8)	541 (9.4)	429 (7.5)

(f) ECSI, June–September.

	Catch in t (% of hoki catch)						
	HOK	HAK	LIN	SWA	SPD	JAV	RAT
2000–01	5	- (0.5)	- (1.7)	-	-	-	-
2001–02	97	- (0.3)	1 (0.8)	-	-	-	1 (1.0)
2002–03	914	22 (2.4)	8 (0.9)	20 (2.2)	5 (0.5)	6 (0.7)	18 (2.0)
2003–04	939	2 (0.3)	4 (0.5)	1 (0.1)	1 (0.1)	4 (0.4)	6 (0.6)
2004–05	280	- (0.2)	1 (0.5)	-	-	1 (0.4)	2 (0.7)
2005–06	505	5 (1.1)	- (0.1)	35 (6.9)	1 (0.2)	1 (0.2)	3 (0.6)
2006–07	72	2 (2.1)	1 (1.2)	2 (2.8)	-	2 (2.8)	9 (12.5)
2007–08	311	- (0.1)	- (0.1)	-	-	-	1 (0.3)
2008–09	41	- (1.1)	1 (1.3)	-	-	1 (2.4)	18 (43.9)
2009–10	5	- (0.5)	- (1.7)	-	-	-	-

Table 7: Number of 2009–10 hoki length frequencies and otoliths by observer trip, target species, and month.

(a) WCSI observer samples

Trip	Month	Target species	Number of	
			Length frequencies	Otoliths
1	Jun	HOK	2	-
2	Jul	HOK	16	-
3	Jul	HOK	48	16
4	Jul	HOK	39	118
5	Jul/Aug	HOK	31	103
6	Jul/Aug	HOK	31	95
7	Jul/Aug	HOK	48	1
8	Jul/Aug	HOK	20	-
9	Jul/Aug	HOK	7	28
10	Aug	HOK(5) , HAK (6)	11	27
11	Aug	HOK (4), HAK (2) , SWA(1)	7	-
12	Aug	HOK (5) , HAK (1)	6	28
13	Aug/Sep	HOK (3), HAK (11)	14	-
14	Aug/Sep	HOK (2) , HAK (3), LIN (1)	6	20
Total			286	502

1. 229 otoliths from market samples

(b) Chatham Rise and ECSI observer data; Chatham Rise includes ECSI non-spawning data. No otoliths in 2009–10.

Trip	Month	Target species	Number of length frequencies	
			Chatham Rise	ECSI spawning
1	Oct	HAK/HOK/LIN/SWA	19	-
2	Oct	HOK/SWA	22	-
3	Oct	HOK	25	-
4	Oct	ORH	1	-
5	Oct	HOK	21	-
6	Oct/Nov	HOK	5	-
7	Nov	HOK	10	-
8	Nov	ORH/SSO	3	-
9	Nov/Dec	HOK/SWA	25	-
10	Nov/Dec	HOK/SWA	12	-
11	Dec	BYX/ORH/SSO	5	-
12	Dec/Jan	HOK	99	-
13	Jan	ORH/SSO	2	-
14	Jan	HOK	2	-
15	Feb/Mar	BOE/ORH	12	-
16	Mar	HOK	10	-
17	Apr/May/Jun	HOK	51	2
18	May	HOK	2	-
19	Aug	HOK	1	1
20	Sep	HOK/SWA	2	-
21	Sep	LIN	2	1
22	Sep	HOK/LIN/SWA	11	-
23	Sep	HOK/SWA	2	-
Total			344	4

(c) Sub-Antarctic observer data

Trip	Month	Target species	Number of	
			Length frequencies	Otoliths
1	Oct	HOK/LIN	12	33
2	Oct	HOK	17	102
3	Oct	HAK	1	3
4	Oct	HOK	1	5
5	Oct	HOK	1	9
6	Oct/Nov	HOK/LIN	22	120
7	Nov	HOK	1	-
8	Dec	HAK	1	5
9	Feb/Mar	HOK/SQU	8	-
10	Feb/Mar	SQU	7	-
11	Feb/Mar	SQU	2	-
12	Feb/Mar/Apr	HOK	72	537
13	Mar	SQU	1	-
14	Mar	SQU	4	-
15	Apr	SQU	2	-
16	Apr	SQU	4	-
17	Apr/May	NOS/SQU	4	-
18	May	SQU	1	-
19	May	SQU/WWA	5	-
20	May/Jun	HOK	26	224
21	May/Jun	SCI	22	-
22	Jun	SQU/WWA	3	11
23	Jun/Jul	HOK	4	30
24	Jun/Jul	LIN/SQU/WWA	14	44
25	Aug	SBW	1	-
26	Sep	SBW	6	-
27	Sep	SBW	5	-
28	Sep	SBW	11	-
29	Sep	SBW	4	-
Total			262	1 123

Table 8: Number of market landings sampled and observer tows for the same area by month and vessel size category for the 2010 sampling season, and Cook Strait stratification.

(a) WCSI inside the 25 n.mile line

Data set		Month				Total
		Jun	Jul	Aug	Sep	
Market landings	Vessel length < 40 m	1	6	4	-	11
Observer tows	Vessel length > 40 m	-	-	-	-	-

(b) Cook Strait

Data set		Month				Total
		Jun	Jul	Aug	Sep	
Market samples	Wellington	-	-	-	-	-
	Nelson/Picton vessel <30 m	-	5	14	1	20
	Nelson/Picton vessel 30–40m	-	-	-	1	1
	Nelson/Picton vessel >40 m	-	3	3	-	6
Observer samples	Nelson/Picton vessel <30 m	-	6	11	5	22
	Nelson/Picton vessel 30–40m	-	-	-	-	-
	Nelson/Picton vessel >40 m	20	47	11	8	86

Table 9: Percentage of female hoki by observer stages on the WCSI for female fish less than or equal to 55 cm (n = 685) and female fish greater than 55 cm (n = 12 478) for the 2010 spawning season.

	Females ≤ 55 cm	Females > 55 cm
Immature and resting	35.7	5.1
Ripening	53.2	51.1
Ripe	8.6	29.9
Running ripe	0.1	7.0
Spent	2.3	6.9

Table 10: Cook Strait 2010 stratification for the length frequencies. Note: No observer length frequencies for vessels < 40 m were used.

Stratum			Stratum	Number of samples	
	Vessel size	Date range	Catch (t)	Market	Observer
1	< 40 m	1 Jun – 30 Jul	2 504	5	-
2	< 40 m	1 – 15 Aug	1 568	5	-
3	< 40 m	16 – 26 Aug	1 402	6	-
4	< 40 m	27 Aug – 30 Sep	938	5	-
5	≥ 40m	1 – 24 Jun	1 016	-	10
6	≥ 40m	1 Jun – 16 Jul	1 260	2	47
7	≥ 40m	17 Jul – 4 Aug	1 666	1	10
8	≥ 40m	5 – 28 Aug	2 343	2	11
9	≥ 40m	29 Aug – 30 Sep	2 962	1	8

Table 11: Strata for the Chatham Rise fishery in 2009–10 based on the tree regression of all data (Observer Programme only), with comparison of the TCEPR, Observer Programme (OP), and otolith data by stratum. The catch for OP is the total catch for the observed tows. No otoliths in 2009–10.

Stratum	Splitting variables			Mean length (cm)	Hoki catch (t)		No. of tows sampled		No. of fish Measured
	Latitude	Longitude	Depth of net		TCEPR	OP	TCEPR	OP	
1	-	-	< 454.5 m	59.7	2 987	259	1 227	32	3 028
2	-	-	454.5–650 m	66.4	33 913	2 526	4 139	275	28 229
3	-	-	≥ 650 m	81.5	2 255	185	913	37	1 868

Table 12: Strata for the Sub-Antarctic fishery in 2009–10 based on the tree regression of all data (Observer Programme only), with comparison of the TCEPR, Observer Programme (OP), and otolith data by stratum. The catch for OP is the total catch for the observed tows.

Stratum	Splitting variables			Mean length (cm)	Hoki catch (t)		No. of tows sampled		No. of otoliths	No. of fish Measured
	Latitude	Longitude	Depth of net		TCEPR	OP	TCEPR	OP		
1	north of 48.98° S	-	< 315m	48.6	257	39	246	26	3	658
2	north of 48.98° S	-	≥ 315m	67.2	7 313	689	1 320	67	382	6 985
3	south of 48.98° S	west of 168.3°	-	78.2	3 222	450	1 277	82	313	5 412
4	south of 48.99° S	east of 168.3°	-	89.9	1 497	579	314	85	425	6 300

Table 13: Relative biomass estimates of hoki on the Chatham Rise from *Tangaroa* trawl surveys, January 1992–2011. The c.v. is the coefficient of variation as % (in parentheses).

	1+ hoki				2+ hoki			3++ hoki		Total hoki	
Survey	Year-class	‘000 t	c.v	Year-class	‘000 t	c.v	‘000 t	c.v	‘000 t	c.v	
1992	1990	2.8	(28)	1989	1.2	(18)	116.1	(8)	120.2	(10)	
1993	1991	32.9	(33)	1990	2.6	(25)	150.1	(9)	185.6	(10)	
1994	1992	14.6	(20)	1991	44.7	(18)	86.2	(9)	145.6	(10)	
1995	1993	6.6	(13)	1992	44.9	(11)	69.0	(9)	120.4	(8)	
1996	1994	27.6	(24)	1993	15.0	(13)	106.6	(10)	152.8	(10)	
1997	1995	3.2	(40)	1994	62.7	(12)	92.1	(8)	158.0	(8)	
1998	1996	4.5	(33)	1995	6.9	(18)	75.6	(11)	86.7	(11)	
1999	1997	25.6	(30)	1996	16.5	(19)	67.0	(10)	109.1	(12)	
2000	1998	14.4	(32)	1997	28.2	(21)	29.1	(9)	71.7	(12)	
2001	1999	0.4	(75)	1998	24.2	(18)	35.7	(9)	60.3	(10)	
2002	2000	22.4	(26)	1999	1.2	(21)	50.7	(12)	74.4	(11)	
2003	2001	0.5	(46)	2000	27.2	(15)	20.4	(9)	52.6	(9)	
2004	2002	14.4	(33)	2001	5.4	(20)	32.8	(13)	52.7	(13)	
2005	2003	17.5	(23)	2002	45.8	(16)	21.2	(11)	84.6	(12)	
2006	2004	25.9	(22)	2003	33.6	(19)	39.7	(10)	99.2	(11)	
2007	2005	9.1	(28)	2004	32.6	(13)	28.8	(9)	70.5	(8)	
2008	2006	15.8	(32)	2005	23.8	(15)	37.2	(8)	76.9	(11)	
2009	2007	25.2	(29)	2006	65.2	(17)	53.7	(8)	144.1	(11)	
2010	2008	19.3	(31)	2007	28.6	(15)	49.6	(16)	97.5	(15)	
2011	2009	26.9	(37)	2008	28.3	(14)	40.7	(8)	93.9	(14)	

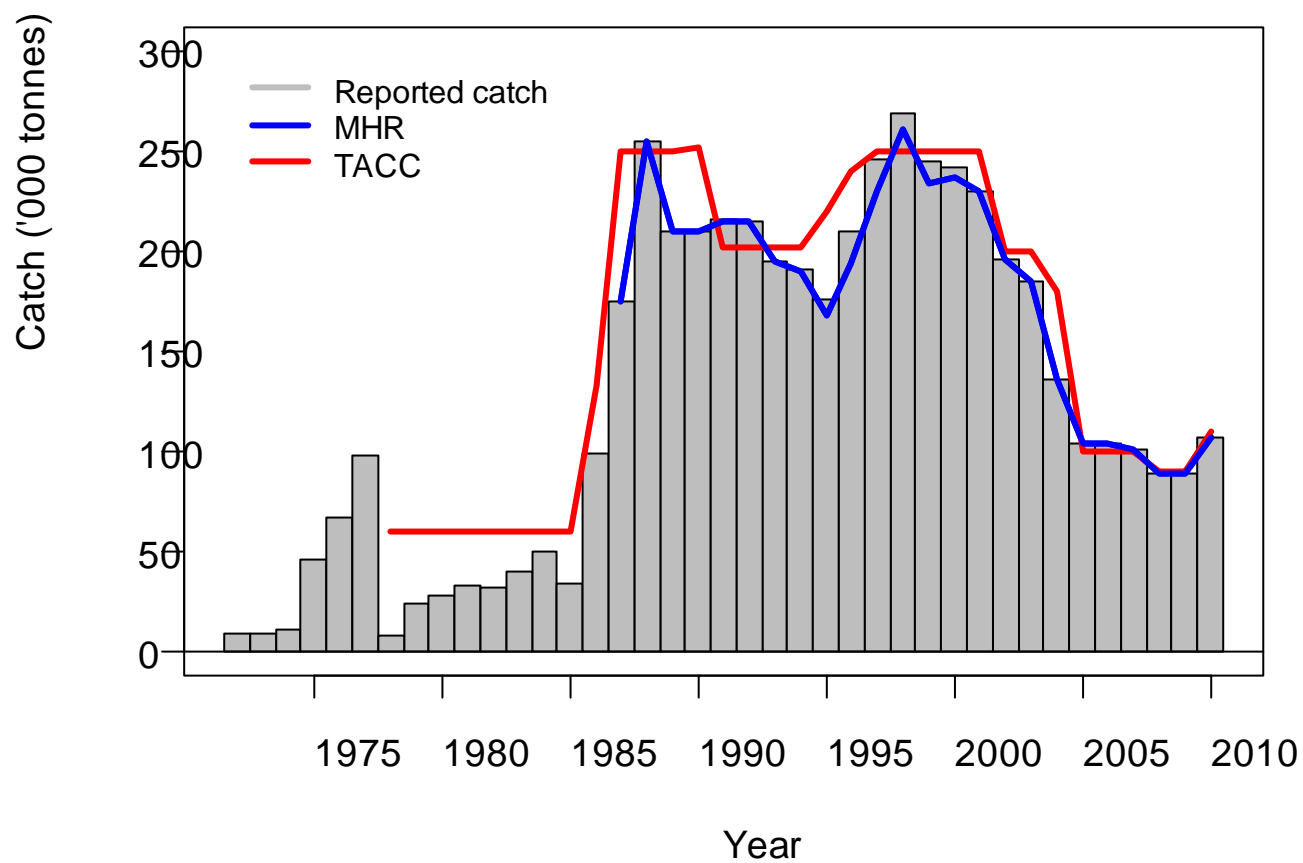


Figure 1: Total New Zealand hoki catch estimated from reported landings for calendar years 1972 to 1983 and fishing years 1983–84 (1984) to 2009–10.

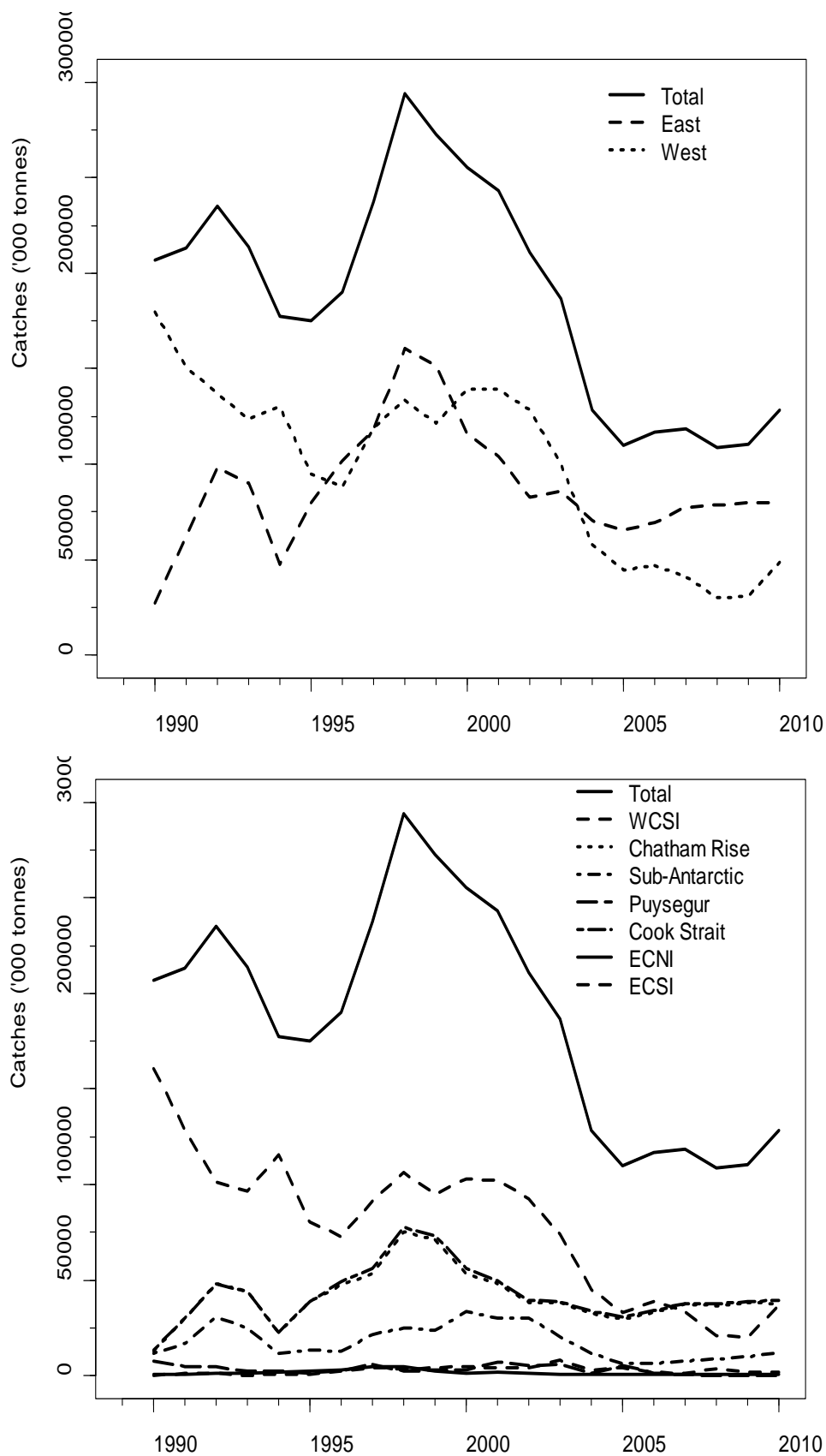


Figure 2a: Estimated total catch (t) of hoki by 'stock' area (upper panel) and fishing area (lower panel) from 1988–89 (1989) to 2009–10 (2010). "Eastern" areas include Chatham Rise, east coast South Island (ECSI), Cook Strait, and east coast North Island (ECNI). "Western" areas include west coast South Island (WCSI), Sub-Antarctic, and Puysegur.

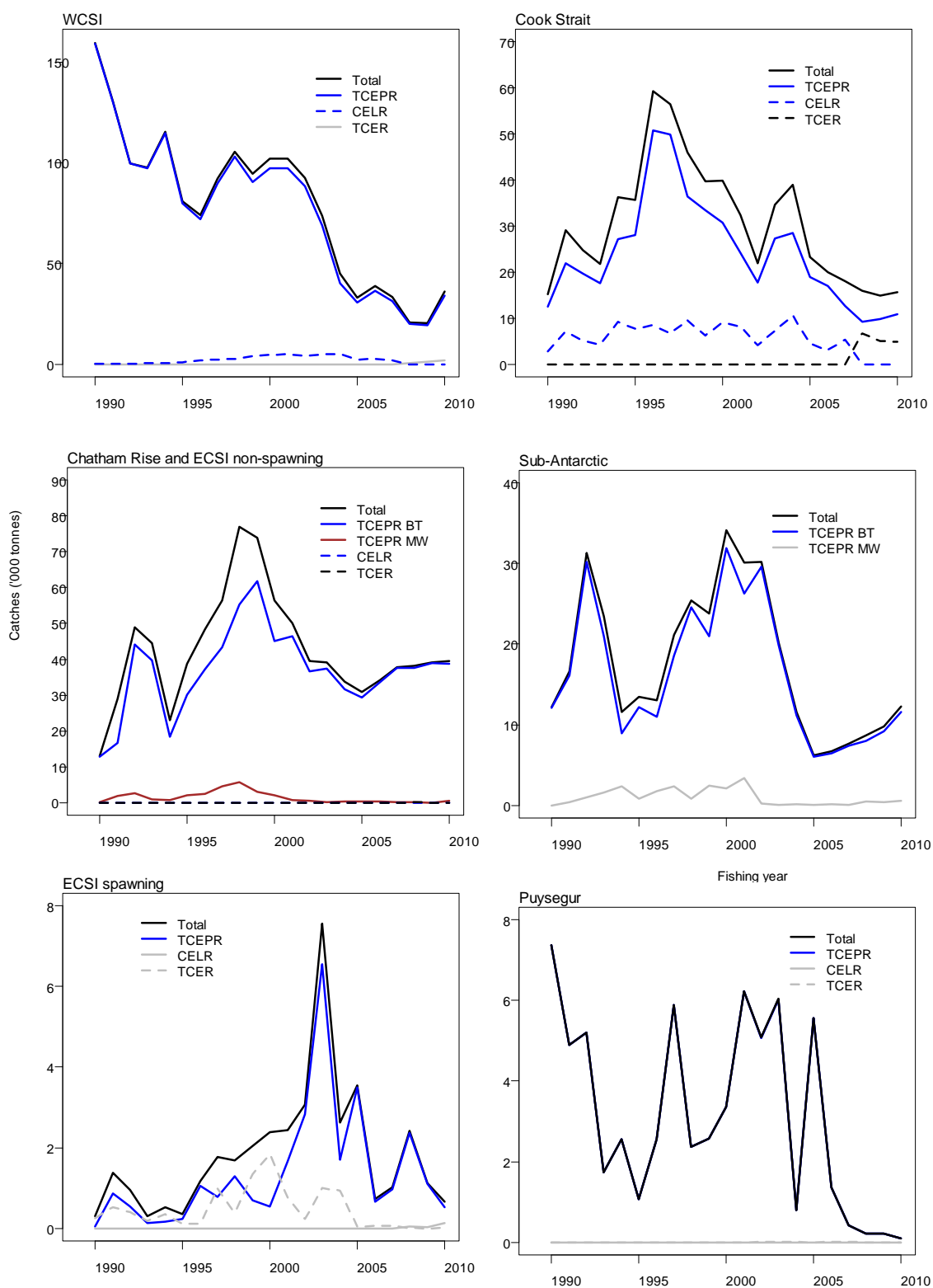


Figure 2b: Total catches and catches by form type by hoki area and fishing year. Chatham Rise and Sub-Antarctic also show TCEPR data split by MW (midwater trawl) and BT (Bottom trawl). Sub-Antarctic and Puysegur have very little CELR or TCER data. No TCER or CELR catches for Sub-Antarctic.

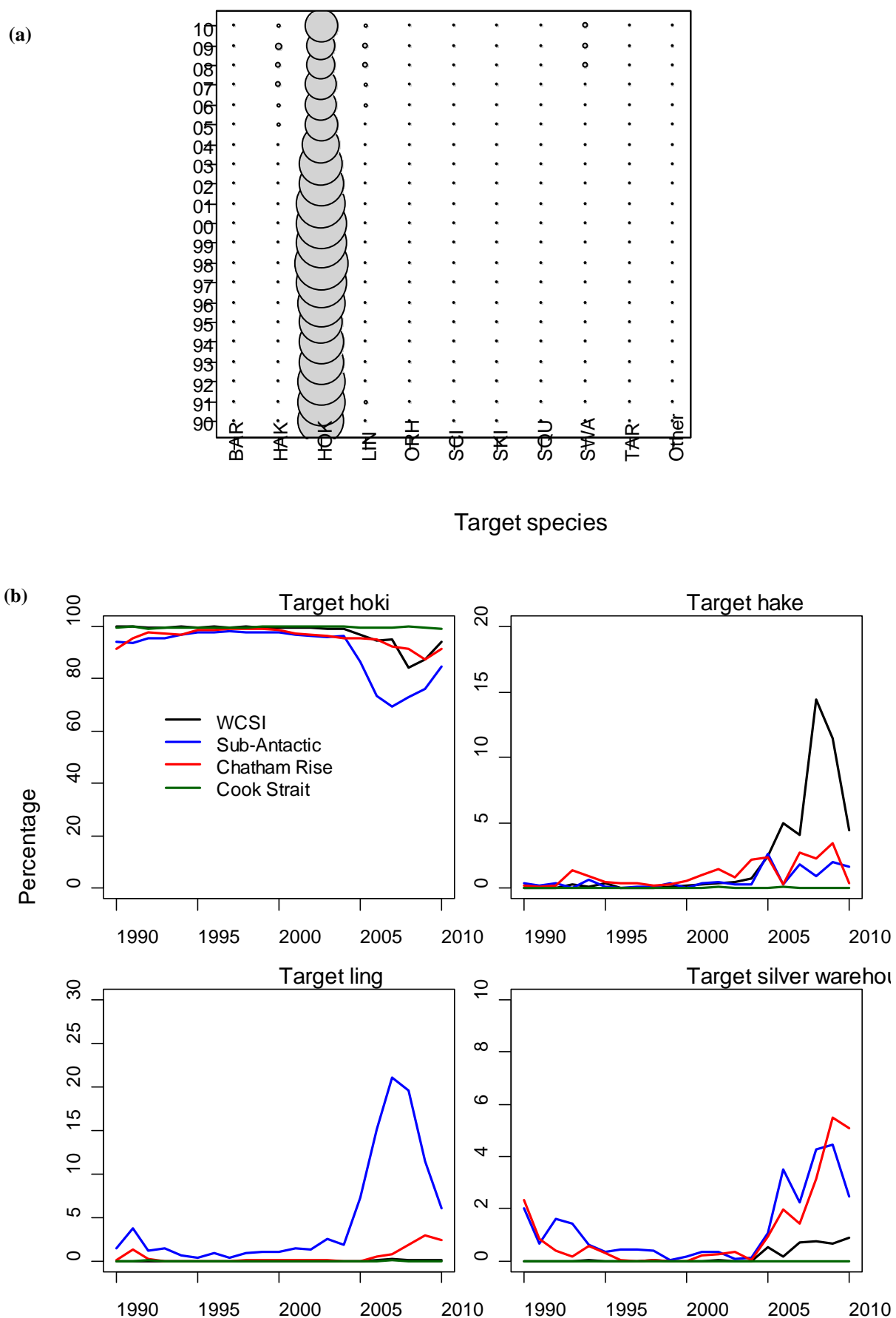
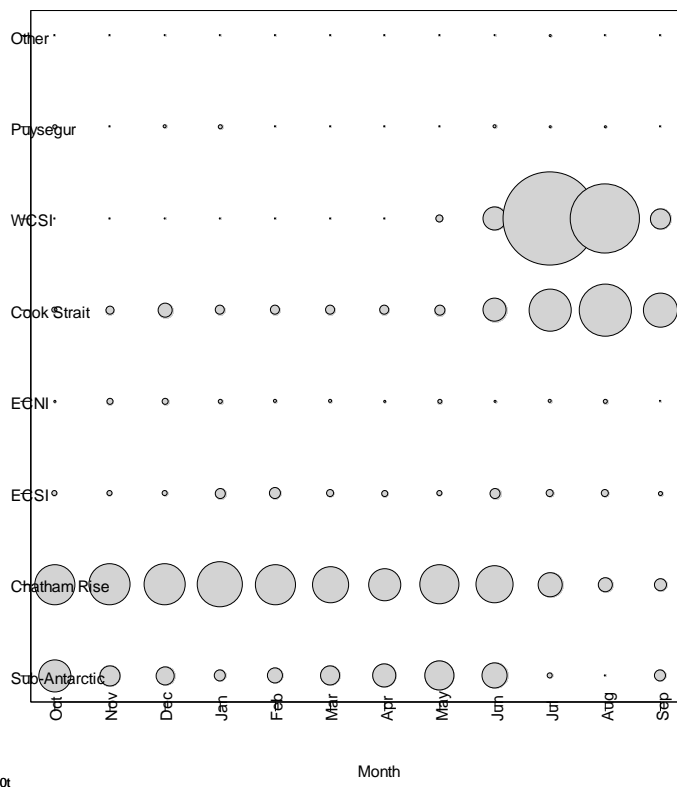


Figure 3: (a) Distribution of hoki catch by target species (maximum circle size is 266 534 t), and (b) percentage of hoki catch for hoki, hake, ling, and silver warehou target tows for the 1989–90 to 2009–10 fishing years.

(a)



(b)

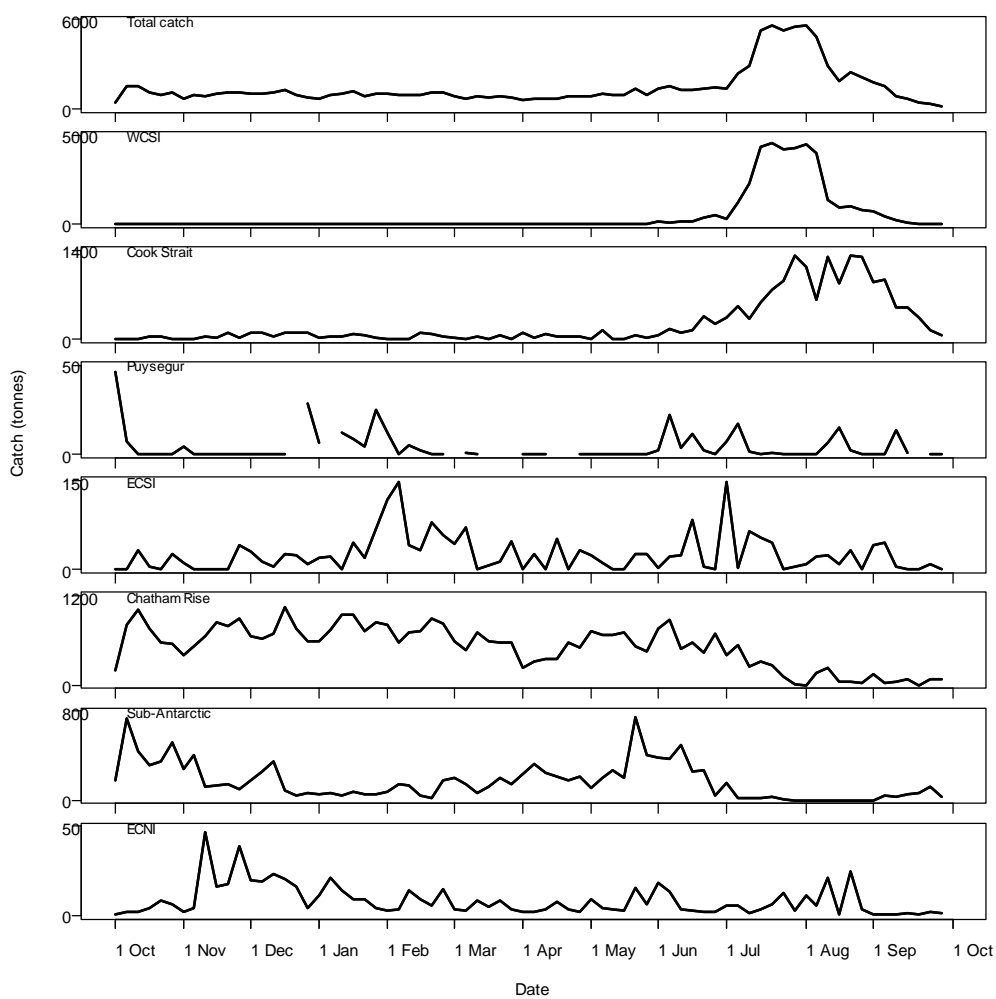


Figure 4: (a) Hoki catch by month and area (maximum circle size is 25 000 t) and (b) distribution of hoki catch (in 5 day bins) by area in the 2009–10 fishing year.

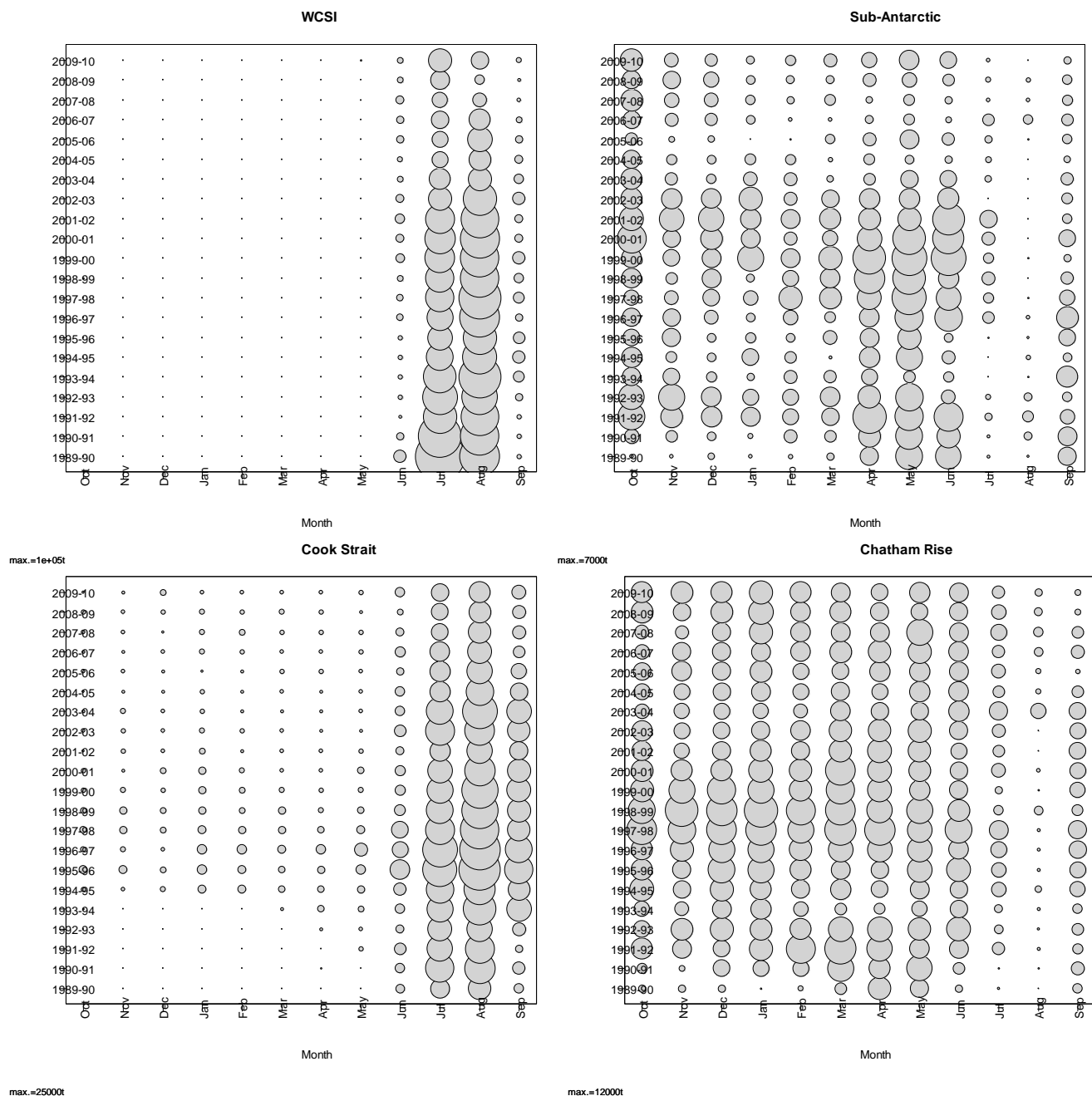


Figure 5: Distribution of hoki catch by month and area for the 1989–90 to 2009–10 fishing years.

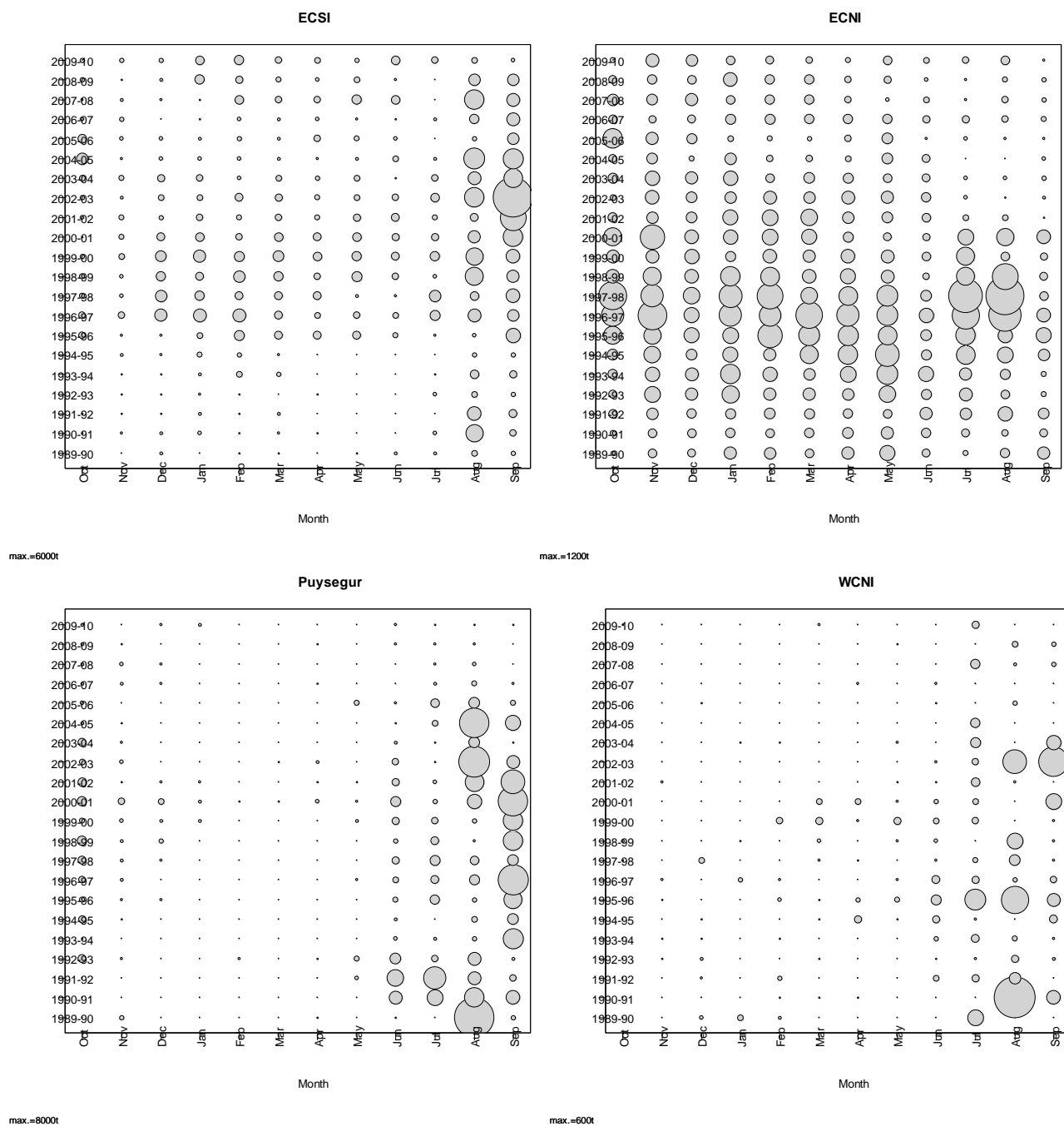
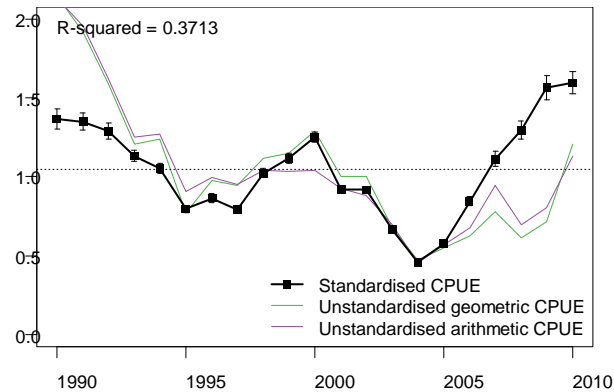
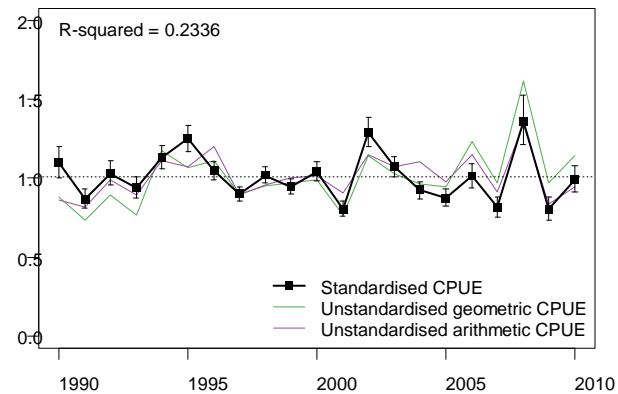


Figure 5: Continued.

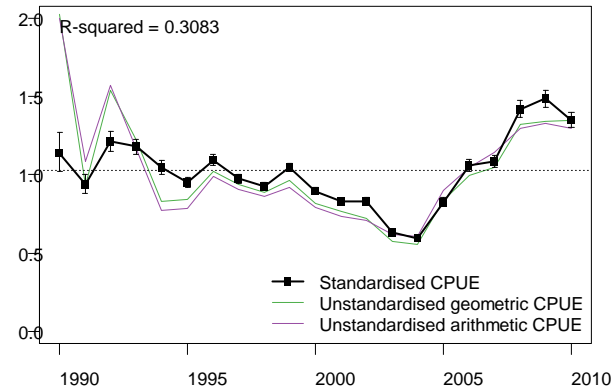
**WCSI core
All target species**



**Cook Strait core
Target hoki
MW tows**



**Chatham Rise
and ECSI core
All target species
BT tows**



**Sub-Antarctic core
All target species
BT tows**

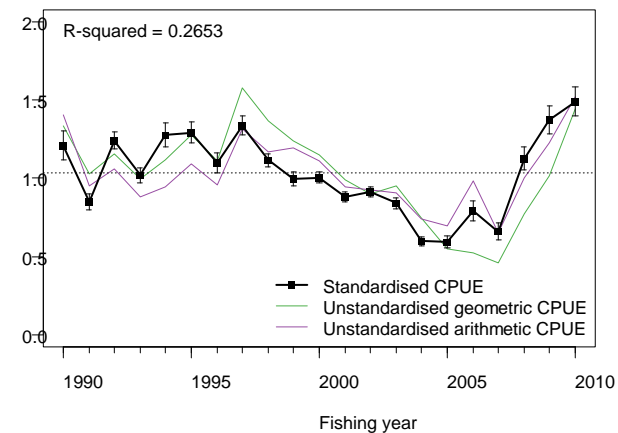
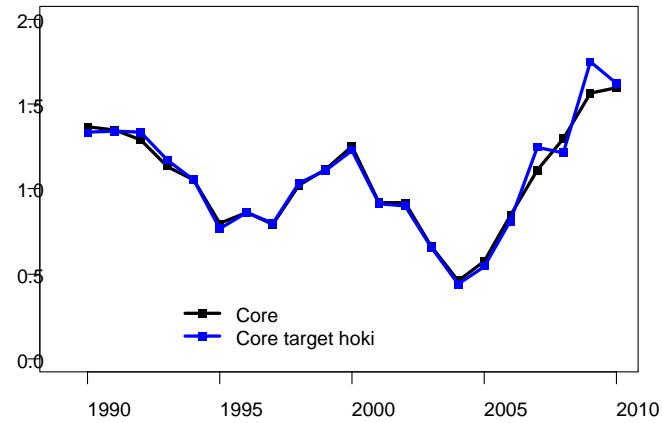
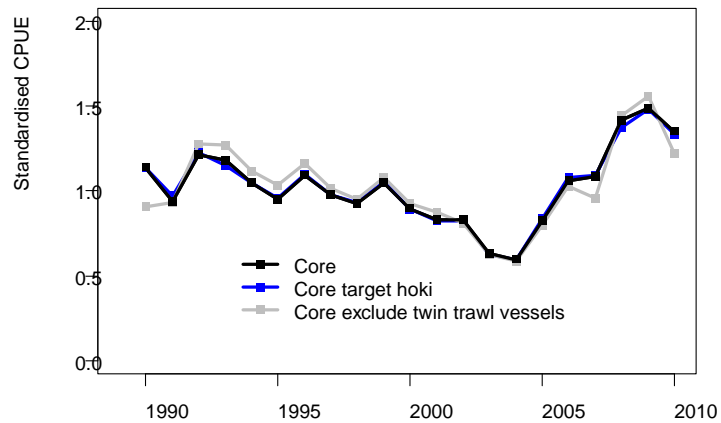


Figure 6a: Model arithmetic, geometric and standardised CPUE indices by area for core data hoki tows for 1990–2010. Datasets for Chatham Rise and ECSI, and Sub-Antarctic included only bottom tows, and Cook Strait included only midwater tows.

WCSI



Chatham Rise And ECSI



Sub-Antarctic

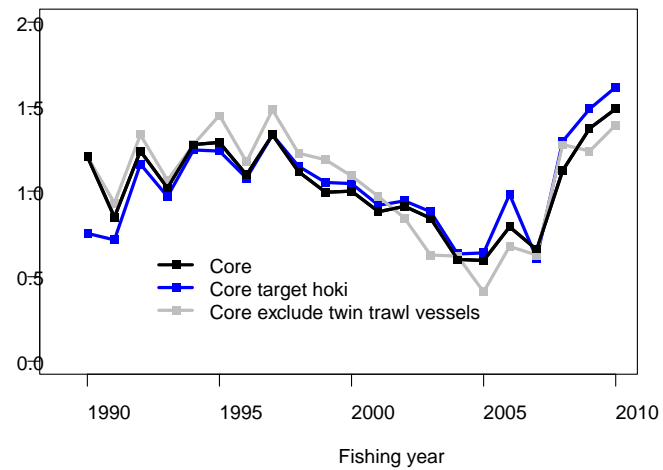


Figure 6b: Comparison of relative indices from model runs for each area.

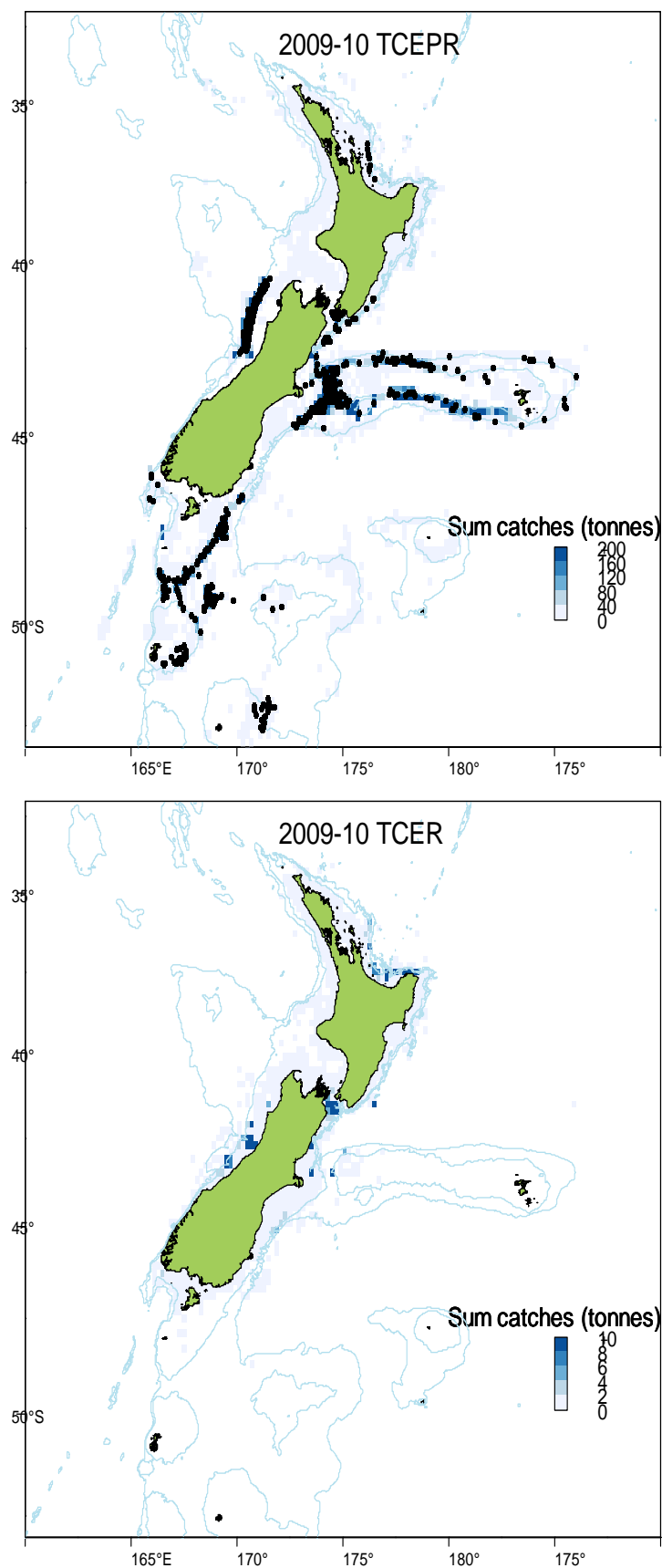


Figure 7: Density plots of all commercial TCEPR and TCER trawls where hoki was caught in the 2009–10 fishing year. TCEPR plot also shows observed positions.

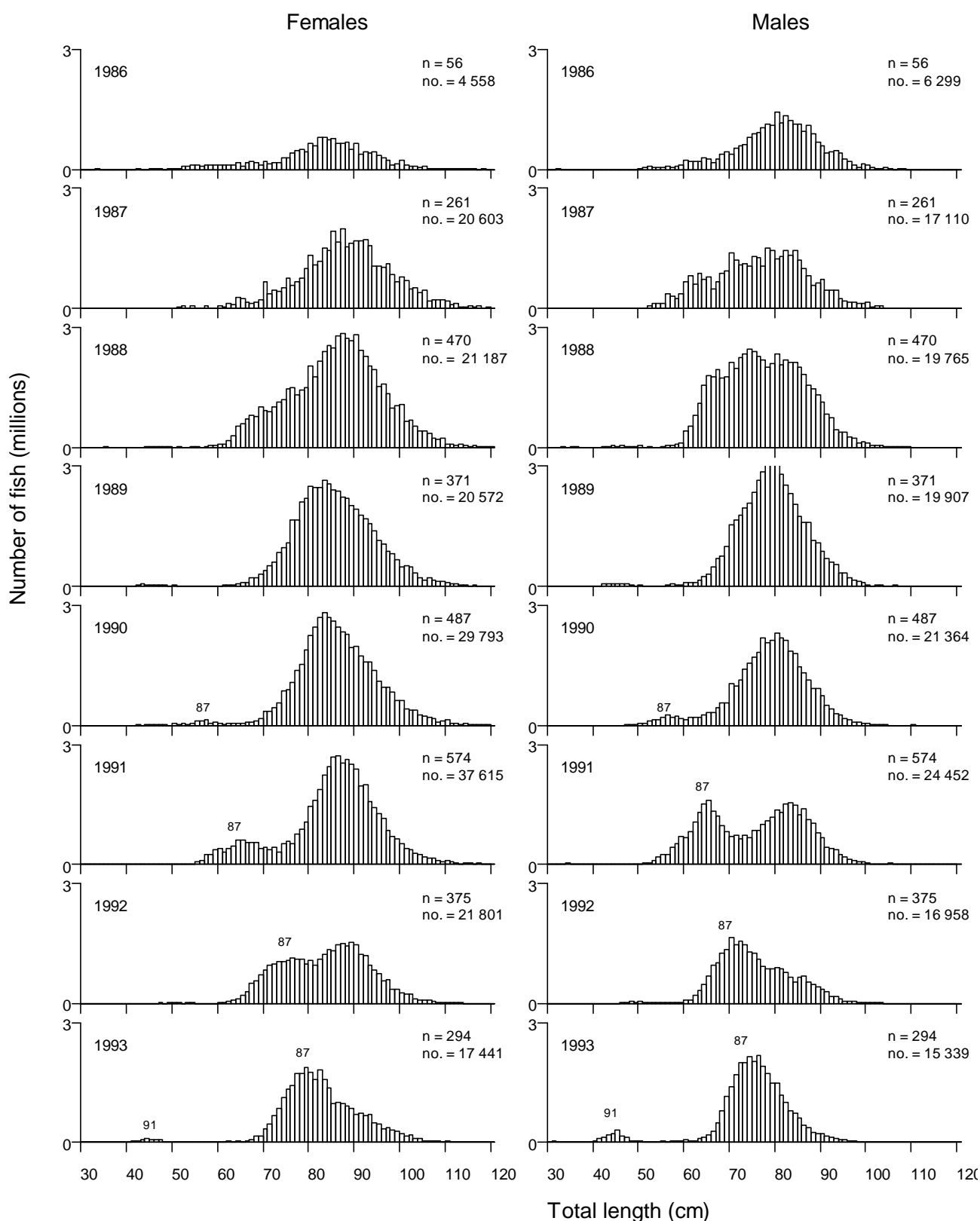


Figure 8a: Length frequency of hoki in commercial catches from the west coast South Island spawning fishery from 1989 to 1993 sampled at sea by the Observer Programme. n, number of tows sampled; no., number of fish sampled. Numbers above the histograms mark estimated year-class modes, e.g., 91 = 1991 year-class.

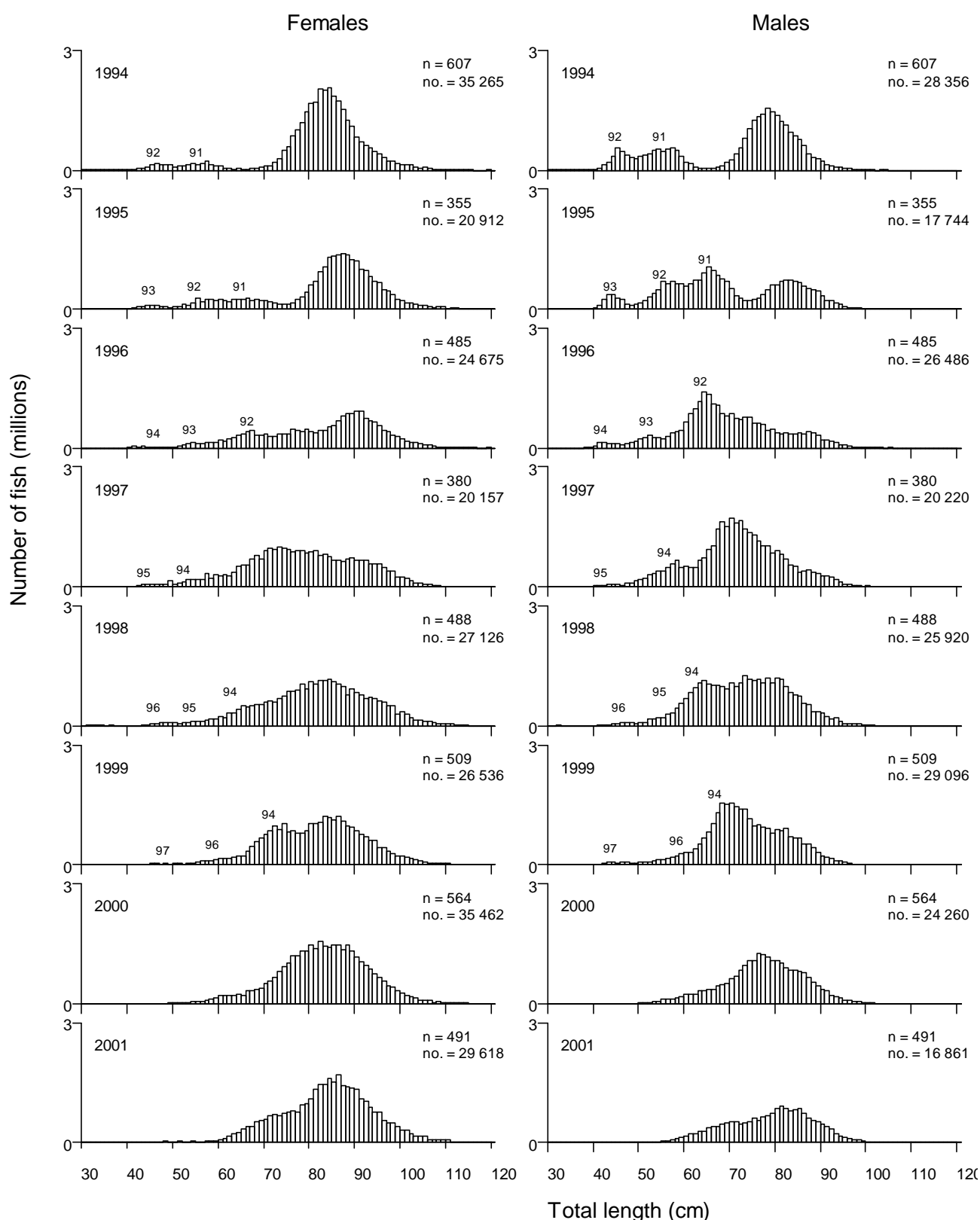


Figure 8a continued: Length frequency of hoki in commercial catches from the west coast South Island spawning fishery from 1996 to 2001 sampled at sea by the Observer Programme. n, number of tows sampled; no., number of fish sampled; N, number of landings sampled. Numbers above the histograms mark estimated year-class modes, e.g., 91 = 1991 year-class.

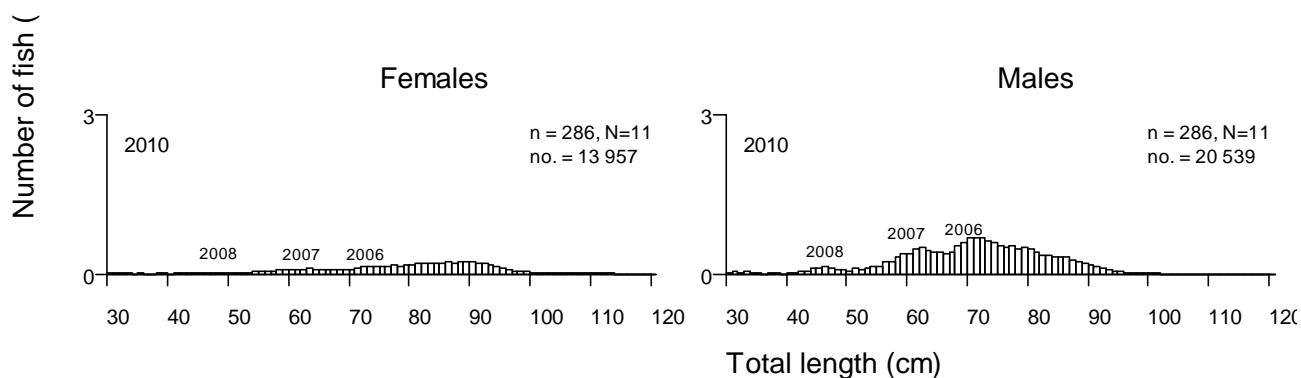


Figure 8a continued: Length frequency of hoki in commercial catches from the west coast South Island spawning fishery for 2010. In 2010, Observer Programme data are combined with samples of landings from inside the 25 n. mile line sampled by NIWA. n, number of tows sampled; no., number of fish sampled; N, number of landings sampled. Numbers above the histograms mark estimated year-class modes, e.g., 2007 = 2007 year-class.

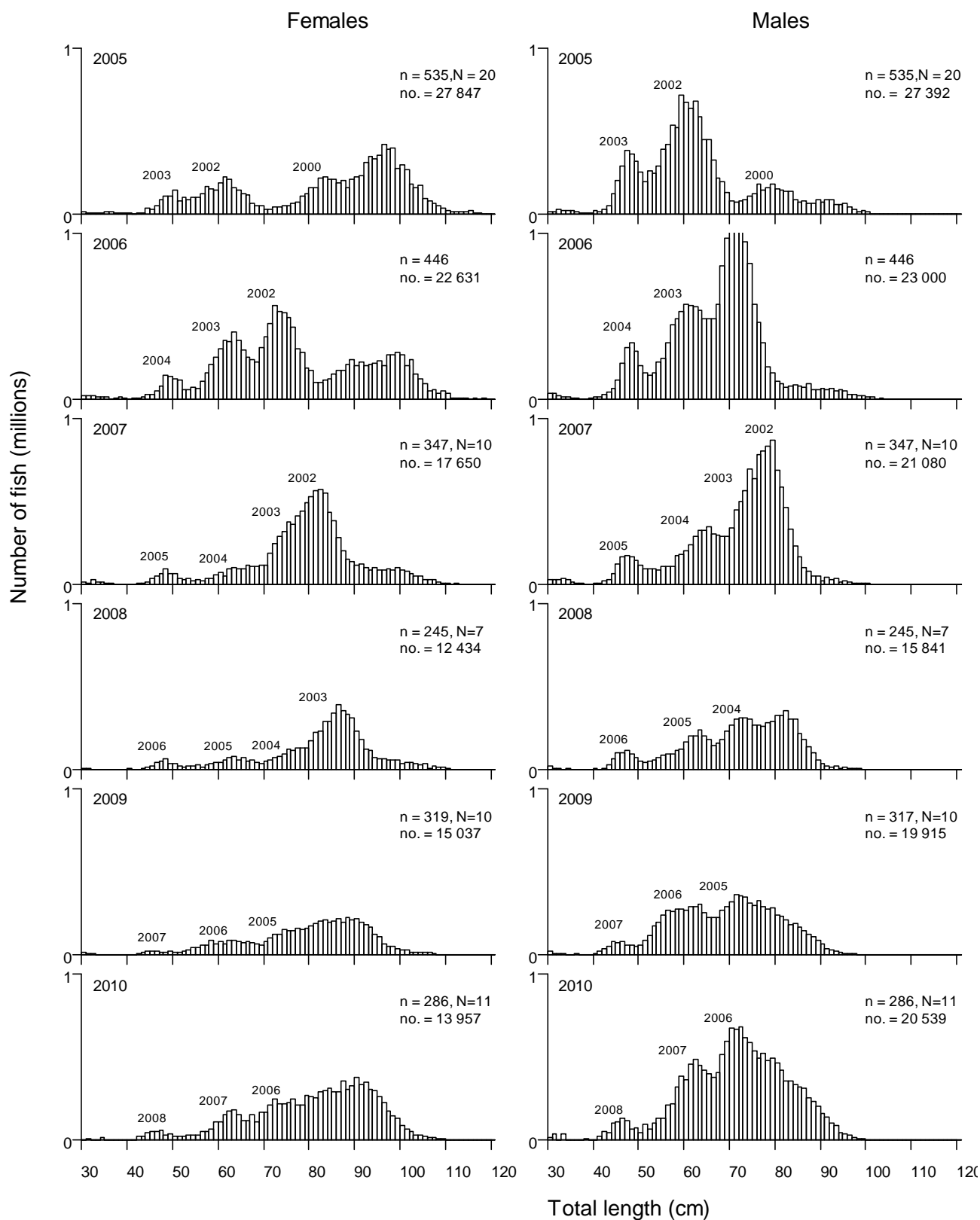


Figure 8b: Length frequency of hoki in commercial catches from the west coast South Island spawning fishery from 2005 to 2010 in different scale for detail.

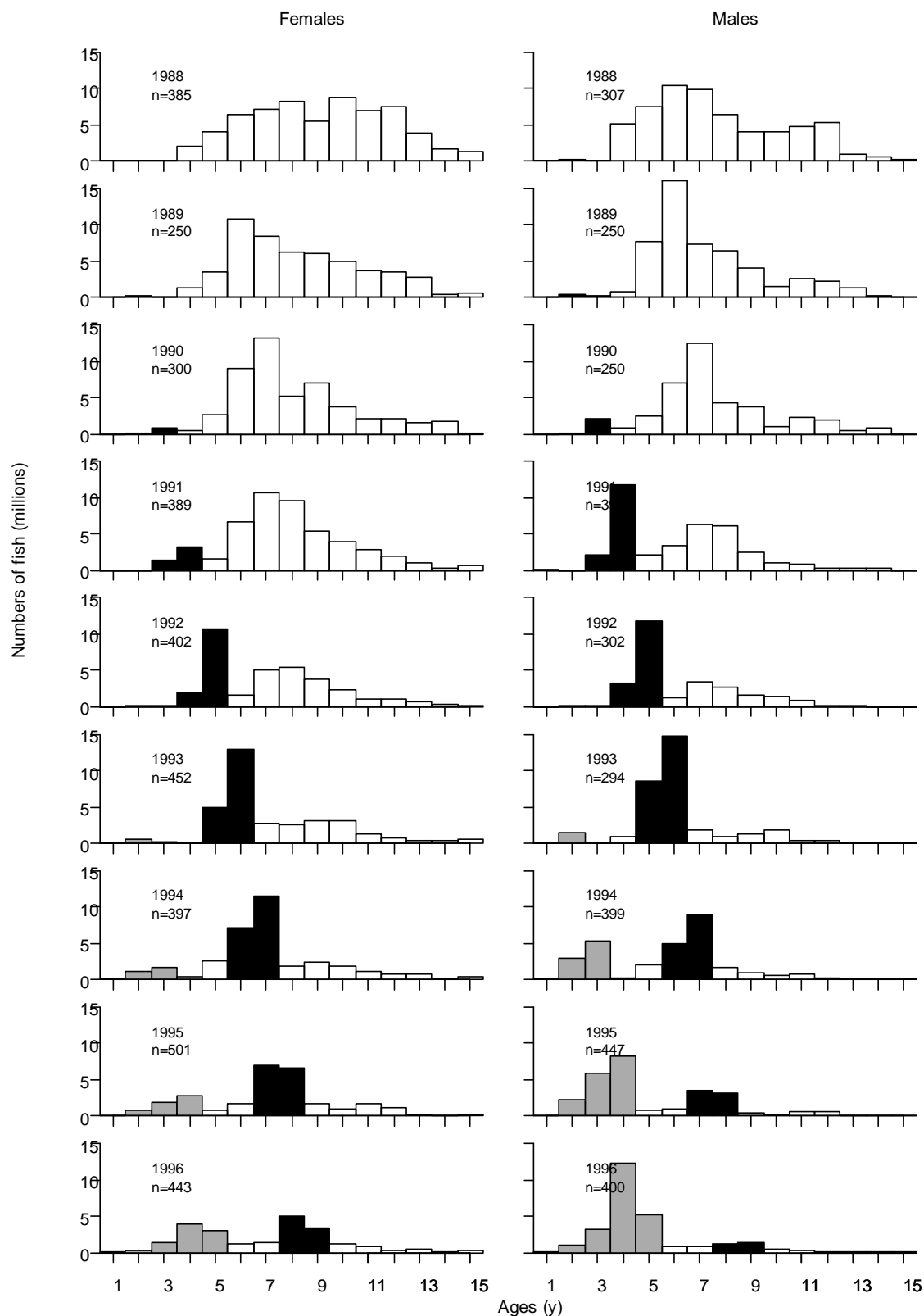


Figure 9a: Catch at age of hoki in commercial catches from the west coast South Island spawning fishery from 1988 to 2010. n, number of fish aged. Black bars for the years 1990 to 2000 show 1987 and 1988 year-classes, grey bars show 1991–94 year-classes, and light grey bars in the 2004–2010 seasons represent the 2002 and 2003 year classes.

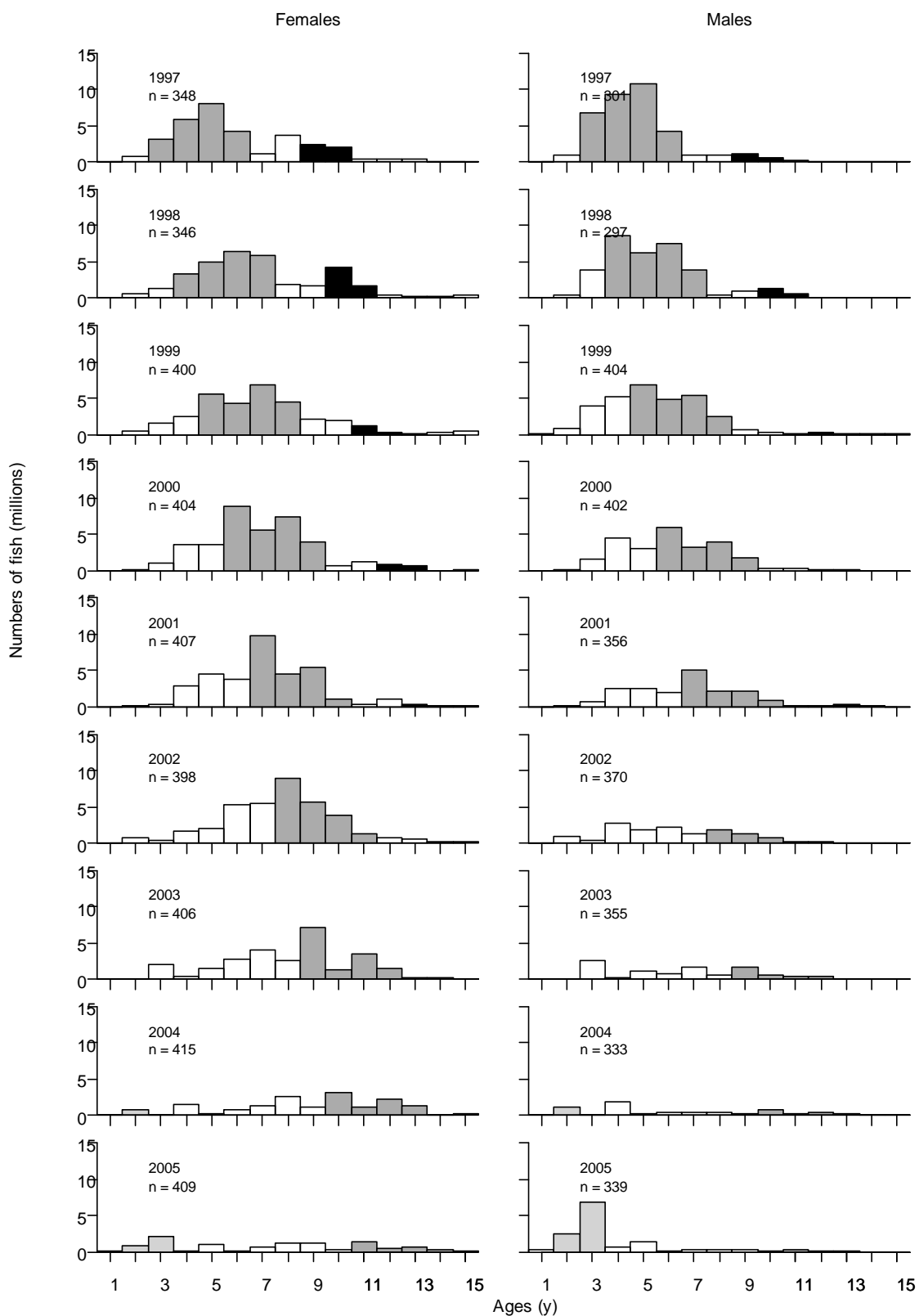


Figure 9a: continued.

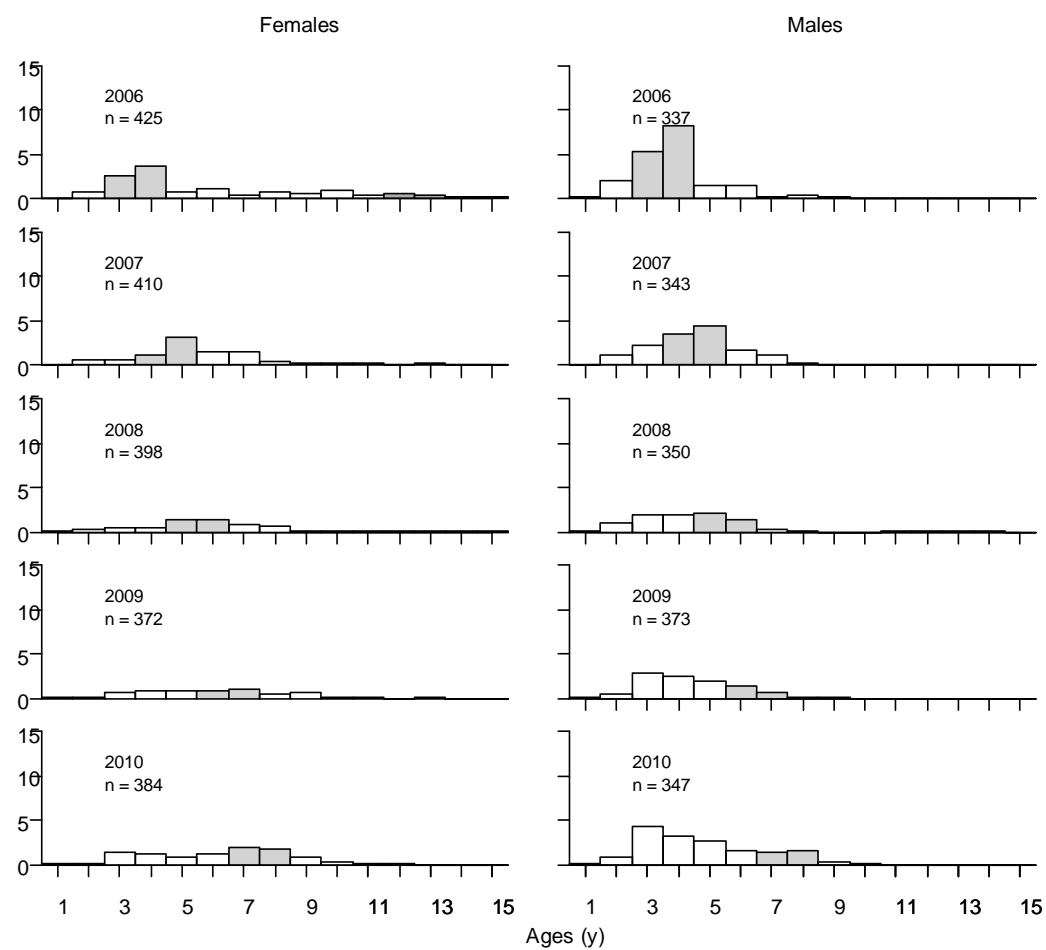


Figure 9a: continued.

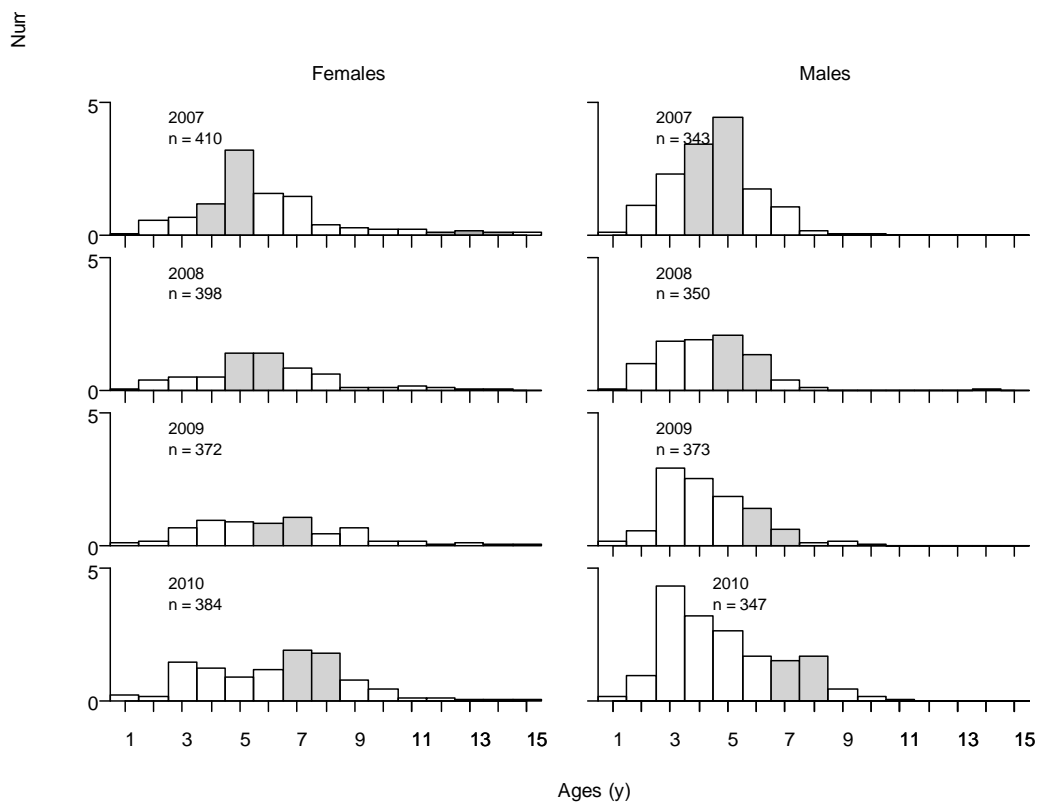


Figure 9b: Catch at age of hoki in commercial catches from the west coast South Island spawning fishery from 2006 to 2010 at a larger scale to show more detail.

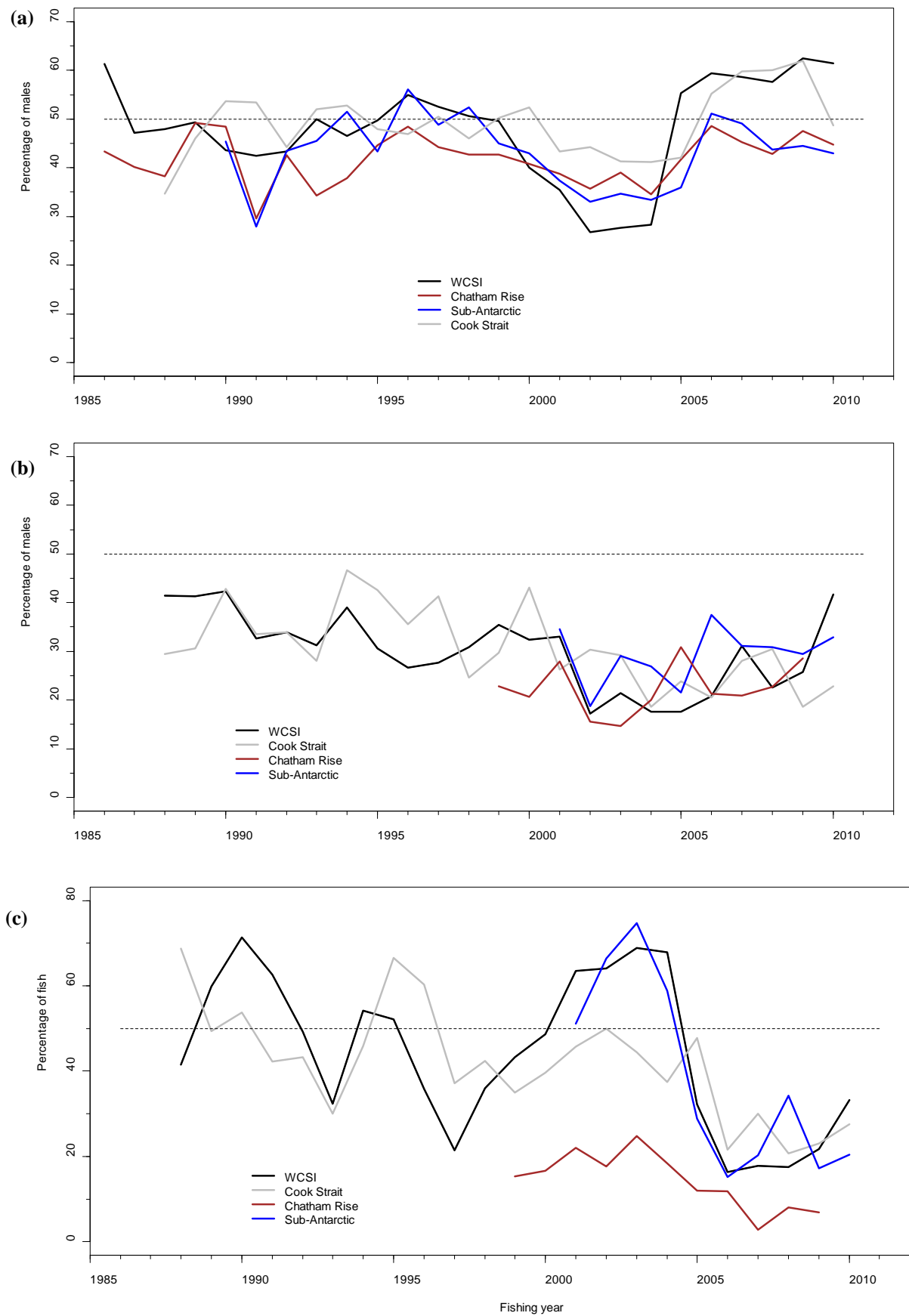


Figure 10: (a) Percentage of males in the catch, (b) percentage of male fish aged 7 and older in the catch, and (c) percentage of male and female fish aged 7 and older in the catch by area and fishing year. No age data for Chatham Rise 2009–10.

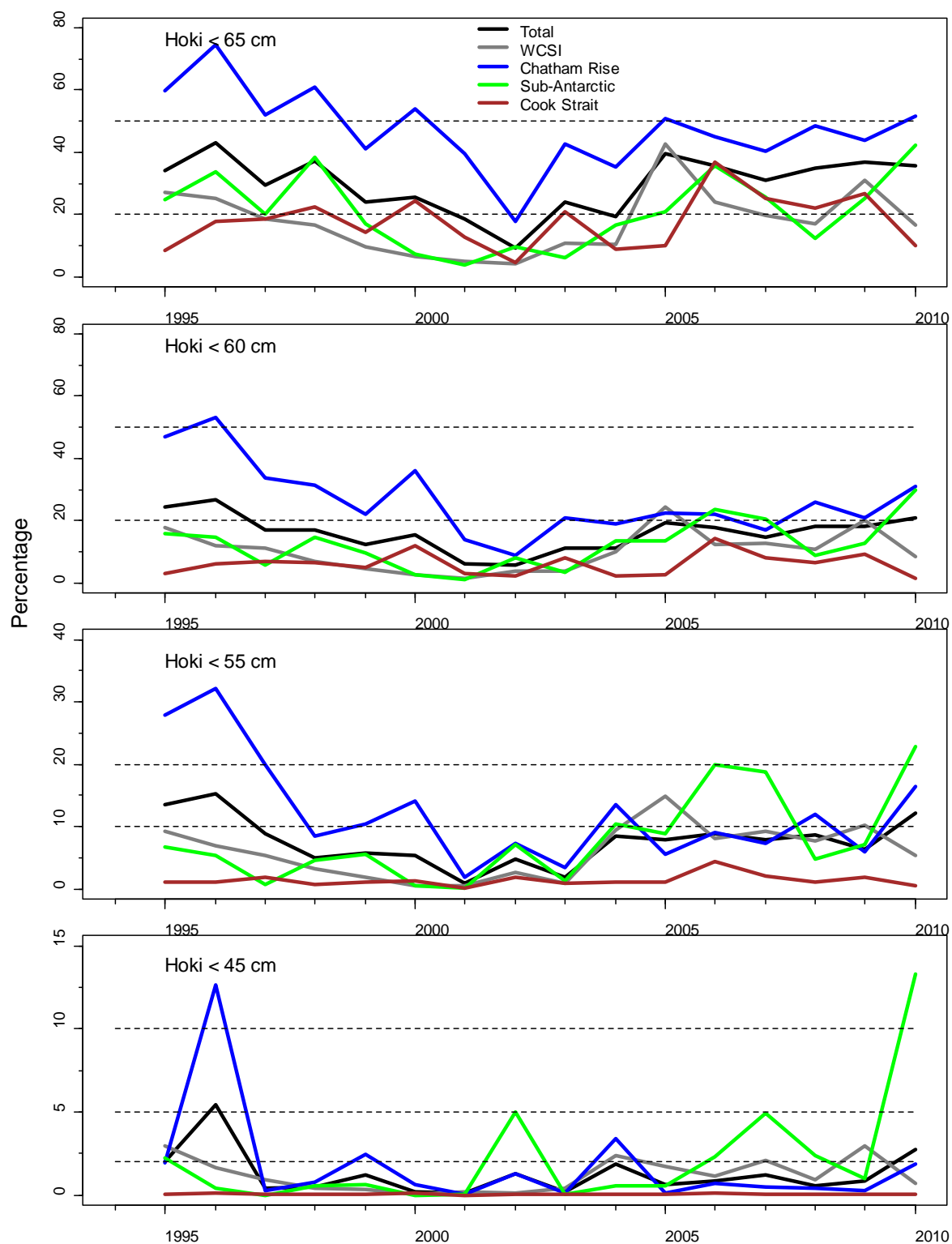


Figure 10d: Percentage of small fish in the catch by area and fishing year.

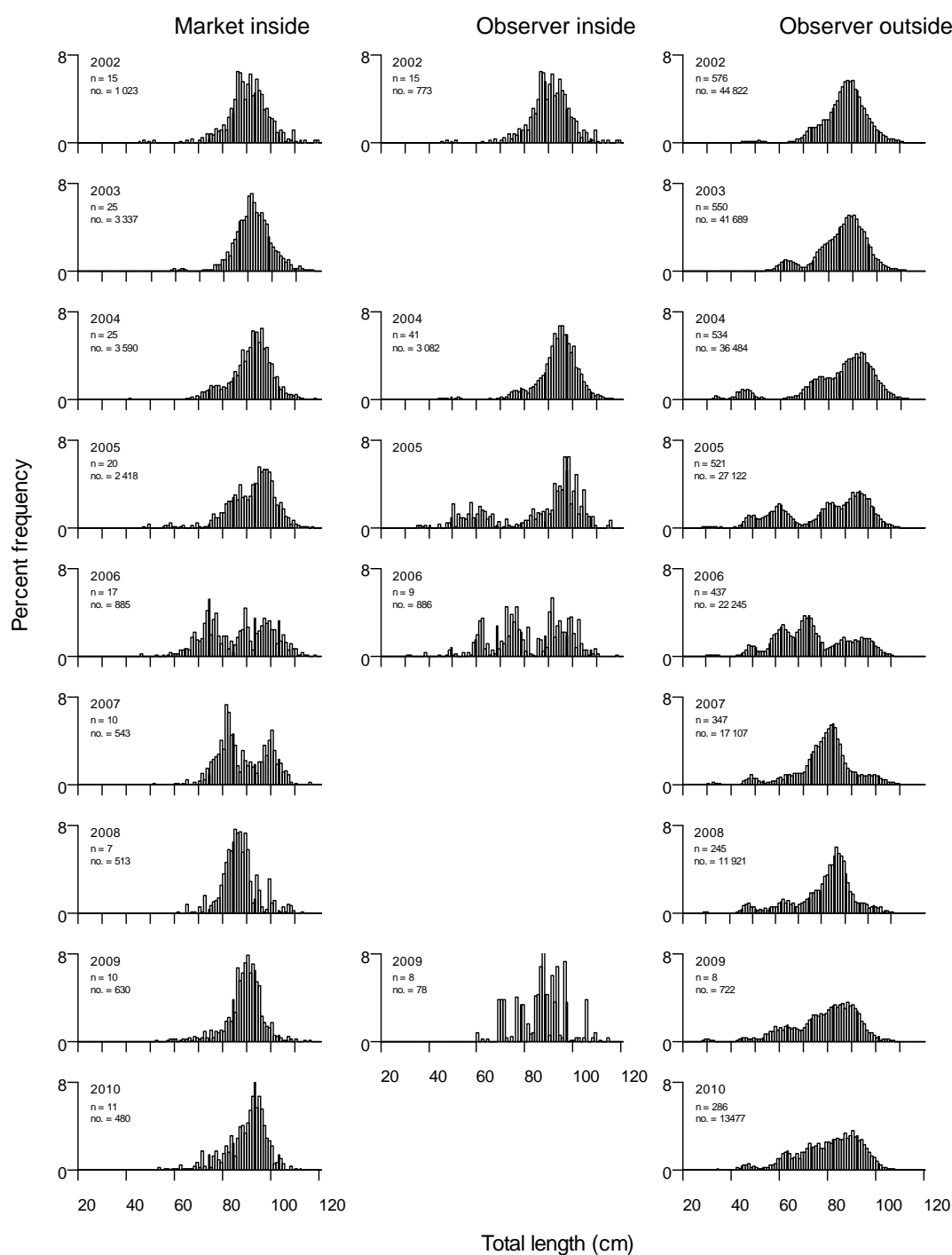


Figure 11a: Female length frequencies from inside the 25 n. mile line sampled by NIWA (market) and OP, and outside the 25 n. mile line sampled at sea by the Observer Programme (OP) in 2002–10. n, number of landings or tows sampled; no., number of fish sampled.

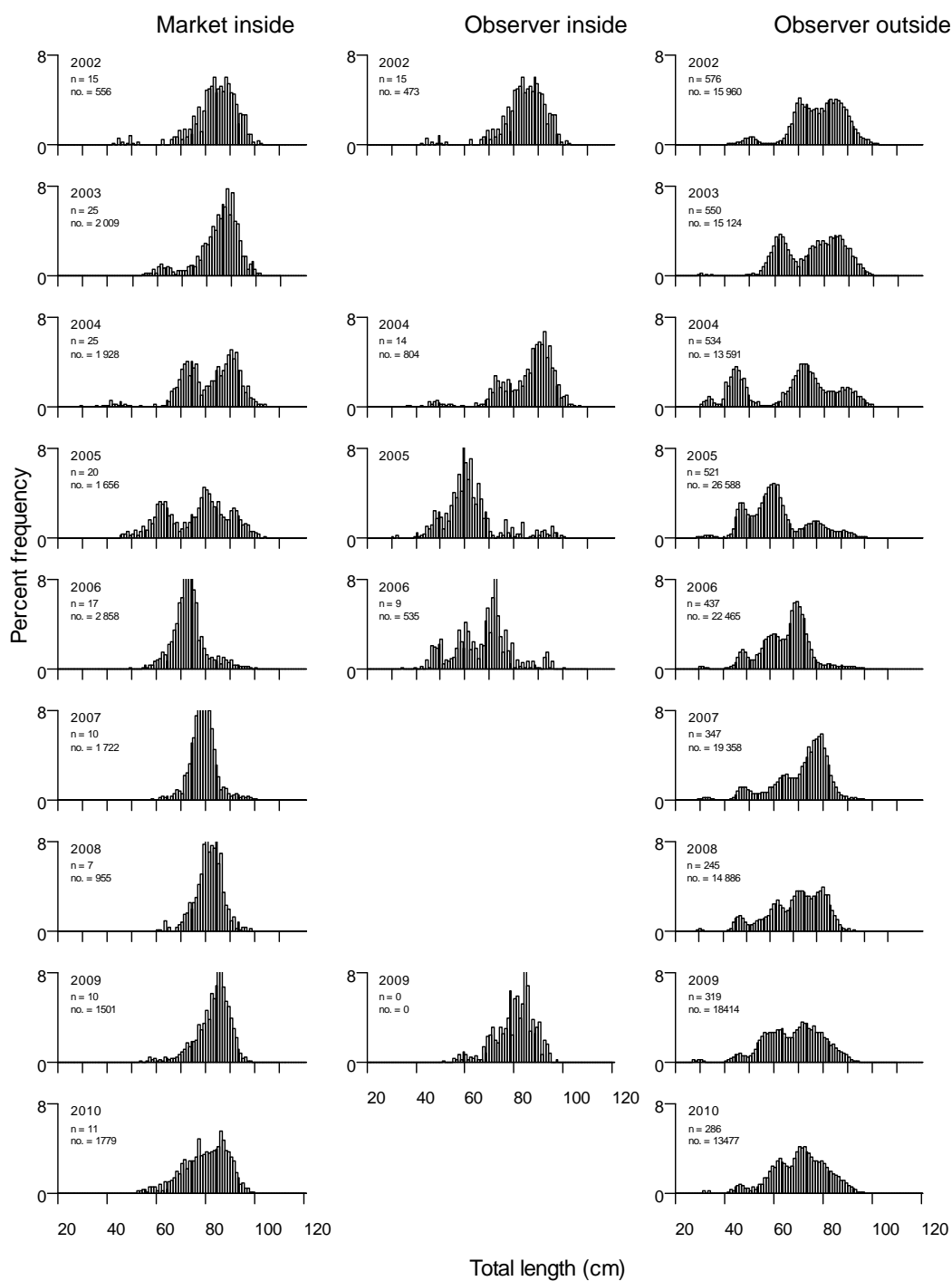


Figure 11b: Male length frequencies from inside the 25 n. mile line sampled by NIWA (market) and OP, and outside the 25 n. mile line sampled at sea by the Observer Programme (OP) in 2002–10. n, number of landings or tows sampled; no., number of fish sampled.

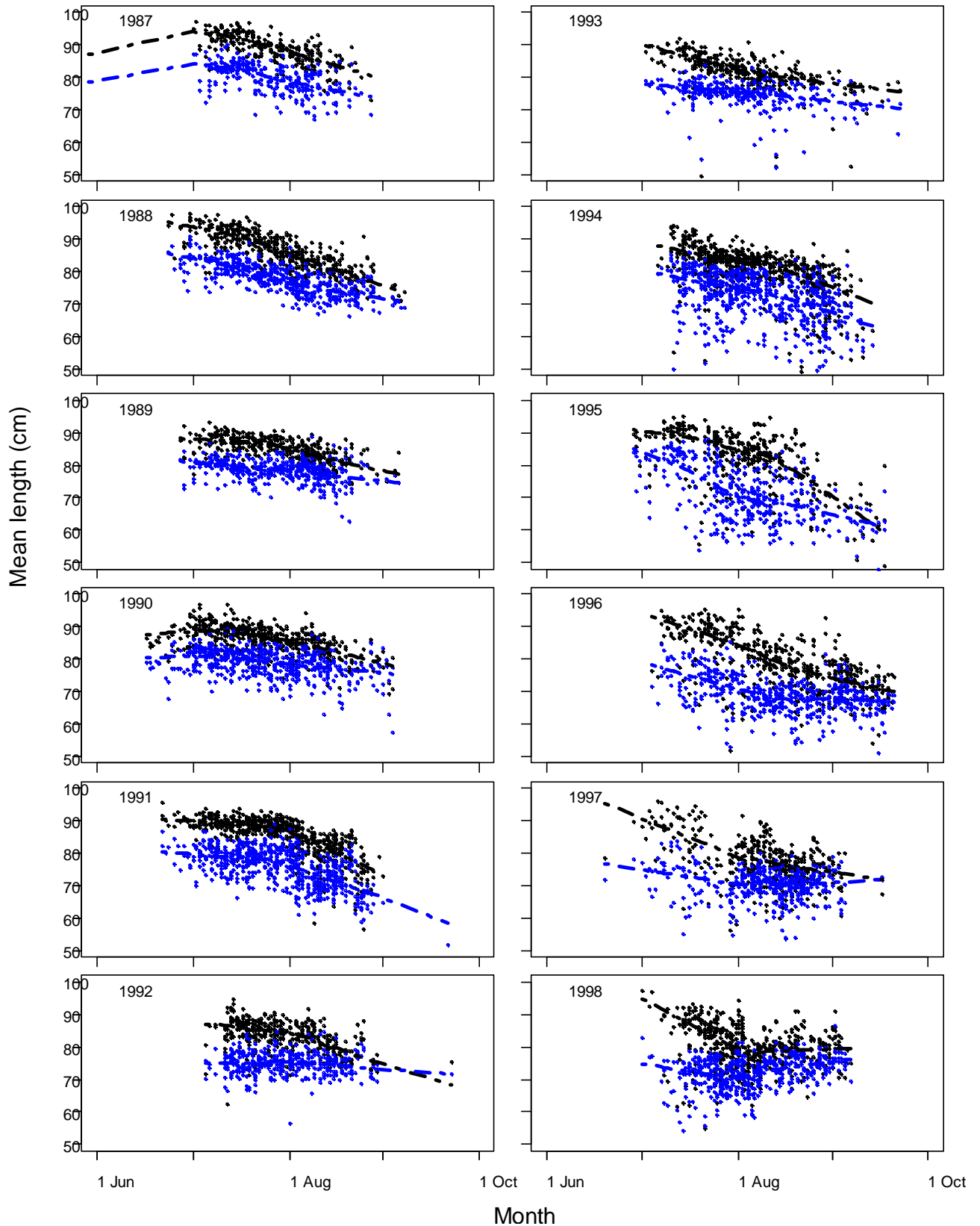


Figure 12: Mean length of female (black) and male (blue) hoki taken in commercial catches from the west coast South Island spawning fishery 1987–99 sampled at sea by the Observer Programme. Lines are a loess fit.

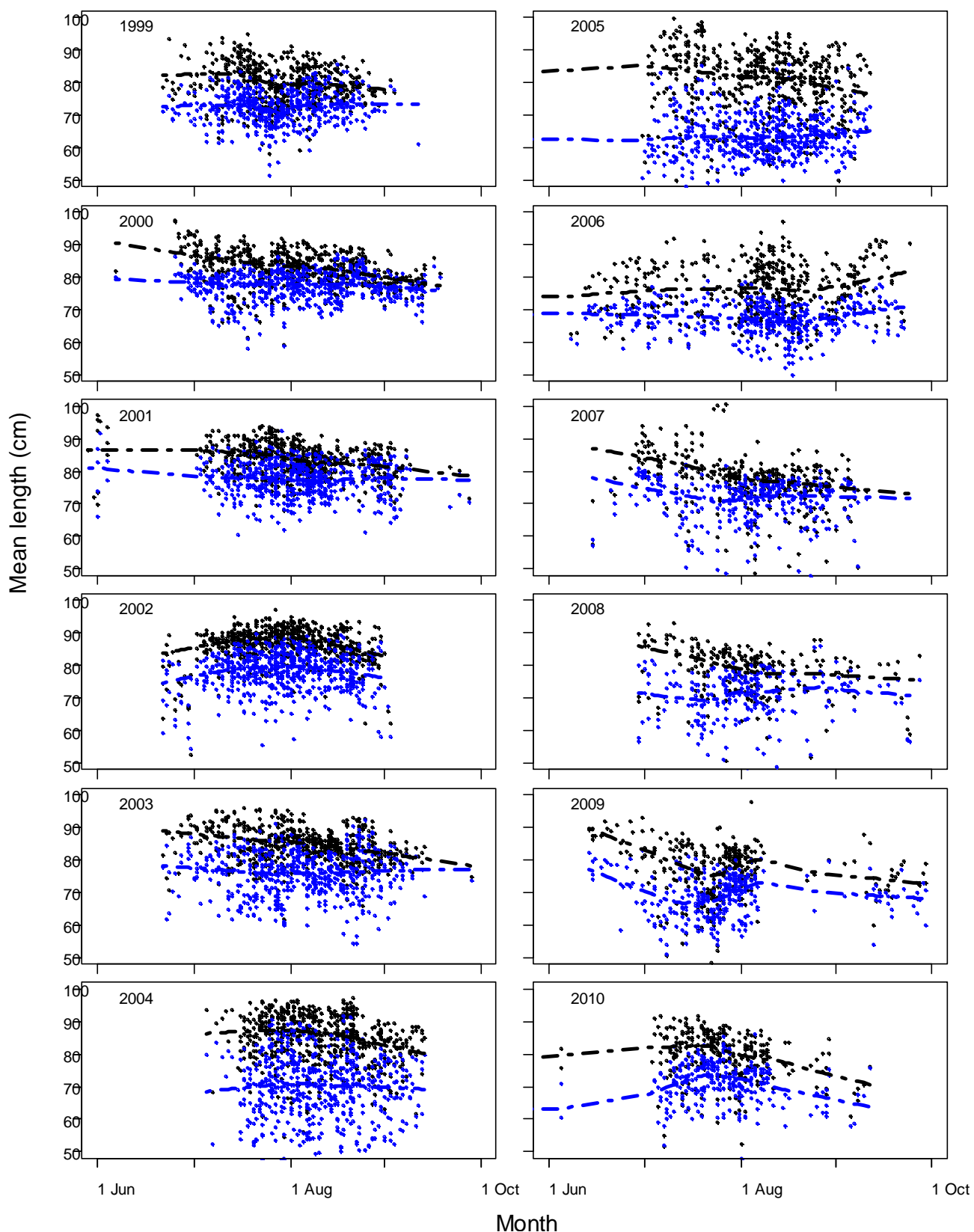


Figure 12 continued: Mean length of female (black) and male (blue) hoki taken in commercial catches from the west coast South Island spawning fishery 1999–2010 sampled at sea by the Observer Programme. Lines are a loess fit.

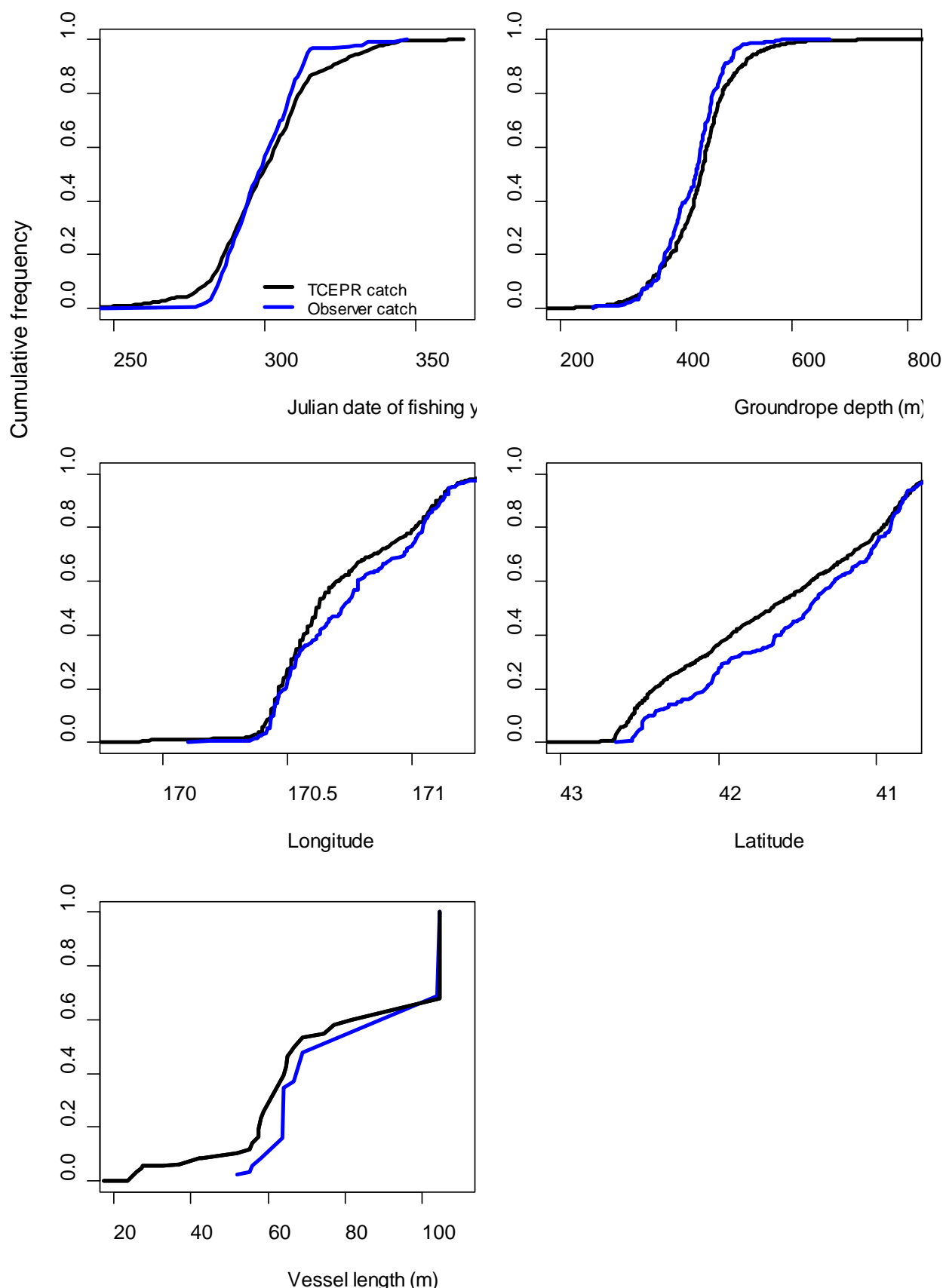


Figure 13: Comparison of WCSI 2009–10 Observer Programme (OP) observer catch coverage with TCEPR catches by day of year, depth, latitude, longitude, and vessel length. If sampling is representative of the fishery, then blue lines (observed catches) should overlay the black line (TCEPR catch).

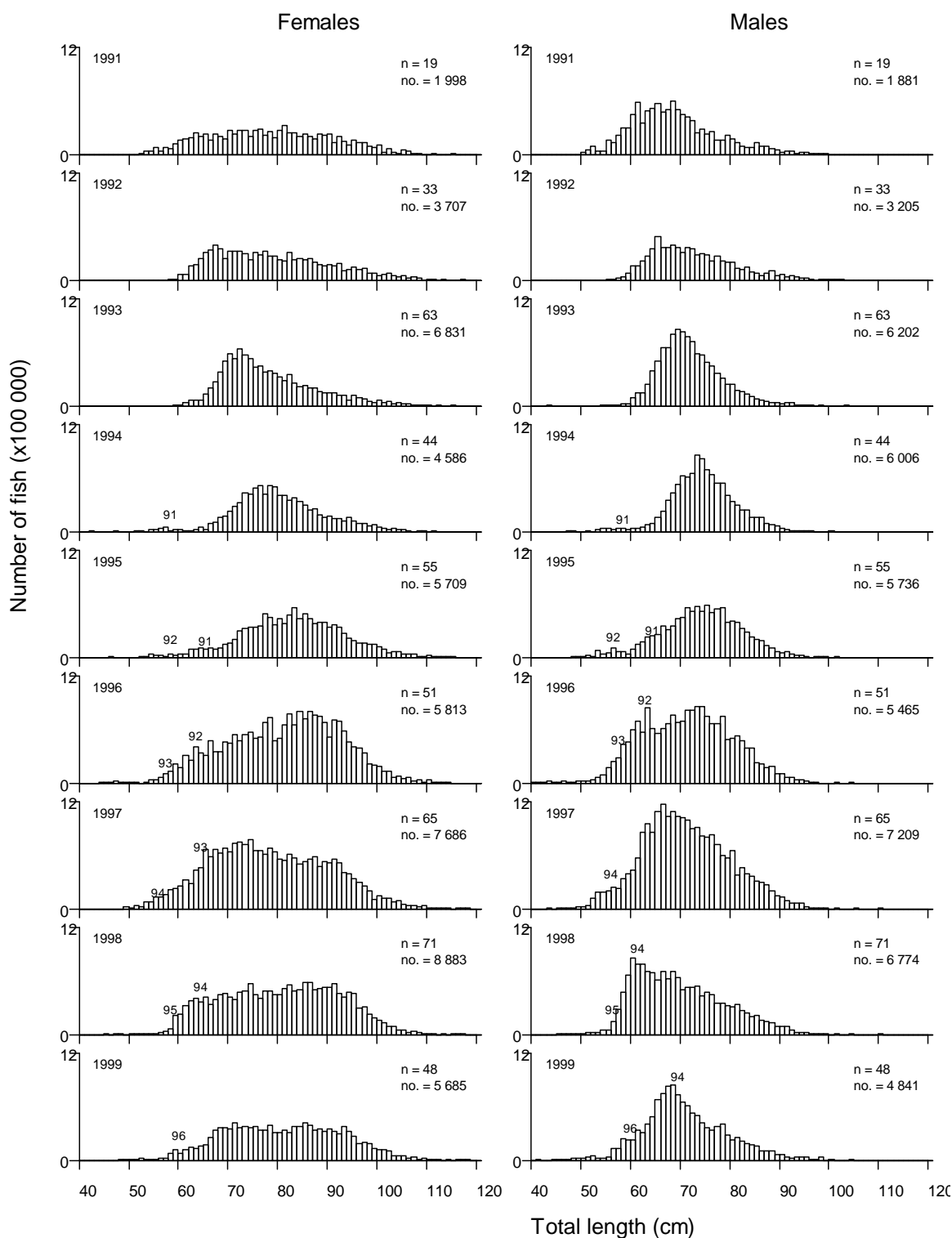


Figure 14: Length frequency of hoki in commercial catches from the Cook Strait spawning fishery from 1991 to 2010 sampled in sheds by the Stock Monitoring Programme and NIWA. n, number of landings sampled; no., number of fish sampled. Numbers above the histograms mark year-class modes, e.g., 91 = 1991 year-class.

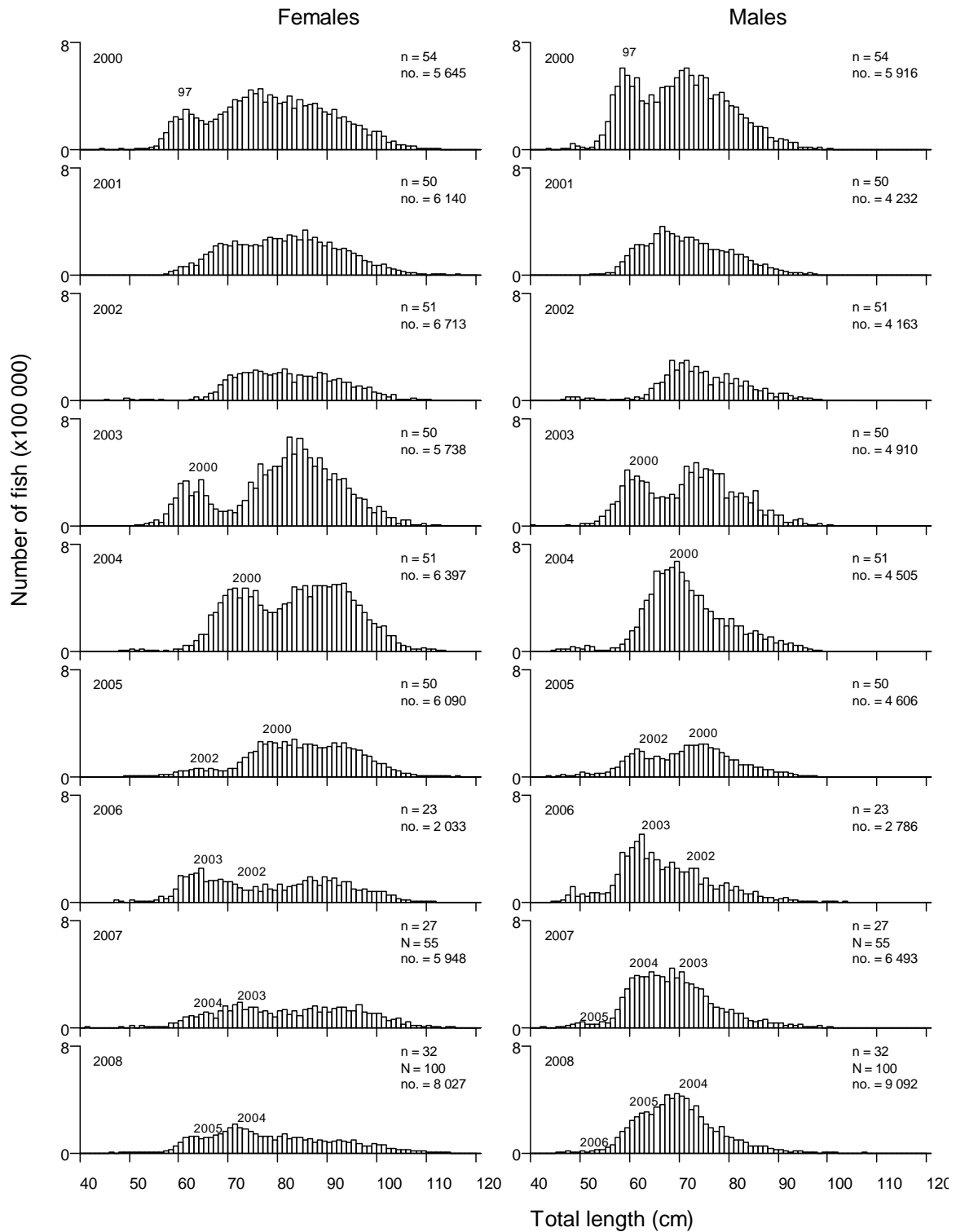


Figure 14: continued. 2006 data excludes Nelson vessels ≥ 40 m which sorted their catch at sea. 2007 and 2008 data includes shed samples (vessels < 40 m) and observer samples (vessels ≥ 40 m). n, number of landings sampled; N, number of observed tows; no., number of fish sampled. Numbers above the histograms mark year-class modes, e.g., 97 = 1997 year-class and 2000 = 2000 year-class.

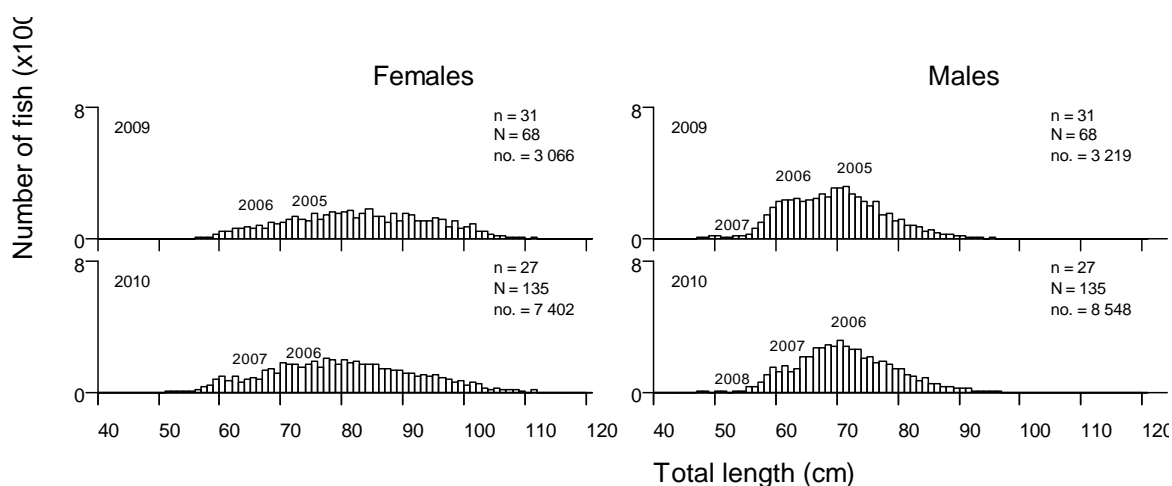


Figure 14: continued. 2009 data includes shed samples (vessels < 40 m) and observer samples vessels \geq 40 m), and 2010 data includes shed samples (vessels < 40 m) and shed and observer samples (vessels \geq 40 m) n, number of landings sampled; N, number of observed tows; no., number of fish sampled. Numbers above the histograms mark year-class modes, e.g., 2007 = 2007 year-class.

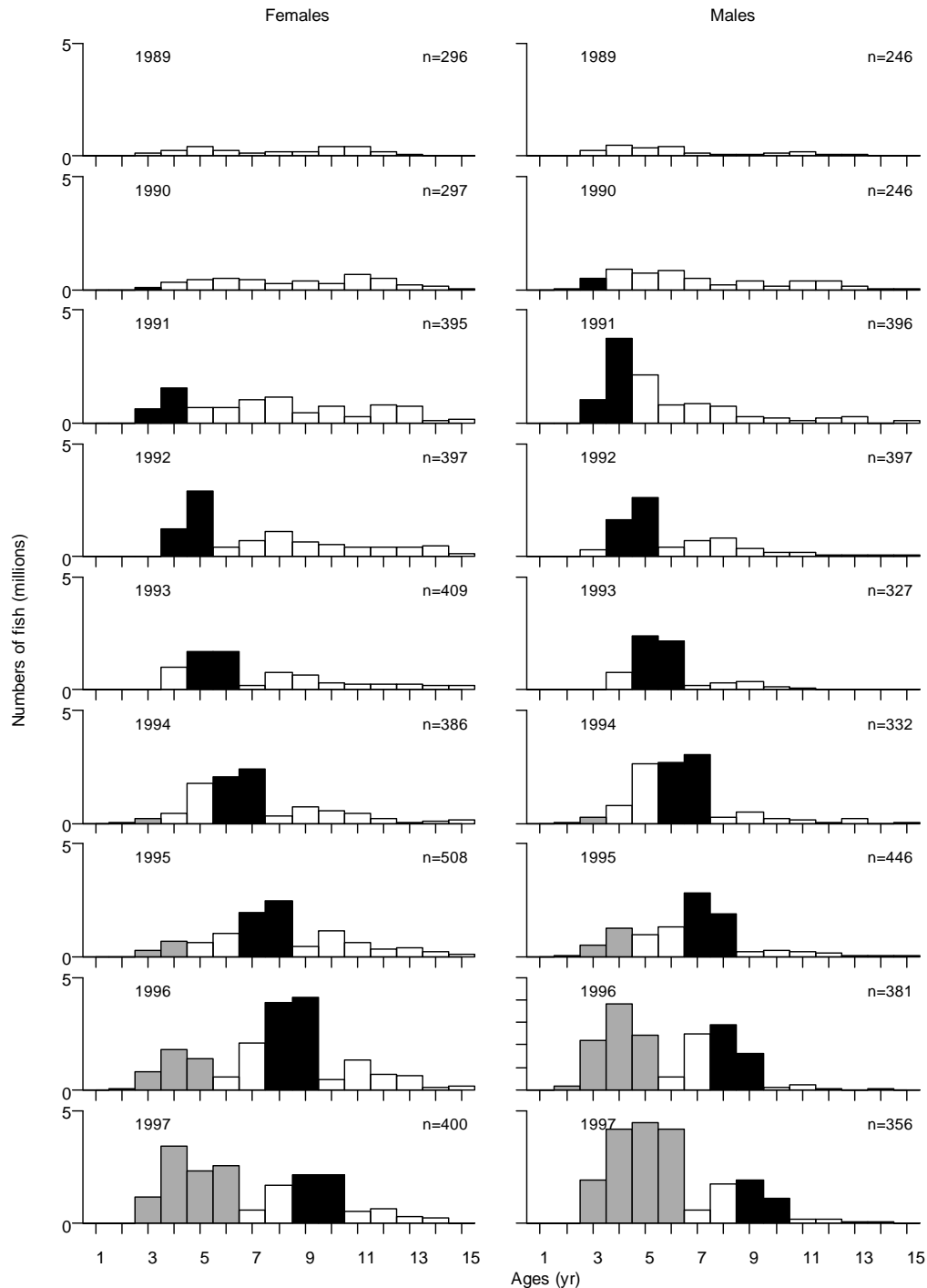


Figure 15: Catch at age of hoki in commercial catches from the Cook Strait spawning fishery from 1988 to 2010 sampled in sheds by the Stock Monitoring Programme and NIWA. 2006 data excludes Nelson shed samples from vessels ≥ 40 m that sorted their catch at sea. 2007–2009 data includes shed samples (vessels < 40 m) and tows sampled at sea by the Observer Programme (vessels ≥ 40 m), and 2010 data includes shed samples (vessels < 40 m) and shed and observer samples (vessels ≥ 40 m). n, number of fish aged.

Black bars show 1987 and 1988 year-classes in the 1990–2003 seasons; dark grey bars show 1991–94 year-classes, light grey bars show the 2000 year-class, and black bars show the 2002–2003 year classes from the 2005 season .

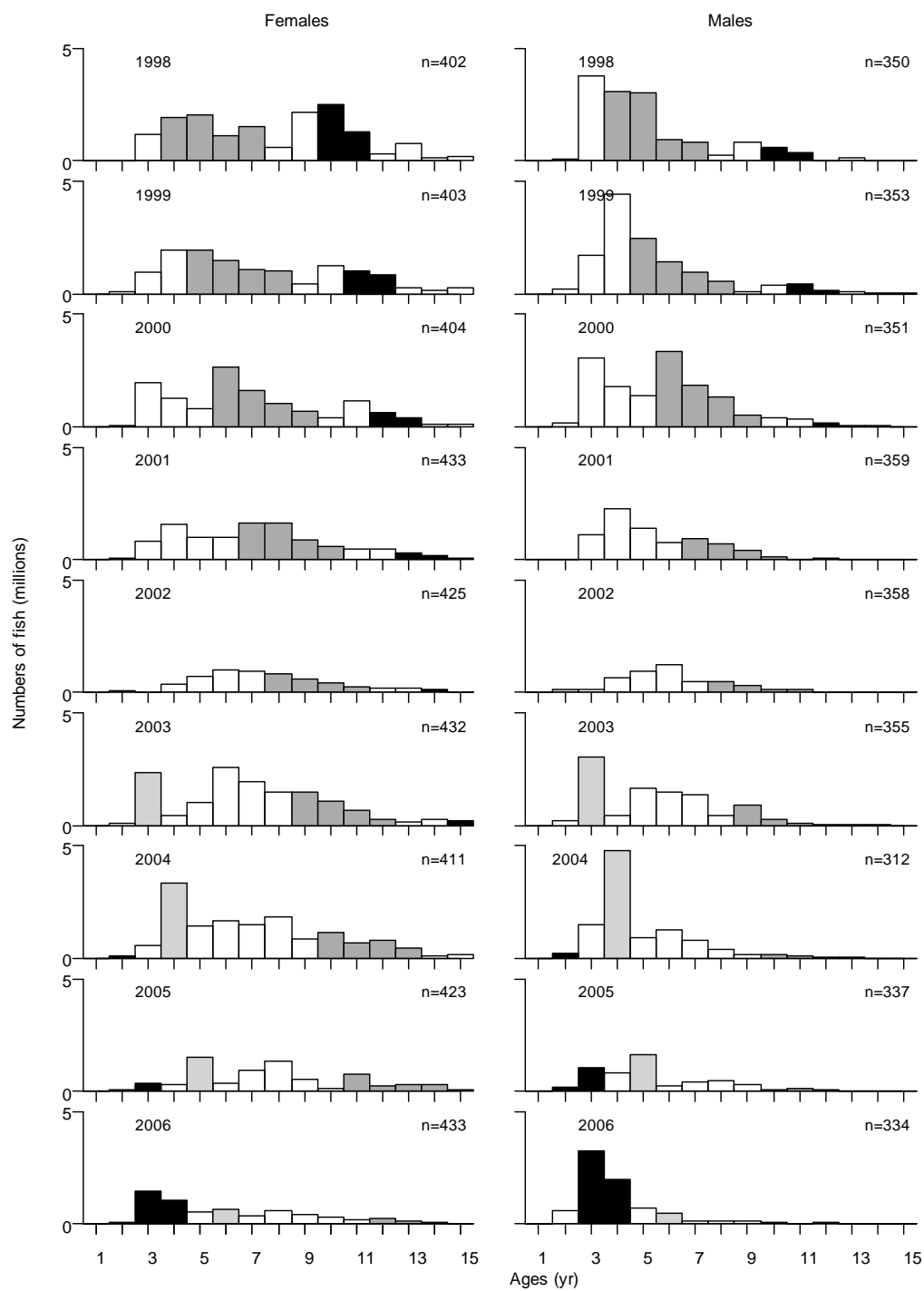


Figure 15: Continued.

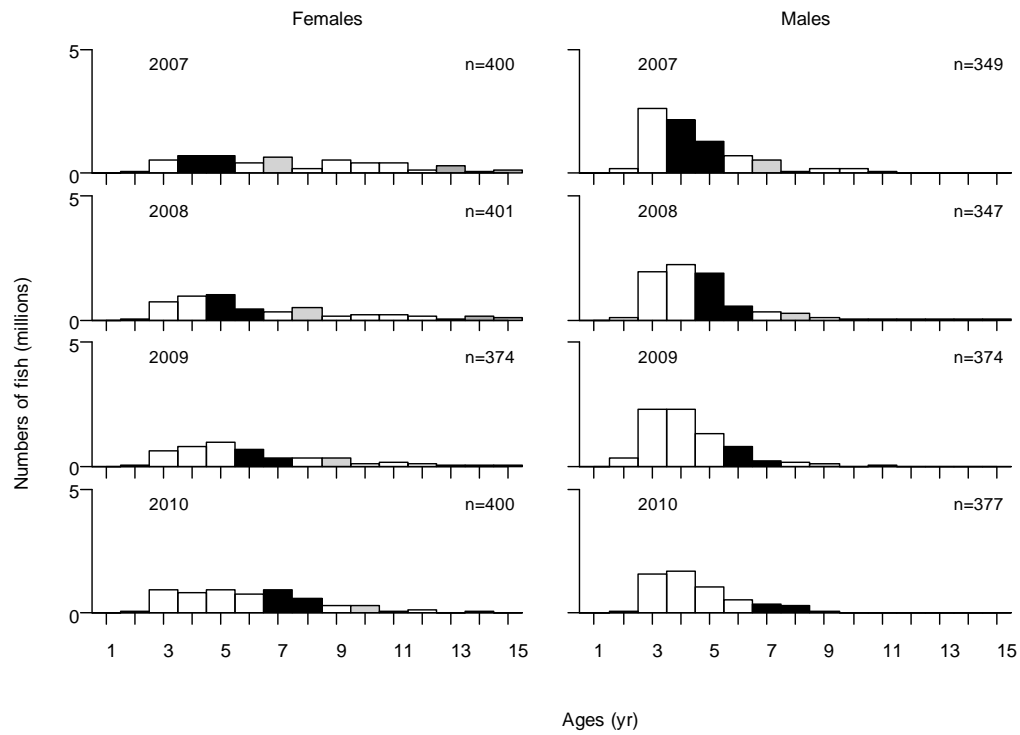
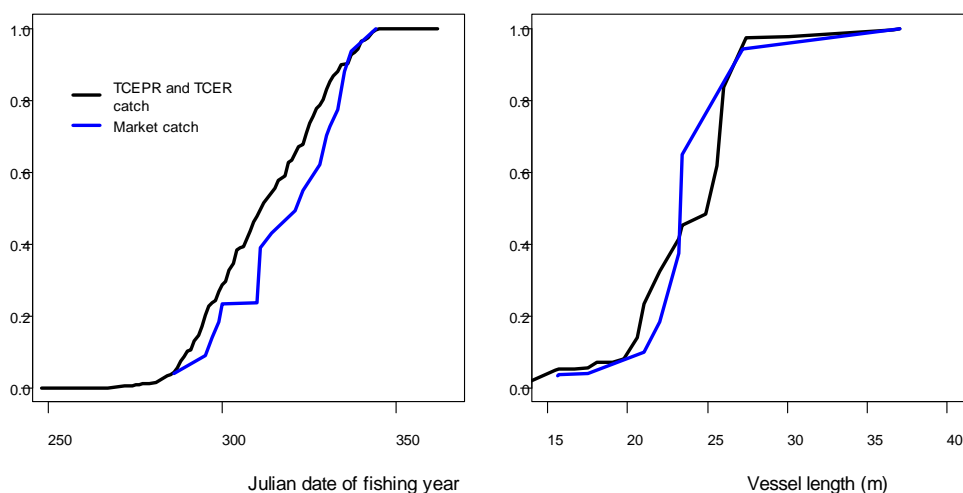


Figure 15: Continued.

(a) Market data, vessels < 40 m



(b) Observer data, vessels ≥ 40 m

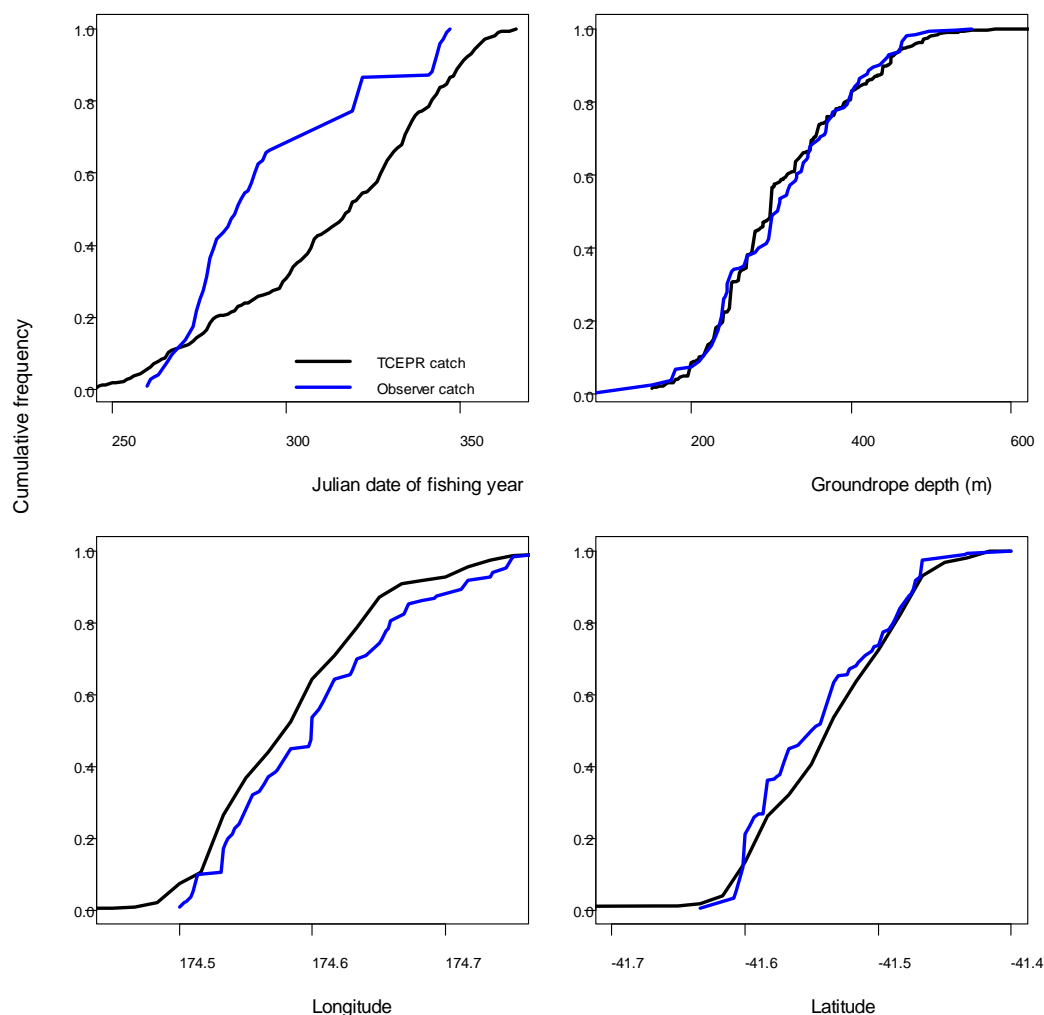


Figure 16: (a) Comparison of Cook Strait 2009–10 market catch coverage for vessels <40 m with TCEPR and TCER <40 m vessel catches by day of year and vessel length, and (b) comparison of Cook Strait 2009–10 Observer Programme (OP) observer catch coverage for ≥ 40 m vessel TCEPR catches from vessels ≥ 40 m by day of year, depth, latitude, and longitude. If sampling is representative of the fishery, then blue lines (sampled catches) should overlay black lines (catches).

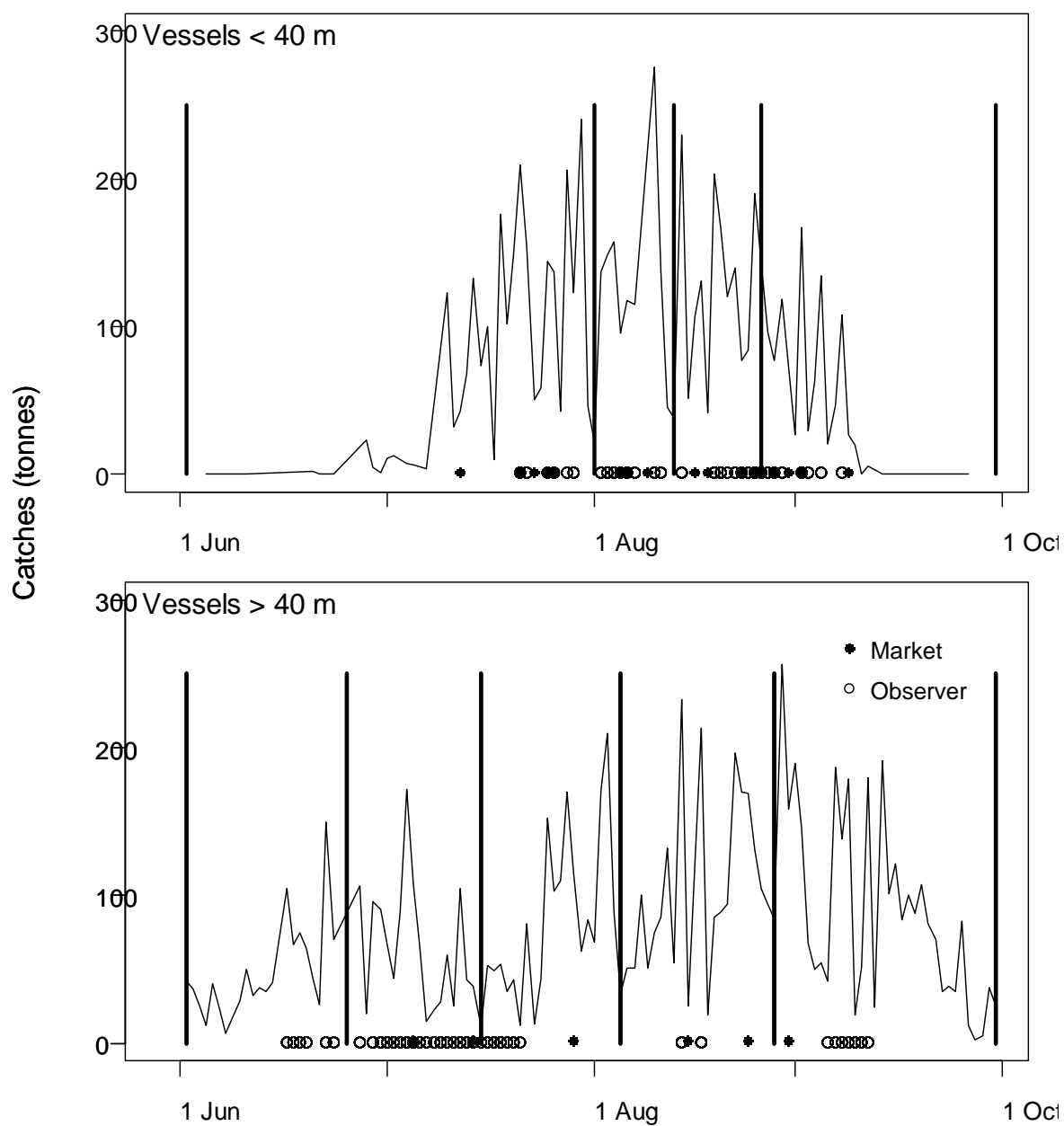


Figure 17: Cook Strait 2009–10 catch by day for vessels <40 m and ≥ 40 m during the spawning season , showing timing of Observer Programme (OP) samples (open circles) and market samples (closed circles). Bars represent stratification (see Table 10 for details).

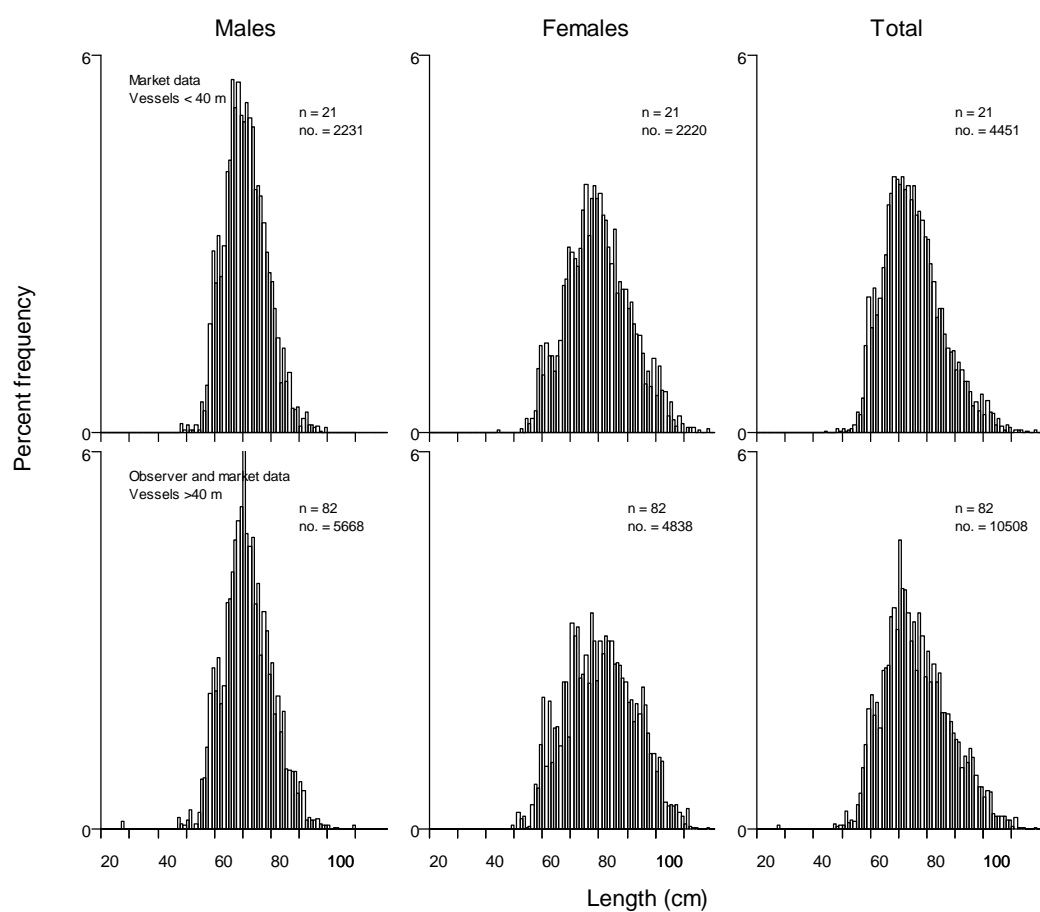


Figure 18a: Comparison of length frequency of hoki in Cook Strait commercial catches from 2009–10. Vessels < 40m are sampled by NIWA (market), and vessels ≥ 40m are sampled by the Observer Programme and NIWA (market). n, number of observed tows or landings sampled; no., number of fish sampled.

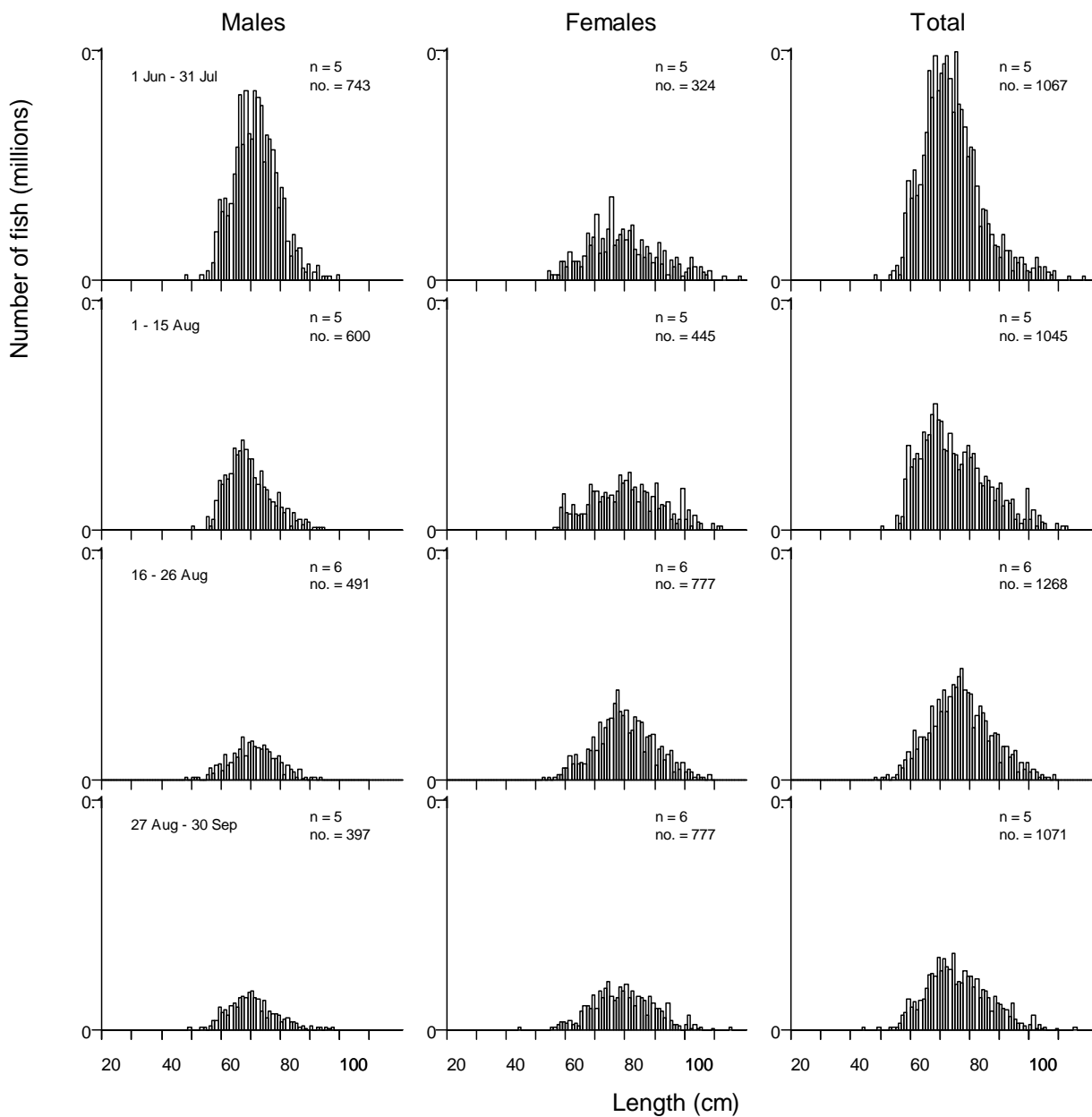


Figure 18b: Comparison of NIWA (market) length frequencies of hoki taken in commercial catches from Cook Strait during 2010 by time strata for vessels < 40m. n, number of landings sampled; no., number of fish sampled.

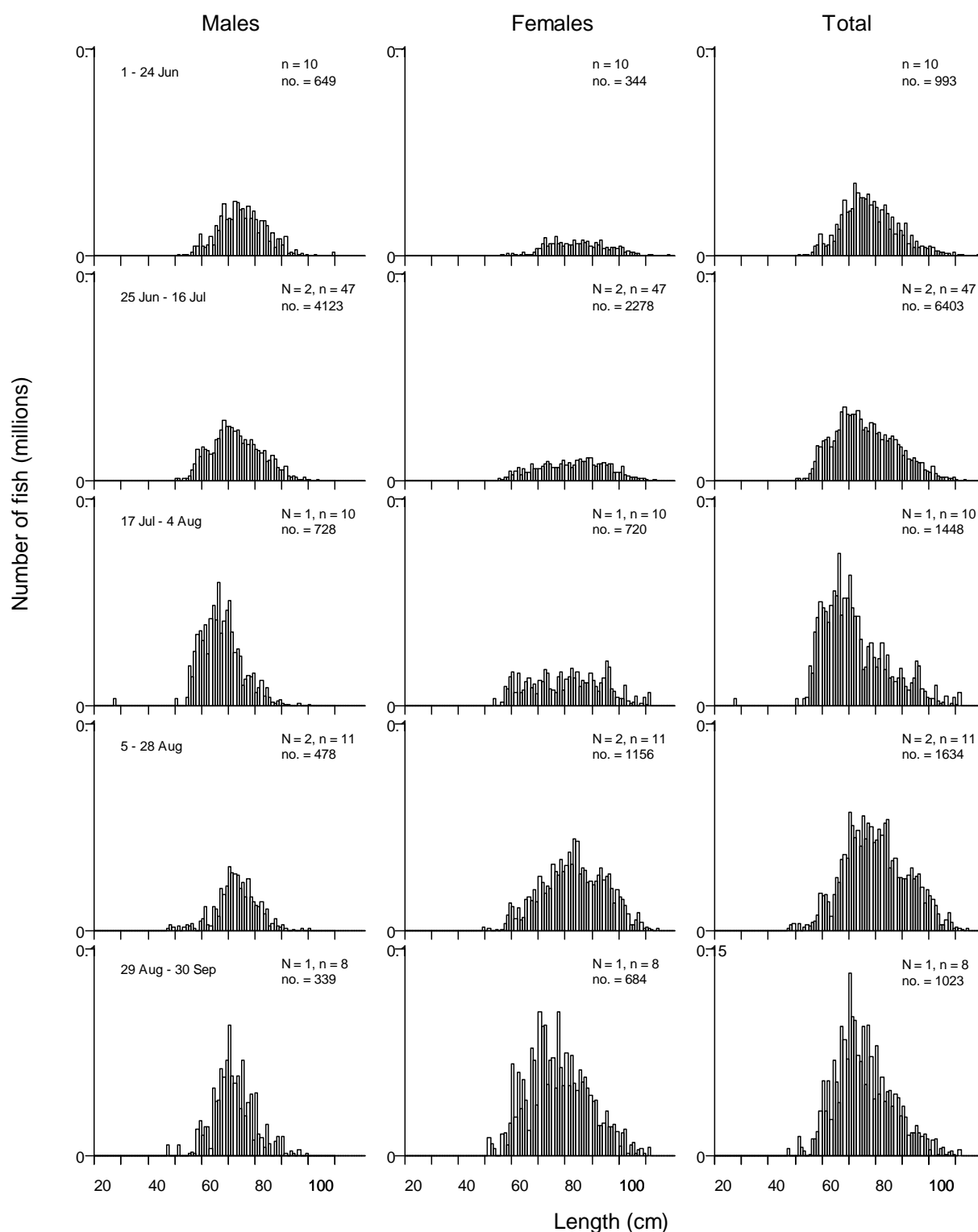


Figure 18c: Comparison of Observer and NIWA (market) length frequencies of hoki taken in commercial catches from Cook Strait during 2010 by time strata for vessels $\geq 40\text{m}$. n, number of landings sampled; N, number of observed tows; no., number of fish sampled.

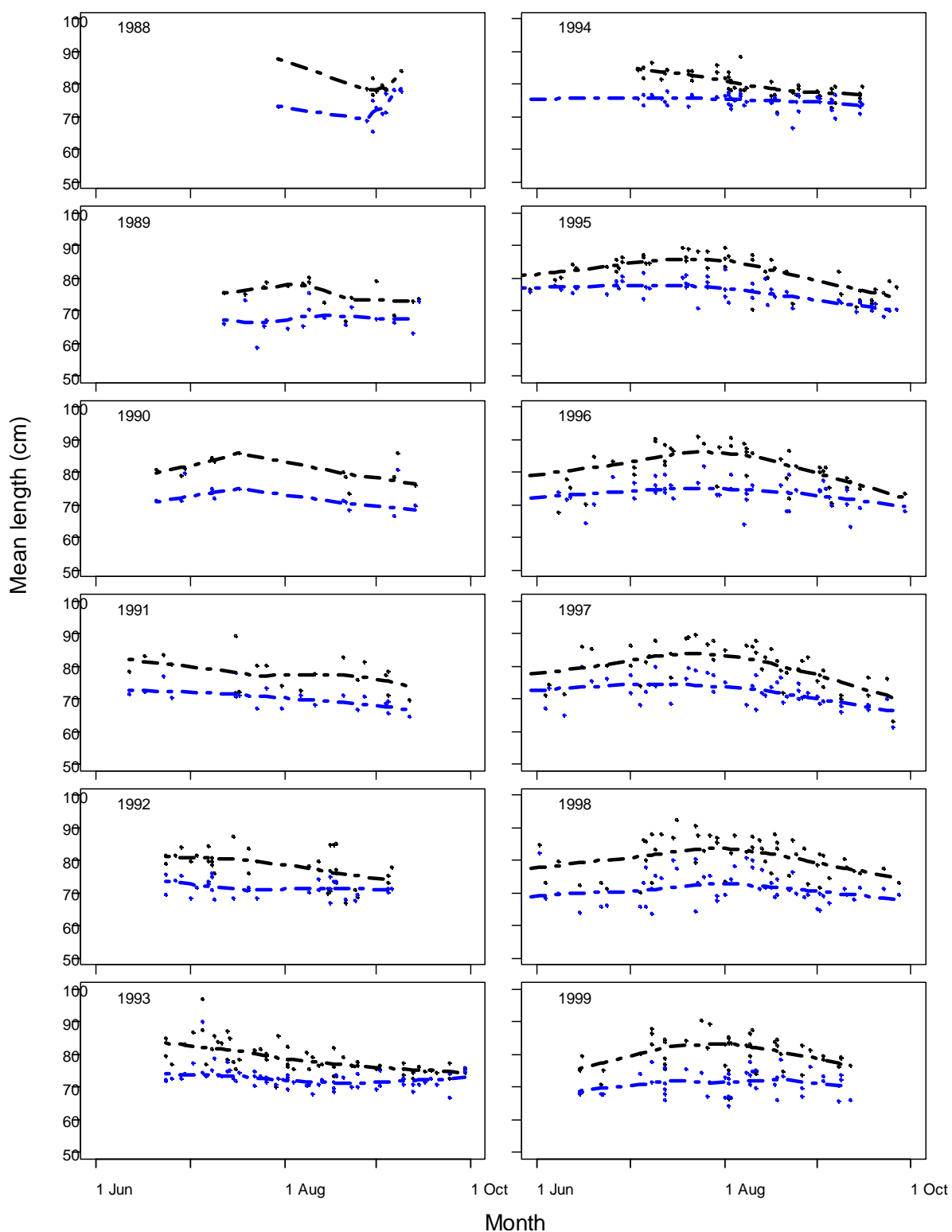


Figure 19a: Mean length of female (black) and male (blue) hoki taken in commercial catches from the Cook Strait spawning fishery 1989–2010 from landings sampled by the Stock Monitoring Programme and NIWA. Lines are a loess fit. 2006 landing data excludes vessels $\geq 40\text{m}$.

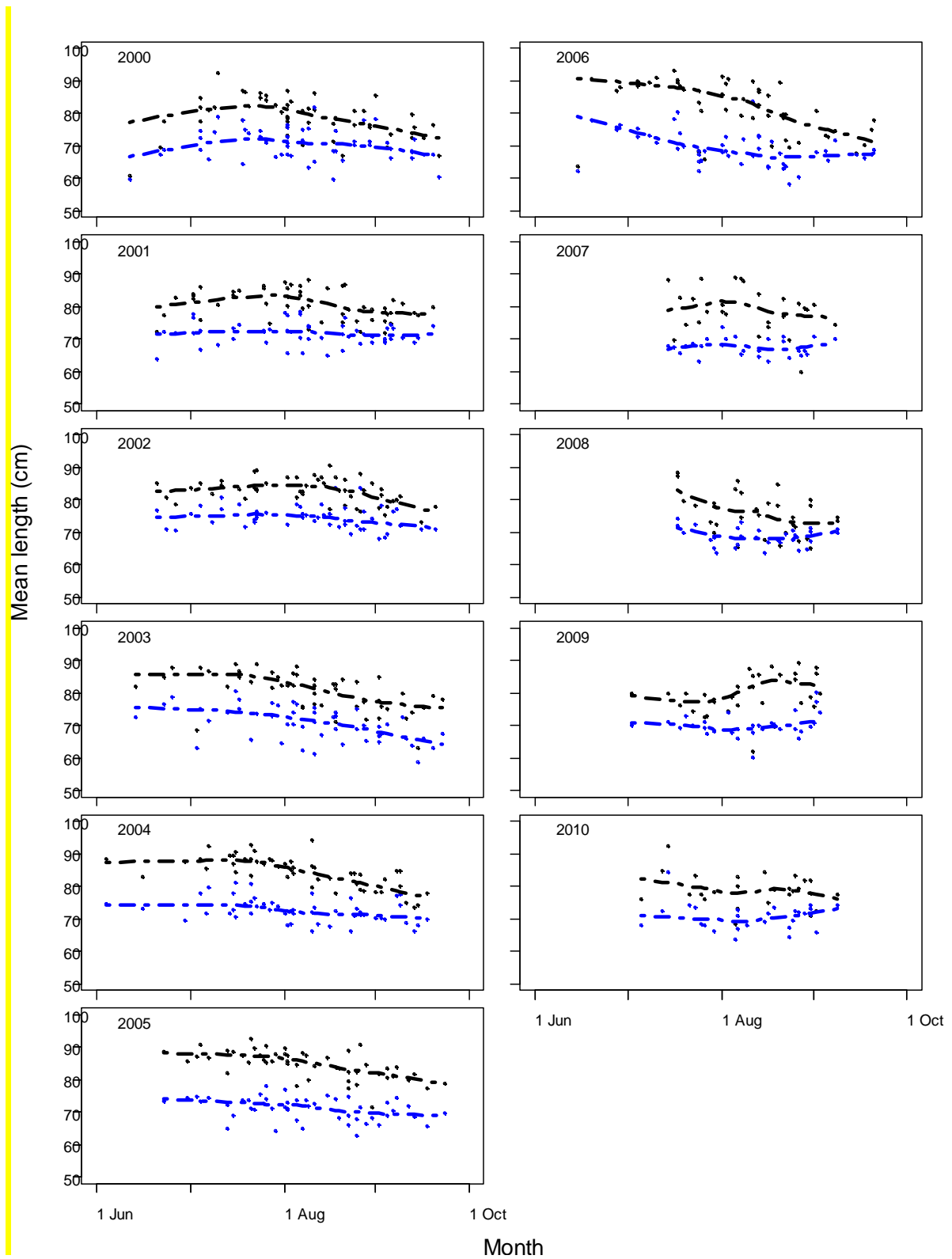


Figure 19a: continued.

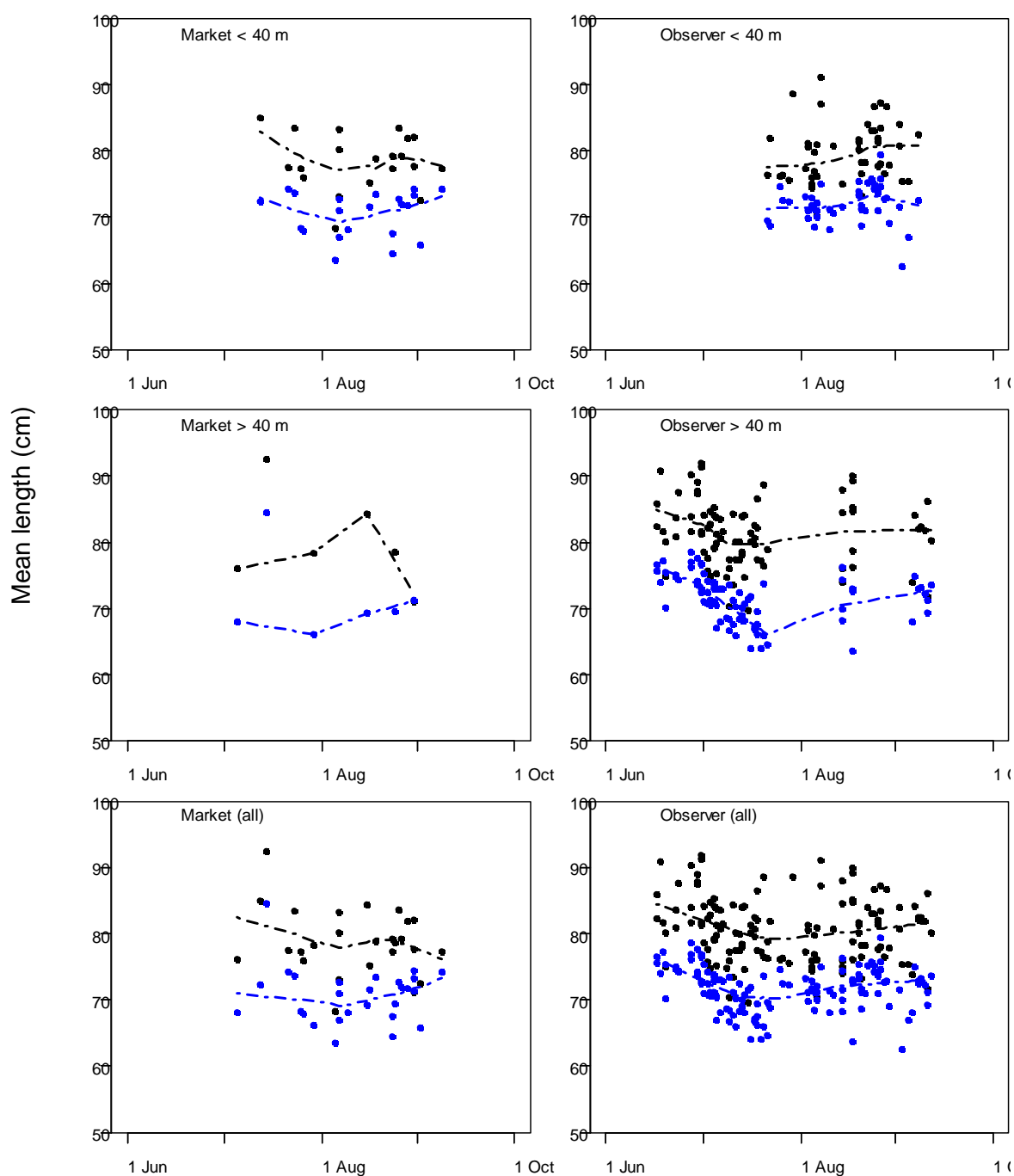


Figure 19b: Mean length of female (black) and male (blue) hoki taken in commercial catches from the Cook Strait spawning fishery in 2010 from Observer Programme (OP) tows and landings sampled by the Stock Monitoring Programme and NIWA for vessels <40m and vessels \geq 40m. Lines are a loess fit.

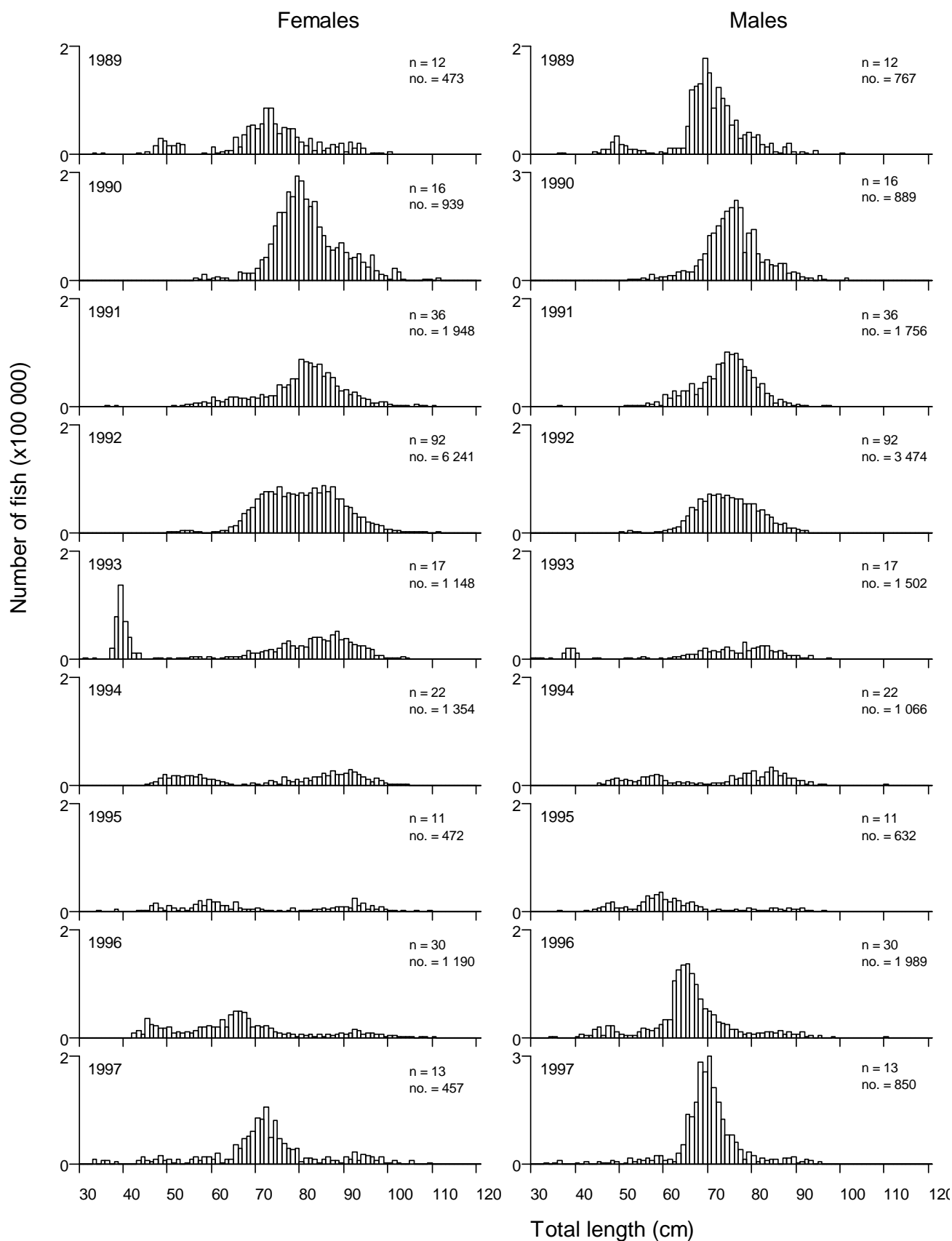


Figure 20: Length frequency of hoki in commercial catches from the Puysegur spawning fishery from 1989 to 1997, and 1999 to 2010 sampled at sea by the Observer Programme. n, number of tows sampled; no., number of fish sampled.

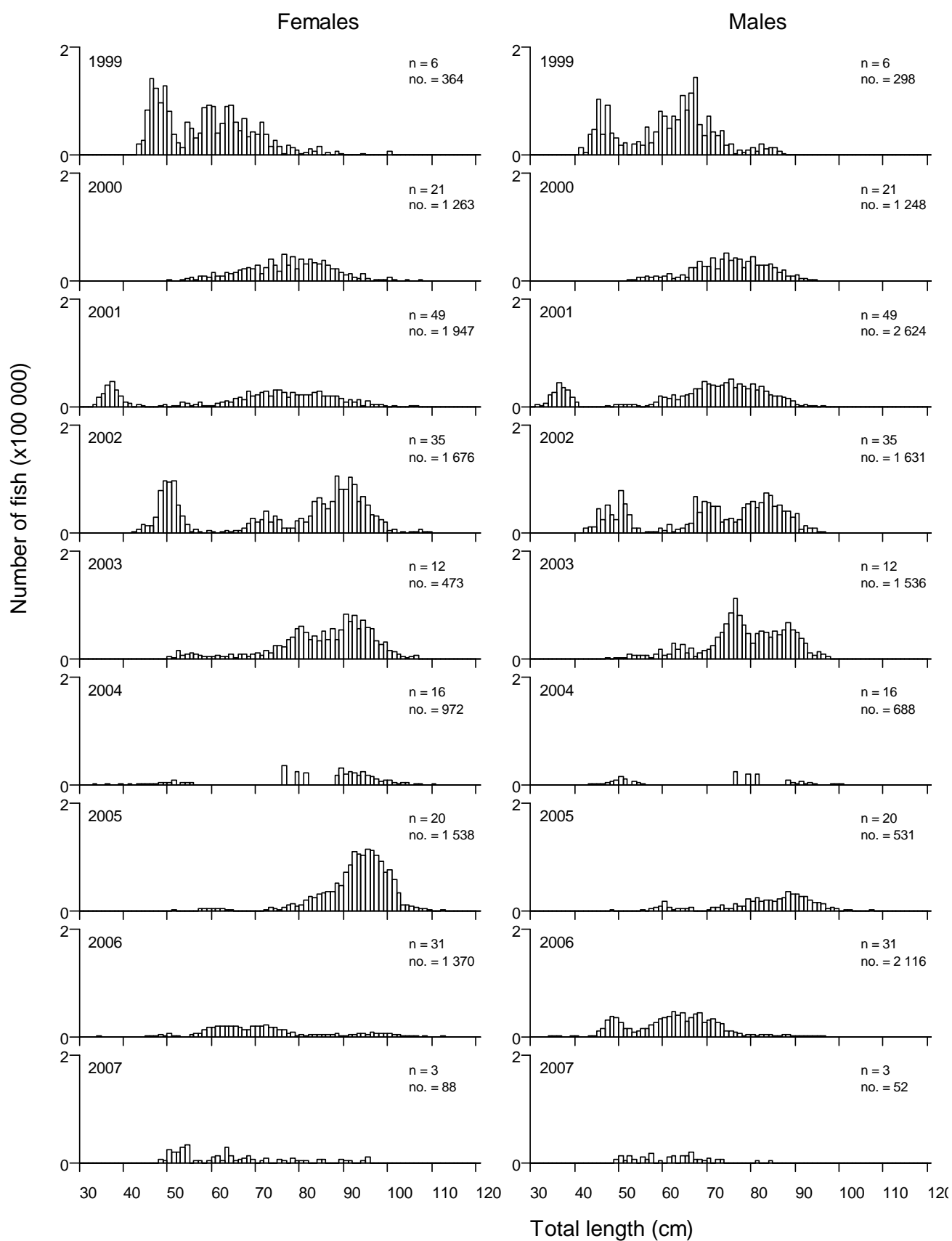


Figure 20: continued.

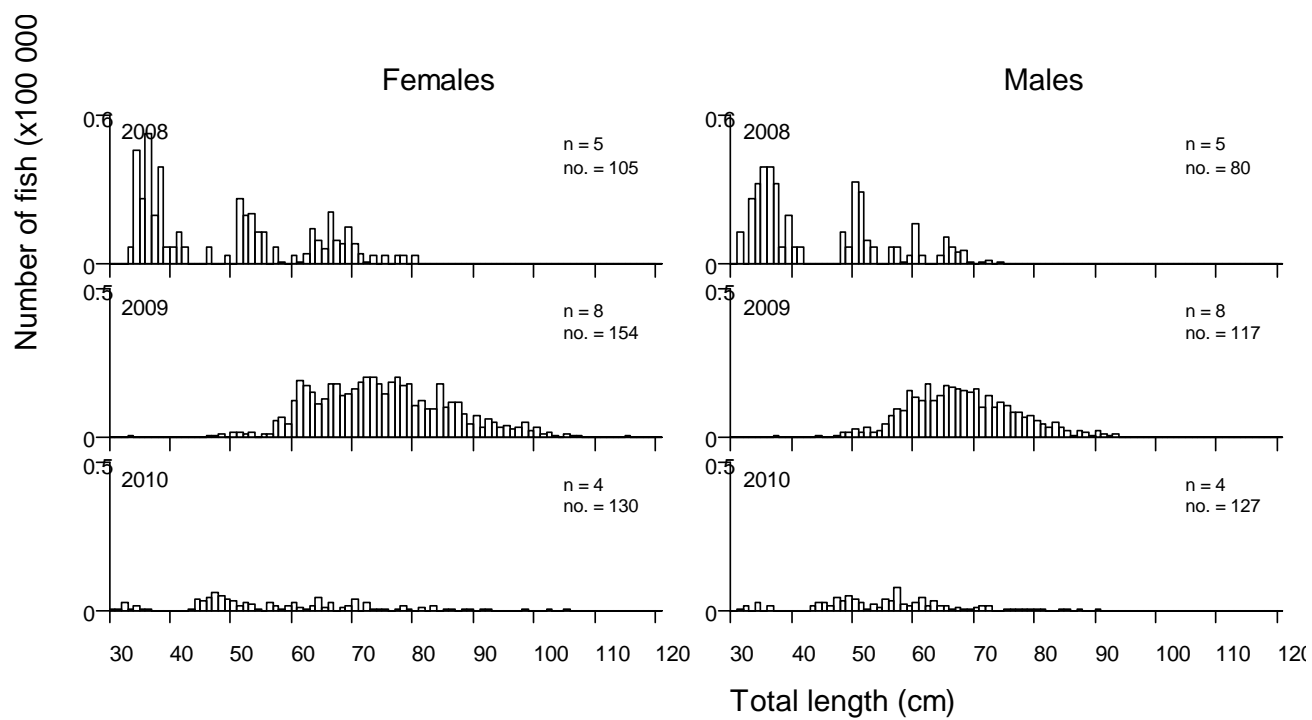


Figure 20: continued.

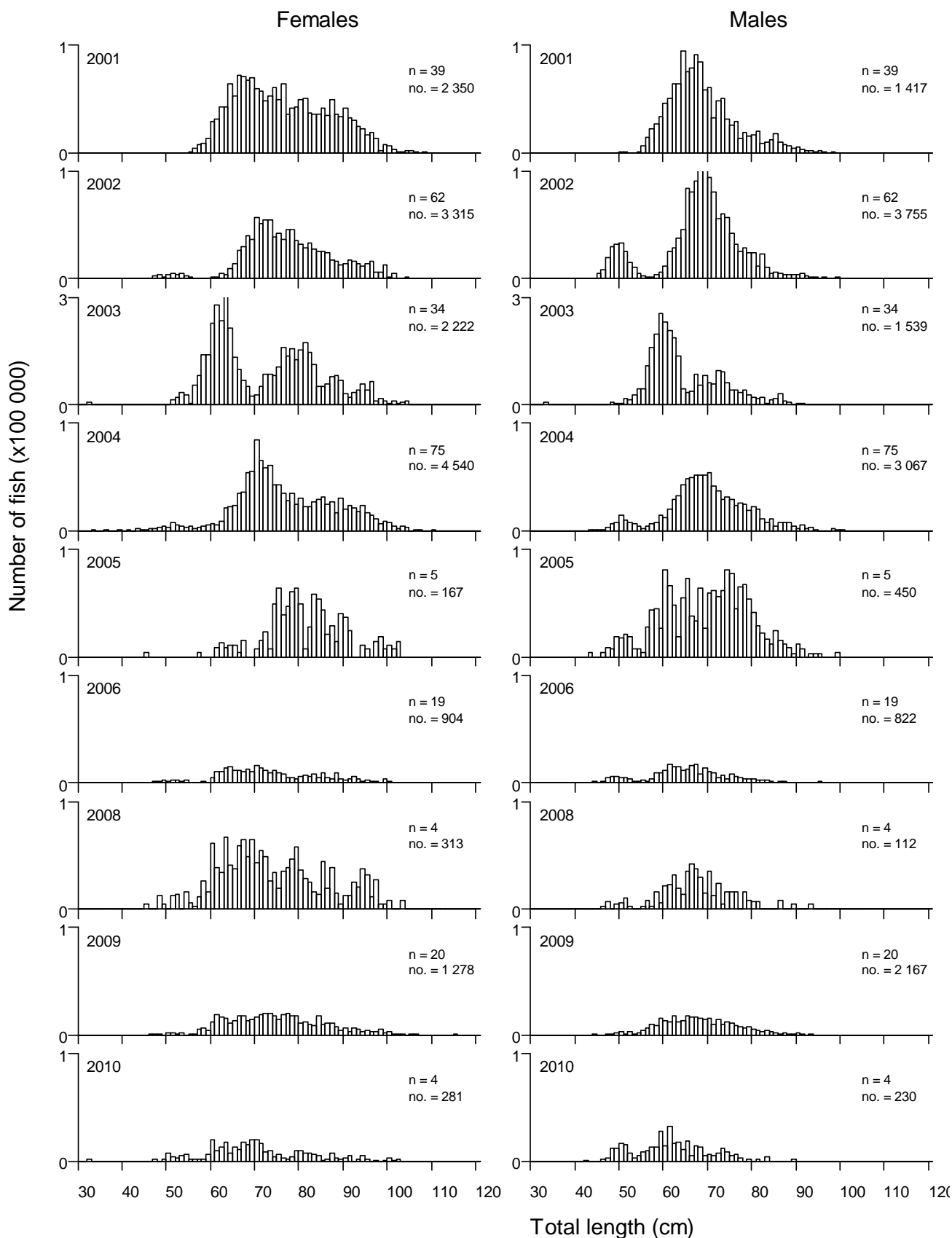


Figure 21: Length frequency of hoki taken in commercial catches from the ECSI spawning fishery from 2001 to 2010 sampled by the Scientific Observer Programme (2001–2006, 2008–2009) and combined with Hoki Management Company data (2001 to 2005). No samples in 2007. n is the number of tows sampled, no. is the number of fish sampled.

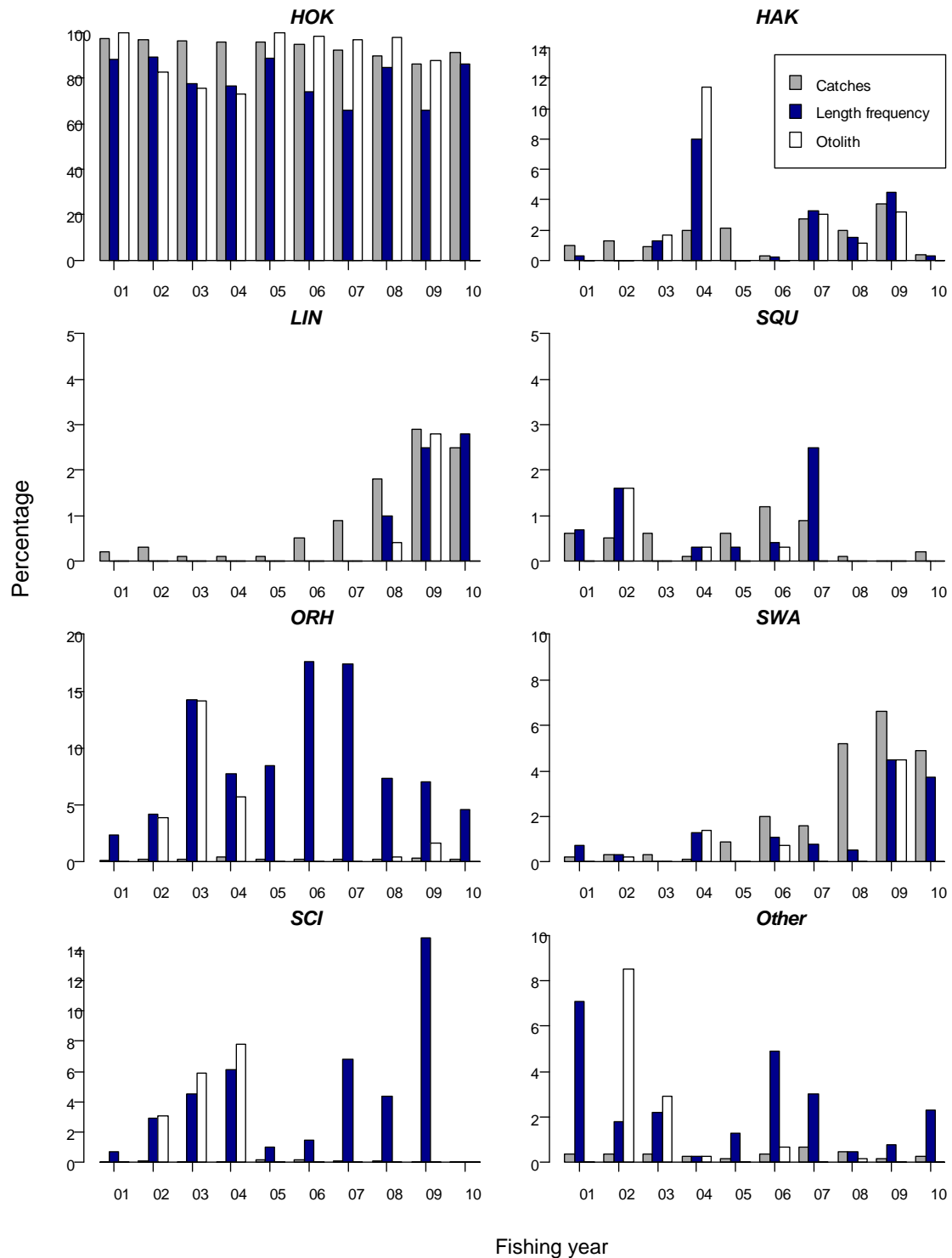


Figure 22: Percentage of hoki (TCEPR, CELR and TCER catch), hoki length frequencies and hoki otoliths collected by the Observer Programme by target species for the Chatham Rise fishery from 2000–01 to 2009–10 (no otolith data for 2009–10). Three-letter codes denote target species: HOK, hoki; ORH, orange roughy; SQU, squid; SWA, silver warehou; HAK, hake; SCI, scampi; LIN, ling; Other, all other target species combined.

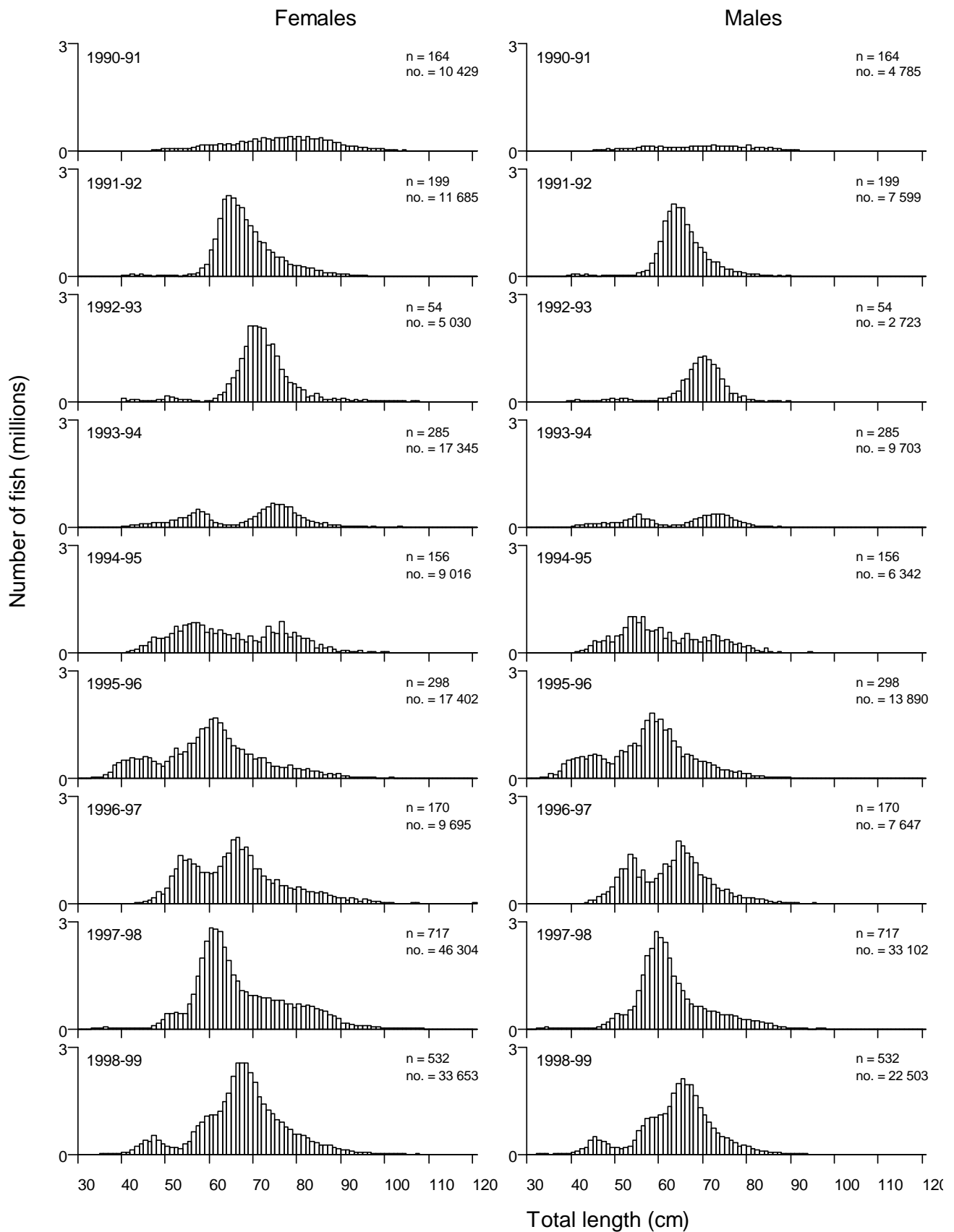


Figure 23: Length frequency of hoki taken in commercial catches from the Chatham Rise fishery from 1990-91 to 2009-10 sampled by the Observer Programme (and combined with Hoki Management Company data in 2000-01 to 2003-04). 2006-07 data only include target hoki or hake tows. n, number of tows sampled; no., number of fish sampled.

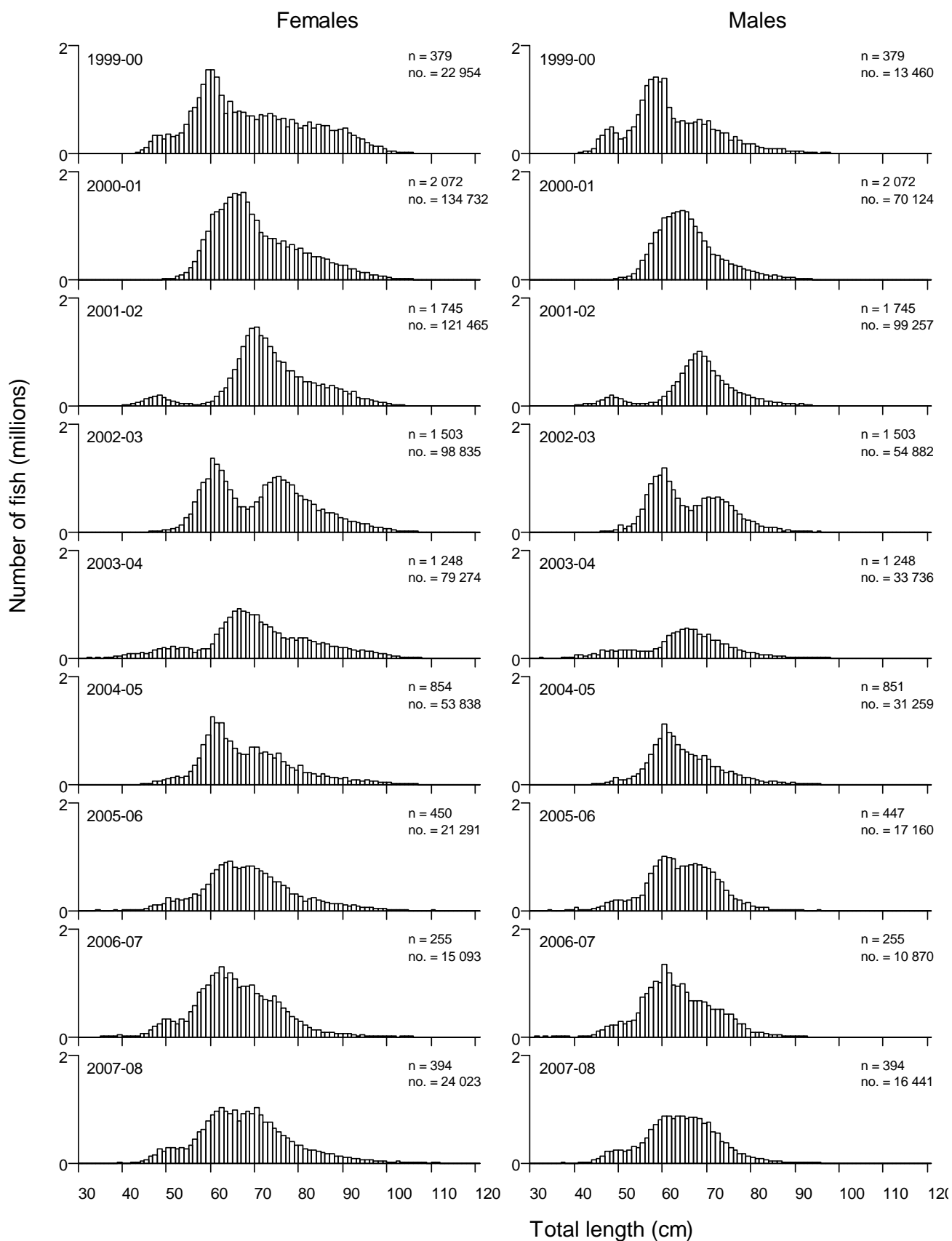


Figure 23: continued.

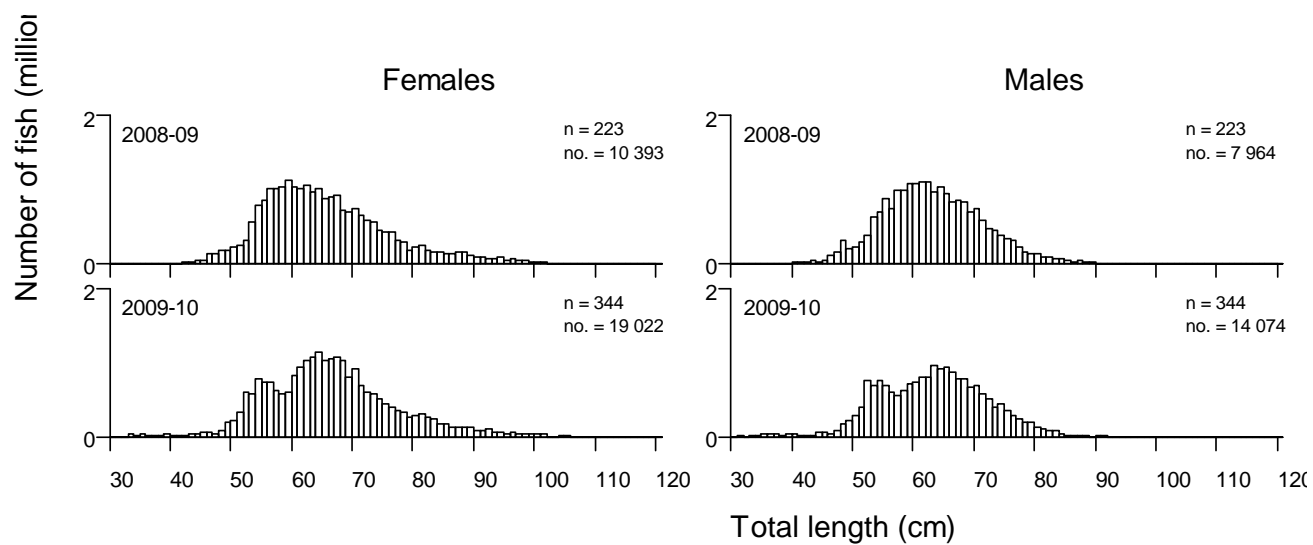


Figure 23: continued

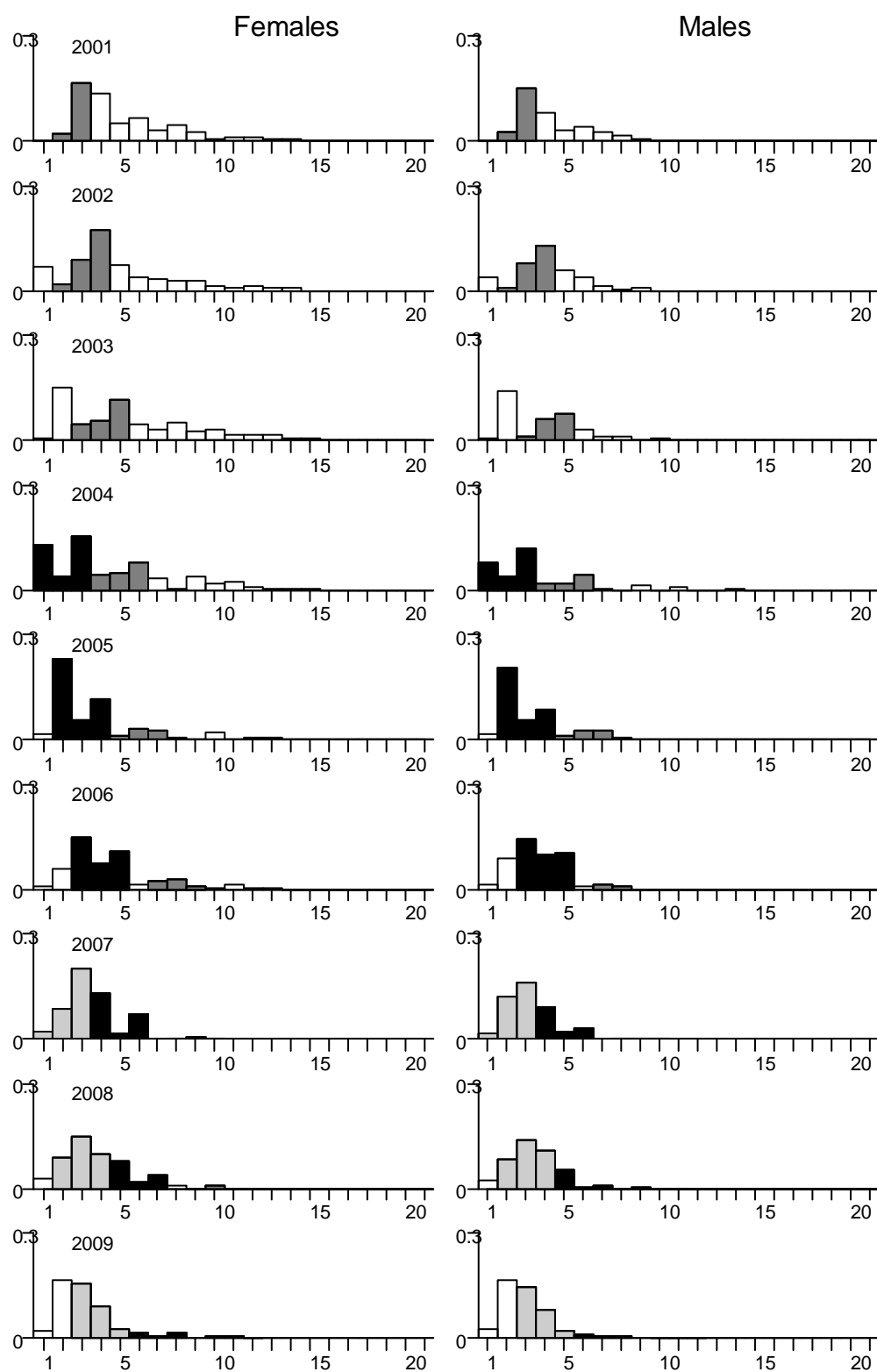


Figure 24: Proportions at age and sex in the catch from the Chatham Rise fishery as estimated by direct ageing of otoliths from 2000–01 to 2008–09. No otoliths in 2009–10. Dark grey bars show 1997–99 year-classes; black bars show 2000–02 year-classes; light grey bars show 2003–2005 year classes.

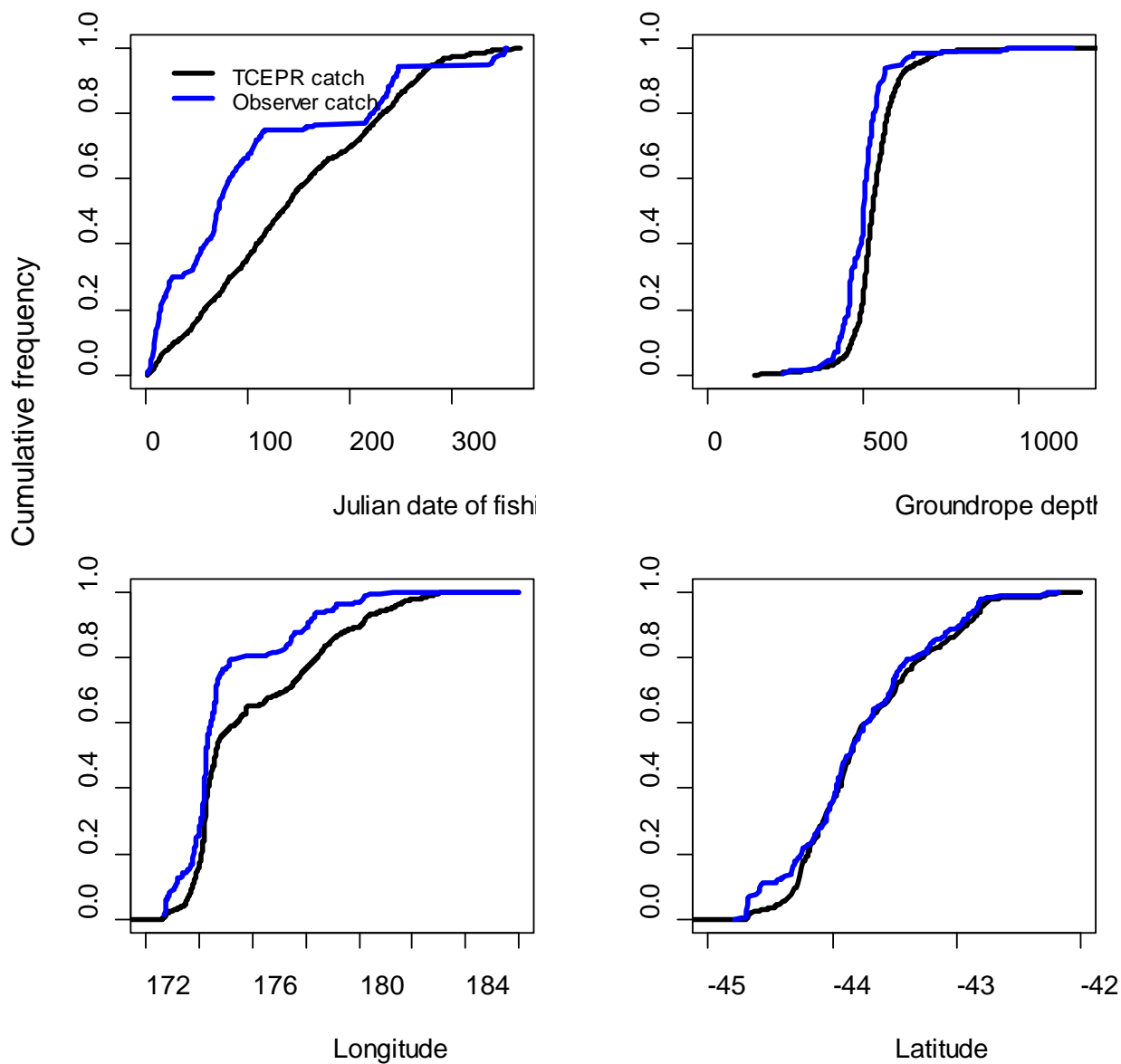


Figure 25: Comparison of Chatham Rise 2009–10 Observer Programme (OP) observer catch coverage with TCEPR catches by day of year, depth, latitude and longitude. If sampling is representative of the fishery, then blue lines (observed catches) should overlay black lines (TCEPR catch).

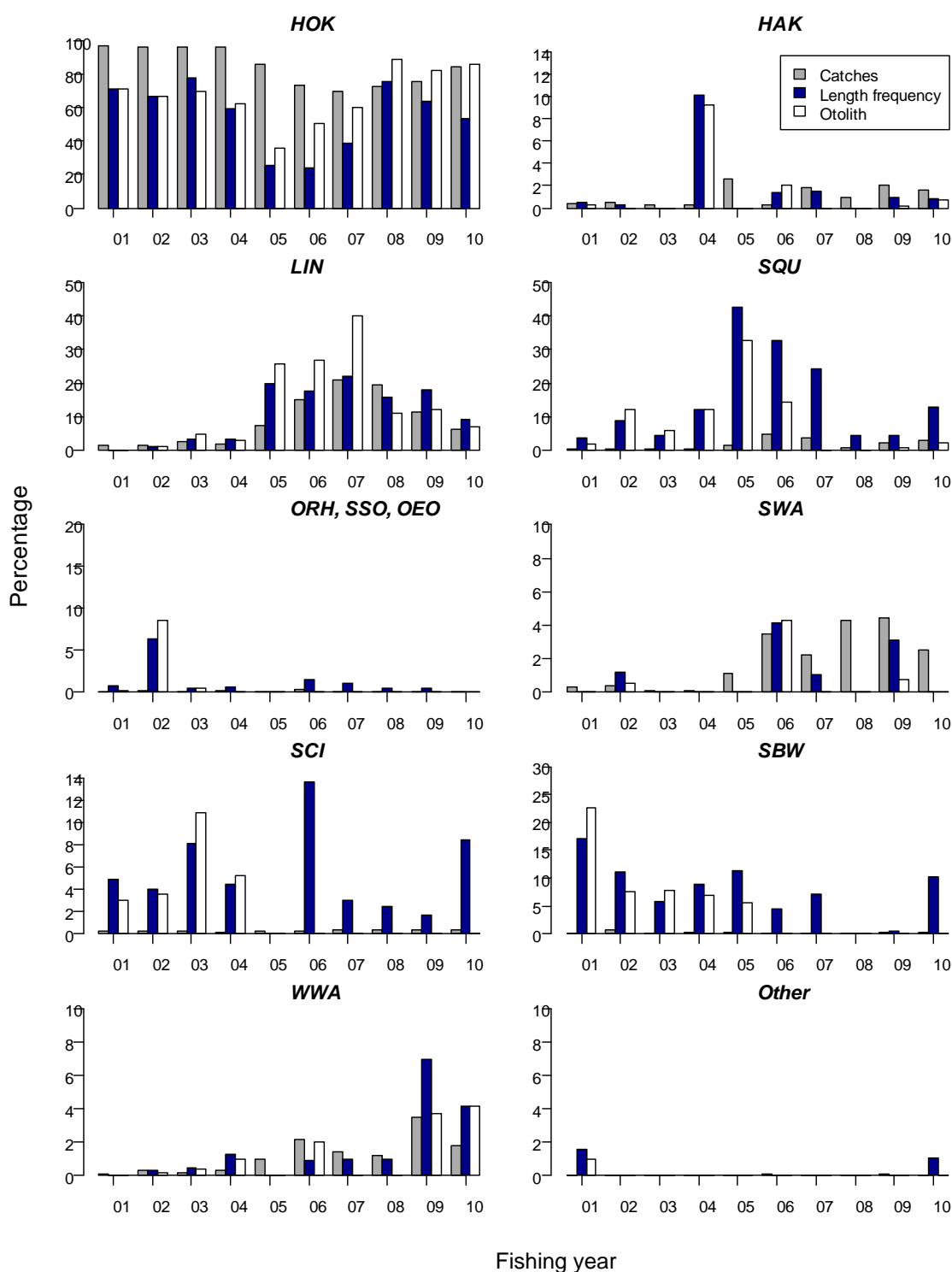


Figure 26: Percentages of hoki TCEPR, TCER and CELR catch, hoki length frequencies, and hoki otoliths collected by the Observer Programme by target species for the Sub-Antarctic fishery from 2000–01 to 2009–10. Three-letter codes denote target species: HOK, hoki; HAK, hake; SQU, squid; ORH, orange roughy, SSO, smooth oreo; OEO, oreo; SWA, silver warehou; SBW, southern blue whiting; SCI, scampi; LIN, ling; WWA, white warehou; Other, other target species combined.

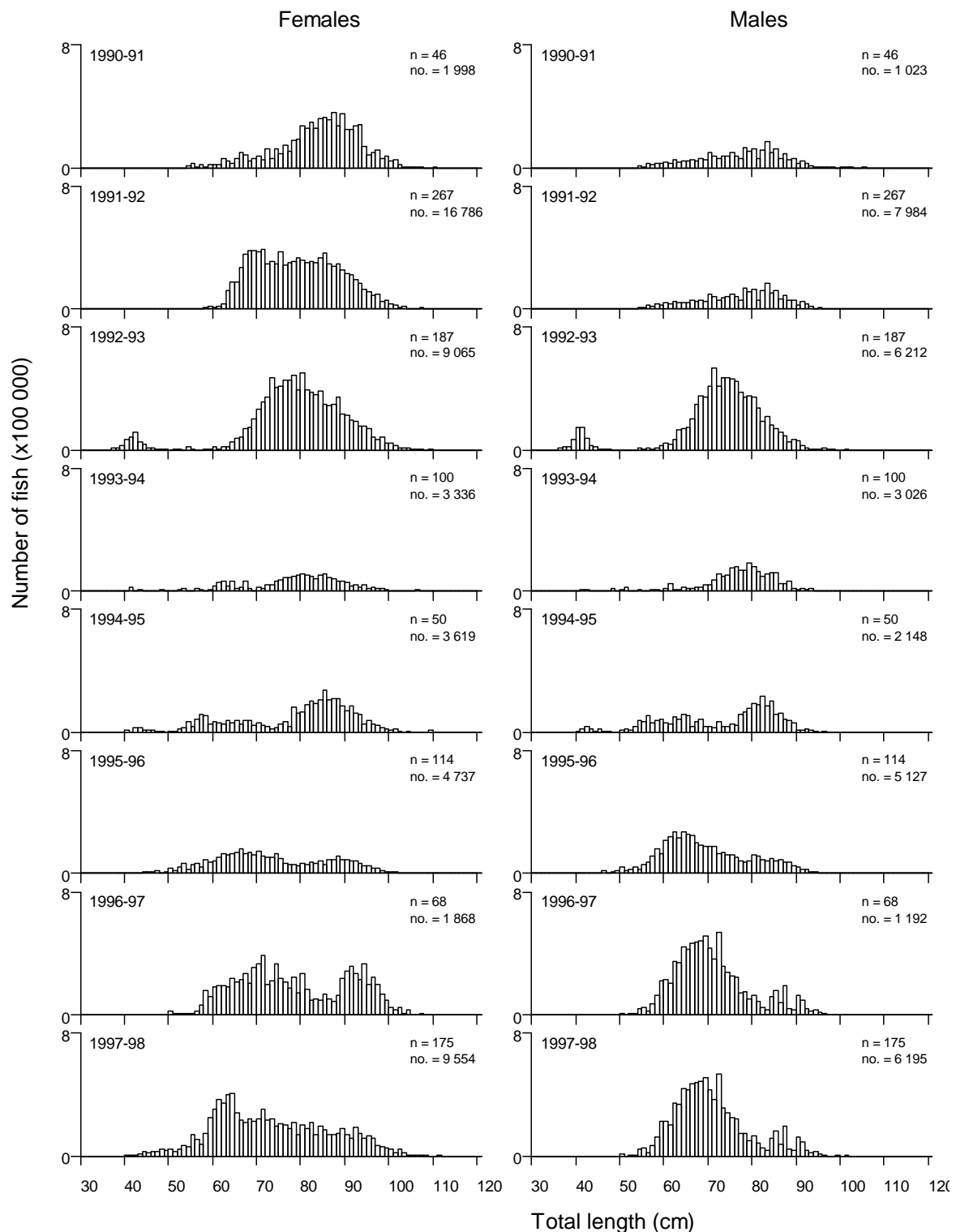


Figure 27: Length frequency of hoki taken in commercial catches from the Sub-Antarctic fishery from 1990-91 to 2009-10 sampled by the Observer Programme (and combined with Hoki Management Company data in 2000-01 to 2004-05). 2006-07 data only includes target hoki or ling tows. n, number of tows sampled; no., number of fish sampled.

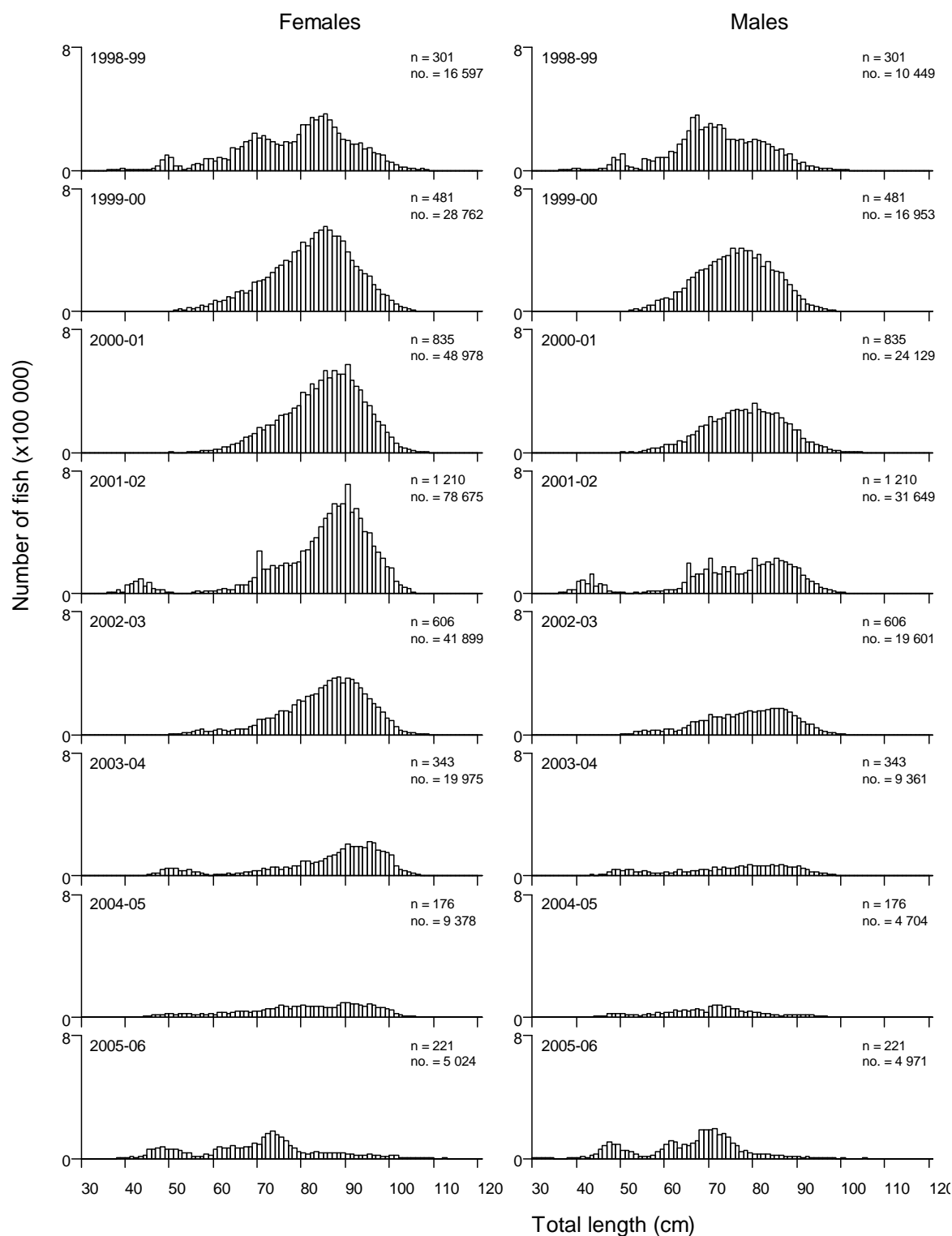


Figure 27: continued.

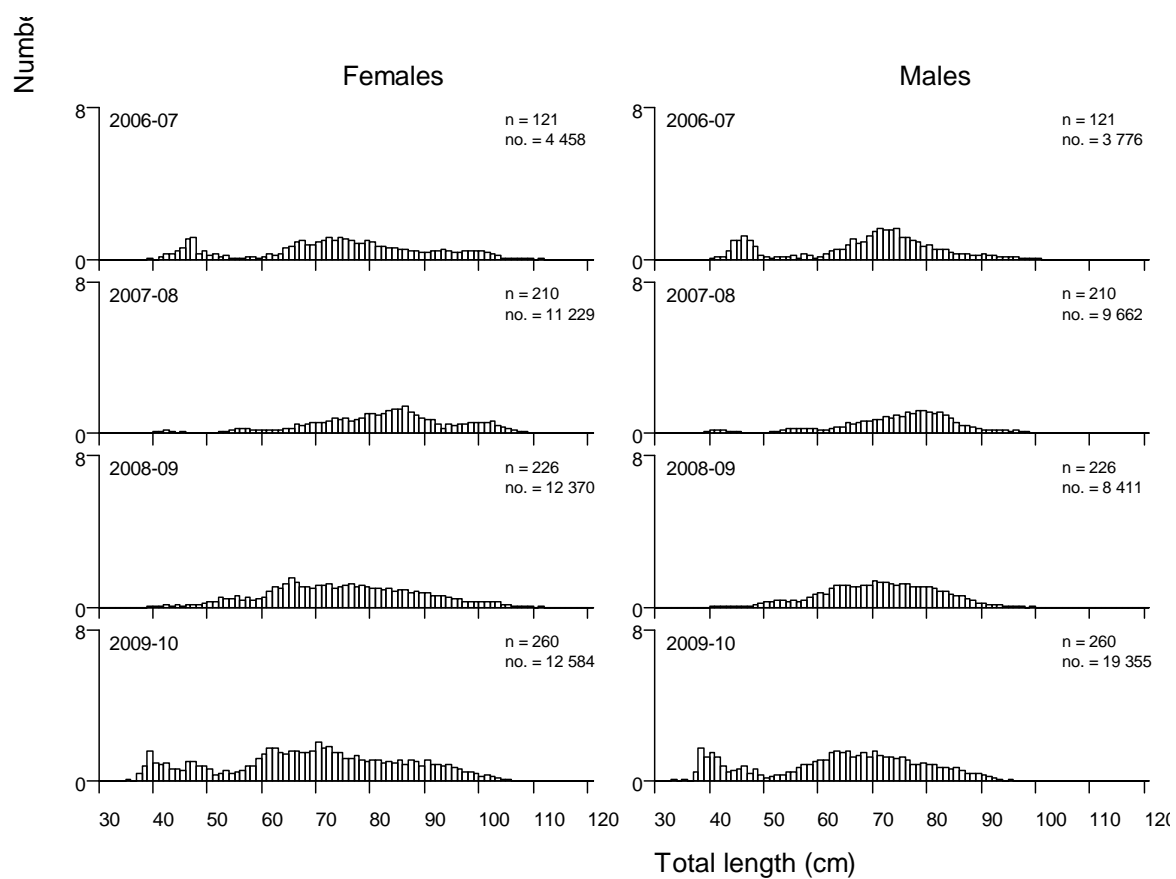


Figure 27: continued.

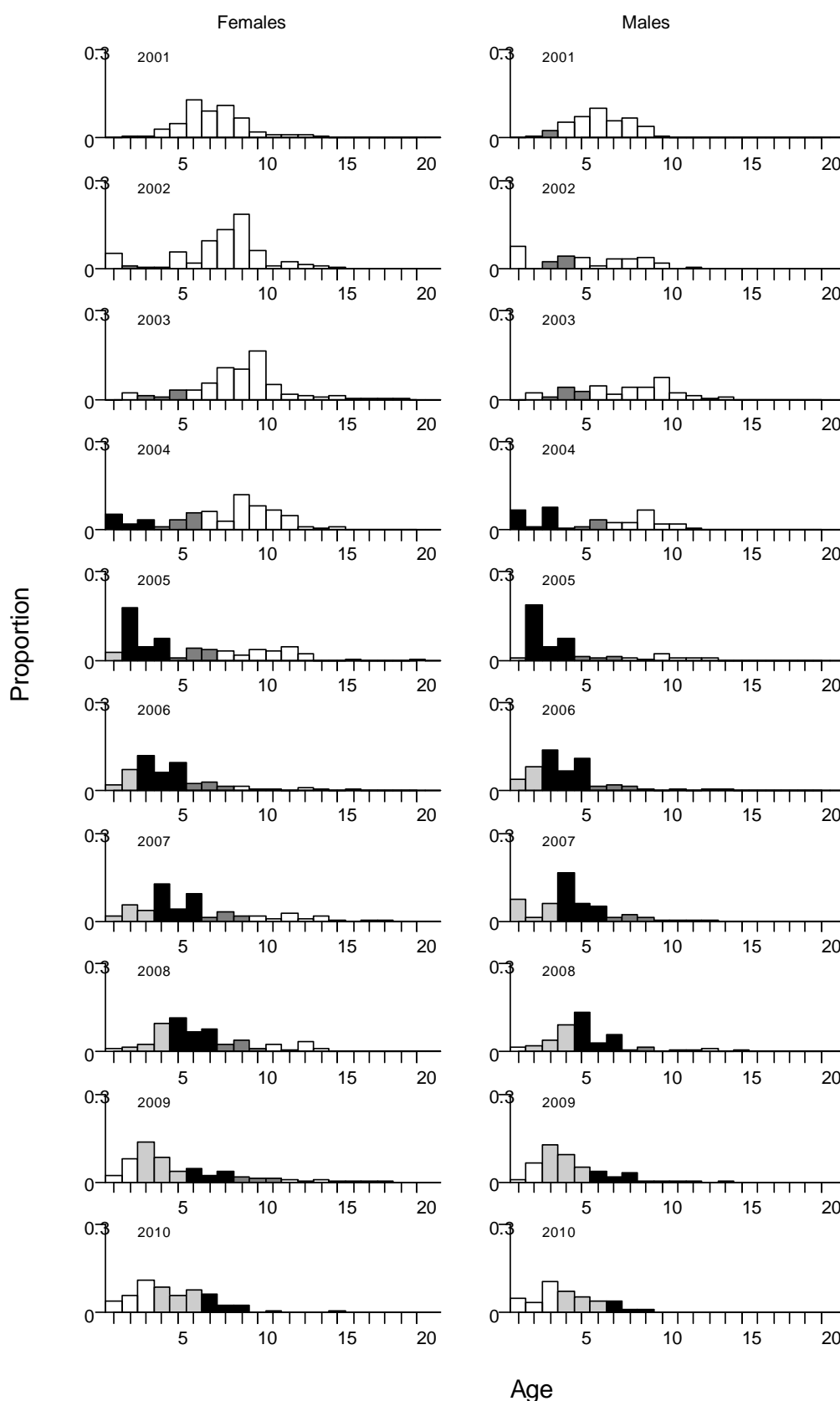


Figure 28: Proportions at age and sex in the catch from the Sub-Antarctic fishery as estimated by direct ageing of otoliths from 2000–01 to 2009–10. Dark grey bars show 1997–99 year-classes; black bars show 2000–02 year-classes; light grey bars show 2003–05 year classes.

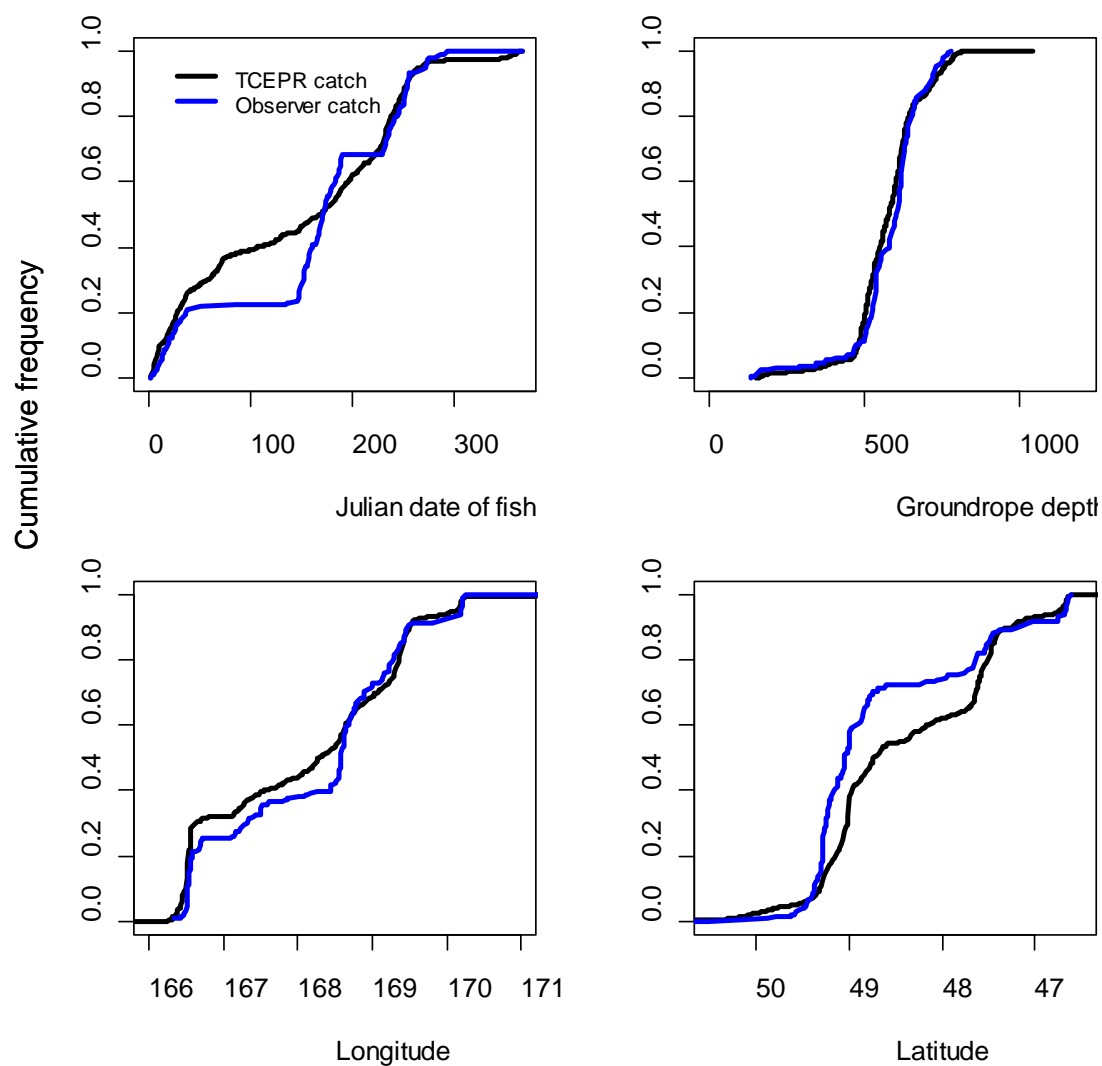


Figure 29: Comparison of Sub-Antarctic 2009–10 Observer Programme (OP) catch coverage with TCEPR catches by day of year, depth, latitude and longitude. If sampling is representative of the fishery, then blue lines (observed catches) should overlay black lines (TCEPR catch).

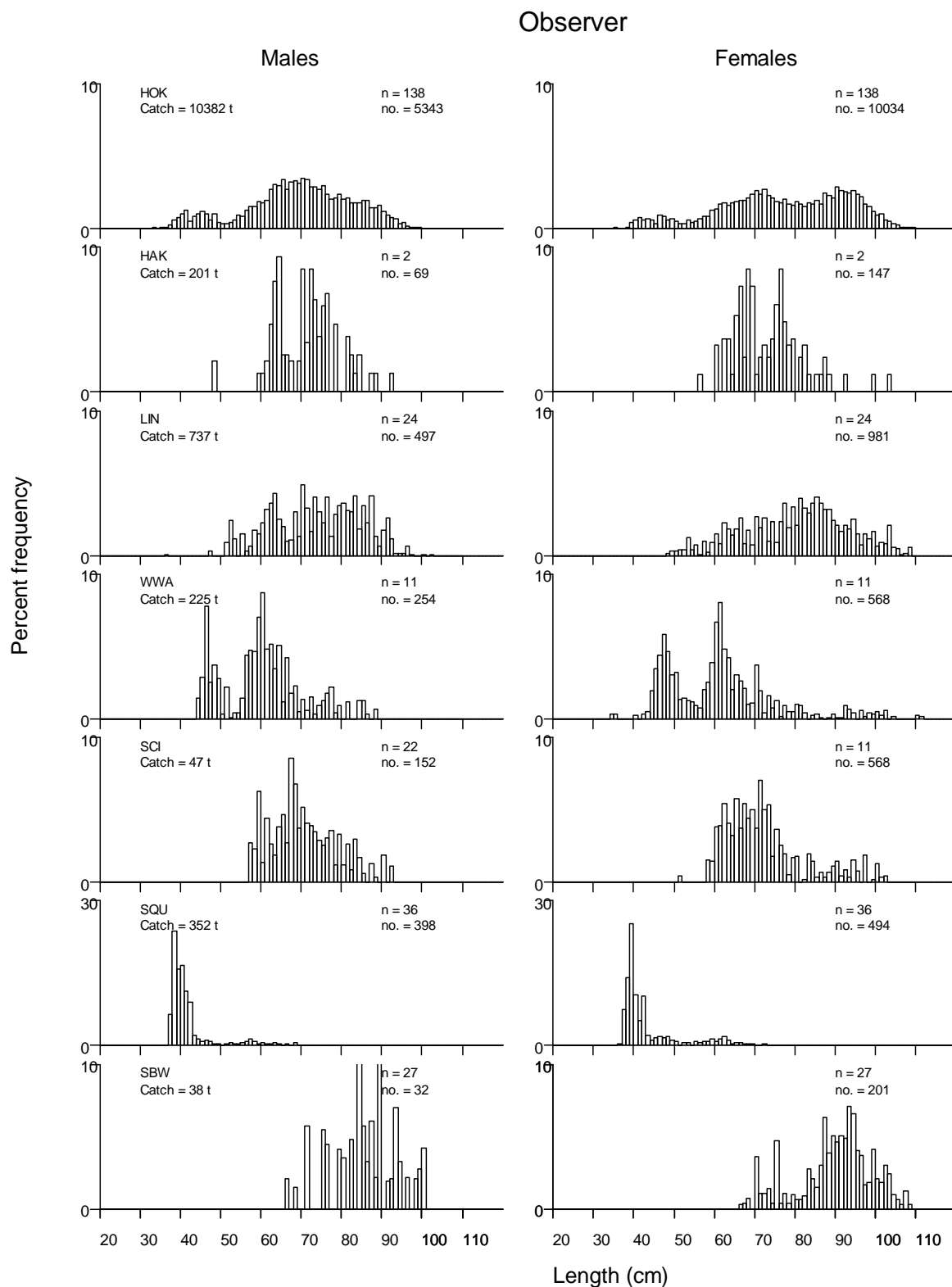


Figure 30: Comparison of length frequency of hoki taken in commercial catches from the 2009–10 Sub-Antarctic fishery sampled by Observer Programme by target species. n, number of tows sampled. Three-letter codes denote target species: HOK, hoki; HAK, hake; LIN, ling; SQU, squid; SCI, scampi; WWA, white warehou; SBW, Southern blue whiting.

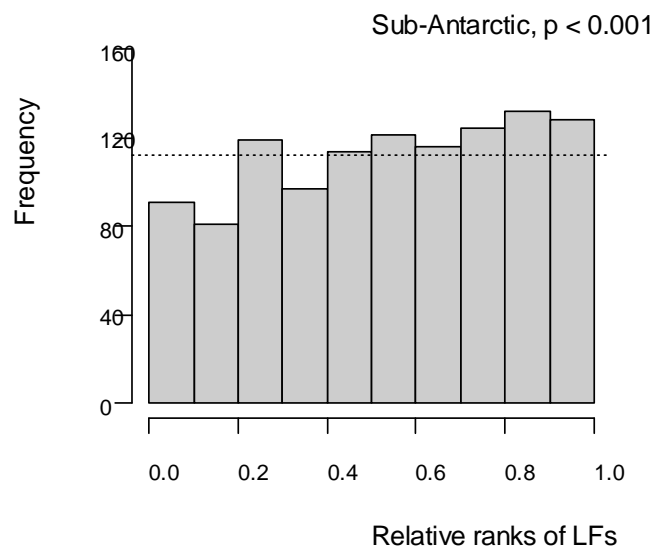


Figure 31: Histogram of ranks of the lengths that yielded 2009–10 Sub-Antarctic otoliths relative to the lengths of hoki measured for each tow. If sampling is random then the expected frequencies are given by the dotted line. The p-value is calculated using the rank-sum test.

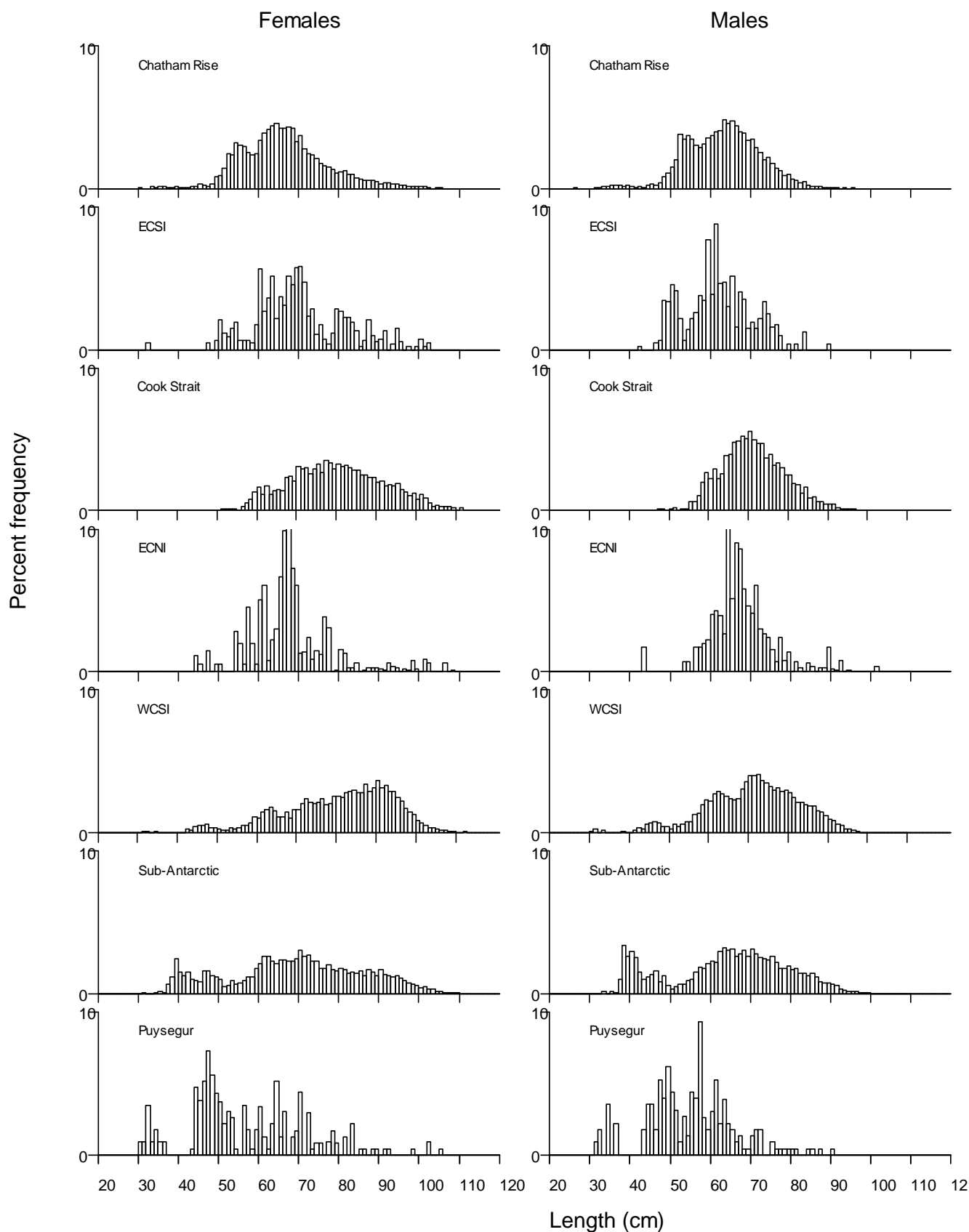


Figure 32: Length frequency of female and male hoki taken in commercial catches from different areas during the 2009–10 fishing year. Cook Strait and WCSI sampled by the Stock Monitoring Programme and Observer Programme, and other areas sampled only by the Observer Programme.

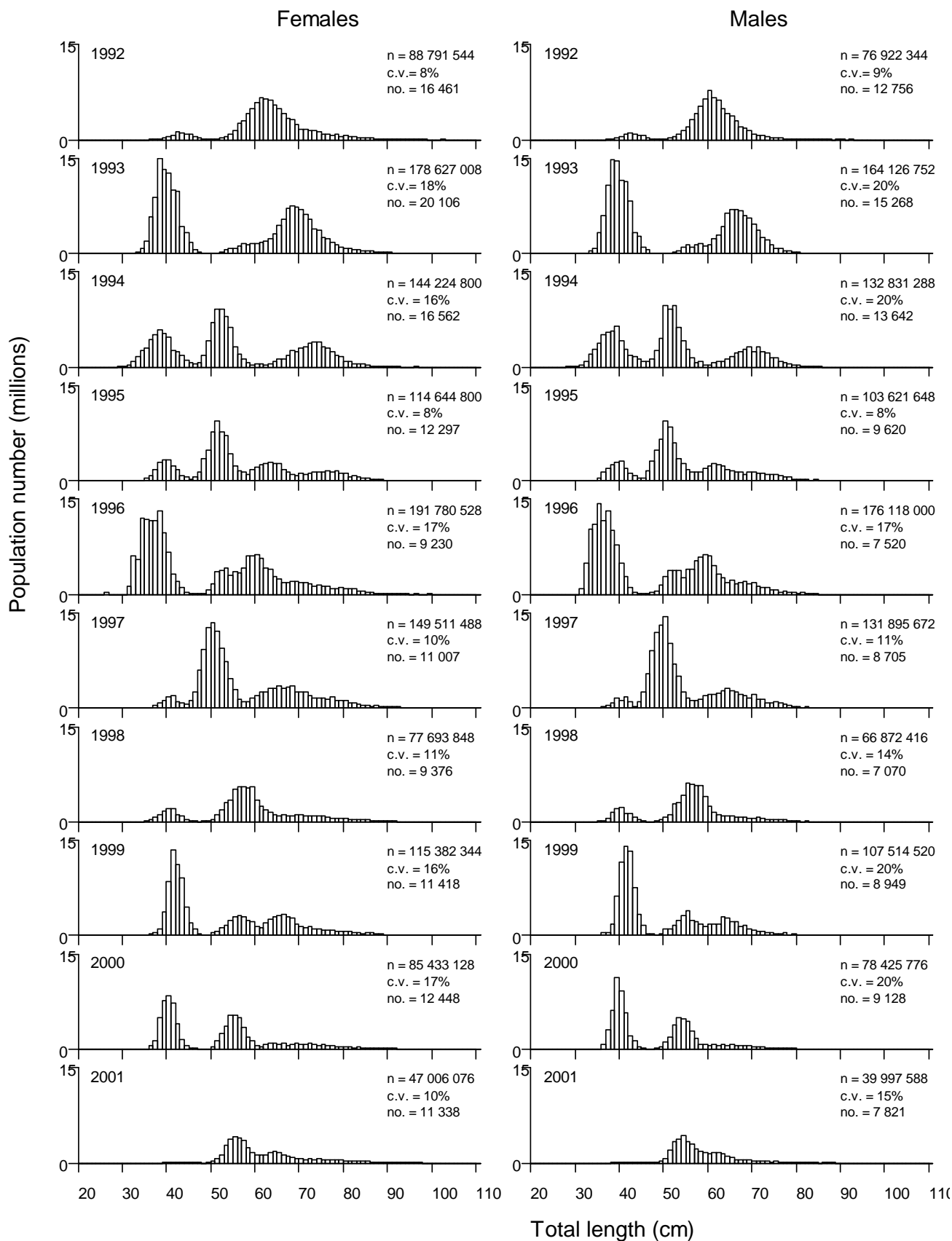


Figure 33: Scaled length frequency for hoki from Chatham Rise *Tangaroa* trawl surveys. n, population numbers of fish; c.v., coefficients of variation; no, number of fish measured.

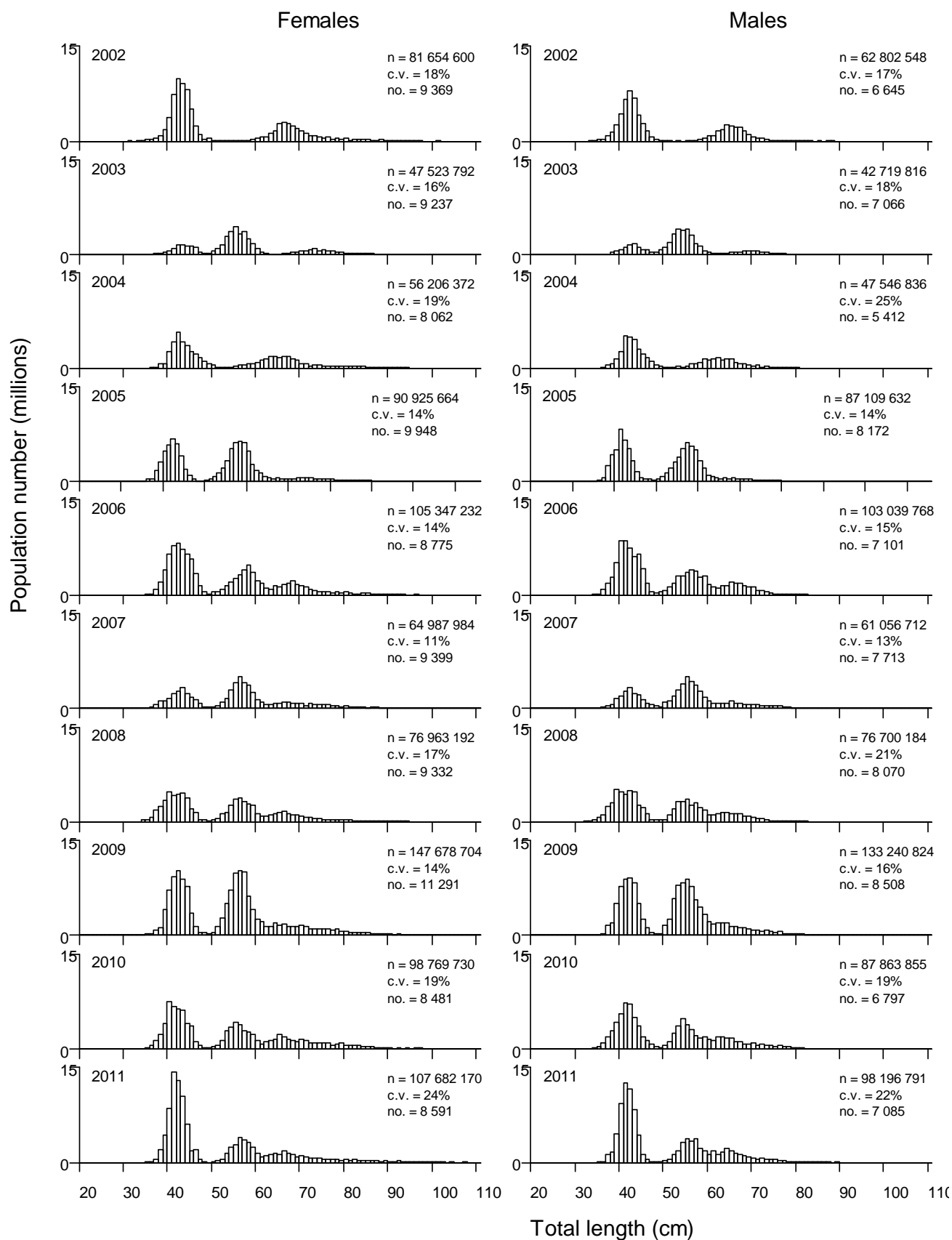


Figure 33: continued.

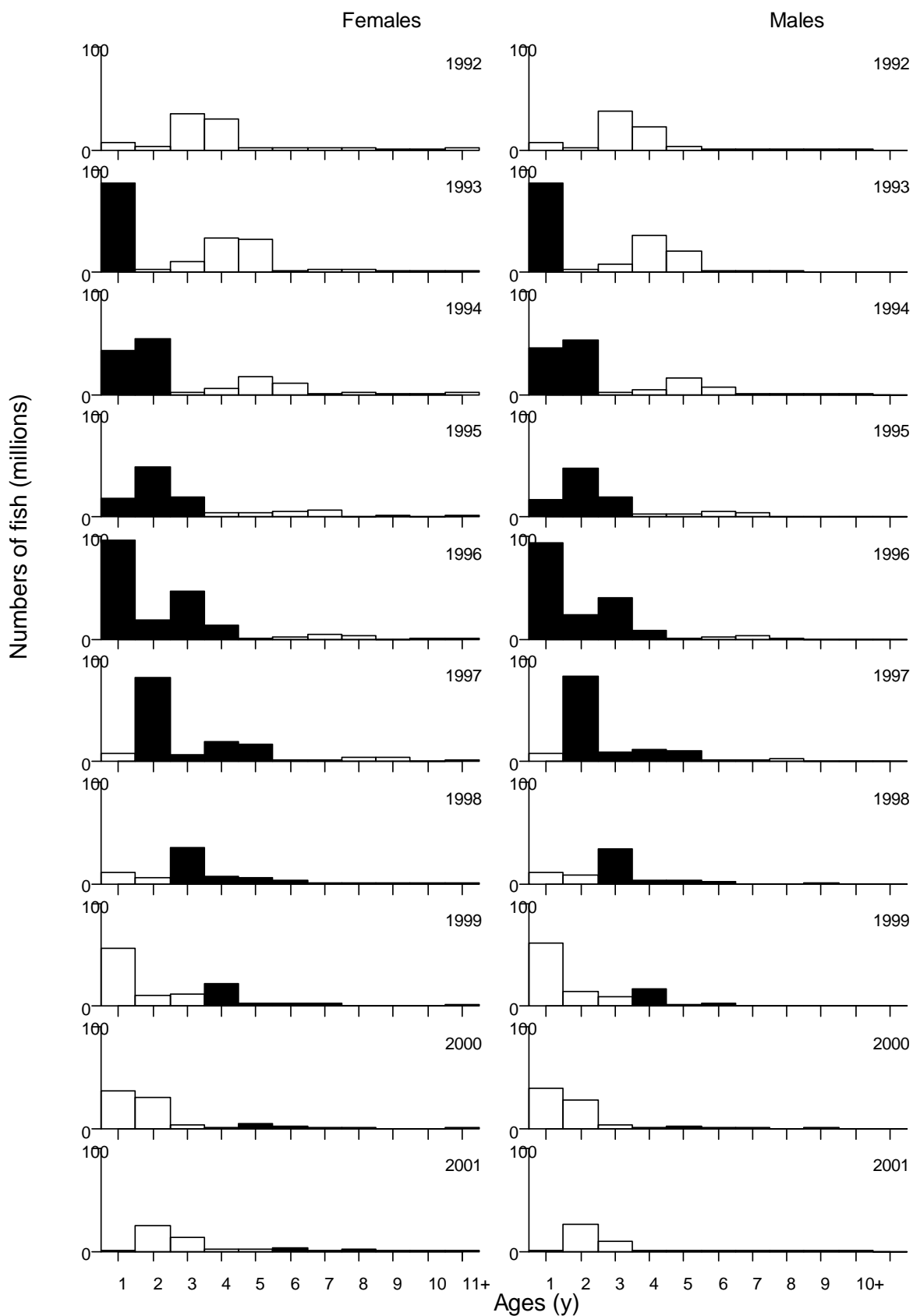


Figure 34: Scaled age frequency for hoki from Chatham Rise *Tangaroa* trawl surveys 1992–2011. Black bars show the 1991–1994 year classes.

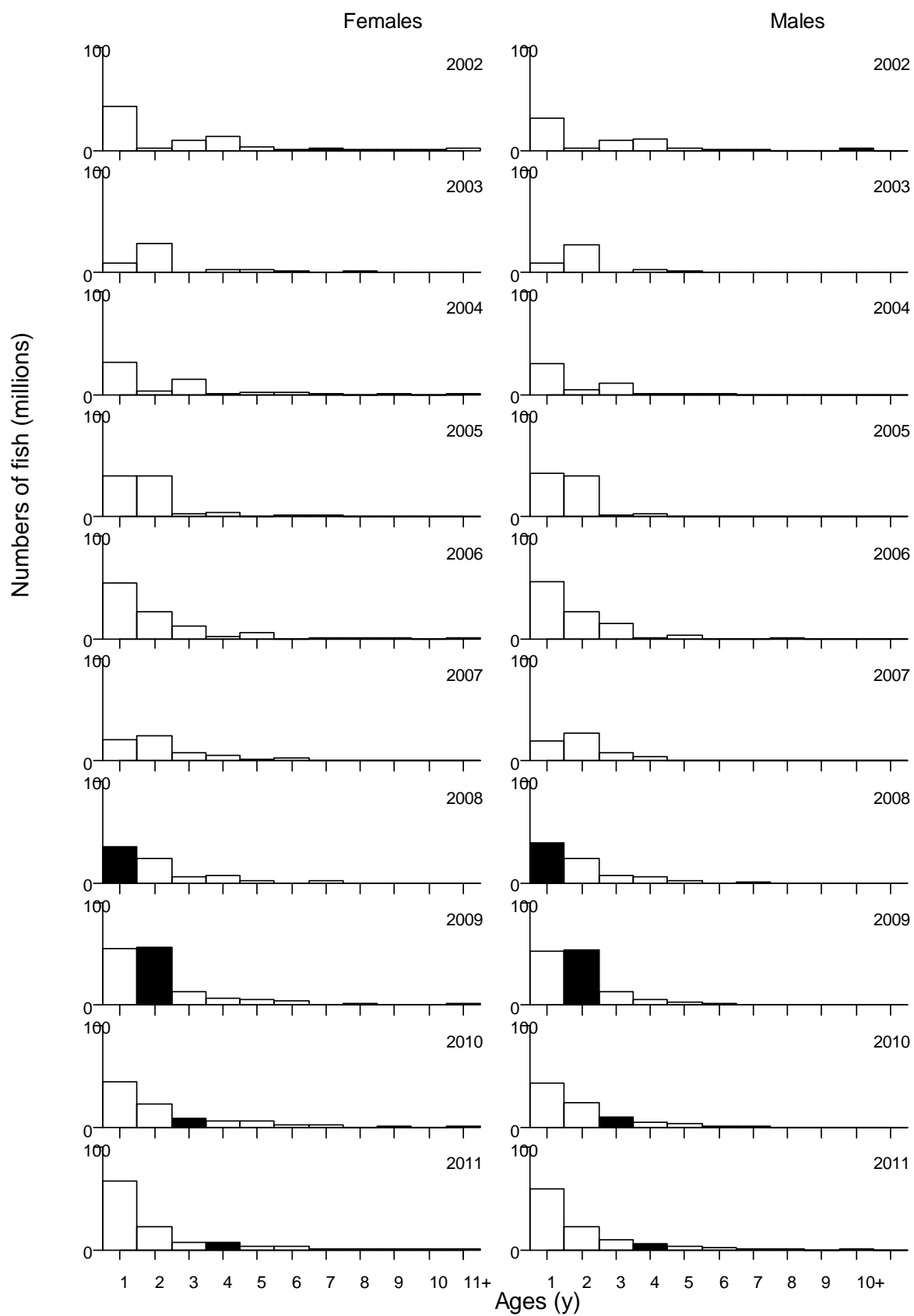


Figure 34: continued. Black bars show the 2006 year class.

APPENDIX Table A1a: Number of vessels, tows, and total catch inside and outside the 25 nautical mile line of the WCSI by year. Data source ungroomed non-zero TCEPR, TCER, and CELR data. Year defined as June to October. No October data in 2010. CELR data is assumed to all come from inside the 25 nautical mile line.

Year	Number of Vessels					Number of Tows				
	TCEPR Outside	TCER Outside	TCEPR inside	TCER Inside	CELR	TCEPR outside	TCER outside	TCEPR inside	TCER inside	CELR
1990	74	-	4	-	20	7 860	-	13	-	251
1991	75	-	2	-	22	8 342	-	12	-	326
1992	70	-	2	-	16	6 415	-	2	-	357
1993	63	-	4	-	19	7 329	-	80	-	551
1994	68	-	5	-	25	8 945	-	98	-	441
1995	63	-	3	-	25	8 648	-	91	-	392
1996	56	-	6	-	29	7 099	-	114	-	568
1997	69	-	15	-	22	8 228	-	396	-	704
1998	58	-	10	-	19	7 771	-	301	-	397
1999	53	-	9	-	17	7 022	-	209	-	665
2000	47	-	11	-	18	6 687	-	694	-	833
2001	52	-	19	-	16	7 080	-	1335	-	827
2002	48	-	16	-	14	6 592	-	1220	-	562
2003	44	-	12	-	6	6 806	-	784	-	677
2004	41	-	15	-	10	5 290	-	1238	-	748
2005	37	-	5	-	10	3 675	-	491	-	469
2006	33	-	5	-	6	4 020	-	162	-	352
2007	30	-	3	3	7	2 649	-	144	24	252
2008	24	5	2	11	-	2 338	18	34	156	-
2009	24	5	0	10	-	1 975	14	0	274	-
2010	27	5	2	9	-	2 311	13	48	258	-

Year							Catch (t)		Percent inside
	TCEPR Outside	TCER Outside	Total Outside	TCEPR Inside	TCER Inside	CELR	Total Inside	Total	
1990	159013	-	159013	13	-	366	379	159392	0
1991	130023	-	130023	113	-	239	352	130375	0
1992	99612	-	99612	0	-	190	190	99802	0
1993	96757	-	96757	406	-	531	937	97694	1
1994	114070	-	114070	555	-	706	1261	115331	1
1995	79338	-	79338	542	-	783	1325	80663	2
1996	70185	-	70185	1959	-	1934	3893	74078	5
1997	84467	-	84467	5235	-	2398	7633	92100	8
1998	98703	-	98703	4277	-	2620	6897	105600	7
1999	87479	-	87479	3022	-	3859	6881	94360	7
2000	88182	-	88182	8959	-	4767	3726	101908	13
2001	81576	-	81576	15553	-	4990	0543	102119	20
2002	71168	-	71168	17254	-	4186	1440	92608	23
2003	57808	-	57808	10986	-	4958	5944	73752	22
2004	26586	-	26586	13639	-	4885	8524	45110	41
2005	25262	-	25262	5369	-	2261	7630	32892	23
2006	34298	-	34298	2153	-	2483	4636	38934	12
2007	30315	-	30315	1073	1	1965	3039	33354	9
2008	19913	32	19945	297	554	-	851	20796	4
2009	19341	23	19364	0	1103	-	1103	20467	5
2010	33237	36	33273	900	1984	-	2884	36157	8

APPENDIX Table A1b: Number of TCEPR, TCER and CELR Cook Strait number of vessels, tows, and total catch by year. Data source is un-groomed non-zero TCEPR, TCER, and CELR tows catching hoki. Year defined as June to October. No October data in 2010.

Year	Number of Vessels				Number of tows			
	TCEPR	TCER	CELR	Total	TCEPR	TCER	CELR	Total
1990	17	-	33	50	1 045	-	617	1 662
1991	21	-	42	63	2 008	-	1 522	3 530
1992	24	-	31	55	1 654	-	831	2 485
1993	20	-	30	50	1 531	-	954	2 485
1994	29	-	38	67	1 963	-	1 440	3 403
1995	25	-	31	56	2 480	-	1 233	3 713
1996	40	-	36	76	4 316	-	1 474	5 790
1997	36	-	29	65	4 744	-	1 032	5 776
1998	29	-	28	57	3 009	-	1 308	4 317
1999	20	-	28	48	2 618	-	895	3 513
2000	22	-	32	54	2 298	-	1 150	3 448
2001	25	-	26	51	1 934	-	989	2 923
2002	19	-	21	40	1 191	-	522	1 713
2003	21	-	25	46	1 904	-	994	2 898
2004	19	-	31	50	1 872	-	1 134	3 006
2005	15	-	16	31	1 423	-	475	1 898
2006	12	-	14	26	1 065	-	328	1 393
2007	8	3	16	27	996	6	495	1 497
2008	7	20	-	27	642	614	-	1 256
2009	11	20	-	31	855	515	-	1 370
2010	8	18	-	26	813	508	-	1 321

Year	Catch (t)			
	TCEPR	TCER	CELR	Total
1990	12 494	-	2 759	15 253
1991	21 910	-	7 169	29 079
1992	19 719	-	5 095	24 814
1993	17 548	-	4 250	21 798
1994	27 174	-	9 159	36 333
1995	28 023	-	7 721	35 744
1996	50 812	-	8 488	59 300
1997	49 839	-	6 665	56 504
1998	36 435	-	9 558	45 993
1999	33 439	-	6 240	39 679
2000	30 755	-	9 078	39 833
2001	24 136	-	8 208	32 344
2002	17 774	-	4 114	21 888
2003	27 349	-	7 288	34 637
2004	28 443	-	10 521	38 964
2005	18 886	-	4 443	23 329
2006	16 947	-	3 091	20 038
2007	12 604	-	5 411	18 015
2008	9 249	6638	-	15 887
2009	9 827	5046	-	14 873
2010	10 827	4834	-	15 661

APPENDIX Table A1c: Number of Chatham Rise and ECSI vessels, tows and catch for all vessels by year for the non-spawning season. Data source is un-groomed non-zero TCEPR, TCER, and CELR tows catching hoki. ‘CELR’ includes all fishing methods reported on the CELR form, and ‘CELR trawl’ includes mid-water and bottom trawl tows only. Chatham Rise data includes data from October to September, and ECSI data includes data from October to June.

Fishing year	Number of Vessels					Number of tows			
	TCEPR	TCER	CELR trawl	CELR	Total	TCEPR	TCER	CELR trawl	Total
1989–90	47	-	23	36	83	2 965	-	506	3 471
1990–91	67	-	38	52	119	5 377	-	896	6 273
1991–92	72	-	30	44	116	8 406	-	571	8 977
1992–93	74	-	31	41	115	8 428	-	526	8 954
1993–94	74	-	26	40	114	6 386	-	518	6 904
1994–95	85	-	31	46	131	9 369	-	694	10 063
1995–96	100	-	27	41	141	10 699	-	421	11 120
1996–97	99	-	18	31	130	12 559	-	305	12 864
1997–98	93	-	18	31	124	15 896	-	215	16 111
1998–99	83	-	24	31	114	14 968	-	436	15 404
1999–00	70	-	17	29	99	13 396	-	343	13 739
2000–01	68	-	11	20	88	12 390	-	416	12 806
2001–02	59	-	14	21	80	10 381	-	297	10 678
2002–03	63	-	16	24	87	11 276	-	266	11 542
2003–04	59	-	11	20	79	9 520	-	222	9 742
2004–05	51	-	12	24	75	7 316	-	129	7 445
2005–06	52	-	14	24	76	7 038	-	145	7 183
2006–07	47	-	11	23	70	7 327	-	158	7 485
2007–08	42	12	-	14	68	7 067	66	-	7 133
2008–09	37	13	1	14	64	6 219	91	2	6 312
2009–10	39	17	-	9	65	6 022	295	-	6 317

Fishing year	Catch (t)				
	TCEPR	TCER	CELR trawl	CELR	Total
1989–90	13 027	-	69	77	13 104
1990–91	28 721	-	163	170	28 891
1991–92	48 779	-	102	106	48 885
1992–93	44 441	-	64	73	44 514
1993–94	22 968	-	64	75	23 043
1994–95	38 599	-	192	204	38 803
1995–96	48 254	-	92	110	48 364
1996–97	56 305	-	99	115	56 420
1997–98	76 944	-	94	118	77 062
1998–99	72 926	-	959	969	73 895
1999–00	56 241	-	171	176	56 417
2000–01	49 584	-	567	576	50 160
2001–02	39 416	-	39	47	39 463
2002–03	39 068	-	20	24	39 092
2003–04	33 630	-	40	43	33 673
2004–05	30 873	-	9	12	30 885
2005–06	34 103	-	7	12	34 115
2006–07	37 829	-	10	18	37 847
2007–08	38 179	61	-	6	38 246
2008–09	39 050	13	-	7	39 070
2009–10	39 389	48	-	7	39 444

APPENDIX Table A1d: Number of ECSI vessels, tows and catch for all vessels by year for the spawning season. Data source is un-groomed non-zero TCEPR, TCER, and CELR tows catching hoki. Year defined as June to October. ‘CELR’ includes all fishing methods reported on the CELR form, and ‘CELR trawl’ includes mid-water and bottom trawl tows only. No data for October 2010.

Fishing year	Number of Vessels					Number of tows			
	TCEPR	TCER	CELR trawl	CELR	Total	TCEPR	TCER	CELR trawl	Total
1990	7	-	17	26	33	34	-	121	155
1991	10	-	20	33	43	147	-	224	371
1992	9	-	12	22	31	83	-	242	325
1993	8	-	13	22	30	40	-	274	314
1994	8	-	12	22	30	35	-	215	250
1995	15	-	10	22	37	62	-	72	134
1996	22	-	10	22	44	184	-	77	261
1997	20	-	6	14	34	175	-	154	329
1998	19	-	6	14	33	219	-	81	300
1999	20	-	9	15	35	139	-	151	290
1900	12	-	9	13	25	93	-	229	322
2001	18	-	8	14	32	199	-	251	450
2002	17	-	10	14	31	269	-	146	415
2003	22	-	11	15	37	555	-	219	774
2004	10	-	10	18	28	129	-	248	377
2005	10	-	3	9	19	237	-	69	306
2006	9	-	5	13	22	72	-	76	148
2007	10	-	4	11	21	106	-	27	133
2008	12	4	0	7	23	243	47	-	290
2009	8	3	0	11	22	100	38	-	138
2010	7	4	0	8	19	58	83	-	141

Fishing year	Catch (t)				
	TCEPR	TCER	CELR trawl	CELR	Total
1990	48	-	243	249	297
1991	866	-	514	519	1 385
1992	536	-	406	408	944
1993	131	-	174	176	307
1994	167	-	360	362	529
1995	242	-	108	111	353
1996	1 059	-	107	110	1 169
1997	785	-	989	993	1 778
1998	1 298	-	377	381	1 679
1999	702	-	1 334	1 338	2 040
1900	544	-	1 841	1 845	2 389
2001	1 663	-	762	769	2 432
2002	2 834	-	225	227	3 061
2003	6 547	-	1 009	1 011	7 558
2004	1 696	-	927	929	2 625
2005	3 493	-	51	54	3 547
2006	660	-	58	65	725
2007	961	-	63	67	1 028
2008	2 376	40	-	5	2 421
2009	1 098	27	-	4	1 129
2010	521	133	-	7	661

APPENDIX Table A1e: Number of Sub-Antarctic vessels, tows and catch for all vessels by year for the non-spawning season. Data source is un-groomed non-zero TCEPR, TCER, and CELR tows catching hoki. ‘CELRL’ includes all fishing methods reported on the CELR form, and ‘CELRL trawl’ includes mid-water and bottom trawl tows only.

Fishing year	Number of Vessels					Number of tows			
	TCEPR	TCER	CELRL trawl	CELRL	Total	TCEPR	TCER	CELRL trawl	Total
1989–90	55	-	-	-	55	2 657	-	-	2 657
1990–91	62	-	-	-	62	4 426	-	-	4 426
1991–92	71	-	-	-	71	6 733	-	-	6 733
1992–93	57	-	1	2	59	5 778	-	1	5 779
1993–94	60	-	-	1	61	3 557	-	-	3 557
1994–95	61	-	-	1	62	3 441	-	-	3 441
1995–96	64	-	1	3	67	3 735	-	2	3 737
1996–97	72	-	-	-	72	4 845	-	-	4 845
1997–98	67	-	1	1	68	5 403	-	4	5 407
1998–99	65	-	-	-	65	5 115	-	-	5 115
1999–00	56	-	-	-	56	7 646	-	-	7 646
2000–01	55	-	-	-	55	7 375	-	-	7 375
2001–02	56	-	1	1	57	8 392	-	25	8 417
2002–03	49	-	3	3	52	5 674	-	10	5 684
2003–04	45	-	-	-	45	3 794	-	-	3 794
2004–05	42	-	-	-	42	2 553	-	-	2 553
2005–06	41	-	-	-	41	2 367	-	-	2 367
2006–07	36	-	-	2	38	2 995	-	-	2 995
2007–08	35	-	-	-	35	2 724	-	-	2 724
2008–09	32	-	-	1	33	2 912	-	-	2 912
2009–10	33	-	-	1	34	3 139	-	-	3 139

Fishing year	Catch (t)				
	TCEPR	TCER	CELRL trawl	CELRL	Total
1989–90	12 196	-	-	-	12 196
1990–91	16 599	-	-	-	16 599
1991–92	31 270	-	-	-	31 270
1992–93	23 486	-	-	-	23 486
1993–94	11 586	-	-	-	11 586
1994–95	13 441	-	-	-	13 441
1995–96	13 078	-	1	1	13 079
1996–97	21 136	-	-	-	21 136
1997–98	25 463	-	1	1	25 464
1998–99	23 780	-	-	-	23 780
1999–00	34 093	-	-	-	34 093
2000–01	30 076	-	-	-	30 076
2001–02	30 184	-	-	-	30 184
2002–03	20 225	-	5	5	20 230
2003–04	11 630	-	-	-	11 630
2004–05	6 250	-	-	-	6 250
2005–06	6 726	-	-	-	6 726
2006–07	7 652	-	-	-	7 652
2007–08	8 700	-	-	-	8 700
2008–09	9 814	-	-	-	9 814
2009–10	12 289	-	-	-	12 289

APPENDIX Table A1f: Number of Puysegur vessels, tows and catch for all vessels by year for the spawning season. Data source is un-groomed non-zero TCEPR, TCER, and CELR tows catching hoki. Year defined as June to December. ‘CELR’ includes all fishing methods reported on the CELR form, and ‘CELR trawl’ includes mid-water and bottom trawl tows only. No October to December data in 2010.

Fishing year	Number of Vessels					Number of tows			
	TCEPR	TCER	CELR trawl	CELR	Total	TCEPR	TCER	CELR trawl	Total
1990	41	-	0	0	41	992	-	0	992
1991	41	-	0	0	41	651	-	0	651
1992	42	-	2	1	43	1 018	-	0	1 018
1993	25	-	2	2	27	336	-	10	346
1994	35	-	2	3	38	487	-	16	503
1995	29	-	0	2	31	346	-	6	352
1996	25	-	0	0	25	624	-	0	624
1997	39	-	0	0	39	876	-	0	876
1998	28	-	1	0	28	480	-	0	480
1999	28	-	2	1	29	581	-	3	584
1900	30	-	1	2	32	641	-	32	673
2001	34	-	2	1	35	665	-	8	673
2002	27	-	1	2	29	496	-	16	512
2003	32	-	1	1	33	543	-	10	553
2004	19	-	1	1	20	156	-	20	176
2005	21	-	1	1	22	481	-	12	493
2006	21	-	2	1	22	352	-	23	375
2007	16	-	0	3	19	258	-	21	279
2008	6	-	0	1	7	128	-	0	128
2009	10	2	0	1	13	83	13	0	96
2010	7	1	0	1	9	70	2	0	72

Fishing year	Catch (t)				
	TCEPR	TCER	CELR trawl	CELR	Total
1990	7 370	-	0	0	7 370
1991	4 897	-	0	0	4 897
1992	5 212	-	0	0	5 212
1993	1 746	-	0	0	1 746
1994	2 558	-	0	0	2 558
1995	1 077	-	0	0	1 077
1996	2 555	-	0	0	2 555
1997	5 883	-	0	0	5 883
1998	2 361	-	0	0	2 361
1999	2 570	-	4	4	2 574
1900	3 353	-	0	0	3 353
2001	6 228	-	1	1	6 229
2002	5 072	-	7	7	5 079
2003	6 018	-	16	16	6 034
2004	801	-	5	5	806
2005	5 555	-	0	0	5 555
2006	1 354	-	6	6	1 360
2007	422	-	9	9	431
2008	216	-	0	0	216
2009	210	4	0	0	214
2010	104	2	0	0	106

APPENDIX Table A2a: Number of vessels, total catch, number of tows, median tow duration, catch per tow, and catch per hour for all WCSI vessels by year. Year defined as June to October. No October data in 2010. Data are non-zero catches for TCEPR midwater tows.

All target species MW tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	64	148 184	6 425	4.2	10.9	2.8
1991	65	119 238	6 568	4.0	10.5	2.7
1992	61	90 101	5 038	3.6	12.2	3.5
1993	57	83 344	5 247	3.2	10.5	3.8
1994	62	105 135	6 930	3.0	9.1	3.3
1995	59	73 844	6 654	3.5	5.2	1.5
1996	58	67 046	5 130	3.5	7.0	2.0
1997	73	83 301	6 531	3.8	7.5	2.1
1998	63	95 108	6 509	3.6	10.6	2.8
1999	54	76 771	5 231	3.1	10.3	3.3
2000	52	79 559	5 265	2.8	12.1	4.4
2001	62	78 870	5 871	2.7	9.0	3.4
2002	56	61 391	4 645	2.3	9.8	4.1
2003	51	51 689	4 295	3.1	8.1	2.3
2004	51	32 051	4 230	2.4	4.6	1.5
2005	37	19 878	2 339	2.5	5.3	1.9
2006	36	21 460	2 014	3.0	6.9	2.5
2007	31	21 122	1 432	3.5	9.3	3.5
2008	15	12 055	886	1.8	6.4	3.8
2009	23	12 601	887	3.2	8.9	3.1
2010	26	23 053	1 211	2.6	15.5	5.3
All years	229	1 355 800	93 338	3.3	8.9	2.7

Target hoki MW tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	25	62 389	2165	4.5	14.2	3.4
1991	53	81 014	4136	4.0	10.5	2.9
1992	28	32 270	1539	4.0	15.3	3.7
1993	47	61 683	3937	3.1	10.5	3.7
1994	52	80 751	5271	3.0	8.6	3.2
1995	52	56 604	5219	3.5	5.2	1.5
1996	48	42 788	3730	3.5	6.5	1.9
1997	67	61 492	4954	3.7	7.5	2.1
1998	60	77 577	5388	3.5	10.4	2.7
1999	37	44 331	3357	3.2	9.8	2.9
2000	43	59 116	4120	2.5	11.3	4.5
2001	56	60 776	4417	2.7	9.0	3.3
2002	54	46 600	3607	2.3	9.4	4.0
2003	50	46 160	3788	3.2	8.1	2.3
2004	48	28 737	3755	2.3	4.7	1.6
2005	35	18 572	2205	2.4	5.3	1.9
2006	34	19 373	1818	2.9	6.9	2.6
2007	31	20 101	1331	3.5	9.9	3.7
2008	13	9 594	705	1.8	6.0	3.6
2009	22	11 746	815	3.2	9.3	3.3
2010	26	20 529	1118	2.6	15.2	5.1
All years	190	942 202	295 848	3.2	8.6	2.7

APPENDIX Table A2b: Number of vessels, total catch, number of tows, median tow duration, catch per tow, and catch per hour for all WCSI vessels by year. Year defined as June to October. No October data in 2010. Data are non-zero catches for TCEPR bottom tows.

All target species BT tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	38	10 842	1 174	4.1	3.6	0.9
1991	36	10 899	1 430	4.0	3.7	0.9
1992	37	9 512	1 033	4.1	4.2	1.0
1993	32	13 819	1 722	3.8	5.2	1.4
1994	32	9 522	1 371	4.2	4.3	0.9
1995	25	6 091	1 310	4.5	2.6	0.5
1996	36	5 098	1 581	4.7	2.2	0.4
1997	47	5 221	1 418	5.0	2.3	0.5
1998	36	6 017	1 246	5.3	3.2	0.5
1999	38	12 920	1 754	4.7	4.6	0.9
2000	34	16 656	1 983	4.5	6.0	1.2
2001	40	18 259	2 396	4.5	5.0	0.9
2002	35	27 036	3 005	5.0	5.2	1.0
2003	39	17 106	3 195	5.3	2.3	0.4
2004	35	8 174	2 152	6.0	1.5	0.3
2005	30	10 753	1 765	6.5	2.5	0.4
2006	26	14 991	2 130	8.4	2.9	0.4
2007	22	10 266	1 344	7.1	3.1	0.4
2008	17	8 156	1 471	9.0	2.4	0.3
2009	17	6 741	1 082	9.2	3.0	0.3
2010	20	11 084	1 139	6.9	5.1	0.9
All years	140	239 162	35 701	5.0	3.2	0.6

Target hoki BT tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	32	10 752	1 061	4.2	4.4	1.1
1991	30	10 823	1 294	4.0	4.2	1.1
1992	28	9 325	790	4.0	7.1	1.7
1993	29	13 775	1 588	3.8	6.0	1.6
1994	29	9 498	1 273	4.2	4.3	1.0
1995	24	6 076	1 276	4.5	2.7	0.6
1996	35	5 068	1 539	4.7	2.2	0.4
1997	42	5 190	1 354	5.0	2.5	0.5
1998	34	5 984	1 218	5.3	3.2	0.5
1999	35	12 886	1 681	4.7	5.2	1.0
2000	32	16 586	1 831	4.3	6.0	1.4
2001	37	18 237	2 311	4.6	5.0	1.0
2002	34	26 766	2 839	5.0	5.9	1.1
2003	39	16 842	2 789	5.1	3.0	0.6
2004	34	7 911	1 797	5.7	2.0	0.4
2005	27	9 782	1 222	5.6	4.6	0.8
2006	24	13 325	1 404	7.0	5.1	0.8
2007	20	8 886	731	4.8	9.3	1.7
2008	13	5 221	479	5.0	8.7	1.7
2009	13	4 464	350	4.5	11.2	2.6
2010	19	9 207	610	3.2	13.5	4.6
All years	128	226 604	29 437	4.7	4.2	0.9

APPENDIX Table A2c: Number of vessels, total catch, number of tows, median tow duration, catch per tow, and catch per hour for all Cook Strait vessels by year. Year defined as June to October. No October data in 2010. Data are non-zero catches for TCEPR midwater tows.

All target species tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	17	12 295	1 023	1.2	9.6	7.8
1991	21	21 742	1 986	1.5	8.4	5.2
1992	22	19 476	1 615	1.2	8.5	6.8
1993	20	16 907	1 479	1.0	8.4	7.0
1994	27	25 176	1 779	1.0	12.0	12.1
1995	24	24 992	2 103	1.0	8.8	10.6
1996	36	42 933	3 040	0.8	11.7	17.3
1997	33	43 108	3 508	1.0	10.8	11.7
1998	27	30 833	2 345	1.0	11.6	11.8
1999	20	27 793	2 019	1.0	12.6	14.6
2000	21	27 994	1 967	0.7	12.1	19.8
2001	25	23 374	1 822	0.8	11.0	14.0
2002	15	17 136	1 066	1.0	14.9	17.2
2003	20	27 042	1 815	1.0	12.7	16.2
2004	19	27 715	1 793	1.0	12.2	14.2
2005	13	18 474	1 344	1.0	13.2	17.2
2006	11	16 632	1 015	0.8	15.4	20.8
2007	7	12 365	947	1.0	10.9	13.7
2008	6	7 563	404	0.8	18.4	23.3
2009	8	9 103	740	0.6	10.1	18.3
2010	8	10 666	793	0.8	11.3	15.4
All years	67	463 317	34 603	1.0	10.9	12.6

Target hoki tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	17	12 295	1 023	1.2	9.6	7.8
1991	21	21 742	1 986	1.5	8.4	5.2
1992	22	19 476	1 615	1.2	8.5	6.8
1993	18	16 886	1 473	1.0	8.4	7.0
1994	27	25 134	1 773	1.0	12.0	12.2
1995	24	24 933	2 099	1.0	8.8	10.6
1996	36	42 854	3 029	0.8	11.7	17.3
1997	33	43 053	3 503	1.0	10.8	11.7
1998	27	30 795	2 343	1.0	11.6	11.8
1999	20	27 790	2 018	1.0	12.6	14.6
2000	21	27 994	1 967	0.7	12.1	19.8
2001	25	23 346	1 819	0.8	11.0	14.1
2002	15	17 136	1 066	1.0	14.9	17.2
2003	20	27 041	1 813	1.0	12.7	16.3
2004	19	27 715	1 791	1.0	12.2	14.2
2005	13	18 470	1 343	1.0	13.2	17.2
2006	11	16 631	1 014	0.8	15.4	20.8
2007	7	12 318	944	1.0	10.9	13.7
2008	5	7 559	397	0.8	18.8	24.4
2009	8	9 091	739	0.6	10.1	18.3
2010	8	10 609	791	0.8	11.3	15.3
All years	67	462 868	34 546	1.0	10.9	12.6

APPENDIX Table A2d: Number of non-zero hoki bottom tow data for Chatham Rise and ECSI vessels, total catch, number of tows, median tow duration, median catch per tow, and median catch per hour by year. Data source is un-groomed bottom non-zero TCEPR tows catching hoki. Year defined as October to June.

All target species tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1989–90	44	11 928	2 508	3.9	2.2	0.7
1990–91	51	15 227	3 954	4.0	2.2	0.6
1991–92	64	41 588	7 292	4.0	3.2	1.0
1992–93	58	37 684	7 014	3.8	3.8	1.1
1993–94	58	17 255	4 974	3.5	2.1	0.8
1994–95	63	25 819	6 367	3.7	3.1	1.0
1995–96	71	33 955	7 808	3.5	3.3	1.0
1996–97	88	38 871	9 179	3.6	3.2	0.9
1997–98	78	49 779	10 925	4.0	3.4	0.9
1998–99	72	60 032	11 906	4.0	4.1	1.1
1999–00	58	42 522	9 904	4.1	3.2	0.8
2000–01	59	42 593	10 578	4.5	3.0	0.7
2001–02	54	32 711	8 723	4.4	2.9	0.7
2002–03	62	33 521	9 880	4.7	2.4	0.5
2003–04	57	24 241	7 820	4.9	2.0	0.5
2004–05	50	26 471	6 326	5.0	2.8	0.6
2005–06	50	31 052	6 378	4.8	3.6	0.8
2006–07	45	33 718	6 474	4.4	3.6	0.8
2007–08	38	33 089	6 137	4.8	3.6	0.8
2008–09	35	35 925	5 686	4.3	4.7	1.1
2009–10	38	36 343	5 436	4.5	5.5	1.2
All years	187	704 326	155 269	4.1	3.1	0.8

Target hoki tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1989–90	25	11 115	1 592	4.0	4.4	1.2
1990–91	36	14 306	2 859	4.0	3.4	0.9
1991–92	40	40 694	4 989	3.8	6.0	1.7
1992–93	37	36 954	4 946	3.5	5.8	1.7
1993–94	30	16 706	3 178	3.1	4.3	1.4
1994–95	34	25 406	5 070	3.4	4.1	1.2
1995–96	49	33 572	6 649	3.3	3.8	1.2
1996–97	64	38 408	7 970	3.5	3.9	1.1
1997–98	61	49 398	9 788	4.0	4.2	1.1
1998–99	42	59 571	10 760	4.0	4.6	1.2
1999–00	33	42 062	8 767	4.0	4.0	1.0
2000–01	40	41 514	9 020	4.5	3.6	0.8
2001–02	31	31 680	7 166	4.4	3.4	0.8
2002–03	30	32 395	8 269	4.8	3.0	0.6
2003–04	27	22 955	5 927	4.8	2.8	0.6
2004–05	21	25 345	4 598	5.0	4.1	0.8
2005–06	18	29 522	4 541	4.8	5.1	1.0
2006–07	20	31 248	4 302	4.3	5.7	1.2
2007–08	22	29 643	3 714	4.7	6.5	1.4
2008–09	21	30 757	3 623	4.2	7.1	1.7
2009–10	21	33 416	4 137	4.6	6.9	1.5
All years	149	676 667	121 865	4.0	4.1	1.1

APPENDIX Table A2e: Number of of non-zero tow data for ECSI vessels, total catches, number hoki midwater or bottom tows, median tow duration, median catch per tow, and median catch per hour by year. Data source is un-groomed midwater or bottom non-zero TCEPR tows catching hoki. Year defined as June to October. No October data in 2010. Data not shown for MW vessels in 2009 or 2010 as only one vessel.

All target species mid-water tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
2000	7	264	20	2.7	6.9	2.3
2001	13	858	90	2.3	6.0	2.2
2002	10	1 961	133	2.4	11.7	5.5
2003	17	3 557	242	2.2	13.7	5.1
2004	5	979	53	2.2	12.2	7.2
2005	6	2 380	127	2.0	15.3	8.1
2006	3	372	25	1.4	14.3	7.9
2007	3	134	12	2.5	6.9	5.7
2008	3	254	26	3.0	8.1	2.7
2009	1	-	-	-	-	-
2010	1	-	-	-	-	-

Target hoki mid-water tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
2000	7	264	20	2.7	6.9	2.3
2001	13	858	90	2.3	6.0	2.2
2002	10	1 961	133	2.4	11.7	5.5
2003	17	3 525	240	2.2	13.7	5.1
2004	5	979	53	2.2	12.2	7.2
2005	6	2 380	127	2.0	15.3	8.1
2006	3	364	24	1.4	14.8	9.0
2007	3	134	12	2.5	6.9	5.7
2008	3	205	20	3.9	8.3	2.7
2009	1	-	-	-	-	-
2010	1	-	-	-	-	-

All target species bottom tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
2000	10	252	69	2.5	2.5	1.0
2001	13	416	80	2.7	3.2	1.1
2002	16	828	124	2.6	3.9	1.6
2003	15	2081	254	2.8	5.3	1.9
2004	7	251	44	2.4	3.2	1.0
2005	8	593	78	2.9	4.1	1.7
2006	7	166	31	2.1	2.1	1.6
2007	10	662	80	2.0	6.2	3.0
2008	12	2113	215	2.8	7.5	2.5
2009	8	636	76	2.8	6.2	2.4
2010	7	511	56	2.8	8.4	2.9

Target hoki bottom tows:

Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
2000	8	252	66	2.5	2.6	1.0
2001	12	416	79	2.7	3.5	1.1
2002	11	820	118	2.7	4.0	1.8
2003	12	2022	244	2.9	5.6	1.9
2004	4	251	40	2.8	3.5	1.1
2005	6	589	75	2.8	4.2	1.8
2006	4	107	21	2.1	3.0	1.6
2007	7	659	68	2.2	8.3	3.5
2008	8	1859	174	2.9	9.2	2.9
2009	6	613	67	2.9	8.2	2.4
2010	7	487	54	2.8	8.2	2.9

APPENDIX Table A2f: Number of non-zero bottom tow data for Sub-Antarctic vessels, total catch, number of hoki tows, median tow duration, median catch per tow, and median catch per hour for all vessels by year. Data source is un-groomed bottom non-zero TCEPR tows catching hoki. Year defined as October to June.

All target species tows:

Fishing Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1989–90	28	10 150	1 776	3.7	3.3	0.9
1990–91	33	13 826	3 334	4.0	3.0	0.7
1991–92	45	28 088	5 850	4.1	3.7	0.9
1992–93	31	19 861	4 932	3.9	3.1	0.8
1993–94	37	7 688	2 610	4.2	1.6	0.4
1994–95	38	12 047	3 019	4.3	2.6	0.7
1995–96	42	10 015	2 952	4.1	2.2	0.5
1996–97	52	16 464	3 824	4.5	2.9	0.7
1997–98	47	22 556	4 763	4.3	3.4	0.8
1998–99	41	19 145	4 120	4.5	3.1	0.7
1999–00	42	30 923	6 858	4.2	3.0	0.8
2000–01	43	23 795	6 121	4.5	2.7	0.6
2001–02	47	27 413	7 541	4.5	2.3	0.6
2002–03	42	19 218	5 423	4.9	2.4	0.5
2003–04	38	10 243	3 510	5.0	2.0	0.4
2004–05	38	5 555	2 298	5.2	1.0	0.2
2005–06	34	5 621	2 025	5.2	0.6	0.1
2006–07	30	5 372	2 277	5.5	0.6	0.1
2007–08	29	7 187	2 355	5.5	1.0	0.2
2008–09	25	8 542	2 562	5.2	1.0	0.2
2009–10	26	11 137	2 781	5.7	1.0	0.2
All years	149	314 846	80 931	4.5	2.4	0.6

Hoki target tows:

Fishing Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1989–90	17	9 709	1 402	3.7	5.2	1.4
1990–91	21	13 556	3 046	4.1	3.1	0.8
1991–92	25	27 083	4 835	4.1	4.2	1.1
1992–93	22	19 169	4 244	3.8	3.7	1.0
1993–94	17	7 449	1 582	3.8	3.2	1.0
1994–95	23	11 776	2 165	4.0	4.1	1.0
1995–96	21	9 786	2 061	3.9	3.5	1.0
1996–97	37	16 143	2 669	4.2	5.1	1.2
1997–98	32	22 134	3 882	4.2	4.2	1.1
1998–99	30	18 681	3 177	4.2	4.1	1.1
1999–00	29	30 291	5 650	4.0	4.0	1.0
2000–01	31	22 979	4 883	4.3	3.5	0.8
2001–02	33	26 523	5 840	4.2	2.9	0.8
2002–03	31	18 449	4 204	4.8	3.0	0.7
2003–04	24	9 897	2 713	4.9	2.8	0.6
2004–05	25	4 944	1 293	5.1	2.5	0.5
2005–06	15	4 168	617	4.8	4.1	0.8
2006–07	20	3 669	842	4.7	2.1	0.5
2007–08	11	5 108	783	4.8	4.5	0.9
2008–09	11	6 405	827	4.5	5.4	1.2
2009–10	12	9 361	1 107	4.5	6.6	1.4
All years	102	297 279	57 822	4.2	3.7	0.9

APPENDIX Table A2g: Number of non-zero tows for Puysegur vessels, total catch, number of hoki bottom and midwater tows, median tow duration, median catch per tow, and median catch per hour for all vessels by year. Data source is un-groomed midwater or bottom non-zero TCEPR tows catching hoki. Year defined as June to December. No October to December data in 2010. Data has been removed where there is one vessel only.

All target species midwater tows:

Fishing Year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	20	4 401	434	2.5	8.7	3.6
1991	13	1 791	137	2.2	11.2	5.1
1992	11	704	80	3.0	7.0	2.1
1993	4	398	40	1.2	6.4	6.4
1994	13	1 580	167	3.0	4.1	1.1
1995	9	447	60	2.5	4.0	1.5
1996	9	1 295	136	2.7	7.3	3.2
1997	19	3 951	318	3.6	10.6	2.7
1998	5	639	74	3.0	7.2	2.1
1999	14	1 182	112	2.8	5.2	1.4
1990	11	1 232	98	4.3	6.8	1.9
2001	20	4 093	308	4.4	9.5	2.1
2002	18	2 224	171	3.6	7.4	1.8
2003	16	3 917	246	3.0	12.2	3.4
2004	4	366	23	4.2	5.7	0.8
2005	9	3 643	158	2.2	22.4	9.8
2006	4	240	16	2.8	15.1	5.0
2007	1	43	-	-	-	-
2008	1	60	-	-	-	-
2009	1	46	-	-	-	-
2010	1	13	-	-	-	-
All years	89	32 266	2 585	3.0	8.6	2.8

Hoki target mid-water tows:

Fishing year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	20	4 396	433	2.5	8.7	3.6
1991	13	1 791	137	2.2	11.2	5.1
1992	10	685	76	3.0	8.2	2.1
1993	4	398	40	1.2	6.4	6.4
1994	13	1 559	165	3.0	4.1	1.1
1995	9	447	60	2.5	4.0	1.5
1996	9	1 295	136	2.7	7.3	3.2
1997	19	3 951	318	3.6	10.6	2.7
1998	5	639	74	3.0	7.2	2.1
1999	14	1 182	112	2.8	5.2	1.4
1990	11	1 232	98	4.3	6.8	1.9
2001	20	4 086	307	4.4	9.5	2.1
2002	18	2 224	171	3.6	7.4	1.8
2003	16	3 917	246	3.0	12.2	3.4
2004	3	364	21	4.3	6.1	1.3
2005	8	3 637	156	2.2	22.9	10.1
2006	4	240	16	2.8	15.1	5.0
2007	1	43	-	-	-	-
2008	1	60	-	-	-	-
2009	1	46	-	-	-	-
2010	1	13	-	-	-	-
All years	87	32 206	2 573	3.0	8.7	2.9

APPENDIX Table A2g: continued.

All target species bottom tows:

Fishing year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	15	111	192	3.2	0.2	0.1
1991	24	1 692	373	4.2	3.1	0.8
1992	30	4 103	845	4.3	3.0	0.7
1993	12	1 065	230	4.2	3.1	0.8
1994	20	402	174	4.2	1.1	0.3
1995	11	216	126	5.6	0.5	0.1
1996	16	991	353	4.2	1.1	0.3
1997	25	1 181	338	5.4	0.8	0.2
1998	20	1 316	255	4.9	2.6	0.6
1999	22	969	264	5.1	1.1	0.2
1990	20	872	283	5.2	1.0	0.2
2001	24	940	227	4.2	2.0	0.5
2002	18	1 858	194	3.8	6.6	1.5
2003	22	823	187	4.5	1.8	0.4
2004	15	199	82	4.8	0.6	0.1
2005	21	519	238	5.3	0.9	0.2
2006	16	1 020	257	4.0	1.0	0.3
2007	13	253	118	5.0	0.7	0.1
2008	6	134	56	4.8	1.4	0.3
2009	7	126	57	3.1	1.0	0.3
2010	6	90	69	5.8	1.0	0.2
All years	94	18 883	4 918	4.5	1.5	0.3

Hoki target bottom tows:

Fishing year	Number of vessels	Total catch (t)	Number of tows	Median tow duration (h)	Median catch per tow (t)	Median catch per hour (t/h)
1990	8	28	21	3.0	1.1	0.3
1991	18	1 565	304	4.0	4.2	1.0
1992	27	3 863	704	4.2	3.2	0.8
1993	11	1 036	204	4.0	3.8	0.9
1994	16	363	137	4.4	1.2	0.3
1995	9	186	91	5.8	0.8	0.1
1996	16	926	272	4.1	1.5	0.3
1997	22	1 000	296	5.3	0.9	0.2
1998	18	1 283	238	4.8	3.0	0.7
1999	21	935	237	5.0	1.2	0.3
1990	18	840	234	4.9	1.5	0.3
2001	22	931	204	4.2	2.5	0.6
2002	16	1 841	185	3.8	6.9	1.7
2003	15	800	140	4.5	3.0	0.7
2004	6	153	25	3.3	4.0	1.1
2005	8	244	51	3.2	2.2	0.9
2006	6	720	79	3.5	6.1	2.2
2007	2	57	14	3.8	2.1	0.5
2008	1	13	-	-	-	-
2009	1	32	-	-	-	-
2010	1	16	-	-	-	-
All years	76	16 832	3 445	4.3	2.6	0.6

APPENDIX Table A3: CPUE datasets for all vessels and for core vessels for each year (1990–2010) for main hoki areas.

WCSI: All target species

Year	All vessels				Core Vessels			
	No vessels	Catch	Effort	CPUE	No vessels	Catch	Effort	CPUE
1990	75	159 026.0	7 599	20.93	17	66 865.6	2 375	28.15
1991	76	130 137.0	7 998	16.27	26	79 311.4	3 074	25.80
1992	71	99 613.8	6 071	16.41	32	61 690.9	2 886	21.38
1993	64	97 163.0	6 969	13.94	33	65 011.3	3 935	16.52
1994	68	114 656.7	8 301	13.81	36	85 278.8	5 093	16.74
1995	64	79 934.1	7 964	10.04	34	60 023.7	5 014	11.97
1996	60	72 143.9	6 711	10.75	34	58 783.4	4 490	13.09
1997	75	89 713.7	8 065	11.12	42	68 309.3	5 436	12.57
1998	66	102 991.6	7 777	13.24	47	86 408.1	6 314	13.69
1999	59	90 501.5	6 996	12.94	42	81 389.8	5 963	13.65
2000	53	97 141.6	7 266	13.37	41	92 389.5	6 747	13.69
2001	63	97 129.4	8 267	11.75	44	89 907.0	7 351	12.23
2002	57	88 426.7	7 650	11.56	43	81 095.0	6 974	11.63
2003	51	68 794.6	7 490	9.18	41	64 515.7	7 034	9.17
2004	51	40 224.9	6 382	6.30	37	32 042.2	5 357	5.98
2005	39	30 631.0	4 104	7.46	34	28 643.8	3 845	7.45
2006	37	36 451.0	4 144	8.80	31	32 883.2	3 677	8.94
2007	32	31 388.3	2 776	11.31	28	28 724.7	2 309	12.44
2008	25	20 210.6	2 357	8.57	22	19 303.6	2 109	9.15
2009	24	19 341.3	1 969	9.82	21	18 351.6	1 730	10.61
2010	28	34 137.3	2 350	14.53	23	31 874.8	2 141	14.89

Cook Strait: Target hoki, June-October, mid-water tows

Year	All vessels				Core Vessels			
	No vessels	Catch	Effort	CPUE	No vessels	Catch	Effort	CPUE
1990	17	12 295.3	1 023	12.02	8	6 468.5	551	11.74
1991	21	21 741.9	1 986	10.95	9	10 914.7	976	11.18
1992	22	19 475.7	1 615	12.06	11	11 032.4	814	13.55
1993	20	16 907.0	1 479	11.43	10	11 523.3	945	12.19
1994	27	25 175.5	1 779	14.15	13	15 205.9	1002	15.18
1995	24	24 992.0	2 103	11.88	12	14 587.4	993	14.69
1996	36	42 933.0	3 040	14.12	16	21 728.0	1 324	16.41
1997	33	43 107.8	3 508	12.29	17	22 999.4	1 886	12.19
1998	27	30 832.8	2 345	13.15	16	21 819.6	1 672	13.05
1999	20	27 792.5	2 019	13.77	16	22 171.4	1 621	13.68
2000	21	27 993.8	1 967	14.23	16	16 870.3	1 215	13.89
2001	25	23 374.0	1 822	12.83	15	14 418.5	1 165	12.38
2002	15	17 135.8	1 066	16.07	12	11 887.8	756	15.72
2003	20	27 041.9	1 815	14.90	12	17 203.0	1 172	14.68
2004	19	27 715.5	1 793	15.46	13	18 491.5	1 225	15.10
2005	13	18 474.4	1 344	13.75	11	13 295.4	994	13.38
2006	11	16 631.6	1 015	16.39	10	11 120.2	707	15.73
2007	7	12 365.2	947	13.06	6	8 381.7	671	12.49
2008	6	7 562.5	404	18.72	5	5 519.9	302	18.28
2009	8	9 102.9	740	12.30	8	5 788.2	507	11.42
2010	8	10 665.6	793	13.45	7	8 009.2	621	12.90

APPENDIX Table A3: continued.

Chatham Rise and ECSI non-spawning: All target species

Year	All vessels				Core Vessels			
	No vessels	Catch	Effort	CPUE	No vessels	Catch	Effort	CPUE
1990	44	11 994.9	2 540	4.72	2	4 906.1	389	12.61
1991	60	27 003.5	4 858	5.56	5	14 100.5	1 403	10.05
1992	68	46 062.4	7 706	5.98	6	22 035.7	2 052	10.74
1993	72	42 195.9	7 966	5.30	9	22 531.8	3 132	7.19
1994	69	21 268.9	6 012	3.54	10	12 399.5	2 571	4.82
1995	80	33 791.7	8 218	4.11	11	22 213.1	4 441	5.00
1996	91	43 596.9	9 585	4.55	11	29 832.4	4 863	6.13
1997	93	50 973.1	11 273	4.52	19	38 328.3	6 544	5.86
1998	90	70 388.8	14 418	4.88	20	58 415.2	10 434	5.60
1999	80	70 926.2	14 178	5.00	19	62 233.8	10 921	5.70
2000	68	53 335.5	12 502	4.27	17	46 938.1	9 708	4.83
2001	67	45 523.5	11 479	3.97	18	40 181.6	8 830	4.55
2002	58	35 438.8	9 568	3.70	17	31 298.4	7 208	4.34
2003	62	34 977.3	10 338	3.38	18	30 849.4	8 054	3.83
2004	57	25 588.1	8 126	3.15	17	22 340.0	5 931	3.77
2005	51	27 944.2	6 680	4.18	14	25 155.5	4 648	5.41
2006	52	31 670.2	6 518	4.86	12	28 341.8	4 507	6.29
2007	46	33 866.9	6 528	5.19	10	29 133.0	4 177	6.97
2008	42	33 542.0	6 252	5.37	9	27 592.9	3 510	7.86
2009	35	35 966.3	5 716	6.29	9	27 829.9	3 347	8.31
2010	39	36 998.0	5 599	6.61	8	32 088.3	3 968	8.09

Sub-Antarctic: All target species

Year	All vessels				Core Vessels			
	No vessels	Catch	Effort	CPUE	No vessels	Catch	Effort	CPUE
1990	45	10 265.9	1 915	5.36	5	7 541.4	1 050	7.18
1991	46	14 091.2	3 455	4.08	7	11 725.5	2 405	4.88
1992	53	29 081.6	5 938	4.90	9	23 109.6	4 252	5.43
1993	51	22 394.8	5 392	4.15	9	17 667.0	3 931	4.49
1994	47	9 103.5	2 977	3.06	7	7 317.0	1 510	4.85
1995	56	12 861.7	3 272	3.93	8	11 749.2	2 104	5.58
1996	62	11 474.9	3 335	3.44	5	6 439.6	1 311	4.91
1997	65	17 680.3	4 116	4.30	11	14 324.0	2 131	6.72
1998	65	23 477.9	4 959	4.73	12	20 708.4	3 456	5.99
1999	57	21 862.2	4 552	4.80	10	15 716.6	2 566	6.12
2000	54	33 116.6	7 351	4.51	11	27 471.4	4 836	5.68
2001	51	27 490.4	6 740	4.08	12	20 083.1	4 145	4.85
2002	54	27 983.5	7 837	3.57	11	24 117.9	5 083	4.74
2003	44	19 512.9	5 519	3.54	11	15 532.4	3 342	4.65
2004	42	10 448.5	3 605	2.90	7	7 462.2	1 969	3.79
2005	42	5 734.5	2 386	2.40	7	3 730.0	1 052	3.55
2006	39	5 840.2	2 091	2.79	6	3 336.5	664	5.02
2007	36	5 547.4	2 346	2.36	5	2 127.4	638	3.33
2008	35	7 880.5	2 460	3.20	5	5 470.6	1 069	5.12
2009	32	9 000.4	2 632	3.42	5	7 119.0	1 136	6.27
2010	30	11 860.8	2 855	4.15	5	9 424.0	1 209	7.79

APPENDIX Table A4: CPUE estimated values and 95% confidence intervals by year for core vessels for main hoki areas.

Year	WCSI All target species		WCSI Target hoki		Cook Strait Target hoki, MW	
	CPUE	CI	CPUE	CI	CPUE	CI
1990	1.36	1.30–1.43	1.33	1.27–1.40	1.10	1.00–1.20
1991	1.35	1.30–1.40	1.34	1.29–1.39	0.87	0.81–0.93
1992	1.29	1.24–1.34	1.34	1.28–1.39	1.03	0.96–1.11
1993	1.13	1.10–1.17	1.17	1.13–1.21	0.94	0.88–1.01
1994	1.05	1.02–1.08	1.05	1.02–1.08	1.13	1.06–1.21
1995	0.80	0.77–0.82	0.77	0.74–0.79	1.25	1.17–1.34
1996	0.86	0.84–0.89	0.86	0.84–0.89	1.05	0.99–1.11
1997	0.79	0.77–0.81	0.80	0.78–0.82	0.90	0.86–0.94
1998	1.02	1.00–1.05	1.04	1.01–1.06	1.02	0.97–1.07
1999	1.12	1.09–1.15	1.11	1.08–1.14	0.95	0.90–1.00
2000	1.25	1.22–1.28	1.23	1.20–1.26	1.04	0.98–1.10
2001	0.92	0.90–0.94	0.91	0.89–0.94	0.80	0.76–0.85
2002	0.92	0.89–0.94	0.90	0.88–0.92	1.29	1.20–1.39
2003	0.67	0.65–0.68	0.66	0.64–0.68	1.07	1.01–1.14
2004	0.46	0.45–0.47	0.44	0.43–0.45	0.92	0.87–0.98
2005	0.58	0.56–0.60	0.55	0.53–0.56	0.88	0.82–0.93
2006	0.84	0.82–0.87	0.81	0.78–0.84	1.01	0.94–1.09
2007	1.11	1.07–1.16	1.25	1.19–1.31	0.82	0.75–0.88
2008	1.30	1.24–1.36	1.21	1.15–1.28	1.36	1.22–1.53
2009	1.57	1.49–1.64	1.75	1.64–1.86	0.81	0.74–0.88
2010	1.59	1.53–1.66	1.62	1.55–1.70	0.99	0.91–1.08

Year	Chatham Rise All target species, BT		Chatham Rise Target hoki, BT		Sub-Antarctic All target species, BT		Sub-Antarctic Target hoki, BT	
	CPUE	CI	CPUE	CI	CPUE	CI	CPUE	CI
1990	1.14	1.02–1.27	1.13	1.02–1.27	1.21	1.12–1.31	0.75	0.68–0.84
1991	0.94	0.88–1.01	0.97	0.91–1.04	0.85	0.80–0.90	0.72	0.67–0.76
1992	1.21	1.15–1.28	1.23	1.16–1.30	1.24	1.19–1.30	1.16	1.11–1.22
1993	1.18	1.13–1.23	1.15	1.10–1.20	1.02	0.97–1.07	0.97	0.93–1.02
1994	1.05	1.00–1.09	1.05	1.00–1.09	1.28	1.20–1.36	1.24	1.17–1.32
1995	0.95	0.92–0.99	0.96	0.92–0.99	1.29	1.23–1.36	1.24	1.18–1.31
1996	1.10	1.06–1.13	1.10	1.06–1.14	1.10	1.04–1.16	1.08	1.02–1.15
1997	0.97	0.95–1.00	0.98	0.95–1.00	1.34	1.28–1.40	1.33	1.27–1.40
1998	0.93	0.90–0.95	0.93	0.91–0.95	1.12	1.07–1.16	1.15	1.10–1.19
1999	1.05	1.02–1.07	1.05	1.03–1.08	1.00	0.95–1.04	1.06	1.01–1.10
2000	0.90	0.88–0.92	0.89	0.87–0.92	1.00	0.97–1.04	1.05	1.01–1.09
2001	0.83	0.81–0.85	0.83	0.81–0.85	0.88	0.85–0.91	0.92	0.89–0.96
2002	0.83	0.81–0.85	0.83	0.80–0.85	0.91	0.88–0.94	0.95	0.92–0.98
2003	0.63	0.61–0.65	0.63	0.61–0.64	0.84	0.81–0.87	0.88	0.85–0.92
2004	0.60	0.58–0.61	0.59	0.58–0.61	0.60	0.57–0.63	0.63	0.60–0.67
2005	0.83	0.80–0.85	0.84	0.81–0.87	0.59	0.55–0.63	0.64	0.59–0.68
2006	1.06	1.02–1.10	1.08	1.04–1.12	0.79	0.73–0.86	0.98	0.89–1.09
2007	1.08	1.05–1.12	1.09	1.05–1.13	0.66	0.61–0.72	0.60	0.55–0.66
2008	1.42	1.37–1.47	1.37	1.32–1.42	1.13	1.05–1.20	1.30	1.20–1.41
2009	1.49	1.43–1.54	1.48	1.43–1.54	1.37	1.29–1.46	1.49	1.38–1.60
2010	1.35	1.31–1.40	1.34	1.29–1.38	1.49	1.40–1.58	1.62	1.51–1.72