

Pacific Herring Coded Wire Tagging Study: 2005 Recoveries

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ABSTRACT

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The results of searching Pacific herring catches from British Columbia roe fisheries in 2005 to recover coded wire tags are presented. It was estimated that 27.0% of the total British Columbia roe herring catch by weight, equivalent to approximately 7,749.3 metric tonnes, was searched for tags at three fish processing plants. Among the 4 stock assessment regions which had openings for roe herring, the percentages of regional catches searched for tags varied from 22.3 to 39.2%. A total of 2,102 tagged herring from five release years were recovered. With respect to year of release, there were no recoveries from 1999; 6 recoveries from 2000; 105 from 2001; 274 from 2002; 433 from 2003 and 1,284 from 2004 and 66 inter-regional strays were observed and are described as follows. From 2001 releases, 1 was from the Strait of Georgia and recovered in the Central Coast. From 2002 releases, 2 were from the Prince Rupert District and recovered in the Central Coast; 1 was from the Prince Rupert District and recovered in the Strait of Georgia; 5 were from the Central Coast and recovered in the Strait of Georgia; 1 was from the Strait of Georgia and recovered in the Central Coast, and 1 was from the Strait of Georgia and recovered in the west coast of Vancouver Island. From 2003 releases, 5 were from the Prince Rupert District and recovered in the Central Coast; 1 was from the Prince Rupert District and recovered in the Strait of Georgia; 2 were from the Prince Rupert District and recovered in the west coast of Vancouver Island; 2 were from the Central Coast and recovered in the Prince Rupert District; 6 were from the Central Coast and recovered in the Strait of Georgia; 1 was from the Central Coast and recovered in the west coast of Vancouver Island, and 1 was from the Strait of Georgia and recovered in the Central Coast. From 2004 releases, 9 were from the Central Coast and recovered in the Prince Rupert District; 15 were from the Central Coast and recovered in the Strait of Georgia; 3 were from the Central Coast and recovered in the west coast of Vancouver Island; 1 was from the west coast of Vancouver Island and recovered in the Prince Rupert District, and 9 were from the west coast of Vancouver Island and recovered in the Strait of Georgia. In addition to regional strays, there were approximately 516 inter-area strays (with the same region of release and recovery) and there were approximately 1,514 recoveries having the same area of release and recovery. Observed tag recovery data were related to roe herring catches by region, area(s) and gear type. Using data from specific recovery and release events, we derived estimates for the number of tagged herring recovered per number released, the number of tagged herring recovered per tonne of roe herring searched, the number of tagged herring removed by the 2005 roe herring fisheries and the number of tagged herring removed per number released.

RÉSUMÉ

Flostrand, L. et Schweigert, J.F. 2007. Pacific herring coded wire tagging study: 2005 recoveries. Can. Tech. Rep. Fish. Aquat. Sci. 2711: vii + 33 p.

Nous présentons les résultats de la recherche de harengs du Pacifique portant une micromarque codée parmi les prises de harengs rogués réalisées en Colombie-Britannique en 2005. Nous estimons que 27,0 % (en poids) des prises totales, soit quelque 7 749,3 tonnes, ont été examinées dans trois usines de transformation du poisson, pour trouver celles qui portaient une micromarque. Parmi les quatre régions côtières d'évaluation des stocks où la pêche du hareng rogué a été ouverte, le pourcentage des prises soumises à cette recherche a varié de 22,3 à 39,2 %. Au total, 2 102 harengs qui ont été marqués en saison au cours de cinq années différentes ont été récupérés (aucun de 1999; 6 de 2000; 105 de 2001; 274 de 2002; 433 de 2003 et 1 284 de 2004). Soixante-six (66) de ces poissons ont été recapturés dans une région différente de celle où ils ont été marqués. Un a été marqué et remis à l'eau en 2001 dans le détroit de Georgia puis recapturé sur la côte centrale. Des harengs marqués en 2002, deux remis à l'eau dans le district de Prince Rupert ont été recapturés sur la côte centrale; un remis à l'eau dans le district de Prince Rupert a été recapturé dans le détroit de Georgia; cinq remis à l'eau sur la côte centrale ont été recapturés dans le détroit de Georgia; un remis à l'eau dans le détroit de Georgia a été recapturé sur la côte centrale; et un remis à l'eau dans le détroit de Georgia a été recapturé sur la côte ouest de l'île de Vancouver. Des harengs marqués en 2003, cinq remis à l'eau dans le district de Prince Rupert ont été recapturés sur la côte centrale; un remis à l'eau dans le district de Prince Rupert a été recapturé dans le détroit de Georgia; deux remis à l'eau dans le district de Prince Rupert ont été recapturés sur la côte ouest de l'île de Vancouver; deux remis à l'eau sur la côte centrale ont été recapturés dans le district de Prince Rupert; six remis à l'eau sur la côte centrale ont été recapturés dans le détroit de Georgia; un remis à l'eau sur la côte centrale a été recapturé sur la côte ouest de l'île de Vancouver; et un remis à l'eau dans le détroit de Georgia a été recapturé sur la côte centrale. Des harengs marqués en 2004, neuf remis à l'eau sur la côte centrale ont été recapturés dans le district de Prince Rupert; 15 remis à l'eau sur la côte centrale ont été recapturés dans le détroit de Georgia; trois remis à l'eau sur la côte centrale ont été recapturés sur la côte ouest de l'île de Vancouver; un remis à l'eau sur la côte ouest de l'île de Vancouver a été recapturé dans le district de Prince Rupert; et neuf remis à l'eau sur la côte ouest de l'île de Vancouver ont été récupérés dans le détroit de Georgia. En plus de ces passages d'une région à l'autre, nous avons également observé environ 516 passages d'un secteur à l'autre (à l'intérieur d'une même région de marquage et de recapture). Quelque 1 514 harengs ont été recapturés au même endroit où ils avaient été remis à l'eau. Nous avons établi le rapport entre les données de harengs marqués récupérés et les prises de harengs rogués selon la région, le secteur et le type d'engin de pêche. À l'aide des données obtenues pour les marquages et les recaptures spécifiques, nous avons aussi estimé le nombre de harengs marqués récupérés par nombre remis à l'eau, le nombre de harengs marqués récupérés par tonne de harengs examinés, le nombre de harengs marqués capturés lors de la pêche de 2005 et le nombre de harengs marqués capturés par nombre remis à l'eau.

INTRODUCTION

The application of coded wire tags (CWT) in Pacific herring began in 1999 and tag recovery from searching roe herring catches began in 2000. The primary purpose of the multi-year tagging study is to increase understanding of herring stock structure and inter-annual fidelity and dispersal to spawning sites. Characterizing spatial and temporal patterns of spawning behaviour is critical to the effective management of the resource.

Pacific Fishery Management Area Regulations of the Canadian Fisheries Act identify 30 statistical (or management) areas along the British Columbia (BC) coast, herein referred to as areas, Figure 1. These areas are used for fishery management, enforcement and catch reporting purposes. Specifically for Pacific herring management and stock assessment purposes, there are five stock assessment regions, numerous area subdivisions, and several subdivisions within each area referred to as herring sections (Midgley 2003). The five Pacific herring stock assessment regions are comprised of: 1) the Queen Charlotte Islands (QCI), south-east portions of Area 2E; 2) the Prince Rupert District (PRD), Areas 3 to 5; 3) the Central Coast (CC), Area 7 and portions of 6 to 8; 4) the Strait of Georgia (SG), Areas 14 to 19 and portions of 13 and 29, and 5) the west coast of Vancouver Island (WCVI), Areas 23 to 25. In this report, all Area 5 release sites were grouped with the PRD, all Area 6 to 9 release sites were grouped with the CC, the Area 16 release site was grouped with the SG and the Area 26 release sites were grouped with the WCVI.

Prior to 2005, CWTs were applied in the QCI (1999), the SG (1999 to 2003), the PRD (2001 to 2003), the CC (2002 to 2004), and WCVI (2004) and searching of roe herring catches for CWTs occurred in 2000 to 2004 (Flostrand and Schweigert 2002, 2003, 2004, 2005). Approximately 1,364,729 tags were released from 1999 to 2004 and approximately 3,360 inter-annual and 2,747 in-season tags were recovered from 2000 to 2004 roe herring fisheries. Herring recovered in a different region from where they were tagged are referred to as inter-regional strays (or regional strays). With respect to year of recovery, 3 regional strays were observed in 2000, 1 regional stray was observed in 2001, 4 regional strays were observed in 2002, and 41 regional strays were observed in each of 2003 and 2004. Herring recovered in the same region but from a different area from where they were tagged are referred to as inter-area strays (or area strays) but reporting to date has not elaborated on these. No herring were tagged in 2005 so this report presents results of the 2005 Pacific herring CWT recovery work only.

Weight estimates for the amounts of British Columbia caught roe herring searched for tags in previous years are as follow. In 2000, 21.3% of annual harvest was searched, equivalent to 6,222 metric tonnes (mt). In 2002, 28.8% of the annual harvest was searched, equivalent to 6,922 mt. In 2002, 31.8% of the annual harvest was searched, equivalent to 8,468 mt. In 2003, 24.9% of the

annual harvest was searched, equivalent to 7,172 mt. In 2004, 25.8% of the annual harvest was searched, equivalent to 6,135 mt. More details on the progress of the study can be found in Flostrand and Schweigert (2002, 2003, 2004, 2005).

METHODS

RECOVERING TAGS FROM 2005 ROE HERRING CATCHES

The equipment and methods for tag recovery were the same as for the 2000 to 2004 seasons, using R9500 CWT detectors and deflector gates along a conveyor belt (Flostrand and Schweigert, 2002 2003, 2004, 2005). The three fish plants housing the tag recovery equipment were the same as those used during the 2001 to 2004 tag recovery seasons, being Icicle Seafoods Inc. (Icicle), Canadian Fishing Company (CFC), and Bella Coola Fisheries Ltd. (BCF). In 2005, the QCI region was closed for roe herring harvests, therefore CWT recovery effort focussed on searching a representative portion of catch from the PRD, CC, SG and WCVI. As in 2003 and 2004, no seined roe herring from Alaska was searched for tags. Tag recovery equipment operated from April 4 to June 24 and J.O. Thomas and Associates were again contracted to: operate recovery units; collect and handle samples; record results of equipment operation; verify catch information related to fish lot processing records and communicate processing schedules and equipment needs with plant staff. Field personnel removed the gill tissue and rinsed each carcass of a putative tagged fish with water to remove possible sources of metal contamination prior to re-testing for the presence of a tag. This was done to reduce the number of false positive recoveries brought to the laboratory for CWT dissection. Roe herring catch records and CWT search data were compiled into a Microsoft Access database. Logbooks were kept to document equipment settings and test trials approximately every hour using seeded specimens to ensure that recovery units were in working order. Records were also kept of conveyor speeds and loading rates (mt/hour). Information pertaining to equipment operation is not presented in this report.

TAG RECOVERIES AND RECOVERY RATES

Tag recovery observations were used to calculate tag recovery rates (%) which were determined by relating the number of tags recovered from specific fisheries to the number of tags released from defined 1999 to 2004 release events. Estimates of tag recovery densities were determined by relating the number of tag recoveries from specific fisheries to quantities of roe herring searched (mt). Recovery rates were determined by:

$$RR_o = R_o / T \quad (1)$$

where

RR_o = observed tag recovery rate;

R_o = observed number of tags recovered by release year, region, and area and by recovery region, area and gear;

T = number of tags released by year, region and area.

Tag (recovery) densities were determined by:

$$RD = R_o / S \quad (2)$$

where

RD = observed tags recovered per metric tonne of roe herring searched;

S = roe herring catch searched (mt) by region, area and gear.

TAG REMOVALS AND REMOVAL RATES

Tag removal refers to the estimate of the number of tagged herring removed from the population by roe herring fisheries. Estimates of tag removals from 2005 roe herring fisheries were determined by incorporating the proportion of each roe herring fishery's catch searched for tags into the number of recoveries observed, determined by :

$$R' = R_o (C/S) \quad (3)$$

where

R' = estimated number of tags removed;

C = total roe herring catch (mt) by region, area, and gear.

Tag removal rates were calculated by dividing tag removal estimates by the number of tags released from defined release events; thus each rate can be interpreted as a percentage of the released tags removed by each fishery. Estimates of tag removal rates were determined by:

$$RR' = R' / T = RR_o / (S/C) \quad (4)$$

where

RR' = estimated tag removal rate.

RESULTS

RECOVERING TAGS FROM 2005 ROE HERRING CATCHES

The total annual BC catch of roe herring in 2005, including charter vessel payment catches, was 28,730.1 mt. Roe herring fishery catches and tag recoveries by region, area, gear, and tonnages searched for tags at fish processing plants are summarized in Table 1. Fishery catch dates, areas and amounts caught (including charter payment catches) are as follows: gillnetting in the PRD occurred from March 19 to 21 in Area 4 and 2,049.6 mt were caught; seining in the PRD occurred from March 18 to 20 in Area 5 and 1,750.1 mt were caught; seining in the CC occurred from March 19 to 24 in Area 7 and 3,778.4 mt were caught; gillnetting in the SG occurred from February 28 to March 5 in Area 14 and 8,953.8 mt were caught; seining in the SG occurred from February 28 to March 3 in Area 14 and 7,929.2 mt were caught; gillnetting in the WCVI occurred from March 7 to 12 in Area 25 and 896.1 mt were caught, and seining in the WCVI occurred from March 7 to 10 in Area 25 and 3,373.0 mt were caught.

An estimated 7,749.3 mt of the total BC roe herring catch was searched for CWTs, representing approximately 27.0% of the total catch. Regionally, 22.3% of PRD; 30.1% of CC; 24.2% of SG and 39.2% of WCVI catches were searched for CWTs. Search percentages by region and fishing gear were as follows: 24.3% of PRD gillnet; 19.8% of PRD seine; 30.1% of CC seine; 24.1% of SG gillnet; 24.4% of SG seine; 30.8% of WCVI gillnet and 41.5% of WCVI seine (Tables 1 to 6). From the total gillnet catch of 11,899.4 mt, approximately 24.6% was searched and from the total seine catch of 16,830.7 mt, approximately 28.6% was searched. The approximate herring tonnage searched at each of the fishing plants was 2,826 at Bella Coola, 2,775 at CFC and 3229 at Icicle.

TAG RECOVERIES AND RECOVERY RATES

A total of 2,102 tag recoveries were obtained from the 2005 CWT search efforts. Table 1 presents all the recoveries by release year, region, gear, area and fish plant of recovery and Table 2 presents all the recoveries by release year, region, area, total tags released and by recovery region, area, gear, catch total and the amount of catch searched for tags. Appendix B lists the number of recoveries observed by tagging set and release batch size. In addition, 202 herring without tags were collected from the fish plants but were found to contain metal contamination (54 BC, 76 CFC and 72 Icicle) and 8 fish were lost prior to inspection of tag codes.

With respect to year of release, there were no recoveries from 1999; 6 recoveries from 2000; 105 from 2001; 274 from 2002; 433 from 2003 and 1,284 from 2004. All 6 of the five-year at large 2000 releases were caught in Area 14 gillnet; 5 were released in Area 14 and 1 was released in Area 17. Out of the 105

four-year at large 2001 releases, 79 were caught in the PRD; 1 was caught in the CC, and 25 were caught in the SG. There was 1 inter-regional stray from Area 14 to Area 7. From all the four-year at large recoveries, 70 were gillnetted and 35 were seined: 53 were from PRD gillnet and 26 were from PRD seine; 1 was from CC seine; 17 were from SG gillnet and 8 were from SG seine.

Out of the 274 recoveries from three-year at large 2002 releases, 172 were caught in the PRD; 60 were caught in the CC; 41 were caught in the SG, and 1 was caught in the WCVI. There were 10 inter-regional strays: 2 were Area 4 releases, of which 1 was recovered in Area 7 and 1 in Area 14; 1 was an Area 5 (Wilson Inlet) release which was recovered in Area 7; 1 was an Area 7 release which was recovered in Area 14; 4 were Area 8 releases which were recovered in Area 14; 2 were Area 14 releases, of which 1 was recovered in Area 7 and 1 was recovered in Area 25. From all the three-year at large recoveries, 162 were gillnetted and 112 were seined: 128 were from PRD gillnet and 44 were from PRD seine; 60 were from CC seine; 34 were from SG gillnet; 7 were from SG seine, and 1 was from WCVI seine.

Out of the 433 recoveries from two-year at large 2003 releases, 200 were caught in the PRD; 195 were caught in the CC; 34 were caught in the SG; 3 were caught in the WCVI, and there was 1 recovery with uncertainty in recovery source due to possible mixing of fish during processing (Table 2). There were 18 inter-regional strays: 8 were Area 5 releases, of which 5 were recovered in Area 7, 1 was recovered in Area 14 and 2 were recovered in Area 25; 4 were Area 7 releases, of which 2 were recovered in Area 5, 1 was recovered in Area 14 and 1 was recovered in Area 25; 4 were Area 8 releases which were recovered in Area 14; 1 was an Area 9 release which was recovered in Area 14, and 1 was an Area 14 release which was recovered in Area 7. From all the two-year at large recoveries with known fishery sources, 44 were gillnetted and 389 were seined: 24 were from PRD gillnet and 176 were from PRD seine; 195 were from CC seine; 20 were from SG gillnet and 14 were from SG seine, and 3 were from WCVI seine.

Out of the 1,284 recoveries from one-year at large 2004 releases, 10 were caught in the PRD; 1,019 were caught in the CC; 24 were caught in the SG; 227 were caught in the WCVI, and there were 4 recoveries with uncertainty in recovery source due to possible mixing of fish during processing (Table 2). There were 37 inter-regional strays: 6 were Area 6 releases, of which 1 was recovered in Area 4, 4 were recovered in Area 5 and 1 was recovered in Area 14; 12 were Area 7 releases, of which 4 were recovered in Area 5, 7 were recovered in Area 14 and 1 was recovered in Area 25; 5 were Area 8 releases, of which 4 were recovered in Area 14 and 1 was recovered in Area 25; 4 were Area 9 releases, of which 3 were recovered in Area 14 and 1 was recovered in Area 25; 3 were Area 23 release which were recovered in Area 14; 2 were Area 24 releases, of which 1 was recovered in Area 5 and 1 was recovered in Area 14, and 5 were Area 26 releases, which were recovered in Area 14. From all the

one-year at large recoveries with known fishery sources, 50 were gillnetted and 1,234 were seined: 1 was from PRD gillnet and 9 from PRD seine; 1,019 were from CC seine; 10 were from SG gillnet and 14 from SG seine; 39 were from WCVI gillnet and 188 from WCVI seine.

Herring CWT recovery rates with respect to release and recovery events are presented in Tables 3. Cumulative recovery rates for release events derived from all roe herring fishery sources are described below. Five-year at large recovery rates for Areas 14 and 17 releases were less than 0.01%. Four-year at large recovery rates for Areas 4 and 5 releases were 0.09 and 0.08%, respectively, and the recovery rate for Area 14 releases was approximately 0.04%. Three-year at large recovery rates for Areas 4,5-north and 5-south (Wilson Inlet) releases were 0.26; 0.16 and 0.08%, respectively; for Areas 6 to 8 releases they were 0.10; 0.12 and 0.07%, respectively, and for Area 14 releases it was 0.04%. Two-year at large recovery rates for Areas 3 and 5 releases were 0.05 and 0.21%, respectively; for Areas 7 to 9 release they were 0.22, 0.7 and 0.04%, respectively and for Areas 14 and 16 releases they were 0.03 and 0%, respectively. One-year at large recovery rates for Areas 6 to 9 release were 0.32; 0.77; 0.09 and 0.06%, respectively; from Areas 23 to 26 release they were 0.08; 0.21; 0.02 and 0.49%, respectively.

Recovery rate trends pertaining to intervals within tagging sessions of 2003 and 2004 releases are briefly summarized below (Appendix C). From 6 tagging sessions with only 2 intervals per session, a reduction in recovery rates from the first interval to the second occurred in 4 of the sessions. There were 41 sessions with 3 or more intervals and from these, 14 sessions showed no decline in recovery rates with increased interval number, 15 sessions had sequential declines in recovery rates with increased interval number and 12 sessions had non-sequential declines in rates (where the last interval's recovery rate was lower than the first but not lower than all intermediate intervals).

Results of tag recovery densities by year and area of release group and by 2005 roe herring fishery are presented in Table 4. A description of these results is not provided in the body of the report.

TAG REMOVALS AND REMOVAL RATES

Estimates of CWT removals and removal rates by release event and by area and gear of recovery are presented in Tables 5 and 6, respectively. The estimate of the total number of tagged herring removed from the population in the 2005 roe herring fishery is 7,494. Summary estimates of removals from 2000 to 2004 releases are 25; 457; 1,118; 1,783, and 4,111, respectively Table 5. Estimates of tag removal rates by release and recovery event are given in Table 6. Five-year at large removal rates ranged from 0 to 0.01%; four-year at large removal rates ranged from 0.16 to 0.34%; three-year at large removal rates

ranged from 0.16 to 0.95%; two-year at large removal rates ranged from 0.12 to 0.81%, and one-year at large recovery rates ranged from 0.07 to 5.91%.

DISCUSSION

The 7,749 mt of BC roe herring searched for tags in 2005 was the second highest amount of catch searched in a given year following 2002; furthermore, there was substantial coverage of each fishery (19.8 to 41.5%) with respect to region and fishing gear. The 2,102 inter-annual recoveries greatly exceeded observations from previous recovery years and the 1,284 one-year at large recoveries in 2005 was more than double those from 2004 (628). Although the number of 2004 releases (357,346) exceeded those in 2003 (328,423), the larger number of one-year at large recoveries observed in 2005 was probably largely due to greater search coverage, especially in statistical areas near to where tagging occurred in previous years. The 66 inter-regional strays recovered in 2005 exceeded the number of strays observed in previous years and comprised 3% of all 2005 recoveries. This percentage of strays is similar to what the 2003 and 2004 inter-annual recoveries showed.

Approximately 38% of all roe herring searched was gillnetted, which accounted for 6% of the one and two-year at large recoveries combined and 68% of the three-year and longer recoveries combined. However, one should also take into account the numbers of releases and geographic proximity of release events when considering gear effects on recoveries. In looking at PRD recoveries, a direct comparison between Area 4 and Area 5 recovery rates and tag densities can't be made because results are confounded by gear and location effects. Overall tag densities for three-year at large and longer SG recoveries were greater in the gillnet catch than the seine catch. The same cannot be said for the WCVI fisheries because only 1 recovery was observed and it was seined. Tag recovery densities for one and two-year at large SG and WCVI recoveries were quite similar for gillnet and seine fisheries.

One observation worth elaborating on is the low number of recoveries from Area 25 2004 releases recovered in Area 25. In this area, tagging occurred during the tail end of the gillnet fishery after considerable spawning had been observed. Field notes indicated that many of the fish caught in the tagging sets looked spawned out. Representative biological samples from these sets showed that 60 to 75% of the fish had spawned, compared to results from the biological samples from Areas 23, 24 and 26, which showed that 4, 0 and 2% of the fish had spawned.

As in 2004, tag interval recovery rates within tagging sessions showed some declines from increasing tagging session duration thus providing some insight into the variability of tagging induced mortality, which may be confounded

with differential natural mortality, migration, age composition, recruitment and gear selectivity.

Future herring tagging efforts are not being planned and 2006 is expected to be the last year for CWT recovery from roe herring fisheries. Future work with the Pacific herring tagging study will focus on analysis of results and model development.

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Table 1. Summary of 2005 CWT recoveries by stock assessment region, fishing gear, statistical area, fish plant of recovery, catch searched for tags, total roe fishery catch, percent of total catch searched and tag release year.

Region	Gear	Area	Fish Plant	Catch (mt)	Total	% Catch	CWT Recoveries by Release Year					
				Searched	Catch (mt)	Searched	2000	2001	2002	2003	2004	All
PRD	GN	4	BCF	215.0	-	-	-	28	49	12	1	90
			CFC	0.0	-	-	-	-	-	-	-	-
			Icicle	284.0	-	-	-	25	79	12	-	116
			All	499.0	2,049.6	24.3	-	53	128	24	1	206
	SN	5	BCF	49.0	-	-	-	4	6	24	3	37
			CFC	174.2	-	-	-	12	20	93	4	129
			Icicle	123.4	-	-	-	10	18	59	2	89
			All	346.6	1,750.1	19.8	-	26	44	176	9	255
	Both	4, 5	All	845.5	3,799.7	22.3		79	172	200	10	461
	CC	7	BCF	322.1	-	-	-	-	25	42	239	306
			CFC	616.9	-	-	-	1	28	107	583	719
			Icicle	197.8	-	-	-	-	7	46	197	250
			All	1,136.7	3,778.4	30.1	-	1	60	195	1,019	1,275
SG	GN	14	BCF	696.7	-	-	3	6	7	4	1	21
			CFC	763.9	-	-	2	9	17	9	2	39
			Icicle	695.8	-	-	1	2	10	7	7	27
			All	2,156.4	8,953.8	24.1	6	17	34	20	10	87
	SN	14	BCF	528.9	-	-	-	2	-	4	3	9
			CFC	748.4	-	-	-	5	6	5	5	21
			Icicle	658.6	-	-	-	1	1	5	6	13
			All	1,936.0	7,929.2	24.4	-	8	7	14	14	43
	Both	14	All	4,092.4	16,883.0	24.2	6	25	41	34	24	130

Table 1 (continued).

Region	Gear	Area	Fish Plant	Catch (mt)	Total	% Catch	CWT Recoveries by Release Year					
				Searched	Catch (mt)	Searched	2000	2001	2002	2003	2004	All
WCVI	GN	25	BCF	275.8	-	-	-	-	-	-	39	39
			CFC	0.0	-	-	-	-	-	-	-	-
			Icicle	0.0	-	-	-	-	-	-	-	-
			All	275.8	896.1	30.8	-	-	-	-	39	39
	SN	25	BCF	738.5	-	-	-	-	-	-	85	85
			CFC	471.7	-	-	-	-	1	3	74	78
			Icicle	188.7	-	-	-	-	-	-	29	29
			All	1,398.9	3,373.0	41.5	-	-	1	3	188	192
	Both	25	All	1,674.7	4,269.1	39.2	0	0	1	3	227	231
	UNK	5, 7	Icicle	-	-	-	-	-	-	-	1	1
		7, 14	CFC	-	-	-	-	-	-	-	1	1
		7, 25	CFC	-	-	-	-	-	-	1	-	1
		7, 25	Icicle	-	-	-	-	-	-	-	1	1
		14, 25	BCF	-	-	-	-	-	-	-	1	1
By plant	Both		BCF	2,825.9	-	-	3	40	87	86	372	588
			CFC	2,775.1	-	-	2	27	72	218	669	988
			Icicle	2,148.2	-	-	1	38	115	129	243	526
BC	GN	All	All	2,931.2	11,899.4	24.6	6	70	162	44	50	332
	SN	All	All	4,818.1	16,830.7	28.6	-	35	112	389	1,234	1,770
	Both	All	All	7,749.3	28,730.1	27.0	6	105	274	433	1,284	2,102

UNK refers to unknown fishery for tag recovery due to possible mixing in fish processing between catches from 2 different seine fisheries.

Table 2. Summary of 2005 CWT recoveries by assessment region, statistical area and fishing gear relative to releases. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Unk	Unk	Unk	Unk	Total
	Area			4	5	7	14	14	25	25	5,7	7,25	7,14	14,25	
	Gear			GN	SN	SN	GN	SN	GN	SN	SN	SN	SN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0					
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9					
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5					27.0
Release	Tags														
Year	Region	Area	Released												
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	-	-	-	-	-	-	-	-	-
	SG	17	14,266	-	-	-	-	-	-	-	-	-	-	-	-
	WYD	14, 17	5,815	-	-	-	-	-	-	-	-	-	-	-	-
	BYD	14, 17	7,141	-	-	-	-	-	-	-	-	-	-	-	-
2000	SG	14	180,229	-	-	-	5	-	-	-	-	-	-	-	5
	SG	17	58,994	-	-	-	1	-	-	-	-	-	-	-	1
	WYD	14, 17	6,471	-	-	-	-	-	-	-	-	-	-	-	-
2001	PRD	4	65,809	49	12	-	-	-	-	-	-	-	-	-	61
	PRD	5	22,387	4	14	-	-	-	-	-	-	-	-	-	18
	SG	14	60,558	-	-	1	17	8	-	-	-	-	-	-	26
2002	PRD	4	48,960	119	5	1	1	-	-	-	-	-	-	-	126
	PRD	5	25,701	7	33	-	-	-	-	-	-	-	-	-	40
	PRD	5WI	11,081	2	6	1	-	-	-	-	-	-	-	-	9
	CC	6	18,168	-	-	19	-	-	-	-	-	-	-	-	19
	CC	7	31,027	-	-	35	-	1	-	-	-	-	-	-	36
	CC	8	9,463	-	-	3	1	3	-	-	-	-	-	-	7
	SG	14	83,528	-	-	1	32	3	-	1	-	-	-	-	37

Table 2 (continued).

Table 2 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Unk	Unk	Unk	Unk	Total	
	Area			4	5	7	14	14	25	25	5,7	7,25	14,7	14,25		
	Gear			GN	SN	SN	GN	SN	GN	SN	SN	SN	SN	SN		
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0						28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398						7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5						27.0
Release	Tags															
Year	Region	Area	Released													
2003	PRD	3*	15,066	5	2	-	-	-	-	-	-	-	-	-	7	
	PRD	5	96,434	19	172	5	1	-	-	2	-	-	-	-	199	
	CC	7	79,920	-	2	170	1	-	-	1	-	1	-	-	175	
	CC	8	27,453	-	-	15	1	3	-	-	-	-	-	-	19	
	CC	9	13,660	-	-	4	-	1	-	-	-	-	-	-	5	
	SG	14	89,247	-	-	1	17	10	-	-	-	-	-	-	28	
	SG	16	6,643	-	-	-	-	-	-	-	-	-	-	-	-	
2004	CC	6	52,049	1	4	160	-	1	-	-	-	-	-	-	166	
	CC	7	107,843	-	4	817	2	5	-	1	1	-	-	-	830	
	CC	8	44,614	-	-	37	1	3	-	1	-	-	-	-	42	
	CC	9	17,770	-	-	4	1	2	-	1	-	-	1	1	10	
	WCVI	23	33,608	-	-	-	1	2	5	17	-	1	-	-	26	
	WCVI	24	32,421	-	1	-	1	-	11	56	-	-	-	-	69	
	WCVI	25	38,601	-	-	-	-	-	3	4	-	-	-	-	7	
	WCVI	26	27,181	-	-	-	4	1	20	108	-	-	-	-	133	
	WYD	WCVI, CC	8, 25	3,259	-	-	1	-	-	-	-	-	-	-	1	
All	All	1,364,729	206	255	1,275	87	43	39	192	1	2	1	1	2,102		

Unk refers to unknown fishery for tag recovery due to possible mixing in fish processing between catches from 2 different seine fisheries.

WI refers to Wilson Inlet release event (southern PRD). * Correction from Tables 2 to 6 in Flostrand and Schweigert (2004, 2005) where it was printed as Area 4 but the release event was in fact in Area 3 (although almost exactly on the border of the two Areas).

Table 3. Estimates of 2005 CWT recovery rates (percentage of the released tags recovered) by assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Unk	Unk	Unk	Unk	Total	
	Area			4	5	7	14	14	25	25	5,7	7,25	7,14	14,25		
	Gear			GN	SN	SN	GN	SN	GN	SN	SN	SN	SN	SN		
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	-	-	-	-		28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9	-	-	-	-		7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5	-	-	-	-		27.0
Release	Tags															
Year	Region	Area	Released													
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-	-	-	-	-	
	SG	14	23,187	-	-	-	-	-	-	-	-	-	-	-	-	
	SG	17	14,266	-	-	-	-	-	-	-	-	-	-	-	-	
	WYD	14, 17	5,815	-	-	-	-	-	-	-	-	-	-	-	-	
	BYD	SG	14, 17	7,141	-	-	-	-	-	-	-	-	-	-	-	
2000	SG	14	180,229	-	-	-	<0.01	-	-	-	-	-	-	-	<0.01	
	SG	17	58,994	-	-	-	<0.01	-	-	-	-	-	-	-	<0.01	
	WYD	14, 17	6,471	-	-	-	-	-	-	-	-	-	-	-	-	
2001	PRD	4	65,809	0.07	0.02	-	-	-	-	-	-	-	-	-	0.09	
	PRD	5	22,387	0.02	0.06	-	-	-	-	-	-	-	-	-	0.08	
	SG	14	60,558	-	-	<0.01	0.03	0.01	-	-	-	-	-	-	0.04	
2002	PRD	4	48,960	0.24	0.01	<0.01	<0.01	-	-	-	-	-	-	-	0.26	
	PRD	5	25,701	0.03	0.13	-	-	-	-	-	-	-	-	-	0.16	
	PRD	5WI	11,081	0.02	0.05	0.01	-	-	-	-	-	-	-	-	0.08	
	CC	6	18,168	-	-	0.10	-	-	-	-	-	-	-	-	0.10	
	CC	7	31,027	-	-	0.11	-	<0.01	-	-	-	-	-	-	0.12	
	CC	8	9,463	-	-	0.03	0.01	0.03	-	-	-	-	-	-	0.07	
	SG	14	83,528	-	-	<0.01	0.04	<0.01	-	<0.01	-	-	-	-	0.04	

Table 3 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Unk	Unk	Unk	Unk	Total
	Area			4	5	7	14	14	25	25	5,7	7,25	14,7	14,25	
	Gear			GN	SN	SN	GN	SN	GN	SN	SN	SN	SN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	-	-	-	-	28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9	-	-	-	-	7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5	-	-	-	-	27.0
Release	Tags														
Year	Region	Area	Released												
2003	PRD	3	15,066	0.03	0.01	-	-	-	-	-	-	-	-	-	0.05
	PRD	5	96,434	0.02	0.18	0.01	<0.01	-	-	<0.01	-	-	-	-	0.21
	CC	7	79,920	-	<0.01	0.21	<0.01	-	-	<0.01	-	<0.01-	-	-	0.22
	CC	8	27,453	-	-	0.05	<0.01	0.01	-	-	-	-	-	-	0.07
	CC	9	13,660	-	-	0.03	-	0.01	-	-	-	-	-	-	0.04
	SG	14	89,247	-	-	<0.01	0.02	0.01	-	-	-	-	-	-	0.03
	SG	16	6,643	-	-	-	-	-	-	-	-	-	-	-	-
2004	CC	6	52,049	<0.01	0.01	0.31	-	<0.01	-	-	-	-	-	-	0.32
	CC	7	107,843	-	<0.01	0.76	<0.01	<0.01	-	<0.01	<0.01	-	-	-	0.77
	CC	8	44,614	-	-	0.08	<0.01	0.01	-	<0.01	-	-	-	-	0.09
	CC	9	17,770	-	-	0.02	0.01	0.01	-	0.01	-	-	0.01	0.01	0.06
	WCVI	23	33,608	-	-	-	<0.01	0.01	0.01	0.05	-	<0.01	-	-	0.08
	WCVI	24	32,421	-	<0.01	-	<0.01	-	0.03	0.17	-	-	-	-	0.21
	WCVI	25	38,601	-	-	-	-	-	0.01	0.01	-	-	-	-	0.02
	WCVI	26	27,181	-	-	-	0.01	<0.01	0.07	0.40	-	-	-	-	0.49
WYD	WCVI, CC	8, 25	3,259	-	-	0.03	-	-	-	-	-	-	-	-	0.03

Unk refers to unknown fishery for tag recovery due to possible mixing in fish processing between catches from 2 different seine fisheries.

WI refers to Wilson Inlet release event (southern PRD).

Table 4. Estimates of 2005 tag densities (CWTs recovered per tonne of roe herring searched) by assessment region, statistical area and fishing gear. Total catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	14	14	25	25	
	Gear			GN	SN	SN	GN	SN	GN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936	2,75.8	1,398.9	7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5	27.0
Release	Tags										
Year	Region	Area	Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	-	-	-	-	-
	SG	17	14,266	-	-	-	-	-	-	-	-
	WYD	SG	14, 17	-	-	-	-	-	-	-	-
	BYD	SG	14, 17	-	-	-	-	-	-	-	-
2000	SG	14	180,229	-	-	-	0.002	-	-	-	0.001
	SG	17	58,994	-	-	-	<0.001	-	-	-	<0.001
	WYD	SG	14, 17	-	-	-	-	-	-	-	<0.001
2001	PRD	4	65,809	0.098	0.035	-	-	-	-	-	0.008
	PRD	5	22,387	0.008	0.040	-	-	-	-	-	0.002
	SG	14	60,558	-	-	0.001	0.008	0.004	-	-	0.003
2002	PRD	4	48,960	0.238	0.014	0.001	<0.001	-	-	-	0.016
	PRD	5	25,701	0.014	0.095	-	-	-	-	-	0.005
	PRD	5WI	11,081	0.004	0.017	0.001	-	-	-	-	0.001
	CC	6	18,168	-	-	0.017	-	-	-	-	0.002
	CC	7	31,027	-	-	0.031	-	0.001	-	-	0.005
	CC	8	9,463	-	-	0.003	<0.001	0.002	-	-	0.001
	SG	14	83,528	-	-	0.001	0.015	0.002	-	0.001	0.005

Table 4 (continued).

Recovery				PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
Region				4	5	7	14	14	25	25	
Area											
Gear				GN	SN	SN	GN	SN	GN	SN	
Total Catch (mt)				2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	28,730.1
Catch Searched (mt)				499	346.5	1,136.7	2,156.4	1,936	2,75.8	1,398.9	7,749.0
Catch Searched (%)				24.3	19.8	30.1	24.1	24.4	30.8	41.5	27.0
Release	Tags										
Year	Region	Area	Released								
2003	PRD	3	15,066	0.010	0.006	-	-	-	-	-	0.001
	PRD	5	96,434	0.038	0.496	0.004	<0.001	-	-	0.001	0.026
	CC	7	79,920	-	0.006	0.15	<0.001	-	-	0.001	0.023
	CC	8	27,453	-	-	0.013	<0.001	0.002	-	-	0.002
	CC	9	13,660	-	-	0.004	-	0.001	-	-	0.001
	SG	14	89,247	-	-	0.001	0.008	0.005	-	-	0.004
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52,049	0.002	0.012	0.141	-	0.001	-	-	0.021
	CC	7	107,843	-	0.012	0.719	0.001	0.003	-	0.001	0.107
	CC	8	44,614	-	-	0.033	<0.001	0.002	-	0.001	0.005
	CC	9	17,770	-	-	0.004	<0.001	0.001	-	0.001	0.001
	WCVI	23	33,608	-	-	-	<0.001	0.001	0.018	0.012	0.003
	WCVI	24	32,421	-	0.003	-	<0.001	-	0.04	0.04	0.009
	WCVI	25	38,601	-	-	-	-	-	0.011	0.003	0.001
	WCVI	26	27,181	-	-	-	0.002	0.001	0.073	0.077	0.017
WYD	WCVI, CC	8, 25	3,259	-	-	0.001	-	-	-	-	<0.001
All	All		1,364,729	0.413	0.736	1.122	0.04	0.022	0.141	0.137	0.271

Table 5. Estimates of 2005 CWT removals by assessment region, statistical area and fishing gear. Total catch, catch tonnage searched and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	14	14	25	25	
	Gear			GN	SN	SN	GN	SN	GN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9	7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	100.0	41.5	27.0
Release	Tags										
Year	Region	Area	Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	-	-	-	-	-
	SG	17	14,266	-	-	-	-	-	-	-	-
	WYD	14, 17	5,815	-	-	-	-	-	-	-	-
	BYD	14, 17	7,141	-	-	-	-	-	-	-	-
2000	SG	14	180,229	-	-	-	21	-	-	-	21
	SG	17	58,994	-	-	-	4	-	-	-	4
	WYD	14, 17	6,471	-	-	-	-	-	-	-	-
2001	PRD	4	65,809	202	61	-	-	-	-	-	263
	PRD	5	22,387	16	71	-	-	-	-	-	87
	SG	14	60,558	-	-	3	71	33	-	-	107
2002	PRD	4	48,960	490	25	3	4	-	-	-	522
	PRD	5	25,701	29	167	-	-	-	-	-	196
	PRD	5WI	11,081	8	30	3	-	-	-	-	41
	CC	6	18,168	-	-	63	-	-	-	-	63
	CC	7	31,027	-	-	116	-	4	-	-	120
	CC	8	9,463	-	-	10	4	12	-	-	26
	SG	14	83,528	-	-	3	133	12	-	2	150

Table 5 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	14	14	25	25	
	Gear			GN	SN	SN	GN	SN	GN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9	
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5	
Release	Tags										
Year	Region	Area	Released								
2003	PRD	3	15,066	21	10	-	-	-	-	-	31
	PRD	5	96,434	78	869	17	4	-	-	5	973
	CC	7	79,920	-	10	565	4	-	-	2	581
	CC	8	27,453	-	-	50	4	12	-	-	66
	CC	9	13,660	-	-	13	-	4	-	-	17
	SG	14	89,247	-	-	3	71	41	-	-	115
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52,049	4	20	532	-	4	-	-	560
	CC	7	107,843	-	20	2,716	8	20	-	2	2,766
	CC	8	44,614	-	-	123	4	12	-	2	141
	CC	9	17,770	-	-	13	4	8	-	2	27
	WCVI	23	33,608	-	-	-	4	8	16	41	69
	WCVI	24	32,421	-	5	-	4	-	35	135	179
	WCVI	25	38,601	-	-	-	-	-	10	10	20
	WCVI	26	27,181	-	-	-	17	4	65	260	346
	WYD	WCVI, CC	8, 25	-	-	3	-	-	-	-	3
All	All		1,364,729	846	1,288	4,238	361	174	126	461	7,494

WI refers to Wilson Inlet release event (southern PRD).

Table 6. Estimates of 2005 CWT removal rates (percentage of the released tag removed) from all roe herring catches by assessment region, statistical area and fish gear. Total catch, catch tonnage and the percentage of catch searched are also shown.

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	14	14	25	25	
	Gear			GN	SN	SN	GN	SN	GN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9	7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	100.0	41.5	27.0
Release	Tags										
Year	Region	Area	Released								
1999	QCI	2E	6,175	-	-	-	-	-	-	-	-
	SG	14	23,187	-	-	-	-	-	-	-	-
	SG	17	14,266	-	-	-	-	-	-	-	-
	WYD	14, 17	5,815	-	-	-	-	-	-	-	-
	BYD	14, 17	7,141	-	-	-	-	-	-	-	-
2000	SG	14	180,229	-	-	-	0.01	-	-	-	0.01
	SG	17	58,994	-	-	-	0.01	-	-	-	0.01
	WYD	14, 17	6,471	-	-	-	-	-	-	-	-
2001	PRD	4	65,809	0.31	0.09	-	-	-	-	-	0.34
	PRD	5	22,387	0.07	0.32	-	-	-	-	-	0.30
	SG	14	60,558	-	-	0.01	0.12	0.05	-	-	0.16
2002	PRD	4	48,960	1.00	0.05	0.01	0.01	-	-	-	0.95
	PRD	5	25,701	0.11	0.65	-	-	-	-	-	0.58
	PRD	5WI	11,081	0.07	0.27	0.03	-	-	-	-	0.30
	CC	6	18,168	-	-	0.35	-	-	-	-	0.39
	CC	7	31,027	-	-	0.37	-	0.01	-	-	0.43
	CC	8	9,463	-	-	0.11	0.04	0.13	-	-	0.27
	SG	14	83,528	-	-	<0.01	0.16	0.01	-	<0.01	0.16

Table 6 (continued).

Recovery	Region			PRD	PRD	CC	SG	SG	WCVI	WCVI	Total
	Area			4	5	7	14	14	25	25	
	Gear			GN	SN	SN	GN	SN	GN	SN	
	Total Catch (mt)			2,049.6	1,750.1	3,778.4	8,953.8	7,929.2	896.1	3,373.0	28,730.1
	Catch Searched (mt)			499.0	346.5	1,136.7	2,156.4	1,936.0	275.8	1,398.9	7,749.0
	Catch Searched (%)			24.3	19.8	30.1	24.1	24.4	30.8	41.5	27.0
Release	Tags										
Year	Region	Area	Released								
2003	PRD	3	15,066	0.14	0.07	-	-	-	-	-	0.17
	PRD	5	96,434	0.08	0.90	0.02	<0.01	-	-	0.01	0.77
	CC	7	79,920	-	0.01	0.71	0.01	-	-	<0.01	0.81
	CC	8	27,453	-	-	0.18	0.02	0.04	-	-	0.26
	CC	9	13,660	-	-	0.10	-	0.03	-	-	0.14
	SG	14	89,247	-	-	<0.01	0.08	0.05	-	-	0.12
	SG	16	6,643	-	-	-	-	-	-	-	-
2004	CC	6	52,049	0.01	0.04	1.02	-	0.01	-	-	1.18
	CC	7	107,843	-	0.04	5.22	0.02	0.04	-	<0.01	5.91
	CC	8	44,614	-	-	0.28	0.01	0.03	-	0.01	0.35
	CC	9	17,770	-	-	0.07	0.02	0.05	-	0.01	0.21
	WCVI	23	33,608	-	-	-	0.01	0.02	0.01	0.12	0.29
	WCVI	24	32,421	-	0.02	-	0.01	-	0.03	0.42	0.79
	WCVI	25	38,601	-	-	-	-	-	0.01	0.02	0.07
	WCVI	26	27,181	-	-	-	0.06	0.02	0.07	0.96	1.81
WYD	WCVI, CC	8, 25	3,259	-	-	0.10	-	-	-	-	0.11

WI refers to Wilson Inlet release event (southern PRD).

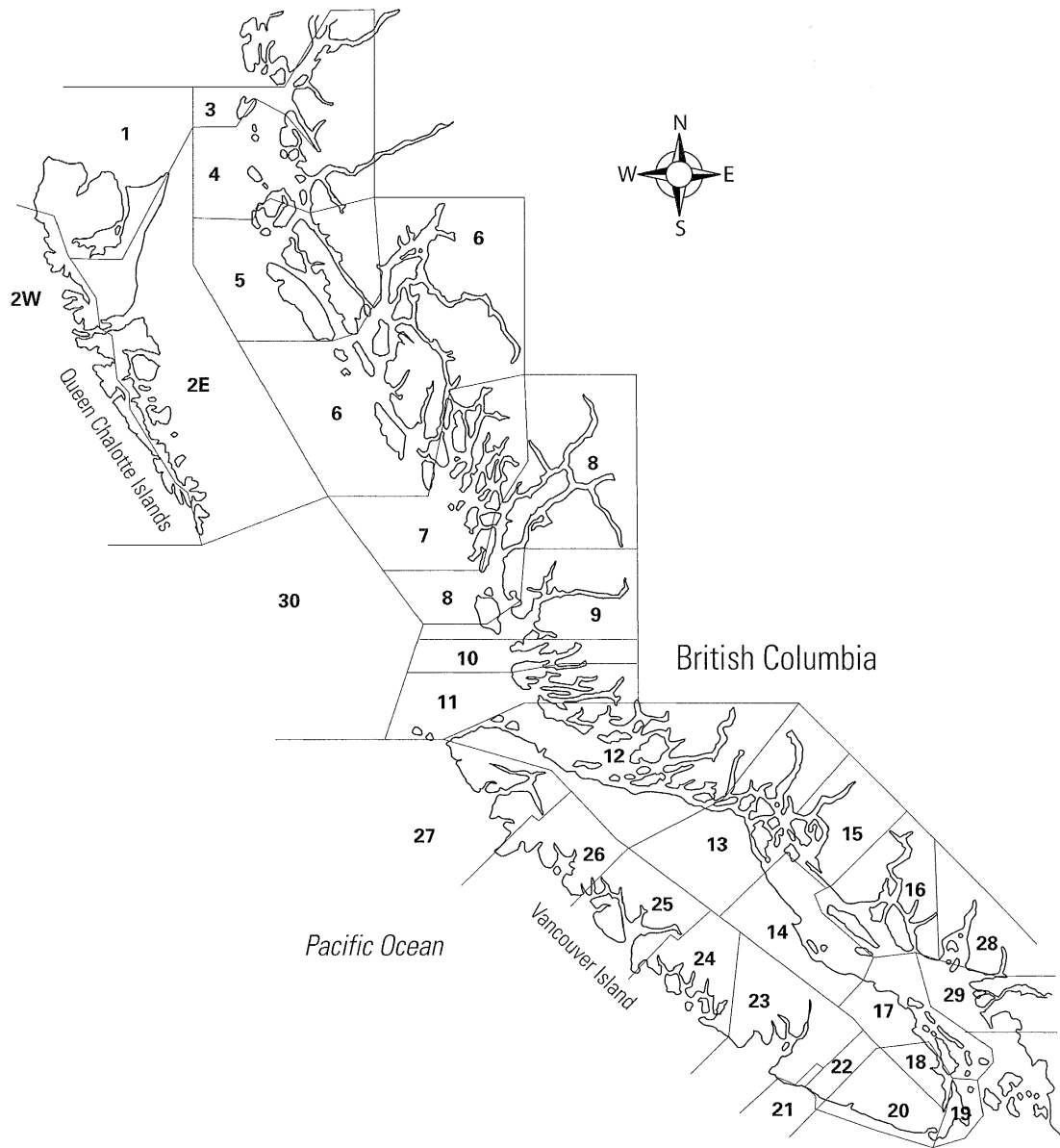


Figure 1. The coast of British Columbia, shown divided into representative inshore fisheries statistical (management) areas.

Appendix A. Summary of 1999 to 2004 herring releases with binary tag code discrepancies and subsequent 2005 tag recoveries.

Discrepancy Type	Release Year	Tagging Set(s)	Area	Tag Code	Releases	2005 Recoveries
Within-year	1999	13	14	18-12-13 ^a	3,310	0
	1999	12	17	18-12-32	2,505	0
	2000	5	14	02-13-12 ^a	3,017	0
	2000	25	17	18-14-43	3,454	0
	2000	14, 15	14	18-12-19 ^a	2,506	0
	2000	21	14	02-12-12	9,108	0
	2000	11	14	18-03-34 ^a	6,356	0
	2000	16, 17	14	18-42-17	7,030	0
	2000	26, 27	17	18-34-42 ^a	511	0
	2000	19	14	18-42-23	0	0
	2000	13	14	18-34-35 ^a	2,024	0
	2000	13	14	18-34-45	0	0
	2000	27	17	18-31-11 ^a	3,312	0
	2000	27	17	18-31-10	3,060	0
	2004	9	25	18-45-39 ^b	3,259	1
	2004	12	8			
	Total		15 codes		49,452	1
Between-years	1999	1	14	18-08-48 ^b	2,587	0
	2000	30	17		952	
	1999	3	14	18-15-63 ^b	1,857	0
	2000	23, 24	17		1,745	
	Total		2 codes		7,141	0

^a Tag code mislabelling occurred between codes used within the same year and stock region.

^b Accidental repeated tag code usage.

Appendix B. Summary of herring CWT releases from 1999 to 2004 by set identification code (year and set number), stock assessment region, statistical area, location, date, code discrepancy (Disc), number of tagged herring released and subsequent 2005 tag recoveries.

Set Id ^a	Region	Area	Location	Date	Disc ^b	Releases	Recoveries
1999-001	SG	14	Fillongley Park	02/03/1999	BYD	3,539	
1999-002	SG	14	Whalebone Point	04/03/1999		3,751	
1999-003	SG	14	Phipps Point	04/03/1999	BYD	3,602	
1999-004	SG	14	Bowser	05/03/1999		3,006	
1999-005	SG	14	Qualicum Bay	06/03/1999		3,590	
1999-006	SG	14	Qualicum Bay	06/03/1999		3,670	
1999-007	SG	14	Metcalfe Bay	07/03/1999		675	
1999-008	SG	14	Chrome Island	09/03/1999		1,644	
1999-009	SG	17	Link Island	15/03/1999		1,964	
1999-010	SG	17	Jesse Island	15/03/1999		3,597	
1999-011	SG	17	McKay Point	16/03/1999		3,370	
1999-012	SG	17	Link Island	18/03/1999		913	
1999-012	SG	17	Link Island	18/03/1999	WYD	2,505	
1999-013	SG	14	French Creek	18/03/1999	WYD	3,310	
1999-014	SG	14	French Creek	19/03/1999		3,438	
1999-015	SG	14	French Creek	19/03/1999		3,413	
1999-016	SG	17	Link Island	20/03/1999		4,422	
1999-017	QCI	02E	Wanderer Island	26/03/1999		1,141	
1999-018	QCI	02E	Wanderer Island	27/03/1999		2,002	
1999-019	QCI	02E	Wanderer Island	28/03/1999		3,032	
2000-001	SG	14	Fillongley Park	26/02/2000		18,963	2
2000-003	SG	14	Fillongley Park	27/02/2000		13,472	
2000-004	SG	14	Big Qualicum	29/02/2000		13,304	
2000-005	SG	14	Boyle Point	03/03/2000	WYD	6,471	
2000-005	SG	14	Boyle Point	03/03/2000		4,809	1
2000-006	SG	14	Boyle Point	03/03/2000		15,489	
2000-007	SG	14	Repulse Point	03/03/2000		13,180	1
2000-009	SG	14	Tribune Bay	05/03/2000		16,100	
2000-011	SG	14	Helliwell Park	06/03/2000		13,386	1
2000-012	SG	14	Qualicum Bay	06/03/2000		4,750	
2000-013	SG	14	Parksville Bay	07/03/2000		7,963	
2000-014	SG	14	Parksville Bay	07/03/2000		18,379	
2000-015	SG	14	Parksville Bay	07/03/2000		5,936	
2000-016	SG	14	French Creek	08/03/2000		2,109	
2000-017	SG	14	French Creek	08/03/2000		1,576	
2000-018	SG	14	French Creek	08/03/2000		9,662	
2000-019	SG	14	Longbeak Point	09/03/2000	WYD	511	
2000-019	SG	14	Longbeak Point	09/03/2000		10,358	
2000-020	SG	14	Longbeak Point	09/03/2000		8,623	
2000-021	SG	14	Northwest Bay	11/03/2000		1,659	

Appendix B (continued).

Set Id ^a	Region	Area	Location	Date	Disc ^b	Releases	Recoveries
2000-022	SG	17	Yellow Point	14/03/2000		8,258	
2000-023	SG	17	Link Island	14/03/2000		5,651	
2000-025	SG	17	Yellow Point	15/03/2000		3,426	
2000-026	SG	17	Link Island	16/03/2000		7,074	
2000-027	SG	17	Hammond Bay	20/03/2000		10,035	
2000-028	SG	17	Mudge Island	21/03/2000		4,235	
2000-029	SG	17	Richard Point	22/03/2000		5,715	
2000-030	SG	17	Blunden Point	22/03/2000		4,517	
2000-031	SG	17	Icarus Point	23/03/2000		4,430	1
2000-032	SG	17	Schooner Cove	24/03/2000		5,653	
2001-001	SG	14	Bowser	04/03/2001		8,457	4
2001-003	SG	14	Bowser	04/03/2001		3,717	3
2001-004	SG	14	Bowser	05/03/2001		3,113	
2001-005	SG	14	Cape Lazo	05/03/2001		7,016	9
2001-006	SG	14	Cape Lazo	06/03/2001		8,090	5
2001-007	SG	14	Cape Lazo	06/03/2001		6,486	1
2001-009	SG	14	Lambert Channel	07/03/2001		9,102	2
2001-012	SG	14	Little Qualicum River	08/03/2001		7,204	1
2001-013	SG	14	Qualicum Bay	08/03/2001		2,798	1
2001-016	SG	14	French Creek	10/03/2001		4,575	
2001-018	PRD	5	Kitkatla Inlet	22/03/2001		6,470	4
2001-019	PRD	5	Kitkatla Inlet	22/03/2001		1,946	
2001-020	PRD	5	Kitkatla Inlet	22/03/2001		1,396	
2001-021	PRD	5	Kitkatla Inlet	23/03/2001		8,275	8
2001-023	PRD	5	Kitkatla Inlet	24/03/2001		4,300	6
2001-024	PRD	4	Casey Cove	28/03/2001		4,170	3
2001-025	PRD	4	Metford Island	28/03/2001		6,708	7
2001-026	PRD	4	Garden Island	29/03/2001		7,443	11
2001-027	PRD	4	Garden Island	30/03/2001		5,338	5
2001-028	PRD	4	Venn Pass	31/03/2001		6,384	5
2001-029	PRD	4	Venn Pass	31/03/2001		6,320	4
2001-030	PRD	4	Big Bay	31/03/2001		6,129	7
2001-031	PRD	4	Venn Pass	01/04/2001		12,508	11
2001-033	PRD	4	Venn Pass	02/04/2001		8,839	8
2001-035	PRD	4	Garden Island	02/04/2001		1,970	
2002-001	SG	14	Norris Rock	05/03/2002		3,908	1
2002-002	SG	14	Gartley Point	06/03/2002		5,585	
2002-003	SG	14	Comox Bar	06/03/2002		4,123	4
2002-004	SG	14	Seal Islets	08/03/2002		9,088	8
2002-005	SG	14	Longbeak Point	08/03/2002		7,339	3
2002-006	SG	14	Sandy Island	11/03/2002		10,345	7

Appendix B (continued).

Set Id ^a	Region	Area	Location	Date	Disc ^b	Releases	Recoveries
2002-007	SG	14	Comox Bar	11/03/2002		2,241	3
2002-008	SG	14	Repulse Point	15/03/2002		2,695	1
2002-009	SG	14	Gravelly Bay	15/03/2002		6,950	1
2002-010	SG	14	French Creek	16/03/2002		4,002	1
2002-011	SG	14	French Creek	17/03/2002		8,248	
2002-012	SG	14	Shingle Spit	17/03/2002		10,738	5
2002-013	SG	14	Comox Bar	19/03/2002		8,266	3
2002-014	CC	8	Pruth Bay	20/03/2002		1,771	2
2002-015	CC	8	Pruth Bay	21/03/2002		7,692	5
2002-016	CC	7	Norman Morrison Bay	21/03/2002		7,772	14
2002-017	CC	7	Berry Inlet	22/03/2002		8,359	8
2002-018	CC	7	Lockhart Bay	22/03/2002		7,161	1
2002-019	CC	7	Spiller Channel	23/03/2002		7,735	13
2002-020	CC	6	Kitasu Bay	24/03/2002		9,042	6
2002-021	CC	6	Kitasu Bay	25/03/2002		9,126	13
2002-022	PRD	4	Swallow Island	26/03/2002		5,936	19
2002-023	PRD	4	Shattock Point	27/03/2002		8,186	17
2002-024	PRD	4	Shattock Point	27/03/2002		6,895	25
2002-025	PRD	4	Shattock Point	27/03/2002		6,933	18
2002-026	PRD	4	Anchor Shoal	28/03/2002		8,324	14
2002-027	PRD	4	Simpson Point	28/03/2002		8,126	25
2002-028	PRD	4	Whitecliff Island	28/03/2002		4,560	8
2002-029	PRD	5	Robert Island	31/03/2002		8,119	18
2002-030	PRD	5	Robert Island	01/04/2002		5,899	11
2002-031	PRD	5	Willis Bay	01/04/2002		2,651	3
2002-032	PRD	5	Willis Bay	01/04/2002		7,255	6
2002-033	PRD	5	Willis Bay	02/04/2002		1,777	2
2002-034	PRD	5WI	Wilson Inlet	02/04/2002		11,081	9
2003-001	SG	16	Secret Cove	05/03/2003		6,643	
2003-002	SG	14	Madrona Point	07/03/2003		12,701	5
2003-003	SG	14	Madrona Point	07/03/2003		3,903	4
2003-004	SG	14	Mistaken Island	10/03/2003		11,433	2
2003-005	SG	14	Brant Point	11/03/2003		1,203	2
2003-006	SG	14	Brant Point	11/03/2003		3,907	
2003-007	SG	14	Baynes Sound	16/03/2003		11,272	3
2003-008	SG	14	Longbeak Point	16/03/2003		12,351	5
2003-009	SG	14	Longbeak Point	16/03/2003		8,337	2
2003-010	SG	14	Chrome Island	17/03/2003		11,372	3
2003-011	SG	14	Repulse Point	17/03/2003		12,768	2
2003-012	CC	9	Goose Bay	20/03/2003		13,660	5
2003-013	CC	8	Storm Inlet	20/03/2003		15,423	10
2003-014	CC	8	Pruth Bay	21/03/2003		12,030	9

Appendix B (continued).

Set Id ^a	Region	Area	Location	Date	Disc ^b	Releases	Recoveries
2003-015	CC	7	Kildidt Sound	22/03/2003		9,132	14
2003-016	CC	7	Lockhart Bay	23/03/2003		13,542	36
2003-017	CC	7	SW Spiller Channel	23/03/2003		13,594	45
2003-018	CC	7	Neekas Inlet	24/03/2003		16,394	37
2003-019	CC	7	Berry Inlet	24/03/2003		11,739	23
2003-020	CC	7	East Higgins Pass	25/03/2003		15,519	20
2003-021	PRD	5	Gurd Point	27/03/2003		14,095	42
2003-022	PRD	5	Gurd Island (Nth)	27/03/2003		14,092	32
2003-023	PRD	5	Dries Inlet	27/03/2003		9,403	29
2003-024	PRD	3	Cunningham Pass	31/03/2003		15,066	7
2003-025	PRD	5	Robert Island	01/04/2003		15,291	27
2003-026	PRD	5	Kitkatla Inlet	01/04/2003		14,379	23
2003-027	PRD	5	Porcher Peninsula	02/04/2003		15,465	26
2003-028	PRD	5	Gurd Point	02/04/2003		13,709	20
2004-001	WCVI	23	SE Spilling Islets	04/03/2004		10,477	6
2004-002	WCVI	23	Mayne Bay	06/03/2004		8,401	3
2004-003	WCVI	23	Saint Ines Island	07/03/2004		14,730	17
2004-004	WCVI	24	Shelter Inlet	10/03/2004		15,119	44
2004-005	WCVI	24	Shelter Inlet	11/03/2004		17,302	25
2004-006	WCVI	26	Kyuquot Channel	13/03/2004		15,717	68
2004-007	WCVI	26	Crowther Channel	13/03/2004		11,464	65
2004-008	WCVI	25	Rosa Harbour	15/03/2004		16,576	4
2004-009	WCVI	25	Rosa Harbour	16/03/2004		2,591	
2004-009	WCVI	25	Rosa Harbour	16/03/2004	WYD	3,259	1
2004-010	WCVI	25	Rosa Harbour	17/03/2004		6,078	3
2004-011	WCVI	25	Rosa Harbour	17/03/2004		13,356	
2004-012	CC	8	Pruth Bay	21/03/2004		18,223	20
2004-013	CC	8	Fairmile Passage	21/03/2004		12,004	11
2004-014	CC	8	Fairmile Passage	22/03/2004		14,387	11
2004-015	CC	6	Kitasu Bay	24/03/2004		17,332	47
2004-016	CC	6	Kitasu Bay	24/03/2004		18,393	59
2004-017	CC	6	Kitasu Bay	25/03/2004		16,324	60
2004-018	CC	7	Berry Inlet	25/03/2004		17,011	152
2004-019	CC	7	Berry Inlet	26/03/2004		19,228	163
2004-020	CC	7	Dundivan Inlet	27/03/2004		18,417	157
2004-021	CC	7	Tankeeah River	27/03/2004		13,659	137
2004-022	CC	7	Tankeeah River	28/03/2004		17,901	151
2004-023	CC	7	East Higgins Pass	30/03/2004		21,627	70
2004-024	CC	9	Goose Bay	31/03/2004		17,770	10
Totals						1,364,729	2,102

^a Set Id refers to release year and set number for first use of tag code in cases where multiple use occurred.

^b Disc indicates which sets had discrepant release information from multiple code use; BYD = between year discrepancies; WYD= within year discrepancies (Appendix A).

Appendix C. Summary of herring CWT 2005 recoveries and recovery rates (RR%) by 2003 and 2004 release stock assessment region, statistical area, location, set identification (year and set number), tagging interval and number of tagged herring released per interval.

Set Id	Region	Area	Location	Interval	Releases	Recoveries	RR%
2003-001	SG	17	Secret Cove	1	3,821	0	0.00
				2	2,822	0	0.00
2003-002	SG	14	Madrona Point	1	4,282	3	0.07
				2	4,236	1	0.02
				3	4,183	1	0.02
2003-003	SG	14	Madrona Point	1	3,903	4	0.10
2003-004	SG	14	Mistaken Island	1	3,806	1	0.03
				2	3,711	0	0.00
				3	3,055	1	0.03
2003-005	SG	14	Brant Point	1	1,203	2	0.17
2003-006	SG	14	Brant Point	1	3,907	0	0.00
2003-007	SG	14	Baynes Sound	1	4,166	2	0.05
				2	4,083	1	0.02
				3	3,884	0	0.00
2003-008	SG	14	Longbeak Point	1	3,890	2	0.05
				2	4,375	1	0.02
				3	4,086	2	0.05
2003-009	SG	14	Longbeak Point	1	3,324	0	0.00
				2	5,013	2	0.04
2003-010	SG	14	Chrome Island	1	4,169	3	0.07
				2	3,352	0	0.00
				3	3,851	0	0.00
2003-011	SG	14	Repulse Point	1	4,237	1	0.02
				2	4,281	1	0.02
				3	4,250	0	0.00
2003-012	CC	9	Goose Bay	1	4,139	2	0.05
				2	3,809	2	0.05
				3	3,822	1	0.03
				4	1,890	0	0.00
2003-013	CC	8	Storm Inlet	1	3,916	2	0.05
				2	4,393	2	0.05
				3	4,338	3	0.07
				4	2,776	3	0.11
2003-014	CC	8	Pruth Bay	1	3,667	4	0.11
				2	3,722	3	0.08
				3	4,641	2	0.04

Appendix C (continued).

Set Id	Region	Area	Location	Interval	Releases	Recoveries	RR%
2003-015	CC	7	Kildidt Sound	1	3,654	6	0.16
				2	4,021	8	0.20
2003-016	CC	7	Lockhart Bay	1	3,866	14	0.36
				2	4,163	8	0.19
				3	4,309	12	0.28
				4	2,661	6	0.23
2003-017	CC	7	SW Spiller Channel	1	3,972	14	0.35
				2	5,347	16	0.30
				3	4,275	15	0.35
2003-018	CC	7	Neekas Inlet	1	5,687	20	0.35
				2	5,433	6	0.11
				3	4,043	8	0.20
				4	1,231	3	0.24
2003-019	CC	7	Berry Inlet	1	4,128	13	0.31
				2	5,141	7	0.14
				3	2,470	3	0.12
2003-020	CC	7	East Higgins Pass	1	4,786	4	0.08
				2	5,049	6	0.12
				3	3,874	5	0.13
				4	1,810	5	0.28
2003-021	PRD	5	Gurd Point	1	4,062	14	0.34
				2	6,194	15	0.24
				3	3,839	13	0.34
2003-022	PRD	5	Gurd Point	1	4,389	11	0.25
				2	6,184	15	0.24
				3	3,519	6	0.17
2003-023	PRD	5	Dries Inlet	1	4,859	20	0.41
				2	4,544	9	0.20
2003-024	PRD	3	Hook Point	1	4,400	1	0.02
				2	6,727	3	0.04
				3	3,939	3	0.08
2003-025	PRD	5	Robert Island	1	4,614	17	0.37
				2	6,624	5	0.08
				3	4,053	5	0.12
2003-026	PRD	5	Kitkatla Inlet	1	4,755	9	0.19
				2	6,222	8	0.13
				3	3,402	6	0.18

Appendix C (continued).

Set Id	Region	Area	Location	Interval	Releases	Recoveries	RR%
2003-027	PRD	5	Porcher Peninsula	1	4,621	8	0.17
				2	6,310	13	0.21
				3	4,534	5	0.11
2003-028	PRD	5	Gurd Point	1	4,787	8	0.17
				2	6,569	9	0.14
				3	2,353	3	0.13
2004-001	WCVI	23	SE Spilling Islets	1	3,585	4	0.11
				2	3,465	1	0.03
				3	3,427	1	0.03
2004-002	WCVI	23	Lyall Point	1	3,954	1	0.03
				2	4,447	2	0.04
2004-003	WCVI	23	Saint Ines Island	1	4,045	4	0.10
				2	4,832	7	0.14
				3	5,034	5	0.10
				4	819	1	0.12
2004-004	WCVI	24	Steamer Cove	1	4,505	19	0.42
				2	4,805	14	0.29
				3	4,015	7	0.17
				4	1,794	4	0.22
2004-005	WCVI	24	Clio Island	1	4,143	11	0.27
				2	6,064	11	0.18
				3	4,176	2	0.05
				4	2,919	1	0.03
2004-006	WCVI	26	Kyuquot Channel	1	4,234	22	0.52
				2	6,251	30	0.48
				3	5,232	16	0.31
2004-007	WCVI	26	Crowther Channel	1	4,750	26	0.55
				2	6,714	39	0.58
2004-008	WCVI	25	Rosa Harbour	1	4,756	4	0.08
				2	4,391	0	0.00
				3	4,570	0	0.00
				4	2,859	0	0.00
2004-009	WCVI	25	Rosa Harbour	1	5,424	2	0.04
2004-010	WCVI	25	Rosa Harbour	1	6,078	3	0.05
2004-011	WCVI	25	Rosa Harbour	1	4,911	0	0.00
				2	4,545	0	0.00
				3	3,900	0	0.00

Appendix C (continued).

Set Id	Region	Area	Location	Interval	Releases	Recoveries	RR%
2004-012	CC	8	Pruth Bay	1	4,297	11	0.26
				2	5,106	4	0.08
				3	5,647	2	0.04
				4	4,025	4	0.10
2004-013	CC	8	Fairmile Passage	1	5,768	6	0.10
				2	4,808	2	0.04
				3	1,428	3	0.21
2004-014	CC	8	Fairmile Passage	1	5,171	5	0.10
				2	5,975	5	0.08
				3	3,241	1	0.03
2004-015	CC	6	Kitasu Bay	1	4,226	16	0.38
				2	5,342	14	0.26
				3	4,034	5	0.12
				4	3,730	12	0.32
2004-016	CC	6	Kitasu Bay	1	5,119	17	0.33
				2	5,953	21	0.35
				3	5,010	11	0.22
				4	2,311	10	0.43
2004-017	CC	6	Kitasu Bay	1	6,068	17	0.28
				2	4,245	12	0.28
				3	6,011	31	0.52
2004-018	CC	7	Berry Inlet	1	4,581	41	0.90
				2	6,646	68	1.02
				3	4,091	32	0.78
				4	1,693	11	0.65
2004-019	CC	7	Berry Inlet	1	5,439	41	0.75
				2	3,594	39	1.09
				3	4,987	42	0.84
				4	5,208	41	0.79
2004-020	CC	7	Dundivan Inlet	1	6,327	59	0.93
				2	6,165	53	0.86
				3	5,925	45	0.76
2004-021	CC	7	Tankeeah River	1	5,193	61	1.17
				2	4,295	38	0.88
				3	4,171	38	0.91
2004-022	CC	7	Tankeeah River	1	4,731	46	0.97
				2	6,630	58	0.87
				3	3,092	22	0.71
				4	3,448	25	0.73

Appendix C (continued).

Set Id	Region	Area	Location	Interval	Releases	Recoveries	RR%
2004-023	CC	7	East Higgins Pass	1	4,458	18	0.40
				2	6,022	22	0.37
				3	5,645	15	0.27
				4	5,502	15	0.27
2004-024	CC	9	Goose Bay	1	5,675	5	0.09
				2	4,240	2	0.05
				3	5,576	1	0.02
				4	2,279	2	0.09
Totals					686,195	1,723	0.25

Appendix D Summary of herring CWT 2004 in-season recoveries and recovery rates (RR%) by release stock assessment region, statistical area, location, set identification (year and set number), tagging interval and number of tagged herring released per interval. These data should have been included in Appendix D of Flostrand and Schweigert (2005).

Set Id	Region	Area	Location	Interval	Releases	Recoveries	RR%
2004-006	WCVI	26	Kyuquot Channel	1	4,234	3	0.07
				2	6,251	1	0.02
				3	5,232	1	0.02
2004-008	WCVI	25	Rosa Harbour	1	4,756	6	0.13
				2	4,391	6	0.14
				3	4,570	2	0.04
				4	2,859	1	0.03
Totals					37,732	20	0.06