

ISSN 1170-2001

NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORT NO. 60

CODED-WIRE TAGGING LABORATORY
1990 ANNUAL REPORT

by

M.J. Unwin

D.H. Lucas

T. Gough

Freshwater Fisheries Centre

MAF Fisheries

PO Box 8324

CHRISTCHURCH

Servicing freshwater fisheries and aquaculture

SEPTEMBER
1990

NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORTS

This report is one of a series initiated in January 1989, and issued by the Freshwater Fisheries Centre, MAF Fisheries. The series was established to ensure that reports prepared for clients, tribunal hearings, internal use, etc., are collected together and available to future users. They are for limited circulation, and some may be confidential.

ISBN 0-477-08399-4



MAF Fisheries is the fisheries business group of the New Zealand Ministry of Agriculture and Fisheries. The name MAF Fisheries was formalised on 1 November 1989 and replaces MAFFish, which was established on 1 April 1987. It combines the functions of the former Fisheries Research and Fisheries Management Divisions, and the fisheries functions of the former Economics Division of MAF.

Enquiries to: The Librarian
Freshwater Fisheries Centre
PO Box 8324
Riccarton, Christchurch
New Zealand

1. INTRODUCTION

Coded-wire tagging is widely used in New Zealand for monitoring returns at maturity of hatchery reared juvenile salmon (Unwin, Lucas and Gough 1987). The tags used are miniature lengths (1.25 mm) of fine stainless steel wire, engraved with a binary code, which are injected into the nose cartilage of the young fish. Since the tag cannot be seen externally, tagged fish are also marked by removal of the adipose fin, so returning adults can be readily identified by anglers, hatchery staff etc.

Most coded-wire tagging is carried out by MAF Fisheries, which holds two of the three tagging machines in the country. MAF also processes all tags recovered from anglers, commercial fishing vessels, surveys of spawning areas etc., as well as returns to most commercial salmon farms. The one exception is the New Zealand Salmon Company, which owns the other tagging machine and which conducts its own tag-recovery programme for salmon returning to the Coleridge and Tent Burn hatcheries. To encourage the return of tags from anglers and the general public, MAF provides a network of "Head Depots" throughout the South Island, and administers an annual lottery with a \$1000 first prize awarded to an angler drawn at random from those who have returned a tagged head over the previous year.

This report provides a summary of coded-wire tag returns and releases over the period 1 August 1989 to 30 July 1990. These include details of all tag releases and recoveries by MAF or by salmon angling interests (Acclimatisation Societies, N Z Salmon Anglers etc.). However, for releases conducted by commercial salmon farms, returns to the individual farms are not included. These data are held by MAF but, for reasons of business confidentiality, are not made available to the general public. For farms such as Tent Burn, which saw the return of approximately 25 000 salmon this season, the tag data given here represent only a small percentage of the total returns.

Throughout this report, two figures are given for tag return data. These are N , the number of tags actually recovered, and N_{ext} , the total number of returning fish for releases which included both tagged and untagged salmon. For these releases, N_{ext} represents the extrapolated return assuming the survival of the untagged fish to have been the same as for the tagged fish. Approximate 95% confidence limits have been estimated where possible. Details of the calculations involved are given by Unwin, Lucas and Gough (1987), and Unwin and Lucas (1988).

2. THE 1990 TAG RECOVERY SEASON

2.1 Tag Recoveries

A total of 793 salmon heads from the 1989/90 season were received at the tagging laboratory (Table 1). Tags were recovered from 724 heads, while 69 failed to show a tag on an X-ray and were recorded as having lost their tag.

Although the percentage tag loss varies substantially according to the mode of recovery, the figure for hatchery recoveries (6.9%) is likely to be the most accurate. A further 9 tags were lost during recovery, leaving a total of 715 which were examined and de-coded. No allowance has been made for lost tags when computing N_{ext} , so that these estimates should be increased by 6.9%.

The 715 recovered tags were from 16 release locations on 10 catchments (Table 2). The main contributions were from Glenariffe, Tent Burn, Silverstream, the Rangitata Salmon Ranch, and the Otago Harbour releases. Allowing for untagged fish, the recoveries represent an estimated $8\ 100 \pm 1000$ salmon of hatchery origin. Table 2 also emphasises the very high "expansion factor" associated with releases from Tent Burn, with each tagged salmon representing over 40 untagged fish.

The returns were dominated by two and three year old fish (Table 3), with four year old tags accounting for only 7% of the recoveries. The apparent recovery of a tag from a six year old fish (taken by a commercial trawler off Banks Peninsula) is almost certainly an error. Such errors have occurred previously when a tagged head has lain in an angler's freezer for one or more years before being handed in to the tagging laboratory. It has not been possible to confirm if this could have happened in the present instance. However, given that over 30 000 tags have now been examined over the last ten years, the prospect of one six year old fish turning up cannot be ruled out completely. In the absence of any way to settle this point, the record has been left to stand.

Anglers accounted for nearly two thirds of the recovered tags (Table 4), although the inclusion of data for tagged fish returning to Tent Burn would reduce this figure substantially. The relatively low number of tags recovered from sea-caught salmon is disappointing. Although some commercial skippers are happy to cooperate with MAF by handing in tags, attitudes within the industry have hardened since the introduction of the closed area off Banks Peninsula, and many tags are undoubtedly lost as a result. The reported 1989/90 by-catch of 11.1 tonnes represents approximately 3000 fish, of which a high proportion (at least 90%) are believed to have been of hatchery origin. The 760 ± 330 hatchery fish estimated to have been recovered represent only 20-30% of this total.

Tagged salmon caught in Otago Harbour accounted for 30% of the recoveries (Table 5). Taking untagged fish into account, however, the largest contributions came from the Rakaia River, followed by the Waimakariri and Rangitata rivers. Recoveries for these three rivers are summarised further in Table 6.

2.2 Brood Year Returns

Returns for all non-commercial releases from the 1986 to 1988 brood years are summarised in Table 7. With a few exceptions, most notably the Otago harbour

releases, the returns are disappointing. Returns for the 1986 brood year are now complete (excluding any five year old fish returning in 1991). Of the fish released from Glenariffe, only one batch (code 63/40/63, released on 19 June 1987 at a mean weight of 91 g) yielded a return exceeding 1%. The June releases produced an average survival of 0.92%, but three further groups released on 11 August 1987 produced a combined return of only 0.15%. By contrast, the two Otago Harbour releases from the 1986 brood year yielded returns of 4.2% and 3.8%

Similar results apply to the 1987 brood year returns. With four year old fish still to come, all three Otago Harbour releases have achieved a return exceeding 5%, with one group (released at Portobello) reaching 8.4%. Few other releases have exceeded 1%. Returns from Glenariffe releases are currently averaging 0.49%, although one of the main production releases (code 63/38/17) has so far yielded 1.18%, and contributed over 600 untagged fish to Glenariffe this year. The two age-cross experimental groups have performed poorly, to the extent that any differences in the age structure of the returning adults would be impossible to pick out.

Of the 1987 brood transfer releases, only the August 1988 Glenariffe - Silverstream transfer (code 63/41/07) has exceeded 1%. An earlier release in February 1988, comprising fish incubated and reared at Silverstream (code 63/27/03), has so far produced a return of only 0.12%.

Although only two year old fish have returned so far from the 1988 brood releases, the results follow much the same pattern as the 1986 and 1987 brood returns. The three Otago Harbour releases are well ahead of the remainder, with an average return of 0.73%. The two Glenariffe to Silverstream transfers (codes 63/39/19 and 63/39/24) and the Lyttelton Harbour transfer (code 63/38/62) are the only other releases for which the return currently exceeds 0.1%. As always, it is not advisable to draw too many conclusions from returns of two year olds (e.g., compare codes 63/27/03 and 63/41/07 from the 1987 brood year releases), but there is at present no reason to expect the 1988 brood to be any more successful than 1986 or 1987.

2.3 Tag Lottery

The continuing success of the Otago Harbour releases has prompted some changes to the lottery and reward system for tagged salmon. Up to 1989, all salmon caught at sea were entered into a separate marine lottery, with a \$5 reward paid for every fish. To reduce the costs to MAF (440 tagged salmon were caught in Otago Harbour last season), we decided to enter all angler caught tagged salmon into the same lottery irrespective of where they were caught. This is much simpler to administer, and leaves the marine lottery free for what it was originally intended for - tagged fish of any species caught at sea by commercial fishers. Under the new system, angler caught salmon from

places such as Lyttelton, Timaru Harbour, Moeraki, and Otago Harbour, will all go into the angler lottery.

A total of 463 fish were eligible for this years lottery, including eight late returns from the 1988/89 season. The \$1000 first prize was won by Mr A Duncan of Ashburton, for a three year old ex Glenariffe salmon (tag code 63/39/58) caught at the Rakaia mouth. Rather surprisingly, the list of winning fish did not include any from Tent Burn (Table 8).

MAF extends its thanks to all anglers who supported the tagging programme by looking for and recovering tagged fish.

2.4 Tag Releases

Tag release data for the 1989 brood year are summarised in Table 9. The table includes all releases for the 1990 season, with the exception of those from the Tent Burn and Coleridge hatcheries (for which data are not yet available).

Overall, these releases amount to 886 000 fish, of which 140 000 (15.9%) were tagged. This is equivalent to an average "expansion factor" of about 6:1. Releases from Glenariffe totalled 542 000, of which 66 000 (12.1%) were tagged. Transfers to Silverstream, the Rangitata River, and the Opihi River amounted to 135 000 fish, of which 25 000 (18.9%) were tagged. This discrepancy arose because fish scheduled for release at Glenariffe were diverted to other release points during the course of the season. Ideally, at least 15%, and preferable 20%, of the fish released from Glenariffe should be tagged.

3. DISCUSSION

Compared to the returns of a few years ago, from the 1981-1983 brood years, tag returns for 1990 continue the poor results which have been apparent since about 1986 (Table 10, Fig. 1). These results are significant because they are based only on tag returns to Glenariffe, and so are not affected by any possible non-reporting of tags from anglers, commercial fishing vessels, or spawning surveys. Returns of 2-year olds are particularly disappointing, and do not augur well for the 1991 season.

As always, the extent to which tag recoveries are under-reported is difficult to gauge. For salmon at sea, the estimated recovery rate of 20% - 30% is a maximum figure, based on the assumption that landings did not exceed the official figure of 11.1 tonnes. The recovery rate from anglers is also a matter for some speculation, bearing in mind that it may well vary from district to district. For example, the relatively high recovery rate for the Rangitata River suggests that South Canterbury anglers may be more conscientious about handing in tags than their North Canterbury counterparts.

An informal survey of about 200 randomly chosen North Canterbury anglers (conducted by Jennifer Lucas), together with an equally informal survey of head depot operators, suggests that between 60% and 70% of salmon anglers are aware of the tagging programme. This is equivalent to a "non-awareness" factor of between 30% and 40%, and is an obvious area where improvement is needed. The introduction of a tagging brochure to be issued with 1990/91 angling licences sold in Canterbury, Otago, and the West Coast, should help significantly in this respect.

4. REFERENCES

Unwin, M.J., and Lucas, D.H. 1988. Measuring hatchery contributions -tag recoveries and the "expansion factor". *Freshwater Catch* 38:14.

Unwin, M.J., Lucas, D.H., and Gough, T. 1987. Coded-wire tagging of juvenile chinook salmon (*Oncorhynchus tshawytscha*) in New Zealand, 1977-86. *New Zealand Fisheries Technical Report No. 2*. 24p.

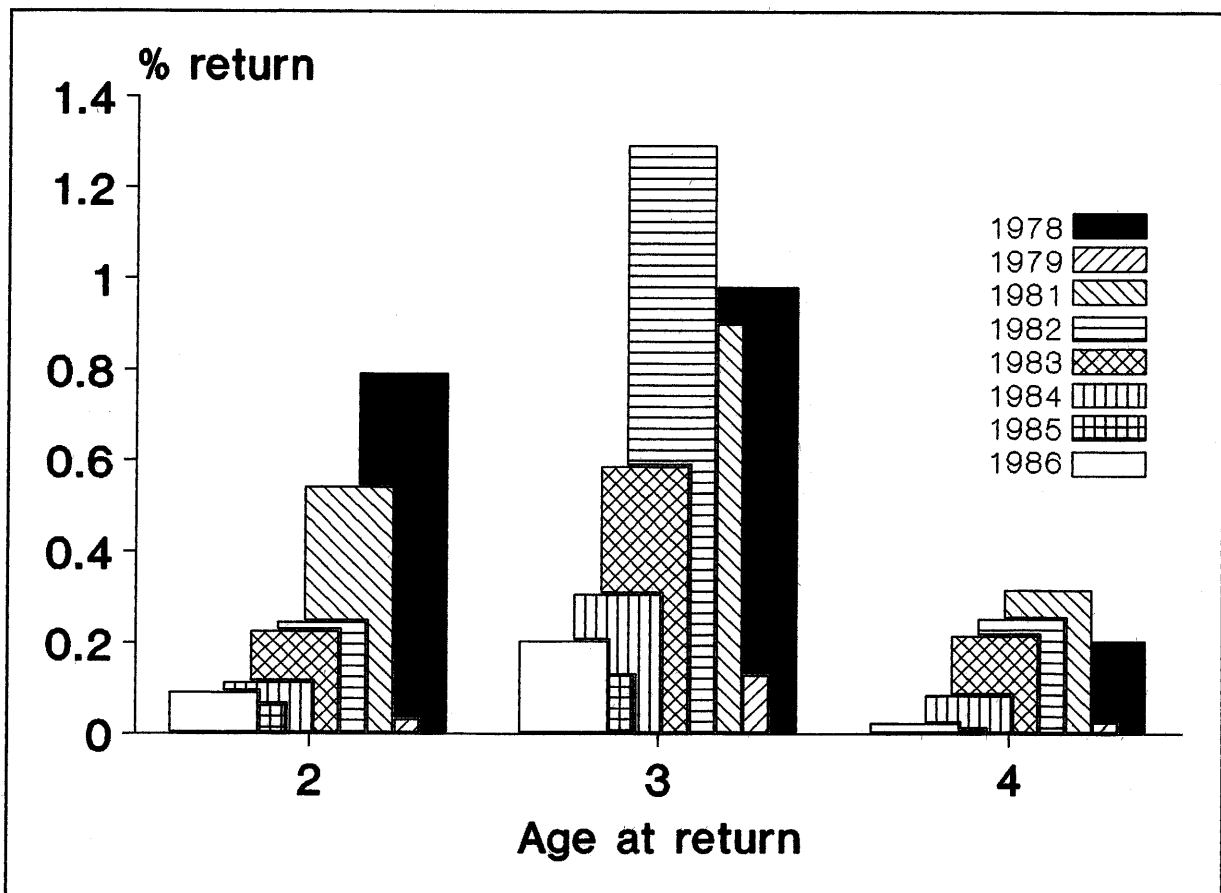


Figure 1. Returns of tagged salmon to Glenariffe by age and brood year, based on the data in Table 10.

Table 1. Salmon heads received at the tagging laboratory by method of recovery, 1989/90.

Method of recovery	Heads examined	Tags recovered	Lost during recovery	No tag found	% tag loss
Hatchery	217	200	2	15	6.9
Angler	512	455	7	50	9.8
Carcase	15	11	0	4	26.7
By-catch	49	49	0	-	-
Total	793	715	9	69	8.7

Table 2. 1989/90 tag returns by origin.

Catchment	Release location	N	N _{ext}
Kahutara River	Mahunga Salmon Farm	11	89 ± 53
Waimakariri River	Silverstream Hatchery	72	528 ± 137
	Cora Lynn Swamp	19	23 ± 13
	Winding Creek	18	51 ± 29
Avon River		2	2 -
Lyttelton Harbour		9	19 ± 12
Tent Burn Hatchery		78	3272 ± 854
Rakaia River	Glenariffe Hatchery	160	2393 ± 431
	Coleridge Hatchery	36	500 ± 167
	Lake Coleridge	15	41 ± 24
Rangitata River	Rangitata Salmon Ranch	51	131 ± 36
	1989 enhancement release	4	19 ± 19
Newhaven, Waitaki		1	11 ± -
Otago Harbour	Inner harbour	65	384 ± 95
	Leith Stream	65	307 ± 77
	Portobello	92	244 ± 50
Waitahuna River		17	77 ± 37
Total		715	8092 ± 994

Table 3. 1989/90 tag recoveries by age.

Age	N	N _{ext}
2	170 (23.8%)	1027 ± 313
3	488 (68.2%)	6227 ± 837
4	53 (7.4%)	820 ± 433
5	3 (0.4%)	17 ± 24
6	1 (0.1%)	1 -
Total	715	8092 ± 994

Table 4. 1989/90 tag recoveries by method of capture.

How caught	N	N _{ext}
Angler	455 (63.6%)	4690 ± 821
Hatchery	200 (30.0%)	2578 ± 451
By-catch	49 (6.8%)	760 ± 327
Spawning survey	11 (1.5%)	63 ± 57
Total	715	8092 ± 994

Table 5. 1989/90 coded-wire tag recoveries by river/area caught.

River	N	N _{ext}
Kahutara	9	73 ± 48
Hurunui	6	81 ± 73
Waimakariri	124	1374 ± 414
Avon	1	1 -
Lyttelton Harbour	5	9 ± 8
Tent Burn	12	430 ± 305
Rakaia	159	2894 ± 586
Lake Coleridge	16	71 ± 63
Rangitata	85	1122 ± 415
Orari	3	161 ± 248
Opihi	1	3 -
Waitaki	5	29 ± 28
Otago Harbour	214	965 ± 158
Clutha	17	74 ± 36
At sea	58	806 ± 329
Total	715	8092 ± 994

Table 6. 1989/90 coded-wire tag recoveries for the Waimakariri, Rakaia, and Rangitata rivers, by method of recovery and release location.

Waimakariri River						
Release location	Angler		Method of recovery Silverstream		Spawning survey	
	N	N _{ext}	N	N _{ext}	N	N _{ext}
Silverstream	28	194 ± 83	37	310 ± 107	2	10 ± 14
Winding Creek	8	20 ± 18	6	26 ± 22	2	2 ± 3
Cora Lynn	15	19 ± 12	-	-	3	3 ± 3
Lyttelton Harbour	-	-	1	2 ± 4	1	2 ± 4
Tent Burn	12	584 ± 360	4	133 ± 132	-	-
Glenariffe	3	38 ± 49	-	-	-	-
Coleridge	2	29 ± 41	-	-	-	-
Total	68	884 ± 376	48	471 ± 171	8	17 ± 15

Rakaia River						
Release location	Angler		Method of recovery Glenariffe		Spawning survey	
	N	N _{ext}	N	N _{ext}	N	N _{ext}
Tent Burn	10	492 ± 379	3	129 ± 149	1	14 ± 28
Glenariffe	20	347 ± 172	108	1716 ± 369	2	32 ± 47
Coleridge	6	93 ± 77	4	55 ± 54	-	-
Rangitata Salmon Ranch	-	-	4	10 ± 10	-	-
Rangitata enhancement	-	-	1	5 ± 9	-	-
Total	36	932 ± 423	120	1915 ± 402	3	46 ± 55

Rangitata River						
Release location	Angler		Method of recovery Rangitata Salmon			
	N	N _{ext}	N	N _{ext}		
Glenariffe	5	29 ± 29	-	-		
Coleridge	20	275 ± 122	1	15 ± 29		
Tent Burn	13	621 ± 381	2	70 ± 97		
Rangitata Salmon Ranch	21	54 ± 23	23	59 ± 24		
Total	59	979 ± 402	26	144 ± 104		

Table 7. Release and return data for all non-commercial coded-wire tag releases, 1986-1988 brood years.

1986 Brood Year										
Released by	Description	Tag code	Release weight(g)	Release date	Number tagged	Number recovered				%
						2	3	4	Total	
MAF Fisheries	Glenariffe production release	63/40/59	22	11/08/87	5194	0	3	0	3	0.06
MAF Fisheries	Glenariffe production release	63/40/60	42	11/08/87	4770	0	5	3	8	0.17
MAF Fisheries	Glenariffe production release	63/40/61	47	19/06/87	5180	9	31	4	44	0.85
MAF Fisheries	Glenariffe production release	63/40/62	74	19/06/87	5059	12	28	4	44	0.87
MAF Fisheries	Glenariffe production release	63/40/63	91	19/06/87	4961	24	35	4	63	1.27
MAF Fisheries	Glenariffe production release	63/41/04	86	19/06/87	4948	15	16	3	34	0.69
MAF Fisheries	Glenariffe production release	63/41/05	83	11/08/87	5054	4	6	2	12	0.24
MAF Fisheries	Glenariffe precocious males	63/45/01	-	16/07/87	501	0	0	0	0	-
Westland A.S.	Lake Mapourika	63/40/33	48	11/03/87	5020	0	20	0	20	0.40
NZSA (Otago)	Inner harbour release	63/40/28	40	8/07/87	5203	87	124	8	219	4.21
NZSA (Otago)	Portobello release	63/41/06	50	1/08/87	5157	95	98	4	197	3.82
NZSA (Otago)	Waitahuna River	63/46/01	35	27/05/87	2341	3	3	4	10	0.43
1987 Brood Year										
Released by	Description	Tag code	Release weight(g)	Release date	Number tagged	Number recovered				%
						2	3	4	Total	
MAF Fisheries	Silverstream production release	63/27/03	70	25/02/88	5102	2	4	0	6	0.12
MAF Fisheries	Silverstream transfer	63/41/07	52	3/08/88	5030	3	50	0	53	1.05
MAF Fisheries	Glenariffe production release	63/38/17	70	28/06/88	5184	22	39	0	61	1.18
MAF Fisheries	Glenariffe production release	63/39/52	50	22/03/88	4987	1	7	0	8	0.16
MAF Fisheries	Glenariffe production release	63/39/54	56	14/07/88	5536	13	20	0	33	0.60
MAF Fisheries	Glenariffe production release	63/39/55	35	2/08/88	5022	3	8	0	11	0.22
MAF Fisheries	Glenariffe production release	63/39/58	46	2/08/88	5051	7	21	0	28	0.55
MAF Fisheries	Glenariffe 4 x 4 cross	63/39/56	61	2/08/88	5162	5	13	0	18	0.35
MAF Fisheries	Glenariffe 3 x 4 cross	63/39/57	34	2/08/88	4083	1	12	0	13	0.32
NZSA (Canty.)	Avon River enhancement	63/39/51	-	-	5106	3	1	0	4	0.08
NZSA (Otago)	Leith Stream release	63/37/46	80	27/06/88	1939	53	51	0	104	5.36
NZSA (Otago)	Dunedin wharf release	63/49/01	80	30/06/88	2029	70	33	0	103	5.08
NZSA (Otago)	Portobello release	63/48/01	85	23/07/88	2002	91	78	0	169	8.44
NZSA (Otago)	Waitahuna River release	63/50/01	80	23/06/88	2086	9	13	0	22	1.05
NCAS	Cora Lynn transfer	63/37/12	47	23/08/88	5059	4	18	0	22	0.43
NCAS	Lake Coleridge transfer	63/39/53	80	14/07/88	5000	1	8	0	9	0.18
NCAS	Winding Creek transfer	63/37/11	43	23/08/88	5218	0	10	0	10	0.19
NCAS	Winding Creek transfer	63/38/09	43	2/03/88	5111	6	8	0	14	0.27
1988 brood year										
Released by	Description	Tag code	Release weight(g)	Release date	Number tagged	Number recovered				%
						2	3	4	Total	
MAF Fisheries	Silverstream transfer	63/39/19	53	23/06/89	5033	9	0	0	9	0.18
MAF Fisheries	Silverstream transfer (held)	63/39/24	51	9/06/89	5154	8	0	0	8	0.15
MAF Fisheries	Lyttelton Harbour release	63/38/62	57	26/07/89	5479	9	0	0	9	0.16
MAF Fisheries	Glenariffe production release	63/38/39	51	27/03/89	10020	5	0	0	5	0.05
MAF Fisheries	Glenariffe production release	63/38/55	43	27/03/89	4995	2	0	0	2	0.04
MAF Fisheries	Glenariffe production release	63/38/56	44	27/03/89	5144	0	0	0	0	-
MAF Fisheries	Glenariffe production release	63/38/58	43	27/03/89	5197	1	0	0	1	0.02
MAF Fisheries	Glenariffe production release	63/38/61	54	31/05/89	4795	0	0	0	0	-
MAF Fisheries	Glenariffe production release	63/39/06	59	31/05/89	9610	3	0	0	3	0.03
MAF Fisheries	Glenariffe production release	63/39/08	59	13/08/89	10061	7	0	0	7	0.07
MAF Fisheries	Glenariffe production release	63/39/21	48	31/05/89	10247	0	0	0	0	-
MAF Fisheries	Coleridge transfer (triploids)	63/37/47	60	3/05/89	7348	7	0	0	7	0.09
Peacock Springs	Avon River release	63/39/04	20	18/03/89	4688	1	0	0	1	0.02
NZ Salmon/NCAS	Upper Waimakariri enhancement	63/38/50	51	4/05/89	4900	1	0	0	1	0.02
NCAS	Winding Creek transfer	63/39/20	48	15/06/89	5120	0	0	0	0	-
AAS/SCAS	Rangitata enhancement	63/38/14	48	22/03/89	9531	4	0	0	4	0.04
Waitaki comp.	Waitaki fishing competition	63/38/10	36	22/04/89	3019	0	0	0	0	-
NZSA (Otago)	Dunedin wharf release	63/36/50	56	20/07/89	3272	24	0	0	24	0.73
NZSA (Otago)	Leith Stream release	63/38/15	64	10/07/89	2069	14	0	0	14	0.68
NZSA (Otago)	Portobello release	63/37/31	68	13/07/89	1221	10	0	0	10	0.82
NZSA (Otago)	Waitahuna River release	63/37/43	45	5/05/89	2178	0	0	0	0	-

Table 8. 1990 coded-wire tag lottery winners.

1st prize of \$1000	Tag code	Year released	Release funded by	Where released	Where caught
Mr A. Duncan, Ashburton	63/39/58	1988	MAF Fisheries	Glenariffe	Rakaia River mouth
Four 2nd prizes of \$100					
Mr M. Finnerty, Dunedin	63/37/46	1988	N Z Salmon Anglers	Leith Stream	Otago Harbour (entrance)
Mr F. Mitchell, Dunedin	63/40/28	1987	N Z Salmon Anglers	Dunedin wharfs	Portobello
Mr A. Wilson, Dunedin	63/37/31	1989	N Z Salmon Anglers	Portobello	Otago Harbour, city wharfs
Mr J. Yee, Dunedin	63/49/01	1988	N Z Salmon Anglers	Dunedin wharfs	Port Chalmers
Twenty 3rd prizes of \$20					
Mr B. Ashwell, Dunedin	63/48/01	1988	N Z Salmon Anglers	Portobello	Portobello wharf
Mr R. Attridge, Christchurch	63/39/53	1988	MAF Fisheries/NCAS	Lake Coleridge	Harper River mouth
Mr G. Brown, Dunedin	63/37/46	1988	N Z Salmon Anglers	Leith Stream	Otago Harbour (entrance)
Mr R. Christie, Christchurch	63/41/07	1988	MAF Fisheries	Silverstream Hatchery	Waimakariri River mouth
Mr P. Cooper, Kaiapoi	63/39/19	1989	MAF Fisheries	Silverstream Hatchery	Kaiapoi River
Mr R. Dunn, Christchurch	63/39/24	1989	MAF Fisheries	Silverstream Hatchery	Kaiapoi River
Mrs J. George, Dunedin	63/49/01	1988	N Z Salmon Anglers	Dunedin wharfs	Otago Harbour (entrance)
Mr B. Gunn, Dunedin	63/48/01	1988	N Z Salmon Anglers	Portobello	Otago Harbour (entrance)
Mr W. Hood, Ashburton	63/41/53	1988	N Z Salmon Company	Coleridge Hatchery	Rangitata River
Mr K. Hopwood, Roxburgh	63/50/01	1988	N Z Salmon Anglers	Waitahuna River	Clutha River, Roxburgh Dam
Mr B. Horwood, Dunedin	63/48/01	1988	N Z Salmon Anglers	Portobello	Otago Harbour, city wharfs
Mr R. Isaac, Dunedin	63/37/46	1988	N Z Salmon Anglers	Leith Stream	Otago Harbour, city wharfs
Mr L. Norris, Dunedin	63/37/46	1988	N Z Salmon Anglers	Leith Stream	Otago Harbour (entrance)
Mr A. Purchess, Dunedin	63/48/01	1988	N Z Salmon Anglers	Portobello	Otago Harbour (entrance)
Mr C. Ratten, Dunedin	63/37/46	1988	N Z Salmon Anglers	Leith Stream	Portobello
Mr D. Ridgeway, Christchurch	63/39/53	1988	MAF Fisheries/NCAS	Lake Coleridge	Harper River mouth
Mr A. Salter, Christchurch	63/38/08	1988	Mahunga Salmon Farm	Kahutara River, Kaikoura	Kahutara River
Mr G. Whyte, Dunedin	63/36/50	1989	N Z Salmon Anglers	Dunedin wharfs	Port Chalmers
Mr A. Wilson, Dunedin	63/48/01	1988	N Z Salmon Anglers	Portobello	Port Chalmers
Mr G. Wilson, Blenheim	63/39/08	1989	MAF Fisheries	Glenariffe	Hurunui River mouth

Table 9: Coded-wire tag release data for the 1989 brood year. N.Z. Salmon release data (Tent Burn and Coleridge) are not yet available.

Tag code	Funded by	Description	Release location	Number released		Release weight	Release date
				Tagged	Untagged		
63/40/10	MAF Fisheries	Silverstream transfer	Silverstream	5 137	32 363	50	23 Apr 90
63/38/36	N.Z.S.A. Canty	Avon River release	University	2 666	3 000	-	17 Mar 90
63/38/31	N.Z.S.A. Canty	Avon River release	Wairarapa Stream	2 591	3 000	-	17 Mar 90
63/40/08	MAF Fisheries	Lyttelton Harbour release	Lyttelton wharf	10 183	28 387	59	1 May 90
63/36/53	MAF Fisheries	Production release	Glenariffe	10 128	80 844	54	9 Mar 90
63/39/62	MAF Fisheries	Production release	Glenariffe	10 191	73 253	85	23 Jun 90
63/40/05	S.I.C.A.S.+	Production release	Glenariffe	10 138	87 814	87	23 Jun 90
63/40/07	MAF Fisheries	Production release	Glenariffe	9 577	78 342	50	4 Mar 90
63/41/08	S.I.C.A.S.	Production release	Glenariffe	10 522	87 247	67	24 Jul 90
63/51/01	MAF Fisheries	Production release	Glenariffe	10 102	36 763	53	5 Mar 90
63/39/12	MAF Fisheries	All female release	Glenariffe	5 153	32 081	47	8 Aug 90
63/39/10	Rangitata Salmon	Production release	Rangitata Salmon Ranch	3 797	13 000	80	2 May 90
63/39/63	S.I.C.A.S	Rangitata River transfer	Arundel Bridge	5 100	38 467	46	15 Mar 90
63/40/11	S.I.C.A.S	Rangitata River transfer	Arundel Bridge	10 051	26 271	42	15 Mar 90
63/39/11	S.I.C.A.S.	Opihi River transfer	Opihi mouth	5 200	12 500	55	12 Jun 90
63/39/15	Regal Salmon	Waitaki River release	Hakataramea confluence	14 129	56 345	54	-
63/40/58	N.Z.S.A. Otago	Otago Harbour release	Dunedin wharf	13 327	43 200	94	30 Jul 90
63/40/13	N.Z.S.A. Otago	Waitahuna River transfer	Waitahuna River	2 600	12 500	50	6 Feb 90
Totals				140 592	745 377		

+ = South Island Council of Acclimatisation Societies.

Table 10. Returns of tagged salmon to Glenariffe by brood year, for groups of salmon weighing at least 20g at release. (No fish weighing over 20g were released in 1980.)

Brood year	Number of groups	Number tagged	Average release weight (g)	Number of fish returning to Glenariffe				Total	%
				Age 2	Age 3	Age 4			
1978	1	7 333	35.0	58 (40.0%)	72 (49.7%)	15 (10.3%)	145	(1.98%)	
1979	2	40 964	34.6	13 (17.1%)	53 (69.7%)	10 (13.2%)	76	(0.19%)	
1980	-	-	-	-	-	-	-	-	
1981	2	38 542	37.8	209 (30.8%)	347 (51.2%)	122 (18.0%)	678	(1.76%)	
1982	15	140 450	39.6	344 (13.7%)	1816 (72.2%)	355 (14.1%)	2515	(1.79%)	
1983	42	372 615	43.1	842 (21.9%)	2187 (57.0%)	803 (20.9%)	3836	(1.03%)	
1984	31	151 623	49.0	171 (22.4%)	466 (60.9%)	127 (16.6%)	765	(0.50%)	
1985	15	75 036	57.8	47 (31.3%)	96 (64.0%)	7 (4.7%)	150	(0.20%)	
1986	7	35 166	63.4	32 (28.6%)	72 (64.3%)	8 (7.1%)	112	(0.32%)	
1987	7	35 025	50.9	47 -	91 -	- -	138	-	
1988	5	39 883	52.9	9 -	- -	- -	9	-	