

Coded-wire tagging of chinook salmon
(*Oncorhynchus tshawytscha*)
in New Zealand, 1977–81:
release programmes and returns at maturity

M. J. Unwin,
D. H. Lucas,
and
T. Gough

New Zealand Fisheries Data Report No. 33
ISSN 0113-2288
1988

MAF Fish

Coded-wire tagging of chinook salmon
(*Oncorhynchus tshawytscha*)
in New Zealand, 1977–81:
release programmes and returns at maturity

M. J. Unwin,
D. H. Lucas,
and
T. Gough

Published by MAFFish
Wellington
1988

ISBN 0-477-08070-7

MAF Fish

MAFFish is the fisheries business group of the New Zealand Ministry of Agriculture and Fisheries. It was established on 1 April 1987 and combines the functions of the old Fisheries Research Division and Fisheries Management Division and the fisheries functions of the old Economics Division.

The New Zealand Fisheries Data Report series continues the Fisheries Research Division Occasional Publication: Data Series.

Inquires to:
The Editor,
Fisheries Research Centre,
P.O. Box 297,
Wellington,
New Zealand.

Contents

	<i>Page</i>
Introduction	5
Factors influencing percentage return	6
References	7
Fig. 1 - The South Island of New Zealand	9
Fig. 2 - The Hurunui, Waimakariri, Rakaia, and Hokitika River systems	10
Table 1 - Summary of coded-wire tagged salmon liberations, 1977-81 ...	11
Table 2 - Release and return data for tagged salmon liberations, 1977-81	12
Table 3 - Summary of release and return data by tag code	16
Appendix 1 - Description of release sites and their associated release programmes	48

Introduction

Coded-wire tagging (CWT) has been increasingly used in New Zealand since 1977 to monitor returns at maturity of hatchery-reared chinook salmon, *Oncorhynchus tshawytscha* (Unwin *et al.* 1987). The much higher returns from the more recent liberations, about 3-4%, are largely due to knowledge gained from releases made over the five rearing seasons from 1977-78 to 1981-82 (Unwin 1985). The data presented in this report are a summary of all returns to January 1988 of tagged salmon released during this period. As New Zealand adult salmon are at the most 5 years old at return (Flain 1982), it is unlikely that any additional tags from these releases will be recovered. All CWT data are subject to the limitations discussed by Unwin *et al.* (1987), especially that they give a minimum estimate of return at maturity.

The return of heads from tagged adult salmon relies greatly on co-operation from recreational anglers. Minimal information only is requested with each return to make this as easy as possible (Unwin *et al.* 1987). The required information includes the location of the recapture, but not details such as length, weight, or sex. When salmon are recovered at a hatchery or fish trap, this additional information is usually recorded, though few of the data, including those from the Freshwater Fisheries Centre (FFC)* experimental hatchery at Glenariffe, have been analysed. Therefore, this report includes only those data which can be derived from the year, location, and method of capture for each tagged salmon recovered. Many of the important statistics for each group of tagged fish, such as the percentage return, the age structure of the returning population, the proportion of the returns taken by anglers, and the extent of straying, can readily be calculated from these data.

From 1977 to 1981, 130 separate groups of coded-wire tagged juvenile salmon, ranging in size from 257 to 52 041 fish, were released from 22 locations throughout the South Island (Figs. 1 and 2, Table 1). All releases were in streams draining to the east coast between the Waiau and Clutha Rivers, except for two locations on the Takaka and Hokitika Rivers. Releases at eight of these sites were for commercial ocean ranching programmes, but the rest were for various research or enhancement projects. The agencies responsible for releases during 1977-81 are listed in Table 1 with the name they were known by at that time; in some instances, these are no longer current. Catchments are tabulated in the order encountered when making a clockwise traverse around the South Island, from the Waiau River to the Takaka River.

A summary of the release and return data for each tag code, grouped by release location, is given in Table 2. For each location, the data are arranged by brood year and tag code ("brood year" here refers to the year in which the salmon were incubated and hatched and is not necessarily the same as the year of release). The numbers of fish released, both tagged and untagged, are not known exactly. Although the number of fish tagged is counted at tagging, there is usually a small incidence of tag loss, typically about 5%, over the next 2-3 weeks (Unwin *et al.* 1987). Where an estimate of tag loss was available, based on examination of a subsample of a few hundred fish, the release numbers have been adjusted. Otherwise, a loss rate of 5% was assumed. As tag loss rates can never be exactly determined, the number of tagged fish actually released in each group is an estimate, but the error is unlikely to exceed 1 or 2%.

* Formerly the Fisheries Research Division (FRD) of the Ministry of Agriculture and Fisheries.

The number of untagged fish released in any group is also an estimate, usually based on the ratio of total weight of fish to mean fish weight, determined when the fish were last handled en masse. Experience at Glenariffe and elsewhere shows that such estimates have an error of between $\pm 10\%$ and $\pm 20\%$. In general, the true number of fish is smaller than the estimate, especially because of mortality due to factors such as cannibalism. Errors of this type are significant when tag return data are used to calculate the number of untagged adults returning from a particular release.

Tables 3a-3k contain the data for releases or related groups of releases with large returns (nominally 10 or more). These tables present a breakdown of each data set according to age at return, method of capture, and area of capture by catchment. For fish recovered in their native river, the data are further tabulated according to the general location of recovery. Most location names refer to a general place rather than a specific locality. For example, the "Rakaia mouth" includes not only the river mouth and lagoon area, but extends some 5-10 km up stream towards the next location near the State Highway 1 (SH 1) road bridge. Where a location is given as a river name only, the location of capture is unknown (e.g., in Table 3a, six fish are listed under the location "Hurunui River"). The terms used to describe the recovery method are those of Unwin *et al.* (1987). The six methods in these tables are "angler", "carcass", "hatchery", "sea", "trap", and "miscellaneous".

Analysis of some of the data in this report has appeared elsewhere (e.g., Crowe 1985, Gillard 1985, Unwin 1985). However, several of the release programmes before 1981, particularly in the minor salmon rivers like the Waiau, Hurunui, Ashburton, and Opihi, had low returns and were discontinued. As documentation of these programmes is sparse, brief descriptions and evaluations of the releases and references are given in Appendix 1.

Factors influencing percentage return

The influence of release date and weight on percentage survival to maturity was discussed by Unwin (1985). Of the 130 releases in Table 2, 38 had no returns. All of these had mean release weights less than 20 g, and all but one were released before 31 December. In contrast, 14 releases had returns of more than 1%; all of these had mean weights over 30 g and were released on or after 6 March. However, the release of large (over 30 g) fish does not necessarily result in a high recapture rate, as is shown by the returns to the hatcheries at Longfellow and Lake Kaniere.

Because of the dominant effect of release date and weight on returns, it is difficult to say if other factors are significant. For example, almost all releases of fish transferred between catchments have been of fish in the 5-20 g weight range, released in November or December. Although most of these releases had low returns, it does not necessarily follow that this resulted from the transfer process. The only transfers with larger returns (e.g., codes 63/45/03 and 63/20/03) were made in February.

Almost all hatchery-reared salmon so far recovered have been of age 2, 3, or 4 (Tables 2 and 3). Only one tagged 5-year-old fish has been recovered (code 63/21/04), out of 4925 returns from the 1977-81 brood years. Three-year-old fish are the dominant age class in both wild (Flain 1982) and hatchery fish, but the proportion of hatchery 2-year-olds exceeds that of the

wild population. There are substantial variations in age at return between release sites and between different releases at any one site.

Anglers and hatcheries return most recovered, tagged, adult salmon (88.5%), but there are again substantial variations between seasons, catchments, and release localities. Foot surveys of known spawning grounds recover many tagged carcasses, particularly on the Rakaia River. The large number of recoveries in the "miscellaneous" category from the Clutha River includes fish taken by the ICI/Wattie gill-netting operations near their fish ladder (Gillard 1985). In comparison with hatcheries, anglers are selective for certain age classes. There is a tendency for the proportion of the recovered fish taken by anglers to increase with age at return on the Rakaia River (e.g., Table 3d - codes 63/12/02, 63/20/02, 63/21/04, and 63/22/04).

A small degree of straying, typically 5-10%, is a general characteristic of hatchery-reared salmon in New Zealand. Strays of Rakaia origin are frequently reported from the Rangitata, Waimakariri, Hurunui, and Waiau Rivers, with isolated specimens from as far away as the Wairau River in Marlborough. As many of these rivers are surveyed only infrequently, recoveries of tagged fish from the more remote areas are proportionally fewer than from rivers such as the Rakaia. The true level of straying is therefore likely to be higher than the raw data indicates.

References

- Beckett, T. W. 1981: ICI/Wattie Salmon Development Project. In Hopkins, C.L. (Comp.), Proceedings of the Salmon Symposium, pp. 83-87. *Fisheries Research Division Occasional Publication No. 30*.
- Bonnett, M. 1980: Hurunui River salmon run. *Freshwater Catch 8*: 5.
- Bull, J. T. 1979: Three Springs Stream, Kimbell. *105th Annual Report, South Canterbury Acclimatisation Society*: 6-8.
- Bull, J. T. 1981: Three Springs project. *107th Annual Report, South Canterbury Acclimatisation Society*: [not paginated].
- Crowe, A. W. 1985: The N.Z. Salmon Co. ocean ranching venture. In Taylor, J. L., Ogilvie, R. M., and Todd, P. R. (Comps.), Proceedings of the Salmon Farming Conference, pp. 8-11. *Fisheries Research Division Occasional Publication No. 47*.
- Flain, M. 1982: Quinnat salmon runs, 1965-78, in the Glenariffe Stream, Rakaia River, New Zealand. *Fisheries Research Division Occasional Publication No. 28*. 22 p.
- Gillard, M. 1985: The ICI/Wattie salmon development project. In Taylor, J. L., Ogilvie, R. M., and Todd, P. R. (Comps.), Proceedings of the Salmon Farming Conference, pp. 12-17. *Fisheries Research Division Occasional Publication No. 47*.
- Graynoth, E., Pierce, L. A., and Wing, S. J. 1981: Fisheries aspects of the lower Waitaki power scheme. *Fisheries Environmental Report No. 8*. 72 p.
- Hopkins, C. L. 1986: Experimental rearing of chinook salmon fingerlings in unfed ponds at Glenariffe. *Fisheries Environmental Report No. 67*. 28 p.
- Kennedy, C. 1981: Bucket culture of salmon eggs. *Freshwater Catch 13*: 7-8.
- Kennedy, C. 1982: Salmon return to Lake Coleridge hatchery. *Freshwater Catch 17*: 5-6.
- Preston, C. B. 1984: Westland "salmon". *Annual Report 1984, Westland Acclimatisation Society*: 18.

- Strange, B. H. 1979: Field Officers Report 1979. *Ninety-third Annual Report, Ashburton Acclimatisation Society*: [not paginated].
- Strange, B. H. 1980: Field Officers Report 1980. *Ninety-fourth Annual Report, Ashburton Acclimatisation Society*: [not paginated].
- Strange, B. H. 1981: Field Officers Report 1981. *Ninety-fifth Annual Report, Ashburton Acclimatisation Society*: [not paginated].
- Todd, P. 1983: Salmon farming in New Zealand. *Freshwater Catch 20*: 16-21.
- Unwin, M. J. 1985: Salmon coded-wire tagging results, 1977-84. In Taylor, J. L., Ogilvie, R. M., and Todd, P. R. (Comps.), Proceedings of the Salmon Farming Conference, pp. 18-24. *Fisheries Research Division Occasional Publication No. 47*.
- 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*. 24 p.

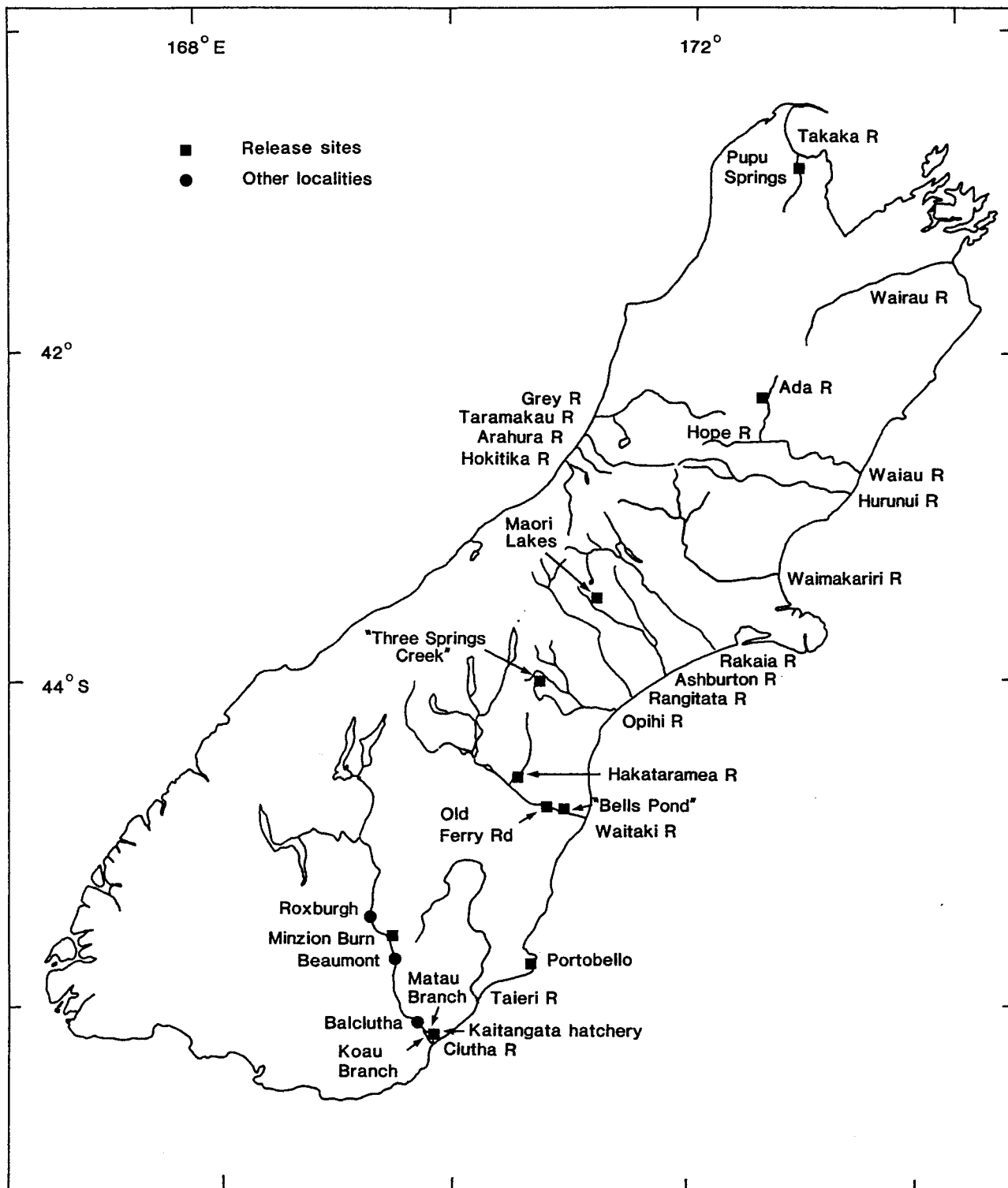


Fig. 1: The South Island of New Zealand.

TABLE 1: Summary of coded-wire tagged salmon liberations, 1977-81

Catchment	Release site	NZMS 1* grid reference	Release agency†	No. of releases	Purpose of release	Source of stock	Reference
Waiau	Ada River	S47:995023	FRD, FMD	2	Experimental, enhancement	Silverstream Hatchery	
Hurunu	Landslip Stream	S53:486587	FRD, FMD	3	Experimental, enhancement	Silverstream Hatchery	
Hurunu	Homestead Stream	S60:624454	FRD, FMD	3	Experimental, enhancement	Silverstream Hatchery	
Hurunu	Longfellow hatchery	S60:734482	Lane Walker Rudkin	6	Commercial ocean ranching	"Double Hill Flats"	
Waimakariri	Silverstream Hatchery	S76:964704	FRD, FMD	17	Enhancement	Rangitata, Rakala, Waimakariri Rivers	
Waimakariri	McIntosh's Rocks	S76:047732	FRD	3	Experimental	Silverstream Hatchery	
Waimakariri	Grasmere Stream	S66:226194	FRD, NCAS	5	Experimental, enhancement	Silverstream Hatchery	
Waimakariri	Winding Creek	S66:265045	FRD, NCAS	3	Experimental, enhancement	Silverstream Hatchery	
Rakaia	Glenariffe hatchery	S73:888835	FRD	23	Experimental, enhancement	Glenariffe Stream	Unwin (1985)
Rakaia	Hydro Lakes	S73:828848	FRD	9	Experimental	Glenariffe Stream	Hopkins (1986)
Rakaia	Lake Coleridge hatchery	S74:023767	NZ Salmon Company	9	Commercial ocean ranching	"Hydra Waters", Rakala River	Crowe (1985)
Rakaia	Blackford Salmon Ranch	S74:090635	E. Mee, AAS	1	Commercial ocean ranching	Rakala River	Kennedy (1981, 1982)
Rakaia	Rakala mouth	S93:615115	FRD	3	Experimental	Glenariffe hatchery	
Ashburton	Maori Lakes	S81:714508	FRD, AAS	3	Experimental, enhancement	Silverstream Hatchery	Strange (1980) Strange (1981)
Opihi	Three Springs Creek	S101:363919	FRD, SCAS	4	Experimental, enhancement	Silverstream Hatchery	Bull (1979, 1981)
Waitaki	Bell's Pond	S127:540900	ICI/Wattie	8	Commercial ocean ranching	Silverstream Hatchery	Beckett (1981)
Waitaki	Hakataramea River	S118:127127	FRD	1	Experimental	Hakataramea River	
Waitaki	Waitaki River	S128:588872	FRD	2	Experimental	Waitaki River	
Ciutha	Katangata hatchery	S179:595191	ICI/Wattie	17	Commercial ocean ranching	Silverstream Hatchery	Beckett (1981) Gillard (1985) Gillard (1985)
Ciutha	Minzlon Burn	S153:250917	ICI/Wattie	1	Commercial ocean ranching, experimental	Silverstream Hatchery	
Hokitika	Tasman Salmon Company	S58:677457	Lane Walker Rudkin	5	Commercial ocean ranching	Glenariffe Stream	Todd (1983)
Takaka	Pupu Springs	S8:174823	Bubbling Springs Salmon Farm	2	Commercial ocean ranching	Glenariffe Stream	Todd (1983)

* The series of 1:63 360 scale topographical maps of New Zealand issued by the Department of Survey and Land Information.

† FRD was the Fisheries Research Division of the Ministry of Agriculture and Fisheries

FMD was the Fisheries Management Division of the Ministry of Agriculture and Fisheries

NCAS is the North Canterbury Acclimatisation Society

AAS is the Ashburton Acclimatisation Society

SCAS is the South Canterbury Acclimatisation Society.

TABLE 2: Release and return data for tagged salmon liberations, 1977-81

Release site	Brood year	Tag code	No. released		Release weight (g)	Release date	No. of returning adults				% return	Estimated return*	
			Tagged	Untagged			Age 2	Age 3	Age 4	Total			
Ada River	1977	63/03/01	2	014	0	-†	29/11/77	0	0	0	0	0.00	0
Ada River	1978	63/18/02	3	779	0	-	07/11/78	0	0	0	0	0.00	0
Landslip Stream	1977	63/02/01	1	982	0	-	29/11/77	0	0	0	0	0.00	0
Landslip Stream	1978	63/17/02	3	873	0	-	07/11/78	0	0	0	0	0.00	0
Landslip Stream	1979	63/41/02	9	991	500	5.6	11/12/79	0	0	0	0	0.00	0
Homestead Stream	1977	63/04/01	2	033	0	-	29/11/77	0	0	0	0	0.00	0
Homestead Stream	1978	63/16/02	4	000	0	-	07/11/78	0	0	0	0	0.00	0
Homestead Stream	1979	63/40/02	10	054	500	5.2	11/12/79	0	0	0	0	0.00	0
Longfellow hatchery	1980	63/01/02	2	645	350	18.8	06/03/81	1	5	0	6	0.23	7
Longfellow hatchery	1980	63/18/03	10	670	57	208	43.0	12/04/81	2	12	14	0.13	89
Longfellow hatchery	1980	63/19/03	10	612	122	200	28.0	11/03/81	0	5	5	0.05	63
Longfellow hatchery	1981	63/23/04	21	340	192	645	32.0	13/05/82	3	6	11	0.05	110
Longfellow hatchery	1981	63/25/01	3	104	0	32.0	13/05/82	1	0	2	3	0.10	3
Longfellow hatchery	1981	63/46/03	20	850	53	593	18.5	25/02/82	3	4	10	0.05	36
Silverstream Hatchery	1977	63/51/01	42	610	444	500	4.0	21/10/77	12	40	52	0.12	594
Silverstream Hatchery	1977	63/54/01	9	519	17	000	6.6	23/12/77	0	0	0	0.00	0
Silverstream Hatchery	1978	63/10/02	49	766	407	962	5.4	20/10/78	17	29	46	0.09	423
Silverstream Hatchery	1978	63/15/01	2	111	0	104.0	15/03/79	2	7	9	9	0.43	9
Silverstream Hatchery	1978	63/23/02	9	377	10	330	13.2	09/11/78	0	1	1	0.01	2
Silverstream Hatchery	1978	63/24/02	9	148	0	24.7	15/12/78	0	2	0	2	0.02	2
Silverstream Hatchery	1979	63/07/02	10	020	171	535	6.2	05/10/79	0	0	0	0.00	0
Silverstream Hatchery	1979	63/59/01	10	246	327	948	5.0	26/10/79	0	1	1	0.01	33
Silverstream Hatchery	1980	63/01/03	18	959	102	084	7.2	06/11/80	0	0	0	0.00	0
Silverstream Hatchery	1980	63/03/03	19	905	100	320	17.0	21/12/80	7	4	12	0.06	72
Silverstream Hatchery	1980	63/04/03	17	440	45	863	7.0	04/12/80	0	1	1	0.01	4
Silverstream Hatchery	1980	63/05/03	21	825	114	544	37.0	10/02/81	7	14	22	0.10	137
Silverstream Hatchery	1981	63/20/04	20	368	0	21.0	09/03/82	5	52	21	78	0.38	78
Silverstream Hatchery	1981	63/57/03	20	621	79	924	7.0	26/10/81	1	0	1	0.01	5
Silverstream Hatchery	1981	63/59/03	20	422	97	236	19.0	21/12/81	7	13	20	0.10	115
Silverstream Hatchery	1981	63/60/03	16	999	97	249	19.0	21/12/81	9	9	18	0.11	121
Silverstream Hatchery	1981	63/61/03	20	492	133	151	46.0	09/03/82	15	45	60	0.29	450
McIntosh's Rocks	1978	63/07/01	1	950	0	12.5	31/10/78	0	1	0	1	0.05	1
McIntosh's Rocks	1979	63/37/02	10	059	10	757	6.2	14/11/79	1	0	1	0.01	2
McIntosh's Rocks	1980	63/02/03	19	608	0	12.4	01/12/80	5	16	0	21	0.11	21
Grasmere Stream	1977	63/57/01	10	035	10	000	5.5	07/12/77	0	0	0	0.00	0
Grasmere Stream	1978	63/25/02	7	666	14	539	-	18/10/78	3	1	4	0.05	12
Grasmere Stream	1979	63/38/02	9	958	61	869	5.5	20/11/79	0	0	0	0.00	0
Grasmere Stream	1980	63/12/03	10	134	10	803	5.4	03/12/80	1	0	1	0.01	2
Grasmere Stream	1981	63/37/03	10	464	0	21.0	12/01/82	4	0	4	0.04	4	

TABLE 2: Release and return data for tagged salmon liberations, 1977-81 (continued)

Release site	Brood year	Tag code	No. released		Release weight (g)	Release date	No. of returning adults				% return	Estimated return*
			Tagged	Untagged			Age 2	Age 3	Age 4	Total		
Winding Creek	1980	63/11/03	9 728	8 926	5.5	04/12/80	0	1	0	1	0.01	2
Winding Creek	1981	63/38/03	10 598	0	18.0	22/12/81	0	3	0	3	0.03	3
Winding Creek	1981	63/58/03	21 626	81 558	8.0	04/11/81	3	4	0	7	0.03	33
Glenariffe hatchery	1977	63/52/01	11 317	0	-	15/01/78	1	5	3	9	0.08	9
Glenariffe hatchery	1977	63/58/01	13 853	1 000	-	12/01/78	1	17	2	20	0.14	21
Glenariffe hatchery	1978	63/11/02	52 041	200	11.7	24/01/79	23	170	10	203	0.39	204
Glenariffe hatchery	1978	63/12/02	27 618	0	14.0	15/02/79	15	153	23	191	0.69	191
Glenariffe hatchery	1978	63/20/02	7 333	0	35.0	14/08/79	68	96	27	191	2.60	191
Glenariffe hatchery	1978	63/27/02	10 494	0	9.2	01/03/79	3	43	2	48	0.46	48
Glenariffe hatchery	1978	63/29/02	25 657	0	14.0	15/02/79	8	74	9	91	0.35	91
Glenariffe hatchery	1979	63/19/02	20 803	51 403	21.0	24/03/80	10	37	8	55	0.26	191
Glenariffe hatchery	1979	63/42/02	20 312	0	14.0	25/02/80	6	49	4	49	0.24	49
Glenariffe hatchery	1979	63/45/02	19 986	0	12.5	23/01/80	1	20	1	22	0.11	22
Glenariffe hatchery	1979	63/48/02	19 970	0	8.0	29/12/79	0	10	2	12	0.06	12
Glenariffe hatchery	1979	63/49/02	19 784	0	9.0	23/01/80	0	9	0	9	0.04	9
Glenariffe hatchery	1979	63/55/02	20 161	74 712	48.6	21/04/80	7	53	11	71	0.35	334
Glenariffe hatchery	1980	63/06/03	21 107	69 283	6.0	21/01/81	3	10	1	14	0.07	60
Glenariffe hatchery	1980	63/07/03	21 290	0	6.0	21/01/81	0	10	2	12	0.06	12
Glenariffe hatchery	1980	63/09/03	21 171	100 000	10.5	20/02/81	0	7	4	11	0.05	63
Glenariffe hatchery	1980	63/10/03	21 004	60 000	14.3	13/03/81	3	29	17	49	0.23	189
Glenariffe hatchery	1980	63/24/03	21 330	48 821	18.6	14/04/81	6	47	17	715	0.33	234
Glenariffe hatchery	1981	63/16/04	19 169	31 288	11.2	17/02/82	10	85	5	100	0.52	263
Glenariffe hatchery	1981	63/21/04	19 828	50 394	30.0	18/03/82	26	164	29	219	1.10	779
Glenariffe hatchery	1981	63/22/04	18 714	0	46.0	16/08/82	266	438	254	958	5.12	958
Glenariffe hatchery	1981	63/62/03	20 105	78 480	8.5	24/01/82	5	38	18	61	0.30	299
Glenariffe hatchery	1981	63/63/03	20 355	78 480	7.2	24/01/82	9	40	10	59	0.29	286
Hydro Lakes	1977	63/61/01	2 629	0	-	14/02/78	2	7	1	10	0.38	10
Hydro Lakes	1978	63/09/01	3 345	0	-	01/03/79	1	11	3	15	0.45	15
Hydro Lakes	1978	63/11/01	11 206	1 000	-	02/03/79	0	17	10	27	0.24	29
Hydro Lakes	1979	63/16/01	8 431	0	-	06/03/80	1	9	5	15	0.18	15
Hydro Lakes	1979	63/19/01	5 257	0	-	10/03/80	1	0	0	1	0.39	1
Hydro Lakes	1980	63/22/01	5 261	0	-	21/04/81	0	1	2	3	0.06	3
Hydro Lakes	1980	63/24/01	1 851	0	-	24/04/81	0	2	0	2	0.11	2
Hydro Lakes	1981	63/02/02	647	0	-	23/09/82	0	5	5	10	1.55	10
Hydro Lakes	1981	63/15/02	816	0	-	20/09/82	2	3	2	7	0.86	7
Lake Coleridge hatchery	1979	63/50/02	20 495	176 534	-	12/04/80	7	59	4	70	0.34	673
Lake Coleridge hatchery	1980	63/14/03	10 793	40 323	28.0	11/03/81	6	26	4	36	0.33	170
Lake Coleridge hatchery	1980	63/15/03	11 312	66 364	27.8	12/04/81	3	29	9	41	0.36	282
Lake Coleridge hatchery	1980	63/16/03	10 484	53 466	29.4	12/04/81	6	39	9	54	0.52	329
Lake Coleridge hatchery	1980	63/17/03	10 513	60 000	40.0	24/07/81	13	73	23	109	1.04	731
Lake Coleridge hatchery	1981	63/41/03	10 520	60 000	80.0	07/06/82	134	195	21	350	3.33	2 346
Lake Coleridge hatchery	1981	63/42/03	10 600	44 100	30.1	06/03/82	34	106	8	148	1.40	764
Lake Coleridge hatchery	1981	63/43/03	10 600	44 100	69.0	09/05/82	80	155	12	247	2.32	1 275
Lake Coleridge hatchery	1981	63/50/03	10 523	54 700	45.4	23/04/82	44	107	7	158	1.50	979

TABLE 2: Release and return data for tagged salmon liberations, 1977-81 (continued)

Release site	Brood year	Tag code	No. released		Release weight (g)	Release date	No. of returning adults				% return	Estimated return*
			Tagged	Untagged			Age 2	Age 3	Age 4	Total		
Blackford Salmon Ranch	1980	63/13/03	10 703	17 900	13.5	12/03/81	2	12	3	17	0.16	45
Rakaia mouth	1978	63/30/02	26 201	0	9.7	28/02/79	6	13	3	22	0.08	22
Rakaia mouth	1979	63/44/02	9 504	0	7.0	21/12/79	1	2	0	3	0.03	3
Rakaia mouth	1980	63/08/03	20 944	0	6.0	22/01/81	0	2	0	2	0.01	2
Maori Lakes	1979	63/28/02	10 365	30 344	4.8	09/10/79	0	0	0	0	0.00	0
Maori Lakes	1979	63/39/02	10 238	38 898	6.5	22/11/79	1	0	1	2	0.02	10
Maori Lakes	1981	63/45/03	10 470	0	17.0	24/02/82	3	11	3	17	0.16	17
Three Springs Creek	1978	63/26/02	10 134	15 000	4.0	21/12/78	2	1	1	4	0.04	10
Three Springs Creek	1979	63/46/02	9 122	0	-	04/12/79	0	0	0	0	0.00	0
Three Springs Creek	1980	63/20/03	21 311	15 308	12.6	23/02/81	1	7	6	14	0.06	24
Three Springs Creek	1981	63/44/03	10 533	1 000	7.9	02/02/82	1	0	1	2	0.02	2
Bell's Pond	1977	63/53/01	8 755	97 000	4.3	02/11/77	0	0	0	0	0.00	0
Bell's Pond	1977	63/60/01	4 655	45 000	11.2	21/12/77	0	0	0	0	0.00	0
Bell's Pond	1978	63/06/02	9 667	73 000	3.6	25/10/78	0	0	0	0	0.00	0
Bell's Pond	1978	63/09/02	4 822	45 184	9.7	20/11/78	0	0	0	0	0.00	0
Bell's Pond	1979	63/32/02	10 348	37 125	6.0	16/10/79	0	0	0	0	0.00	0
Bell's Pond	1979	63/33/02	10 445	40 205	5.0	16/10/79	0	0	0	0	0.00	0
Bell's Pond	1980	63/31/03	2 467	0	4.5	16/12/80	0	0	0	0	0.00	0
Bell's Pond	1980	63/34/02	10 074	12 931	6.2	16/12/80	0	3	1	4	0.04	9
Hakataramea River	1977	63/06/01	2 155	0	-	06/12/77	0	0	0	0	0.00	0
Old Ferry Road	1977	63/05/01	2 258	0	-	05/12/77	0	0	0	0	0.00	0
Old Ferry Road	1978	63/08/01	2 321	0	-	28/11/78	0	0	0	0	0.00	0
Kaitangata	1977	63/55/01	9 508	2 620	7.6	19/12/77	1	0	0	1	0.01	1
Kaitangata	1977	63/56/01	7 319	72 000	4.0	12/11/77	0	0	0	0	0.00	0
Kaitangata	1978	63/03/02	3 155	31 000	7.2	27/10/78	0	0	0	0	0.00	0
Kaitangata	1978	63/04/02	3 418	31 000	7.2	27/10/78	0	0	0	0	0.00	0
Kaitangata	1978	63/05/02	3 221	31 000	7.2	07/10/78	0	0	0	0	0.00	0
Kaitangata	1978	63/08/02	4 477	37 836	10.7	21/11/78	0	0	0	0	0.00	0
Kaitangata	1979	63/31/02	10 244	82 481	8.1	30/10/79	0	0	0	0	0.00	0
Kaitangata	1979	63/36/02	10 025	82 681	6.2	23/10/79	0	0	0	0	0.00	0
Kaitangata	1980	63/28/03	30 998	39 550	5.4	17/12/80	0	2	0	2	0.01	5
Kaitangata	1981	63/19/04	11 482	0	170.0	17/08/82	57	76	3	136	1.18	136
Kaitangata	1981	63/21/02	5 659	0	170.0	17/08/82	26	53	3	82	1.45	82
Kaitangata	1981	63/22/02	3 437	0	170.0	17/08/82	18	32	1	51	1.48	51
Kaitangata	1981	63/26/03	11 456	11 346	15.0	14/12/81	0	0	0	0	0.00	0
Kaitangata	1981	63/30/03	10 178	61 672	15.0	17/12/81	0	0	0	0	0.00	0
Kaitangata, Portobello	1981	63/36/03	1 323	0	-	22/12/82	2	6	1	9	0.68	9
Kaitangata	1981	63/40/03	10 578	8 596	6.0	17/12/81	0	0	0	0	0.00	0
Kaitangata	1981	63/48/03	10 370	0	170.0	30/10/82	93	85	6	184	1.77	184

TABLE 2: Release and return data for tagged salmon liberations, 1977-81 (continued)

Release site	Brood year	Tag code	No. released		Release weight (g)	Release date	No. of returning adults				% return	Estimated return*	
			Tagged	Untagged			Age 2	Age 3	Age 4	Total			
Minzion Burn	1981	63/32/03	5	292	0	104.0	28/07/82	49	41	4	94	1.78	94
Kanlere River	1979	63/57/02	16	626	200	90.0	20/09/80	6	6	1	13	0.08	13
Kanlere River	1980	63/20/01	4	914	60	44.0	12/04/81	0	2	0	2	0.04	2
Kanlere River	1980	63/22/03	21	139	96	29.0	12/04/81	1	1	1	3	0.01	17
Kanlere River	1981	63/17/04	21	180	175	15.7	14/12/81	0	0	0	0	0.00	0
Kanlere River	1981	63/18/04	19	829	156	35.0	08/04/82	3	14	1	18	0.09	160
Pupu Springs	1978	63/13/02	26	592	0	20.0	22/02/79	0	0	0	0	0.00	0
Pupu Springs	1979	63/47/02	26	895	175	18.0	16/11/79	0	0	0	0	0.00	0

* Estimated total return from tagged and untagged fish, assuming both had the same survival.

† No data available.

§ Includes one 5 year old fish.

TABLE 3a: Release and return data for 6 groups of coded-wire tagged salmon released from the Longfellow hatchery, Hurunui River, 1980-81

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/01/02	1980	2 645	350	06/03/81	6	0.23	7
63/18/03	1980	10 670	57 208	12/04/81	14	0.13	89
63/19/03	1980	10 612	122 200	11/03/81	5	0.05	63
63/23/04	1981	21 340	192 645	13/05/82	11	0.05	110
63/25/01	1981	3 104	0	13/05/82	3	0.10	3
63/46/03	1981	20 850	53 593	25/02/82	10	0.05	36
Total		69 221	425 996		49		308

		Age at return (years)			
		2	3	4	Total
Code	63/01/02	1 (17%)	5 (83%)	0 (0%)	6 (100%)
	63/18/03	2 (14%)	12 (86%)	0 (0%)	14 (100%)
	63/19/03	0 (0%)	5 (100%)	0 (0%)	5 (100%)
	63/23/04	3 (27%)	6 (55%)	2 (18%)	11 (100%)
	63/25/01	1 (33%)	0 (0%)	2 (67%)	3 (100%)
	63/46/03	3 (30%)	4 (40%)	3 (30%)	10 (100%)
Recovery method	Angler	2 (20%)	16 (50%)	6 (86%)	24 (49%)
	Carcass	1 (10%)	0 (0%)	0 (0%)	1 (2%)
	Hatchery	7 (70%)	15 (47%)	1 (14%)	23 (47%)
	Sea	0 (0%)	1 (3%)	0 (0%)	1 (2%)
Area	At sea	0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Hurunui River	8 (80%)	27 (84%)	5 (71%)	40 (82%)
	Rakaia River	0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Waiau River	1 (10%)	1 (3%)	1 (14%)	3 (6%)
	Waimakariri River	1 (10%)	2 (6%)	1 (14%)	4 (8%)
Location	Hurunui mouth	0 (0%)	3 (11%)	2 (40%)	5 (13%)
	SH 1 bridge	0 (0%)	1 (4%)	1 (20%)	2 (5%)
	Mandamus	0 (0%)	3 (11%)	1 (20%)	4 (10%)
	Longfellow hatchery	7 (88%)	14 (52%)	1 (20%)	22 (55%)
	North Branch	1 (13%)	0 (0%)	0 (0%)	1 (3%)
	Hurunui River	0 (0%)	6 (22%)	0 (0%)	6 (15%)
Total		10 (20%)	32 (65%)	7 (14%)	49 (100%)

TABLE 3b: Release and return data for 9 groups of coded-wire tagged salmon released from the Silverstream Hatchery, Waimakariri River, 1977-81

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/51/01	1977	42 610	444 500	21/10/77	52	0.12	594
Age at return (years)							

				2	3	4	Total
Recovery method	Angler Hatchery			5 (42%)	15 (38%)	0 (0%)	20 (38%)
				7 (58%)	25 (63%)	0 (0%)	32 (62%)
Area	Rangitata River Waimakariri River			1 (8%)	0 (0%)	0 (0%)	1 (2%)
				11 (92%)	40 (100%)	0 (0%)	51 (98%)
Location	Waimakariri mouth			0 (0%)	3 (8%)	0 (0%)	3 (6%)
	McIntosh's Rocks			3 (27%)	12 (30%)	0 (0%)	15 (29%)
	Silverstream Hatchery			7 (64%)	25 (63%)	0 (0%)	32 (63%)
	Waimakariri River			1 (9%)	0 (0%)	0 (0%)	1 (2%)
Total				12 (23%)	40 (77%)	0 (0%)	52 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/10/02	1978	49 766	407 962	20/10/78	46	0.09	423
Age at return (years)							

				2	3	4	Total
Recovery method	Angler Hatchery			2 (12%)	6 (21%)	0 (0%)	8 (17%)
				15 (88%)	23 (79%)	0 (0%)	38 (83%)
Area	Waimakariri River			17 (100%)	29 (100%)	0 (0%)	46 (100%)
Location	McIntosh's Rocks			2 (12%)	1 (3%)	0 (0%)	3 (7%)
	Silverstream Hatchery			15 (88%)	23 (79%)	0 (0%)	38 (83%)
	Waimakariri River			0 (0%)	5 (17%)	0 (0%)	5 (11%)
Total				17 (37%)	29 (63%)	0 (0%)	46 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/15/01	1978	2 111	0	15/03/79	9	0.43	9
Age at return (years)							

				2	3	4	Total
Recovery method	Angler Hatchery			0 (0%)	3 (43%)	0 (0%)	3 (33%)
				2 (100%)	4 (57%)	0 (0%)	6 (67%)
Area	Waimakariri River			2 (100%)	7 (100%)	0 (0%)	9 (100%)
Location	Silverstream Hatchery			2 (100%)	4 (57%)	0 (0%)	6 (67%)
	Waimakariri River			0 (0%)	3 (43%)	0 (0%)	3 (33%)
Total				2 (22%)	7 (78%)	0 (0%)	9 (100%)

TABLE 3b: Release and return data for 9 groups of coded-wire tagged salmon released from the Silverstream Hatchery, Waimakariri River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/03/03	1980	19 905	100 320	21/12/80	12	0.06	72
Age at return (years)							

2 3 4 Total							
Recovery method	Angler Hatchery			1 (14%)	1 (25%)	0 (0%)	2 (17%)
				6 (86%)	3 (75%)	1 (100%)	10 (83%)
Area	Waimakariri River			7 (100%)	4 (100%)	1 (100%)	12 (100%)
Location	Waimakariri mouth Silverstream Hatchery			1 (14%)	1 (25%)	0 (0%)	2 (17%)
				6 (86%)	3 (75%)	1 (100%)	10 (83%)
Total				7 (58%)	4 (33%)	1 (8%)	12 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/05/03	1980	21 825	114 544	10/02/81	22	0.10	137
Age at return (years)							

2 3 4 Total							
Recovery method	Angler Hatchery			0 (0%)	2 (14%)	1 (100%)	3 (14%)
	Sea			7 (100%)	11 (79%)	0 (0%)	18 (82%)
				0 (0%)	1 (7%)	0 (0%)	1 (5%)
Area	At sea			0 (0%)	1 (7%)	0 (0%)	1 (5%)
	Waimakariri River			7 (100%)	13 (93%)	1 (100%)	21 (95%)
Location	Waimakariri mouth			0 (0%)	1 (8%)	1 (100%)	2 (10%)
	Silverstream Hatchery			7 (100%)	11 (85%)	0 (0%)	18 (86%)
	Waimakariri River			0 (0%)	1 (8%)	0 (0%)	1 (5%)
Total				7 (32%)	14 (64%)	1 (5%)	22 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/20/04	1981	20 368	0	09/03/82	78	0.38	78
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			1 (20%)	30 (58%)	12 (57%)	43 (55%)
	Carcass			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Hatchery			4 (80%)	20 (38%)	8 (38%)	32 (41%)
	Miscellaneous			0 (0%)	0 (0%)	1 (5%)	1 (1%)
	Trap			0 (0%)	1 (2%)	0 (0%)	1 (1%)
Area	Waimakariri River			5 (100%)	52 (100%)	21 (100%)	78 (100%)
Location	Waimakariri mouth			0 (0%)	4 (8%)	6 (29%)	10 (13%)
	McIntosh's Rocks			1 (20%)	25 (48%)	5 (24%)	31 (40%)
	SH 1 bridge			0 (0%)	0 (0%)	1 (5%)	1 (1%)
	Silverstream Hatchery			4 (80%)	20 (38%)	9 (43%)	33 (42%)
	Cust River			0 (0%)	2 (4%)	0 (0%)	2 (3%)
	Winding Creek			0 (0%)	1 (2%)	0 (0%)	1 (1%)
Total				5 (6%)	52 (67%)	21 (27%)	78 (100%)

TABLE 3b: Release and return data for 9 groups of coded-wire tagged salmon released from the Silverstream Hatchery, Waimakariri River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/59/03	1981	20 422	97 236	21/12/81	20	0.10	115
Age at return (years)							

				2	3	4	Total
Recovery method	Angler			1 (14%)	6 (46%)	0 (0%)	7 (35%)
	Hatchery			5 (71%)	7 (54%)	0 (0%)	12 (60%)
	Miscellaneous			1 (14%)	0 (0%)	0 (0%)	1 (5%)
Area	Waimakariri River			7 (100%)	13 (100%)	0 (0%)	20 (100%)
Location	Waimakariri mouth			0 (0%)	3 (23%)	0 (0%)	3 (15%)
	McIntosh's Rocks			0 (0%)	1 (8%)	0 (0%)	1 (5%)
	SH 1 bridge			1 (14%)	1 (8%)	0 (0%)	2 (10%)
	Silverstream Hatchery			5 (71%)	7 (54%)	0 (0%)	12 (60%)
	Waimakariri River			1 (14%)	1 (8%)	0 (0%)	2 (10%)
Total				7 (35%)	13 (65%)	0 (0%)	20 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/60/03	1981	16 999	97 249	21/12/81	18	0.11	121
Age at return (years)							

				2	3	4	Total
Recovery method	Angler			2 (22%)	4 (44%)	0 (0%)	6 (33%)
	Hatchery			7 (78%)	5 (56%)	0 (0%)	12 (67%)
Area	Waimakariri River			9 (100%)	9 (100%)	0 (0%)	18 (100%)
Location	Waimakariri mouth			2 (22%)	2 (22%)	0 (0%)	4 (22%)
	McIntosh's Rocks			0 (0%)	1 (11%)	0 (0%)	1 (6%)
	SH 1 bridge			0 (0%)	1 (11%)	0 (0%)	1 (6%)
	Silverstream Hatchery			7 (78%)	5 (56%)	0 (0%)	12 (67%)
Total				9 (50%)	9 (50%)	0 (0%)	18 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/61/03	1981	20 492	133 151	09/03/82	60	0.29	450
Age at return (years)							

				2	3	4	Total
Recovery method	Angler			0 (0%)	20 (44%)	0 (0%)	20 (33%)
	Hatchery			15 (100%)	25 (56%)	0 (0%)	40 (67%)
Area	Hurunui River			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Waimakariri River			15 (100%)	44 (98%)	0 (0%)	59 (98%)
Location	Waimakariri mouth			0 (0%)	9 (20%)	0 (0%)	9 (15%)
	McIntosh's Rocks			0 (0%)	9 (20%)	0 (0%)	9 (15%)
	SH 1 bridge			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Silverstream Hatchery			15 (100%)	25 (57%)	0 (0%)	40 (68%)
Total				15 (25%)	45 (75%)	0 (0%)	60 (100%)

TABLE 3c: Release and return data for 8 groups of coded-wire tagged salmon released in Grasmere Stream and Winding Creek, Waimakariri River, 1977-81

Release location: Grasmere Stream

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/57/01	1977	10 035	10 000	07/12/77	0	0.00	0
63/25/02	1978	7 666	14 539	18/10/78	4	0.05	12
63/38/02	1979	9 958	61 869	20/11/79	0	0.00	0
63/12/03	1980	10 134	10 803	03/12/80	1	0.01	2
63/37/03	1981	10 464	0	12/01/82	4	0.04	4
Total		48 257	97 211		9	0.02	18

		Age at return (years)			
		2	3	4	Total
Code	63/12/03	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	63/25/02	3 (75%)	1 (25%)	0 (0%)	4 (100%)
	63/37/03	4 (100%)	0 (0%)	0 (0%)	4 (100%)
Recovery method	Angler	4 (50%)	0 (0%)	0 (0%)	4 (44%)
	Trap	4 (50%)	1 (100%)	0 (0%)	5 (56%)
Area	Waimakariri River	8 (100%)	1 (100%)	0 (0%)	9 (100%)
Location	McIntosh's Rocks	1 (13%)	0 (0%)	0 (0%)	1 (11%)
	Grasmere Stream	7 (88%)	1 (100%)	0 (0%)	8 (89%)
Total		8 (89%)	1 (11%)	0 (0%)	9 (100%)

Release location: Winding Creek

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/11/03	1980	9 728	8 926	04/12/80	1	0.01	2
63/38/03	1981	10 598	0	22/12/81	3	0.03	3
63/58/03	1981	21 626	81 558	04/11/81	7	0.03	33
Total		41 952	90 484		11	0.03	38

		Age at return (years)			
		2	3	4	Total
Code	63/11/03	0 (0%)	1 (100%)	0 (0%)	1 (100%)
	63/38/03	0 (0%)	3 (100%)	0 (0%)	3 (100%)
	63/58/03	3 (43%)	4 (57%)	0 (0%)	7 (100%)
Recovery method	Angler	1 (33%)	3 (38%)	0 (0%)	4 (36%)
	Carcass	0 (0%)	1 (13%)	0 (0%)	1 (9%)
	Trap	2 (67%)	4 (50%)	0 (0%)	6 (55%)
Area	Waimakariri River	3 (100%)	8 (100%)	0 (0%)	11 (100%)
Location	McIntosh's Rocks	0 (0%)	2 (25%)	0 (0%)	2 (18%)
	Winding Creek	3 (100%)	5 (63%)	0 (0%)	8 (73%)
	Waimakariri River	0 (0%)	1 (13%)	0 (0%)	1 (9%)
Total		3 (27%)	8 (73%)	0 (0%)	11 (100%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/52/01	1977	11 317	0	15/01/78	9	0.08	9
63/58/01	1977	13 853	1 000	12/01/78	20	0.14	21
Total		25 170	1 000		29	0.12	30

		Age at return (years)			
		2	3	4	Total
Code	63/52/01	1 (11%)	5 (56%)	3 (33%)	9 (100%)
	63/58/01	1 (5%)	17 (85%)	2 (10%)	20 (100%)
Recovery method	Angler	0 (0%)	5 (23%)	1 (20%)	6 (21%)
	Carcass	0 (0%)	1 (5%)	0 (0%)	1 (3%)
	Hatchery	1 (50%)	15 (68%)	4 (80%)	20 (69%)
	Sea	1 (50%)	1 (5%)	0 (0%)	2 (7%)
Area	At sea	1 (50%)	1 (5%)	0 (0%)	2 (7%)
	Rakaia River	1 (50%)	20 (91%)	5 (100%)	26 (90%)
	Rangitata River	0 (0%)	1 (5%)	0 (0%)	1 (3%)
Location	Rakaia mouth	0 (0%)	1 (5%)	0 (0%)	1 (4%)
	SH 1 bridge	0 (0%)	2 (10%)	0 (0%)	2 (8%)
	Rakaia Gorge	0 (0%)	1 (5%)	0 (0%)	1 (4%)
	Glenariffe hatchery	1 (100%)	15 (75%)	4 (80%)	20 (77%)
	Double Hill Flats	0 (0%)	1 (5%)	0 (0%)	1 (4%)
	Rakaia River	0 (0%)	0 (0%)	1 (20%)	1 (4%)
Total		2 (7%)	22 (76%)	5 (17%)	29 (100%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns		
		Tagged	Untagged						
63/11/02	1978	52 041	200	24/01/79	203	0.39	204		
						Age at return (years)			
						2	3	4	Total
Recovery method	Angler			5 (22%)	45 (26%)	6 (60%)	56 (28%)		
	Carcass			2 (9%)	12 (7%)	0 (0%)	14 (7%)		
	Hatchery			14 (61%)	110 (65%)	4 (40%)	128 (63%)		
	Sea			1 (4%)	2 (1%)	0 (0%)	3 (1%)		
	Trap			1 (4%)	1 (1%)	0 (0%)	2 (1%)		
Area	At sea			1 (4%)	2 (1%)	0 (0%)	3 (1%)		
	Hurunui River			0 (0%)	1 (1%)	0 (0%)	1 (0%)		
	Rakaia River			19 (83%)	166 (98%)	10 (100%)	195 (96%)		
	Rangitata River			2 (9%)	0 (0%)	0 (0%)	2 (1%)		
	Waimakariri River			0 (0%)	1 (1%)	0 (0%)	1 (0%)		
	Wairau River			1 (4%)	0 (0%)	0 (0%)	1 (0%)		
Location	Rakaia mouth			2 (11%)	6 (4%)	2 (20%)	10 (5%)		
	SH 1 bridge			0 (0%)	10 (6%)	1 (10%)	11 (6%)		
	Barrhill			0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Steeles Road			0 (0%)	3 (2%)	0 (0%)	3 (2%)		
	Highbank			0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Rakaia Gorge			0 (0%)	3 (2%)	1 (10%)	4 (2%)		
	Acheron confluence			0 (0%)	3 (2%)	0 (0%)	3 (2%)		
	Kowhai Flat			0 (0%)	1 (1%)	1 (10%)	2 (1%)		
	Lake Coleridge hatchery			0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Donald Hill			1 (5%)	5 (3%)	0 (0%)	6 (3%)		
	Glenariffe confluence			0 (0%)	8 (5%)	1 (10%)	9 (5%)		
	Glenariffe hatchery			14 (74%)	109 (66%)	4 (40%)	127 (65%)		
	Double Hill Flats			2 (11%)	9 (5%)	0 (0%)	11 (6%)		
	Hydra Waters			0 (0%)	2 (1%)	0 (0%)	2 (1%)		
	Manuka Point			0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Rakaia River			0 (0%)	3 (2%)	0 (0%)	3 (2%)		
Total				23 (11%)	170 (84%)	10 (5%)	203 (100%)		

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/12/02	1978	27 618	0	15/02/79	191	0.69	191
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			1 (7%)	27 (18%)	19 (83%)	47 (25%)
	Carcass			0 (0%)	13 (8%)	1 (4%)	14 (7%)
	Hatchery			11 (73%)	111 (73%)	3 (13%)	125 (65%)
	Sea			3 (20%)	1 (1%)	0 (0%)	4 (2%)
	Trap			0 (0%)	1 (1%)	0 (0%)	1 (1%)
Area	At sea			3 (20%)	1 (1%)	0 (0%)	4 (2%)
	Rakaia River			12 (80%)	148 (97%)	20 (87%)	180 (94%)
	Rangitata River			0 (0%)	3 (2%)	2 (9%)	5 (3%)
	Waimakariri River			0 (0%)	1 (1%)	1 (4%)	2 (1%)
Location	Rakaia mouth			0 (0%)	1 (1%)	4 (20%)	5 (3%)
	SH 1 bridge			0 (0%)	5 (3%)	1 (5%)	6 (3%)
	Barrhill			0 (0%)	0 (0%)	1 (5%)	1 (1%)
	Steeles Road			0 (0%)	1 (1%)	1 (5%)	2 (1%)
	Rakaia Gorge			1 (8%)	2 (1%)	0 (0%)	3 (2%)
	Acheron confluence			0 (0%)	5 (3%)	1 (5%)	6 (3%)
	Donald Hill			0 (0%)	3 (2%)	1 (5%)	4 (2%)
	Glenariffe confluence			0 (0%)	6 (4%)	5 (25%)	11 (6%)
	Glenariffe hatchery			11 (92%)	111 (75%)	3 (15%)	125 (69%)
	Double Hill Flats			0 (0%)	12 (8%)	0 (0%)	12 (7%)
	Hydra Waters			0 (0%)	2 (1%)	0 (0%)	2 (1%)
	Rakaia River			0 (0%)	0 (0%)	3 (15%)	3 (2%)
	Total				15 (8%)	153 (80%)	23 (12%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/20/02	1978	7 333	0	14/08/79	191	2.60	191
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			8 (12%)	14 (15%)	12 (44%)	34 (18%)
	Carcass			2 (3%)	6 (6%)	0 (0%)	8 (4%)
	Hatchery			58 (85%)	75 (78%)	15 (56%)	148 (77%)
	Trap			0 (0%)	1 (1%)	0 (0%)	1 (1%)
Area	Hurunui River			1 (1%)	1 (1%)	0 (0%)	2 (1%)
	Opihi River			1 (1%)	0 (0%)	0 (0%)	1 (1%)
	Rakaia River			65 (96%)	92 (96%)	25 (93%)	182 (95%)
	Rangitata River			0 (0%)	0 (0%)	1 (4%)	1 (1%)
	Waiau River			0 (0%)	1 (1%)	1 (4%)	2 (1%)
	Waimakariri River			1 (1%)	2 (2%)	0 (0%)	3 (2%)
Location	Rakaia mouth			0 (0%)	4 (4%)	3 (12%)	7 (4%)
	SH 1 bridge			1 (2%)	3 (3%)	2 (8%)	6 (3%)
	Steeles Road			2 (3%)	1 (1%)	0 (0%)	3 (2%)
	Highbank			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Rakaia Gorge			2 (3%)	1 (1%)	1 (4%)	4 (2%)
	Acheron confluence			1 (2%)	1 (1%)	0 (0%)	2 (1%)
	Kowhai Flat			0 (0%)	0 (0%)	2 (8%)	2 (1%)
	Lake Coleridge hatchery			0 (0%)	3 (3%)	0 (0%)	3 (2%)
	Glenariffe confluence			0 (0%)	0 (0%)	2 (8%)	2 (1%)
	Glenariffe hatchery			58 (89%)	72 (78%)	15 (60%)	145 (80%)
	Double Hill Flats			1 (2%)	6 (7%)	0 (0%)	7 (4%)
Total				68 (36%)	96 (50%)	27 (14%)	191 (100%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/27/02	1978	10 494	0	01/03/79	48	0.46	48
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			1 (33%)	3 (7%)	0 (0%)	4 (8%)
	Carcass			0 (0%)	3 (7%)	0 (0%)	3 (6%)
	Hatchery			1 (33%)	36 (84%)	2 (100%)	39 (81%)
	Sea			1 (33%)	1 (2%)	0 (0%)	2 (4%)
Area	At sea			1 (33%)	1 (2%)	0 (0%)	2 (4%)
	Rakaia River			2 (67%)	41 (95%)	2 (100%)	45 (94%)
	Waiau River			0 (0%)	1 (2%)	0 (0%)	1 (2%)
Location	Rakaia mouth			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Steeles Road			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Rakaia Gorge			1 (50%)	0 (0%)	0 (0%)	1 (2%)
	Glenariffe hatchery			1 (50%)	36 (88%)	2 (100%)	39 (87%)
	Double Hill Flats			0 (0%)	3 (7%)	0 (0%)	3 (7%)
Total				3 (6%)	43 (90%)	2 (4%)	48 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/29/02	1978	25 657	0	15/02/79	91	0.35	91
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			1 (13%)	12 (16%)	2 (22%)	15 (16%)
	Carcass			1 (13%)	8 (11%)	0 (0%)	9 (10%)
	Hatchery			5 (63%)	52 (70%)	6 (67%)	63 (69%)
	Sea			1 (13%)	2 (3%)	1 (11%)	4 (4%)
Area	At sea			1 (13%)	2 (3%)	1 (11%)	4 (4%)
	Rakaia River			7 (88%)	71 (96%)	8 (89%)	86 (95%)
	Rangitata River			0 (0%)	1 (1%)	0 (0%)	1 (1%)
Location	Rakaia mouth			1 (14%)	3 (4%)	0 (0%)	4 (5%)
	SH 1 bridge			0 (0%)	3 (4%)	0 (0%)	3 (3%)
	Barrhill			0 (0%)	0 (0%)	1 (13%)	1 (1%)
	Steeles Road			0 (0%)	1 (1%)	1 (13%)	2 (2%)
	Rakaia Gorge			0 (0%)	3 (4%)	0 (0%)	3 (3%)
	Kowhai Flat			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Lake Coleridge hatchery			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Glenariffe confluence			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Glenariffe hatchery			5 (71%)	51 (72%)	6 (75%)	62 (72%)
	Double Hill Flats			1 (14%)	7 (10%)	0 (0%)	8 (9%)
	Total				8 (9%)	74 (81%)	9 (10%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns					
		Tagged	Untagged									
63/19/02	1979	20 803	51 403	24/03/80	55	0.2	191					
Age at return (years)												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;"></th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">Total</th> </tr> </thead> </table>									2	3	4	Total
	2	3	4	Total								
Recovery method	Angler	1 (10%)	14 (38%)	5 (63%)	20 (36%)							
	Carcass	1 (10%)	1 (3%)	1 (13%)	3 (5%)							
	Hatchery	8 (80%)	22 (59%)	2 (25%)	32 (58%)							
Area	Rakaia River	10 (100%)	36 (97%)	7 (88%)	53 (96%)							
	Rangitata River	0 (0%)	1 (3%)	1 (13%)	2 (4%)							
Location	Rakaia mouth	0 (0%)	3 (8%)	2 (29%)	5 (9%)							
	SH 1 bridge	1 (10%)	3 (8%)	0 (0%)	4 (8%)							
	Barrhill	0 (0%)	2 (6%)	0 (0%)	2 (4%)							
	Highbank	0 (0%)	0 (0%)	1 (14%)	1 (2%)							
	Rakaia Gorge	0 (0%)	2 (6%)	0 (0%)	2 (4%)							
	Acheron confluence	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
	Lake Coleridge hatchery	0 (0%)	2 (6%)	0 (0%)	2 (4%)							
	Donald Hill	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
	Glenariffe confluence	0 (0%)	1 (3%)	1 (14%)	2 (4%)							
	Glenariffe hatchery	8 (80%)	20 (56%)	2 (29%)	30 (57%)							
	Double Hill Flats	1 (10%)	1 (3%)	0 (0%)	2 (4%)							
	Rakaia River	0 (0%)	0 (0%)	1 (14%)	1 (2%)							
	Total		10 (18%)	37 (67%)	8 (15%)	55 (100%)						

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns					
		Tagged	Untagged									
63/42/02	1979	20 312	0	25/02/80	49	0.24	49					
Age at return (years)												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;"></th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">Total</th> </tr> </thead> </table>									2	3	4	Total
	2	3	4	Total								
Recovery method	Angler	2 (33%)	21 (54%)	1 (25%)	24 (49%)							
	Carcass	0 (0%)	0 (0%)	2 (50%)	2 (4%)							
	Hatchery	3 (50%)	17 (44%)	1 (25%)	21 (43%)							
	Sea	1 (17%)	1 (3%)	0 (0%)	2 (4%)							
Area	At sea	1 (17%)	1 (3%)	0 (0%)	2 (4%)							
	Hurunui River	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
	Rakaia River	5 (83%)	33 (85%)	4 (100%)	42 (86%)							
	Rangitata River	0 (0%)	3 (8%)	0 (0%)	3 (6%)							
	Waimakariri River	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
Location	Rakaia mouth	1 (20%)	2 (6%)	0 (0%)	3 (7%)							
	SH 1 bridge	0 (0%)	3 (9%)	0 (0%)	3 (7%)							
	Barrhill	1 (20%)	0 (0%)	0 (0%)	1 (2%)							
	Steeles Road	0 (0%)	1 (3%)	1 (25%)	2 (5%)							
	Highbank	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
	Rakaia Gorge	0 (0%)	3 (9%)	0 (0%)	3 (7%)							
	Acheron confluence	0 (0%)	3 (9%)	0 (0%)	3 (7%)							
	Lake Coleridge hatchery	0 (0%)	2 (6%)	0 (0%)	2 (5%)							
	Donald Hill	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
	Glenariffe confluence	0 (0%)	1 (3%)	2 (50%)	3 (7%)							
	Glenariffe hatchery	3 (60%)	15 (45%)	1 (25%)	19 (45%)							
	Rakaia River	0 (0%)	1 (3%)	0 (0%)	1 (2%)							
	Total		6 (12%)	39 (80%)	4 (8%)	49 (100%)						

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns		
		Tagged	Untagged						
63/45/02	1979	19 986	0	23/01/80	22	0.11	22		
<u>Age at return (years)</u>									
2 3 4 Total									
Recovery method	Angler	0	(0%)	5	(25%)	1	(100%)	6	(27%)
	Carcass	0	(0%)	4	(20%)	0	(0%)	4	(18%)
	Hatchery	1	(100%)	11	(55%)	0	(0%)	12	(55%)
Area	Rakaia River	1	(100%)	18	(90%)	1	(100%)	20	(91%)
	Rangitata River	0	(0%)	1	(5%)	0	(0%)	1	(5%)
	Waimakariri River	0	(0%)	1	(5%)	0	(0%)	1	(5%)
Location	Rakaia mouth	0	(0%)	1	(6%)	1	(100%)	2	(10%)
	SH 1 bridge	0	(0%)	1	(6%)	0	(0%)	1	(5%)
	Glenariffe confluence	0	(0%)	3	(17%)	0	(0%)	3	(15%)
	Glenariffe hatchery	1	(100%)	11	(61%)	0	(0%)	12	(60%)
	Double Hill Flats	0	(0%)	2	(11%)	0	(0%)	2	(10%)
Total		1	(5%)	20	(91%)	1	(5%)	22	(100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns		
		Tagged	Untagged						
63/48/02	1979	19 970	0	29/12/79	12	0.06	12		
<u>Age at return (years)</u>									
2 3 4 Total									
Recovery method	Angler	0	(0%)	3	(30%)	2	(100%)	5	(42%)
	Hatchery	0	(0%)	6	(60%)	0	(0%)	6	(50%)
	Sea	0	(0%)	1	(10%)	0	(0%)	1	(8%)
Area	At sea	0	(0%)	1	(10%)	0	(0%)	1	(8%)
	Rakaia River	0	(0%)	9	(90%)	2	(100%)	11	(92%)
Location	SH 1 bridge	0	(0%)	1	(11%)	1	(50%)	2	(18%)
	Blackford Salmon Farm	0	(0%)	0	(0%)	1	(50%)	1	(9%)
	Acheron confluence	0	(0%)	1	(11%)	0	(0%)	1	(9%)
	Glenariffe confluence	0	(0%)	1	(11%)	0	(0%)	1	(9%)
	Glenariffe hatchery	0	(0%)	6	(67%)	0	(0%)	6	(55%)
Total		0	(0%)	10	(83%)	2	(17%)	12	(100%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/49/02	1979	19 784	0	23/01/80	9	0.05	9
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			0 (0%)	6 (67%)	0 (0%)	6 (67%)
	Hatchery			0 (0%)	3 (33%)	0 (0%)	3 (33%)
Area	Rakaia River			0 (0%)	9 (100%)	0 (0%)	9 (100%)
Location	Rakaia mouth			0 (0%)	2 (22%)	0 (0%)	2 (22%)
	SH 1 bridge			0 (0%)	1 (11%)	0 (0%)	1 (11%)
	Steeles Road			0 (0%)	2 (22%)	0 (0%)	2 (22%)
	Acheron confluence			0 (0%)	1 (11%)	0 (0%)	1 (11%)
	Glenariffe hatchery			0 (0%)	3 (33%)	0 (0%)	3 (33%)
Total				0 (0%)	9 (100%)	0 (0%)	9 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/55/02	1979	20 161	74 712	21/04/80	71	0.35	334
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			0 (0%)	18 (34%)	1 (9%)	19 (27%)
	Carcass			1 (14%)	1 (2%)	2 (18%)	4 (6%)
	Hatchery			5 (71%)	33 (62%)	8 (73%)	46 (65%)
	Sea			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Trap			1 (14%)	0 (0%)	0 (0%)	1 (1%)
Area	At sea			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Rakaia River			6 (86%)	50 (94%)	11 (100%)	67 (94%)
	Rangitata River			1 (14%)	1 (2%)	0 (0%)	2 (3%)
	Waimakariri River			0 (0%)	1 (2%)	0 (0%)	1 (1%)
Location	Rakaia mouth			0 (0%)	2 (4%)	0 (0%)	2 (3%)
	SH 1 bridge			0 (0%)	3 (6%)	1 (9%)	4 (6%)
	Barrhill			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Highbank			0 (0%)	3 (6%)	0 (0%)	3 (4%)
	Rakaia Gorge			0 (0%)	3 (6%)	0 (0%)	3 (4%)
	Kowhai Flat			0 (0%)	2 (4%)	0 (0%)	2 (3%)
	Glenariffe confluence			0 (0%)	2 (4%)	2 (18%)	4 (6%)
	Glenariffe hatchery			5 (83%)	33 (66%)	8 (73%)	46 (69%)
	Double Hill Flats			1 (17%)	1 (2%)	0 (0%)	2 (3%)
Total				7 (10%)	53 (75%)	11 (15%)	71 (100%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/06/03	1980	21 107	69 283	21/01/81	14	0.07	60
Age at return (years)							

		2	3	4	Total		
Recovery method	Angler	1 (33%)	4 (40%)	1 (100%)	6 (43%)		
	Carcass	0 (0%)	1 (10%)	0 (0%)	1 (7%)		
	Hatchery	2 (67%)	5 (50%)	0 (0%)	7 (50%)		
Area	Rakaia River	3 (100%)	10 (100%)	1 (100%)	14 (100%)		
Location	Rakaia mouth	0 (0%)	2 (20%)	0 (0%)	2 (14%)		
	SH 1 bridge	0 (0%)	0 (0%)	1 (100%)	1 (7%)		
	Barrhill	0 (0%)	1 (10%)	0 (0%)	1 (7%)		
	Steeles Road	1 (33%)	0 (0%)	0 (0%)	1 (7%)		
	Rakaia Gorge	0 (0%)	1 (10%)	0 (0%)	1 (7%)		
	Lake Coleridge hatchery	0 (0%)	2 (20%)	0 (0%)	2 (14%)		
	Glenariffe confluence	0 (0%)	1 (10%)	0 (0%)	1 (7%)		
	Glenariffe hatchery	2 (67%)	3 (30%)	0 (0%)	5 (36%)		
Total		3 (21%)	10 (71%)	1 (7%)	14 (100%)		

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/07/03	1980	21 290	0	21/01/81	12	0.06	12
Age at return (years)							

		2	3	4	Total		
Recovery method	Angler	0 (0%)	4 (40%)	2 (100%)	6 (50%)		
	Hatchery	0 (0%)	6 (60%)	0 (0%)	6 (50%)		
Area	Rakaia River	0 (0%)	10 (100%)	2 (100%)	12 (100%)		
Location	Rakaia mouth	0 (0%)	2 (20%)	2 (100%)	4 (33%)		
	SH 1 bridge	0 (0%)	1 (10%)	0 (0%)	1 (8%)		
	Barrhill	0 (0%)	1 (10%)	0 (0%)	1 (8%)		
	Glenariffe hatchery	0 (0%)	6 (60%)	0 (0%)	6 (50%)		
Total		0 (0%)	10 (83%)	2 (17%)	12 (100%)		

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/09/03	1980	21 171	100 000	20/02/81	11	0.05	63
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			0 (0%)	2 (29%)	2 (50%)	4 (36%)
	Hatchery			0 (0%)	5 (71%)	2 (50%)	7 (64%)
Area	Rakaia River			0 (0%)	6 (86%)	4 (100%)	10 (91%)
	Waimakariri River			0 (0%)	1 (14%)	0 (0%)	1 (9%)
Location	Rakaia mouth			0 (0%)	0 (0%)	1 (25%)	1 (10%)
	Highbank			0 (0%)	1 (17%)	0 (0%)	1 (10%)
	Rakaia Gorge			0 (0%)	0 (0%)	1 (25%)	1 (10%)
	Glenariffe hatchery			0 (0%)	5 (83%)	2 (50%)	7 (70%)
Total				0 (0%)	7 (64%)	4 (36%)	11 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/10/03	1980	21 004	60 000	13/03/81	49	0.23	189
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			0 (0%)	11 (38%)	6 (35%)	17 (35%)
	Carcass			0 (0%)	3 (10%)	7 (41%)	10 (20%)
	Hatchery			3 (100%)	14 (48%)	4 (24%)	21 (43%)
	Miscellaneous			0 (0%)	1 (3%)	0 (0%)	1 (2%)
Area	Hurunui River			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Rakaia River			3 (100%)	27 (93%)	17 (100%)	47 (96%)
	Waiau River			0 (0%)	1 (3%)	0 (0%)	1 (2%)
Location	Rakaia mouth			0 (0%)	1 (4%)	1 (6%)	2 (4%)
	SH 1 bridge			0 (0%)	3 (11%)	1 (6%)	4 (9%)
	Steeles Road			0 (0%)	0 (0%)	1 (6%)	1 (2%)
	Highbank			0 (0%)	1 (4%)	1 (6%)	2 (4%)
	Rakaia Gorge			0 (0%)	1 (4%)	0 (0%)	1 (2%)
	Acheron confluence			0 (0%)	0 (0%)	1 (6%)	1 (2%)
	Kowhai Flat			0 (0%)	1 (4%)	0 (0%)	1 (2%)
	Donald Hill			0 (0%)	2 (7%)	1 (6%)	3 (6%)
	Glenariffe confluence			0 (0%)	1 (4%)	5 (29%)	6 (13%)
	Glenariffe hatchery			3 (100%)	14 (52%)	4 (24%)	21 (45%)
	Double Hill Flats			0 (0%)	3 (11%)	2 (12%)	5 (11%)
Total				3 (6%)	29 (59%)	17 (35%)	49 (100%)

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/24/03	1980	21 330	48 821	14/04/81	71*	0.33	234
Age at return (years)							

2 3 4 Total							
Recovery method	Angler	1 (17%)	21 (45%)	9 (53%)	32*	(45%)	
	Carcass	0 (0%)	6 (13%)	4 (24%)	10	(14%)	
	Hatchery	5 (83%)	20 (43%)	4 (24%)	29	(41%)	
Area	Hurunui River	0 (0%)	0 (0%)	2 (12%)	2	(3%)	
	Rakaia River	6 (100%)	42 (89%)	14 (82%)	62	(87%)	
	Rangitata River	0 (0%)	5 (11%)	1 (6%)	7*	(10%)	
Location	Rakaia mouth	1 (17%)	11 (26%)	2 (14%)	14	(23%)	
	SH 1 bridge	0 (0%)	3 (7%)	1 (7%)	4	(6%)	
	Steeles Road	0 (0%)	0 (0%)	1 (7%)	1	(2%)	
	Highbank	0 (0%)	1 (2%)	0 (0%)	1	(2%)	
	Rakaia Gorge	0 (0%)	1 (2%)	1 (7%)	2	(3%)	
	Lake Coleridge hatchery	1 (17%)	0 (0%)	0 (0%)	1	(2%)	
	Glenariffe confluence	0 (0%)	4 (10%)	1 (7%)	5	(8%)	
	Glenariffe hatchery	4 (67%)	20 (48%)	4 (29%)	28	(45%)	
	Double Hill Flats	0 (0%)	1 (2%)	1 (7%)	2	(3%)	
	Hydra Waters	0 (0%)	1 (2%)	1 (7%)	2	(3%)	
	Rakaia River	0 (0%)	0 (0%)	2 (14%)	2	(3%)	
Total		6 (8%)	47 (66%)	17 (24%)	71*	(100%)	

* Includes one 5-year-old fish.

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/16/04	1981	19 169	31 288	17/02/82	100	0.52	263
Age at return (years)							

2 3 4 Total							
Recovery method	Angler	1 (10%)	24 (28%)	3 (60%)	28	(28%)	
	Carcass	1 (10%)	19 (22%)	0 (0%)	20	(20%)	
	Hatchery	7 (70%)	41 (48%)	2 (40%)	50	(50%)	
	Sea	1 (10%)	1 (1%)	0 (0%)	2	(2%)	
Area	At sea	1 (10%)	1 (1%)	0 (0%)	2	(2%)	
	Hurunui River	0 (0%)	1 (1%)	0 (0%)	1	(1%)	
	Rakaia River	9 (90%)	78 (92%)	4 (80%)	91	(91%)	
	Rangitata River	0 (0%)	4 (5%)	1 (20%)	5	(5%)	
	Waiau River	0 (0%)	1 (1%)	0 (0%)	1	(1%)	
Location	Rakaia mouth	0 (0%)	7 (9%)	0 (0%)	7	(8%)	
	SH 1 bridge	0 (0%)	5 (6%)	0 (0%)	5	(5%)	
	Barrhill	0 (0%)	1 (1%)	0 (0%)	1	(1%)	
	Steeles Road	0 (0%)	1 (1%)	0 (0%)	1	(1%)	
	Highbank	0 (0%)	0 (0%)	1 (25%)	1	(1%)	
	Rakaia Gorge	1 (11%)	1 (1%)	0 (0%)	2	(2%)	
	Acheron confluence	0 (0%)	2 (3%)	1 (25%)	3	(3%)	
	Lake Coleridge hatchery	1 (11%)	3 (4%)	0 (0%)	4	(4%)	
	Glenariffe confluence	0 (0%)	6 (8%)	0 (0%)	6	(7%)	
	Glenariffe hatchery	6 (67%)	38 (49%)	2 (50%)	46	(51%)	
	Double Hill Flats	1 (11%)	10 (13%)	0 (0%)	11	(12%)	
	Hydra Waters	0 (0%)	4 (5%)	0 (0%)	4	(4%)	
Total		10 (10%)	85 (85%)	5 (5%)	100	(100%)	

TABLE 3d: Release and return data for 23 groups of coded-wire tagged salmon released from the Glenariffe hatchery, Rakaia River, 1977-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/62/03	1981	20 105	78 480	24/01/82	61	0.30	299
Age at return (years)							

				2	3	4	Total
Recovery method	Angler			1 (20%)	7 (18%)	6 (33%)	14 (23%)
	Carcass			0 (0%)	9 (24%)	1 (6%)	10 (16%)
	Hatchery			4 (80%)	22 (58%)	11 (61%)	37 (61%)
Area	Ashburton River			0 (0%)	0 (0%)	1 (6%)	1 (2%)
	Hurunui River			1 (20%)	0 (0%)	0 (0%)	1 (2%)
	Rakaia River			4 (80%)	38 (100%)	17 (94%)	59 (97%)
Location	Rakaia mouth			0 (0%)	2 (5%)	1 (6%)	3 (5%)
	SH 1 bridge			0 (0%)	1 (3%)	1 (6%)	2 (3%)
	Steeles Road			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Acheron confluence			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Lake Coleridge hatchery			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Donald Hill			0 (0%)	0 (0%)	1 (6%)	1 (2%)
	Glenariffe confluence			0 (0%)	4 (11%)	1 (6%)	5 (8%)
	Glenariffe hatchery			4 (100%)	21 (55%)	11 (65%)	36 (61%)
	Double Hill Flats			0 (0%)	6 (16%)	0 (0%)	6 (10%)
	Hydra Waters			0 (0%)	0 (0%)	1 (6%)	1 (2%)
	Rakaia River			0 (0%)	1 (3%)	1 (6%)	2 (3%)
Total				5 (8%)	38 (62%)	18 (30%)	61 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/63/03	1981	20 355	78 480	24/01/82	59	0.29	286
Age at return (years)							

2							
3							
4							
Total							
Recovery method	Angler			2 (22%)	12 (30%)	6 (60%)	20 (34%)
	Carcass			2 (22%)	10 (25%)	0 (0%)	12 (20%)
	Hatchery			5 (56%)	18 (45%)	4 (40%)	27 (46%)
Area	Rakaia River			9 (100%)	36 (90%)	10 (100%)	55 (93%)
	Rangitata River			0 (0%)	3 (8%)	0 (0%)	3 (5%)
	Waimakariri River			0 (0%)	1 (3%)	0 (0%)	1 (2%)
Location	Rakaia mouth			0 (0%)	0 (0%)	3 (30%)	3 (5%)
	SH 1 bridge			0 (0%)	5 (14%)	0 (0%)	5 (9%)
	Steeles Road			1 (11%)	1 (3%)	1 (10%)	3 (5%)
	Rakaia Gorge			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Acheron confluence			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Kowhai Flat			1 (11%)	0 (0%)	1 (10%)	2 (4%)
	Donald Hill			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Glenariffe confluence			1 (11%)	6 (17%)	1 (10%)	8 (15%)
	Glenariffe hatchery			5 (56%)	18 (50%)	4 (40%)	27 (49%)
	Double Hill Flats			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Hydra Waters			1 (11%)	2 (6%)	0 (0%)	3 (5%)
Total				9 (15%)	40 (68%)	10 (17%)	59 (100%)

TABLE 3e: Release and return data for 9 groups of coded-wire tagged salmon released in the Hydro Lakes, Glenariffe Stream, 1977-81

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/61/01	1977	2 629	0	14/02/78	10	0.38	10
63/09/01	1978	3 345	0	01/03/79	15	0.45	15
63/11/01	1978	11 206	1 000	02/03/79	27	0.24	29
63/16/01	1979	8 431	0	06/03/80	15	0.18	15
63/19/01	1979	257	0	10/03/80	1	0.39	1
63/22/01	1980	5 261	0	21/04/81	3	0.06	3
63/24/01	1980	1 851	0	24/04/81	2	0.11	2
63/02/02	1981	647	0	23/09/81	10	1.55	10
63/15/02	1981	816	0	20/09/82	7	0.86	7
Total		34 443	1 000		90	0.26	92

		Age at return (years)			
		2	3	4	Total
Code	63/02/02	0 (0%)	5 (50%)	5 (50%)	10 (100%)
	63/09/01	1 (7%)	11 (73%)	3 (20%)	15 (100%)
	63/11/01	0 (0%)	17 (63%)	10 (37%)	27 (100%)
	63/15/02	2 (29%)	3 (43%)	2 (29%)	7 (100%)
	63/16/01	1 (7%)	9 (60%)	5 (33%)	15 (100%)
	63/19/01	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	63/22/01	0 (0%)	1 (33%)	2 (67%)	3 (100%)
	63/24/01	0 (0%)	2 (100%)	0 (0%)	2 (100%)
	63/61/01	2 (20%)	7 (70%)	1 (10%)	10 (100%)
Recovery method	Angler	0 (0%)	9 (16%)	7 (25%)	16 (18%)
	Carcass	0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Hatchery	7 (100%)	44 (80%)	20 (71%)	71 (79%)
	Sea	0 (0%)	0 (0%)	1 (4%)	1 (1%)
	Trap	0 (0%)	1 (2%)	0 (0%)	1 (1%)
Area	At sea	0 (0%)	0 (0%)	1 (4%)	1 (1%)
	Hurunui River	0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Rakaia River	7 (100%)	52 (95%)	25 (89%)	84 (93%)
	Rangitata River	0 (0%)	1 (2%)	1 (4%)	2 (2%)
	Waimakariri River	0 (0%)	1 (2%)	1 (4%)	2 (2%)
Location	Rakaia mouth	0 (0%)	2 (4%)	1 (4%)	3 (4%)
	SH 1 bridge	0 (0%)	2 (4%)	1 (4%)	3 (4%)
	Barrhill	0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Rakaia Gorge	0 (0%)	1 (2%)	1 (4%)	2 (2%)
	Donald Hill	0 (0%)	0 (0%)	1 (4%)	1 (1%)
	Glenariffe hatchery	7 (100%)	44 (85%)	20 (80%)	71 (85%)
	Double Hill Flats	0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Manuka Point	0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Rakaia River	0 (0%)	0 (0%)	1 (4%)	1 (1%)
Total		7 (8%)	55 (61%)	28 (31%)	90 (100%)

TABLE 3f: Release and return data for 9 groups of coded-wire tagged salmon released from the Lake Coleridge hatchery, Rakaia River, 1979-81

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/50/02	1979	20 495	176 534	12/04/80	70	0.34	673
<u>Age at return (years)</u>							
				2	3	4	Total
Recovery method	Angler			2 (29%)	20 (34%)	3 (75%)	25 (36%)
	Carcass			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Hatchery			5 (71%)	34 (58%)	1 (25%)	40 (57%)
	Sea			0 (0%)	3 (5%)	0 (0%)	3 (4%)
	Trap			0 (0%)	1 (2%)	0 (0%)	1 (1%)
Area	At sea			0 (0%)	3 (5%)	0 (0%)	3 (4%)
	Rakaia River			7 (100%)	53 (90%)	3 (75%)	63 (90%)
	Rangitata River			0 (0%)	1 (2%)	1 (25%)	2 (3%)
	Waimakariri River			0 (0%)	2 (3%)	0 (0%)	2 (3%)
Location	Rakaia mouth			0 (0%)	2 (4%)	0 (0%)	2 (3%)
	SH 1 bridge			2 (29%)	3 (6%)	1 (33%)	6 (10%)
	Barrhill			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Steeles Road			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Highbank			0 (0%)	2 (4%)	0 (0%)	2 (3%)
	Rakaia Gorge			0 (0%)	3 (6%)	0 (0%)	3 (5%)
	Acheron confluence			0 (0%)	4 (8%)	0 (0%)	4 (6%)
	Lake Coleridge hatchery			0 (0%)	21 (40%)	1 (33%)	22 (35%)
	Donald Hill			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Glenariffe hatchery			5 (71%)	13 (25%)	0 (0%)	18 (29%)
	Double Hill Flats			0 (0%)	1 (2%)	0 (0%)	1 (2%)
	Rakaia River			0 (0%)	1 (2%)	1 (33%)	2 (3%)
Total				7 (10%)	59 (84%)	4 (6%)	70 (100%)

TABLE 3f: Release and return data for 9 groups of coded-wire tagged salmon released from the Lake Coleridge hatchery, Rakaia River, 1979-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/14/03	1980	10 793	40 323	11/03/81	36	0.33	170
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			2 (33%)	9 (35%)	2 (50%)	13 (36%)
	Hatchery			4 (67%)	17 (65%)	1 (25%)	22 (61%)
	Miscellaneous			0 (0%)	0 (0%)	1 (25%)	1 (3%)
Area	Rakaia River			5 (83%)	24 (92%)	4 (100%)	33 (92%)
	Rangitata River			1 (17%)	2 (8%)	0 (0%)	3 (8%)
Location	Rakaia mouth			0 (0%)	3 (13%)	2 (50%)	5 (15%)
	SH 1 bridge			0 (0%)	1 (4%)	0 (0%)	1 (3%)
	Steeles Road			0 (0%)	0 (0%)	1 (25%)	1 (3%)
	Rakaia Gorge			0 (0%)	1 (4%)	0 (0%)	1 (3%)
	Acheron confluence			1 (20%)	1 (4%)	0 (0%)	2 (6%)
	Kowhai Flat			0 (0%)	1 (4%)	0 (0%)	1 (3%)
	Lake Coleridge hatchery			3 (60%)	14 (58%)	1 (25%)	18 (55%)
	Glenariffe hatchery			1 (20%)	3 (13%)	0 (0%)	4 (12%)
Total				6 (17%)	26 (72%)	4 (11%)	36 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/15/03	1980	11 312	66 364	12/04/81	41	0.36	282
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			1 (33%)	9 (31%)	1 (11%)	11 (27%)
	Carcass			0 (0%)	2 (7%)	3 (33%)	5 (12%)
	Hatchery			2 (67%)	17 (59%)	5 (56%)	24 (59%)
	Sea			0 (0%)	1 (3%)	0 (0%)	1 (2%)
Area	At sea			0 (0%)	1 (3%)	0 (0%)	1 (2%)
	Rakaia River			3 (100%)	25 (86%)	9 (100%)	37 (90%)
	Rangitata River			0 (0%)	3 (10%)	0 (0%)	3 (7%)
Location	Rakaia mouth			0 (0%)	2 (8%)	1 (11%)	3 (8%)
	Acheron confluence			1 (33%)	2 (8%)	0 (0%)	3 (8%)
	Lake Coleridge hatchery			1 (33%)	15 (60%)	4 (44%)	20 (54%)
	Glenariffe confluence			0 (0%)	1 (4%)	0 (0%)	1 (3%)
	Glenariffe hatchery			1 (33%)	2 (8%)	1 (11%)	4 (11%)
	Double Hill Flats			0 (0%)	1 (4%)	0 (0%)	1 (3%)
	Hydra Waters			0 (0%)	0 (0%)	3 (33%)	3 (8%)
	Rakaia River			0 (0%)	2 (8%)	0 (0%)	2 (5%)
Total				3 (7%)	29 (71%)	9 (22%)	41 (100%)

TABLE 3f: Release and return data for 9 groups of coded-wire tagged salmon released from the Lake Coleridge hatchery, Rakaia River, 1979-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/16/03	1980	10 484	53 466	12/04/81	54	0.52	329
Age at return (years)							

2 3 4 Total							
Recovery method	Angler	1 (17%)	14 (36%)	5 (56%)	20 (37%)		
	Carcass	0 (0%)	6 (15%)	3 (33%)	9 (17%)		
	Hatchery	5 (83%)	17 (44%)	1 (11%)	23 (43%)		
	Sea	0 (0%)	2 (5%)	0 (0%)	2 (4%)		
Area	At sea	0 (0%)	2 (5%)	0 (0%)	2 (4%)		
	Rakaia River	6 (100%)	33 (85%)	7 (78%)	46 (85%)		
	Rangitata River	0 (0%)	4 (10%)	1 (11%)	5 (9%)		
	Waiau River	0 (0%)	0 (0%)	1 (11%)	1 (2%)		
Location	Rakaia mouth	1 (17%)	1 (3%)	0 (0%)	2 (4%)		
	SH 1 bridge	0 (0%)	0 (0%)	2 (29%)	2 (4%)		
	Barrhill	0 (0%)	2 (6%)	0 (0%)	2 (4%)		
	Steeles Road	0 (0%)	2 (6%)	0 (0%)	2 (4%)		
	Rakaia Gorge	0 (0%)	1 (3%)	0 (0%)	1 (2%)		
	Acheron confluence	0 (0%)	4 (12%)	1 (14%)	5 (11%)		
	Lake Coleridge hatchery	3 (50%)	12 (36%)	1 (14%)	16 (35%)		
	Glenariffe confluence	0 (0%)	1 (3%)	1 (14%)	2 (4%)		
	Glenariffe hatchery	2 (33%)	5 (15%)	0 (0%)	7 (15%)		
	Double Hill Flats	0 (0%)	5 (15%)	0 (0%)	5 (11%)		
	Hydra Waters	0 (0%)	0 (0%)	2 (29%)	2 (4%)		
Total		6 (11%)	39 (72%)	9 (17%)	54 (100%)		

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/17/03	1980	10 513	60 000	24/07/81	109	1.04	731
Age at return (years)							

2 3 4 Total							
Recovery method	Angler	5 (38%)	23 (32%)	5 (22%)	33 (30%)		
	Carcass	0 (0%)	3 (4%)	5 (22%)	8 (7%)		
	Hatchery	7 (54%)	46 (63%)	12 (52%)	65 (60%)		
	Sea	0 (0%)	1 (1%)	1 (4%)	2 (2%)		
	Trap	1 (8%)	0 (0%)	0 (0%)	1 (1%)		
Area	At sea	0 (0%)	1 (1%)	1 (4%)	2 (2%)		
	Hurunui River	0 (0%)	3 (4%)	0 (0%)	3 (3%)		
	Rakaia River	9 (69%)	62 (85%)	20 (87%)	91 (83%)		
	Rangitata River	0 (0%)	1 (1%)	2 (9%)	3 (3%)		
	Waiau River	0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Waimakariri River	3 (23%)	4 (5%)	0 (0%)	7 (6%)		
	Wairau River	1 (8%)	0 (0%)	0 (0%)	1 (1%)		
	Waitaki River	0 (0%)	1 (1%)	0 (0%)	1 (1%)		
Location	Rakaia mouth	0 (0%)	10 (16%)	1 (5%)	11 (12%)		
	SH 1 bridge	1 (11%)	0 (0%)	0 (0%)	1 (1%)		
	Barrhill	0 (0%)	0 (0%)	1 (5%)	1 (1%)		
	Highbank	1 (11%)	0 (0%)	1 (5%)	2 (2%)		
	Rakaia Gorge	0 (0%)	1 (2%)	0 (0%)	1 (1%)		
	Kowhai Flat	0 (0%)	2 (3%)	0 (0%)	2 (2%)		
	Lake Coleridge hatchery	3 (33%)	34 (55%)	11 (55%)	48 (53%)		
	Donald Hill	0 (0%)	1 (2%)	0 (0%)	1 (1%)		
	Glenariffe hatchery	4 (44%)	11 (18%)	1 (5%)	16 (18%)		
	Double Hill Flats	0 (0%)	2 (3%)	2 (10%)	4 (4%)		
	Hydra Waters	0 (0%)	1 (2%)	3 (15%)	4 (4%)		
Total		13 (12%)	73 (67%)	23 (21%)	109 (100%)		

TABLE 3f: Release and return data for 9 groups of coded-wire tagged salmon released from the Lake Coleridge hatchery, Rakaia River, 1979-81 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/42/03	1981	10 600	44 100	06/03/82	148	1.40	764
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			4 (12%)	30 (28%)	3 (38%)	37 (25%)
	Carcass			0 (0%)	4 (4%)	1 (13%)	5 (3%)
	Hatchery			29 (85%)	71 (67%)	4 (50%)	104 (70%)
	Sea			1 (3%)	1 (1%)	0 (0%)	2 (1%)
Area	At sea			1 (3%)	1 (1%)	0 (0%)	2 (1%)
	Hurunui River			0 (0%)	3 (3%)	0 (0%)	3 (2%)
	Rakaia River			30 (88%)	94 (89%)	6 (75%)	130 (88%)
	Rangitata River			2 (6%)	4 (4%)	2 (25%)	8 (5%)
	Waimakariri River			1 (3%)	4 (4%)	0 (0%)	5 (3%)
Location	Rakaia mouth			1 (3%)	4 (4%)	0 (0%)	5 (4%)
	SH 1 bridge			0 (0%)	3 (3%)	0 (0%)	3 (2%)
	Barrhill			0 (0%)	3 (3%)	0 (0%)	3 (2%)
	Steeles Road			0 (0%)	6 (6%)	0 (0%)	6 (5%)
	Highbank			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Rakaia Gorge			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Acheron confluence			0 (0%)	1 (1%)	1 (17%)	2 (2%)
	Lake Coleridge hatchery			27 (90%)	70 (74%)	4 (67%)	101 (78%)
	Donald Hill			0 (0%)	0 (0%)	1 (17%)	1 (1%)
	Glenariffe confluence			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Glenariffe hatchery			2 (7%)	1 (1%)	0 (0%)	3 (2%)
	Hydra Waters			0 (0%)	3 (3%)	0 (0%)	3 (2%)
Total				34 (23%)	106 (72%)	8 (5%)	148 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/50/03	1981	10 523	54 700	23/04/82	158	1.50	979
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			5 (11%)	34 (32%)	4 (57%)	43 (27%)
	Carcass			0 (0%)	3 (3%)	0 (0%)	3 (2%)
	Hatchery			39 (89%)	69 (64%)	3 (43%)	111 (70%)
	Sea			0 (0%)	1 (1%)	0 (0%)	1 (1%)
Area	At sea			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Hurunui River			1 (2%)	2 (2%)	0 (0%)	3 (2%)
	Rakaia River			40 (91%)	92 (86%)	6 (86%)	138 (87%)
	Rangitata River			2 (5%)	12 (11%)	1 (14%)	15 (9%)
	Waimakariri River			1 (2%)	0 (0%)	0 (0%)	1 (1%)
Location	Rakaia mouth			0 (0%)	8 (9%)	1 (17%)	9 (7%)
	SH 1 bridge			0 (0%)	3 (3%)	1 (17%)	4 (3%)
	Steeles Road			2 (5%)	1 (1%)	0 (0%)	3 (2%)
	Rakaia Gorge			0 (0%)	3 (3%)	0 (0%)	3 (2%)
	Acheron confluence			0 (0%)	3 (3%)	1 (17%)	4 (3%)
	Lake Coleridge hatchery			34 (85%)	67 (73%)	3 (50%)	104 (75%)
	Glenariffe hatchery			4 (10%)	2 (2%)	0 (0%)	6 (4%)
	Double Hill Flats			0 (0%)	2 (2%)	0 (0%)	2 (1%)
	Rakaia River			0 (0%)	2 (2%)	0 (0%)	2 (1%)
	Wilberforce River			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Total				44 (28%)	107 (68%)	7 (4%)

TABLE 3g: Release and return data for a group of coded-wire tagged salmon released from Blackford Salmon Ranch, Rakaia River, 1980

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/13/03	1980	10 703	17 900	12/03/81	17	0.16	45
Age at return (years)							
				2	3	4	Total
Recovery method	Angler			0 (0%)	4 (33%)	0 (0%)	4 (24%)
	Carcass			0 (0%)	0 (0%)	1 (33%)	1 (6%)
	Hatchery			2 (100%)	8 (67%)	2 (67%)	12 (71%)
Area	Rakaia River			2 (100%)	12 (100%)	3 (100%)	17 (100%)
Location	Rakaia mouth			0 (0%)	1 (8%)	1 (33%)	2 (12%)
	SH 1 bridge			0 (0%)	2 (17%)	0 (0%)	2 (12%)
	Blackford Salmon Ranch			0 (0%)	2 (17%)	2 (67%)	4 (24%)
	Lake Coleridge hatchery			1 (50%)	4 (33%)	0 (0%)	5 (29%)
	Glenariffe hatchery			1 (50%)	2 (17%)	0 (0%)	3 (18%)
	Rakaia River			0 (0%)	1 (8%)	0 (0%)	1 (6%)
Total				2 (12%)	12 (71%)	3 (18%)	17 (100%)

TABLE 3h: Release and return data for 6 groups of coded-wire tagged salmon released at McIntosh's Rocks (Waimakariri River) and the Rakaia River mouth, 1978-80

Release location: McIntosh's Rocks

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/07/01	1978	1 950	0	31/10/78	1	0.05	1
63/37/02	1979	10 059	10 757	14/11/79	1	0.01	2
63/02/03	1980	19 608	0	01/12/80	21	0.11	21
Total		31 617	10 757		23	0.07	24

		Age at return (years)			
		2	3	4	Total
Code	63/02/03	5 (24%)	16 (76%)	0 (0%)	21 (100%)
	63/07/01	0 (0%)	1 (100%)	0 (0%)	1 (100%)
	63/37/02	1 (100%)	0 (0%)	0 (0%)	1 (100%)
Recovery method	Angler	1 (17%)	10 (59%)	0 (0%)	11 (48%)
	Hatchery	4 (67%)	6 (35%)	0 (0%)	10 (43%)
	Miscellaneous	0 (0%)	1 (6%)	0 (0%)	1 (4%)
	Trap	1 (17%)	0 (0%)	0 (0%)	1 (4%)
Area	Waimakariri River	6 (100%)	17 (100%)	0 (0%)	23 (100%)
Location	Waimakariri mouth	0 (0%)	4 (24%)	0 (0%)	4 (17%)
	McIntosh's Rocks	0 (0%)	4 (24%)	0 (0%)	4 (17%)
	SH 1 bridge	0 (0%)	2 (12%)	0 (0%)	2 (9%)
	Silverstream Hatchery	4 (67%)	6 (35%)	0 (0%)	10 (43%)
	Grasmere Stream	1 (17%)	0 (0%)	0 (0%)	1 (4%)
	Waimakariri River	1 (17%)	1 (6%)	0 (0%)	2 (9%)
Total		6 (26%)	17 (74%)	0 (0%)	23 (100%)

Release location: Rakaia mouth

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/30/02	1978	26 201	0	28/02/79	22	0.08	22
63/44/02	1979	9 504	0	21/12/79	3	0.03	3
63/08/03	1980	20 944	0	22/01/81	2	0.01	2
Total		56 649	0		27	0.05	27

		Age at return (years)			
		2	3	4	Total
Code	63/08/03	0 (0%)	2 (100%)	0 (0%)	2 (100%)
	63/30/02	6 (27%)	13 (59%)	3 (14%)	22 (100%)
	63/44/02	1 (33%)	2 (67%)	0 (0%)	3 (100%)
Recovery method	Angler	2 (29%)	5 (29%)	3 (100%)	10 (37%)
	Carcass	0 (0%)	3 (18%)	0 (0%)	3 (11%)
	Hatchery	5 (71%)	9 (53%)	0 (0%)	14 (52%)
Area	Hurunui River	1 (14%)	0 (0%)	0 (0%)	1 (4%)
	Rakaia River	6 (86%)	17 (100%)	3 (100%)	26 (96%)
Location	Rakaia mouth	1 (17%)	5 (29%)	2 (67%)	8 (31%)
	SH 1 bridge	0 (0%)	0 (0%)	1 (33%)	1 (4%)
	Lake Coleridge hatchery	0 (0%)	1 (6%)	0 (0%)	1 (4%)
	Glenariffe hatchery	5 (83%)	8 (47%)	0 (0%)	13 (50%)
	Double Hill Flats	0 (0%)	3 (18%)	0 (0%)	3 (12%)
Total		7 (26%)	17 (63%)	3 (11%)	27 (100%)

TABLE 3i: Release and return data for 7 groups of coded-wire tagged salmon released into the Maori Lakes and Three Springs Creek, 1979-81

Release location: Maori Lakes

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/28/02	1979	10 365	30 344	09/10/79	0	0.00	0
63/39/02	1979	10 238	38 898	22/11/79	2	0.02	10
63/45/03	1981	10 470	0	24/02/82	17	0.16	17
Total		31 073	69 242		19	0.06	27

		Age at return (years)			
		2	3	4	Total
Code	63/39/02	1 (50%)	0 (0%)	1 (50%)	2 (100%)
	63/45/03	3 (18%)	11 (65%)	3 (18%)	17 (100%)
Recovery method	Angler	3 (75%)	7 (64%)	1 (25%)	11 (58%)
	Carcass	0 (0%)	1 (9%)	1 (25%)	2 (11%)
	Hatchery	1 (25%)	3 (27%)	2 (50%)	6 (32%)
Area	Ashburton River	1 (25%)	2 (18%)	0 (0%)	3 (16%)
	Rakaia River	1 (25%)	5 (45%)	3 (75%)	9 (47%)
	Rangitata River	2 (50%)	3 (27%)	0 (0%)	5 (26%)
	Waimakariri River	0 (0%)	1 (9%)	1 (25%)	2 (11%)
Location	Ashburton mouth	1 (100%)	1 (50%)	0 (0%)	2 (67%)
	South Branch	0 (0%)	1 (50%)	0 (0%)	1 (33%)
Total		4 (21%)	11 (58%)	4 (21%)	19 (100%)

Release location: Three Springs Creek

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/26/02	1978	10 134	15 000	21/12/78	4	0.04	10
63/46/02	1979	9 122	0	04/12/79	0	0.00	0
63/20/03	1980	21 311	15 308	23/02/81	14	0.07	24
63/44/03	1981	10 533	1 000	02/02/82	2	0.02	2
Total		51 100	31 308		20	0.04	36

		Age at return (years)			
		2	3	4	Total
Code	63/20/03	1 (7%)	7 (50%)	6 (43%)	14 (100%)
	63/26/02	2 (50%)	1 (25%)	1 (25%)	4 (100%)
	63/44/03	1 (50%)	0 (0%)	1 (50%)	2 (100%)
Recovery method	Angler	3 (75%)	6 (75%)	8 (100%)	17 (85%)
	Hatchery	0 (0%)	1 (13%)	0 (0%)	1 (5%)
	Sea	1 (25%)	1 (13%)	0 (0%)	2 (10%)
Area	At sea	1 (25%)	1 (13%)	0 (0%)	2 (10%)
	Opihi River	2 (50%)	2 (25%)	2 (25%)	6 (30%)
	Rakaia River	0 (0%)	2 (25%)	2 (25%)	4 (20%)
	Rangitata River	1 (25%)	3 (38%)	4 (50%)	8 (40%)
Location	Opihi mouth	2 (100%)	2 (100%)	2 (100%)	6 (100%)
Total		4 (20%)	8 (40%)	8 (40%)	20 (100%)

TABLE 3j: Release and return data for 5 groups of coded-wire tagged salmon released into the Clutha River, 1981

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/19/04*	1981	11 482	0	17/08/82	136	1.18	136
<u>Age at return (years)</u>							

		2	3	4	Total		
Recovery method	Angler	39 (68%)	58 (76%)	3 (100%)	100 (74%)		
	Carcass	0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Hatchery	3 (5%)	0 (0%)	0 (0%)	3 (2%)		
	Miscellaneous	8 (14%)	13 (17%)	0 (0%)	21 (15%)		
	Sea	7 (12%)	3 (4%)	0 (0%)	10 (7%)		
	Trap	0 (0%)	1 (1%)	0 (0%)	1 (1%)		
Area	At sea	7 (12%)	3 (4%)	0 (0%)	10 (7%)		
	Clutha River	48 (84%)	71 (93%)	3 (100%)	122 (90%)		
	Waitaki River	2 (4%)	2 (3%)	0 (0%)	4 (3%)		
Location	Koau mouth	0 (0%)	0 (0%)	1 (33%)	1 (1%)		
	Matau mouth	0 (0%)	12 (17%)	0 (0%)	12 (10%)		
	Kaitangata raceway	3 (6%)	3 (4%)	0 (0%)	6 (5%)		
	Balclutha	0 (0%)	12 (17%)	0 (0%)	12 (10%)		
	Beaumont	0 (0%)	1 (1%)	0 (0%)	1 (1%)		
	Roxburgh	33 (69%)	36 (51%)	2 (67%)	71 (58%)		
	Clutha River	12 (25%)	7 (10%)	0 (0%)	19 (16%)		
Total		57 (42%)	76 (56%)	3 (2%)	136 (100%)		

* Released at Kaitangata.

TABLE 3j: Release and return data for 5 groups of coded-wire tagged salmon released into the Clutha River, 1981 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/21/02*	1981	5 659	0	17/08/82	82	1.45	82
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			18 (69%)	45 (85%)	3 (100%)	66 (80%)
	Carcass			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Hatchery			1 (4%)	0 (0%)	0 (0%)	1 (1%)
	Miscellaneous			6 (23%)	6 (11%)	0 (0%)	12 (15%)
	Sea			1 (4%)	1 (2%)	0 (0%)	2 (2%)
Area	At sea			1 (4%)	1 (2%)	0 (0%)	2 (2%)
	Clutha River			25 (96%)	52 (98%)	3 (100%)	80 (98%)
Location	Matau mouth			0 (0%)	7 (13%)	2 (67%)	9 (11%)
	Kaitangata raceway			1 (4%)	2 (4%)	0 (0%)	3 (4%)
	Balclutha			0 (0%)	7 (13%)	1 (33%)	8 (10%)
	Minzlon Burn			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Roxburgh			13 (52%)	30 (58%)	0 (0%)	43 (54%)
	Clutha River			11 (44%)	5 (10%)	0 (0%)	16 (20%)
Total			26 (32%)	53 (65%)	3 (4%)	82 (100%)	

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/22/02*	1981	3 437	0	17/08/82	51	1.48	51
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			14 (78%)	24 (75%)	1 (100%)	39 (76%)
	Miscellaneous			2 (11%)	6 (19%)	0 (0%)	8 (16%)
	Sea			2 (11%)	2 (6%)	0 (0%)	4 (8%)
Area	At sea			2 (11%)	2 (6%)	0 (0%)	4 (8%)
	Clutha River			16 (89%)	29 (91%)	1 (100%)	46 (90%)
	Taieri River			0 (0%)	1 (3%)	0 (0%)	1 (2%)
Location	Matau mouth			0 (0%)	6 (21%)	1 (100%)	7 (15%)
	Kaitangata raceway			0 (0%)	2 (7%)	0 (0%)	2 (4%)
	Balclutha			0 (0%)	5 (17%)	0 (0%)	5 (11%)
	Roxburgh			9 (56%)	14 (48%)	0 (0%)	23 (50%)
	Clutha River			7 (44%)	2 (7%)	0 (0%)	9 (20%)
	Total			18 (35%)	32 (63%)	1 (2%)	51 (100%)

* Released at Kaitangata.

TABLE 3j: Release and return data for 5 groups of coded-wire tagged salmon released into the Clutha River, 1981 (continued)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/48/03*	1981	10 370	0	30/10/82	184	1.77	184
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			56 (60%)	63 (74%)	5 (83%)	124 (67%)
	Hatchery			2 (2%)	0 (0%)	0 (0%)	2 (1%)
	Miscellaneous			34 (37%)	19 (22%)	1 (17%)	54 (29%)
	Sea			1 (1%)	3 (4%)	0 (0%)	4 (2%)
Area	At sea			1 (1%)	3 (4%)	0 (0%)	4 (2%)
	Clutha River			91 (98%)	82 (96%)	5 (83%)	178 (97%)
	Taieri River			1 (1%)	0 (0%)	1 (17%)	2 (1%)
Location	Matau mouth			0 (0%)	13 (16%)	1 (20%)	14 (8%)
	Kaitangata raceway			2 (2%)	3 (4%)	0 (0%)	5 (3%)
	Balclutha			0 (0%)	11 (13%)	2 (40%)	13 (7%)
	Beaumont			0 (0%)	1 (1%)	0 (0%)	1 (1%)
	Roxburgh			66 (73%)	47 (57%)	2 (40%)	115 (65%)
	Clutha River			23 (25%)	7 (9%)	0 (0%)	30 (17%)
Total				93 (51%)	85 (46%)	6 (3%)	184 (100%)

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/32/03†	1981	5 292	0	28/07/82	94	1.78	94
Age at return (years)							

2 3 4 Total							
Recovery method	Angler			25 (51%)	24 (59%)	4 (100%)	53 (56%)
	Miscellaneous			20 (41%)	15 (37%)	0 (0%)	35 (37%)
	Sea			4 (8%)	2 (5%)	0 (0%)	6 (6%)
Area	At sea			43 (8%)	2 (5%)	0 (0%)	6 (6%)
	Clutha River			44 (90%)	38 (93%)	4 (100%)	86 (91%)
	Hurunui River			0 (0%)	1 (2%)	0 (0%)	1 (1%)
	Taieri River			1 (2%)	0 (0%)	0 (0%)	1 (1%)
Location	Kaitangata raceway			0 (0%)	2 (5%)	0 (0%)	2 (2%)
	Beaumont			0 (0%)	0 (0%)	1 (25%)	1 (1%)
	Roxburgh			30 (68%)	33 (87%)	2 (50%)	65 (76%)
	Clutha River			14 (32%)	3 (8%)	1 (25%)	18 (21%)
Total				49 (52%)	41 (44%)	4 (4%)	94 (100%)

* Released at Kaitangata.
† Released at Minzion Burn.

TABLE 3k: Release and return data for 5 groups of coded-wire tagged salmon released from the Tasman Salmon Company farm, Kaniere River, 1979-81

Tag code	Brood year	No. released		Release date	No. of returns	% return	Estimated returns
		Tagged	Untagged				
63/57/02	1979	16 626	200	20/09/80	13	0.08	13
63/20/01	1980	4 914	60	12/04/81	2	0.04	2
63/22/03	1980	21 139	96 387	12/04/81	3	0.01	17
63/17/04	1981	21 180	175 700	14/12/81	0	0.00	0
63/18/04	1981	19 829	156 100	08/04/82	18	0.09	160
Total		83 688	428 447		36	0.04	192

		Age at return (years)			
		2	3	4	Total
Code	63/18/04	3 (17%)	14 (78%)	1 (6%)	18 (100%)
	63/20/01	0 (0%)	2 (100%)	0 (0%)	2 (100%)
	63/22/03	1 (33%)	1 (33%)	1 (33%)	3 (100%)
	63/57/02	6 (46%)	6 (46%)	1 (8%)	13 (100%)
Recovery method	Angler	8 (80%)	14 (61%)	3 (100%)	25 (69%)
	Hatchery	2 (20%)	9 (39%)	0 (0%)	11 (31%)
Area	Arahura River	1 (10%)	0 (0%)	0 (0%)	1 (3%)
	Grey River	3 (30%)	1 (4%)	0 (0%)	4 (11%)
	Hokitika River	5 (50%)	21 (91%)	2 (67%)	28 (78%)
	Taramakau River	1 (10%)	1 (4%)	1 (33%)	3 (8%)
Location	Kaniere Bridge	0 (0%)	6 (29%)	0 (0%)	6 (21%)
	Kaniere River	1 (20%)	5 (24%)	0 (0%)	6 (21%)
	Tasman farm	2 (40%)	9 (43%)	0 (0%)	11 (39%)
	Hokitika River	2 (40%)	1 (5%)	2 (100%)	5 (18%)
Total		10 (28%)	23 (64%)	3 (8%)	36 (100%)

Appendix 1: Description of release sites and their associated release programmes

Ada River, Landslip Stream, and Homestead Stream

Ada River is a small headwater tributary of the Waiau River, while Landslip and Homestead Streams are tributaries of the Hurunui River; all are known spawning grounds for wild salmon (Bonnett 1980). Fish from the Silverstream Hatchery for all eight releases were taken by road transporter to the Hope River on the Lewis Pass Highway (SH 7), and from there with a helicopter monsoon bucket. In the Ada River and Landslip Stream, the fish were released into deep, slow-moving pools about 500 m above the junction with the respective main stems. Homestead Stream did not have such a pool; the fish were released into relatively fast and shallower water about 50 m above the Hurunui confluence. Mean juvenile weight at release was not usually recorded, but would have been about 5 g.

No returns of adult salmon were recorded from any of these liberations (Table 2). Three tagged fish were taken by anglers fishing the Waiau River in 1981 and 1982, but all were of Glenariffe origin. Extensive searches for carcasses in the Hurunui River during 1980 found 2 tagged fish of Glenariffe origin out of 413 carcasses examined (Bonnett 1980). No tagged carcasses were recovered in 1981 or 1982 (FFC unpublished data).

Longfellow hatchery

The Hurunui Salmon Company was established in 1979 and its operations were based at the Longfellow hatchery. The hatchery has changed hands several times since 1981, and is now owned by Como Industries Ltd. Rearing facilities consist of five concrete raceways 25 m long by 2.4 m wide, gravity fed by water from Sisters Stream.

Most of the hatchery stock in 1980 and 1981 was reared from fry trapped at "Double Hill Flats" in the Rakaia headwaters, held temporarily at Glenariffe, and then transferred to the Longfellow raceways. Two small groups of salmon of local origin were raised at the Longfellow hatchery (codes 63/01/02 and 63/25/01), each being the progeny of one pair of adults.

Returns from the six releases ranged from 0.05 to 0.23% (Table 2) and averaged 0.07% (Table 3a). Of the 48 adults recovered in fresh water, 83% returned to the Hurunui River, and 48% returned to the hatchery. One tagged carcass was found in the North Branch of the Hurunui River below Lake Sumner. Other carcasses were probably present, but not recovered; however, it is unlikely that there would have been enough to significantly alter the return figures.

Grasmere Stream and Winding Creek

Releases at these two sites were a joint FRD-NCAS project to assess the survival and homing of salmon "transplants" and enhance the salmon run in the Waimakariri River. Both streams are established spawning waters and have been monitored for many years by NCAS field staff. Fisheries Research Division operated an upstream trap on Winding Creek from 1979 to 1984 and maintained daily records of salmon movements during the annual spawning run.

All fish released as part of the enhancement programme were reared at the Silverstream hatchery and were taken by road transporter to the point of release. In 1981, release weights ranged from 8 to 21 g; before that, all release weights had been about 5 g. Most releases of tagged fish were accompanied by liberations of untagged fish of the same size.

Returns from both sites were extremely low (Table 3c); they averaged 0.02% for the Grasmere Stream releases and 0.03% for those at Winding Creek. However, the homing of the returning fish was not affected by the transfer. All 20 adults were taken in the Waimakariri catchment, and 80% of these were caught in the stream where release took place. None of the transferred fish were recaptured at Silverstream.

Blackford Salmon Ranch

Blackford Salmon Ranch is a small, privately owned hatchery on the southern bank of the Rakaia River (Fig. 2). There was only one liberation during 1977-81, with a return of 0.16% (Table 3g).

"McIntosh's Rocks" and the Rakaia River mouth

From 1978 to 1980, FRD conducted a series of releases to investigate whether mortality associated with the downriver passage of hatchery-reared juvenile salmon could be reduced by releasing fish directly into estuarine waters. Parallel releases on the Waimakariri and Rakaia Rivers used fish reared at Silverstream and Glenariffe respectively. The release point on the Waimakariri River was at a place known locally as "McIntosh's Rocks", on the northern bank of the Waimakariri immediately down stream from the Kaiapoi River confluence. The Rakaia River releases were made into the extreme southern end of the tidal lagoon at the river mouth. The 1978 and 1980 Rakaia mouth releases were associated with the release of fish of the same weight from Glenariffe, within the same 24 hours.

None of the six river mouth releases had a large return (Table 2). The data for all six releases, grouped by river, are listed in Table 3h. Despite the low returns, there are some differences between the upstream and downstream sites. On the Rakaia River, percentage returns for the river mouth releases were 2-7 times less than for the corresponding Glenariffe releases, the 1978 returns (codes 63/27/02 and 63/30/02) being the most disparate. The Waimakariri data are generally too few to draw any conclusions, with the possible exception of the 1980 liberation, for which returns to the downriver site (code 63/02/03) were almost 20 times greater than those at Silverstream (code 63/04/03). However, there was also a difference in release weight between the two sites (7.0 g at Silverstream and 12.4 g at "McIntosh's Rocks"), so the difference in returns may not be entirely due to the differing release locations. The programme was discontinued after 1980, because of the low returns and the conflicting results on the two rivers.

Maori Lakes and "Three Springs Creek"

Releases at these two sites, in the headwaters of the Ashburton and Opihi Rivers respectively, were for the same reason as the Grasmere Stream and Winding Creek liberations, i.e., to enhance the local sports fishery.

Maori Lakes, in the headwaters of the Ashburton River South Branch, are a group of small swampy ponds ranging in area from 1 to 10 ha. The stream draining these lakes is known to be a salmon spawning area (Strange 1979, 1980, 1981). Details of the liberations were given by Strange (1980, 1981) and are summarised in Table 2.

"Three Springs Creek", near Kimbell on SH 8, is a minor spring-fed tributary of the Opihi River. It was chosen as a suitable site for the release of young salmon into the Opihi system after a physical and biological survey of the stream (Bull 1979). Details of the release programme were given by Bull (1979, 1981). Returns from these releases were very low; two had nil returns and the maximum return (code 63/45/03) was 0.16%. Some homing occurred, though strays from both releases were found throughout the Rangitata and Rakaia River systems, and two Maori Lakes fish were recorded as far north as the Waimakariri River.

Hakataramea River and Old Ferry Road

The aim of the FRD releases at these two sites, both within the lower Waitaki River catchment, was to monitor the returns of wild chinook-salmon fingerlings with the CWT technique. Seine nets were used to catch the fish to be tagged, and the sites were chosen because of their accessibility and the availability of fish. The Hakataramea River is one of the principal spawning waters in the lower Waitaki River system (Graynoth *et al.* 1981).

It was not possible to capture more than about 2000 fish of a size suitable for tagging at either site. A total of 6734 fish were tagged in three separate groups, two in 1977 and one in

1978 (Table 2). Accurate records were not kept, but many of the fish were no more than 60-70 mm long (or about 3 g) at the time of tagging.

No returning adult salmon were ever recovered from this project. Because of this and the practical difficulties of tagging in the field (e.g., a portable electric generator was required to power the tagging machine), tagging of wild fish has not been attempted since.

Tasman Salmon Company, Kaniere River

The Tasman Salmon Company's Kaniere hatchery began operations in 1979, when it was owned by Lane Walker Rudkin Ltd, and it has since been bought by Fleetwing Enterprises Ltd. A brief description of the hatchery was given by Todd (1983). Juvenile salmon stock for the hatchery was obtained from Glenariffe, originally from wild fry collected in the downstream trap, and later from ova stripping.

Five releases of tagged salmon were made from the hatchery during 1979-81 (Table 2). From its opening the hatchery had a policy of holding stock for longer than was customary; all but one of the releases were of fish 8-12 months of age and weighing up to 90 g. Return data for all five releases are summarised in Table 3k.

Total returns of tagged adults were uniformly low, with one nil return and a maximum recapture of 0.09%. Returns to the hatchery were even lower, accounting for less than one-third of the adults recovered. However, local anglers benefited from the releases, tagged fish being caught as far north as the Grey River. The release with the highest return (code 63/18/04) was accompanied by many untagged fish, and the resulting estimated return of about 160 mature fish is consistent with reports of an unusually productive salmon fishery in the Hokitika River during 1983 (Preston 1984).

Bubbling Springs Salmon Farm Company, Waikoropupu (Pupu) Springs

The Bubbling Springs hatchery, on the Takaka River in Golden Bay, was established in 1976. Bubbling Springs is the northernmost hatchery to ocean-ranch salmon (Fig. 1) and takes its water supply from the Waikoropupu Springs. A brief description of the hatchery was given by Todd (1983).

The hatchery was originally stocked with wild fry from Glenariffe, and early work concentrated on ocean ranching. Two releases of tagged fish were made, in 1978 and 1979 (Table 2). No tagged adult salmon from these releases were ever recovered, and subsequent work at the hatchery was directed towards other salmon husbandry techniques, especially pond rearing.

