



FISHERIES RESEARCH SERVICES

Scottish Fish Farms Annual Production Survey, 2002



SCOTTISH EXECUTIVE
Environment and Rural Affairs Department



FISHERIES RESEARCH SERVICES

SCOTTISH FISH FARMS

Annual Production Survey 2002

This report was prepared for
the Scottish Executive by
FRS Marine Laboratory

FRS Marine Laboratory is a division of
Fisheries Research Services,
an agency of the Scottish Executive

Foreword

The annual production survey of fish farms in Scotland for 2002 was carried out by Fisheries Research Services, (FRS) an agency of the Scottish Executive Environment and Rural Affairs Department (SEERAD).

Responses to questionnaires (detailed in Appendix 1 (a-d)) from Scottish fish farming companies covering the period 1 January - 31 December 2002 are summarised in this survey. The survey is structured to allow readers to follow industry trends within the trout, salmon and other farmed species sectors, in addition to providing information on production in 2002. Where available, statistics are given for the 12-year period 1991-2002. Data from previous years have been reassessed and updated where necessary. To allow direct comparison to data provided in previous surveys, production information by region is presented in SEERAD defined areas.

The co-operation of the fish farming industry in completing the questionnaires is gratefully acknowledged.

R M Stagg
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SUMMARY

The tables below summarise the full results from the 2002 fish farms annual production survey.

Rainbow Trout (*Oncorhynchus mykiss*)

		2001	2002
Total production	(tonnes)	5,466	6,659
Production for the table	(tonnes)	4,674	5,711
Production for restocking	(tonnes)	792	948
Number of staff employed		159	160
Mean productivity	(tonnes/person)	34.38	41.6
Number of ova laid down to hatch	(millions)	23.0	22.1
Number of ova imported	(millions)	21.6	21.4

In 2002 rainbow trout production increased by 1,193 tonnes. Employment increased by one staff member and productivity per person increased to 41.6 tonnes. There was a slight decrease of 0.9 million ova laid down to hatch and the number of ova imported also decreased slightly.

Other Species (including Arctic charr, *Salvelinus alpinus*; Brown trout, *Salmo trutta*; Cod, *Gadus morhua*; Halibut, *Hippoglossus hippoglossus*)

		2001	2002
Total production	(tonnes)	203.75	370.1
Number of staff employed	(full-time)	75	69
	(part-time)	22	30
Number of ova laid down to hatch	(millions)	25	134
Number of ova imported	(millions)	0	0

Atlantic salmon (*Salmo salar*)

Smolts

		2001	2002
Number of ova produced	(millions)	99.9	108
Number of ova laid down to hatch	(millions)	83.4	86.7
Number of ova exported	(millions)	11.2	8.2
Number of ova imported	(millions)	20.62	22.6
Number of smolts produced	(millions)	47.5	47.2
Number of smolts put to sea	(millions)	48.6	50.1
Number of staff employed		428	405
Mean productivity (000s smolts/person)		111.1	116.4

The production of ova increased by over eight million in 2002 and the number of ova laid down to hatch increased by over three million. Imports of ova increased, while there was a continued drop in ova exports. Smolt production was down slightly. The number of staff employed decreased by 23 and mean productivity increased.

Production fish

		2001	2002
Total production	(tonnes)	138,519	145,609
Production of 0-year fish	(tonnes)	1,227	824
Production of grilse	(tonnes)	42,065	34,380
Production of pre-salmon	(tonnes)	54,474	57,943
Production of salmon	(tonnes)	40,754	52,462
Mean fish weight 0-year	(kg)	2.2	3.03
Mean fish weight grilse	(kg)	3.8	3.45
Mean fish weight pre-salmon	(kg)	4.7	4.18
Mean fish weight salmon	(kg)	4.5	4.77
Number of staff employed		1,257	1,306
Mean productivity	tonnes/person	110.2	111.5

Production tonnage increased by 5.1% with an increased harvest at later stages of production. Staff numbers increased by 49. Mean productivity showed a slight increase.

Smolt survival (percentage harvested)

Survival (%)	Years 0+1	Year 2	Total
1999 input year class	58.5	22.1	80.6
2000 input year class	52.4	24.3	76.7

Overall smolt survival decreased by under 4% compared with the 1999-year class.

1. RAINBOW TROUT (*Oncorhynchus mykiss*)

Annual production surveys were sent to all 39 companies registered with the Scottish Executive and engaged in the production of rainbow trout in Scotland during 2002. Returns were received from all 39 companies, covering the 57 sites currently in production.

Production

Table 1a: Total production (tonnes) of rainbow trout during 1991-2002

Year	Tonnes	Year	Tonnes
1991	3,334	1997	4,653
1992	3,953	1998	4,913
1993	4,023	1999	5,834
1994	4,263	2000	5,154
1995	4,683	2001	5,466
1996	4,630	2002	6,659

Production increased in 2002 by 1,193 tonnes, an increase of over 21%. This was mainly due to an increase in production from freshwater cages for the table trade. Within the table trade, significant increases were seen in the large and medium sizes of fish, with a decrease in small fish. In the restocking trade, the production of large and small fish showed an increase, while medium sized fish decreased.

Table 1b: Production (tonnes) for the table trade during 1994-2002 according to weight category

Year	<450 g	450-900 g	>900 g	Total
	<1 lb	1-2 lbs	>2 lbs	Tonnes
1994	2,376	288	1,038	3,702
1995	2,736	199	1,149	4,084
1996	2,701	181	1,002	3,884
1997	2,646	104	1,098	3,848
1998	3,009	173	887	4,069
1999	3,151	144	1,562	4,857
2000	3,005	203	1,103	4,311
2001	3,053	404	1,217	4,674
2002	2,937	1,056	1,718	5,711

Production for the table was 5,711 tonnes, an increase of 1,037 tonnes (22%) over the 2001 total and accounted for 85.8% of the total rainbow trout production, a similar proportion to that seen in 2001. Supply was mainly of the smaller sized fish weighing up to 450 g, encompassing 51% of total production.

Table 1c: Production (tonnes) for the restocking trade during 1994-2002 according to weight category

Year	<450 g	450-900 g	>900 g	Total
	<1 lb	1-2 lbs	>2 lbs	Tonnes
1994	125	337	99	561
1995	107	411	81	599
1996	188	484	74	746
1997	97	589	119	805
1998	69	538	237	844
1999	237	553	187	977
2000	41	609	193	843
2001	18	526	248	792
2002	28	484	436	948

Production for the restocking of angling waters increased in 2002 and accounted for 14.2% of total rainbow trout production in 2002. In 2002, production totalled 948 tonnes, an increase of 156 tonnes (19.7%) on the 2001 total. These figures represent the tonnage of fish supplied to angling waters for restocking purposes; they do not account for the catch taken by anglers.

Escapes

There were three reported escapes from freshwater rainbow trout farms in 2002, involving the loss of 82,400 fish.

Production by Farm

Table 2: Numbers of sites grouped by tonnage produced during 1994-2002

Year	Number of sites per production tonnage				Total number of sites
	<1-25	26-100	101-200	>2	
1994	25	15	12	4	56
1995	26	15	13	5	59
1996	24	14	12	6	56
1997	19	22	12	4	57
1998	26	14	8	8	56
1999	18	14	8	9	49
2000	16	12	8	8	44
2001	17	12	6	10	45
2002	16	13	4	12	45

Production was reported from 45 farms. The number of producers in the size brackets, 26-100 tonnes and >200 tonnes, increased in 2002, while those producers in the size brackets, <1-25 tonnes and 101-200 tonnes decreased. These figures do not include those sites specialising in the production of ova or young fish for on-growing.

Production by Method

Table 3: Grouping of rainbow trout sites by production tonnages, main method of production in 2002 and comparison with production in 2001

Production method	Production grouping (tonnes) in 2002					Total tonnage and (%) by method		Number of sites	
	<10	10-25	26-50	51-100	>100	2001	2002	2001	2002
FW cages	0	1	1	0	7	2,639 (48.3)	3,462 (52)	10	9
FW ponds and raceways	4	8	4	8	6	2,146 (39.2)	2,194 (32.9)	25	30
FW tanks and hatcheries	3	0	0	0	0	120(2.2)	6 (0.1)	7	3
SW cages	0	0	0	0	3	561 (10.3)	997 (15)	3	3
SW tanks	0	0	0	0	0	0	0	0	0
Total	7	9	5	8	16	5,466	6,659	45	45

Freshwater production accounted for 5,662 tonnes (85%) and seawater production for the remaining 997 tonnes (15%). The main rearing facilities were freshwater cages, ponds and raceways. There was an increase in production in seawater cages, no production in seawater tanks and a decrease in freshwater tank production.

Company and Site Data

Table 4: Number of companies and sites in production during 1991-2002

Year	No. of companies	No. of sites
1991	56	69
1992	53	72
1993	52	74
1994	56	72
1995	54	69
1996	52	69
1997	51	69
1998	51	71
1999	54	68
2000	54	63
2001	50	57
2002	39	57

The number of companies registered with the Scottish Executive as being actively engaged in rainbow trout production was 39 in 2002. This apparent reduction in the number of companies engaged in rainbow trout production is due to a change in the survey criteria. The number of sites registered and in production during 2002 was 57.

Staffing and Productivity

Table 5: Number of staff employed and productivity per person during 1991-2002

Year	Full-time	Part-time	Total	Productivity (tonnes/person)
1991	133	51	184	18.1
1992	135	73	208	19.0
1993	134	73	207	19.4
1994	139	70	209	20.4
1995	132	64	196	23.9
1996	129	60	189	24.5
1997	130	52	182	25.6
1998	137	49	186	26.4
1999	126	51	177	33.0
2000	121	47	168	30.7
2001	118	41	159	34.4
2002	114	46	160	41.6

The overall number of staff employed in 2001 increased by one to 160 in 2002. The number of full-time staff decreased by four, whilst the number of part-time employees increased by five.

Productivity, measured as tonnes produced per person, increased by more than seven tonnes per person in 2002. No distinction was made between full and part-time employees when calculating productivity.

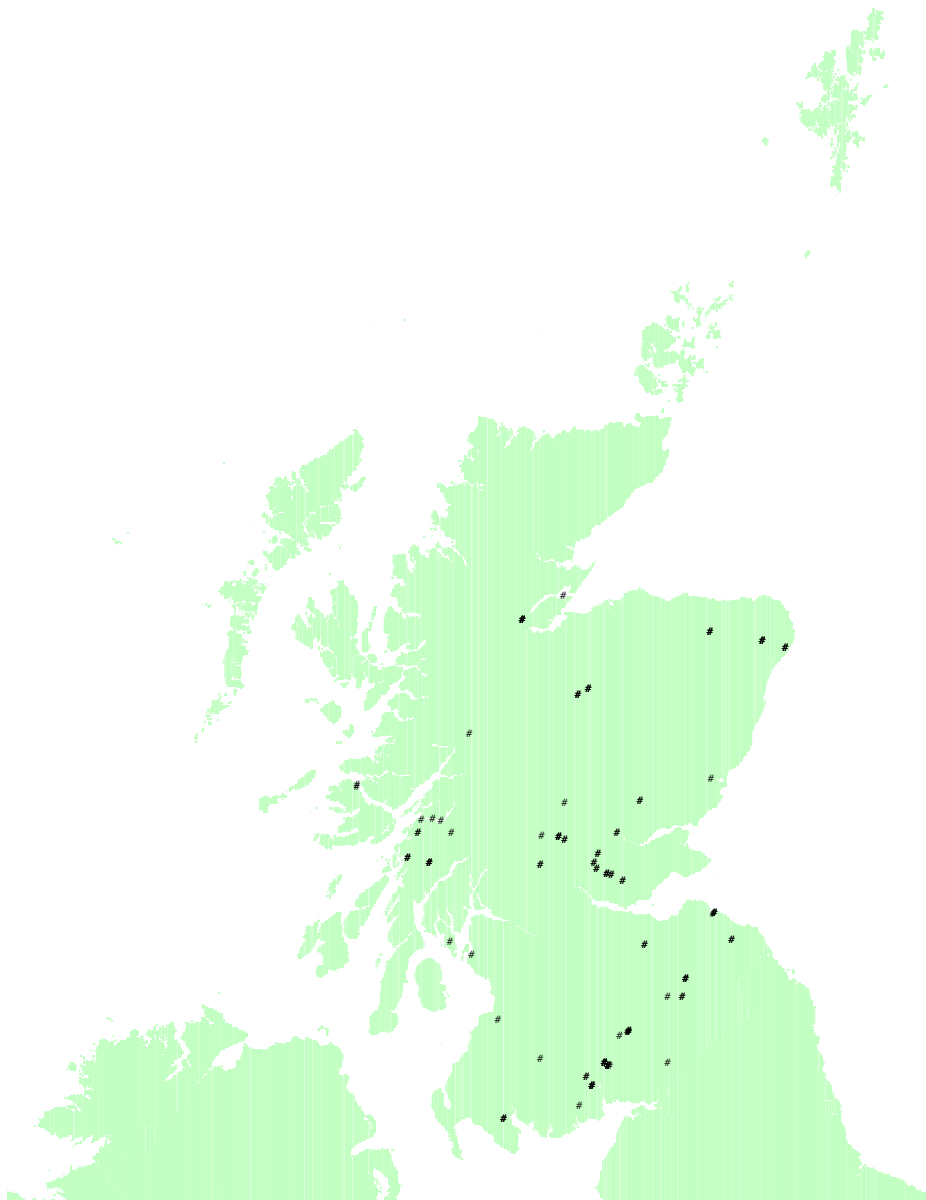
Production by Area

Table 6: Production and staffing by area in 2002

Area	No. sites	Table production (tonnes)	Restocking production (tonnes)	Mean tonnes per site	Staffing			Productivity tonnes/person
					F/T	P/T	Total	
North	7	473	106	82.7	14	4	18	32.2
East	19	1,472	375	97.2	39	17	56	33.0
West	13	2,892	104	230.5	32	12	44	68.1
South	18	874	363	68.7	29	13	42	29.4
All	57	5,711	948	116.8	114	46	160	41.6

Productivity per site was greatest in the west, 230.5 tonnes per site, a reflection of some of the production being in sea water rather than fresh water in this area. Productivity per person was also greatest in the west, at 68.1 tonnes per person.

Figure 1: The Distribution of Active Rainbow Trout Farms 2002



Type of Ova Laid Down

Table 7: Number (000s) and proportions (%) of ova types laid down to hatch during 1993-2002

Year	All female diploid no. (%)	Triploid no. (%)	Mixed sex diploid no. (%)	Total ova
1993	17,261 (87)	1,396 (7)	1,087 (6)	19,744
1994	18,105 (92)	1,134 (6)	365 (2)	19,604
1995	19,546 (94)	1,170 (6)	119 (<1)	20,835
1996	21,308 (94)	935 (4)	435 (2)	22,678
1997	21,117 (90)	1,386 (6)	1,000 (4)	23,503
1998	23,222 (92)	1,515 (6)	504 (2)	25,241
1999	16,324 (88)	1,853 (10)	456 (2)	18,633
2000	17,264 (82)	1,202 (6)	2,513 (12)	20,979
2001	20,788 (90)	2,107 (9)	140 (1)	23,035
2002	19,733 (89)	1,822 (8)	570 (3)	22,125

Source of Ova Laid Down

Table 8: Number (000s) and sources of ova laid down to hatch 1993-2002

Year	Ova produced in Great Britain (GB)			Imported ova			Total
	Own stock	Other stock	Total	Northern hemisphere	Southern hemisphere	Total	
1993	1,830	405	2,235	12,815	4,694	17,509	19,744
1994	479	625	1,104	13,055	5,445	18,500	19,604
1995	165	360	525	12,485	7,825	20,310	20,835
1996	420	988	1,408	13,247	8,023	21,270	22,678
1997	1,232	837	2,069	11,594	9,840	21,434	23,503
1998	2,559	60	2,619	11,038	11,595	22,633	25,252
1999	878	392	1,270	11,415	5,946	17,361	18,631
2000	1,397	900	2,297	10,161	8,525	18,686	20,983
2001	918	525	1,443	13,515	8,075	21,590	23,033
2002	530	200	730	12,385	9,010	21,395	22,125

In 2002, the total number of eyed-ova laid down to hatch decreased by almost one million (3.9%) on the 2001 figure. The proportion of ova from GB broodstock decreased to 3.3% of the total, and the rainbow trout industry remained reliant on imported ova. Data on importation of ova into Scotland are also available from the import licences and are shown in Table 9a. Any discrepancy between the figures in Table 8 and 9a is due to data being obtained from two independent sources.

Imports of Ova from Official Import Licences

Table 9a: Number (000s) and sources of ova imported into Scotland during 1995-2002

Source	1995	1996	1997	1998	1999	2000	2001	2002
Northern	6,285	4,095	2,425	2,065	3,335	1,085	710	-
Isle of Man	3,550	4,182	4,205	3,273	4,222	5,842	6,670	6,775
Denmark	2,650	5,075	5,354	5,700	4,546	4,225	6,135	5,000
South Africa	7,825	8,023	9,450	11,585	6,036	7,762	8,075	7,750
USA	-	-	-	-	-	-	-	1,700
Others (EU)	-	220	-	-	-	-	-	-
Totals	20,310	21,595	21,434	22,623	18,139	18,914	21,590	21,225

Table 9b: Seasonal variation in numbers (000s) and sources of ova imported into Scotland during 2002

Month	Isle of Man	Denmark	South Africa	USA
January	1,660	1,200	-	-
February	185	250	-	-
March	1,580	1,900	-	-
April	80	650	-	1,000
May	-	200	-	200
June	-	-	1,000	300
July	-	-	3,300	-
August	-	-	2,750	-
September	-	-	700	100
October	1,000	600	-	-
November	120	-	-	-
December	2,150	200	-	100
Totals	6,775	5,000	7,750	1,700

There were no imports of ova from Northern Ireland during 2002. Denmark, the Isle of Man and a new supplier in the USA accounted for 63.5% of ova imported into Scotland during 2002 (63% from the northern hemisphere during 2001), the remainder being sourced in South Africa. By using a mixture of ova from the northern and southern hemispheres, producers are able to regulate production throughout the year and produce a constant supply of fish for their markets.

Trade in Fry and Fingerlings

Table 10: Number (000s) of fry and fingerlings traded during 1993-2002

Year	Fry and fingerlings bought			Total number bought	Total number sold
	All female diploid nos. (%)	Triploid nos. (%)	Mixed sex diploid nos. (%)		
1993	8,395 (73)	917 (8)	2,239 (19)	11,551	9,823
1994	9,854 (90)	1,017 (9)	47 (<1)	10,918	10,379
1995	12,449 (95)	683 (5)	0	13,132	10,912
1996	12,174 (93)	572 (4)	283 (2)	13,029	11,578
1997	15,028 (94)	889 (5)	98 (1)	16,015	10,330
1998	13,035 (96)	410 (3)	80 (1)	13,525	11,000
1999	11,264 (94)	90 (1)	616 (5)	11,970	9,759
2000	13,410 (92)	287 (2)	892 (6)	14,589	12,505
2001	16,065 (96)	685 (4)	0	16,750	13,961
2002	10,031 (88)	670 (6)	667 (6)	11,368	10,101

The established trade between hatcheries and on-growing farms continued in 2002. Some companies specialised in the production of fry and fingerlings. The total number of fry and fingerlings purchased by producers decreased by 32%, whilst the total number sold by producers decreased by 28%. The disparity between supply and demand is met by supplies being bought in from England, Wales and Northern Ireland; the shortage in supply was lower than that seen in 2001.

Use of Vaccines

Table 11: Number of sites rearing fish vaccinated against enteric redmouth disease (ERM) during 1991-2002

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
No. of sites	30	33	28	35	31	33	35	31	40	35	33	34

Vaccines continued to be widely used as a preventative treatment against ERM, a potentially serious bacterial disease, caused by the bacterium *Yersinia ruckeri*. A total of 30.6 million fish were vaccinated. Vaccination is generally carried out as a bath treatment at the fingerling stage although some vaccines were administered by intra-peritoneal injection.

2. ATLANTIC SALMON (*Salmo salar*) - OVA AND SMOLTS

Annual production surveys were sent to all 55 companies registered with the Scottish Executive as being actively engaged in the freshwater production of Atlantic salmon in Scotland during 2002. Returns were received from all companies, covering the 173 sites currently in production.

Company and Farm Data

Table 12: Number of companies and sites in production during 1994-2002¹

Year	No. of companies	No. of sites
1994	68	147
1995	69	162
1996	67	166
1997	65	171
1998	64	177
1999	65	189
2000	60	184
2001	56	169
2002	55	173

In 2002 the number of companies registered with the Scottish Executive as being actively engaged in the freshwater production of Atlantic salmon decreased by one to 55. A total of 278 freshwater sites were registered and of these 87 sites were inactive and 191 active. One hundred and seventy-three of the active sites were in commercial production, the difference being accounted for by farms that were not used during 2002.

Production and Staffing

Table 13: Number (000s) of smolts produced, staff employed and smolt productivity during 1992-2002

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Number (000s) of smolts produced	20,827	21,043	23,117	26,539	33,619	38,187	44,853	39,763	45,583	47,546	47,161
Staffing											
Full-time	266	233	245	279	308	344	318	300	341	317	312
Part-time	93	115	133	117	133	166	96	124	103	111	93
Total	359	348	378	396	441	510	414	424	444	428	405
Productivity, 000s of smolts per person	58.0	60.5	61.2	67.0	76.2	74.9	108.3	93.8	102.7	111.1	116.4

Smolt production in 2002 decreased by under 0.5 million, a decrease of 0.8% compared to 2001.

¹ Under the term of the Registration of Fish Farming and Shellfish Farming Business Order 1985, all persons engaged in the practice of fish farming in Scotland are required to register the details of their business within two months of the commencement of commercial activity. Fisheries Research Services is the Scottish Executive agency responsible for administering the fish farms business register and is the point of contact for farmers who wish to change registration details or register a new business. Although registration details of specific sites and businesses are confidential under the Diseases of Fish Act 1937 as Amended 1983, the company and site information is published here in summary form, in accordance with the terms of the Act.

The number of staff employed decreased by 23 and productivity increased by 5%, to a figure of 116,400 smolts produced per employee.

Escapes

There were no reported escapes from freshwater Atlantic salmon farms in 2002.

Smolts by Age Group

Table 14: Number of smolts (000s) produced by type during 1993-2002

Year	S½	S1	S1½	S2	Total
1993	686	19,698	202	457	21,043
1994	1,672	20,712	511	222	23,117
1995	2,663	22,705	365	806	26,539
1996	6,298	26,334	523	464	33,619
1997	9,333	27,679	692	483	38,187
1998	8,478	35,383	686	306	44,853
1999	10,770	28,345	586	62	39,763
2000	11,841	33,722	0	20	45,583
2001	14,684	32,732	110	20	47,546
2002	15,791	30,527	843	0	47,161

In 2002 production was dominated by S1 smolts, although numbers produced decreased by 7%. The production of S½ smolts increased by 7% reflecting the increasing trend in the number of photoperiod adjusted smolts used by the industry. There was a marked increase in the production of S1½, while no S2 smolts were produced.

Production Systems

Table 15: Number and capacity of production systems during 1998-2002

System	No. of sites with system					Total capacity, 000s cubic metres					
	Year	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
Cages		80	86	85	76	81	343	457	344	328	409
Tanks and Raceways		97	103	99	93	92	40	39	45	48	41
Total		177	189	184	169	173	383	496	389	376	450

There are two principal types of facility used for the production of smolts in fresh water – tanks and cages. In 2002, the number of farms employing tanks, ponds and raceways decreased by one, and the number of farms employing cages increased by five. In terms of volume, tank capacity decreased by 7,000 m³, whilst cage volume increased by 81,000 m³. This resulted in a net increase in volume of 74,000 m³ available for the production of smolts in Scotland during 2002.

Table 16: Number (000s) of smolts produced and stocking densities by production system during 1998-2002

Year	Number of smolts produced (000s)					Stocking densities(smolts /m)				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
Cages	25,049	22,242	24,052	25,237	27,076	73	49	70	77	66
All others	19,804	17,521	21,531	22,309	20,085	495	449	478	465	490
Total	44,853	39,763	45,583	47,546	47,161	-	-	-	-	-

The average stocking densities of cages decreased compared to 2001, whilst the stocking densities of tanks increased; in the case of cages from 77 to 66 fish per m³ and in the case of tanks, from 465 to 490 fish per m³.

Ova Production

Table 17: Number (000s) of salmon ova produced during 1995-2002

Year	1995	1996	1997	1998	1999	2000	2001	2002
No. of ova	89,556	122,665	186,470	151,841	122,649	124,619	99,921	107,996

Almost one hundred and eight million ova were stripped in 2002, an increase of over eight million (8.1%) on the 2001 season.

Table 18: Source, number (000s) and previous year's estimate of ova laid down to hatch during 1993-2002

Year	In-house broodstock	Out-sourced GB broodstock	GB wild broodstock	Foreign ova	Total	Previous year's estimate
1993	44,524	19,281	514	4,381	68,700	54,415
1994	25,883	14,991	450	5,347	46,671	49,064
1995	37,176	25,063	475	2,160	64,874	46,538
1996	46,545	23,784	65	8,045	78,439	71,635
1997	60,421	23,308	323	1,750	85,802	76,629
1998	49,207	19,085	0	1,010	69,302	69,632
1999	52,122	25,804	4,291	500	82,717	68,644
2000	38,674	33,592	1,605	4,660	78,531	69,220
2001	40,086	32,002	615	10,720	83,423	83,458
2002	40,732	30,664	120	15,184	86,700	80,679
2003	-	-	-	-	-	73,193

The number of ova laid down to hatch was 86.7 million, an increase of over three million (4%) on the 2001 figure. The majority of the ova (47%) were derived from producers' own broodstock, the proportion being slightly less than that seen in 2001. Supplies from other producer's broodstock were proportionally smaller, with an increasing proportion being derived from sources outside Great Britain. Producers' estimates for the number of ova to be laid down in 2003 shows a projected decrease, although this is usually a lower figure than the numbers of ova laid down in any year. The ova derived from wild stocks are generally held and hatched for wild stock enhancement by the aquaculture industry, in co-operation with the wild fisheries.

Smolts Produced and Put to Sea

Table 19: Actual and projected smolt production and smolts put to sea (millions) during 1993-2004

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Actual smolts put to sea	20.5	22.0	26.8	30.8	42.8	45.9	41.1	45.2	48.6	50.1		
Smolts produced	21.0	23.1	26.5	33.6	38.2	44.8	39.8	45.6	47.5	47.2		
Estimated production	21.8	22.1	25.2	31.8	41.6	45.3	49.6	42.1	50.2	49.3	44.2	48.8
Ratio of ova laid down to smolts produced	3.3	2.0	2.4	2.3	2.2	1.5	1.7	1.8	1.8	1.8		

The figure for the number of smolts put to sea includes smolts produced in England and fish imported from elsewhere whereas smolt production data relate only to those produced in Scotland. Farmers estimate putting 44.2 million smolts to sea in 2003.

The ratio of ova laid down to hatch to smolts produced in 2002 remained similar to the ratio in 2001.

Scale of Production

Table 20: Smolt producing sites grouped by numbers (000s) of smolts produced during 1991-2002

Year	Scale of production								No. of sites in production	Total smolts produced
	1-10	11-25	26-50	51-100	101-250	251-500	501-1,000	>1,000		
1991	2	11	17	22	26	26	5	2	111	22,404
1992	3	8	14	17	41	23	4	0	110	20,828
1993	1	9	15	17	32	21	9	0	104	21,043
1994	4	5	13	24	37	17	13	0	113	23,117
1995	1	6	15	29	30	26	14	1	122	26,540
1996	1	7	13	29	33	26	17	3	129	33,619
1997	0	3	13	22	39	24	18	6	125	38,187
1998	1	3	12	24	33	29	20	8	130	44,853
1999	1	1	15	25	29	24	21	7	123	39,763
2000	1	2	10	17	36	24	24	9	123	45,583
2001	0	1	7	19	30	26	13	14	110	47,546
2002	1	1	11	17	29	34	17	10	120	47,161

Note: These data refer only to sites producing smolts. The sites holding only ova, fry or parr are excluded.

There has been an increase in the number of sites producing smolts since 2001. The number of sites producing less than 101,000 smolts has increased by three, and there has been an increase of seven in the number of sites producing more than 100,000 smolts. Although there has been a decrease in the number of sites producing in excess of one million smolts per year, there was an increase in the number of sites producing between 501,000 and one million smolts per year. This drop in production at larger sites coupled with an increase in the number

of smaller production sites, has resulted in an overall decrease in smolts produced, whilst the total number of sites involved in smolt production has increased.

Production of Ova and Smolt by Production Area

Table 21: Staffing, and ova laid down to hatch, 2001-2002, smolt production 2001-2002 and projected production 2003-2004 by region

Region	Number of staff employed in 2002		Ova laid down to hatch (000s)		Smolt production (000s)		Estimated smolt production (000s)	
	F/T	P/T	2001	2002	2001	2002	2003	2004
Northwest	152	39	48,309	49,760	25,880	23,295	23,010	25,965
Orkney	4	6	117	700	368	681	935	1,140
Shetland	19	13	5,177	3,938	1,520	1,449	2,110	2,480
West	59	13	12,759	13,809	9,937	9,155	8,441	9,380
Western Isles	68	15	14,117	14,612	7,387	9,906	7,423	7,134
East and South	10	7	2,943	3,881	2,454	2,675	2,313	2,665
All Scotland	312	93	83,422	86,700	47,546	47,161	44,232	48,764

The north west, west and the Western Isles were the main ova and smolt producing areas in 2002, and employed the greatest number of staff.

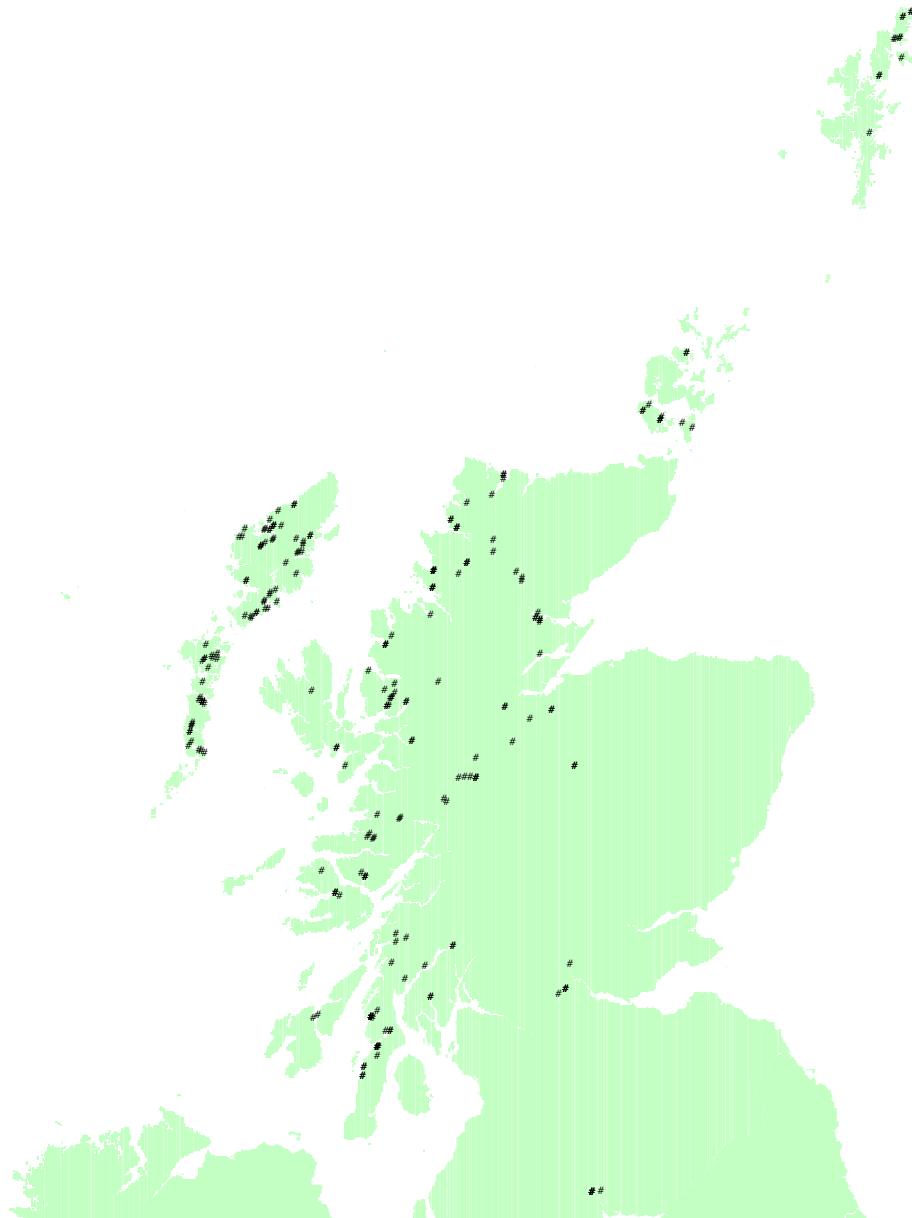
International Trade in Ova

Since the introduction of the EU single market on 1 January 1993 and the associated Fish Health Regulations common to all EU member states, a trade in live salmon and ova has been established.

In addition, the European Economic Area (EEA) Agreement allows trade between the EU and the member states of the European Free Trade Association (EFTA). Until 2003 trade, under the EEA Agreement, was restricted to halibut alevins and salmonid eggs or gametes. With the cessation of these restrictions trade became based on the same rules as are established within the EU, regarding approval of farms and zones for listed diseases. Norway has an equivalent status to GB with regard to List II diseases but protective measures in place against infectious salmon anaemia (ISA) and *Gyrodactylus salaris* have prevented trade. Changes introduced to these protective measures in 2003 mean the importation of salmonid ova is permitted from Norway.

Trade with Third Countries has also been established, but imports are permitted only under licence, from sources that have met rigorous health testing requirements. Exports to countries outside the EU are subject to the health conditions placed by the importing country. FRS advises potential exporters to ascertain with the importing country any specific health testing requirements that may be a condition of import.

Figure 2: The Distribution of Active Smolt Farms 2002



Imports and Exports

Table 22a: Source and number (000s) of ova, parr and smolts imported during 1993-2002 derived from import licences

Import Year	Ova				Total	Parr and Smolts
	EU Member States	EFTA	Third Countries			EU Member States
		Iceland	Australia	USA		
1993	4,439	-	470	-	4,909	-
1994	5,823	-	240	-	6,063	72
1995	1,470	-	600	-	2,070	2,902
1996	6,690	-	1,355	-	8,045	2,849
1997	2,305	-	1,200	-	3,505	2,168
1998	260	-	750	-	1,010	2,140
1999	244	-	500	-	744	900
2000	0	4,610	500	-	5,110	3,436
2001	8,173	10,833	1,620	-	20,626	2,475
2002	8,650	11,623	1,800	500	22,573	2,879

Table 22b: Destination and number (000s) of salmon ova exported during 1994-2002 derived from export certificates

Export year	Farmed origin			Total	Wild origin total
	Chile	EU	Others		
1994	15,691	6,740	40	22,471	350
1995	19,542	7,770	40	27,352	450
1996	19,720	20,445	20	40,185	435
1997	44,810	12,525	-	57,335	270
1998	23,375	4,459	20	27,754	492
1999	16,880	13,054	-	29,934	52
2000	9,740	25,311	-	35,051	50
2001	2,675	8,542	0	11,217	0
2002	1,600	6,627	0	8,227	0

The numbers of ova imported increased by more than 9%. This was due to the introduction in 2002 of ova availability from the USA along with increases in the importation of ova from the EU, Australia and Iceland. The number of parr imported increased.

In 2002 a total of 8.2 million ova were exported. Exports to other EU member states decreased by 22% to 6.6 million. Exports to Chile fell by 40% to 1.6 million, the lowest level observed to date. Overall, exports were down by 27% based on the 2001 figure.

Vaccines

Table 23: Number of sites using vaccines 1994-2002 and number of fish vaccinated during 1994-2002

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002
No. of sites	85	102	112	118	122	115	114	106	108
No of fish vaccinated	19.4	25.3	31.8	39.7	43.7	43.9	45.8	51.3	47.5

Vaccines were used to provide protection against furunculosis, a disease caused by the bacterium *Aeromonas salmonicida*, which was the cause of serious losses within the fish farming industry in the late 1980s and early 1990s. Vaccination is normally carried out at the pre-smolt stage by intra-peritoneal injection. In addition, some sites vaccinated fish against enteric redmouth disease (ERM), infectious pancreatic necrosis virus (IPNV) and *Vibrio* spp. bacteria.

3. ATLANTIC SALMON - PRODUCTION

Production

Production survey information was collected from all 84 companies actively involved in Atlantic salmon production, farming 328 active sites. This figure represents the entire industry operating in Scotland.

Table 24: Annual production of Atlantic salmon (tonnes) during 1986-2002 and projected production in 2003

Year	Tonnes	Percentage difference	Year	Tonnes	Percentage difference
1986	10,337	-	1995	70,060	9
1987	12,721	23	1996	83,121	19
1988	17,951	41	1997	99,197	19
1989	28,553	59	1998	110,784	12
1990	32,351	13	1999	126,686	14
1991	40,593	25	2000	128,959	2
1992	36,101	-11	2001	138,519	7
1993	48,691	35	2002	145,609	5
1994	64,066	32	2003	176,596*	-

*farmers' estimate of projected tonnage based on stocks currently being on-grown

The total production of Atlantic salmon during 2002 was 145,609 tonnes, an increase of 7,090 tonnes (5%) on 2001 production. This is the tenth consecutive annual increase in production.

Escapes

There were thirteen reported escapes from seawater Atlantic salmon farms in 2002, involving the loss of 367,405 fish.

Table 25: Number (000s) and production (tonnes) of salmon harvested and mean fish weight (kg) per year class during 1994-2002

	Year of smolt input	Year of harvest	Number (000s)	Production (tonnes)	Mean weight at harvest (kg)
	1994	1994	261	388	1.5
	1995	1995	207	369	1.8
	1996	1996	315	638	2.0
	1997	1997	282	585	2.1
Harvest in year 0 (i.e. in year of input)	1998	1998	696	2,048	2.9
	1999	1999	1,000	2,763	2.8
	2000	2000	765	2,673	3.5
	2001	2001	557	1,227	2.2
	2002	2002	272	824	3.0

	Year of smolt input	Year of harvest	Number (000s)	Production (tonnes)	Mean weight at harvest (kg)
Harvest in year 1	1993	1994	13,446	41,865	3.1
	1994	1995	14,420	47,775	3.3
	1995	1996	17,132	57,998	3.4
	1996	1997	20,245	71,349	3.5
	1997	1998	29,014	86,783	3.0
	1998	1999	22,556	83,823	3.8
	1999	2000	23,077	89,963	3.9
	2000	2001	22,726	96,539	4.2
	2001	2002	23,819	92,323	3.9
Harvest in year 2	1992	1994	5,096	21,812	4.3
	1993	1995	5,137	21,916	4.3
	1994	1996	5,408	24,485	4.5
	1995	1997	6,195	27,263	4.4
	1996	1998	5,148	21,953	4.3
	1997	1999	9,027	40,100	4.4
	1998	2000	8,450	36,323	4.3
	1999	2001	9,096	40,754	4.5
	2000	2002	10,992	52,462	4.8

Table 26: Number (000s) and production (tonnes) of grilse and pre-salmon harvested during 1994-2002

Year	Grilse (January-August)			Pre-salmon (September-December)		
	Number	Tonnes	Average weight (kg)	Number	Tonnes	Average weight (kg)
1994	6,435	17,386	2.7	7,011	24,479	3.5
1995	7,610	22,235	2.9	6,809	25,540	3.8
1996	8,669	25,776	3.0	8,462	32,222	3.8
1997	10,489	34,227	3.3	9,756	37,122	3.8
1998	16,740	38,963	2.3	12,275	47,820	3.9
1999	12,448	41,259	3.3	10,109	42,564	4.2
2000	12,561	45,229	3.6	10,516	44,734	4.2
2001	11,072	42,065	3.8	11,654	54,474	4.7
2002	9,968	34,380	3.4	13,851	57,943	4.2

Table 27: Percentage (by weight) of annual production by growth stage harvested during 1995-2002

Year	1995	1996	1997	1998	1999	2000	2001	2002
Growth stage	-	-	-	-	-	-	-	-
Input year fish	<1	<1	<1	2	2	2	<1	<1
Grilse	32	31	35	35	32	35	30	23
Pre-salmon	36	39	37	43	34	35	39	40
Salmon	31	29	27	20	32	28	30	36

Survival and Production in Smolt Year Classes

Table 28: Survival and production in smolt year classes during 1990-2002

Year of smolt input	Smolt input (000s)	Harvest year 0				Harvest year 1				Harvest year 2				Total % of year class harvested	Year class weight (tonnes)	Yield per smolt (kg)
		Number (000s)	Weight (tonnes)	Mean weight (kg)	% harvested	Number (000s)	Weight (tonnes)	Mean weight (kg)	% harvest	Number (000s)	Weight (tonnes)	Mean weight (kg)	% harvest			
1990	21,408	-	-	-	-	8,877	21,026	2.4	41.5	4,315	14,728	3.4	20.1	61.6	35,754	1.67
1991	20,227	-	-	-	-	8,864	21,373	2.4	43.8	4,675	15,875	3.4	23.1	66.9	37,248	1.84
1992	20,527	-	-	-	-	11,102	32,738	3.0	54.1	5,096	21,812	4.3	24.8	78.9	54,550	2.65
1993	20,541	46	78	1.7	0.2	13,446	41,865	3.1	65.5	5,135	21,916	4.2	25.0	90.7	63,859	3.10
1994	21,953	260	388	1.5	1.2	14,420	47,775	3.3	65.7	5,408	24,485	4.5	24.6	91.5	72,629	3.31
1995	26,786	206	269	1.8	0.8	17,132	57,998	3.4	64.0	6,195	27,263	4.4	23.1	87.8	85,530	3.19
1996	32,906	315	638	2.0	1.9	20,245	71,349	3.5	61.5	5,148	21,953	4.3	15.6	78.1	93,940	2.85
1997	42,766	282	585	2.1	0.7	29,014	86,783	3.0	67.8	9,027	40,098	4.4	21.1	89.6	127,466	2.98
1998	45,870	696	2,048	2.9	1.5	22,556	83,823	3.7	49.2	8,450	36,323	4.3	18.4	69.1	122,194	2.66
1999	41,106	1,000	2,763	2.8	2.4	23,077	89,963	3.9	56.1	9,096	40,754	4.5	22.1	80.6	133,480	3.25
2000	45,185	765	2,673	3.5	2.1	22,726	96,539	4.2	50.3	10,992	52,462	4.8	24.3	76.7	151,674	3.36
2001	48,643	557	1,227	2.2	1.1	23,819	92,323	3.9	49.0							
2002	50,086	272	824	3.0	0.5											

In 2000, the last year for which survival can be calculated, the survival rate from smolt input to harvest was 76.7%. The 2000 year class displayed a lower survival rate than that seen in 1999 and is slightly lower than the survival averaged over the last 11 year-classes.

Of the 2001 year class, 50.1% of the input has been harvested, approximately 2.3% fewer than the average harvest of fish one year after input in the 2000 year class. The average weight dropped by 0.3kg to 3.9 kg. This may indicate an increased harvest in 2003 of two sea winter (2SW) fish, or a decrease in the survival rate of the year class as a whole.

In 2002, the harvest of fish from the 2002 smolt input was 0.5%, a further decrease compared with the proportion of fish harvested from the same year class in recent years.

Smolts to Sea

Table 29: Number (000s) and origin of smolts put to sea during 1993-2002

Year	Smolts put to sea (000s)				Total (000s)	Scottish Origin	English Origin		Other Origin	
	S½	S1	S1½	S2		%	(000s)	%	(000s)	%
1993	-	19,843	-	698	20,541	96	827	4	-	-
1994	1,865	19,701	113	274	21,953	93	1,451	7	-	-
1995	2,442	23,081	589	674	26,786	97	852	3	-	-
1996	5,527	26,157	180	974	32,838	90	1,166	4	1,936	6
1997	8,936	33,274	182	374	42,766	88	2,957	7	2,028	5
1998	12,796	32,649	190	235	45,870	92	2,714	6	1,080	2
1999	11,585	29,119	335	68	41,107	94	2,221	5	600	1
2000	9,517	35,176	399	93	45,185	92	3,396	8	0	0
2001	14,118	34,321	171	33	48,643	98	1,183	2	0	0
2002	15,850	32,761	1,475	0	50,086	94	1,564	3	1,676	3

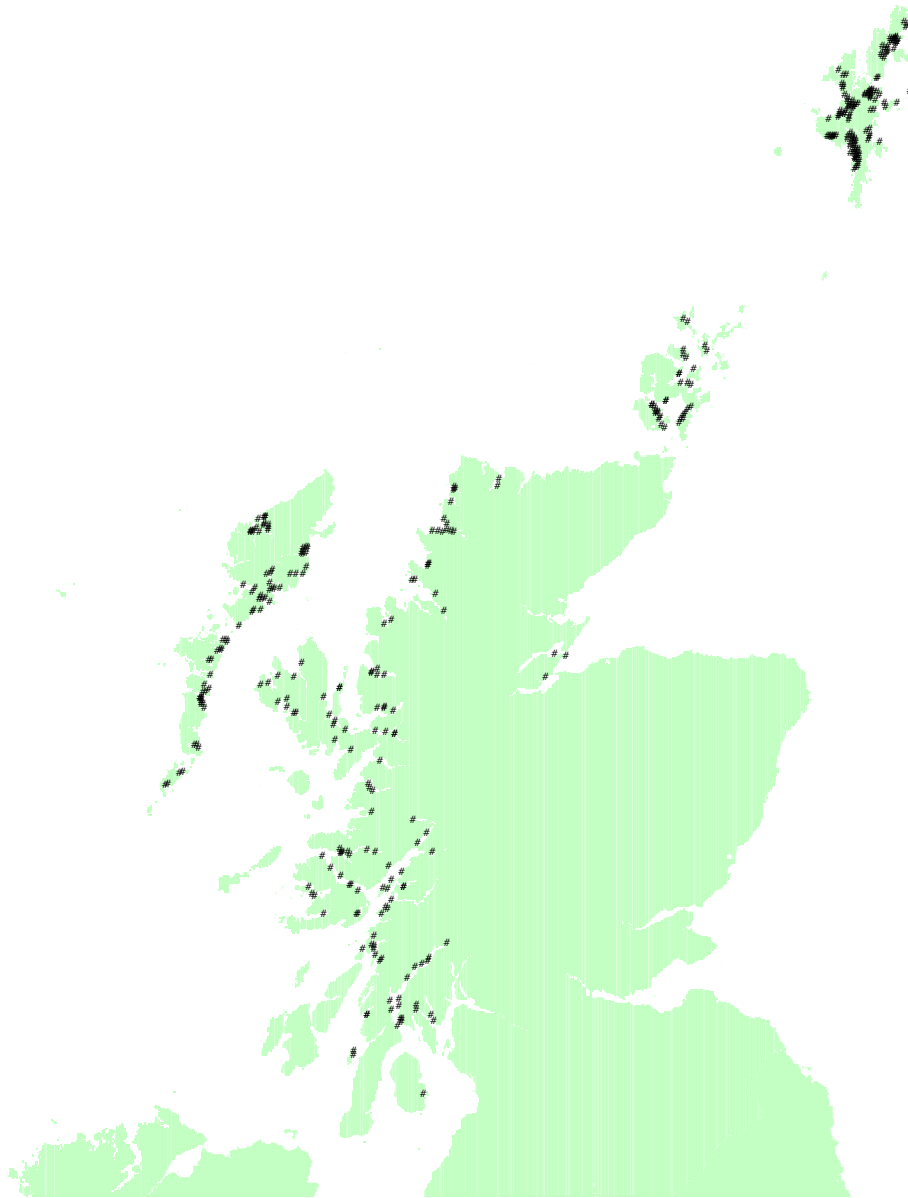
The total number of smolts put to sea in 2002 was over 50 million. The smolt input comprised mainly S1 smolts (65%), and the proportion of photoperiod adjusted fish (S½ smolts and S1½ smolts) input increased to 35%. Approximately 6% of smolts input into Scottish salmon farms were sourced from outwith Scotland. This is an increase compared with the proportion observed in 2001.

Survival and Production in Smolt Year Classes by Production Area

Table 30: Number (000s) of smolts put to sea and year class survival by area during 1992-2002

Region	Smolts put to sea (000s)		Harvest in year 0			Harvest in year 1			Harvest in year 2			Total Harvest (=survival)	
	Year	No	Year	No	%	Year	No	%	Year	No	%	No	%
North West	1992	7,650	1992	-	-	1993	5,160	67.5	1994	1,647	21.5	6,807	89.0
	1993	7,684	1993	47	0.6	1994	5,405	70.3	1995	1,927	25.1	7,379	96.2
	1994	7,914	1994	108	1.4	1995	4,721	59.7	1996	1,438	18.2	6,267	79.2
	1995	9,428	1995	60	0.6	1996	7,500	79.6	1997	1,153	12.2	8,713	92.4
	1996	12,438	1996	99	0.8	1997	8,335	67.0	1998	1,818	14.6	10,252	82.4
	1997	11,228	1997	112	1.0	1998	7,253	64.6	1999	2,183	19.4	9,548	85.0
	1998	17,808	1998	315	1.7	1999	9,075	50.9	2000	1,614	9.1	11,004	61.8
	1999	11,393	1999	288	2.5	2000	9,422	82.7	2001	1,198	10.5	10,908	95.7
	2000	11,308	2000	457	4.0	2001	6,754	59.7	2002	2,144	19.0	9,355	82.7
	2001	13,767	2001	93	0.7	2002	8,112	58.9					
	2002	12,634	2002	135	1.1								
Orkney	1992	681	1992	-	-	1993	236	34.7	1994	217	31.9	453	66.6
	1993	726	1993	-	-	1994	478	65.8	1995	176	24.2	654	90.0
	1994	754	1994	-	-	1995	399	52.9	1996	222	29.4	621	82.3
	1995	1,127	1995	-	-	1996	508	45.1	1997	430	38.1	938	83.2
	1996	1,175	1996	-	-	1997	428	36.4	1998	291	24.2	719	61.2
	1997	1,506	1997	-	-	1998	971	64.5	1999	257	17.1	1,228	81.6
	1998	2,409	1998	75	3.1	1999	986	40.9	2000	259	10.8	1320	54.8
	1999	3,235	1999	10	0.3	2000	1,614	49.9	2001	782	24.2	2,406	74.4
	2000	2,604	2000	-	-	2001	670	25.7	2002	235	9.0	905	34.7
	2001	2,932	2001	-	-	2002	1,660	56.6					
	2002	2,741	2002	-	-								
Shetland	1992	5,014	1992	-	-	1993	2,342	46.7	1994	1,248	24.9	3,590	71.6
	1993	4,491	1993	-	-	1994	3,354	73.1	1995	993	21.6	4,347	94.7
	1994	5,012	1994	24	0.5	1995	3,055	61.0	1996	1,846	36.8	4,925	98.3
	1995	5,811	1995	41	0.7	1996	3,021	52.0	1997	2,622	44.4	5,643	95.5
	1996	6,234	1996	-	-	1997	3,828	61.4	1998	1,141	18.3	4,966	79.7
	1997	13,276	1997	-	-	1998	7,265	54.7	1999	3,835	28.9	11,100	83.6
	1998	12,617	1998	78	0.6	1999	5,498	43.6	2000	4,783	37.9	10,359	82.1
	1999	12,663	1999	65	0.5	2000	5,576	44.0	2001	4,139	32.7	9,780	77.2
	2000	15,096	2000	-	-	2001	5,102	33.8	2002	4,578	30.3	9,680	64.1
	2001	17,398	2001	123	0.7	2002	6,465	37.2					
	2002	17,260	2002	-	-								

Figure 3: The Distribution of Active Salmon Production Farms 2002



Staffing

Table 31: Number of staff employed in salmon production during 1992-2002

Year		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Staff	F/T	985	976	1,003	1,104	1,150	1,088	1,117	1,036	1,141	1,066	1,083
	P/T	275	248	242	251	241	207	192	268	256	191	223
Total staff		1,260	1,224	1,245	1,355	1,391	1,295	1,309	1,304	1,397	1,257	1,306
Productivity (tonnes/person)		28.7	39.8	51.4	51.7	59.8	76.6	84.6	97.2	92.3	110.2	111.5

The total number of staff employed in salmon production in 2002 was 1,306 an increase of 49. The staffing figures collected refer specifically to the production of salmon and do not include figures for staff involved with processing or marketing activities. Productivity increased to 111.5 tonnes production per person.

Production Methods

Table 32: Production methods, capacity, tonnage and average stocking densities (kg/m³) during 2000-2002

Method	Number of sites			Total capacity (000s cubic metres)			Production (tonnes)		
	2000	2001	2002	2000	2001	2002	2000	2001	2002
Seawater tanks	2	2	2	15.5	15.5	15.5	129	232	330
Seawater cages	344	318	326	14,423	14,893	15,374	128,830	138,287	145,279
For cage sites:ratio of production (Kg) to cage capacity (m ³)							8.9	9.3	9.4

Almost all of the fish, 145,279 tonnes (99.8%) were produced in seawater cages, the proportion from seawater tanks, 0.2%, remained the same as in 2001. This figure (0.2%) reflects the continued high installation and running costs incurred in operating seawater tank systems. Thirty five active seawater tank sites were registered in Scotland. Only two were actively producing salmon. Most seawater tank capacity has now been re-deployed for the production of other species or salmon broodstock.

Sea cage capacity increased by 481,000 m³ in 2002, reflecting the rise in the size of sites in production. Production efficiency in cages, measured as the ratio of fish weight in kilograms produced per cubic metre, increased by 0.1 kg in 2002. In cage sites, the ratio of production, expressed in kilograms, to cage capacity, expressed in cubic metres, was 8.9; 9.3 and 9.4 in 2000, 2001 and 2002 respectively. This indicates that on average across all production stages in any year, the stocking density is less than 10 kilograms per cubic metre.

Scale of Production by Site

Table 33: Number of sites shown in relation to their production grouping and percentage share of production 1994-2002

Production grouping (tonnes)								Total		
	0	1-50	51-100	101-200	201-500	501-1,000	>1,000	Sites*	Tonnes	
No of sites	1994	154	29	31	49	64	27	9	363	64,066
	1995	162	24	23	37	68	32	13	359	70,060
	1996	125	20	28	49	66	25	21	334	83,121
	1997	120	21	22	41	63	43	28	338	99,197
	1998	130	32	16	31	66	39	29	343	11,784
	1999	158	21	17	21	53	42	39	351	126,686
	2000	183	8	20	15	40	40	40	346	128,959
	2001	148	9	4	28	41	39	51	320	138,519
	2002	131	10	10	25	50	51	51	328	145,609
% share of production	1994	0	1	4	12	33	31	19	-	-
	1995	0	1	2	8	31	32	26	-	-
	1996	0	1	3	9	26	22	39	-	-
	1997	0	1	2	6	20	28	43	-	-
	1998	0	1	1	4	21	23	50	-	-
	1999	0	1	1	2	13	24	59	-	-
	2000	0	0.6	1.4	1.9	10.9	25.1	60.5	-	-
	2001	0	0.2	0.2	2.9	10.0	20.8	65.9	-	-
	2002	0	0.2	0.5	2.6	12.6	26.6	57.5	-	-

*Includes farms stocked but having no production.

In 2002, there was an increase of one in the number of sites producing less than 50 tonnes and an increase of 12 in those sites producing between 501 and 1,000 tonnes. This trend toward large sites has been continuing over several years.

Company Productivity

Table 34: Number of companies grouped by production (tonnes), manpower and productivity (tonnes per person) during 2001-2002

Total Tonnage		0-100	101-200	201-400	401-700	701-1,000	1,001-2,000	>2,000	Total
No of Companies	2001	29	7	8	13	6	9	15	87
	2002	24	4	11	9	7	14	15	84
No of tonnes	2001	37	686	2,779	7,440	5,377	12,036	110,164	138,519
	2002	346	650	3,464	4,898	6,215	18,892	111,144	145,609
Manpower (total)	2001	103	24	71	91	50	112	806	1,257
	2002	49	19	69	56	103	167	843	1,306
Productivity (tonnes/person)	2001	0.36	28	39	82	107	107	137	110
	2002	7	34	50	88	60	113	132	111

Productivity may be used as a measure of efficiency, and was found to be related to the scale of production. The greatest productivity (132 tonnes per person) was achieved in those companies having a production in excess of two thousand tonnes and the least (seven tonnes per person) in the companies producing the smallest tonnages. In comparison with 2001 the average company productivity increased from 110 to 111 tonnes per person.

Overall production was dominated by 15 companies in 2002, which between them accounted for over 76% of the salmon production in Scotland.

Manpower and Production by Production Area

Table 35: Manpower and production (tonnes) by area 1994-2002 and projected production in 2003

Region	Year	Staff		Annual Production	Productivity (t/pers)	Year of input		Grilse		Pre salmon		Salmon	
		F/T	P/T			Tonnes	Mean weight (kg)	Tonnes	Mean weight (kg)	Tonnes	Mean weight (kg)	Tonnes	Mean weight (kg)
North west	1994	407	59	25,003	54	170	1.6	7,392	2.7	9,991	3.7	7,450	4.5
	1995	401	54	22,509	49	99	1.6	7,291	2.7	7,433	3.6	7,686	4.0
	1996	405	45	32,282	72	200	2.0	14,824	3.1	10,789	3.9	6,469	4.5
	1997	392	40	35,218	82	221	2.0	14,879	3.2	14,669	3.9	5,449	4.7
	1998	396	43	32,213	73	1,139	3.6	12,847	3.0	10,973	3.8	7,254	4.0
	1999	403	72	39,635	83	670	2.3	18,618	3.1	12,538	4.0	7,809	3.6
	2000	365	62	45,486	106	1,795	3.9	20,360	3.5	16,374	4.4	6,957	4.3
	2001	373	38	34,120	83	130	1.4	14,062	3.5	13,334	4.8	6,594	5.5
	2002	366	77	40,156	91	467	3.2	11,819	3.2	17,772	4.0	10,128	4.7
	2003			41,707*									
Orkney	1994	48	19	2,108	31	-	-	371	2.5	957	3.0	780	3.6
	1995	58	11	1,903	28	-	-	392	2.7	849	3.4	662	3.8
	1996	55	13	2,444	36	-	-	511	2.5	1,023	3.3	910	4.1
	1997	36	20	3,063	67	-	-	277	2.6	1,119	3.5	1,667	3.9
	1998	66	15	4,485	55	150	2.0	1,884	3.4	1,378	3.3	1,073	3.4
	1999	78	20	4,902	50	22	2.2	1,162	3.2	2,486	4.0	1,232	4.8
	2000	91	15	6,370	60	-	-	3,338	3.6	2,089	3.1	943	3.6
	2001	75	15	5,588	62	-	-	810	4.2	1,892	4.0	2,886	3.7
	2002	80	11	7,585	83	-	-	2,720	3.9	3,971	4.1	894	3.8
	2003			10,335*									
Shetland	1994	193	106	14,279	48	23	1.0	3,371	2.6	5,967	2.9	4,918	3.9
	1995	201	109	15,523	50	59	1.4	4,204	3.2	6,908	3.9	4,352	4.4
	1996	209	114	19,710	61	-	-	2,042	2.8	8,814	3.9	8,854	4.8
	1997	224	83	24,630	84	-	-	3,207	2.9	10,002	3.7	11,421	4.4
	1998	218	93	33,404	107	222	2.8	11,162	1.5	16,690	4.2	5,330	4.7
	1999	227	100	36,228	111	221	3.4	4,449	2.7	15,111	4.0	16,447	4.3
	2000	258	77	43,133	129	-	-	7,189	3.7	16,360	4.5	19,584	4.1
	2001	227	52	39,745	142	130	1.1	4,905	3.7	16,441	4.3	18,269	4.4
	2002	238	46	49,341	174	-	-	7,107	3.6	19,646	4.4	22,588	4.9
	2003			69,755*									

Region	Year	Staff		Annual Production	Productivity (t/pers)	Year of input		Grilse		Pre salmon		Salmon	
		F/T	P/T			Tonnes	Mean weight (kg)	Tonnes	Mean weight (kg)	Tonnes	Mean weight (kg)	Tonnes	Mean weight (kg)
South West	1994	173	35	13,184	63	5	1.0	3,277	2.8	4,249	3.8	5,653	4.8
	1995	247	51	15,777	53	47	1.9	4,641	3.0	5,505	3.8	5,584	4.6
	1996	273	44	17,223	54	68	1.1	3,889	2.8	6,895	3.7	6,371	4.4
	1997	197	19	17,194	80	-	-	6,186	3.2	4,705	3.4	6,303	4.7
	1998	223	14	23,722	100	88	2.1	8,783	3.2	8,936	3.8	5,915	4.2
	1999	108	26	23,929	179	741	3.3	5,064	3.4	5,594	5.2	12,530	5.4
	2000	166	87	14,088	56	325	3.0	2,894	3.4	3,385	4.3	7,484	5.2
	2001	165	48	32,574	153	-	-	9,113	4.2	13,166	5.4	10,295	4.8
	2002	196	54	26,351	105	-	-	2,992	3.5	9,112	4.2	14,247	4.9
	2003			31,486*									
Western Isles	1994	182	23	9,494	46	191	1.5	2,976	2.7	3,316	4.2	3,011	3.8
	1995	197	26	14,348	64	164	2.0	5,707	2.9	4,845	3.8	6,632	4.4
	1996	208	25	11,462	49	370	2.4	4,510	2.8	4,701	3.8	1,881	4.3
	1997	239	45	19,082	67	364	2.1	9,678	3.5	6,627	4.2	2,413	3.8
	1998	214	27	17,073	71	449	2.4	4,287	3.2	9,843	3.8	2,494	5.1
	1999	220	50	21,992	81	1,109	2.7	11,966	4.1	6,835	4.5	2,082	4.7
	2000	261	15	19,882	72	553	2.8	11,448	3.7	6,526	3.8	1,355	4.6
	2001	226	38	26,493	100	967	2.8	13,176	3.8	9,640	4.4	2,710	3.2
	2002	203	35	22,176	93	387	2.8	9,742	3.6	7,442	4.0	4,605	4.2
	2003			23,313*									
All Scotland	1994	1,003	242	64,066	51	389	1.5	17,386	2.7	24,479	3.5	21,812	4.3
	1995	1,104	251	70,060	52	368	1.8	22,235	2.3	25,540	3.8	21,916	4.3
	1996	1,150	241	83,121	60	638	2.0	25,776	3.0	32,222	3.8	24,485	4.5
	1997	1,088	207	99,197	77	585	2.0	34,227	3.3	37,122	3.8	27,263	4.4
	1998	1,117	192	110,784	85	2,048	2.9	38,963	2.3	47,820	3.9	21,953	4.3
	1999	1,036	268	126,686	97	2,763	2.8	41,259	3.3	42,564	4.2	40,100	4.4
	2000	1,141	256	128,959	92	2,673	3.5	45,229	3.6	44,734	4.2	36,232	4.3
	2001	1,066	191	138,520	110	1,227	2.2	42,066	3.8	54,473	4.7	40,754	4.5
	2002	1,083	223	145,609	112	824	3.0	34,380	3.4	57,943	4.2	52,462	4.8
	2003			176,596*									

*Estimated production in 2003

Company and Farm Data

Table 36: Number of companies and sites engaged in salmon production during 1993-2002

Year	Number of companies			Number of sites		
	Producing	Non-producing	Total	Producing	Non-producing	Total
1993	132	12	144	283	86	369
1994	119	12	131	262	101	363
1995	108	12	120	268	91	359
1996	106	1	107	278	56	334
1997	98	3	101	275	65	340
1998	95	11	106	289	54	343
1999	94	1	95	264	87	351
2000	68	22	90	163	183	346
2001	81	6	87	238	82	320
2002	73	11	84	197	131	328

The number of companies registered with SEERAD and actively producing salmon in 2002 was 73, a decrease of eight on the 2001 figure. Eleven companies remained active and registered, although not producing salmon for harvest in 2002. This continued the trend of salmon production being concentrated within fewer companies. These 84 companies have 328 registered active sites, although not all active sites may have produced fish for harvest in 2002.

Fallowing

Table 37: Number of seawater cage sites employing a fallow period during 1994-2002

Year	Fallow Period (weeks)						Total
	0	<4	4-8	9-26	27-51	52	
1994	118	13	48	64	12	103	358
1995	110	14	60	73	6	91	354
1996	112	12	71	70	13	56	334
1997	122	6	54	77	11	65	335
1998	118	10	55	84	22	54	343
1999	94	12	49	90	33	73	351
2000	74	23	61	86	25	75	344
2001	80	10	76	94	15	45	320
2002	99	8	85	85	24	27	328

Of the 328 cage sites recorded as being active in 2002, 202 farms were fallow for a variable period, whilst a further 27 farms were fallow for the whole of 2002. The accepted normal production cycle in seawater varies in length between 18 months and two years, and a fallow period at the end of production can break the cycle of disease or parasitic infections. There were 99 sites that had no fallow period in 2002. These may have been stocked late in 2001 with out of season smolts, or may not follow recommended practice of incorporating a fallow period in the production cycle.

Broodstock Farms

Table 38: Number of sites holding broodstock during 1991-2002

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Broodstock sites	27	15	21	24	18	28	37	25	20	18	15	19

In 2002, the number of sites holding broodstock, including freshwater and seawater farms was 19, an increase on the 2001 figure. The number of sites holding broodstock in any one year is variable, as can be seen from the previous years' figures, which indicate no obvious trend. Twenty-two thousand, one hundred and eighty-eight female fish were stripped, yielding almost 108 million ova, compared with almost 100 million in 2001, which can be calculated to show an average ova yield per fish of 4,867.

4. OTHER SPECIES

There has been a continued increase in interest for the farming of other species. Brown trout (*Salmo trutta*) has been farmed for many years for the restocking market, but there is an increasing interest in farming marine species. These provide a diversification from the production of rainbow trout and Atlantic salmon, allowing some of the smaller companies to remain within the aquaculture sector and the larger companies to broaden their production base. As the other species sector expands, the employment provided and the contribution to the total production of the Scottish aquaculture industry will increase.

Table 39: Number of staff employed in farming other species during 1999-2002

Year	Full-time	Part-time	Total
1999	54	18	72
2000	73	25	98
2001	75	22	97
2002	69	30	99

Table 40: Number of companies and sites producing other species' and production of other species (tonnes) during 1999-2002 and estimated production in 2003

Species	No of companies	No of sites	1999 Production tonnage	2000 Production tonnage	2001 Production tonnage	2002 Production tonnage	2003 Production tonnage*
Arctic Charr	7	10	2.8	7	3.75	7.2	17
Brown Trout/ Sea Trout	19	26	92	138	105	175.7	400
Cod	6	7	0.1	15.7	15	0	144
Halibut	7	12	3.6	4.5	80	187.2	292

*farmers' estimates based on stocks currently being on-grown

Not all of this production is for the table market. There is some production of Arctic charr (*Salvelinus alpinus*) and brown trout for the angling restocking market.

There were no reported escapes from farms rearing other species in 2002.

Table 41: Source of other species' ova laid down to hatch during 2002

Species	Source of ova laid down to hatch (000s)		
	Own broodstock	Other GB broodstock	Foreign ova
Arctic charr (<i>Salvelinus alpinus</i>)	30	40	0
Cod (<i>Gadus morhua</i>)	112,000	4,071	0
Brown trout/Sea trout (<i>Salmo trutta</i>)	3,231	365	0
Halibut (<i>Hippoglossus hippoglossus</i>)	14,000	160	0

Table 42: Trade in other species small fish in 2002

Species	Bought (000s)	Sold (000s)
Cod	57	42
Halibut	133	105
Brown Trout / Sea Trout	69	821

There were also sites stocked with carp (*Cyprinus carpio*), turbot (*Scophthalmus maximus*), lemon sole (*Microstomus kitt*), brook charr (*Salvelinus fontinalis*) and haddock (*Melanogrammus aeglefinus*). There was production of haddock, brook charr and turbot, but due to the small number of companies in production, it is not possible to summarise these data without revealing the production of individual companies.

5. CONCLUSIONS

Rainbow trout (*Oncorhynchus mykiss*)

The production of rainbow trout increased by 21% in 2002 to 6,659 tonnes and was directed at both the table (85.8%) and restocking (14.2%) markets. The total numbers of staff employed by the sector increased by one to 160. As a consequence of this the overall productivity of the industry increased to reach 41.6 tonnes per person. One of the reasons for this is the continued increase in the proportion of large farms producing in excess of 200 tonnes.

The number of ova laid down to hatch decreased by under one million and was almost exclusively either all-female diploid (89%) or sterile triploid (8%) stocks. Only 3.3% of these ova were sourced within GB reflecting a continued rise in the numbers imported from abroad and a decline in the numbers of home produced ova. Although 36.5% of these imports were to meet the needs of out of season production (mainly from South Africa) the trend reflects the high dependence of the Scottish trout industry on imported ova.

There was a continuing trade in fingerlings, with the majority still being sourced within Scotland.

A high percentage of stock was vaccinated against ERM, indicating producers' awareness of the risk of infectious diseases.

Atlantic salmon (*Salmo salar*)

The survey shows increased production of salmon, improved productivity per person and improved yield from smolts. There was a slight decrease in the production of smolts and the yield from ova stayed the same.

Smolt production decreased by 0.8% to 47.2 million with slightly under two thirds (64.7%) being S1 and the majority of the remainder being S¹/₂ (33.5%) smolts. The number of staff directly employed on freshwater sites decreased by 23. This resulted in an increase in productivity to over 116,000 fish per person. Although productivity per person increased, the actual number of smolts produced decreased by 0.8%. The number of ova laid down to hatch has increased by 4%. The ratio of ova laid down to smolts produced has remained at 1.8 in 2002. Projected estimates for 2003 suggest that fewer ova were laid down to hatch, and that less smolts will be produced in 2003 and 2004.

Almost all ova for the production of Scottish salmon was derived from Scottish farmed stocks, with 17% derived from non-Scottish stocks, an increase of 4% on reliance from foreign sources. The export of ova to other countries within the EU decreased by 22%, whilst exports to Chile decreased by 40%.

The production tonnage in seawater increased by 5.1% in 2002; due mainly to an increased average weight giving a higher yield per smolt put to sea. The number of staff directly employed on site increased, with the development of 49 jobs in the seawater industry. Although the estimated smolt placement in 2003 is down to 44.2 million, a continued increase in production is expected in 2004 given the improvements in average weight and survival rates of fish that are already at sea. The estimated harvest forecast for 2003 is 176,596 tonnes, an increase of 21.3% on the 2002 total.

Along with the increase in tonnage, the number of sites in production increased from 320 to 328. The trend towards increasing the size of producing sites continued with 52% of sites producing over 500 tonnes in 2002.

Other Species

Interest in the diversification of aquaculture continues but progress is still limited. Nevertheless in 2002 there were significant increases in the tonnages of halibut and sea trout produced. Although interest in cod remains encouraging there was no production reported during 2002.

APPENDIX 1

Questionnaires sent to Fish Farmers

**ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS
for the PERIOD 1 JANUARY to 31 DECEMBER 2002**

RAINBOW TROUT - DATA

**Please complete and return by 31 JANUARY 2002 to R J Smith, FRS Marine Laboratory
PO Box 101, Victoria Road, Aberdeen, AB11 9DB**

Reg No SF/

Name of site Please correct site name here (if necessary) Please correct main method of production on each site (if necessary), ie fresh water cages or tanks

1	How many staff were employed in RAINBOW TROUT production (company total)	Full time	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	Part time	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
		Site 1	Site 2	Site 3	Site 4
2	How many eyed ova were laid down for hatching in 2002				
a	from own broodstock	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	from other GB broodstock	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
c	from abroad (<u>Northern Hemisphere</u> incl, N Ireland and Isle of Man)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
d	from abroad (<u>Southern Hemisphere</u>)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
3	How many of the above ova were				
a	all female diploid	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	mixed sex diploid	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
c	all triploid	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
4	How many fry/fingerlings were				
a	bought	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	sold	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
5	How many bought fry/fingerlings were				
a	all female diploid	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	mixed sex diploid	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
c	all triploid	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
6	How many of these fish were vaccinated against ERM				
a	vaccinated on site	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	bought vaccinated	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
7	What was your total production in TONNES for the TABLE TRADE				
a	<450 g (<1 lb)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	450-900 g (1-2 lb)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
c	>900 g (>2 lb)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
8	What was your total production in TONNES for the RESTOCKING TRADE				
a	<450 g (<1 lb)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
b	450-900 g (1-2 lb)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>
c	>900 g (>2 lb)	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/>

SEERAD ANNUAL PRODUCTION SURVEY 2002

GUIDANCE NOTES FOR QUESTIONNAIRE

RAINBOW TROUT

GENERAL NOTES

1. Please check that the pre-printed information on the sheet is correct.
2. If a site is inactive and **not part of a fallowing cycle**, please write "INACTIVE" after the site name.
3. When completing the boxes please start from the right, if NONE then enter a **zero** in right hand box eg

					0
--	--	--	--	--	---

Hopefully all questions are self explanatory but you may wish to note that:

Q1. How many staff

- a Please give the total number of full and part-time workers employed by the company in rainbow trout production
- b Please ensure that the same staff are NOT included more than once if the company/business operates more than one site
- c Staff employed solely in processing dead fish for marketing should NOT be included

Q2. Ova laid down for hatching

Give the TOTAL NUMBER of ova laid down, if the number exceeds six figures please indicate the total number clearly in margin beside the appropriate box - this also applies to questions 3-5

Q7-8. Weight of fish sold for:

Please record the weight of fish sold to the nearest **tonne** (not in kgs), for part tonnes please indicate strongly using a decimal point, eg **31.5**

It will be appreciated if the questionnaires are returned promptly and not later than 31 January to allow the Annual Survey Report for 2002 to be produced.

**ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2002**

ATLANTIC SALMON - SMOLT DATA

**Please complete and return by 31 JANUARY 2003 to R J Smith, FRS Marine Laboratory
PO Box 101, Victoria Road, Aberdeen, AB11 9DB**

Reg No SF/

Name of site

Please correct site name here
(if necessary)

Please correct main method of production on each site (if necessary) ie
fresh water cages or tanks

**1 How many staff were employed in smolt production
(company total)**

Full time

Part time

**2 How many ova were produced in the winter
of 2001-2002 (company total)**

**3 How many eyed ova were laid down for
hatching in winter of 2001-2002**

Site 1

Site 2

Site 3

Site 4

- a From own farmed broodstock
- b From other GB farmed broodstock
- c From GB wild broodstock
- d From foreign sources

**4 How many eyed ova do you expect to
hatch this winter (2002-2003)**

5 How many fry or parr were

- a Transferred into the site
- b Transferred out of the site

6 How many smolts were produced as

- a S $\frac{1}{2}$ s (ie from 2002 hatch)
- b S1s (ie from 2001 hatch)
- c S1 $\frac{1}{2}$ s (ie from 2000 hatch)
- d S2s (ie from 2000 hatch)

7 How many smolts were sold as

- a S1s (incl S $\frac{1}{2}$ s)
- b S2s (incl S1 $\frac{1}{2}$ s)

**8 How many smolts do you expect to
produce for sea winter on-growing
next spring (2003) as**

- a S1s (incl S $\frac{1}{2}$ s)
- b S2s (incl S1 $\frac{1}{2}$ s)

**9 How many smolts do you plan to
produce in 2004**

**10 What is the fish holding capacity
of each site in cubic metres**

**11 Duration of FALLOW PERIOD in
WEEKS (cage sites only)**

12 How many fish did you vaccinate

- a against furunculosis
- b against ERM
- c against IPN
- d against *Vibrio* spp.

SEERAD ANNUAL PRODUCTION SURVEY 2002

GUIDANCE NOTES FOR QUESTIONNAIRE ATLANTIC SALMON SMOLTS

GENERAL NOTES

1. Please check that the pre-printed information on the sheet is correct.
2. If a site is inactive and **not part of a fallowing cycle**, please write "INACTIVE" after the site name.
3. When completing the boxes please start from the right, if NONE then enter a **zero** in right hand box eg

					0
--	--	--	--	--	---
4. If the numbers for any box exceeds 6 figures please indicate the total number clearly in margin beside the appropriate box

Hopefully all questions are self explanatory but you may wish to note that:

Q1. How many staff

Please enter the total number of full and part-time staff employed in smolt production, this includes maintenance staff and staff seasonally employed for specific purposes, eg vaccination - please indicate clearly if you have contracted out vaccinating work to avoid duplication in numbers

Please ensure that the same staff are NOT included more than once if your company operates more than one site, especially for companies which operate both smolt and salmon grower sites

Companies are asked to use their discretion as to what they class as full and part-time staff

Q2. Number of ova produced

Enter the total number of ova produced by the company only once, if more than one form is used please enter **zero** or score out on subsequent forms

Q6. How many smolts produced as S $\frac{1}{2}$ or S1 etc

The definitions used for the survey are:

S $\frac{1}{2}$	<12 months old, ie put to sea in year of hatch
S1	12-18 months old, ie put to sea in January-June in year post hatch
S1 $\frac{1}{2}$	19-24 months old, ie put to sea in July-December in year post hatch
S2	>24 months old when put to sea

- Q7. } For S1s - combine numbers of S $\frac{1}{2}$ s with S1s and
Q8. } For S2s - combine numbers of S1 $\frac{1}{2}$ s with S2s

Q9. Enter here the total number of smolts (any stage) likely to be produced

Q11. Please enter the total cubic metre capacity for all tanks or cages combined

Q12. Fallow period - applies to cage sites only

Please enter any weeks that the site was fallow in 2002 (maximum = 52)

It will be appreciated if the questionnaires are returned promptly and not later than 31 January to allow the Annual Survey Report for 2002 to be produced.

**ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2002**

ATLANTIC SALMON - PRODUCTION DATA

Please complete and return by 31 JANUARY 2003 to R J Smith, FRS Marine Laboratory
PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Reg No SF/

Name of site Please correct site name here (if necessary) Please correct main method of production on each site (if necessary), ie sea water cages or tanks

<p>1 How many staff were employed in salmon production (company total), excluding post-harvest processing staff</p>	<p>Full time <input style="width: 30px; height: 15px; border: 1px solid black;" type="text"/></p>	<p>Part time <input style="width: 30px; height: 15px; border: 1px solid black;" type="text"/></p>																		
	Site 1	Site 2	Site 3	Site 4																
<p>2 How many smolts were put into the site in 2002 as:</p> <p>a S½s (ie from 2002 hatch)</p> <p>b S1s (ie from 2001 hatch)</p> <p>c S1½s (ie from 2000 hatch)</p> <p>d S2s (ie from 2000 hatch)</p>	<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>3 How many of the above smolts came from England</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>4 Total smolt input proposed in 2003</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>5 HARVEST of 2002 SMOLT INPUT in 2002</p> <p>a Number of tonnes</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>6 HARVEST of 2001 SMOLT INPUT from 1 JANUARY to 31 AUGUST</p> <p>a Number of tonnes</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>7 HARVEST of 2001 SMOLT INPUT from 1 SEPTEMBER to 31 DECEMBER</p> <p>a Number of tonnes</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>8 HARVEST of 2000 SMOLT INPUT</p> <p>a Number of tonnes</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>9 How many tonnes of fish do you expect to harvest in 2003</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>10a Were brood fish produced in 2002</p> <p>b How many fish were stripped</p>	<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>11 What is the current fish holding capacity of each site in cubic metres</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>12 Duration of FALLOW PERIOD in WEEKS (cage sites; MAX = 52)</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>				
<p>13 Does a management agreement in respect of fish health operate with other producers in your area</p>	<p align="center">YES/NO</p>	<p align="center">YES/NO</p>	<p align="center">YES/NO</p>	<p align="center">YES/NO</p>																

SEERAD ANNUAL PRODUCTION SURVEY 2002

GUIDANCE NOTES FOR QUESTIONNAIRE

ATLANTIC SALMON

GENERAL NOTES

1. Please check that the pre-printed information on the sheet is correct.
2. If a site is inactive and **not part of a fallowing cycle**, please enter "INACTIVE" after the site name.
3. If a site was used **only to hold broodstock** for stripping please enter "BRD" after the site name.
4. When completing the boxes please start from the right eg for 250 tonnes enter
as

			2	5	0
--	--	--	---	---	---

 or if NONE then enter as

					0
--	--	--	--	--	---

Hopefully all questions are self explanatory but you should note that:

Q1. How many staff

Please enter the total number of full and part-time workers employed in salmon production; this includes site staff, veterinary and maintenance staff, vaccination teams, administrative and harvesting staff but NOT processing or marketing staff

Please ensure that the same staff are NOT included more than once if the company operates more than one site, especially if your company operates both salmon grower and smolt sites

Q2. How many smolts put to sea

The definitions used for the survey are:

- S $\frac{1}{2}$ <12 months old, ie put to sea in year of hatch
S1 12-18 months old, ie put to sea in January-June in the year post hatch
S1 $\frac{1}{2}$ 19-24 months old, ie put to sea in July-December in the year post hatch
S2 >24 months old, ie when put to sea

Q10. Broodstock production

Please circle YES if broodfish were produced on the site

Q11. Fish holding capacity

Please enter the total cubic metre capacity for all tanks and cages combined or, if not known, give the size of tanks or cages (area or circumference plus depth x nos tanks or cages)

Q12. Fallow period

For cage sites only; please enter any number of weeks a site was fallow in 2002; the total number of fallow weeks should not exceed 52

It will be appreciated if the questionnaires are returned promptly and not later than 31 January to allow the Annual Survey Report for 2002 to be produced.

**ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS
for the PERIOD 1 JANUARY to 31 DECEMBER 2002**

OTHER SPECIES - DATA

Please complete and return by 31 JANUARY 2003 to R J Smith, FRS Marine Laboratory,
PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Business address: Business number:
FB/0

	Name of site	Site no	Species code	Main method of production
1	FS
2	FS
3	FS
4	FS

1. How many staff in total were employed in other species production (company total) Full time Part time

	Site	Site	Site	Site
Species code
2. How many ova were laid down for hatching in 2002				
a) From own brood stock
b) From GB brood stock
c) From foreign sources
3. How many fry/small fish were				
a) Bought
b) Sold
4. What was your total production for the market in TONNES
5. What is your predicted production for the market in 2003 in TONNES

SEERAD ANNUAL PRODUCTION SURVEY

GUIDANCE NOTES FOR QUESTIONNAIRE

OTHER SPECIES

GENERAL NOTES

1. The results of this survey will be made available to the FAO and will be published in the Annual Production Survey of Scottish Fish Farms produced by SEERAD, in summary form only.
2. All information on the form has been hand written, please check that it is correct.
3. If a site is inactive, and not part of a fallowing cycle, or is no longer used to culture the species concerned, please score through the relevant site name or species code.

Species Codes			
ACH	Arctic Charr	BCH	Brook Charr
CAR	Carp	COD	Cod
HAD	Haddock	HAL	Halibut
LSO	Lemon Sole	TIL	Tilapia
TRO	Brown/sea trout	TUR	Turbot

Q1. How many staff

Please include those staff that were involved only in other species production. Please do not include staff that are involved in the production of Atlantic salmon or rainbow trout.

It will be appreciated if the questionnaires are returned promptly and not later than 31 January to allow the annual survey report for 2002 to be produced

APPENDIX 2
Glossary and Abbreviations

Active	Fish farms in a production growing cycle which may contain stock or be fallow.
Alevin	Young fish, at stage from hatching to end of dependence on yolk sacs as primary source of nutrition.
Approved Zone Status	EU recognition of an area clear of listed disease(s).
Broodstock	Adult fish held until maturation for breeding purposes.
Diploid	Fish with the normal two sets of chromosomes.
EEA	European Economic Area
EFTA	European Free Trade Association
EU	European Union
Eyed-ova/eggs	Fish egg(s) at the stage of development when the heavily pigmented eyes of the embryo are sufficiently developed to be clearly visible.
Fallow	Fish farm having no stock, but still part of a growing cycle.
Fingerling	A term commonly applied to young stages of salmonid fish.
FRS	Fisheries Research Services
Fry	Young salmon at stage from independence of yolk sac as primary source of nutrition to dispersal from the redd.
Gamete	Reproductive cells.
Grilse	Salmon maturing after one winter at sea.
Inactive	Fish farms not in a production cycle and without stock.
Intra-peritoneal	Within the body cavity.
Non-producing	A site which is active, may be stocked with fish, but has produced no fish for harvest during the specified year.
On-growing	Farm producing fish for the table market.
Ova	Eggs.
0-year fish	Fish in their first year of life.
Parr	Young salmon at stage from dispersal from redd to migration as a smolt.
Photoperiod	Alteration of light regime.
Pre-salmon	Non-mature salmon usually after one winter at sea.
Raceway	Concrete or brick channels used for farming fish.

S ¹ / ₂	Salmon or sea trout smolting at approximately six months from hatch (usually by photoperiod and/or temperature manipulation).
S1	Salmon or sea trout smolting at approximately one year from hatch.
S ¹ / ₂	Salmon or sea trout smolting at approximately 18 months from hatch.
S2	Salmon or sea trout smolting at approximately two years from hatch.
SEERAD	Scottish Executive Environment and Rural Affairs Department
Smolt	Fully silvered juvenile salmon ready to be transferred or to migrate to sea.
Third Country	Country outside the EU.
Triploid	Genetically modified fish that have three sets of chromosomes instead of two.
Year Class	Fish hatched or put to sea in a given year.
ERM	Enteric redmouth
IHN	Infectious haemopoietic necrosis
IPN	Infectious pancreatic necrosis
ISA	Infectious salmon anaemia
VHS	Viral haemorrhagic septicaemia
RTFS	Rainbow trout fry syndrome

Fisheries Research Services is an agency of the Scottish Executive

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