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Fisheries Research Services

Scottish Fish Farms
Annual Production Survey, 2004

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SCOTTISH EXECUTIVE
Environment and Rural Affairs Department

SCOTTISH FISH FARMS

Annual Production Survey 2004

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

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an agency of the Scottish Executive

Foreword

The annual production survey of fish farms in Scotland for 2004 was carried out by Fisheries Research Services (FRS), an agency of the Scottish Executive. This survey collates annual production data from registered Scottish fish farm sites. Surveys conducted by other organisations are produced independently of FRS and may not be directly comparable. The production tonnage obtained is for the wet weight of fish at harvest.

Responses to questionnaires from Scottish fish farming companies covering the period 1 January - 31 December 2004 are summarised in this survey. The questionnaires are given in Appendix 1a-d. The survey is structured to allow readers to follow industry trends within the trout, salmon and other farmed species sectors. Where available, statistics are given for the 13-year period 1991-2004. 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 defined areas.

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

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December 2005

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SUMMARY

The tables below summarise the results from the 2004 fish farms annual production survey.

Rainbow Trout (*Oncorhyncus mykiss*)

		2003	2004
Total production	(tonnes)	7,085	6,352
Production for the table	(tonnes)	6,189	5,416
Production for restocking	(tonnes)	896	936
Number of staff employed		148	152
Mean productivity	(tonnes/person)	47.9	41.8
Number of ova laid down to hatch	(millions)	26.3	32.5
Number of ova imported	(millions)	25.6	31.9

In 2004 rainbow trout production decreased by 733 tonnes. Employment increased by four staff members and productivity per person decreased to 41.8 tonnes. There was an increase of 6.2 million ova laid down to hatch and the number of ova imported also increased.

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

		2003	**2004**
Total production	(tonnes)	515.3	365
Number of staff employed	(full-time)	73	61
	(part-time)	24	18
Number of ova laid down to hatch	(millions)	141[a]	37[a]
Number of ova imported	(millions)	0[b]	0[b]

[a] Excluding cod and brown trout ova laid down to hatch from foreign sources.
[b] Excluding cod and brown trout ova imported.

In 2004 the production of other species decreased by 150.3 tonnes. This was due to decreases in cod and halibut production. Overall employment decreased by eighteen due to one producer concentrating on Atlantic salmon production rather than cod. There were also decreases in the number of ova laid down to hatch, but due to the small number of companies involved it is not possible to summarise these data without potentially revealing the figures for individual companies.

Atlantic salmon (*Salmo salar*)

Smolts

		2003	2004
Number of ova produced	(millions)	115.6	128.9
Number of ova laid down to hatch	(millions)	80.7	70.6
Number of ova exported	(millions)	2.2	5.9
Number of ova imported	(millions)	21.2	17.0
Number of smolts produced	(millions)	44.4	40.0
Number of smolts put to sea	(millions)	43.8	38.2
Number of staff employed		373	319
Mean productivity (000s smolts/person)		119.1	125.4

The production of ova increased by over thirteen million in 2004 and the number of ova laid down to hatch decreased by over ten million. Imports of ova decreased, while there was an increase in ova exports. Smolt production was down by over four million. The number of staff employed decreased by 54 and mean productivity increased.

Production fish

		2003	2004
Total production	(tonnes)	169,736	158,099
Production of 0-year fish	(tonnes)	276	319
Production of grilse	(tonnes)	32,977	27,710
Production of pre-salmon	(tonnes)	63,228	58,082
Production of salmon	(tonnes)	73,255	71,988
Mean fish weight 0-year	(kg)	3.37	1.90
Mean fish weight grilse	(kg)	3.85	4.06
Mean fish weight pre-salmon	(kg)	4.50	4.55
Mean fish weight salmon	(kg)	4.69	4.63
Number of staff employed		1,217	1,161
Mean productivity	tonnes/person	139.5	136.2

Production tonnage decreased by 6.9% with a reduction in harvest at later stages of production. Staff numbers decreased by 56. Mean productivity showed a slight decrease.

Smolt survival (percentage harvested)

Survival (%)	Years 0+1	Year 2	Total
2001 input year class	49.5	32.1	81.6
2002 input year class	45.6	31.1	76.7

Overall smolt survival decreased by 4.9% compared with the 2001 year class.

1. RAINBOW TROUT (*Oncorhynchus mykiss*)

Annual production survey questionnaires were sent to all 38 companies registered with the Scottish Executive and engaged in the production of rainbow trout in Scotland during 2004. Returns were received from all 38 companies, covering the 62 sites currently in production.

Production

Table 1a: Total production (tonnes) of rainbow trout during 1991-2004

Year	Tonnes	Year	Tonnes
1991	3,334	1998	4,913
1992	3,953	1999	5,834
1993	4,023	2000	5,154
1994	4,263	2001	5,466
1995	4,683	2002	6,659
1996	4,630	2003	7,085
1997	4,653	2004	6,352

Production decreased in 2004 by 733 tonnes, a decrease of over 10%. This was mainly due to a decrease in production from freshwater cages, ponds and raceways for the table trade. Within the table trade, significant decreases were seen in the large and small sizes of fish, with an increase in medium fish. In the restocking trade, the production of medium and large fish showed an increase, while small sized fish remained almost the same.

Table 1b: Production (tonnes) for the table trade during 1994-2004 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
2003	2,531	1,181	2,477	6,189
2004	1,553	1,946	1,917	5,416

Production for the table was 5,416 tonnes, a decrease of 773 tonnes (12.5%) on the 2003 total and accounted for 85.3% of the total rainbow trout production, a decrease in the proportion from that produced in 2003. Supply was mainly of fish weighing more than 450 g, encompassing 71% of total production for the table.

Table 1c: Production (tonnes) for the restocking trade during 1994-2004 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
2003	63	490	343	896
2004	64	509	363	936

Production for the restocking of angling waters increased in 2003 and accounted for 14.7% of total rainbow trout production in 2004. In 2004, production totalled 936 tonnes, an increase of 40 tonnes (4.5%) on the 2003 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 no reported escapes from rainbow trout sites in 2004.

Production by Site

Table 2: Numbers of sites grouped by tonnage produced during 1994-2004

Year	Number of sites per production tonnage				Total number of sites
	<1-25	26-100	101-200	>200	
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
2003	17	9	6	11	43
2004	14	14	5	10	43

Production was reported from 43 sites. The number of producers in the size brackets, <1-25 tonnes, 101-200 tonnes and >200 tonnes, decreased in 2004, while those producers in the size bracket, 26-100 tonnes increased. 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 2004 and comparison with production in 2003

Production method	Production grouping (tonnes) in 2004					Total tonnage and (%) by method		Number of sites	
	<10	10-25	26-50	51-100	>100	2003	2004	2003	2004
FW cages	0	2	0	0	7	3,664 (51.8)	3,320 (52.3)	9	9
FW ponds and raceways	2	6	7	7	5	1,988 (28)	1,910 (30.1)	27	27
FW tanks and hatcheries	3	0	0	0	0	42 (0.6)	8 (0.1)	4	3
SW cages	1	0	0	0	3	1,391 (19.6)	1,114 (17.5)	3	4
SW tanks	0	0	0	0	0	0	0	0	0
Total	6	8	7	7	15	7,085	6,352	43	43

Freshwater production accounted for 5,238 tonnes (82.5%) and seawater production for the remaining 1,114 tonnes (17.5%). The main rearing facilities were freshwater cages, ponds and raceways. There was a decrease in production in freshwater tanks and seawater cages, with no production in seawater tanks.

Company and Site Data

Table 4: Number of companies and sites in production during 1991-2004

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
2003	37	56
2004	38	62

The number of companies registered with the Scottish Executive as being actively engaged in rainbow trout production was 38 in 2004. The number of sites registered and in production during 2004 was 62.

Staffing and Productivity

Table 5: Number of staff employed and productivity per person during 1991-2004

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
2003	107	41	148	47.9
2004	115	37	152	41.8

The overall number of staff employed in 2004 increased by four to 152. The number of full-time staff increased by eight and the number of part-time employees decreased by four.

Productivity, measured as tonnes produced per person, decreased by more than six tonnes per person in 2004. No distinction was made between full and part-time employees when calculating productivity.

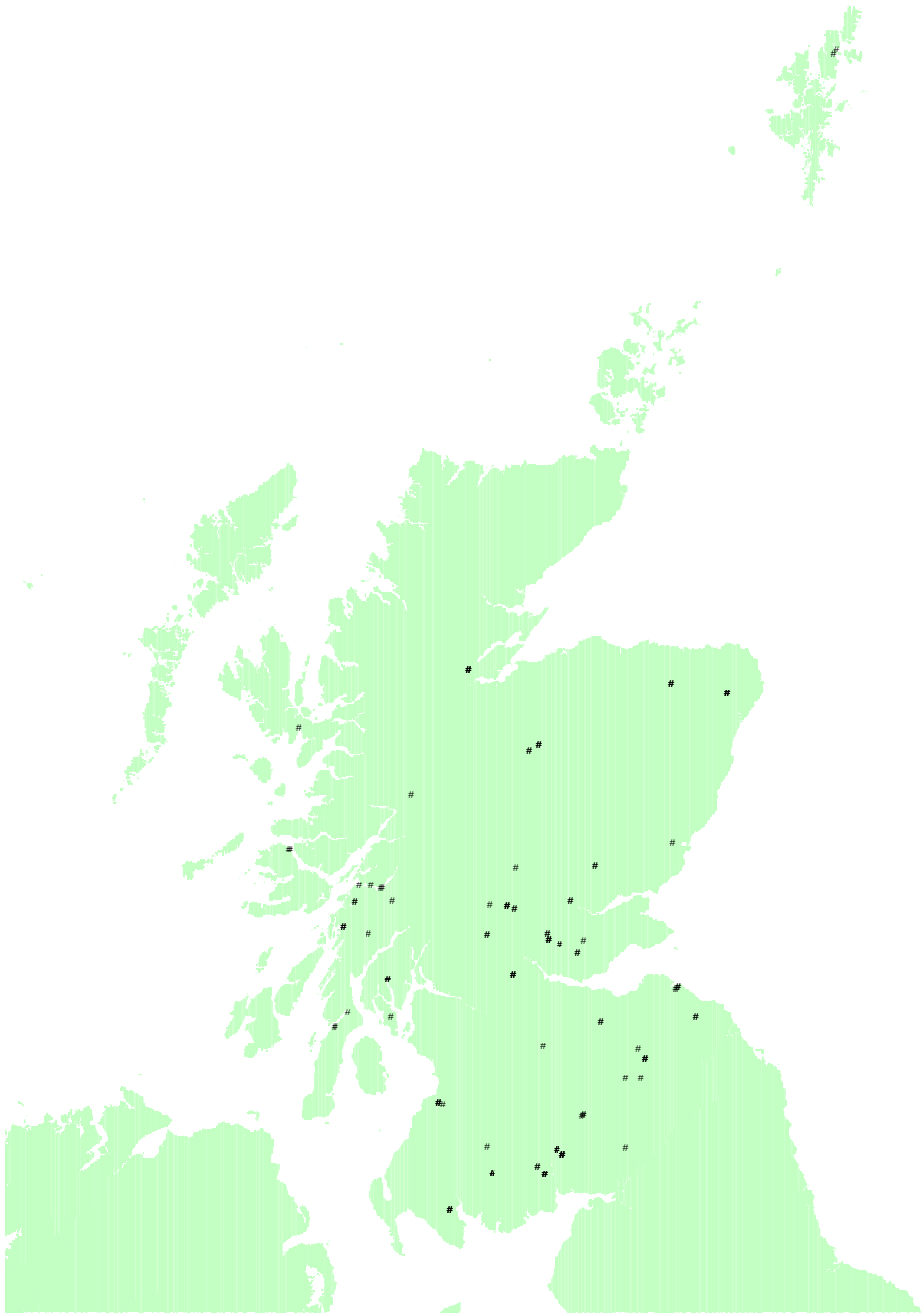
Production by Area

Table 6: Production and staffing by area in 2004

Area	No. sites	Table production (tonnes)	Restocking production (tonnes)	Mean tonnes per site	Staffing			Productivity tonnes/person
					F/T	P/T	Total	
North	10	601	117	71.8	14	3	17	42.2
East	18	1,382	367	97.2	39	14	53	33.0
West	18	2,850	80	162.8	31	10	41	71.5
South	16	583	372	59.7	31	10	41	23.3
All	62	5,416	936	102.4	115	37	152	41.8

Productivity per site was greatest in the west, 162.8 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 71.5 tonnes per person.

Figure 1: The Distribution of Active Rainbow Trout Sites 2004



Type of Ova Laid Down

Table 7: Number (000s) and proportions (%) of ova types laid down to hatch during 1993-2004

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
2003	24,692 (94)	1,586 (6)	60 (<1)	26,338
2004	29,272 (90)	3,146 (10)	138 (<1)	32,556

Source of Ova Laid Down

Table 8: Number (000s) and sources of ova laid down to hatch 1993-2004

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
2003	430	280	710	25,578	50	25,628	26,338
2004	330	320	650	31,906	0	31,906	32,556

In 2004, the total number of eyed-ova laid down to hatch increased by over six million (24%) on the 2003 figure. The proportion of ova from GB broodstock decreased to 2.0% 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 Tables 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 1997-2004

Source	1997	1998	1999	2000	2001	2002	2003	2004
N. Ireland	2,425	2,065	3,335	1,085	710	-	-	405
Isle of Man	4,205	3,273	4,222	5,842	6,670	6,775	6,855	8,012
Denmark	5,354	5,700	4,546	4,225	6,135	5,000	5,270	6,370
South Africa	9,450	11,585	6,036	7,762	8,075	7,750	50	-
USA	-	-	-	-	-	1,700	11,035	17,335
France	-	-	-	-	-	-	875	800
Totals	21,434	22,623	18,139	18,914	21,590	21,225	24,085	32,922

Table 9b: Seasonal variation in numbers (000s) and sources of ova imported into Scotland during 2004

Month	France	Isle of Man	Denmark	N. Ireland	USA
January	-	250	300	400	590
February	400	2,900	1,950	-	-
March	-	700	1,800	-	800
April	-	207	1,420	-	2,195
May	-	-	-	-	575
June	200	-	300	-	2,475
July	-	-	-	-	3,475
August	-	-	-	-	2,000
September	-	-	-	5	3,725
October	200	1,600	-	-	500
November	-	525	500	-	500
December	-	1,830	100	-	500
Totals	800	8,012	6,370	405	17,335

There were no imports of ova from South Africa during 2004. This decrease was due to marketing changes within the industry. Suppliers within the EU accounted for 47% of ova imported into Scotland during 2004, and the USA accounted for 53%. To maintain their ability to regulate production throughout the year and produce a constant supply of fish for their markets, producers have had to rely upon supplies of out of season ova from stocks in the northern hemisphere. This accounts for the increase in imports from the USA.

Trade in Fry and Fingerlings

Table 10: Number (000s) of fry and fingerlings traded during 1993-2004

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
2003	17,500 (94)	1,007 (5)	193 (1)	18,700	17,451
2004	18,859 (91)	1,536 (7)	364 (2)	20,759	19,166

The established trade between hatcheries and on-growing farms continued in 2004. Some companies specialised in the production of fry and fingerlings. The total number of fry and fingerlings purchased by producers increased by 11%, whilst the total number sold by producers increased by 9%. The disparity between supply and demand is met by supplies being bought from England, Wales and Northern Ireland. The shortage in supply was greater than that seen in 2003.

Use of Vaccines

Table 11: Number of sites rearing fish vaccinated against enteric redmouth disease (ERM) during 1993-2004

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
No. of sites	28	35	31	33	35	31	40	35	33	34	38	42

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 survey questionnaires were sent to all 48 companies registered with the Scottish Executive as being actively engaged in the freshwater production of Atlantic salmon in Scotland during 2004. Returns were received from all companies, covering the 172 sites currently in production.

Company and Site Data

Table 12: Number of companies and sites in production during 1996-2004[c]

Year	No. of companies	No. of sites
1996	67	166
1997	65	171
1998	64	177
1999	65	189
2000	60	184
2001	56	169
2002	55	173
2003	48	176
2004	48	172

In 2004 the number of companies registered with the Scottish Executive as being actively engaged in the freshwater production of Atlantic salmon remained at 48. A total of 276 freshwater sites were registered and of these 93 sites were inactive and 183 active. One hundred and seventy two of the active sites were in commercial production, the difference being accounted for by farms that were not used during 2004.

Production and Staffing

Table 13: Number (000s) of smolts produced, staff employed and smolt productivity during 1994-2004

Year		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Number (000s) of smolts produced		23,117	26,539	33,619	38,187	44,853	39,763	45,583	47,546	47,161	44,414	39,999
Staffing	Full-time	245	279	308	344	318	300	341	317	312	291	259
	Part-time	133	117	133	166	96	124	103	111	93	82	60
	Total	378	396	441	510	414	424	444	428	405	373	319
Productivity, 000s of smolts per person		61.2	67.0	76.2	74.9	108.3	93.8	102.7	111.1	116.4	119.1	125.4

[c] Under the terms of the Registration of Fish Farming and Shellfish Farming Business Order 1985, as amended, 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 Section 9 of the Diseases of Fish Act 1983, the company and site information is published here in summary form, in accordance with the terms of the Act.

Smolt production in 2004 decreased by over 4.4 million, a decrease of 9.9% compared to 2003. The number of staff employed decreased by 54 and productivity increased by 5%, to a figure of 125,400 smolts produced per employee.

Escapes

There was one reported escape from a freshwater Atlantic salmon site in 2004, involving the loss of one fish.

Smolts by Age Group

Table 14: Number of smolts (000s) produced by type during 1993-2004

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
2003	14,907	28,836	671	0	44,414
2004	14,428	24,862	709	0	39,999

In 2004, production was dominated by S1 smolts, although numbers produced decreased by 14%. The production of S½ smolts decreased by 3%. There was an increase in the production of S1½, while no S2 smolts were produced.

Production Systems

Table 15: Number and capacity of production systems during 2000-2004

System	No. of sites with system					Total capacity, 000s cubic metres				
Year	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
Cages	85	76	81	80	76	344	328	409	391	365
Tanks and Raceways	99	93	92	96	96	45	48	41	40	43
Total	184	169	173	176	172	389	376	450	431	408

The principal types of facility used for the production of smolts in fresh water are cages and tanks and raceways. In 2004, the number of farms employing tanks and raceways remained the same, and the number of farms employing cages decreased by four. In terms of volume, tank capacity increased by 3,000 m^3, and cage volume decreased by 26,000 m^3. This resulted in a net decrease in volume of 23,000m^3 available for the production of smolts in Scotland during 2004.

Table 16: Number (000s) of smolts produced and stocking densities by production system during 2000-2004

	Number of smolts produced (000s)					Stocking densities(smolts /m³)				
Year	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
Cages	24,052	25,237	27,076	24,094	17,575	70	77	66	62	48
All others	21,531	22,309	20,085	20,320	22,424	478	465	490	508	521
Total	45,583	47,546	47,161	44,414	39,999	-	-	-	-	-

The average stocking densities of cages decreased compared to 2003, whilst the stocking densities of tanks increased; in the case of cages from 62 to 48 fish per m^3 and in the case of tanks, from 508 to 521 fish per m^3.

Ova Production

Table 17: Number (000s) of salmon ova produced during 1997-2004

Year	1997	1998	1999	2000	2001	2002	2003	2004
No. of ova	186,470	151,841	122,649	124,619	99,921	107,996	115,569	128,866

Almost one hundred and twenty nine million ova were stripped in 2004, an increase of over thirteen million (11%) on the 2003 season.

Table 18: Source, number (000s) and previous year's estimate of ova laid down to hatch during 1993-2005

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	38,766	21,138	0	20,822	80,726	73,193
2004	31,390	20,024	27	19,138	70,579	74,464
2005	-	-	-	-	-	65,741

The number of ova laid down to hatch was 70.6 million, a decrease of over ten million (12.6%) on the 2003 figure. The majority of the ova (44.5%) were derived from producers' own broodstock, the proportion being slightly less than that seen in 2003. Supplies from other producers' 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 2005 show a projected decrease compared to the actual number of ova laid down in 2004. The ova derived from wild stocks are generally held and hatched for wild stock enhancement by the aquaculture industry in cooperation with wild fisheries managers.

Smolts Produced and Put to Sea

Table 19: Actual and projected smolt production and smolts put to sea (millions) during 1995-2006

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Actual smolts put to sea	26.8	32.8	42.8	45.9	41.1	45.2	48.6	50.1	43.8	38.2		
Smolts produced	26.5	33.6	38.2	44.8	39.8	45.6	47.5	47.2	44.4	40.0		
Estimated production	25.2	31.8	41.6	45.3	49.6	42.1	50.2	49.3	44.2	40.0	36.2	42.5
Ratio of ova laid down to smolts produced	2.4	2.3	2.2	1.5	1.7	1.8	1.8	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. Any discrepancy may be due to smolts that were produced in Scotland but were not put to sea in Scotland. Farmers estimate putting 36.2 million smolts to sea in 2005.

The ratio of ova laid down to hatch to smolts produced in 2004 was similar to the ratio in 2003.

Scale of Production

Table 20: Smolt producing sites grouped by numbers (000s) of smolts produced during 1992-2004

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		
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
2003	2	0	7	20	32	31	12	10	114	44,414
2004	3	3	9	14	31	22	18	7	107	39,999

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

There has been a decrease in the number of sites producing smolts since 2003. The number of sites producing less than 101,000 smolts has remained the same, and there has been a decrease of seven in the number of sites producing more than 100,000 smolts. The number of sites producing in excess of one million smolts per year decreased by three, with an increase in the number of sites producing between 501,000 and one million smolts per year. This drop in the number of sites producing smolts has resulted in an overall decrease in smolts produced.

Production of Ova and Smolt by Production Area

Table 21: Staffing and ova laid down to hatch, 2003-2004, smolt production 2003-2004 and estimated production 2005-2006 by region

Region	Number of staff employed in 2004		Ova laid down to hatch (000s)		Smolt production (000s)		Estimated smolt production (000s)	
	F/T	P/T	2003	2004	2003	2004	2005	2006
Northwest	123	23	48,363	38,217	23,448	19,737	18,917	22,270
Orkney	5	7	200	210	682	754	412	410
Shetland	14	10	2,520	2,475	1,468	2,087	1,572	1,880
West	52	6	13,370	13,819	9,548	9,572	8,898	9,551
Western Isles	53	8	13,315	12,909	7,092	6,141	4,601	6,272
East and South	12	6	2,958	2,949	2,176	1,708	1,802	2,145
All Scotland	259	60	80,726	70,579	44,414	39,999	36,202	42,528

The north west, west and the Western Isles were the main ova and smolt producing areas in 2004, and employed the greatest number of staff.

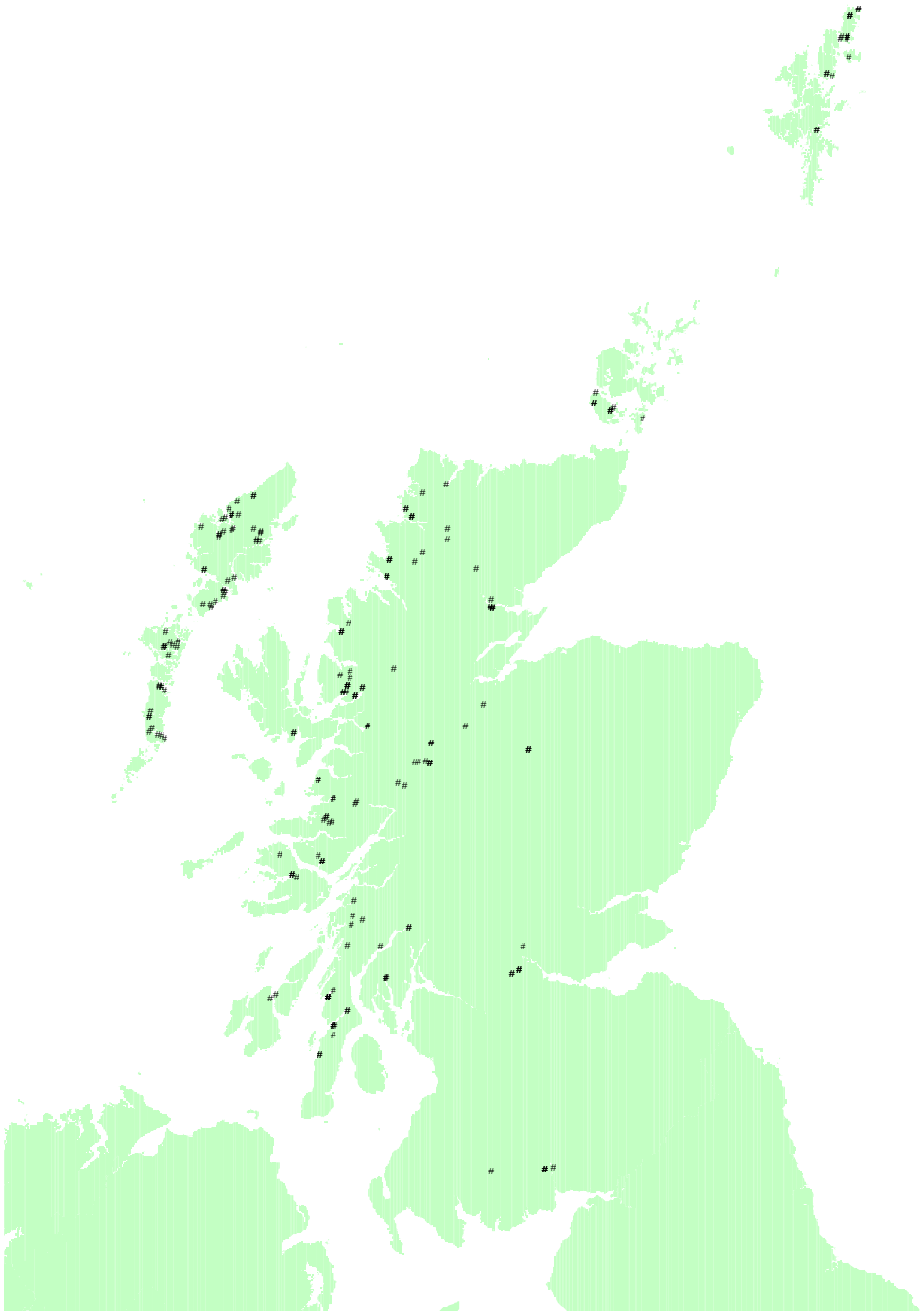
International Trade in Ova

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 Great Britain with regard to List II diseases, but additional guarantees granted to Great Britain in respect of *Gyrodactylus salaris* have prevented trade in live fish. Changes 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 only from sites that have met the same health standards as are established within the EU regarding the approval of farms and zones for listed diseases. 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 Sites 2004



Imports and Exports

Table 22a: Source and number (000s) of ova, parr and smolts imported during 1993-2004 derived from import licences

Import Year	Ova						Parr and Smolts
	EU Member States	EFTA		Third Countries		Total	EU Member States
		Iceland	Norway	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
2003	7,820	9,518	2,900	550	400	21,188	2,570
2004	4,450	3,475	6,750	1,860	450	16,985	824

Table 22b: Destination and number (000s) of salmon ova exported during 1994-2004 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	0	57,335	270
1998	23,375	4,459	20	27,754	492
1999	16,880	13,054	0	29,934	52
2000	9,740	25,311	0	35,051	50
2001	2,675	8,542	0	11,217	0
2002	1,600	6,627	0	8,227	0
2003	0	2,171	0	2,171	0
2004	2,215	3,699	0	5,914	0

The numbers of ova imported decreased by 20%. This is related to the decrease in ova laid down to hatch during 2004. The number of parr imported decreased.

In 2004, a total of 5.9 million ova were exported. Exports to other EU member states increased by 70% to 3.7 million. The trade with Chile was re-established with 2.2 million ova being exported. Overall, exports more than doubled compared with the 2003 figure.

Vaccines

Table 23: Number of sites using vaccines and number (millions) of fish vaccinated during 1996-2004

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004
No. of sites	112	118	122	115	114	106	108	104	98
No. of fish vaccinated	31.8	39.7	43.7	43.9	45.8	51.3	47.5	41.7	39.4

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 (IPN) and *Vibrio*sis.

3. ATLANTIC SALMON - PRODUCTION

Production

Production survey information was collected from all 69 companies actively involved in Atlantic salmon production, farming 315 active sites. This figure represents the entire industry operating in Scotland.

Table 24: Annual production of Atlantic salmon (tonnes) during 1986-2004 and projected production in 2005

Year	Tonnes	Percentage difference	Year	Tonnes	Percentage difference
1986	10,337	-	1996	83,121	19
1987	12,721	23	1997	99,197	19
1988	17,951	41	1998	110,784	12
1989	28,553	59	1999	126,686	14
1990	32,351	13	2000	128,959	2
1991	40,593	25	2001	138,519	7
1992	36,101	-11	2002	144,589	4
1993	48,691	35	2003	169,736	17
1994	64,066	32	2004	158,099	-7
1995	70,060	9	2005	136,056*	

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

The total production of Atlantic salmon during 2004 was 158,099 tonnes, a decrease of 11,637 tonnes (-7%) on 2003 production. This is the first decrease in production since 1992.

Escapes

There were thirteen reported escapes from seawater Atlantic salmon sites in 2004, involving the loss of 82,646 fish.

Table 25: Number (000s) and production (tonnes) of salmon harvested and mean fish weight (kg) per year class during 1994-2004

	Year of smolt input	Year of harvest	Number (000s)	Production (tonnes)	Mean weight at harvest (kg)
Harvest in year 0 (i.e. in year of input)	1994	1994	261	388	1.5
	1995	1995	207	369	1.8
	1996	1996	315	638	2.0
	1997	1997	282	585	2.1
	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
	2003	2003	82	276	3.4
	2004	2004	168	319	1.9
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	23,528	90,230	3.8
	2002	2003	22,602	96,205	4.3
	2003	2004	19,596	85,792	4.4
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	11,354	53,535	4.7
	2001	2003	15,619	73,255	4.7
	2002	2004	15,555	71,988	4.6

Table 26: Number (000s) and production (tonnes) of grilse and pre-salmon harvested during 1994-2004

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	9,872	33,609	3.4	13,656	56,621	4.1
2003	8,560	32,977	3.8	14,042	63,228	4.5
2004	6,824	27,710	4.1	12,772	58,082	4.5

Table 27: Percentage (by weight) of annual production by growth stage harvested during 1996-2004

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004
Growth stage	-	-	-	-	-	-	-	-	-
Input year fish	<1	<1	2	2	2	<1	<1	<1	<1
Grilse	31	35	35	32	35	30	23	19	17
Pre-salmon	39	37	43	34	35	39	39	37	37
Salmon	29	27	20	32	28	30	37	43	45

Survival and Production in Smolt Year Classes

Table 28: Survival and production in smolt year classes during 1990-2004

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	1.7	22,726	96,539	4.2	50.3	11,354	53,535	4.7	25.1	77.1	152,747	3.38
2001	48,643	557	1,227	2.2	1.1	23,528	90,230	3.8	48.4	15,619	73,255	4.7	32.1	81.6	164,712	3.39
2002	50,086	272	824	3.0	0.5	22,602	96,205	4.3	45.1	15,555	71,988	4.6	31.1	76.7	169,017	3.37
2003	43,083	82	276	3.4	0.2	19,596	85,792	4.4	45.5							
2004	38,182	168	319	1.9	0.4											

In 2002, the last year for which survival can be calculated, the survival rate from smolt input to harvest was 76.7%. The 2002 year class displayed a lower survival rate than that seen in 2001 and also lower than the survival averaged over the last 13 year-classes.

Of the 2003 year class, 45.7% of the input has been harvested, approximately 0.1% more than the average harvest of fish one year after input in the 2002 year class. The average weight increased by 0.1kg to 4.4 kg. This may indicate an increased harvest in 2005 of two sea winter (2SW) fish.

In 2004, the harvest of fish from the 2004 smolt input was 0.4%, an increase compared with the proportion of fish harvested from the same year class in 2003.

Smolts to Sea

Table 29: Number (000s) and origin of smolts put to sea during 1993-2004

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
2003	14,534	28,283	986	0	43,803	93	2,590	6	325	>1
2004	13,713	23,248	1,221	0	38,182	97	634	2	541	>1

The total number of smolts put to sea in 2004 was over 38 million. The smolt input comprised mainly S1 smolts (61%), and the proportion of photoperiod adjusted fish (S½ smolts and S1½ smolts) input increased to 39%. Approximately 3% of smolts input into Scottish salmon farms were sourced from outwith Scotland. This is a decrease compared with the proportion observed in 2003.

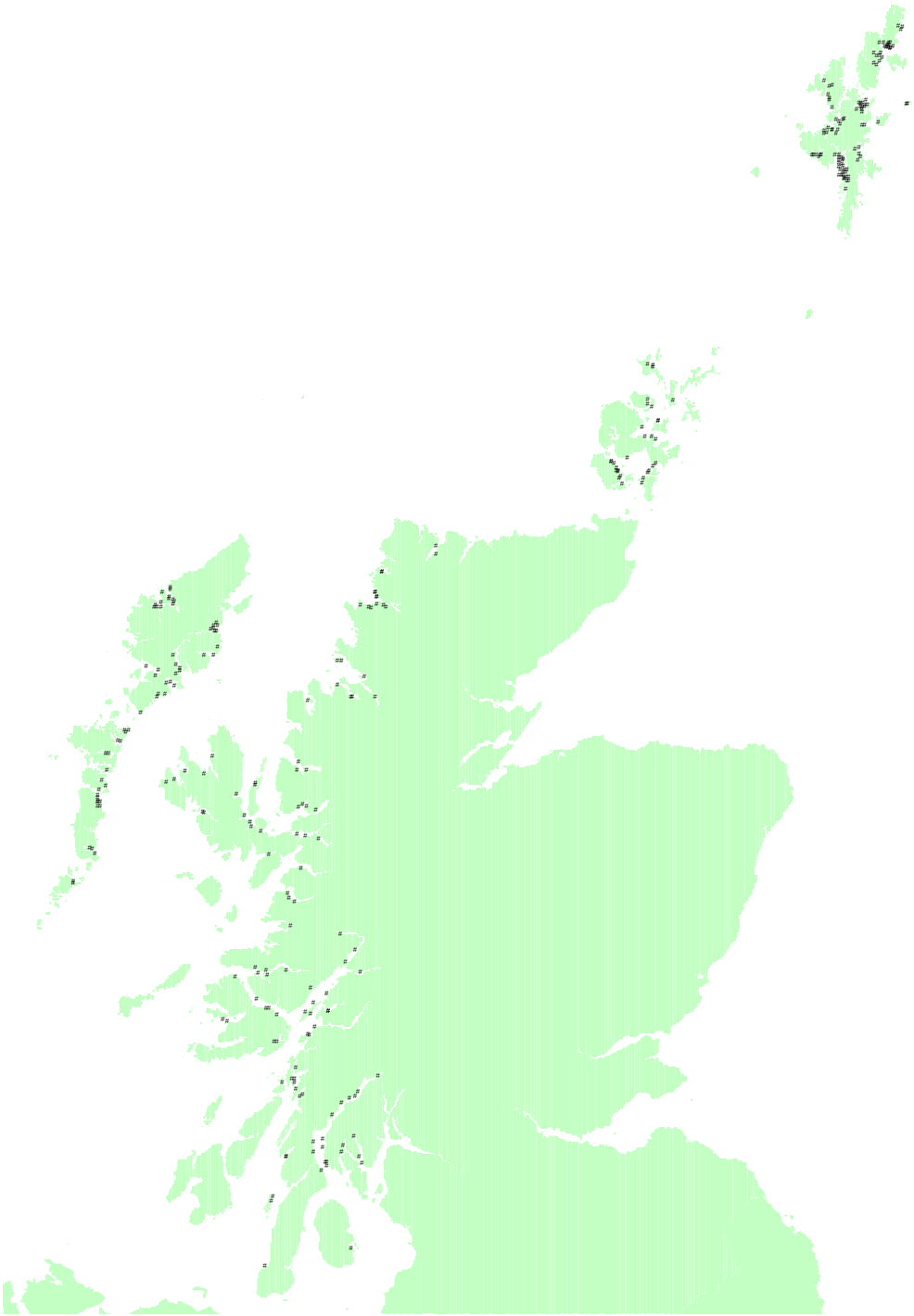
Survival and Production in Smolt Year Classes by Production Area

Table 30: Number (000s) of smolts put to sea and year class survival by area during 1993-2004

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	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	2003	2,455	17.8	10,660	77.4
	2002	12,634	2002	135	1.1	2003	7,007	55.5	2004	3,113	24.6	10,255	81.2
	2003	13,103	2003	-	-	2004	7,667	58.5					
	2004	9,642	2004	168	1.7								
Orkney	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	1,320	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	597	22.9	1,267	48.7
	2001	2,932	2001	-	-	2002	1,369	46.7	2003	1,464	49.9	2,833	96.6
	2002	2,741	2002	-	-	2003	1,169	42.6	2004	742	27.1	1,911	69.7
	2003	2,964	2003	-	-	2004	1,141	38.5					
	2004	1,843	2004	-	-								
Shetland	1993	4,491	1993	-	-	1994	3,354	73.1	1995	993	21.6	4,347	71.6
	1994	5,012	1994	24	0.5	1995	3,055	61.0	1996	1,846	36.8	4,925	94.7
	1995	5,811	1995	41	0.7	1996	3,021	52.0	1997	2,622	44.4	5,643	98.3
	1996	6,234	1996	-	-	1997	3,828	61.4	1998	1,141	18.3	4,966	95.5
	1997	13,276	1997	-	-	1998	7,265	54.7	1999	3,835	28.9	11,100	79.7
	1998	12,617	1998	78	0.6	1999	5,498	43.6	2000	4,783	37.9	10,359	83.6
	1999	12,663	1999	65	0.5	2000	5,576	44.0	2001	4,139	32.7	9,780	82.1
	2000	15,096	2000	-	-	2001	5,102	33.8	2002	4,578	30.3	9,680	77.2
	2001	17,398	2001	123	0.7	2002	6,465	37.2	2003	7,973	45.8	14,561	64.1
	2002	17,260	2002	-	-	2003	5,850	33.9	2004	5,675	32.9	11,525	83.7
	2003	14,446	2003	-	-	2004	6,031	41.7					66.8
	2004	12,372	2004	-	-								

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	%
South West	1993	5,131	1993	-	-	1994	2,300	44.8	1995	1,215	23.6	3,515	68.5
	1994	4,614	1994	-	-	1995	2,994	64.9	1996	1,460	31.6	4,454	96.5
	1995	6,437	1995	25	0.4	1996	3,268	50.8	1997	1,349	21.0	4,642	72.1
	1996	9,924	1996	64	0.6	1997	3,317	33.4	1998	1,408	14.2	4,789	48.2
	1997	11,540	1997	-	-	1998	4,126	35.8	1999	2,305	20.0	6,431	55.8
	1998	6,505	1998	41	0.6	1999	2,543	39.1	2000	1,501	23.1	4,085	62.8
	1999	5,370	1999	226	4.2	2000	1,626	30.3	2001	2,131	39.7	3,983	74.2
	2000	7,851	2000	110	1.4	2001	4,554	58.0	2002	2,925	37.3	7,589	96.7
	2001	7,667	2001	-	-	2002	3,014	39.3	2003	3,022	39.4	6,036	78.7
	2002	7,403	2002	-	-	2003	3,761	50.8	2004	2,808	37.9	6,569	88.7
	2003	6,834	2003	-	-	2004	2,110	30.9					
	2004	5,926	2004	-	-								
Western Isles	1993	2,805	1993	-	-	1994	1,909	68.1	1995	825	29.4	2,734	97.5
	1994	4,002	1994	125	3.1	1995	3,252	81.3	1996	442	11.0	3,819	95.4
	1995	3,983	1995	80	2.0	1996	2,836	71.2	1997	641	16.1	3,557	89.3
	1996	5,137	1996	152	3.0	1997	4,340	84.5	1998	491	9.6	4,983	97.1
	1997	5,274	1997	170	3.2	1998	3,900	73.9	1999	447	8.5	4,517	85.6
	1998	6,559	1998	187	2.8	1999	4,455	67.9	2000	294	4.5	4,936	75.2
	1999	8,445	1999	411	4.9	2000	4,839	57.3	2001	847	10.0	6,097	72.2
	2000	8,325	2000	198	2.4	2001	5,646	67.8	2002	1,110	13.3	6,954	83.5
	2001	6,879	2001	341	4.9	2002	4,568	66.4	2003	705	10.2	5,614	81.6
	2002	10,048	2002	137	1.4	2003	4,815	47.9	2004	3,217	32.0	8,169	81.3
	2003	6,456	2003	82	1.3	2004	2,647	41.0					
	2004	8,399	2004	-	-								

Figure 3: The Distribution of Active Salmon Production Sites 2004



Staffing

Table 31: Number of staff employed in salmon production during 1994-2004

Year		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Staff	F/T	1,003	1,104	1,150	1,088	1,117	1,036	1,141	1,066	1,083	1,066	1,019
	P/T	242	251	241	207	192	268	256	191	223	151	142
Total staff		1,245	1,355	1,391	1,295	1,309	1,304	1,397	1,257	1,306	1,217	1,161
Productivity (tonnes/person)		51.4	51.7	59.8	76.6	84.6	97.2	92.3	110.2	110.7	139.5	136.2

The total number of staff employed in salmon production in 2004 was 1,161 a decrease of 56 compared with 2003. 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 decreased from 139.5 to 136.2 tonnes production per person.

Production Methods

Table 32: Production methods, capacity, tonnage and average stocking densities (kg/m^3) during 2002-2004

Method	Number of sites			Total capacity (000s cubic metres)			Production (tonnes)		
	2002	2003	2004	2002	2003	2004	2002	2003	2004
Seawater tanks	2	1	1	15.5	5.5	5.8	330	0	0
Seawater cages	326	325	314	15,374	15,632	15,531	144,259	169,736	158,099
For cage sites:ratio of production (Kg) to cage capacity (m^3)							9.4	10.9	10.2

All of the fish were produced in seawater cages. The fact that there was no production from seawater tank sites in 2004 reflects the continued high installation and running costs incurred in operating seawater tank systems. Twenty eight active seawater tank sites were registered in Scotland but none 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 decreased by 101,000 m^3 in 2004, reflecting the decrease in the number of sites in production. Production efficiency in cages, measured as the ratio of fish weight in kilograms produced per cubic metre, decreased by 0.7 kg in 2004. In cage sites, the ratio of production, expressed in kilograms, to cage capacity, expressed in cubic metres, was 9.4, 10.9 and 10.2 in 2002, 2003 and 2004 respectively. This indicates that on average across all production stages in any year, the stocking density is around 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 1995-2004

Production grouping (tonnes)	0	1-50	51-100	101-200	201-500	501-1,000	>1,000	Total Sites*	Total Tonnes
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	144,589
2003	125	6	14	13	53	45	70	326	169,736
2004	122	10	7	25	41	55	55	315	158,099
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	2.7	12.8	26.5	57.3	-	-
2003	0	0.1	0.6	1.2	10.4	19.7	68	-	-
2004	0	0.1	0.4	2.4	9.4	26.1	61.6	-	-

*Includes farms stocked but having no production.

In 2004, there was a decrease of three in the number of sites producing less than 500 tonnes and a decrease of 5 in those sites producing over 500 tonnes. This reflects the decrease in the overall number of sites in production and the decrease in the number of smolts being put to sea.

Company Productivity

Table 34: Number of companies grouped by production (tonnes), manpower and productivity (tonnes per person) during 2003-2004

Total Tonnage		0-100	101-200	201-400	401-700	701-1,000	1,001-2,000	>2,000	Total
No. of Companies	2003	23	1	6	6	6	20	19	81
	2004	15	6	6	4	11	9	18	69
No. of tonnes	2003	322	151	1,605	3,183	4,958	29,426	130,091	169,736
	2004	55	941	1,534	2,188	9,599	12,038	131,744	158,099
Manpower (total)	2003	42	5	25	23	36	165	921	1,217
	2004	27	30	29	12	82	77	904	1,161
Productivity (tonnes/person)	2003	8	30	64	138	138	178	141	139
	2004	2	31	53	182	117	156	146	136

Productivity may be used as a measure of efficiency, and was found to be related to the scale of production. The greatest productivity (182 tonnes per person) was achieved in those companies having a production between four hundred and one tonnes and seven hundred tonnes, and the least (two tonnes per person) in the companies producing the smallest tonnages. In comparison with 2003 the average company productivity decreased from 139 to 136 tonnes per person.

Overall production was dominated by 18 companies in 2004, which between them accounted for over 83% of the salmon production in Scotland.

Manpower and Production by Production Area

Table 35: Manpower and production (tonnes) by area 1995-2004 and projected production in 2005

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	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	437	3.2	11,819	3.2	17,772	4.0	10,128	4.7
	2003	259	32	40,425	139	-	-	12,250	3.7	15,971	4.3	12,204	5.0
	2004	321	38	48,609	135	319	1.9	10,912	4.0	22,586	4.6	14,792	4.7
	2005			31,581*									
Orkney	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	6,565	72	-	-	1,949	3.2	2,649	3.5	1,967	3.3
	2003	121	15	10,740	79	-	-	1,016	3.6	3,508	4.0	6,216	4.2
	2004	68	10	6,600	85	-	-	1,877	3.3	2,107	3.6	2,616	3.5
	2005			5,344*									
Shetland	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	222	48	61,685	228	-	-	3,898	3.9	21,698	4.5	36,089	4.5
	2004	185	27	53,101	250	-	-	6,732	4.2	20,543	4.6	25,826	4.5
	2005			41,903*									

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	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	218	35	33,583	133	-	-	4,329	4.1	13,407	4.9	15,847	5.2
	2004	219	34	23,911	95	-	-	2,733	4.1	6,832	4.7	14,346	5.1
	2005			30,634*									
Western Isles	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	246	21	23,303	87	276	3.4	11,484	3.9	8,644	4.6	2,899	4.1
	2004	226	33	25,878	100	-	-	5,456	4.1	6,014	4.5	14,408	4.5
	2005			26,594*									
All Scotland	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	144,589	111	824	3.0	33,609	3.4	56,621	4.1	53,535	4.7
	2003	1,066	151	169,736	139	276	3.4	32,977	3.8	63,228	4.5	73,255	4.7
	2004	1,019	142	158,099	136	319	1.9	27,710	4.1	58,082	4.5	71,988	4.6
	2005			136,056*									

*Estimated production in 2005

Company and Site Data

Table 36: Number of companies and sites engaged in salmon production during 1994-2004

Year	Number of companies			Number of sites		
	Producing	Non-producing	Total	Producing	Non- producing	Total
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
2003	63	18	81	201	125	326
2004	57	12	69	193	122	315

The number of companies registered and actively producing salmon in 2004 was 57, a decrease of six on the 2003 figure. Twelve companies remained active and registered, although not producing salmon for harvest in 2004. This continued the trend of salmon production being concentrated within fewer companies. These 69 companies have 315 registered active sites, although not all active sites may have produced fish for harvest in 2004.

Fallowing

Table 37: Number of seawater sites employing a fallow period during 1995-2004

Year	Fallow Period (weeks)						Total
	0	<4	4-8	9-26	27-51	52	
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
2003	95	14	68	80	40	29	326
2004	82	9	52	95	42	35	315

Of the 315 sites recorded as being active in 2004, 198 farms were fallow for a variable period, whilst a further 35 farms were fallow for the whole of 2004. The normal production cycle in sea water 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 82 sites that had no fallow period in 2004. These may have been stocked late in 2003 with out of season smolts, or may not follow recommended practice of incorporating a fallow period in the production cycle.

Broodstock Sites

Table 38: Number of sites holding broodstock during 1993-2004

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Broodstock sites	21	24	18	28	37	25	20	18	15	19	20	15

In 2004, the number of sites holding broodstock, including freshwater and seawater sites was 15, a decrease on the 2003 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. Fifteen thousand, eight hundred and one female fish were stripped, yielding almost 129 million ova, compared with almost 116 million in 2003, which can be calculated to show an average ova yield per fish of 8,156.

4. OTHER SPECIES

There has been continued interest in the farming of other species. Brown trout (*Salmo trutta*) have been farmed for many years for the restocking market, but there is an increasing interest in farming marine species. These provide 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 marine species sector expands, the employment provided and the contribution to the total production of the Scottish aquaculture industry is expected to increase.

Staffing

Table 39: Number of staff employed in farming other species during 1999-2004

Year	Full-time	Part-time	Total
1999	54	18	72
2000	73	25	98
2001	75	22	97
2002	69	30	99
2003	73	24	97
2004	61	18	79

Company, Site and Production Data

Table 40: Number of companies and sites producing other species and production of other species (tonnes) during 2001-2004 and estimated production in 2005

Species	No of companies	No of sites	2001 Production tonnage	2002 Production tonnage	2003 Production tonnage	2004 Production tonnage	2005 Production tonnage*
Arctic Charr	5	8	3.75	7.2	3.1	3.25	10.5
Brown Trout/ Sea Trout	29	45	105	175.7	198.3	167	172
Cod	14	20	15	0	82.1	8	355.5
Halibut	9	17	80	187.2	231.8	186.8	227

*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.

Escapes

There was one reported escape from a seawater farm rearing other species in 2004, involving the loss of 10,000 fish.

Ova Laid Down to Hatch

Table 41: Source of other species' ova laid down to hatch during 2004

Species	Source of ova laid down to hatch (000s)		
	Own broodstock	Other GB broodstock	Foreign ova
Arctic charr (*Salvelinus alpinus*)	45	100	0
Cod (*Gadus morhua*)	18,641	9,703	[d]
Brown trout/Sea trout (*Salmo trutta*)	2,599	88	[d]
Halibut (*Hippoglossus hippoglossus*)	6,000	0	0

[d] There were companies which laid down cod and brown trout ova from foreign sources but due to the small number of companies involved it is not possible to summarise these data without potentially revealing the figures for individual companies.

Trade in Small Fish

Table 42: Trade in other species small fish in 2004

Species	Bought (000s)	Sold (000s)
Cod	743	560
Halibut	67	28
Brown Trout / Sea Trout	229	734

There were also sites stocked with brook charr (*Salvelinus fontinalis*), carp (*Cyprinus carpio*), Dover sole (*Microstomus pacificus*), haddock (*Melanogrammus aeglefinus),* lemon sole (*Microstomus kitt*), orfe (*Leuciscus idus*), tench (*Tinca tinca*) and turbot (*Scophthalmus maximus*). There was production of 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 decreased by 10% in 2004 to 6,352 tonnes and was directed at the table (85.3%) and restocking (14.7%) markets. The total numbers of staff employed by the sector increased by four to 152. As a consequence, the overall productivity of the industry decreased to 41.8 tonnes per person. One of the reasons for this was the decrease in the production from freshwater and seawater cage sites for the table market.

The number of ova laid down to hatch increased by over six million and was almost exclusively either all-female diploid (90%) or sterile triploid (10%) stocks. Only 2.0% 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. There were no imports from South Africa during 2004. To meet the needs of out of season production there was an increase in the level of imports from the USA (53% of total ova imported). The trend reflecting the high dependence of the Scottish trout industry on imported ova was maintained.

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 decreased production of salmon, reduced productivity per person and reduced yield from smolts. There was a decrease in the production of smolts and the yield from ova stayed the same.

Smolt production decreased by 9.9% to 39.9 million with slightly under two thirds (62.2%) being S1 and the majority of the remainder being S½ (36.1%) smolts. The number of staff directly employed on freshwater sites decreased by 54. This resulted in an increase in productivity to over 125,000 fish per person. Although productivity per person increased, the actual number of smolts produced decreased by 9.9%. The number of ova laid down to hatch has decreased by 13%. The ratio of ova laid down to smolts produced has remained at 1.8 in 2004. Projected estimates for 2005 suggest that fewer ova were laid down to hatch and that less smolts will be produced in 2005, followed by an increase in 2006.

The majority of ova for the production of Scottish salmon were derived from Scottish farmed stocks, with 27% derived from non-Scottish stocks, an increase of 1% on reliance from foreign sources. The export of ova to other countries within the EU increased by 70% and the trade with Chile was re-established.

The production tonnage in sea water decreased by 6.9% in 2004, this was due mainly to a reduction in the number of smolts being put to sea. The number of staff directly employed on site decreased, with the loss of 56 jobs in the seawater industry. The estimated smolt placement in 2005 has decreased to 36.2 million and a decrease in production is expected in 2005 given the decrease in the number of smolts put to sea in 2004. The estimated harvest forecast for 2005 is 136,056 tonnes, a decrease of 13.9% on the 2004 total.

With the production tonnage decreasing in 2004, the number of sites in production decreased from 326 to 315. The trend towards increasing the size of producing sites continued with 57% of sites producing over 500 tonnes in 2004.

Other Species

Interest in the diversification of aquaculture was maintained. Staff numbers decreased due to one producer concentrating on Atlantic salmon production rather than cod. In 2004 there was a significant decrease in the tonnage of cod produced. There were also decreases in the tonnages of halibut and brown trout produced. Industry has predicted significant increases in production for 2005.

APPENDIX 1

Questionnaires sent to Fish Farmers

ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS for the PERIOD 1 JANUARY to 31 DECEMBER 2004

RAINBOW TROUT - DATA

Please complete and return by 11 FEBRUARY 2005 to R J Smith, FRS Marine Laboratory PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Reg No FB/

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** ☐☐☐ **Part time** ☐☐☐

	Site 1	Site 2	Site 3	Site 4
2 How many eyed ova were laid down for hatching in 2004				
a from own broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b from other GB broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c from abroad (Northern Hemisphere **incl**, N Ireland and Isle of Man)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d from abroad (Southern Hemisphere)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
3 How many of the above ova were				
a all female diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b mixed sex diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c all triploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
4 How many fry/fingerlings were				
a bought	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b sold	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
5 How many bought fry/fingerlings were				
a all female diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b mixed sex diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c all triploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
6 How many of these fish were vaccinated against ERM				
a vaccinated on site	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b bought vaccinated	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
7 What was your total production in TONNES for the TABLE TRADE				
a <450 g (<1 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b 450-900 g (1-2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c >900 g (>2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
8 What was your total production in TONNES for the RESTOCKING TRADE				
a <450 g (<1 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b 450-900 g (1-2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c >900 g (>2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐

SEERAD ANNUAL PRODUCTION SURVEY 2004

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 11 February 2005 to allow the Annual Survey Report for 2004 to be produced.

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2004

ATLANTIC SALMON - SMOLT DATA

Please complete and return by 11 FEBRUARY 2005 to R J Smith, FRS Marine Laboratory PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Reg No FB/

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 2003-2004 (company total) ☐☐☐☐☐☐☐☐

		Site 1	Site 2	Site 3	Site 4
3	**How many eyed ova were laid down for hatching in winter of 2003-2004**				
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 (2004-2005)**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
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	**S2s** (ie from 2004 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S1s** (ie from 2003 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c	**S12s** (ie from 2003 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d	**S2s** (ie from 2002 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
7	**How many smolts were sold as**				
a	**S1s** (incl S2s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S2s** (incl S12s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
8	**How many smolts do you expect to produce for sea winter on-growing next spring (2005) as**				
a	**S1s** (incl S2s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S2s** (incl S12s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
9	**How many smolts do you plan to produce in 2006**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
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 2004

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 S2 or S1 etc

The definitions used for the survey are:

S2	<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
S12	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 S2s with S1s and
Q8. } **For S2s** - combine numbers of S12s 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 2004 (maximum = 52)

It will be appreciated if the questionnaires are returned promptly and not later than 11 February 2005 to allow the Annual Survey Report for 2004 to be produced.

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2004

ATLANTIC SALMON - PRODUCTION DATA

Please complete and return by 11 FEBRUARY 2005 to R J Smith, FRS Marine Laboratory PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Reg No FB/

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

1 How many staff were employed in salmon production (company total), excluding post-harvest processing staff — **Full time** ☐☐☐ **Part time** ☐☐☐

		Site 1	Site 2	Site 3	Site 4
2	**How many smolts were put into the site in 2004 as:**				
a	**S2s** (ie from 2004 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S1s** (ie from 2003 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c	**S12s** (ie from 2003 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d	**S2s** (ie from 2002 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
3	**How many of the above smolts came from England**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
4	**Total smolt input proposed in 2005**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
5	**HARVEST of 2004 SMOLT INPUT in 2004**				
a	Number of tonnes	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
6	**HARVEST of 2003 SMOLT INPUT from 1 JANUARY to 31 AUGUST**				
a	Number of tonnes	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
7	**HARVEST of 2003 SMOLT INPUT from 1 SEPTEMBER to 31 DECEMBER**				
a	Number of tonnes	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
8	**HARVEST of 2002 SMOLT INPUT**				
a	Number of tonnes	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
9	**How many tonnes of fish do you expect to harvest in 2005**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
10a	**Were brood fish produced in 2004**	**YES/NO**	**YES/NO**	**YES/NO**	**YES/NO**
b	**How many fish were stripped**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
11	**What is the current fish holding capacity of each site in cubic metres**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
12	**Duration of FALLOW PERIOD in WEEKS (cage sites; MAX = 52)**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
13	**Does a management agreement in respect of fish health operate with other producers in your area**	**YES/NO**	**YES/NO**	**YES/NO**	**YES/NO**

SEERAD ANNUAL PRODUCTION SURVEY 2004

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:

S2 **<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
S12 **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 2004; the total number of fallow weeks should not exceed 52

It will be appreciated if the questionnaires are returned promptly and not later that 11 February to allow the Annual Survey Report for 2004 to be produced.

ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS
for the PERIOD 1 JANUARY to 31 DECEMBER 2004

OTHER SPECIES - DATA

Please complete and return by 11 FEBRUARY 2005 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 2004				
a) From own broodstock	.....	.....	.....	.....
b) From GB broodstock	.....	.....	.....	.....
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 2005 in TONNES	.....	.....	.....	.....

SEERAD ANNUAL PRODUCTION SURVEY 2004

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 11 February 2005 to allow the annual survey report for 2004 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.
$S1^1/_2$	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 haemopoeitic necrosis
IPN	Infectious pancreatic necrosis
ISA	Infectious salmon anaemia
VHS	Viral haemorrhagic septicaemia
RTFS	Rainbow trout fry syndrome