



FISHERIES RESEARCH SERVICES

## Scottish Fish Farms Annual Production Survey, 2001



SCOTTISH EXECUTIVE  
Environment and Rural Affairs Department

## **SCOTTISH FISH FARMS**

### **Annual Production Survey 2001**

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 2001 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 rainbow trout and Atlantic salmon farming companies covering the period 1 January - 31 December 2001 are summarised in this survey. The survey is structured to allow readers to follow trends within the trout and salmon industries, in addition to providing information on production in 2001. Where available, statistics are given for the 10 year period 1992-2001. 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 2001 fish farms annual production survey.

### Rainbow Trout (*Oncorhynchus mykiss*)

		2000	2001
Total production	(tonnes)	5,154	5,466
Production for the table	(tonnes)	4,311	4,674
Production for restocking	(tonnes)	843	792
Number of staff employed		168	159
Mean productivity	(tonnes/person)	30.68	34.38
Number of ova laid down to hatch	(millions)	20.9	23.0
Number of ova imported	(millions)	18.7	21.6

In 2001 rainbow trout production increased by 312 tonnes. Employment decreased by nine staff and productivity per person increased to 34.38 tonnes. There was an increase of over two million ova laid down to hatch and an increase in the number of ova imported.

### Other Species

		2000	2001
Total production	(tonnes)	165.2	203.75
Number of staff employed	(full-time)	73	75
	(part-time)	25	22
Number of ova laid down to hatch	(millions)	53	25
Number of ova imported	(millions)	0.8	0

## Atlantic salmon (*Salmo salar*)

### Smolts

		2000	2001
Number of ova produced	(millions)	124.6	99.9
Number of ova laid down to hatch	(millions)	78.5	83.4
Number of ova exported	(millions)	17.2	11.2
Number of ova imported	(millions)	5.11	20.62
Number of smolts produced	(millions)	45.6	47.5
Number of smolts put to sea	(millions)	45.2	48.6
Number of staff employed		444	428
Mean productivity (000s smolts/person)		102.7	111.1

The production of ova decreased by over twenty four million in 2001, but the number of ova laid down to hatch increased by almost five million. Imports of ova increased and exports of ova fell significantly. Smolt production increased by 4%. The number of staff employed decreased by 16 and mean productivity increased.

### Production fish

		2000	2001
Total production	(tonnes)	128,959	138,519
Production of 0-year fish	(tonnes)	2,673	1,227
Production of grilse	(tonnes)	45,229	42,065
Production of pre-salmon	(tonnes)	44,734	54,474
Production of salmon	(tonnes)	36,323	40,754
Mean fish weight 0-year	(kg)	3.5	2.2
Mean fish weight grilse	(kg)	3.6	3.8
Mean fish weight pre-salmon	(kg)	4.2	4.7
Mean fish weight salmon	(kg)	4.3	4.5
Number of staff employed		1,397	1,257
Mean productivity	tonnes/person	92.3	110.2

Production tonnage increased by 7.4% with an increased harvest at later stages of production. Staff numbers decreased by one hundred and forty. Mean productivity increased by almost 20%.

**Smolt survival (percentage harvested)**

Survival (%)	Years 0+1	Year 2	Total
1998 input year class	50.7	18.4	69.1
1999 input year class	58.5	22.1	80.6

Overall smolt survival increased by over 11%, with increased survival at each stage of production compared with the 1998 year class.



## 1. RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)

Annual production surveys were sent to all 50 companies registered with the Scottish Executive as being actively engaged in the production of rainbow trout in Scotland during 2001. Returns were received from all 50 companies, covering the 57 sites currently in production.

### Production

**Table 1a:** Total Production (Tonnes) of Rainbow Trout during 1991-2001

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

Production increased in 2001 by 312 tonnes, an increase of over 6%. Within the table trade, increases were seen in all sizes of fish. In the restocking trade, only the production of large fish showed an increase, the production of small and medium sized fish decreased.

**Table 1b:** Production (Tonnes) for the Table Trade during 1994-2001 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

Production for the table was 4,674 tonnes, an increase of 363 tonnes (8%) over the 2000 total and accounted for 85.5% of the total rainbow trout production, a similar proportion to that seen in 2000.

Supply was mainly of the smaller sized fish weighing up to 450g, encompassing 65% of total production.

**Table 1c:** Production (Tonnes) for the Restocking Trade during 1994-2001 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

Production for the restocking of angling waters decreased again in 2001 and accounted for 14.5% of total rainbow trout production in 2001. In 2001, production totalled 792 tonnes, a decrease of 51 tonnes (6%) on the 2000 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 farms in 2001.

## Production by Farm

**Table 2:** Numbers of Sites Grouped by Tonnage Produced during 1994-2001

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

Production was reported from 45 farms. The number of producers in all size brackets, with the exception of 101-200 tonnes, increased in 2001. 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 2001, and Comparison with Production in 2000

Production method	Production grouping (tonnes) in 2001					Total tonnage and (%) by method		Number of sites	
	<10	10-25	26-50	51-100	>100	2000	2001	2000	2001
FW cages	1	2	0	1	6	2,258 (44)	2,639 (48.3)	9	10
FW ponds and raceways	4	5	5	4	7	1,972 (38)	2,146 (39.2)	25	25
FW tanks and hatcheries	5	0	1	1	0	140(3)	120(2.2)	7	7
SW cages	0	0	0	0	3	784 (15)	561 (10.3)	3	3
SW tanks	0	0	0	0	0	0	0	0	0
Total	10	7	6	6	16	5,154	5,466	44	45

Freshwater production accounted for 4,905 tonnes (90%) and seawater production for the remaining 561 tonnes (10%). The main rearing facilities were freshwater cages, tanks, ponds and raceways. There was a decrease 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 1991-2001

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

The number of companies registered with the Scottish Executive as being actively engaged in rainbow trout production was 50, a decrease of four since 2000. The number of sites registered and in production was 57, a decrease of six from 2000.

## Staffing and Productivity

**Table 5:** Number of Staff Employed and Productivity Per Person during 1991-2001

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

The overall number of staff employed in 2001 decreased by nine to 159 in 2001. The number of full-time staff decreased by three, whilst the number of part-time employees decreased by six.

Productivity, measured as tonnes produced per person, increased by almost 4 tonnes per person in 2001. No distinction was made between full and part-time employees when calculating productivity.

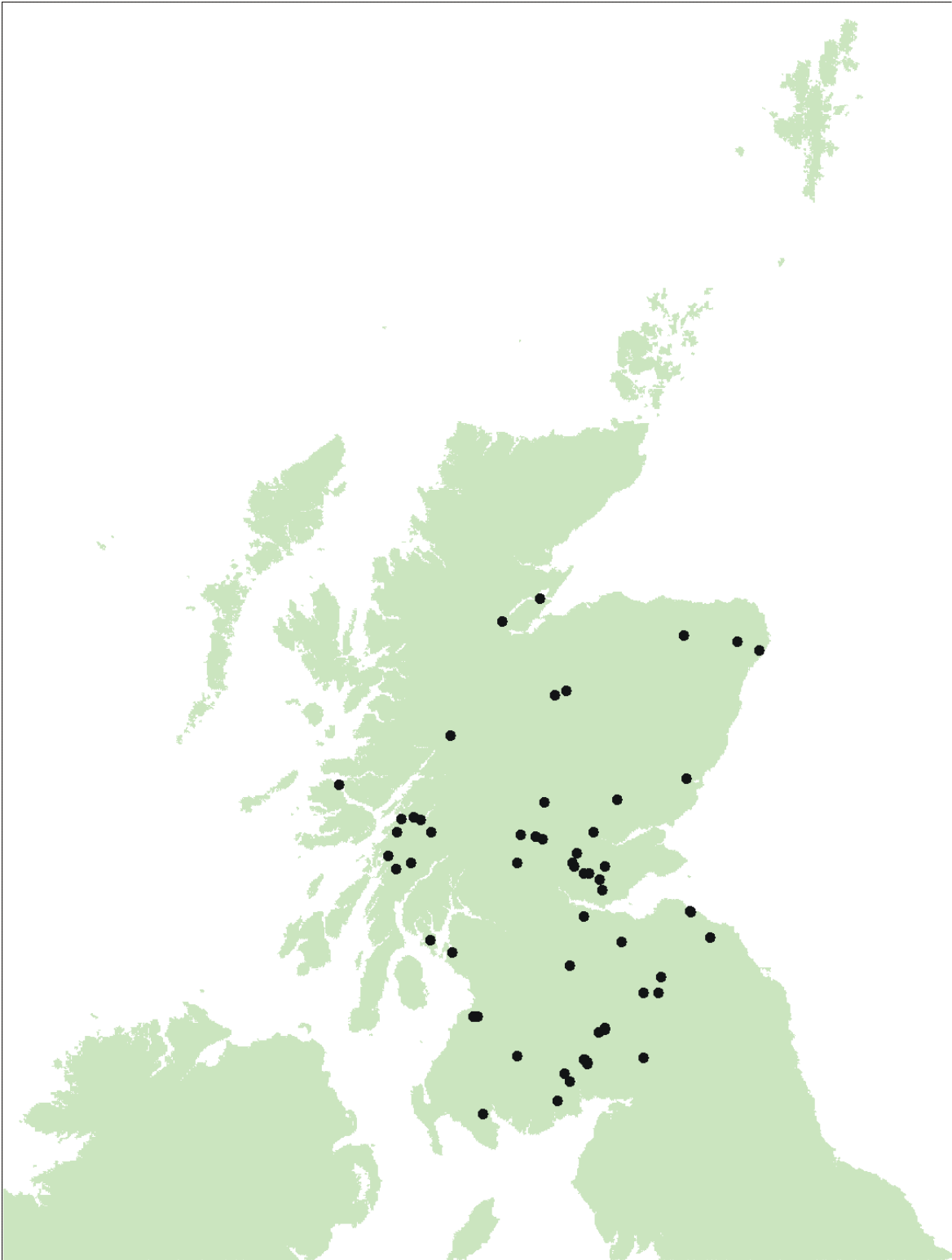
## Production by Area

**Table 6:** Production and Staffing by Area in 2001

Area	No. sites	Table production (tonnes)	Restocking production (tonnes)	Mean tonnes per site	Staffing			Productivity tonnes/person
					F/T	P/T	Total	
North	7	505	105	87.1	14	5	19	32.1
East	18	972	335	72.6	45	12	57	22.9
West	16	2,012	110	132.6	35	14	49	43.3
South	16	1,185	242	89.2	24	10	34	42.0
All	57	4,674	792	95.9	118	41	159	34.4

Productivity per site was greatest in the west, 132.6 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 43.3 tonnes per person.

Figure 1: The Distribution of Active Rainbow Trout Farms 2001



## Type of Ova Laid Down

**Table 7:** Number (000s) and Proportions (%) of Ova Types Laid Down to Hatch during 1993-2001

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

## Source of Ova Laid Down

**Table 8:** Number (000s) and Sources of Ova Laid Down to Hatch 1993-2001

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

In 2001, the total number of eyed-ova laid down to hatch increased by over 2 million (9.8%) on the 2000 figure. The proportion of ova from GB broodstock decreased to 6.3% 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 9 (a).

## Imports of Ova from Official Import Licences

**Table 9a:** Number (000s) and Sources of Ova Imported into Scotland during 1995-2001

Source	1995	1996	1997	1998	1999	2000	2001
Northern Ireland	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
Denmark	2,650	5,075	5,354	5,700	4,546	4,225	6,135
South Africa	7,825	8,023	9,450	11,585	6,036	7,762	8,075
Others (EU)	-	220	-	-	-	-	-
Totals	20,310	21,595	21,434	22,623	18,139	18,914	21,590



**Table 9b:** Seasonal Variation in Numbers (000s) and Sources of Ova Imported into Scotland in 2001

Month	Northern Ireland	Isle of Man	Denmark	South Africa
January	-	1,400	1,900	-
February	100	300	-	-
March	-	-	800	-
April	-	585	1,910	-
May	-	85	625	-
June	-	-	-	1,450
July	-	-	-	4,075
August	-	-	-	2,300
September	570	-	200	250
October	40	470	-	-
November	-	430	200	-
December	-	3,400	500	-
Totals	710	6,670	6,135	8,075

Denmark, the Isle of Man and Northern Ireland accounted for 63% of ova imported into Scotland during 2001 (59% during 2000), 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 1993-2001

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

The established trade between hatcheries and on-growing farms continued in 2001. Some companies specialised in the production of fry and fingerlings. The total number of fry and fingerlings purchased by producers increased by 15%, whilst the total number sold by producers increased by 12%. The disparity between supply and demand is met by supplies being bought in from England, Wales and Northern Ireland; the shortage in supply was greater than that seen in 2000.

## Use of Vaccines

**Table 11:** Number of Sites Rearing Fish Vaccinated Against Enteric Redmouth Disease (ERM) during 1991-2001

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

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 21.2 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 56 companies registered with the Scottish Executive as being actively engaged in the freshwater production of Atlantic salmon in Scotland during 2001. Returns were received from all companies, covering the 169 sites currently in production.

### Company and Farm Data

**Table 12:** Number of Companies and Sites in Production during 1994-2001<sup>1</sup>

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

In 2001 the number of companies registered with the Scottish Executive as being actively engaged in the freshwater production of Atlantic salmon decreased by four to fifty six. A total of 286 freshwater sites were registered and of these 81 sites were inactive and 205 active. One hundred and sixty nine of the active sites were in commercial production, the difference being accounted for by farms which were not used during 2001.

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<sup>1</sup> 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.

## Production and Staffing

**Table 13:** Number (000s) of Smolts Produced, Staff Employed and Smolt Productivity during 1991-2001

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	
Number (000s) of smolts produced	22,404	20,827	21,043	23,117	26,539	33,619	38,187	44,853	39,763	45,583	47,546	
Staffing	Full-time	271	266	233	245	279	308	344	318	300	341	317
	Part-time	79	93	115	133	117	133	166	96	124	103	111
	Total	350	359	348	378	396	441	510	414	424	444	428
Productivity, 000s of smolts per person	64.0	58.0	60.5	61.2	67.0	76.2	74.9	108.3	93.8	102.7	111.1	

Smolt production in 2001 increased by almost 2 million, an increase of 4% compared to 2000.

The number of staff employed decreased by 16 and productivity increased by 8%, to a figure of 111,000 smolts produced per employee.

### Escapes

There was one reported escape from freshwater Atlantic salmon farms in 2001, involving the loss of 20,000 fish.

## Smolts by Age Group

**Table 14:** Number of Smolts (000s) Produced by Type during 1993-2001

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

In 2001 production was dominated by S1 smolts, although numbers produced decreased by 3%. The production of S½ smolts increased by 24% reflecting the increasing trend in the number of photoperiod adjusted smolts used by the industry. There was a slight increase in the production of S1½ and S2 smolts.

## Production Systems

**Table 15:** Number and Capacity of Production Systems during 1997-2001

System	No. of sites with system					Total capacity, 000s cubic metres				
	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
Year										
Cages	70	80	86	85	76	326	343	457	344	328
Tanks and Raceways	101	97	103	99	93	45	40	39	45	48
Total	171	177	189	184	169	371	383	496	389	376

There are two principal types of facility used for the production of smolts in fresh water – tanks and cages. In 2001, the number of farms employing tanks and raceways decreased by six, and the number of farms employing cages decreased by nine. In terms of volume, tank capacity increased by 3,000 m<sup>3</sup>, whilst cage volume decreased by 16,000 m<sup>3</sup>. This resulted in a net decrease in volume of 13,000 m<sup>3</sup> available for the production of smolts in Scotland during 2001.

**Table 16:** Number (000s) of Smolts Produced and Stocking Densities by Production Systems during 1997-2001

Year	Number of smolts produced (000s)					Stocking densities(smolts /m <sup>3</sup> )				
	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
Cages	19,942	25,049	22,242	24,052	25,237	61	73	49	70	77
All others	18,245	19,804	17,521	21,531	22,309	405	495	449	478	465
Total	38,187	44,853	39,763	45,583	47,546	-	-	-	-	-

The average stocking densities of cages increased compared to 2000, whilst the stocking densities of tanks decreased; in the case of cages from 70 to 77 fish per m<sup>3</sup> and in the case of tanks, from 478 to 465 fish per m<sup>3</sup>.

### Ova Production

**Table 17:** Number (000s) of Salmon Ova Produced During 1993-2001

Year	1994	1995	1996	1997	1998	1999	2000	2001
No. of ova	98,900	89,556	122,665	186,470	151,841	122,649	124,619	99,921

Almost one hundred million ova were stripped in 2001, a decrease of over 24 million (19.8%) on the 2000 season.

**Table 18:** Source, Number (000s) and Previous Years Estimate of Ova Laid Down to Hatch during 1993-2001

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	-	-	-	-	-	80,679

The number of ova laid down to hatch was in excess of 83.4 million, an increase of almost 5 million (6%) on the 2000 figure. The majority of the ova (48%) was derived from producers' own

broodstock, the proportion being slightly less than that seen in 2000. 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 2002 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) 1993-2003

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Actual smolts put to sea	20.5	22.0	26.8	30.8	42.8	45.9	41.1	45.2	48.6		
Smolts produced	21.0	23.1	26.5	33.6	38.2	44.8	39.8	45.6	47.5		
Estimated production	21.8	22.1	25.2	31.8	41.6	45.3	49.6	42.1	50.2	49.3	54.6
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		

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 49.3 million smolts to sea in 2002.

The ratio of ova laid down to hatch to smolts produced in 2001 remained similar to the ratio in 2000.

## Scale of Production

**Table 20:** Smolt Producing Sites Grouped by Numbers (000s) of Smolts Produced during 1991-2001

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

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 2000. The number of sites producing less than 101,000 smolts has decreased by 3, and there has been a drop of 10 in the number of sites producing more than 100,000 smolts. However, there has been an increase in the number of sites producing in excess of one million smolts per year, allowing the number of smolts produced to rise whilst the total number of sites involved in smolt production has fallen. This focus of production in larger sites is a trend mirrored in other areas of fish farm production.



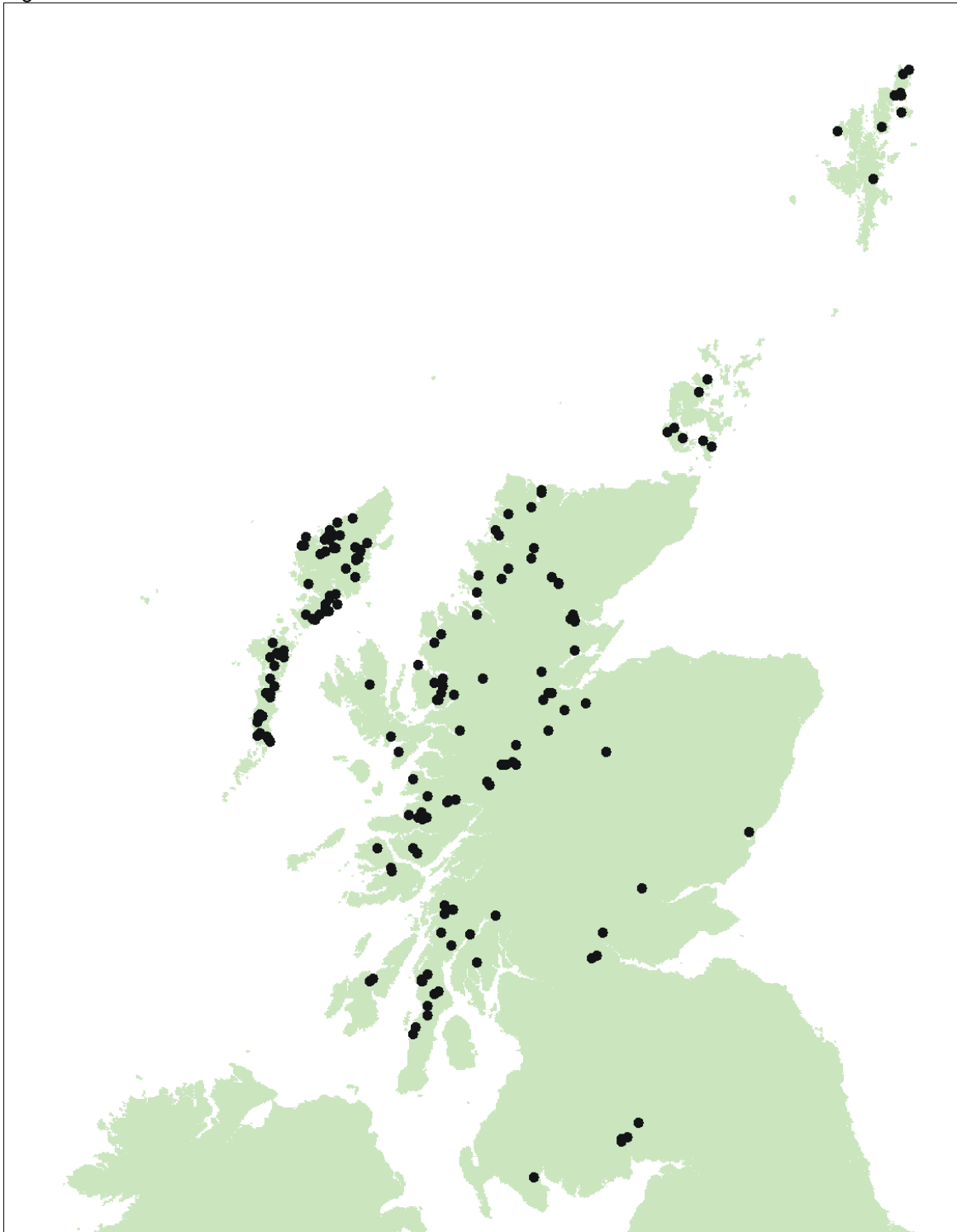
## Production of Ova and Smolt by Production Area

**Table 21:** Staffing, and Ova Laid Down to Hatch, 2000-2001, Smolt Production and Projected Production 2002-2003 by Region

Region	Number of staff employed in 2001		Ova laid down to hatch (000s)		Smolt production (000s)		Estimated smolt production (000s)	
	F/T	P/T	2000	2001	2000	2001	2002	2003
Northwest	141	53	41,119	48,309	24,902	25,880	26,144	28,542
Orkney	4	6	1,017	117	673	368	480	490
Shetland	26	15	5,906	5,177	1,981	1,520	1,579	1,970
West	50	24	10,733	12,759	8,011	9,937	10,787	11,246
Western Isles	85	8	16,872	14,117	8,282	7,387	8,210	10,054
East and South	11	5	2,884	2,943	1,734	2,454	2,083	2,280
All Scotland	317	111	78,531	83,422	45,583	47,546	49,283	54,582

The north west, west and the Western Isles were the main ova and smolt producing areas in 2001, and employed the greatest number of staff.

Figure 2 The Distribution of Active Smolt Farms 2001



## 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 member states, a trade in live salmon and ova has been established. The ending of the EEA agreement in January 2003 also means that trade with Norway will become a possibility in the future. Trade with Third Countries has also been established, but imports are permitted only under licence, from sources which 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.

## Imports and Exports

**Table 22a:** Source and Number (000s) of Ova, Parr and Smolts Imported during 1993-2001  
Derived from Import Licences

Import Year	Ova				Parr and Smolts
	EU Member States	Australia	Iceland	Total	EU Member States
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	500	4,610	5,110	3,436
2001	8,173	1,620	10,833	20,626	2,475

**Table 22b:** Destination and Number (000s) of Salmon Ova Exported during 1994-2001 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

The import of ova increased more than four-fold. This is due to the import of ova from the EU and Iceland. The number of parr imported decreased.

In 2001 a total of 11.2 million ova were exported. Exports to other EU member states decreased by 66% to eight and a half million. Exports to Chile fell by 73% to almost two and three quarter million, the lowest level observed. Overall, exports were down by 68% based on the 2000 figure.

## Vaccines

**Table 23:** Number of Sites Using Vaccines 1991-2001 and Number of Fish Vaccinated During 1994-2001

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
No. of sites	61	71	73	85	102	112	118	122	115	114	106
No. of fish vaccinated	-	-	-	19.4	25.3	31.8	39.7	43.7	43.9	45.8	51.3

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 87 companies actively involved in Atlantic salmon production, farming 320 active sites. This figure represents the entire industry operating in Scotland.

**Table 24:** Annual Production of Salmon (tonnes) during 1986-2001 and Projected Production in 2002

Year	Tonnes	Year	Tonnes
1986	10,337	1994	64,066
1987	12,721	1995	70,060
1988	17,951	1996	83,121
1989	28,553	1997	99,197
1990	32,351	1998	110,784
1991	40,593	1999	126,686
1992	36,101	2000	128,959
1993	48,691	2001	138,519
		2002	159,060*

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

The total production of Atlantic salmon during 2001 was 138,519 tonnes, an increase of 9,560 tonnes (7.4%) on 2000 production. This is the ninth consecutive annual increase in production.

#### Escapes

There were twelve reported escapes from seawater Atlantic salmon farms in 2001, involving the loss of 67,000 fish.

**Table 25:** Number (000s) and Production (tonnes) of Salmon Harvested and Mean Fish Weight (kg) per Year Class during 1994-2001

	Year of smolt input	Year of harvest	Number (000s)	Production (tonnes)	Mean weight at harvest (kg)
Harvest in year 0 (ie 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
Harvest in year 1	2001	2001	557	1,227	2.2
	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
Harvest in year 2	1999	2000	23,077	89,963	3.9
	2000	2001	22,726	96,539	4.2
	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	

**Table 26:** Number (000s) and Production (tonnes) of Grilse and Pre-salmon Harvested during 1994-2001

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

**Table 27:** Percentage (by Weight) of Annual Production by Growth Stage Harvested during 1994-2001

Year	1994	1995	1996	1997	1998	1999	2000	2001
Growth stage	-	-	-	-	-	-	-	-
Input year fish	<1	<1	<1	<1	2	2	2	2
Grilse	27	32	31	35	35	32	35	34
Pre-salmon	38	36	39	37	43	34	35	36
Salmon	34	31	29	27	20	32	28	28

## Survival and Production in Smolt Year Classes

**Table 28:** Survival and Production in Year Classes during 1990-2001

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							
2001	48,643	557	1,227	2.2	1.1											



In 1999, the last year for which survival can be calculated, the survival rate from smolt input to harvest was 80.6%. The 1999 year class displayed a higher survival rate than seen in 2000 and is slightly higher than the survival averaged over the last 10 year-classes.

Of the 2000 year class, 50.3% of the input has been harvested, approximately 6% fewer than the average harvest of fish one year after input in the 1999 year class. The average weight increased by 0.3kg to 4.2kg. This may indicate an increased harvest in 2002 of two sea winter (2SW) fish, or a decrease in the survival rate of the year class as a whole.

In 2001, the harvest of fish from the 2001 smolt input was 1.1%, 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 1993-2001

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	89	1,166	4	2,138	7
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	95	2,221	5	0	0
2000	9,517	35,176	399	93	45,185	92	3,396	8	300	<1
2001	14,118	34,321	171	33	48,643	98	1,183	2	0	0

The total number of smolts put to sea in 2001 was over 48 million. The smolt input comprised mainly S1 smolts (70%), and the proportion of photoperiod adjusted fish (S½ smolts and S1½ smolts) input increased to 29%. Approximately 2% of smolts input into Scottish salmon farms was sourced from outwith Scotland. This is a decrease compared with the proportion observed in recent years.

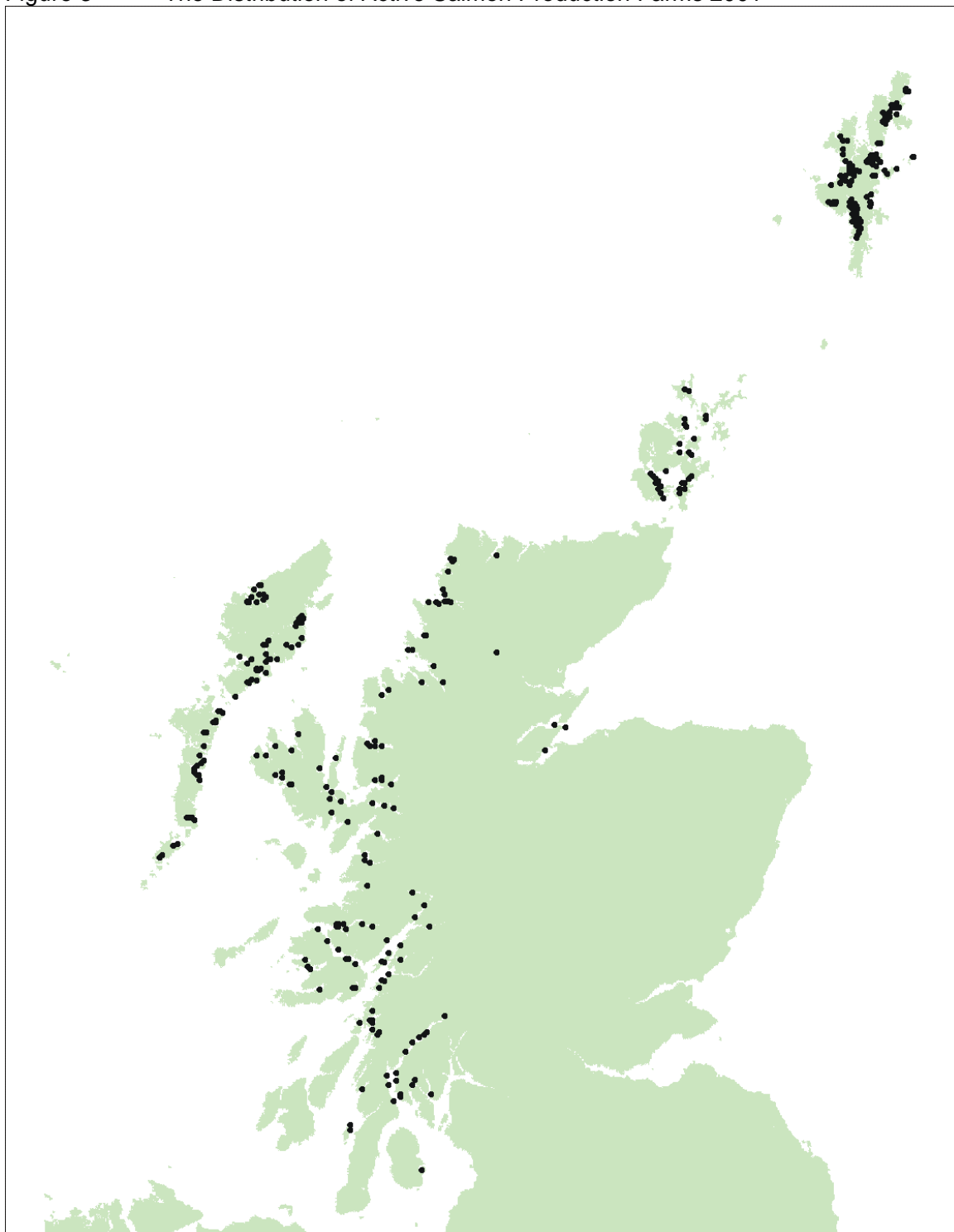
### Survival and Production in Smolt Year Classes by Production Area

**Table 30:** Number (000s) of Smolts put to Sea and Year Class Survival by Area 1992-2001

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					
	2001	13,767	2001	93	0.7								
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					
	2001	2,932	2001	-	-								
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
	Shetland	1999	12,663	1999	65	0.5	2000	5,576	44.0	2001	4,139	32.7	9,780



Figure 3 The Distribution of Active Salmon Production Farms 2001



## Staffing

**Table 31:** Number of Staff Employed in Salmon Production during 1992-2001

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

The total number of staff employed in salmon production in 2001 was 1,257 a decrease of one hundred and forty. The staff 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 110.2 tonnes production per-person. The decrease in employment at seawater sites is a trend which is reflected across the fish farming sector.

## Production Methods

**Table 32:** Production Methods, Capacity, Tonnage and Average Stocking Densities (kg/m<sup>3</sup>) during 1999-2001

Method	Number of sites			Total capacity (000s cubic metres)			Production (tonnes)		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Seawater tanks	3	2	2	15.5	15.5	15.5	194	129	232
Seawater cages	348	344	318	13,596	14,423	14,893	126,492	128,830	138,287
For cage sites:ratio of production (kg) to cage capacity (m <sup>3</sup> )							9.3	8.9	9.3

Almost all of the fish, 138,287 tonnes (99.8%) were produced in seawater cages, the proportion from seawater tanks, 0.2%, remained the same as in 2000. This figure reflects the continued high installation and running costs incurred in operating seawater tank systems. Thirty-eight 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 470,000 m<sup>3</sup> in 2001, 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 0.4kg in 2001. In cage sites, the ratio of production, expressed in kilograms, to cage capacity, expressed in cubic metres, was: 9.3; 8.9 and 9.3 in 1999,2000 and 2001 respectively. This indicates that on average across all production stages in any year, the stocking density is less than ten 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 1994-2001

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
% 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	-	-

\*Includes farms stocked but having no production.

In 2001, there was an increase of one in the number of sites producing less than 50 tonnes and an increase of eleven in those sites producing in excess of 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 2000-2001

Total Tonnage		0-100	101-200	201-400	401-700	701-1,000	1,001-2,000	>2,000	Total
No. of Companies	2000	30	6	11	9	7	12	15	90
	2001	29	7	8	13	6	9	15	87
No. of tonnes	2000	536	886	3,487	5,235	6,198	16,950	95,667	128,959
	2001	37	686	2,779	7,440	5,377	12,036	110,164	138,519
Manpower (total)	2000	104	33	63	68	124	166	839	1,397
	2001	103	24	71	91	50	112	806	1,257
Productivity (tonnes/person)	2000	5	27	55	77	50	102	114	92
	2001	0.36	28	39	82	107	107	137	110

Productivity may be used as a measure of efficiency, and was found to be related to the scale of production. The greatest productivity (137 tonnes per person) was achieved in those companies having a production in excess of two thousand tonnes and the least (less than one tonne per person) in the companies producing the smallest tonnages. In comparison with 2000 the average company productivity increased from 92 to 110 tonnes per person.

Overall production was dominated by 15 companies in 2001, which between them accounted for almost 80% of the salmon production in Scotland.





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			26,300*										
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			24,902*										
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			159,060*										

\*Estimated production in 2002

## Company and Farm Data

**Table 36:** Number of Companies and Sites Engaged in Salmon Production during 1993-2001

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

The number of companies registered with SEERAD and actively producing salmon in 2001 was 81, an increase of 13 on the 2000 figure. Six companies remained active and registered, although not producing salmon for harvest in 2001. This continued the trend of salmon production being concentrated within fewer companies. These 87 companies have 320 registered active sites, although not all active sites may have produced fish for harvest in 2001.

## Fallowing

**Table 37:** Number of Seawater Cage Sites Employing a Fallow Period during 1994-2001

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

Of the 320 cage sites recorded as being active in 2001, 195 farms were fallow for a variable period, whilst a further 45 farms were fallow for the whole of 2001. 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 80 sites that had no fallow period in 2001. These may have been stocked late in 2000 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 1991-2001

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

In 2001, the number of sites holding broodstock, including freshwater and seawater farms was 15, a decrease on the 2000 figure, following the trend evident since 1998. 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. Nineteen thousand, three hundred and seventy five female fish were stripped, yielding almost 100 million ova, compared with more than 124 million in 2000, which can be calculated to show an average ova yield per fish of 5,157.

#### 4. OTHER SPECIES

There is an increased interest in 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 this 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 1999-2001

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

**Table 40:** Number of Companies and Sites Producing Other Species and Production of Other Species (tonnes) during 1999-2001 and Estimated Production 2002

Species	No. of companies	No. of sites	1999 Production tonnage	2000 Production tonnage	2001 Production tonnage	2002 Production tonnage*
Arctic Char	7	10	2.8	7	3.75	8
Brown Trout /Sea Trout	19	26	92	138	105	127.4
Cod	6	7	0.1	15.7	15	207
Halibut	7	12	3.6	4.5	80	257

\*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 char (*salvelinus alpinus*) and brown trout for the angling restocking market.

There were three escape incidents in 2001, involving the escape of around 8,500 sea trout.

**Table 41:** Source of Ova Laid Down to Hatch in 2001

Species	Source of ova laid down to hatch (000s)		
	Own broodstock	Other GB broodstock	Foreign ova
Arctic char ( <i>Salvelinus alpinus</i> )	105	134	0
Cod ( <i>Gadus morhua</i> )	3,500	200	0
Brown trout/Sea trout ( <i>Salmo trutta</i> )	2,617	90	0
Halibut ( <i>Hippoglossus hippoglossus</i> )	18,000	200	0

**Table 42:** Trade in Other Species Small Fish in 2001

Species	Bought (000s)	Sold (000s)
Cod	56	0
Halibut	154	9,090
Brown Trout / Sea Trout	72	589

There were also sites stocked with carp (*Cyprinus carpio*), turbot (*Scophthalmus maximus*), lemon sole (*Microstomus kitt*), lumpsucker (*Cyclopterus lumpus*) and haddock (*Melanogrammus aeglefinus*). There was production of carp, brook trout 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 6% in 2001 to 5,466 tonnes and was directed solely at the table (85.5%) and restocking (14.5%) markets. The total numbers of staff employed by the sector decreased slightly to 159. As a consequence of these two factors the overall productivity of the industry increased to reach 34.4 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 increased for the third year running and was almost exclusively either all female diploid (90%) or sterile triploid (9%) stocks. Only 6% of these ova were sourced within the UK reflecting a continued rise in the numbers imported from abroad and a decline in the numbers of home produced ova. Although 37% 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 eggs.

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**

The survey shows increased production of salmon and smolts, improved productivity per person and improved yield from eggs and smolts.

Smolt production increased by 4% to 47.5 million with over two thirds (68.8%) being S1 and the majority of the remainder being S½ (30.9%) smolts. The number of staff directly employed on freshwater sites decreased by 16 resulting in increased productivity to over 111,000 fish per person. The number of smolts produced per egg laid down has increased year on year and the ratio of eggs laid down to smolts produced has increased from 3.3 in 1993 to 1.8 in 2001. Projected estimates for 2002 suggest that there were more ova laid down to hatch, and that more smolts will be produced in 2002 and 2003.

Almost all ova for the production of Scottish salmon was derived from Scottish farmed stocks, with 16% derived from non-Scottish stocks, an increase of 10% on reliance from foreign sources. The export of ova to other countries within the EU decreased by 66%, whilst exports to Chile decreased by 68%. There was a 7% increase in the importation of foreign ova as a result of the use of Icelandic eggs.

The production tonnage in seawater increased by 7.4% in 2001, due mainly to an increased average weight and increased survival giving a higher yield per smolt put to sea. The number of staff directly employed on site decreased, with the loss of 140 jobs in the seawater industry. The estimated smolt placement in 2002 is 49.3 million, which would indicate an increased harvest in 2003 and 2004, given improvements in average weight and survival rates. The estimated harvest forecast for 2002 is 159,060 tonnes, an increase of 14.8% on the 2001 total.

Despite the increase in tonnage the number of sites in production fell from 346 to 320. This reflects the trends towards increased size of producing sites. The average production of a seawater salmon farm in Scotland is now 866 tons and the number of sites producing tonnage in excess of 1,000 tons increased by 5% in 2001.

## **Other species**

Interest in the diversification of aquaculture continues but progress is still limited. Nevertheless in 2001 there was a significant increase in the tonnage of halibut produced and the numbers of cod put to sea with the potential to produce over two hundred tonnes in 2002.

# APPENDIX 1

Questionnaires sent to Fish Farmers

## ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2001

### RAINBOW TROUT - DATA

Please complete and return by 11 January 2002 to C. E. T. Allan, FRS Marine Laboratory  
PO Box 101, 375 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 freshwater cages or tanks

1    How many staff were employed in trout production                      Full time       Part time

2    How many eyed ova were laid down                      Site 1                      Site 2                      Site 3                      Site 4  
for hatching in 2001

a    from own broodstock                                

b    from GB broodstock                                

c    from abroad (Northern Hemisphere  
including 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    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)                                

         >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)



**ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS  
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2001**

**ATLANTIC SALMON - SMOLT DATA**

Please complete and return by 11 January 2002 to C. E. T. Allan, FRS Marine Laboratory  
PO Box 101, 375 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 freshwater cages or tanks

<p><b>1 How many staff were employed in smolt production company total)</b></p>	<p>Full time <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>      Part time <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p>																									
<p><b>2 How many ova were produced in the winter of 2000-2001 (company total)</b></p>	<p><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p>																									
<p><b>3 How many eyed ova were laid down for hatching (winter of 2000-2001)</b></p>	<table border="0"> <tr> <td></td> <td align="center"><b>Site 1</b></td> <td align="center"><b>Site 2</b></td> <td align="center"><b>Site 3</b></td> <td align="center"><b>Site 4</b></td> </tr> <tr> <td>a From own farmed broodstock</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>b From other GB farmed broodstock</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>c From GB wild broodstock</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>d From foreign sources</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>		<b>Site 1</b>	<b>Site 2</b>	<b>Site 3</b>	<b>Site 4</b>	a From own farmed broodstock	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	b From other GB farmed broodstock	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	c From GB wild broodstock	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	d From foreign sources	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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d From foreign sources	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																						
<p><b>4 How many eyed ova do you expect to hatch this winter (2001-2002)</b></p>	<table border="0"> <tr> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																				
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<p><b>5 How many fry or parr were</b></p>	<table border="0"> <tr> <td>a Transferred into the site</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>b Transferred out of the site</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	a Transferred into the site	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	b Transferred out of the site	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>															
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<p><b>6 How many smolts were produced as</b></p>	<table border="0"> <tr> <td>a S<sup>1</sup>/2 s (ie from 2000 hatch)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>b S1s (ie from 1999 hatch)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>c S1<sup>1</sup>/2 s (ie from 1998 hatch)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>d S2s (ie from 1998 hatch)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	a S <sup>1</sup> /2 s (ie from 2000 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	b S1s (ie from 1999 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	c S1 <sup>1</sup> /2 s (ie from 1998 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	d S2s (ie from 1998 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>					
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b S1s (ie from 1999 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																						
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<p><b>7 How many smolts were sold as</b></p>	<table border="0"> <tr> <td>a S1s (incl S<sup>1</sup>/2 s)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>b S2s (incl S1<sup>1</sup>/2 s)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	a S1s (incl S <sup>1</sup> /2 s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	b S2s (incl S1 <sup>1</sup> /2 s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>															
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<p><b>8 How many smolts do you expect to produce for sea winter on-growing next spring (2002) as</b></p>	<table border="0"> <tr> <td>a S1s (incl S<sup>1</sup>/2 s)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>b S2s (incl S1<sup>1</sup>/2 s)</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	a S1s (incl S <sup>1</sup> /2 s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	b S2s (incl S1 <sup>1</sup> /2 s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>															
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<p><b>9 How many smolts do you plan to produce in the spring of 2003</b></p>	<table border="0"> <tr> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																				
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<p><b>10 What is the fish holding capacity of each site in cubic metres</b></p>	<table border="0"> <tr> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																				
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<p><b>11 Duration of FALLOW PERIOD in WEEKS (cage sites only)</b></p>	<table border="0"> <tr> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																						
<p><b>12 How many fish did you vaccinate</b></p>	<table border="0"> <tr> <td>a against furunculosis</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>b against ERM</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>c against <i>Vibrio</i> sp.</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>d against IPN</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>	a against furunculosis	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	b against ERM	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	c against <i>Vibrio</i> sp.	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	d against IPN	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>					
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d against IPN	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																						

**ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS  
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2001**

**ATLANTIC SALMON - PRODUCTION DATA**

Please complete and return by 11 January 2002 to C. E. T. Allan, FRS Marine Laboratory  
PO Box 101, 375 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 seawater cages or tanks

<b>1</b>	<b>How many staff were employed in salmon production (company total), excluding post-harvest processing staff)</b>	<b>Full time</b>	<input type="text"/>	<input type="text"/>	<b>Part time</b>	<input type="text"/>	<input type="text"/>
<b>2</b>	<b>How many smolts were put into the site in 2001 as:</b>	<b>Site 1</b>	<b>Site 2</b>	<b>Site 3</b>	<b>Site 4</b>		
a	S <sup>1</sup> /2 s (ie from 2001 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
b	S1s (ie from 2000 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
c	S <sup>1</sup> /2 s (ie from 1999 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
d	S2s (ie from 1999 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>3</b>	<b>How many of the above smolts came from England</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>4</b>	<b>Total smolt input proposed in 2002</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>5</b>	<b>HARVEST of 2000 SMOLT INPUT in 2001</b>						
a	Number of tonnes	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
b	Number of fish	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>6</b>	<b>HARVEST of 2001 SMOLT INPUT from 1 JANUARY to 31 AUGUST</b>						
a	Number of tonnes	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
b	Number of fish	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>7</b>	<b>HARVEST of 2000 SMOLT INPUT from 1 SEPTEMBER to 31 DECEMBER</b>						
a	Number of tonnes	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
b	Number of fish	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>8</b>	<b>HARVEST of 1999 SMOLT INPUT</b>						
a	Number of tonnes	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
b	Number of fish	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>9</b>	<b>How many tonnes of fish do you expect to produce in 2002</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>10a</b>	<b>Were brood fish produced in 2001</b>	YES/NO	YES/NO	YES/NO	YES/NO		
<b>b</b>	<b>How many fish were stripped</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>11</b>	<b>What is the current fish holding capacity of each site in cubic metres</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>12</b>	<b>Duration of FALLOW PERIOD in WEEKS (cage sites; MAX=52)</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<b>13</b>	<b>Does a management agreement in respect of fish health operate with</b>	YES/NO	YES/NO	YES/NO	YES/NO		

## APPENDIX 2

### Glossary and Abbreviations

<b>Active</b>	Fish farms in a production growing cycle which may contain stock or be fallow.
<b>Alevin</b>	Young salmon, at stage from hatching to end of dependence on yolk sacs as primary source of nutrition.
<b>Approved Zone Status</b>	EU recognition of an area clear of listed disease(s).
<b>Biomass</b>	Weight of organisms in an area.
<b>Cohort</b>	A group of fish spawned at a given period.
<b>Diploid</b>	Fish with the normal two sets of chromosomes.
<b>Eyed-ova/eggs</b>	Fish egg(s) at the stage of development when the heavily pigmented eyes of the embryo are sufficiently developed to be clearly visible.
<b>Fallow</b>	Fish farm having no stock, but still part of a growing cycle.
<b>Fecundity</b>	Fertility of an organism.
<b>Fingerling</b>	A term commonly applied to young stages of salmonid fish.
<b>First feeder</b>	Refers to the youngest feeding fish on a farm.
<b>Fry</b>	Young salmon at stage from independence of yolk sac as primary source of nutrition to dispersal from the redd.
<b>GB approved</b>	EU recognised zone clear of List II diseases. health zone
<b>Grilse</b>	Salmon maturing after one winter at sea.
<b>Grilsing period</b>	Period during first year at sea when gonads are maturing (salmon).
<b>Inactive</b>	Fish farms not in a production cycle and without stock.
<b>Milt</b>	Sperm.
<b>Monovalent</b>	Vaccine to produce a protective immune response against a single pathogen.
<b>Non-producing</b>	A site which is active, may be stocked with fish, but has produced no fish for harvest during the specified year.
<b>Ongrowing</b>	Farm producing fish for the table market.
<b>Ova</b>	Eggs
<b>0-year fish</b>	Fish in their first year of life.
<b>Parr</b>	Young salmon at stage from dispersal from redd to migration as a smolt.

<b>Photoperiod</b>	Alteration of light regime.
<b>Polyvalent</b>	Vaccine to produce a protective immune response against several pathogens.
<b>Pre-salmon</b>	Non-mature salmon usually after one winter at sea.
<b>Raceway</b>	Concrete or brick channels used for farming fish.
<b>Recreational Fisheries</b>	Angling fishery.
<b>S<sup>1/2</sup></b>	Salmon or sea trout smolting at approximately six months from hatch (usually by photoperiod and/or temperature manipulation)
<b>S1</b>	Salmon or sea trout smolting at approximately one year from hatch.
<b>S<sup>1 1/2</sup></b>	Salmon or sea trout smolting at approximately 18 months from hatch.
<b>S2</b>	Salmon or sea trout smolting at approximately two years from hatch.
<b>Smolt</b>	Fully silvered juvenile salmon ready to be transferred or to migrate to sea.
<b>Third Country</b>	Country outside the EU.
<b>Triploid</b>	Genetically modified fish which have three sets of chromosomes instead of two.
<b>Year Class</b>	Fish hatched or put to sea in a given year.
<b>ATC</b>	Animal test certificate
<b>ERM</b>	Enteric redmouth
<b>IHN</b>	Infectious haemopoietic necrosis
<b>IPN</b>	Infectious pancreatic necrosis
<b>ISA</b>	Infectious salmon anaemia
<b>VHS</b>	Viral haemorrhagic septicaemia
<b>RTFS</b>	Rainbow trout fry syndrome
<b>SEERAD</b>	Scottish Executive Environment and Rural Affairs Department
<b>VMD</b>	Veterinary Medicines Directorate

Fisheries Research Services is an agency of the Scottish Executive

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