



FISHERIES RESEARCH SERVICES

Scottish Fish Farms Annual Production Survey, 2007





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Annual Production Survey 2007

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the Scottish Government by
Fisheries Research Services

Fisheries Research Services is
an agency of the Scottish Government

Foreword

The annual production survey of fish farms in Scotland for 2007 was carried out by Fisheries Research Services (FRS), an agency of the Scottish Government. 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 2007 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 16-year period 1991-2007. 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 cooperation of the fish farming industry in completing the questionnaires is gratefully acknowledged.

R J Smith

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SUMMARY

The tables below summarise the results from the 2007 fish farms annual production survey.

Atlantic salmon (*Salmo salar*)

Smolts

		2006	2007
Number of ova produced	(millions)	60.9	83.8
Number of ova laid down to hatch	(millions)	64.1	75.3
Number of ova exported	(millions)	31.3	32.3
Number of ova imported	(millions)	30.2	44.1
Number of smolts produced	(millions)	40.8	38.1
Number of smolts put to sea	(millions)	41.1	37.8
Number of staff employed		271	279
Mean productivity (000s smolts/person)		150.6	136.6

The production of ova increased by almost twenty three million in 2007, and the number of ova laid down to hatch increased by over eleven million. Imports and exports of ova increased, and there was a decrease of almost three million in the production of smolts. The number of staff employed increased by eight, whilst mean productivity decreased.

Production fish

		2006	2007
Total production	(tonnes)	131,847	129,930
Production of 0-year fish	(tonnes)	211	40
Production of grilse	(tonnes)	18,162	15,811
Production of pre-salmon	(tonnes)	45,937	45,079
Production of salmon	(tonnes)	67,537	69,000
Mean fish weight 0-year	(Kg)	1.8	1.7
Mean fish weight grilse	(Kg)	4.2	4.1
Mean fish weight pre-salmon	(Kg)	4.7	4.5
Mean fish weight salmon	(Kg)	4.7	4.6
Number of staff employed		871	916
Mean productivity	tonnes/person	151.4	141.8

Production tonnage decreased by 1.4% with a decrease in mean weight at harvest. Staff numbers increased by 45. Mean productivity showed a decrease.

Smolt survival (percentage harvested)

Survival (%)	Years 0+1	Year 2	Total
2004 input year class	39.0	36.5	75.5
2005 input year class	37.8	40.3	78.1

Overall smolt survival increased by 2.6% compared with the 2004 year class.

Rainbow Trout (*Oncorhynchus mykiss*)

		2006	2007
Total production	(tonnes)	7,492	7,414
Production for the table	(tonnes)	6,628	6,569
Production for restocking	(tonnes)	864	845
Number of staff employed		147	143
Mean productivity	(tonnes/person)	51.0	51.8
Number of ova laid down to hatch	(millions)	26.8	28.3
Number of ova imported	(millions)	25.1	26.9

In 2007, rainbow trout production decreased by 78 tonnes. Employment decreased by four staff members, and productivity per person increased to 51.8 tonnes. There was an increase of 1.5 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!^a*Gadus morhua*; Halibut, (*Hippoglossus hippoglossus*))

		2006	2007
Total production	(tonnes)	1,047	1,388
Number of staff employed	(full-time)	92	75
	(part-time)	17	29
Number of ova laid down to hatch	(millions)	135 ^a	45 ^a
Number of ova imported	(millions)	0 ^b	0 ^b

^a Excluding cod ova laid down to hatch from foreign sources.

^b Excluding cod ova imported.

In 2007 the production of other species increased by 341 tonnes on the 2006 total. Overall, employment decreased by five, due to a decrease in staffing levels within the cod sector. 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.

Number of Escape Incidents from Fish Farms Notified to the Scottish Government

Species	Number of escape notifications	Number of fish escaped
Rainbow trout	11	56,151
Atlantic salmon (freshwater stages)	2	15,075
Atlantic salmon (seawater stages)	18	139,391
Other species	2	26

1. RAINBOW TROUT (*Oncorhynchus mykiss*)

Annual production survey questionnaires were sent to all 38 companies registered with the Scottish Government and engaged in the production of rainbow trout in Scotland during 2007. Returns were received from all 38 companies, covering the 70 sites currently in production.

Production

Table 1a: Total production (tonnes) of rainbow trout during 1994-2007

Year	Tonnes	Year	Tonnes
1994	4,263	2001	5,466
1995	4,683	2002	6,659
1996	4,630	2003	7,085
1997	4,653	2004	6,352
1998	4,913	2005	6,989
1999	5,834	2006	7,492
2000	5,154	2007	7,414

Production decreased in 2007 by 78 tonnes, a decrease of 1.0%. Within the table trade, a significant increase was observed in the small sized fish, with decreases in the large and medium sizes of fish. In the restocking trade, the production of medium sized fish showed an increase, while large and small fish production showed decreases.

Table 1b: Production (tonnes) for the table trade during 1997-2007 according to weight category

Year	<450 g	450-900 g	>900 g	Total
	<1 lb	1-2 lbs	>2 lbs	Tonnes
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
2005	2,856	1,203	2,111	6,170
2006	2,182	1,810	2,636	6,628
2007	2,499	1,663	2,407	6,569

Production for the table in 2007 was 6,569 tonnes, a decrease of 59 tonnes (0.9%) on the 2006 total, and accounted for 88.6% of the total rainbow trout production, a similar proportion to that produced in 2006. Supply was mainly of fish weighing up to 900 g, encompassing 63% of total production for the table.

Table 1c: Production (tonnes) for the restocking trade during 1997-2007 according to weight category

Year	<450 g	450-900 g	>900 g	Total
	<1 lb	1-2 lbs	>2 lbs	Tonnes
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
2005	21	390	408	819
2006	36	357	471	864
2007	24	413	408	845

Production for the restocking of angling waters decreased in 2007 and accounted for 11.4% of total rainbow trout production in 2007. In 2007, production totalled 845 tonnes, a decrease of 19 tonnes (2.2%) on the 2006 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 eleven reported escape incidents from rainbow trout sites in 2007, involving the loss of 56,151 fish.

Production by Site

Table 2: Numbers of sites grouped by tonnage produced during 1997-2007

Year	Number of sites per production tonnage				Total number of sites
	<1-25	26-100	101-200	>200	
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
2005	18	12	6	11	47
2006	16	15	6	13	50
2007	14	15	3	16	48

Production was reported from 48 sites. The number of producers in the size bracket >200 tonnes increased in 2007, while those producers in the size brackets <1-25 tonnes and 101- 200 tonnes decreased, and the number of producers in the size bracket 26-100 tonnes remained unchanged. 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 2007, and comparison with production in 2006

Production method	Production grouping (tonnes) in 2007					Total tonnage and (%) by method		Number of sites	
	<10	10-25	26-50	51-100	>100	2006	2007	2006	2007
FW cages	1	1	0	1	5	2,842 (37.9)	2,704 (36.5)	8	8
FW ponds and raceways	3	6	6	7	6	2,299 (30.7)	2,354 (31.7)	29	28
FW tanks and hatcheries	3	0	0	0	0	10 (0.1)	3 (>0.1)	3	3
SW cages	0	0	0	1	8	2,341 (31.3)	2,353 (31.7)	10	9
SW tanks	0	0	0	0	0	0	0	0	0
Total	7	7	6	9	19	7,492	7,414	50	48

Freshwater production accounted for 5,061 tonnes (68.3%) and seawater production for the remaining 2,353 tonnes (31.7%). The main rearing facilities were freshwater cages, ponds and raceways. There was a slight increase in production from seawater cages, but a decrease in production from freshwater cages.

Company and Site Data

Table 4: Number of companies and sites in production during 1994-2007

Year	No. of companies	No. of sites
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
2005	42	70
2006	36	66
2007	38	70

The number of companies registered with the Scottish Government as being actively engaged in rainbow trout production was 38 in 2007. The number of sites registered and in production during 2007 was 70.

Staffing and Productivity

Table 5: Number of staff employed, and productivity per person during 1994-2007

Year	Full-time	Part-time	Total	Productivity (tonnes/person)
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
2005	108	35	143	48.9
2006	112	35	147	51.0
2007	111	32	143	51.8

The overall number of staff employed in 2007 decreased by four to 143. During 2007 the number of full-time staff decreased by one and the number of part-time employees decreased by three.

Productivity, measured as tonnes produced per person, increased slightly by 0.8% in 2007. No distinction was made between full and part-time employees when calculating productivity.

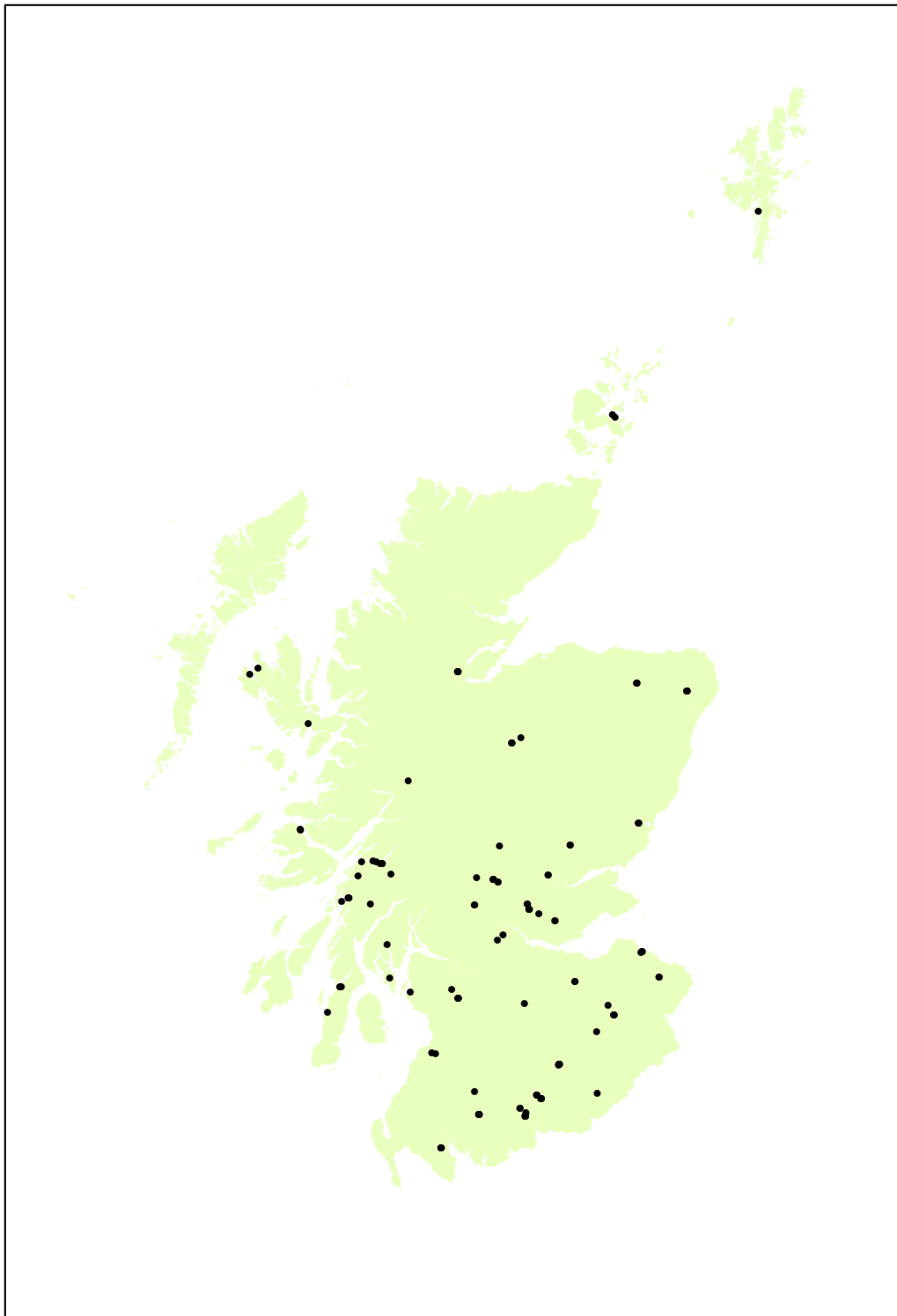
Production by Area

Table 6: Production and staffing by area in 2007

Area	No. sites	Table production (tonnes)	Restocking production (tonnes)	Mean tonnes per site	Staffing			Productivity tonnes/person
					F/T	P/T	Total	
North	13	1,790	95	145	22	6	28	67.3
East	18	1,443	332	98.6	34	8	42	42.3
West	23	2,411	86	108.6	30	4	34	73.4
South	16	925	332	78.6	25	14	39	32.2
All	70	6,569	845	105.9	111	32	143	51.8

Productivity per site was greatest in the north, 145 tonnes per site, a reflection of some sea cage sites diversifying into rainbow trout production in the Northern Isles. However, productivity per person remained greatest in the west, at 73.4 tonnes per person.

Figure 1: The distribution of active rainbow trout sites 2007



Type of Ova Laid Down

Table 7: Number (000s) and proportions (%) of ova types laid down to hatch during 1996-2007

Year	All female diploid no.(%)	Triploid no. (%)	Mixed sex diploid no. (%)	Total ova
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
2005	16,773 (83)	1,729 (8)	1,745 (9)	20,247
2006	22,378 (84)	2,804 (10)	1,626 (6)	26,808
2007	23,630 (83)	2,531 (9)	2,140 (8)	28,301

Source of Ova Laid Down

Table 8: Number (000s) and sources of ova laid down to hatch 1996-2007

Year	Ova produced in Great Britain (GB)			Imported ova			Total
	Own stock	Other stock	Total	Northern hemisphere	Southern hemisphere	Total	
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
2005	281	105	386	16,977	2,884	19,861	20,247
2006	541	2,169	2,710	22,588	1,510	24,098	26,808
2007	936	230	1,166	26,650	485	27,135	28,301

In 2007, the total number of eyed-ova laid down to hatch increased by over one million (6%) on the 2006 figure. The proportion of ova from GB broodstock decreased to 4.1% 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 2000-2007

Source	2000	2001	2002	2003	2004	2005	2006	2007
N. Ireland	1,085	710	-	-	405	1,710	2,830	7,721
Isle of Man	5,842	6,670	6,775	6,855	8,012	1,700	3,480	3,767
Denmark	4,225	6,135	5,000	5,270	6,370	9,225	14,525	13,070
South Africa	7,762	8,075	7,750	50	-	-	-	485
USA	-	-	1,700	11,035	17,335	4,440	2,310	890
France	-	-	-	875	800	200	-	-
Australia	-	-	-	-	-	2,600	1,500	-
Norway	-	-	-	-	-	-	500	1,200
Totals	18,914	21,590	21,225	24,085	32,922	19,875	25,145	27,133

Table 9b: Seasonal variation in numbers (000s) and sources of ova imported into Scotland during 2007

Month	Norway	South Africa	Isle of Man	Denmark	N. Ireland	USA
January	-	-	-	2,350	950	-
February	500	-	750	1,120	2,796	-
March	500	-	1,650	150	500	-
April	200	-	7	2,090	-	-
May	-	-	-	1,910	90	-
June	-	285	-	-	-	-
July	-	200	-	-	380	-
August	-	-	-	300	1,870	90
September	-	-	-	700	200	300
October	-	-	130	1,100	250	500
November	-	-	1,050	2,550	-	-
December	-	-	180	800	685	-
Totals	1,200	485	3,767	13,070	7,721	890

Suppliers within the EU accounted for 91% of ova imported into Scotland during 2007, with the USA accounting for 3%, South Africa 2% and Norway 4%. To maintain their ability to regulate production throughout the year and produce a constant supply of fish for their markets, producers have to rely upon supplies of out of season ova. Historically these have been obtained from sources in the southern hemisphere, but to meet demand, markets have now been established within the EU.

Trade in Fry and Fingerlings

Table 10: Number (000s) of fry and fingerlings traded during 1996-2007

Year	Fry and fingerlings bought			Total number bought	Total number sold
	All female diploid nos. (%)	Triploid nos. (%)	Mixed sex diploid nos. (%)		
1996	12,174 (93)	572 (5)	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
2005	14,618 (83)	1,532 (9)	1,480 (8)	17,630	16,919
2006	19,731 (89)	1,675 (7)	790 (4)	22,196	20,460
2007	14,830 (89)	1,140 (7)	675 (4)	16,645	23,631

The established trade between hatcheries and on-growing farms continued in 2007. Some companies specialised in the production of fry and fingerlings. The total number of fry and fingerlings purchased by producers decreased by 25%, and the total number sold by producers increased by 15%. The disparity between supply and demand is due to supplies being sold to England and Wales. There was not a shortage in supply as has been noted in previous years.

Use of Vaccines

Table 11: Number of sites rearing fish vaccinated against enteric redmouth disease (ERM) during 1996-2007

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
No. of sites	33	35	31	40	35	33	34	38	42	37	31	28

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 41.4 million fish were vaccinated on 28 sites. 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 37 companies registered with the Scottish Government as being actively engaged in the freshwater production of Atlantic salmon in Scotland during 2007. Returns were received from all companies, covering the 135 sites currently in production.

Company and Site Data

Table 12: Number of companies and sites in production during 1999-2007^c

Year	No. of companies	No. of sites
1999	65	189
2000	60	184
2001	56	169
2002	55	173
2003	48	176
2004	48	172
2005	41	148
2006	39	135
2007	37	135

In 2007 the number of companies registered with the Scottish Government as being actively engaged in the freshwater production of Atlantic salmon decreased to 37. A total of 270 freshwater sites were registered, and of these, 135 sites were inactive and 135 sites were actively engaged in commercial production.

Production and Staffing

Table 13: Number (000s) of smolts produced, staff employed and smolt productivity during 1997-2007

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number (000s) of smolts produced	38,187	44,853	39,763	45,583	47,546	47,161	44,414	39,999	36,326	40,827	38,125
Staffing											
Full-time	344	318	300	341	317	312	291	259	200	209	217
Part-time	166	96	124	103	111	93	82	60	74	62	62
Total	510	414	424	444	428	405	373	319	274	271	279
Productivity, 000s of smolts per person	74.9	108.3	93.8	102.7	111.1	116.4	119.1	125.4	132.6	150.6	136.6

Smolt production in 2007 decreased by over 2.7 million, a decrease of 6.6% compared to 2006. The number of staff employed increased by eight, and productivity decreased by over 9%, to a figure of 136,600 smolts produced per employee.

^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 Government 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. The registration details of specific sites and businesses is subject to consideration under The Freedom of Information (Relaxation of Statutory Prohibitions on Disclosure of Information) (Scotland) Order 2008. Company and site information is published here in summary form.

Escapes

There were two reported escape incidents from freshwater Atlantic salmon sites in 2007, involving the loss of 15,075 fish.

Smolts by Age Group

Table 14: Number of smolts (000s) produced by type during 1996-2007

Year	S½	S1	S1½	S2	Total
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
2005	12,639	22,197	1,489	1	36,326
2006	16,953	23,172	698	4	40,827
2007	15,431	22,694	0	0	38,125

In 2007, production was dominated by S1 smolts, with numbers produced decreasing by 2.1%. The production of S½ smolts also decreased by 9%. There was no production of S1½ or S2 smolts.

Production Systems

Table 15: Number and capacity of production systems during 2003-2007

System	No. of sites with system					Total capacity, 000s cubic metres				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Cages	80	76	61	58	56	391	365	378	365	327
Tanks and Raceways	96	96	87	77	79	40	43	38	36	60
Total	176	172	148	135	135	431	408	416	401	387

The principal types of facility used for the production of smolts in fresh water are cages or tanks and raceways. In 2007, the number of farms using tanks and raceways increased by two, and the number of farms using cages decreased by two. In terms of volume, tank and raceway capacity increased by 24,000 m³, and cage volume decreased by 38,000 m³. This resulted in a net decrease in volume of 14,000 m³ available for the production of smolts in Scotland during 2007.

Table 16: Number (000s) of smolts produced, and stocking densities by production system during 2003-2007

Year	Number of smolts produced (000s)					Stocking densities (smolts /m ³)				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Cages	24,094	17,575	15,380	18,700	19,440	62	48	41	51	59
All others	20,320	22,424	20,946	22,127	18,685	508	521	551	615	311
Total	44,414	39,999	36,326	40,827	38,125	-	-	-	-	-

The average stocking densities of cages increased compared to 2006, while those of tanks and raceways decreased; in the case of cages from 51 to 59 fish per m³ and in the case of tanks and raceways, from 615 to 311 fish per m³.

Ova Production

Table 17: Number (000s) of salmon ova produced during 2000-2007

Year	2000	2001	2002	2003	2004	2005	2006	2007
No. of ova	124,619	99,921	107,996	115,569	128,866	73,211	60,941	83,822

Just under 84 million ova were stripped in 2007, an increase of almost 23 million (38%) on the 2006 season.

Table 18: Source, number (000s) and previous year's estimate of ova laid down to hatch during 1996-2008

Year	In-house broodstock	Out-sourced GB broodstock	GB wild broodstock	Foreign ova	Total	Previous year's estimate
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	43,261	22,465	71	9,896	75,693	65,741
2006	19,063	17,768	63	27,157	64,051	58,385
2007	18,837	14,366	78	42,022	75,303	68,032
2008	-	-	-	-	-	75,302

The number of ova laid down to hatch was 75.3 million, an increase of over eleven million (17.6%) on the 2006 figure. The majority of the ova (56%) were derived from foreign sources, this was an increase of almost 15 million (55%) on the 2006 figure. Supplies derived from GB broodstock decreased by over 3.5 million, this was a 10% decrease on the 2006 figure. Producers' estimates for the number of ova to be laid down in 2008 are similarly proportioned to the actual number of ova laid down in 2007. 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 1998-2009

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Actual smolts put to sea	45.9	41.1	45.2	48.6	50.1	43.8	39.1	37.2	41.1	37.8		
Smolts produced	44.8	39.8	45.6	47.5	47.2	44.4	40.0	36.3	40.8	38.1		
Estimated production	45.3	49.6	42.1	50.2	49.3	44.2	40.0	36.2	33.2	41.2	34.9	43.7
Ratio of ova laid down to smolts produced	1.5	1.7	1.8	1.8	1.8	1.8	1.8	2.1	1.6	2.0		

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 34.9 million smolts to sea in 2008.

The ratio of ova laid down to hatch to smolts produced in 2007 was greater than the ratio in 2006.

Scale of Production

Table 20: Smolt-producing sites grouped by numbers (000s) of smolts produced during 1995-2007

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		
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
2005	2	1	4	15	25	22	21	4	94	36,326
2006	1	4	2	9	19	21	18	10	84	40,827
2007	2	2	4	7	21	21	14	11	82	38,125

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 2006. The number of sites producing less than 101,000 smolts has decreased by one, and there has also been a decrease of one in the number of sites producing more than 100,000 smolts. The number of sites producing in excess of one million smolts per year increased by one, with a decrease in the number of sites producing between 501,000 and one million smolts per year.

Production of Ova and Smolt by Production Area

Table 21: Staffing, and ova laid down to hatch, 2006-2007, smolt production 2006-2007 and estimated production 2008-2009 by region

Region	Number of staff employed in 2007		Ova laid down to hatch (000s)		Smolt production (000s)		Estimated smolt production (000s)	
	F/T	P/T	2006	2007	2006	2007	2008	2009
Northwest	110	43	32,020	38,981	21,825	20,155	17,626	23,072
Orkney	2	0	110	150	95	156	196	100
Shetland	9	6	140	1,921	647	1,294	1,305	1,660
West	43	5	14,623	18,227	10,043	9,448	9,549	9,910
Western Isles	39	6	15,384	12,917	6,629	6,023	4,635	7,140
East and South	14	2	1,774	3,107	1,588	1,049	1,620	1,848
All Scotland	217	62	64,051	75,303	40,827	38,125	34,931	43,730

The north west, west and the Western Isles were the main ova and smolt producing areas in Scotland in 2007, and employed the greatest number of staff.

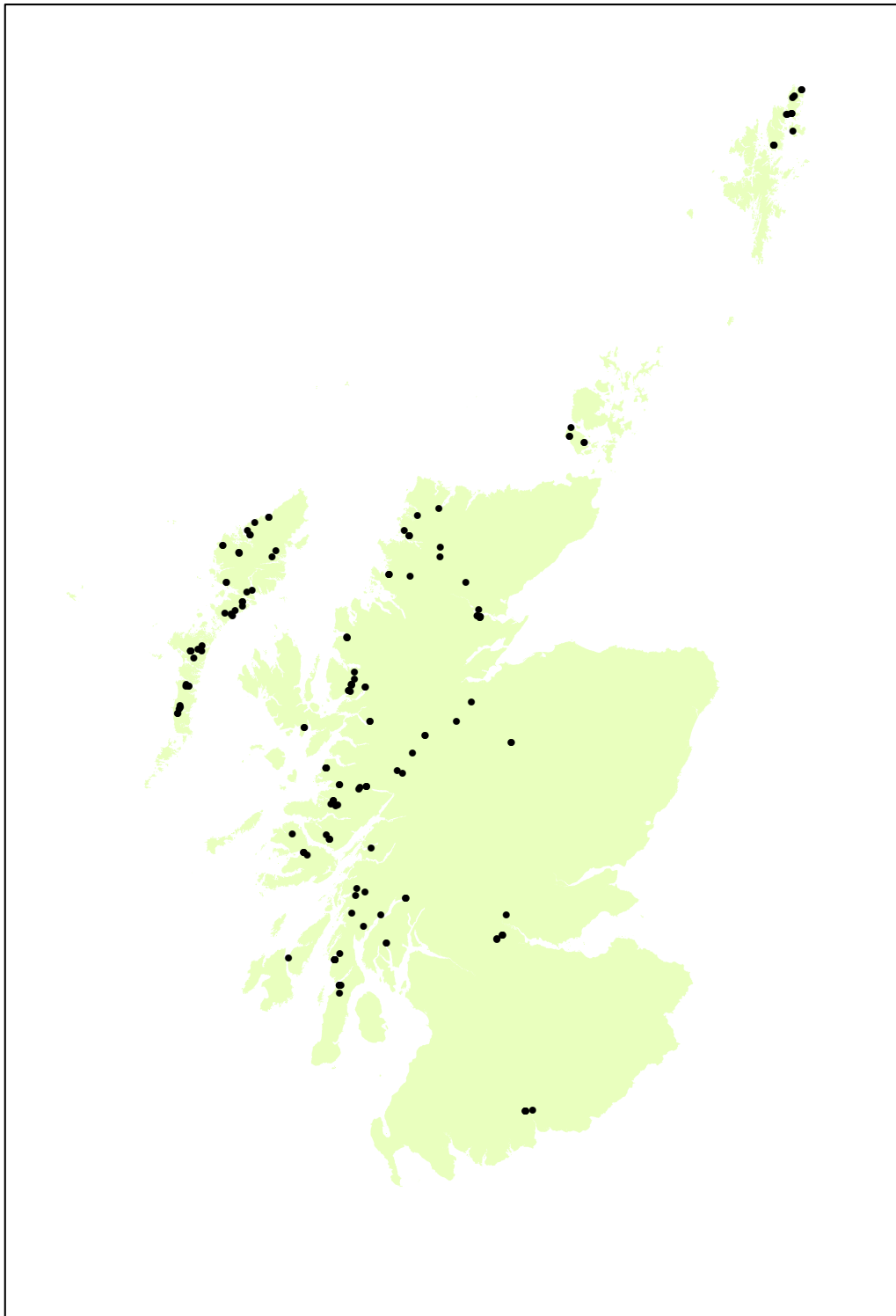
International Trade in Ova

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 2007



Imports and Exports

Table 22a: Source and number (000s) of ova, parr and smolts imported during 1996-2007 derived from import licences

Import Year	Ova					Total	Parr and Smolts
	EU Member States	EFTA		Third Countries			EU Member States
		Iceland	Norway	Australia	USA		
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
2005	2,610	570	13,210	-	450	16,840	150
2006	11,575	300	15,940	2,400	-	30,215	375
2007	10,511	0	33,555	0	0	44,066	420

The numbers of ova imported increased by 46%. The number of parr and smolts imported increased by 12%.

Table 22b: Destination and number (000s) of salmon ova exported during 1997-2007 derived from export certificates

Export year	Farmed origin				Total	Wild origin total
	Chile	EU	Faroes	Others		
1997	44,810	12,525	0	0	57,335	270
1998	23,375	4,459	0	20	27,854	492
1999	16,880	13,054	0	0	29,934	52
2000	9,740	25,311	0	0	35,051	50
2001	2,675	8,542	0	0	11,217	0
2002	1,600	6,627	0	0	8,227	0
2003	0	2,171	0	0	2,171	0
2004	2,215	3,699	0	0	5,914	0
2005	8,560	3,130	1,566	0	13,256	0
2006	26,930	4,312	0	0	31,242	0
2007	32,150	164	0	0	32,314	0

In 2007, a total of 32.3 million ova were exported. Exports of ova to other EU member states decreased by 96% to 0.16 million in 2007. The trade with Chile increased by over 5 million ova. Overall, exports increased by 3% on the 2006 figure.

Vaccines

Table 23: Number of sites using vaccines and number (millions) of fish vaccinated during 1999-2007

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
No. of sites	115	114	106	108	104	98	84	79	73
No. of fish (millions) vaccinated	43.9	45.8	51.3	47.5	41.7	39.4	33.8	43.5	41.0

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 *Vibriosis*. A total of 41.0 million fish were vaccinated across 73 sites.

3. ATLANTIC SALMON - PRODUCTION

Production

Production survey information was collected from all 38 companies actively involved in Atlantic salmon production, farming 247 active sites. This figure represents the entire industry operating in Scotland.

Table 24: Annual production of Atlantic salmon (tonnes) during 1987-2007 and projected production in 2008

Year	Tonnes	Percentage difference	Year	Tonnes	Percentage difference
1987	12,721	23	1998	110,784	12
1988	17,951	41	1999	126,686	14
1989	28,553	59	2000	128,959	2
1990	32,351	13	2001	138,519	7
1991	40,593	25	2002	144,589	4
1992	36,101	-11	2003	169,736	17
1993	48,691	35	2004	158,099	-7
1994	64,066	32	2005	129,588	-18
1995	70,060	9	2006	131,847	2
1996	83,121	19	2007	129,930	-1.4
1997	99,197	19	2008	136,775*	

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

The total production of Atlantic salmon during 2007 was 129,930 tonnes, a decrease of 1,917 tonnes (1.4%) on the 2006 production. This slight decrease in production shows that the industry continues to consolidate and stabilise at a manageable production level.

Escapes

There were 18 reported escape incidents from seawater Atlantic salmon sites in 2007, involving the loss of 139,391 fish.

Table 25: Number (000s) and production (tonnes) of salmon harvested, and mean fish weight (Kg) per year class during 1997-2007

	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)	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
	2005	2005	0	0	0
	2006	2006	115	211	1.8
	2007	2007	23	40	1.7
Harvest in year 1	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
	2004	2005	15,075	67,738	4.5
	2005	2006	14,036	64,099	4.6
	2006	2007	13,787	60,890	4.4
Harvest in year 2	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
	2003	2005	13,920	61,850	4.4
	2004	2006	14,237	67,537	4.7
	2005	2007	14,999	69,000	4.6

Table 26: Number (000s) and production (tonnes) of grilse and pre-salmon harvested during 1997-2007

Year	Grilse (January-August)			Pre-salmon (September-December)		
	Number	Tonnes	Average weight (Kg)	Number	Tonnes	Average weight (Kg)
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
2005	5,662	22,972	4.1	9,413	44,766	4.7
2006	4,357	18,162	4.2	9,679	45,937	4.7
2007	3,823	15,811	4.1	9,964	45,079	4.5

Table 27: Percentage (by weight) of annual production by growth stage harvested during 1999-2007

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Growth stage	-	-	-	-	-	-	-	-	-
Input year fish	2	2	<1	<1	<1	<1	0	<1	<1
Grilse	32	35	30	23	19	17	18	13	12
Pre-salmon	34	35	39	39	37	37	34	35	34
Salmon	32	28	30	37	43	45	48	51	53

Survival and Production in Smolt Year Classes

Table 28: Survival and production in smolt year classes during 1991-2007

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)	% harvest	Number (000s)	Weight (tonnes)	Mean weight (Kg)	% harvest	Number (000s)	Weight (tonnes)	Mean weight (Kg)	% harvest			
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	13,920	61,850	4.4	32.3	78.0	147,918	3.43
2004	39,041	168	319	1.9	0.4	15,075	67,738	4.5	38.6	14,237	67,537	4.7	36.5	75.5	135,594	3.47
2005	37,168	-	-	-	-	14,036	64,099	4.6	37.8	14,999	69,000	4.6	40.3	78.1	133,099	3.58
2006	41,091	115	211	1.8	0.3	13,787	60,890	4.4	33.5							
2007	37,853	23	40	1.7	0.06											

In 2005, the last year for which survival can be calculated, the survival rate from smolt input to harvest was 78.1%. The 2005 year class displayed a higher survival rate than that noted in 2004, and was lower than the survival averaged over the last 15 year-classes.

Of the 2006 year class, 33.8% of the input has been harvested, approximately 4% lower than the average harvest of fish one year after input in the 2005 year class. The average weight decreased by 0.2Kg to 4.4 Kg. This may indicate an increased harvest in 2008 of 2 sea winter (2SW) fish.

In 2007, the harvest of fish from the 2007 smolt input was 0.06%, a decrease compared with the proportion of fish harvested from the same year class in 2006.

Smolts to Sea

Table 29: Number (000s) and origin of smolts put to sea during 1995-2007

Year	Smolts put to sea (000s)				Total (000s)	Scottish Origin	English Origin		Other Origin	
	S½	S1	S1½	S2		%	(000s)	%	(000s)	%
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	14,044	23,776	1,221	0	39,041	97	634	2	541	>1
2005	13,051	22,501	1,616	0	37,168	96	1,594	4	0	0
2006	15,578	23,733	1,779	0	41,090	96	1,257	3	272	>1
2007	14,665	23,188	0	0	37,853	94	1,747	5	420	1

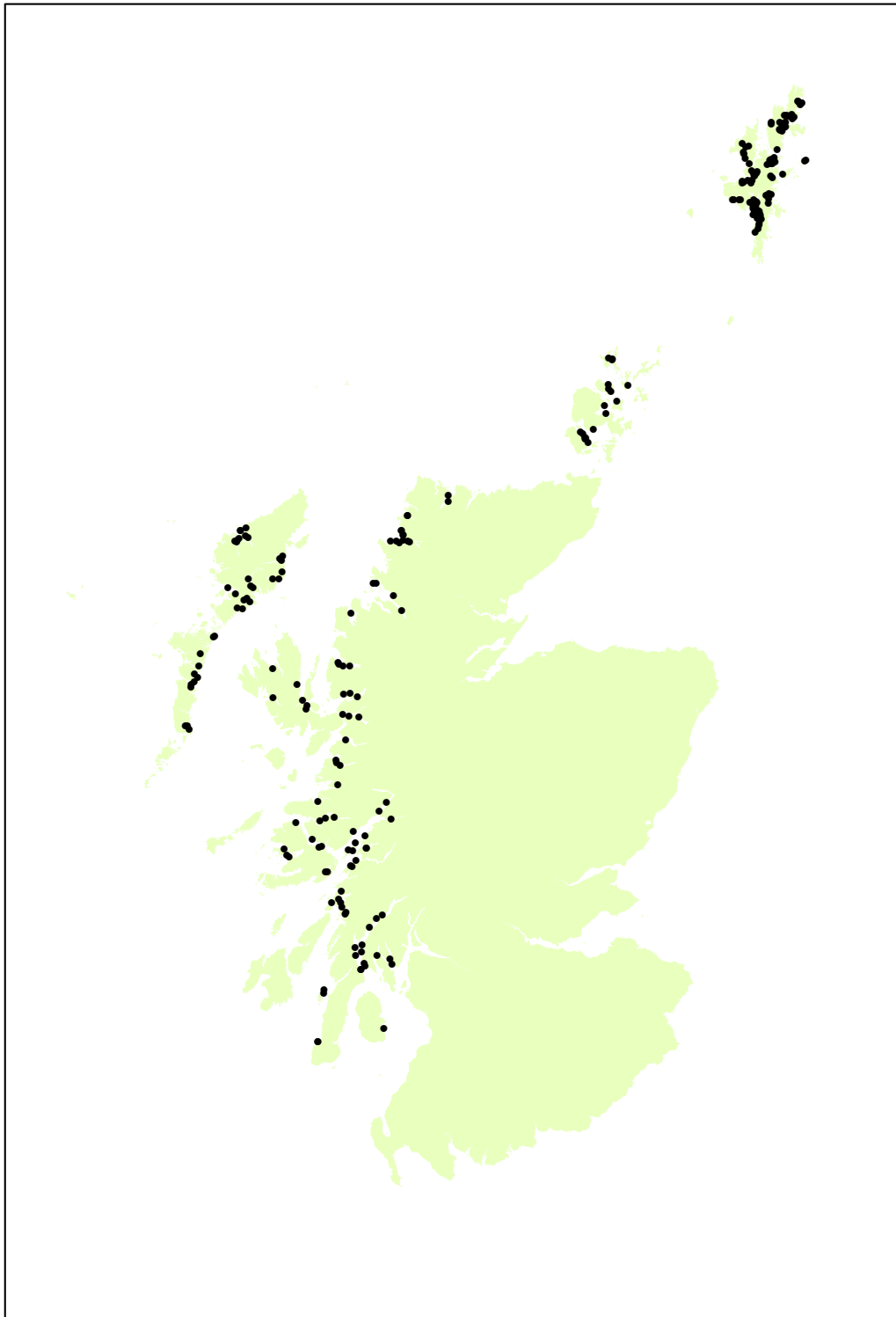
The total number of smolts put to sea in 2007 was almost 38 million. The smolt input comprised mainly S1 smolts (61%), and the proportion of photoperiod adjusted fish (S½ smolts) input decreased to 39%. Approximately 6% of smolts input into Scottish salmon farms were sourced from outwith Scotland. This is an increase on the proportion observed in 2006.

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 1996-2007

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	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	1.8	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	2005	2,847	21.7	10,514	80.2
	2004	9,642	2004	168	1.7	2005	4,516	46.8	2006	2,978	30.9	7,662	79.5
	2005	10,888	2005	-	-	2006	5,796	53.2	2007	2,914	26.8	8,710	80.0
	2006	10,403	2006	115	1.1	2007	4,300	41.3					
	2007	9,563	2007	23	0.2								
	Orkney	1996	1,175	1996	-	-	1997	428	36.4	1998	291	24.8	719
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	48.6
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	2005	980	33.1	2,121	71.6
2004		1,842	2004	-	-	2005	480	26.0	2006	416	22.6	896	48.6
2005		2,192	2005	-	-	2006	598	27.3	2007	602	27.4	1,200	54.7
2006		1,622	2006	-	-	2007	433	26.7					
2007		1,408	2007	-	-								
Shetland		1996	6,234	1996	-	-	1997	3,828	61.4	1998	1,141	18.3	4,969
	1997	13,276	1997	-	-	1998	7,265	54.7	1999	3,835	28.9	11,100	83.6
	1998	12,617	1998	78	0.6	1999	5,498	43.6	2000	4,783	37.9	10,359	82.1
	1999	12,663	1999	65	0.5	2000	5,576	44.0	2001	4,139	32.7	9,780	77.2
	2000	15,096	2000	-	-	2001	5,102	33.8	2002	4,578	30.3	9,680	64.1
	2001	17,398	2001	123	0.7	2002	6,465	37.2	2003	7,973	45.8	14,561	83.7
	2002	17,260	2002	-	-	2003	5,850	33.9	2004	5,675	32.9	11,525	66.8
	2003	14,446	2003	-	-	2004	6,031	41.7	2005	4,071	28.2	10,102	69.9
	2004	12,372	2004	-	-	2005	4,220	34.1	2006	4,040	32.7	8,260	66.8
	2005	10,824	2005	-	-	2006	4,162	38.4	2007	4,175	38.6	8,337	77.0
	2006	13,180	2006	-	-	2007	4,578	34.7					
	2007	14,947	2007	-	-								

Figure 3: The distribution of active salmon production sites 2007



Staffing

Table 31: Number of staff employed in salmon production during 1997-2007

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Staff F/T	1,088	1,117	1,036	1,141	1,066	1,083	1,066	1,019	851	790	798
P/T	207	192	268	256	191	223	151	142	128	81	118
Total staff	1,295	1,309	1,304	1,397	1,257	1,306	1,217	1,161	979	871	916
Productivity (tonnes/person)	76.6	84.6	97.2	92.3	110.2	110.7	139.5	136.2	132.4	151.4	141.8

The total number of staff employed in salmon production in 2007 was 916, an increase of 45 compared with 2006. 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 151.4 to 141.8 tonnes production per person.

Production Methods

Table 32: Production methods, capacity, tonnage and average stocking densities (Kg/m³) during 2005-2007

Method	Number of sites			Total capacity (000s cubic metres)			Production (tonnes)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Seawater tanks	1	1	1	5.8	5.8	5.9	0	0	14
Seawater cages	277	251	246	15,569	15,406	14,571	129,588	131,847	129,916
For cage sites: ratio of production (Kg) to cage capacity (m ³)							8.3	8.6	8.9

The vast majority of the fish were produced in seawater cages. There were 14 tonnes of production from seawater tank sites in 2007. This reflects the continued high installation and running costs incurred in operating seawater tank systems. Eleven active seawater tank sites were registered in Scotland, and only one was 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 853,000 m³ during 2007. This continues to reflect 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, increased by 0.3 Kg in 2007. In cage sites, the ratio of production, expressed in kilograms, to cage capacity, expressed in cubic metres, was 8.3, 8.6 and 8.9 in 2005, 2006 and 2007 respectively. This indicates that on average across all production stages in any year, the stocking density is under 9 Kg 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 1997-2007

Production grouping (tonnes)								Total	
	0	1-50	51-100	101-200	201-500	501-1,000	>1,000	Sites*	Tonnes
1997	120	21	22	41	63	43	28	338	99,197
1998	130	32	16	31	66	39	29	343	110,784
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
2005	112	8	13	16	41	37	51	278	129,588
2006	95	10	10	16	29	30	62	252	131,847
2007	89	9	8	19	33	34	55	247	129,930
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	-	-
2005	0	0.2	0.7	1.9	10.8	20.5	65.9	-	-
2006	0	0.2	0.6	1.8	7.9	15.9	73.6	-	-
2007	0	0.2	0.4	2.3	8.3	19.0	69.8	-	-

*Includes farms stocked but having no production.

In 2007, there was an increase of four in the number of sites producing less than 500 tonnes, and a decrease of three in those sites producing over 500 tonnes. The trend showing a decrease in the overall number of sites in production and the concentration of production in larger sites was maintained in 2007.

Company Productivity

Table 34: Number of companies grouped by production (tonnes), manpower and productivity (tonnes per person) during 2006-2007

Total Tonnage		0-100	101-200	201-400	401-700	701-1,000	1,001-2,000	>2,000	Total
No. of companies	2006	15	5	3	2	4	4	11	44
	2007	13	3	4	3	3	2	10	38
No. of tonnes	2006	67	826	977	1,130	3,440	5,832	119,575	131,847
	2007	60	461	987	1,761	2,570	2,444	121,647	129,930
Manpower (total)	2006	39	15	15	22	51	63	666	871
	2007	37	13	22	15	58	26	745	916
Productivity (tonnes/person)	2006	2	55	65	51	67	93	179	151
	2007	2	35	45	117	44	94	163	142

Productivity may be used as a measure of efficiency, and was found to be related to the scale of production. The greatest productivity (163 tonnes per person) was achieved in those companies having a production of over two thousand tonnes, and the least (two tonnes per person) in the companies producing the smallest tonnages. In comparison with 2006, the average company productivity decreased from 151 to 142 tonnes per person.

Overall production was dominated by 10 companies in 2007, which between them accounted for over 93% of the salmon production in Scotland.

Manpower and Production by Production Area

Table 35: Manpower and production (tonnes) by area 1998-2007, and projected production in 2008

Region	Year	Staff		Annual Production	Productivity (t/person)	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	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	267	31	32,439	109	-	-	8,816	3.9	10,608	4.7	13,015	4.6
	2006	203	23	40,219	178	211	1.8	8,742	4.2	16,995	4.6	14,271	4.8
	2007	277	44	33,541	104	40	1.7	6,674	4.1	13,212	4.9	13,615	4.7
2008			40,211*										
Orkney	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	47	4	5,183	102	-	-	989	3.5	805	4.1	3,389	3.5
	2006	72	3	3,724	50	-	-	509	3.1	1,689	3.9	1,526	3.7
	2007	41	7	4,432	92	-	-	196	3.9	1,657	4.3	2,579	4.3
2008			4,273*										
Shetland	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	162	33	38,946	200	-	-	3,424	4.4	16,296	4.7	19,226	4.7
	2006	190	18	39,278	189	-	-	3,765	4.3	16,134	4.9	19,379	4.8
	2007	182	25	40,795	197	-	-	2,663	4.5	17,838	4.5	20,294	4.9
2008			50,665*										

Region	Year	Staff		Annual Production	Productivity (t/person)	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	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	188	36	33,056	148	-	-	4,675	4.7	11,430	5.0	16,951	4.6
	2006	181	22	25,460	125	-	-	2,467	4.4	7,920	5.3	15,073	5.5
	2007	162	36	31,353	158	-	-	4,309	4.1	7,069	4.3	19,975	4.8
2008			19,109*										
Western Isles	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	187	24	19,964	95	-	-	5,068	3.8	5,627	4.5	9,269	3.9
	2006	144	15	23,166	146	-	-	2,679	4.0	3,199	4.3	17,288	4.2
	2007	136	6	19,809	140	-	-	1,969	3.8	5,303	4.2	12,537	4.0
2008			22,517*										
All Scotland	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	851	128	129,588	132	-	-	22,972	4.1	44,766	4.7	61,850	4.4
	2006	790	81	131,847	151	211	1.8	18,162	4.2	45,937	4.7	67,537	4.7
	2007	798	118	129,930	142	40	1.7	15,811	4.1	45,079	4.5	69,000	4.6
2008			136,775*										

*Estimated production in 2008

Company and Site Data

Table 36: Number of companies and sites engaged in salmon production during 1997-2007

Year	Number of companies			Number of sites		
	Producing	Non-producing	Total	Producing	Non-producing	Total
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
2005	40	10	50	166	112	278
2006	32	12	44	157	95	252
2007	28	10	38	158	89	247

The number of companies registered and actively producing salmon in 2007 was 28, a decrease of four on the 2006 figure. Ten companies remained active and registered, although not producing salmon for harvest in 2007. This continued the trend of salmon production being concentrated within fewer companies. These 38 companies have 247 registered active sites, although not all active sites may have produced fish for harvest in 2007.

Fallowing

Table 37: Number of seawater sites employing a fallow period during 1998-2007

Year	Fallow Period (weeks)						Total
	0	<4	4-8	9-26	27-51	52	
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
2005	75	11	36	86	37	33	278
2006	67	10	44	74	37	20	252
2007	67	16	41	61	38	24	247

Of the 247 sites recorded as being active in 2007, 156 farms were fallow for a variable period, whilst a further 24 farms were fallow for the whole of 2007. 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 67 sites that had no fallow period in 2007. These may have been stocked late in 2006 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 1996-2007

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Broodstock sites	28	37	25	20	18	15	19	20	15	15	17	20

In 2007, the number of freshwater and seawater sites holding broodstock increased to 20. 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. Fourteen thousand, four hundred and twenty female fish were stripped, yielding just under 84 million ova, compared with just under 61 million in 2006, which can be calculated to show an average ova yield per fish of 5,813.

4. OTHER SPECIES

There has been continued 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 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, and markets are established, 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 1999-2007

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
2005	73	18	91
2006	92	17	109
2007	75	29	104

Company, Site and Production Data

Table 40: Number of companies and sites producing other species, and production of other species (tonnes) during 2004-2007, and estimated production in 2008

Species	No. of companies	No. of sites	2004 Production tonnage	2005 Production tonnage	2006 Production tonnage	2007 Production tonnage	2008 Production tonnage*
Arctic Charr	3	5	3.25	3	3.5	6.5	4
Brown trout/ Sea trout	25	43	167	122	267	124	298
Cod	12	20	8	69.6	543	1111	2501
Halibut	7	13	186.8	272.4	233	147	290

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

There were significant increases in the production of cod and Arctic charr. Cod production increased by 568 tonnes on the 2006 figure and production of Arctic charr has increased by 3 tonnes which is almost a 100% increase on the 2006 figure. There was a decrease in brown trout or sea trout, and halibut production.

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 were two reported escapes from sites rearing other species in 2007, involving the loss of 26 fish.

Ova Laid Down to Hatch

Table 41: Source of other species' ova laid down to hatch during 2007

Species	Source of ova laid down to hatch (000s)		
	Own broodstock	Other GB broodstock	Foreign ova
Arctic charr (<i>Salvelinus alpinus</i>)	8	0	0
Cod (<i>Gadus morhua</i>)	34,315	3,100	^d
Brown trout/Sea trout (<i>Salmo trutta</i>)	1,780	273	0
Halibut (<i>Hippoglossus hippoglossus</i>)	6,000	0	0

^d There were companies which laid down cod 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 2007

Species	Bought (000s)	Sold (000s)
Cod	590	1,889
Halibut	103	70
Brown trout / Sea trout	236	762

There were also sites stocked with brook charr (*Salvelinus fontinalis*), carp (*Cyprinus carpio*), chub (*Leuciscus cephalus*), haddock (*Melanogrammus aeglefinus*), pollack (*Pollachius pollachius*), sheepshead minnow (*Cyprinodon variegatus variegatus*), turbot (*Scophthalmus maximus*) and whiting (*Merlangius merlangus*). There was production of brook charr, carp, sheepshead minnow 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 1.0% in 2007 to 7,414 tonnes and was directed at the table (88.6%) and restocking (11.4%) markets. The total numbers of staff employed by the sector decreased by four to 143. Although there was a slight decrease in employment and production, this did not result in a reduction to productivity. There was an overall increase in the productivity of the industry to 51.8 tonnes per person.

The number of ova laid down to hatch increased by almost 1.5 million and was mainly all-female diploid stock (83%). The proportion of ova that were sourced within GB decreased to 4.1%, resulting from a decrease in the numbers of home-produced ova. There were no imports from Australia during 2007. To meet the needs of out of season production, the industry re-established the trade with South Africa (2% of total ova imported) and increased the trade with Norway (4% of total ova imported). There was also a continued decline in the number of ova imported from the USA. The trend reflecting the high dependence of the Scottish trout industry on imported ova was maintained.

There was a continued 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 a slight decrease in the production of salmon, reduced productivity per person and an increased yield from smolts. There was a decrease in the production of smolts, and the yield from ova also decreased.

Smolt production decreased by 6.6% to 38.1 million, with over half (59.5%) being S1, and the remainder being S½ smolts (40.5%). The number of staff directly employed on freshwater sites increased by eight. This resulted in a decrease in productivity to 136,600 fish per person. The number of ova laid down to hatch has increased by 17.6%. The ratio of ova laid down to smolts produced has increased to 2.0 in 2007. Projected estimates for 2008 suggest that a similar number of ova were laid down to hatch, and that fewer smolts will be produced in 2008, followed by an increase in 2009.

The majority of ova for the production of Scottish salmon were derived from foreign sources, with 56% being derived from non-Scottish stocks, an increase of 14% on reliance from foreign sources. The export of ova to other countries within the EU decreased by 96%, while the trade with Chile increased by 19%.

The production tonnage in sea water decreased by 1.4% in 2007, this was due mainly to a decrease in the mean weight of fish being harvested. The number of staff directly employed on site increased, with the development of 45 jobs in the seawater industry. The estimated smolt placement in 2008 has decreased to 34.9 million, and an increase in production is expected in 2008 given the decrease in the number of fish harvested one year after input from the 2006 year class. The estimated harvest forecast for 2008 is 136,775 tonnes, an increase of 5.0% on the 2007 total.

With the production tonnage decreasing in 2007, the number of sites in production decreased from 252 to 247. The trend towards concentrating production in larger sites was maintained, with 69.8% of production being concentrated in the sites producing over 1,000 tonnes per annum.

Other Species

Interest in the diversification of aquaculture was maintained during 2007. Staff numbers decreased mainly due to restructuring within the cod sector during 2007. In 2007 there was a significant increase in the tonnage of cod produced. There were also decreases in the tonnages of halibut and brown trout produced. The industry has predicted increases in production for the halibut and brown trout sectors in 2008. Although the industry has predicted another significant increase in production for the cod sector in 2008, this figure may not be achieved due to the closure of one major cod producer.

APPENDIX 1

Questionnaires sent to Fish Farmers

**ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2007**

ATLANTIC SALMON - PRODUCTION DATA

Please complete and return by 31 JANUARY 2008 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

<p>1 How many staff were employed in salmon production (company total), excluding post-harvest processing staff</p>	<p>Full time <input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/> <input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/> <input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/></p>	<p>Part time <input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/> <input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/> <input style="width: 20px; height: 15px; border: 1px solid black;" type="text"/></p>																									
<p>Site 1</p>	<p>Site 2</p>	<p>Site 3</p>	<p>Site 4</p>																								
<p>2 How many smolts were put into the site in 2007 as:</p> <p>a S¹/₂s (ie from 2007 hatch)</p> <p>b S1s (ie from 2006 hatch)</p> <p>c S1¹/₂s (ie from 2006 hatch)</p> <p>d S2s (ie from 2005 hatch)</p>	<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>									<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>									<table border="1" style="width: 100%; height: 40px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>								
<p>3 How many of the above smolts came from England</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>4 Total smolt input proposed in 2008</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>5 HARVEST of 2007 SMOLT INPUT in 2007</p> <p>a Number of tonnes (wet weight at harvest)</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>6 HARVEST of 2006 SMOLT INPUT from 1 JANUARY to 31 AUGUST</p> <p>a Number of tonnes (wet weight at harvest)</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>7 HARVEST of 2006 SMOLT INPUT from 1 SEPTEMBER to 31 DECEMBER</p> <p>a Number of tonnes (wet weight at harvest)</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>8 HARVEST of 2005 SMOLT INPUT</p> <p>a Number of tonnes (wet weight at harvest)</p> <p>b Number of fish</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>9 How many tonnes of fish do you expect to harvest in 2008</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>10a Were brood fish produced in 2007</p> <p>b How many fish were stripped</p>	<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<p align="center">YES/NO</p> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>11 What is the current fish holding capacity of each site in cubic metres</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>12 Duration of FALLOW PERIOD in WEEKS (cage sites; MAX = 52)</p>	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td><td style="width: 25px; height: 15px;"></td></tr> </table>																
<p>13 Does a management agreement in respect of fish health operate with other producers in your area</p>	<p align="center">YES/NO</p>	<p align="center">YES/NO</p>	<p align="center">YES/NO</p>																								

SGMD ANNUAL PRODUCTION SURVEY 2007

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. All harvest tonnages should be supplied for the wet weight of fish at harvest.
4. If a site was used **only to hold broodstock** for stripping please enter "BRD" after the site name.
5. 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:

- S¹/₂** <12 months old, ie put to sea in year of hatch
S1 12-18 months old, ie put to sea in January-June in the year post hatch
S¹/₂ 19-24 months old, ie put to sea in July-December in the year post hatch
S2 >24 months old, ie when put to sea

Q10. Broodstock production

Please circle YES if broodfish were produced on the site

Q11. Fish holding capacity

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

Q12. Fallow period

For cage sites only; please enter any number of weeks a site was fallow in 2007; the total number of fallow weeks should not exceed 52

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2008 to allow the Annual Survey Report for 2007 to be produced.

**ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2007**

ATLANTIC SALMON - SMOLT DATA

**Please complete and return by 31 JANUARY 2008 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 2006-2007 (company total)

	Site 1	Site 2	Site 3	Site 4
3 How many eyed ova were laid down for hatching in winter of 2006-2007				
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"/>

4 How many eyed ova do you expect to hatch this winter (2007-2008)

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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	Site 1	Site 2	Site 3	Site 4
5 How many fry or parr were				
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"/>

	Site 1	Site 2	Site 3	Site 4
6 How many smolts were produced as				
a S ¹ / ₂ s (ie from 2007 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b S1s (ie from 2006 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c S ¹ / ₂ s (ie from 2006 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d S2s (ie from 2005 hatch)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

	Site 1	Site 2	Site 3	Site 4
7 How many smolts were sold as				
a S1s (incl S ¹ / ₂ s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b S2s (incl S ¹ / ₂ s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

	Site 1	Site 2	Site 3	Site 4
8 How many smolts do you expect to produce for sea winter on-growing next spring (2008) as				
a S1s (incl S ¹ / ₂ s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b S2s (incl S ¹ / ₂ s)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

9 How many smolts do you plan to produce in 2009

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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10 What is the fish holding capacity of each site in cubic metres

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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11 Duration of FALLOW PERIOD in WEEKS (cage sites only)

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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	Site 1	Site 2	Site 3	Site 4
12 How many fish did you vaccinate				
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 IPN	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d against <i>Vibrio</i> spp.	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

SGMD ANNUAL PRODUCTION SURVEY 2007

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 S1/2 or S1 etc

The definitions used for the survey are:

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

- Q7. } For S1s - combine numbers of S^{1/2}s with S1s and
- Q8. } For S2s - combine numbers of S1^{1/2}s with S2s

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

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

Q12. Fallow period - applies to cage sites only

Please enter any weeks that the site was fallow in 2007 (maximum = 52)

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2008 to allow the Annual Survey Report for 2007 to be produced.

**ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS
for the PERIOD 1 JANUARY to 31 DECEMBER 2007**

RAINBOW TROUT - DATA

**Please complete and return by 31 JANUARY 2008 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

**2 How many eyed ova were laid down for
hatching in 2007**

Site 1

Site 2

Site 3

Site 4

a from own broodstock
b from other GB broodstock

c from abroad (Northern Hemisphere
incl, N Ireland and Isle of Man)

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d from abroad (Southern Hemisphere)

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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)

SGMD ANNUAL PRODUCTION SURVEY 2007

GUIDANCE NOTES FOR QUESTIONNAIRE

RAINBOW TROUT

GENERAL NOTES

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

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

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

Q1. How many staff

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

Q2. Ova laid down for hatching

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

Q7-8. Weight of fish sold for:

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

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2008 to allow the Annual Survey Report for 2007 to be produced.

**ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS
for the PERIOD 1 JANUARY to 31 DECEMBER 2007**

OTHER SPECIES - DATA

Please complete and return by 31 JANUARY 2008 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 2007				
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 2008 in TONNES

SGMD ANNUAL PRODUCTION SURVEY 2007

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 SGMD, 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.

Q4 - 5. Weight of fish sold

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

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2008 to allow the annual survey report for 2007 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.

S¹/2	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.
S1¹/2	Salmon or sea trout smolting at approximately 18 months from hatch.
S2	Salmon or sea trout smolting at approximately two years from hatch.
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.

Fisheries Research Services is an agency of the Scottish Government

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