SCOTTISH FISH FARMS

Annual Production Survey 2008

The Scottish Government

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This report was prepared by
Marine Scotland Science

Foreword

The annual production survey of fish farms in Scotland for 2008 was carried out by Marine Scotland Science (MSS) formerly Fisheries Research Services (FRS). This survey collates annual production data from registered Scottish fish farm sites. Surveys conducted by other organisations are produced independently of MSS 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 2008 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 17-year period 1991-2008. 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.

A J Walker

October 2009

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SUMMARY

The tables below summarise the results from the 2008 fish farms annual production survey.

Rainbow Trout (*Oncorhyncus mykiss*)

		2007	2008
Total production	(tonnes)	7,414	7,670
Production for the table	(tonnes)	6,569	6,812
Production for restocking	(tonnes)	845	858
Number of staff employed		143	141
Mean productivity	(tonnes/person)	51.8	54.4
Number of ova laid down to hatch	(millions)	28.3	26.2
Number of ova imported	(millions)	26.9	25.2

In 2008, rainbow trout production increased by 256 tonnes. Employment decreased by two staff members, and productivity per person increased to 54.4 tonnes. There was a decrease of 2.1 million ova laid down to hatch, and the number of ova imported also decreased.

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

		2007	2008
Total production	(tonnes)	1,388	2,340
Number of staff employed	(full-time)	75	80
	(part-time)	29	44
Number of ova laid down to hatch	(millions)	45[a]	20
Number of ova imported	(millions)	0[b]	1

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

In 2008 the production of other species increased by 952 tonnes on the 2007 total. Overall, employment increased by twenty. There was a decrease in the number of ova laid down to hatch.

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

Species	Number of reported incidents which could have led to an escape of farmed fish	Number of reported incidents which did lead to an escape of farmed fish	Number of fish escaped
Rainbow trout	2	7	10,690
Atlantic salmon (freshwater stages)	2	1	1,700
Atlantic salmon (seawater stages)	5	7	56,941
Other species	0	1	3,700

Atlantic salmon (*Salmo salar*)

Smolts

		2007	2008
Number of ova produced	(millions)	83.8	135.2
Number of ova laid down to hatch	(millions)	75.3	65.6
Number of ova exported	(millions)	32.3	62.3
Number of ova imported	(millions)	44.1	28.3
Number of smolts produced	(millions)	38.1	36.4
Number of smolts put to sea	(millions)	37.8	36.6
Number of staff employed		279	263
Mean productivity (000s smolts/person)		136.6	138.6

The production of ova increased by over fifty one million in 2008, and the number of ova laid down to hatch decreased by just under ten million. Exports of ova increased and imports decreased. There was a decrease of almost two million in the production of smolts. The number of staff employed decreased by sixteen, whilst mean productivity increased.

Production fish

		2007	2008
Total production	(tonnes)	129,930	128,606
Production of 0-year fish	(tonnes)	40	216
Production of grilse	(tonnes)	15,811	15,296
Production of pre-salmon	(tonnes)	45,079	39,463
Production of salmon	(tonnes)	69,000	73,631
Mean fish weight 0-year	(Kg)	1.7	1.9
Mean fish weight grilse	(Kg)	4.1	4.1
Mean fish weight pre-salmon	(Kg)	4.5	4.2
Mean fish weight salmon	(Kg)	4.6	4.6
Number of staff employed		916	949
Mean productivity	tonnes/person	141.8	135.5

Production tonnage decreased by just over 1% with a decrease in mean weight of pre-salmon, no change in mean weight of grilse and salmon and increase in mean weight of 0-year fish at harvest. Staff numbers increased by 33. Mean productivity showed a decrease of over 6 tonnes/person.

Smolt survival (percentage harvested)

Survival (%)	Years 0+1	Year 2	Total
2005 input year class	37.8	40.3	78.1
2006 input year class	33.8	38.6	72.5

Overall smolt survival decreased by 5.6% compared with the 2005 year class.

1. RAINBOW TROUT (*Oncorhynchus mykiss*)

Annual production survey questionnaires were sent to all 31 companies registered with the Scottish Government and engaged in the production of rainbow trout in Scotland during 2008. Returns were received from all 31 companies, covering the 66 sites currently in production.

Production

Table 1a: Total production (tonnes) of rainbow trout during 1995-2008

Year	Tonnes	Year	Tonnes
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
2001	5,466	2008	7,670

Production increased in 2008 by 256 tonnes, an increase of 3.4%. Within the table trade, an increase was observed in the medium and large sizes of fish, with decreases in the small size of fish. In the restocking trade, the production of medium sized fish showed a decrease, while large and small fish production showed increase.

Table 1b: Production (tonnes) for the table trade during 1998-2008 according to weight category

Year	‹450 g	450-900 g	›900 g	Total
	‹1 lb	1-2 lbs	›2 lbs	Tonnes
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
2008	2,375	1,950	2,487	6,812

Production for the table in 2008 was 6,812 tonnes, an increase 243 tonnes (3.7%) on the 2007 total, and accounted for 88.8% of the total rainbow trout production, a similar proportion to that produced in 2007. Supply was mainly of fish weighing up to 900 g, encompassing 63.5% of total production for the table.

Table 1c: Production (tonnes) for the restocking trade during 1998-2008 according to weight category

Year	‹450 g	450-900 g	›900 g	Total
	‹1 lb	1-2 lbs	›2 lbs	Tonnes
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
2008	27	351	480	858

Production for the restocking of angling waters increased in 2008 and accounted for 11.2% of total rainbow trout production in 2008. In 2008, production totalled 858 tonnes, an increase of 13 tonnes (1.5%) on the 2007 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 seven incidents involving the loss of a total of 10,690 fish from rainbow trout sites in 2008. There were an additional two reported incidents where the farm confirmed there was no loss of fish.

Production by Site

Table 2: Numbers of sites grouped by tonnage produced during 1998-2008

Year	Number of sites per production tonnage				Total number of sites
	‹1-25	26-100	101-200	›200	
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
2008	8	15	7	14	44

Production was reported from 44 sites. The number of producers in the size bracket‹1-25 and ›200 tonnes decreased in 2008, while those producers in the size bracket 101- 200 tonnes increased, 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 2008, and comparison with production in 2007

Production method	Production grouping (tonnes) in 2008					Total tonnage and (%) by method		Number of sites	
	‹10	10-25	26-50	51-100	›100	2007	2008	2007	2008
FW cages	0	1	0	0	6	2,704 (36.5)	2,562 (33.4)	8	7
FW ponds and raceways	2	3	6	8	7	2,354 (31.7)	2,463 (32.1)	28	26
FW tanks and hatcheries	1	1	0	0	0	3 (›0.1)	17 (0.2)	3	2
SW cages	0	0	0	1	8	2,353 (31.7)	2,628 (34.3)	9	9
SW tanks	0	0	0	0	0	0	0	0	0
Total	3	5	6	9	21	7,414	7,670	48	44

Freshwater production accounted for 5,042 tonnes (65.7%) and seawater production for the remaining 2,628 tonnes (34.3%). There was an 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 1995-2008

Year	No. of companies	No. of sites
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
2008	31	66

The number of companies registered with the Scottish Government as being actively engaged in rainbow trout production was 31 in 2008. The number of sites registered and in production during 2008 was 66.

Staffing and Productivity

Table 5: Number of staff employed, and productivity per person during 1995-2008

Year	Full-time	Part-time	Total	Productivity (tonnes/person)
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
2008	107	34	141	54.4

The overall number of staff employed in 2008 decreased by two to 141. During 2008 the number of full-time staff decreased by four and the number of part-time employees increased by two.

Productivity, measured as tonnes produced per person, increased by 2.6% in 2008. No distinction was made between full and part-time employees when calculating productivity.

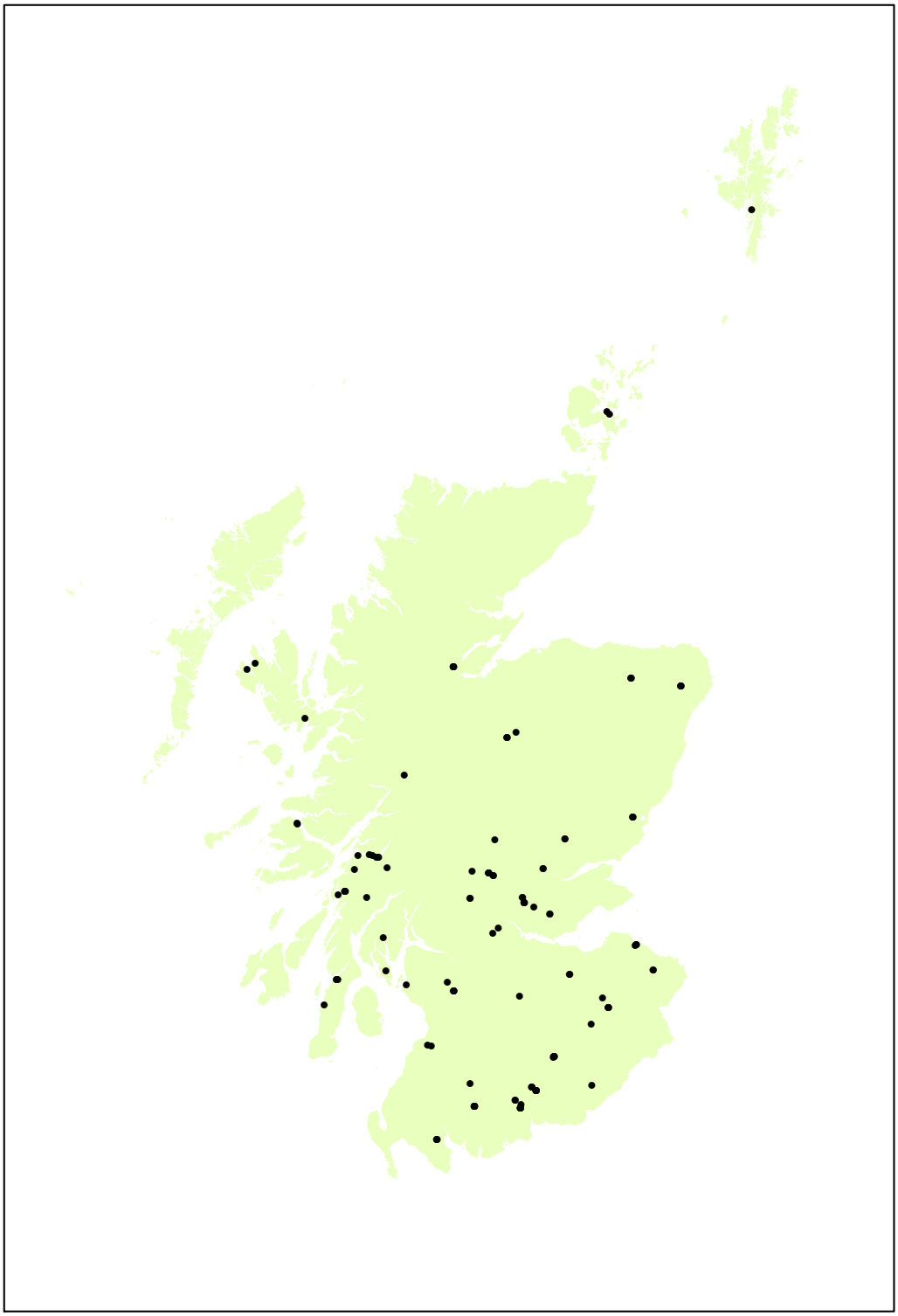
Production by Area

Table 6: Production and staffing by area in 2008

Area	No. sites	Table production (tonnes)	Restocking production (tonnes)	Mean tonnes per site	Staffing			Productivity tonnes/person
					F/T	P/T	Total	
North	12	1,792	80	156.0	18	6	24	78.0
East	18	1,485	358	102.4	36	13	49	37.6
West	21	2,661	68	129.9	27	6	33	82.7
South	15	874	352	81.7	26	9	35	35.0
All	66	6,812	858	116.2	107	34	141	54.4

Productivity per site was greatest in the north, 156 tonnes per site. However, productivity per person remained greatest in the west, at 82.7 tonnes per person.

Figure 1: The distribution of active rainbow trout sites 2008



Type of Ova Laid Down

Table 7: Number (000s) and proportions (%) of ova types laid down to hatch during 1997-2008

Year	All female diploid no.(%)	Triploid no. (%)	Mixed sex diploid no. (%)	Total ova
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
2008	22,978 (88)	2,526 (9)	725 (3)	26,229

Source of Ova Laid Down

Table 8: Number (000s) and sources of ova laid down to hatch 1997-2008

Year	Ova produced in Great Britain (GB)			Imported ova			Total
	Own stock	Other stock	Total	Northern hemisphere	Southern hemisphere	Total	
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
2008	582	487	1,069	25,160	0	25,160	26,229

In 2008, the total number of eyed-ova laid down to hatch decreased by over two million (7%) on the 2007 figure. The proportion of ova from GB broodstock decreased to 4% 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 2001-2008

Source	2001	2002	2003	2004	2005	2006	2007	2008
N. Ireland	710	-	-	405	1,710	2,830	7,721	16,130
Isle of Man	6,670	6,775	6,855	8,012	1,700	3,480	3,767	775
Denmark	6,135	5,000	5,270	6,370	9,225	14,525	13,070	5,530
South Africa	8,075	7,750	50	-	-	-	485	-
USA	-	1,700	11,035	17,335	4,440	2,310	890	1,490
France	-	-	875	800	200	-	-	-
Australia	-	-	-	-	2,600	1,500	-	-
Norway	-	-	-	-	-	500	1,200	1,500
Totals	21,590	21,225	24,085	32,922	19,875	25,145	27,133	25,425

Table 9b: Seasonal variation in numbers (000s) and sources of ova imported into Scotland during 2008

Month	Norway	Isle of Man	Denmark	N. Ireland	USA
January	-	50	1,080	3,600	-
February	1,000	-	300	1,870	-
March	-	210	600	1,830	-
April	500	-	1,600	570	-
May	-	-	530	540	-
June	-	-	300	270	400
July	-	-	195	-	90
August	-	-	-	2,530	-
September	-	-	-	1,520	500
October	-	-	125	1,400	500
November	-	-	200	700	-
December	-	515	600	1,300	-
Totals	1,500	775	5,530	16,130	1,490

Suppliers within the EU accounted for 88.2% of ova imported into Scotland during 2008, with the USA accounting for 5.9% and Norway 5.9%. 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 1997-2008

Year	Fry and fingerlings bought			Total number bought	Total number sold
	All female diploid nos. (%)	Triploid nos. (%)	Mixed sex diploid nos. (%)		
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
2008	24,298 (95)	1,082 (4)	118 (0.5)	25,498	31,036

The established trade between hatcheries and on-growing farms continued in 2008. Some companies specialised in the production of fry and fingerlings. The total number of fry and fingerlings purchased by producers increased by 53%, and the total number sold by producers increased by 31%. The disparity between supply and demand is due to supplies being sold to England and Wales.

Use of Vaccines

Table 11: Number of sites rearing fish vaccinated against enteric redmouth disease (ERM) during 1997-2008

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
No. of sites	35	31	40	35	33	34	38	42	37	31	28	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 29.1 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 38 companies registered with the Scottish Government as being actively engaged in the freshwater production of Atlantic salmon in Scotland during 2008. Returns were received from all companies, covering the 130 sites currently in production.

Company and Site Data

Table 12: Number of companies and sites in production during 2000-2008[c]

Year	No. of companies	No. of sites
2000	60	184
2001	56	169
2002	55	173
2003	48	176
2004	48	172
2005	41	148
2006	39	135
2007	37	135
2008	38	130

In 2008 the number of companies registered with the Scottish Government as being actively engaged in the freshwater production of Atlantic salmon increased to 38. A total of 256 freshwater sites were registered, and of these, 126 sites were inactive and 130 sites were actively engaged in commercial production.

Production and Staffing

Table 13: Number (000s) of smolts produced, staff employed and smolt productivity during 1998-2008

Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number (000s) of smolts produced		44,853	39,763	45,583	47,546	47,161	44,414	39,999	36,326	40,827	38,125	36,450
Staffing	Full-time	318	300	341	317	312	291	259	200	209	217	209
	Part-time	96	124	103	111	93	82	60	74	62	62	54
	Total	414	424	444	428	405	373	319	274	271	279	263
Productivity, 000s of smolts per person		108.3	93.8	102.7	111.1	116.4	119.1	125.4	132.6	150.6	136.6	138.6

Smolt production in 2008 decreased by over 1.6 million, a decrease of 4.4% compared to 2007. The number of staff employed decreased by sixteen and productivity increased by 1.5%, to a figure of 138,600 smolts produced per employee.

[c] Under the terms of the Aquatic Animal Heath (Scotland) Regulations 2009 it is an offence to operate an aquaculture production business unless the business is authorised by the competent authority. MSS is responsible for the authorisation of production businesses and is the point of contact for farmers who wish to change authorisation details.
The authorisation details of specific businesses, as specified in Part I of Annex II to Directive 2006/88/EC, are available in a publicly available record under regulation 13 of The Aquatic Animal Health (Scotland) Regulations 2009. Company and site information is published here in summary form.

Escapes

There was one incident involving the loss of 1,700 fish from freshwater Atlantic salmon sites in 2008. There were an additional two reported incidents where the farm confirmed there was no loss of fish.

Smolts by Age Group

Table 14: Number of smolts (000s) produced by type during 1997-2008

Year	S½	S1	S1½	S2	Total
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
2008	12,431	24,019	0	0	36,450

In 2008, production was dominated by S1 smolts, with numbers produced increasing by5.8%. The production of S½ smolts decreased by 19.4%. There was no production of S1½ or S2 smolts.

Production Systems

Table 15: Number and capacity of production systems during 2004-2008

System	No. of sites with system					Total capacity, 000s cubic metres				
Year	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Cages	76	61	58	56	53	365	378	365	327	385
Tanks and Raceways	96	87	77	79	77	43	38	36	60	64
Total	172	148	135	135	130	408	416	401	387	449

The principal types of facility used for the production of smolts in fresh water are cages or tanks and raceways. In 2008, the number of farms using tanks and raceways decreased by two, and the number of farms using cages decreased by three. In terms of volume, tank and raceway capacity increased by 4,000 m³, and cage volume increased by 58, 000 m³. This resulted in a net increase in volume of 62,000 m³ available for the production of smolts in Scotland during 2008.

Table 16: Number (000s) of smolts produced, and stocking densities by production system during 2004-2008

	Number of smolts produced (000s)					Stocking densities (smolts /m^3)				
Year	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Cages	17,575	15,380	18,700	19,440	17,065	48	41	51	59	44
All others	22,424	20,946	22,127	18,685	19,385	521	551	615	311	303
Total	39,999	36,326	40,827	38,125	36,450		-	-	-	-

The average stocking densities of cages and tanks and raceways decreased compared to 2007, in the case of cages from 59 to 44 fish per m^3 and in the case of tanks and raceways, from 311 to 303 fish per m^3.

Ova Production

Table 17: Number (000s) of salmon ova produced during 2001-2008

Year	2001	2002	2003	2004	2005	2006	2007	2008
No. of ova	99,921	107,996	115,569	128,866	73,211	60,941	83,822	135,230

Just over 135 million ova were stripped in 2008, an increase of over 51 million (61%) on the 2007 season.

Table 18: Source, number (000s) and previous year's estimate of ova laid down to hatch during 1997-2009

Year	In-house broodstock	Out-sourced GB broodstock	GB wild broodstock	Foreign ova	Total	Previous year's estimate
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	19,831	14,261	171	26,409	60,672	75,302
2009	-	-	-	-	-	64,693

The number of ova laid down to hatch was 60.7 million, a decrease of 14.6 million (19.4%) on the 2007 figure. The majority of the ova (43.5%) were derived from foreign sources, this was a decrease of 15.6 million (37%) on the 2007 figure. Supplies derived from GB broodstock increased by just under 1 million, this was a 2.9% increase on the 2007 figure. Producers' estimates for the number of ova to be laid down in 2009 are similarly proportioned to the actual number of ova laid down in 2008. 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 1999-2010

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Actual smolts put to sea	41.1	45.2	48.6	50.1	43.8	39.1	37.2	41.1	37.8	36.6		
Smolts produced	39.8	45.6	47.5	47.2	44.4	40.0	36.3	40.8	38.1	36.4		
Estimated production	49.6	42.1	50.2	49.3	44.2	40.0	36.2	33.2	41.2	34.9	32.6	35.6
Ratio of ova laid down to smolts produced	1.7	1.8	1.8	1.8	1.8	1.8	2.1	1.6	2.0	1.7		

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 32.6 million smolts to sea in 2009.

The ratio of ova laid down to hatch to smolts produced in 2008 was less than the ratio in 2007.

Scale of Production

Table 20: Smolt-producing sites grouped by numbers (000s) of smolts produced during 1996-2008

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		
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
2008	2	1	5	8	21	20	15	9	81	36,450

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 2007. The number of sites producing less than 101,000 smolts has increased by one, and there has also been a decrease of two in the number of sites producing more than 100,000 smolts. The number of sites producing in excess of one million smolts per year has decreased by two.

Production of Ova and Smolt by Production Area

Table 21: Staffing, and ova laid down to hatch, 2007-2008, smolt production 2007-2008 and estimated production 2009-2010 by region

Region	Number of staff employed in 2008		Ova laid down to hatch (000s)		Smolt production (000s)		Estimated smolt production (000s)	
	F/T	P/T	2007	2008	2007	2008	2009	2010
Northwest	109	24	38,981	24,847	20,155	18,416	16,377	15,276
Orkney	2	0	150	0	156	190	120	120
Shetland	9	11	1,921	1,660	1,294	1,305	1,390	1,690
West	36	8	18,227	18,695	9,448	10,510	8,828	9,567
Western Isles	38	2	12,917	12,251	6,023	4,677	4,405	6,040
East and South	15	9	3,107	3,219	1,049	1,352	1,524	2,883
All Scotland	209	54	75,303	60,672	38,125	36,450	32,644	35,576

The north west, west and the Western Isles were the main ova and smolt producing areas in Scotland in 2008, and employed the greatest number of staff.

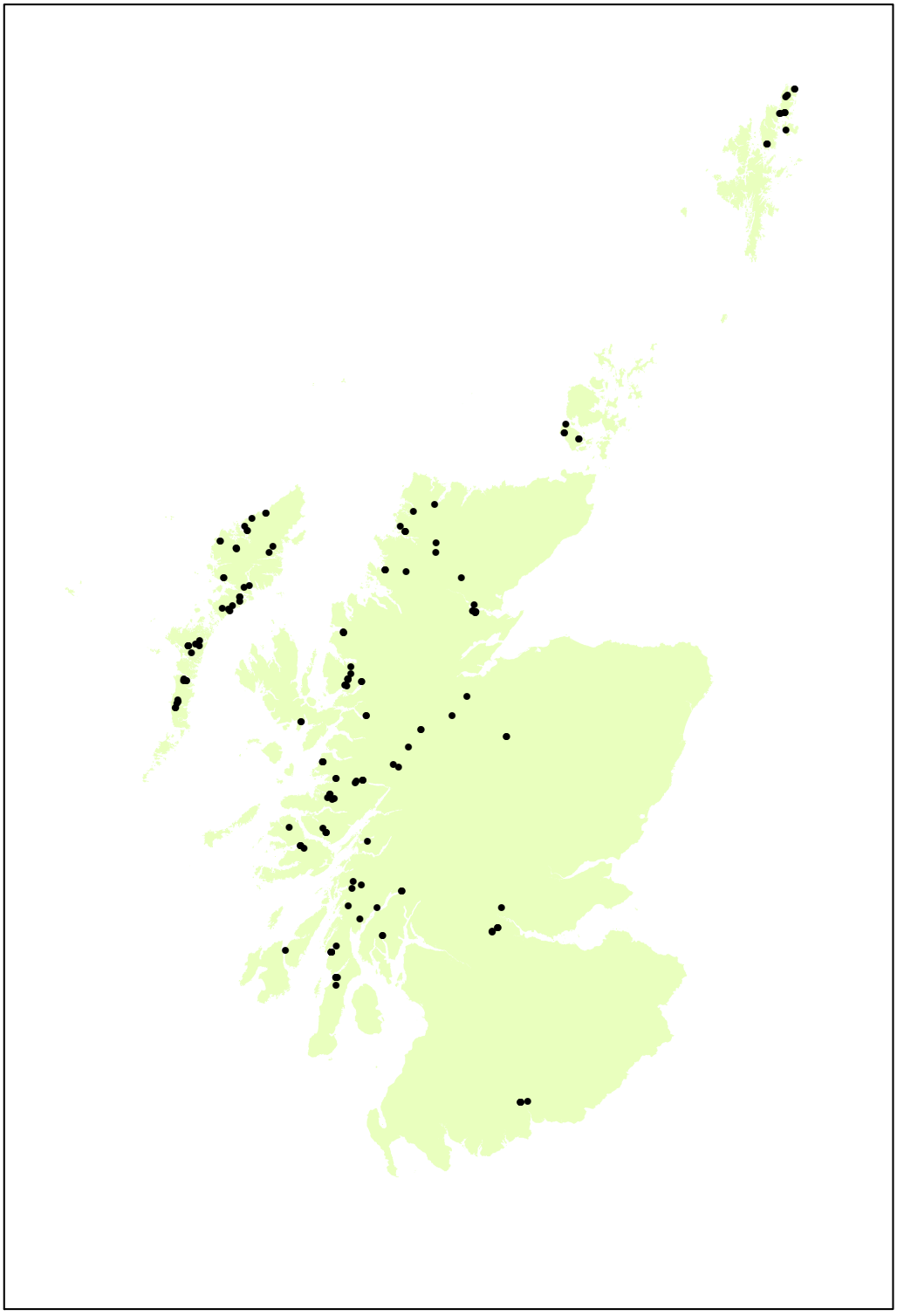
International Trade in Ova

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. Areas of Norway have equivalent status to Great Britain with regard to non exotic diseases, but additional guarantees granted to Great Britain in respect of *Gyrodactylus salaris* has meant trade in live fish has not occurred. 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. MSS 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 2008



Imports and Exports

Table 22a: Source and number (000s) of ova, parr and smolts imported during 1997-2008 derived from import licences

Import Year	Ova						Parr and Smolts
	EU Member States	EFTA		Third Countries		Total	EU Member States
		Iceland	Norway	Australia	USA		
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
2008	5,600	0	22,703	0	0	28,303	519

The numbers of ova imported decreased by 36%. The number of parr and smolts imported increased by 24%.

Table 22b: Destination and number (000s) of salmon ova exported during 1998-2008 derived from export certificates

Export year	Farmed origin				Total	Wild origin total
	Chile	EU	Faroes	Others		
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
2008	62,185	130	0	15	62,330	0

In 2008, a total of 62.3 million ova were exported. Exports of ova to other EU member states decreased by 21% to 0.13 million in 2008. The trade with Chile increased by over 30 million ova. Overall, exports increased by 93% on the 2007 figure.

Vaccines

Table 23: Number of sites using vaccines and number (millions) of fish vaccinated during 2000-2008

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
No. of sites	114	106	108	104	98	84	79	73	80
No. of fish (millions) vaccinated	45.8	51.3	47.5	41.7	39.4	33.8	43.5	41.0	36.7

Vaccines were used to provide protection against furunculosis, a disease caused by the bacterium *Aeromonas salmonicida*, which was the cause of serious losses within the fish farming industry in the late 1980s and early 1990s. Vaccination is normally carried out at the pre-smolt stage by intra-peritoneal injection. In addition, some sites vaccinated fish against enteric redmouth disease (ERM), infectious pancreatic necrosis (IPN) and *Vibrio*sis. A total of 36.7 million fish were vaccinated across 80 sites.

3. ATLANTIC SALMON - PRODUCTION

Production

Production survey information was collected from all 35 companies actively involved in Atlantic salmon production, farming 257 active sites. This figure represents the entire industry operating in Scotland.

Table 24: Annual production of Atlantic salmon (tonnes) during 1988-2008 and projected production in 2008

Year	Tonnes	Percentage difference	Year	Tonnes	Percentage difference
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	128,606	-1
1998	110,784	12	2009	133,027*	

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

The total production of Atlantic salmon during 2008 was 128,606 tonnes, a decrease of 1,324 tonnes (1%) on the 2007 production. This slight decrease in production shows that the industry continues to consolidate and stabilise at a manageable production level.

Escapes

There were seven incidents involving the loss of a total of 56,941 fish from seawater Atlantic salmon sites in 2008. There were an additional five reported incidents where the farm confirmed there was no loss of fish.

Table 25: Number (000s) and production (tonnes) of salmon harvested, and mean fish weight (Kg) per year class during 1998-2008

	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)	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
	2008	2008	116	216	1.9
Harvest in year 1	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
	2007	2008	13,011	54,759	4.2
Harvest in year 2	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
	2006	2008	15,881	73,631	4.6

Table 26: Number (000s) and production (tonnes) of grilse and pre-salmon harvested during 1998-2008

Year	Grilse (January-August)			Pre-salmon (September-December)		
	Number	Tonnes	Average weight (Kg)	Number	Tonnes	Average weight (Kg)
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
2008	3,716	15,296	4.1	9,295	39,463	4.2

Table 27: Percentage (by weight) of annual production by growth stage harvested during 2000-2008

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Growth stage	-	-	-	-	-	-	-	-	-
Input year fish	2	‹1	‹1	‹1	‹1	0	‹1	‹1	‹1
Grilse	35	30	23	19	17	18	13	12	12
Pre-salmon	35	39	39	37	37	34	35	34	31
Salmon	28	30	37	43	45	48	51	53	57

Survival and Production in Smolt Year Classes

Table 28: Survival and production in smolt year classes during 1991-2008

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	15,881	73,631	4.6	38.6	72.5	134,732	3.28
2007	37,853	23	40	1.7	0.06	13,011	54,759	4.2	34.4							
2008	36,626	116	216	1.9	0.3											

In 2006, the last year for which survival can be calculated, the survival rate from smolt input to harvest was 72.5%. The 2006 year class displayed a lower survival rate than that noted in 2005, and was lower than the survival averaged over the last 15 year-classes.

Of the 2007 year class, 34.4% of the input has been harvested, approximately 1% higher than the average harvest of fish one year after input in the 2006 year class. The average weight decreased by 0.2Kg to 4.2 Kg.

In 2008, the harvest of fish from the 2008 smolt input was 0.3%, an increase compared with the proportion of fish harvested from the same year class in 2007.

Smolts to Sea

Table 29: Number (000s) and origin of smolts put to sea during 1996-2008

Year	Smolts put to sea (000s)				Total (000s)	Scottish Origin	English Origin		Other Origin	
	S½	S1	S1½	S2		%	(000s)	%	(000s)	%
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
2008	10,903	25,723	0	0	36,626	96	1,418	4	0	0

The total number of smolts put to sea in 2008 was 36.6 million. The smolt input comprised mainly S1 smolts (70%), and the proportion of photoperiod adjusted fish (S½ smolts) input decreased to 30%. Approximately 4% of smolts input into Scottish salmon farms were sourced from outwith Scotland. This is a decrease on the proportion observed in 2007.

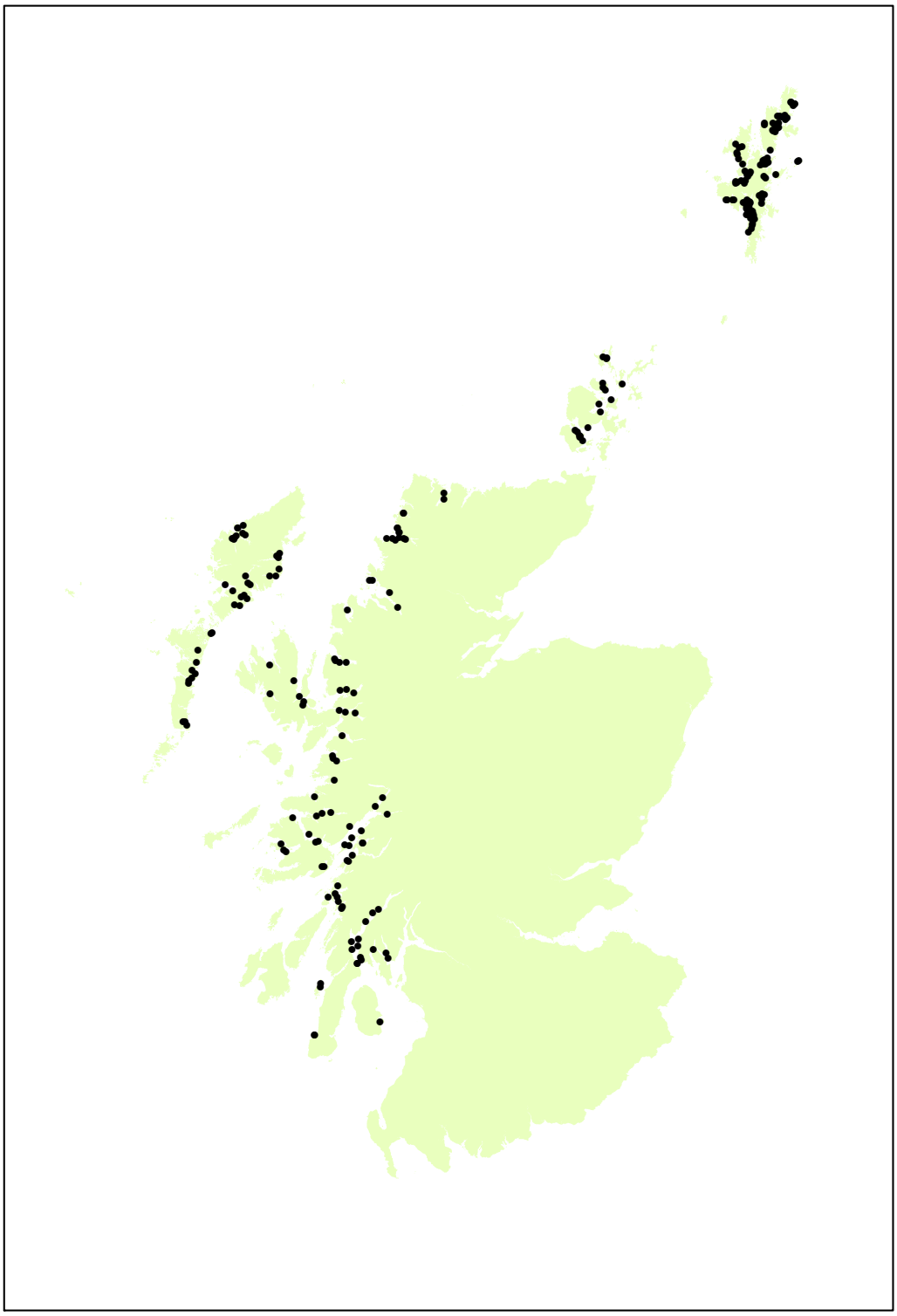
Survival and Production in Smolt Year Classes by Production Area

Table 30: Number (000s) of smolts put to sea and year class survival by area during 1997-2008

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	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	2008	3,664	35.2	8,079	77.7
	2007	9,563	2007	23	0.2	2008	5,394	56.4					
	2008	9,328	2008	69	0.7								
Orkney	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	2008	586	36.1	1,019	62.8
	2007	1,408	2007	-	-	2008	594	42.2					
	2008	1,912	2008	-	-								
Shetland	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	2008	5,349	40.6	9,927	75.3
	2007	14,947	2007	-	-	2008	4,530	30.3					
	2008	13,816	2008	47	0.3								
South West	1997	11,540	1997	-	-	1998	4,126	35.7	1999	2,305	20.0	6,431	55.7

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	%
	1998	6,505	1998	41	0.6	1999	2,543	39.1	2000	1,501	23.1	4,085	62.8
	1999	5,370	1999	226	4.2	2000	1,626	30.3	2001	2,131	39.7	3,983	74.2
	2000	7,851	2000	110	1.4	2001	4,554	58.0	2002	2,925	37.3	7,589	96.7
	2001	7,667	2001	-	-	2002	3,014	39.3	2003	3,022	39.4	6,036	78.7
	2002	7,403	2002	-	-	2003	3,761	50.8	2004	2,808	37.9	6,569	88.7
	2003	6,834	2003	-	-	2004	2,110	30.9	2005	3,646	53.3	5,756	84.2
	2004	6,786	2004	-	-	2005	3,281	48.4	2006	2,722	40.1	6,003	88.5
	2005	6,589	2005	-	-	2006	2,054	31.2	2007	4,175	63.3	6,229	94.5
	2006	7,032	2006	-	-	2007	2,677	38.1	2008	3,427	48.7	6,104	86.8
	2007	6,135	2007	-	-	2008	980	16.0					
	2008	6,386	2008	-	-								
	1997	5,274	1997	170	3.2	1998	3,900	73.9	1999	447	8.5	4,517	85.6
	1998	6,559	1998	187	2.8	1999	4,455	67.9	2000	294	4.5	4,936	75.2
	1999	8,445	1999	411	4.9	2000	4,839	57.3	2001	847	10.0	6,097	72.2
	2000	8,325	2000	198	2.4	2001	5,646	67.8	2002	1,110	13.3	6,954	83.5
	2001	6,879	2001	341	5.0	2002	4,568	66.4	2003	705	10.2	5,614	81.6
Western Isles	2002	10,048	2002	137	1.4	2003	4,815	47.9	2004	3,217	32.0	8,169	81.3
	2003	6,456	2003	82	1.3	2004	2,647	41.0	2005	2,377	36.8	5,106	79.1
	2004	8,399	2004	-	-	2005	2,578	30.7	2006	4,081	48.6	6,659	79.3
	2005	6,675	2005	-	-	2006	1,426	21.4	2007	3,133	46.9	4,559	68.3
	2006	8,853	2006	-	-	2007	1,799	20.3	2008	2,855	32.2	4,654	52.6
	2007	5,800	2007	-	-	2008	1,513	26.1					
	2008	5,184	2008	-	-								

Figure 3: The distribution of active salmon production sites 2008



Staffing

Table 31: Number of staff employed in salmon production during 1998-2008

Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Staff	F/T	1,117	1,036	1,141	1,066	1,083	1,066	1,019	851	790	798	849
	P/T	192	268	256	191	223	151	142	128	81	118	100
Total staff		1,309	1,304	1,397	1,257	1,306	1,217	1,161	979	871	916	949
Productivity (tonnes/person)		84.6	97.2	92.3	110.2	110.7	139.5	136.2	132.4	151.4	141.8	135.5

The total number of staff employed in salmon production in 2008 was 949, an increase of 33 compared with 2007. 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 141.8 to 135.5 tonnes production per person.

Production Methods

Table 32: Production methods, capacity, tonnage and average stocking densities (Kg/m^3) during 2006-2008

Method	Number of sites			Total capacity (000s cubic metres)			Production (tonnes)		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
Seawater tanks	1	1	1	5.8	5.9	5.9	0	14	21
Seawater cages	251	246	256	15,406	14,571	14,769	131,847	129,916	128,585
For cage sites: ratio of production (Kg) to cage capacity (m^3)							8.6	8.9	8.7

The vast majority of the fish were produced in seawater cages. There were 21 tonnes of production from seawater tank sites in 2008. This reflects the continued high installation and running costs incurred in operating seawater tank systems. Eight 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 increased by 198,000 m^3 during 2008. The number of sites in production increased by ten. Production efficiency in cages, measured as the ratio of fish weight in kilograms produced per cubic metre, decreased by 0.2 Kg in 2008. In cage sites, the ratio of production, expressed in kilograms, to cage capacity, expressed in cubic metres, was 8.6, 8.9 and 8.7 in 2006, 2007 and 2008 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 1998-2008

Production grouping (tonnes)	0	1-50	51-100	101-200	201-500	501-1,000	>1,000	Total Sites*	Total Tonnes
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
2008	118	7	9	15	22	29	57	257	128,606
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	-	-
2008	0	0.1	0.5	1.6	5.8	15.9	76	-	-

*Includes farms stocked but having no production.

In 2008, there was a decrease of 16 in the number of sites producing 1 to 500 tonnes, and a decrease of 3 in those sites producing over 500 tonnes. The trend showing the concentration of production in larger sites was maintained in 2008.

Company Productivity

Table 34: Number of companies grouped by production (tonnes), manpower and productivity (tonnes per person) during 2007-2008

Total Tonnage		0-100	101-200	201-400	401-700	701-1,000	1,001-2,000	>2,000	Total
No. of companies	2007	13	3	4	3	3	2	10	38
	2008	14	4	2	2	1	3	9	35
No. of tonnes	2007	60	461	987	1,761	2,570	2,444	121,647	129,930
	2008	131	560	585	1,003	798	3,276	122,253	128,606
Manpower (total)	2007	37	13	22	15	58	26	745	916
	2008	16	28	10	26	4	64	801	949
Productivity (tonnes/person)	2007	2	35	45	117	44	94	163	142
	2008	8	20	58	39	199	51	153	135

Productivity may be used as a measure of efficiency, and was found to be related to the scale of production. The greatest productivity (199 tonnes per person) was achieved in the company having a production between 701 and 1,000 tonnes, and the least (eight tonnes per person) in the companies producing the smallest tonnages. In comparison with 2007, the average company productivity decreased from 142 to 135 tonnes per person.

Overall production was dominated by 9 companies in 2008, which between them accounted for over 95% of the salmon production in Scotland.

Manpower and Production by Production Area

Table 35: Manpower and production (tonnes) by area 1999-2008, and projected production in 2009

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	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	280	34	41,250	131	125	1.8	7,817	4.2	15,997	4.5	17,311	4.7
	2009			27,461*									
Orkney	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	60	5	5,716	88	-	-	811	4.2	1,747	4.3	3,158	5.4
	2009			6,607*									
Shetland	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	202	26	42,593	187	91	1.9	3,970	4.1	13,982	3.9	24,550	4.6
	2009			47,770*									

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	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	173	21	20,584	106	-	-	1,212	4.0	3,108	4.6	16,264	4.7
	2009			37,002*									
Western Isles	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	134	14	18,463	125	-	-	1,486	3.8	4,629	4.1	12,348	4.3
	2009			14,187*									
All Scotland	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	849	100	128,606	135	216	1.9	15,296	4.1	39,463	4.2	73,631	4.6
	2009			133,027*									

*Estimated production in 2009

Company and Site Data

Table 36: Number of companies and sites engaged in salmon production during 1998-2008

Year	Number of companies			Number of sites		
	Producing	Non-producing	Total	Producing	Non- producing	Total
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
2008	26	9	35	139	118	257

The number of companies registered and actively producing salmon in 2008 was 26, a decrease of two on the 2007 figure. Nine companies remained active and registered, although not producing salmon for harvest in 2008. This continued the trend of salmon production being concentrated within fewer companies. These 35 companies have 257 registered active sites, although not all active sites may have produced fish for harvest in 2008.

Fallowing

Table 37: Number of seawater cage sites employing a fallow period during 1999-2008

Year	Fallow Period (weeks)						Total
	0	<4	4-8	9-26	27-51	52	
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
2008	53	16	28	92	40	28	257

Of the 257 seawater cage sites recorded as being active in 2008, 204 farms were fallow for a variable period, whilst 28 farms were fallow for the whole of 2008. 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 53 sites that had no fallow period in 2008. These may have been stocked late in 2007 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 1997-2008

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Broodstock sites	37	25	20	18	15	19	20	15	15	17	20	20

In 2008, the number of freshwater and seawater sites holding broodstock remained at 20. The number of sites holding broodstock in any one year can be variable, as can be seen from the previous years' figures, which indicate no obvious trend. Fourteen thousand, three hundred and thirty-eight fish were stripped, yielding just over 135 million ova, compared with just under 84 million in 2007, which can be calculated to show an average ova yield per fish of 9,418.

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 increased production in marine species. These provide diversification from the production of rainbow trout and Atlantic salmon. The forecast for production in 2009 of Cod and Artic charr is significantly reduced and employment provided by these sectors is expected to decrease.

Staffing

Table 39: Number of staff employed in farming other species during 2000-2008

Year	Full-time	Part-time	Total
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
2008	80	44	124

Company, Site and Production Data

Table 40: Number of companies and sites producing other species, and production of other species (tonnes) during 2005-2008, and estimated production in 2009

Species	No. of companies	No. of sites	2005 Production tonnage	2006 Production tonnage	2007 Production tonnage	2008 Production tonnage	2009 Production tonnage*
Arctic charr	2	2	3	3.5	6.5	0.9	0
Brown trout/ Sea trout	19	34	122	267	124	311	245
Cod	7	14	69.6	543	1,111	1,822	0.4
Halibut	5	9	272.4	233	147	206	210

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

There were significant increases in the production of cod increasing by 711 tonnes and brown trout/sea trout increasing by 187 tonnes on the 2007 figures. Halibut production also increased. There was a decrease in Arctic charr 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 was one reported escape from sites rearing other species in 2008, involving the loss of 3,700 fish.

Ova Laid Down to Hatch

Table 41: Source of other species' ova laid down to hatch during 2008

Species	Source of ova laid down to hatch (000s)		
	Own broodstock	Other GB broodstock	Foreign ova
Arctic charr (*Salvelinus alpinus*)	1,000	0	0
Cod (*Gadus morhua*)	14,268	0	0
Brown trout/Sea trout (*Salmo trutta*)	1,780	273	0
Halibut (*Hippoglossus hippoglossus*)	3,000	0	1,000

Trade in Small Fish

Table 42: Trade in other species' small fish in 2008

Species	Bought (000s)	Sold (000s)
Cod	1,303	2,862
Halibut	95	80
Brown trout / Sea trout	159	470

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 increased by 3.4% in 2008 to 7,670 tonnes and was directed at the table (88.8%) and restocking (11.2%) markets. The total numbers of staff employed by the sector decreased by two to 141. There was an overall increase in the productivity of the industry to 54.4 tonnes per person.

The number of ova laid down to hatch decreased by 2 million and was mainly all-female diploid stock (88%). The proportion of ova that were sourced within GB decreased to 4%, resulting from a decrease in the numbers of home-produced ova. There were no imports from the Southern hemisphere during 2008. There was an increase in the trade with Norway (5.9% of total ova imported) and USA (5.9% of total ova imported). Northern Ireland was the largest source of imported ova with 64% of the total ova imported. There is a continued high dependence of the Scottish trout industry on imported ova.

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 a decreased yield from smolts. There was a decrease in the production of smolts, and the yield from ova also decreased.

Smolt production decreased by 4.4% to 36.4 million, with over half (65.9%) being S1, and the remainder being S½ smolts (34.1%). The number of staff directly employed on freshwater sites decreased by sixteen. This resulted in an increased productivity to138, 600 fish per person. The number of ova laid down to hatch has decreased by19.4%. The ratio of ova laid down to smolts produced has decreased to 1.7 in 2008. Projected estimates for 2009 suggest that a similar number of ova were laid down to hatch, and that fewer smolts will be produced in 2009, followed by an increase in 2010.

The majority of ova for the production of Scottish salmon were derived from Great British sources (56.5%) in 2008. Foreign sources supplied 43.5% of the ova laid down. The export of ova to other countries within the EU decreased by 21%, while the trade with Chile increased by 93%.

The production tonnage in sea water decreased by 1% in 2008, this was due mainly to a decrease in the mean weight and number of year one fish being harvested. The number of staff directly employed on site increased, with the development of 33 jobs in the seawater industry. The estimated smolt placement in 2009 has decreased to 32.6 million, and production is expected to remain stable in 2009 as there has not been an increase in smolt input. The estimated harvest forecast for 2009 is 133,027 tonnes, an increase of 3.4% on the 2008 total.

The production tonnage decreased in 2008 and the number of sites in production increased from 247 to 257. The trend towards concentrating production in larger sites was maintained, with 76% 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 2008 and staff numbers increased. There was a significant increase in the tonnage of cod produced but the estimated tonnage for 2009 is less than a tonne. This is due to the closure of a major cod producing company. Artic charr production dropped significantly in 2008 and estimated production for 2009 is zero. There was an increase in the tonnages of halibut and industry has predicted another small increase in production 2009. Brown trout production increased significantly in 2008 but a decrease in production is estimated for 2009.

APPENDIX 1

Questionnaires sent to Fish Farmers

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2008

ATLANTIC SALMON - PRODUCTION DATA

Please complete and return by 31 JANUARY 2009 to A J Walker, FRS Marine Laboratory
PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Reg No FB/

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

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

		Site 1	Site 2	Site 3	Site 4
2	**How many smolts were put into the site in 2008 as:**				
a	**S$1^1/_2$s** (ie from 2008 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S1s** (ie from 2007 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c	**S1$^1/_2$s** (ie from 2007 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d	**S2s** (ie from 2006 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
3	**How many of the above smolts came from England**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
4	**Total smolt input proposed in 2009**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
5	**HARVEST of 2008 SMOLT INPUT in 2008**				
a	Number of tonnes (wet weight at harvest)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
6	**HARVEST of 2007 SMOLT INPUT from 1 JANUARY to 31 AUGUST**				
a	Number of tonnes (wet weight at harvest)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
7	**HARVEST of 2007 SMOLT INPUT from 1 SEPTEMBER to 31 DECEMBER**				
a	Number of tonnes (wet weight at harvest)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
8	**HARVEST of 2006 SMOLT INPUT**				
a	Number of tonnes (wet weight at harvest)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Number of fish	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
9	**How many tonnes of fish do you expect to harvest in 2009**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
10a	**Were brood fish produced in 2008**	**YES/NO**	**YES/NO**	**YES/NO**	**YES/NO**
b	**How many fish were stripped**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
11	**What is the current fish holding capacity of each site in cubic metres**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
12	**Duration of FALLOW PERIOD in WEEKS (cage sites; MAX = 52)**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
13	**Does a management agreement in respect of fish health operate with other producers in your area**	**YES/NO**	**YES/NO**	**YES/NO**	**YES/NO**

SGMD ANNUAL PRODUCTION SURVEY 2008

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:

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 the year post hatch
S1$^1/_2$ **19-24 months old**, ie put to sea in July-December in the year post hatch
S2 **>24 months old**, ie when put to sea

Q10. Broodstock production

Please circle **YES** if broodfish were produced on the site

Q11. Fish holding capacity

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

Q12. Fallow period

For cage sites only; please enter any number of weeks a site was fallow in 2008; 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 2009 to allow the Annual Survey Report for 2008 to be produced.

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2008

ATLANTIC SALMON - SMOLT DATA

Please complete and return by 31 JANUARY 2009 to A J Walker, 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 2007-2008 (company total) ☐☐☐☐☐☐☐☐

		Site 1	Site 2	Site 3	Site 4
3	**How many eyed ova were laid down for hatching in winter of 2007-2008**				
a	From own farmed broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	From other GB farmed broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c	From GB wild broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d	From foreign sources	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
4	**How many eyed ova do you expect to hatch this winter (2008-2009)**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
5	**How many fry or parr were**				
a	Transferred into the site	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	Transferred out of the site	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
6	**How many smolts were produced as**				
a	**S$^{1}/_{2}$s** (ie from 2008 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S1s** (ie from 2007 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c	**S1$^{1}/_{2}$s** (ie from 2007 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d	**S2s** (ie from 2006 hatch)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
7	**How many smolts were sold as**				
a	**S1s** (incl S$^{1}/_{2}$s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S2s** (incl S1$^{1}/_{2}$s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
8	**How many smolts do you expect to produce for sea winter on-growing next spring (2009) as**				
a	**S1s** (incl S$^{1}/_{2}$s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	**S2s** (incl S1$^{1}/_{2}$s)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
9	**How many smolts do you plan to produce in 2010**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
10	**What is the fish holding capacity of each site in cubic metres**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
11	**Duration of FALLOW PERIOD in WEEKS (cage sites only)**	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
12	**How many fish did you vaccinate**				
a	against furunculosis	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b	against ERM	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c	against IPN	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d	against *Vibrio* spp.	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐

SGMD ANNUAL PRODUCTION SURVEY 2008

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 2008 (maximum = 52)

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2009 to allow the Annual Survey Report for 2008 to be produced.

ANNUAL RETURN of INFORMATION from SCOTTISH FISH FARMS
for the PERIOD 1 JANUARY to 31 DECEMBER 2008
RAINBOW TROUT - DATA

Please complete and return by 31 JANUARY 2009 to A J Walker, FRS Marine Laboratory
PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Reg No FB/

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

1 How many staff were employed in RAINBOW TROUT production (company total) **Full time** ☐☐☐ **Part time** ☐☐☐

	Site 1	Site 2	Site 3	Site 4
2 How many eyed ova were laid down for hatching in 2008				
a from own broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b from other GB broodstock	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c from abroad (Northern Hemisphere **incl**, N Ireland and Isle of Man)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d from abroad (Southern Hemisphere)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
3 How many of the above ova were				
a all female diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b mixed sex diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c all triploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
4 How many fry/fingerlings were				
a bought	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b sold	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
5 How many bought fry/fingerlings were				
a all female diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b mixed sex diploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c all triploid	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
6 How many of these fish were vaccinated against ERM				
a vaccinated on site	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b bought vaccinated	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
7 What was your total production in TONNES for the TABLE TRADE				
a <450 g (<1 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b 450-900 g (1-2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c >900 g (>2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
8 What was your total production in TONNES for the RESTOCKING TRADE				
a <450 g (<1 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b 450-900 g (1-2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c >900 g (>2 lb)	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
9 What is the fish holding capacity of the holding units for each site in cubic metres				
a Tanks	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
b Ponds	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
c Raceways	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
d Cages	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐

SGMD ANNUAL PRODUCTION SURVEY 2008

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**

Q9. Fish Holding Capacity

Please enter the total cubic metre capacity for each type of production unit

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2009 to allow the Annual Survey Report for 2008 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.
MSS	Marine Scotland Science.
Parr	Young salmon at stage from dispersal from redd to migration as a smolt.
Photoperiod	Alteration of light regime.
Pre-salmon	Non-mature salmon usually after one winter at sea.
Raceway	Concrete or brick channels used for farming fish.

$S^1/_2$	Salmon or sea trout smolting at approximately six months from hatch (usually by photoperiod and/or temperature manipulation).
S1	Salmon or sea trout smolting at approximately one year from hatch.
$S1^1/_2$	Salmon or sea trout smolting at approximately 18 months from hatch.
S2	Salmon or sea trout smolting at approximately two years from hatch.
Smolt	Fully silvered juvenile salmon ready to be transferred or to migrate to sea.
Third Country	Country outside the EU.
Triploid	Genetically manipulated 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.

This document is also available on the Scottish Government website:
www.scotland.gov.uk

ISBN : 1363-5859