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Scottish Fish Farm Production Survey 2018

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SCOTTISH FISH FARM PRODUCTION SURVEY 2018

This report was prepared by Marine Scotland Science

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// FOREWORD

The annual production survey of fish farms in Scotland for 2018 was carried out by Marine Scotland Science (MSS). This survey collates annual production data from Scottish finfish farm sites operated by authorised aquaculture production businesses. These are Official Statistics published in accordance with the Code of Practice for official Statistics, https://gss.civilservice.gov.uk/policy-store/code-of-practice-for-statistics/. The production tonnage obtained is for the wet weight (i.e. weight of live fish) at harvest.

Responses to questionnaires from Scottish fish farming companies covering the period 1st January to 31st December 2018 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 rainbow trout, Atlantic salmon and other farmed species sectors. 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.

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L A Munro

September 2019

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// EXECUTIVE SUMMARY

The tables below summarise the results from the 2018 fish farms annual production survey.

Rainbow Trout (*Oncorhynchus mykiss*)

		2017	2018
Total production	(tonnes)	7,637	6,413
Production for the table	(tonnes)	6,997	5,874
Production for restocking	(tonnes)	640	539
Number of staff employed		132	136
Mean productivity	(tonnes/person)	57.9	47.2
Number of ova laid down to hatch	(millions)	7.0	6.3
Number of ova imported	(millions)	6.5	5.8

In 2018, the production of rainbow trout decreased by 1,224 tonnes. Employment increased by four staff and mean productivity decreased to 47.2 tonnes per person. The number of ova laid down to hatch decreased by 0.7 million and the number of ova imported decreased by 0.7 million.

Atlantic salmon (*Salmo salar*)

Smolts

		2017	2018
Number of ova produced	(millions)	12.6	15.2
Number of ova laid down to hatch	(millions)	65.7	70.5
Number of ova exported	(millions)	0.3	0.02
Number of ova imported	(millions)	57.9	65.8
Number of smolts produced	(millions)	46.2	47.1
Number of smolts put to sea	(millions)	46.1	45.4
Number of staff employed		291	278
Mean productivity (000's smolts/person)		158.6	169.4

The production of ova increased by 2.6 million in 2018 and the number of ova laid down to hatch increased by 4.8 million. A very small amount of ova were exported in 2018 (0.02 million) and the number of ova imported increased by 7.9 million from the 2017 figure. The number of smolts produced increased by 0.9 million. In 2018 the number of staff decreased by 13 and mean productivity increased by 10,800 smolts per person.

Production fish

		2017	2018
Total production	(tonnes)	189,707	156,025
Production of 0-year fish	(tonnes)	0	247
Production of grilse	(tonnes)	68,116	53,244
Production of pre-salmon	(tonnes)	58,329	57,310
Production of salmon	(tonnes)	63,262	45,224
Mean fish weight 0-year	(kg)	-	2.9
Mean fish weight grilse	(kg)	5.0	4.9
Mean fish weight pre-salmon	(kg)	4.8	5.2
Mean fish weight salmon	(kg)	5.7	6.3
Number of staff employed		1,389	1,466
Mean productivity	tonnes/person	136.6	106.4

Production tonnage decreased by 33,682 tonnes with an increase in the mean harvest weight of pre-salmon and salmon but a decrease in the mean weight of grilse. Staff numbers increased by 77 and mean productivity decreased to 106.4 tonnes per person.

Smolt survival (percentage harvested)

Survival (%)	Years 0+1	Year 2	Total
2015 input year class	54.7	24.4	79.1
2016 input year class	59.9	16.7	76.6

The smolt survival rate for the 2016 input year class decreased to 76.6%.

Other Species

Including brown/sea trout *(Salmo trutta)*; halibut *(Hippoglossus hippoglossus)*; lumpsucker *(Cyclopterus lumpus)* and several species of wrasse (Labridae)

		2017	2018
Total production	(tonnes)	91[a]	40[a]
Number of staff employed	(full-time)	45	45
	(part-time)	17	15
Number of ova laid down to hatch	(millions)	4.7[b]	38.9[b]
Number of ova imported	(millions)	1.2	1.5

Some figures are excluded from this report as providing them would reveal production information from an individual company.

[a]Excluding halibut production.

[b]Excluding halibut ova laid down to hatch.

In 2018, the production of other species decreased by 51 tonnes from the 2017 total, although this figure does not include halibut production. Overall, employment decreased by two in 2018. There was an increase in the number of ova laid down to hatch during 2018 and again any halibut ova laid down to hatch were excluded from this figure.

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	0	2	5,575
Atlantic salmon (freshwater stages)	0	0	0
Atlantic salmon (seawater stages)	8	5	47,726
Other Species (from sites rearing seawater Atlantic salmon)	0	0	0

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

Production survey information was collected from all 23 companies actively involved in rainbow trout production, farming 53 active sites. This figure represents the entire industry operating in Scotland.

Production

Table 1a: Annual production (tonnes) of rainbow trout during 2004-2018 and projected production in 2019

Year	Tonnes	Year	Tonnes
2004	6,352	2012	5,670
2005	6,989	2013	5,611
2006	7,492	2014	5,882
2007	7,414	2015	8,588
2008	7,670	2016	8,096
2009	6,766	2017	7,637
2010	5,139	2018	6,413
2011	4,619	2019	8,379*

* Industry estimate based on stocks currently being on-grown.

Production decreased in 2018 by 1,224 tonnes, a decrease of 16%, to 6,413 tonnes.

Table 1b: Production (tonnes) for the table trade during 2009-2018 according to weight category

Year	<450 g <1 lb	450-900 g 1-2 lbs	>900 g >2 lbs	Total Tonnes
2009	2,232	1,143	2,620	5,995
2010	2,125	727	1,606	4,458
2011	1,421	1,004	1,433	3,858
2012	1,195	1,655	2,209	5,059
2013	1,908	825	2,268	5,001
2014	2,334	290	2,704	5,328
2015	2,299	258	5,476	8,033
2016	2,393	234	4,810	7,437
2017	2,000	544	4,453	6,997
2018	803	223	4,848	5,874

Production for the table in 2018 was 5,874 tonnes, a decrease of 1,123 tonnes (16%) on the 2017 total. This accounted for 92% of the total rainbow trout production, the same proportion as was produced in 2017. Also, an increase in the number of fish in the large size range and decreases in the number of fish in the small and medium size ranges were highlighted.

Table 1c: Production (tonnes) for the restocking trade during 2009-2018 according to weight category

Year	<450 g <1 lb	450-900 g 1-2 lbs	>900 g >2 lbs	Total Tonnes
2009	32	294	444	770
2010	19	201	461	681
2011	8	419	334	761
2012	22	266	323	611
2013	24	221	365	610
2014	28	256	270	554
2015	15	158	382	555
2016	35	183	441	659
2017	10	150	480	640
2018	14	143	382	539

In 2018, production for the restocking of angling waters decreased to 539 tonnes representing a decrease of 101 tonnes (16%) on the 2017 total. This accounted for 8% of total rainbow trout production in 2018. These figures represent the tonnage of fish supplied to angling waters for restocking purposes; they do not account for the catch taken by anglers. The production of medium and large sized fish showed decreases while there was an increase in the production of small sized fish.

Production by Site

Table 2: Numbers of sites grouped by tonnage produced during 2009-2018

Year	Number of sites per production tonnage				Total number of sites
	<1-25	26-100	101-200	>200	
2009	10	11	7	11	39
2010	7	13	9	7	36
2011	9	10	6	8	33
2012	10	10	6	8	34
2013	6	11	5	8	30
2014	6	11	5	9	31
2015	4	10	5	11	30
2016	6	10	3	13	32
2017	4	8	5	11	28
2018	5	10	3	11	29

Production was reported from 29 of the 53 active sites. The number of producers in the <1-25 tonnes and 26-100 tonnes size brackets increased while those in the 101-200 tonnes size bracket decreased. The numbers of producers in the >200 tonnes size bracket remained the same as in 2017. 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 methods of production in 2018 and comparison with production in 2017

Production method	Production grouping (tonnes) in 2018					Total tonnage and (%) by method		Number of sites	
	<10	10-25	26-50	51-100	>100	2017	2018	2017	2018
FW cages	1	0	0	0	5	2,592 (34.0%)	1,838 (28.7%)	6	6
FW ponds and raceways	1	1	6	2	4	1,484 (19.4%)	1,142 (17.8%)	13	14
FW tanks and hatcheries	2	0	0	1	0	79 (1.0%)	70 (1.1%)	3	3
SW cages	0	0	0	1	5	3,482 (45.6%)	3,363 (52.4%)	6	6
SW tanks	0	0	0	0	0	0	0	0	0
Total	4	1	6	4	14	7,637	6,413	28	29

Seawater production accounted for 3,363 tonnes (52.4%) and freshwater production the remaining 3,050 tonnes (47.6%). Production from freshwater cages, freshwater ponds and raceways, freshwater tanks and hatcheries and seawater cages all decreased during 2018.

Company and Site Data

Table 4: Number of companies and sites in production during 2009-2018

Year	No. of companies	No. of sites
2009	27	56
2010	25	51
2011	23	48
2012	25	48
2013	24	46
2014	24	46
2015	24	45
2016	24	44
2017	23	44
2018	23	53

In 2018 the number of companies authorised by the Scottish Government and actively engaged in rainbow trout production was 23. The number of sites registered and in production was 53.

Staffing and Productivity

Table 5: Number of staff employed and productivity per person during 2009-2018

Year	Full-time Male	Full-time Female	Total Full-time	Part-time Male	Part-time Female	Total Part-time	Total Staff	Productivity (tonnes/ person)
2009	107	4	111	22	5	27	138	49.0
2010	95	3	98	24	7	31	129	39.8
2011	90	5	95	16	7	23	118	39.1
2012	74	5	79	23	5	28	107	53.0
2013	85	4	89	16	5	21	110	51.0
2014	86	7	93	13	7	20	113	52.1
2015	100	10	110	10	6	16	126	68.2
2016	90	10	100	15	6	21	121	66.9
2017	98	12	110	15	7	22	132	57.9
2018	103	8	111	17	8	25	136	47.2

The overall number of staff employed in 2018 increased by four to 136. The number of full-time staff increased by one while the number of part-time staff increased by three. Productivity, measured as tonnes produced per person, decreased by 18.5% in 2018 with no distinction between full and part-time employees being made for this calculation.

Production by Area

Table 6: Production and staffing by area in 2018

Area	No. of sites	Table production (tonnes)	Restocking production (tonnes)	Mean tonnes per site	Staffing			Productivity (tonnes/ person)
					F/T	P/T	Total	
North*	13	57	25	6.3	5	5	10	8.2
East	13	1,048	268	101.2	32	8	40	32.9
West	16	4,250	28	267.4	59	4	63	67.9
South	11	519	218	67.0	15	8	23	32.0
All	53	5,874	539	121.0	111	25	136	47.2

*From 2018, the North area also included production and staff from the Western Isles

Productivity was greatest in the West at 267.4 tonnes per site and 67.9 tonnes per person.

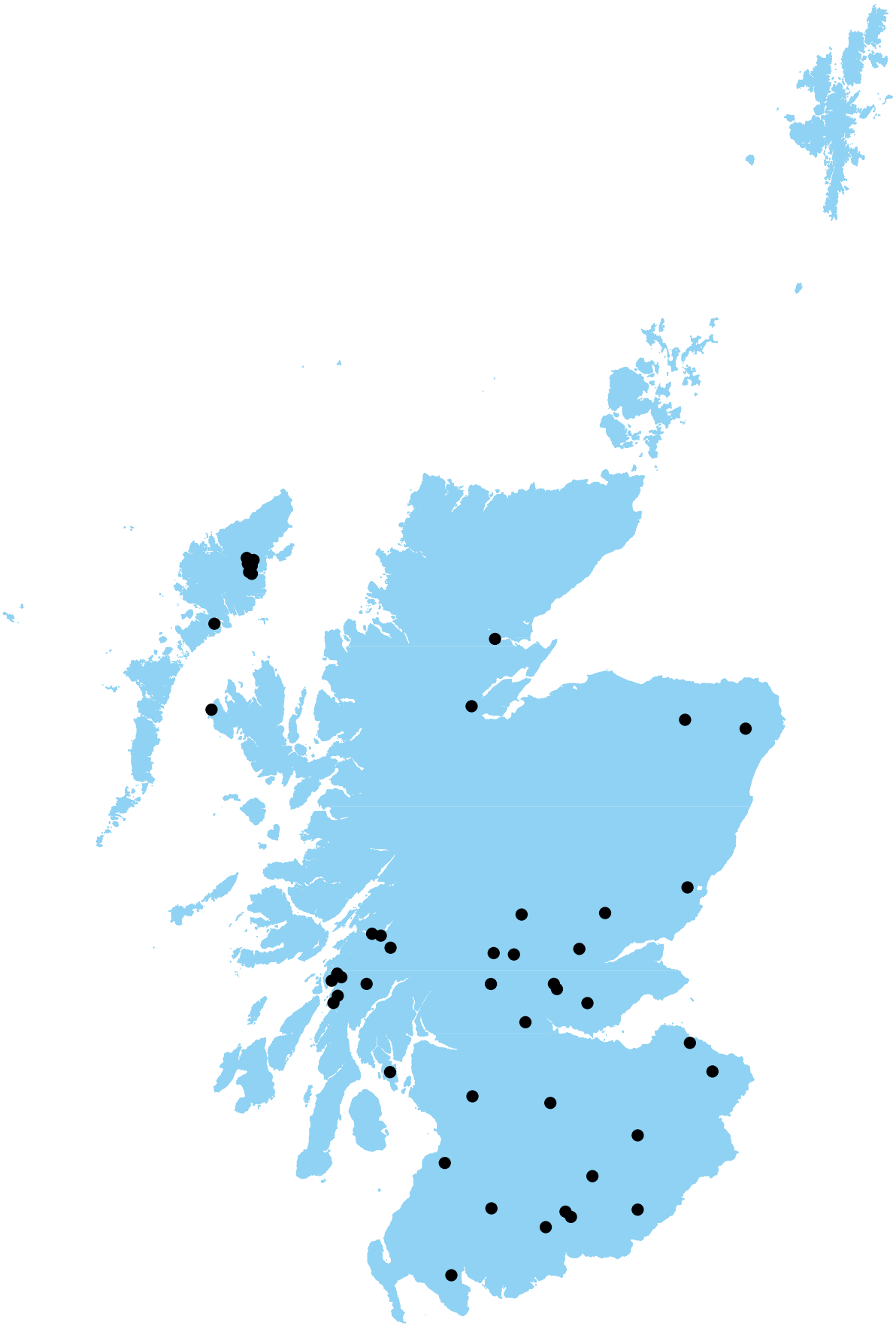


FIGURE 1: THE DISTRIBUTION OF ACTIVE RAINBOW TROUT SITES IN 2018

Type of Ova Laid Down

Table 7: Number (000s) and proportions (%) of eyed ova types laid down to hatch during 2009-2018

Year	All female diploid no. (%)	Triploid no. (%)	Mixed sex diploid no. (%)	Total ova
2009	15,469 (87)	2,341 (13)	35 (<1)	17,845
2010	13,352 (89)	1,052 (7)	675 (4)	15,079
2011	12,673 (84)	2,254 (15)	215 (1)	15,142
2012	10,967 (85)	2,005 (15)	7 (<1)	12,979
2013	7,857 (80)	1,955 (20)	77 (<1)	9,889
2014	8,321 (75)	2,710 (25)	9 (<1)	11,040
2015	10,245 (85)	1,800 (15)	76 (<1)	12,121
2016	7,986 (80)	1,943 (20)	5 (<1)	9,934
2017	2,366 (34)	4,670 (66)	5 (<1)	7,041
2018	1,460 (23)	4,843 (77)	15 (<1)	6,318

Source of Ova Laid Down

Table 8: Number (000s) and sources of eyed ova laid down to hatch in 2009-2018

Year	Ova produced in Great Britain (GB)			Total imported ova	Total
	Own stock	Other stock	Total	Northern hemisphere	
2009	603	220	823	17,022	17,845
2010	415	50	465	14,614	15,079
2011	215	189	404	14,738	15,142
2012	14	230	244	12,735	12,979
2013	77	537	614	9,275	9,889
2014	9	655	664	10,376	11,040
2015	6	888	894	11,227	12,121
2016	35	349	384	9,550	9,934
2017	20	547	567	6,474	7,041
2018	15	495	510	5,808	6,318

In 2018, the total number of eyed ova laid down to hatch decreased by 0.7 million (10%) on the 2017 figure. All ova were imported from the Northern hemisphere; no ova have been imported from the Southern hemisphere since 2007. The proportion of ova from GB broodstock remained the same as in 2017 (8.1% of the total) and the rainbow trout industry remained reliant on imported ova. Data on the importation of ova into Scotland are also available from the health certificates 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 from Official Import Health Certificates

Table 9a: Number (000s) and sources of ova imported into Scotland from outwith GB during 2009-2018

Source	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Denmark	4,070	1,715	5,250	1,950	1,315	2,500	2,330	5,535	3,518	3,728
Isle of Man	290	1,400	520	300	800	1,000	175	20	300	0
N. Ireland	10,090	9,247	7,320	8,332	5,125	4,780	6,535	3,040	1,240	1,085
Norway	750	200	130	300	175	710	670	500	774	0
USA	2,240	2,340	1,580	1,800	2,350	1,700	1,675	750	0	855
Totals	17,440	14,902	14,800	12,682	9,765	10,690	11,385	9,845	5,832	5,668

Table 9b: Seasonal variation in numbers (000s) and sources of ova imported into Scotland from outwith GB during 2018

Month	Denmark	N. Ireland	USA
January	0	200	0
February	1000	135	0
March	370	0	0
April	0	100	175
May	950	0	0
June	0	0	205
July	0	100	205
August	0	100	0
September	0	450	230
October	400	0	40
November	320	0	0
December	688	0	0
Totals	3,728	1,085	855

Table 9c: Number (000s) and sources of fish imported into Scotland from outwith GB during 2009-2018

Source	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
N. Ireland	0	<1	72	155	537	674	746	592	486	391
Republic of Ireland	0	2	0	0	0	0	0	0	0	0

Suppliers within the European Union (EU) accounted for 84.9% of ova imported into Scotland during 2018 with the USA accounting for the remaining 15.1%. In recent years there has been a trend for producers to import part grown rainbow trout into Scotland from outwith GB.

Trade in Fry and Fingerlings

Table 10: Number (000s) of fry and fingerlings traded during 2009-2018

Year	Fry and fingerlings bought			Total number bought	Total number sold
	All female diploid no. (%)	Triploid no. (%)	Mixed sex diploid no. (%)		
2009	21,113 (94)	1,358 (6)	0	22,471	20,597
2010	15,539 (95)	585 (4)	141 (1)	16,265	14,686
2011	16,288 (88.5)	1,970 (10.7)	138 (0.8)	18,396	16,612
2012	12,543 (91)	1,226 (9)	0	13,769	12,088
2013	6,734 (84)	1,239 (16)	0	7,973	6,749
2014	5,911 (81)	1,423 (19)	0	7,334	6,719
2015	6,104 (87)	598 (9)	290 (4)	6,992	6,971
2016	6,452 (85)	1,125 (15)	0	7,577	6,779
2017	3,989 (73)	1,446 (27)	0	5,435	4,145
2018	979 (42)	1,361 (58)	0	2,340	2,383

The established trade between hatcheries and on-growing farms continued in 2018. Some companies specialised in fry and fingerling production. The total number of fry and fingerlings bought decreased by 56.9% while the number sold decreased by 42.5%. The disparity between supply and demand is due to trade with England and Wales.

Use of Vaccines

Table 11: Number of sites rearing fish vaccinated against enteric redmouth disease (ERM) and number of fish vaccinated (millions) during 2009-2018

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of sites	31	27	26	24	19	21	17	18	18	17
No. of fish	27.5	20.0	20.3	20.4	9.9	10.0	8.3	7.3	5.4	3.4

Vaccines continued to be used as a preventative treatment against enteric redmouth disease (ERM), a potentially serious bacterial infection, caused by *Yersinia ruckeri*. Vaccination is generally carried out as a bath treatment at the fingerling stage, although some vaccines are administered by intra-peritoneal injection. A total of 3.4 million fish were vaccinated on 17 sites.

Organic Production

Of the 53 sites recorded as being active in rainbow trout production in 2018, none were certified as organic.

Escapes

There were two incidents involving the loss of 5,575 fish from rainbow trout sites in 2018.

// 2. ATLANTIC SALMON (*SALMO SALAR*) – OVA AND SMOLTS

Production survey information was collected from all 24 companies actively involved in the freshwater production of Atlantic salmon, farming 71 active sites. This figure represents the entire freshwater industry operating in Scotland.

Company and Site Data

Table 12: Number of companies and sites in production during 2009-2018

Year	No. of companies	No. of sites
2009	30	105
2010	31	104
2011	28	98
2012	28	100
2013	27	102
2014	26	96
2015	25	87
2016	26	87
2017	24	79
2018	24	71

In 2018 the number of companies authorised by the Scottish Government for freshwater production of Atlantic salmon remained at 24. A total of 71 sites were actively engaged in commercial production, a decrease of eight from the 2017 figure.

Production and Staffing

Table 13: Number (000s) of smolts produced, staff employed and smolt productivity during 2009-2018

Year	Number (000's) of Smolts produced	Full-time Male	Full-time Female	Total Full-time	Part-time Male	Part-time Female	Total Part-time	Total Staff	Productivity, 000's smolts per person
2009	36,868	202	14	216	42	12	54	270	136.5
2010	36,872	213	20	233	42	14	56	289	127.6
2011	43,626	207	18	225	45	23	68	293	148.9
2012	44,324	218	17	235	60	33	93	328	135.1
2013	40,457	226	11	237	29	19	48	285	142.0
2014	45,004	226	18	244	42	23	65	309	145.6
2015	44,571	208	31	239	41	14	55	294	151.6
2016	42,894	225	27	252	35	7	42	294	145.9
2017	46,152	219	31	250	33	8	41	291	158.6
2018	47,097	210	29	239	30	9	39	278	169.4

Smolt production in 2018 increased by 2% compared to 2017. The number of staff employed in 2018 decreased by 13 and productivity increased by 6.8% to a figure of 169,400 smolts produced per person. Data for staffing and productivity in 2013 are shown, however, there are uncertainties with these data due to consolidation within the industry.

Smolts by Age Group

Table 14: Number of smolts (000s) produced by type during 2009-2018

Year	S½	S1	S1½	Total
2009	13,837	23,031	0	36,868
2010	14,116	22,756	0	36,872
2011	17,233	26,393	0	43,626
2012	18,795	25,239	290	44,324
2013	19,024	21,279	154	40,457
2014	22,367	22,473	164	45,004
2015	23,850	20,711	10	44,571
2016	25,072	17,822	0	42,894
2017	28,072	18,080	0	46,152
2018	24,058	23,039	0	47,097

In 2018, there was an increase (27.4%) in the number of S1 smolts produced but a decrease (14.3%) in the number of S½ smolts produced. There was no production of S1½ smolts in 2018 and no S2 smolts produced since 2006.

Production Systems

Table 15: Number and capacity of production systems during 2014-2018

System	No. of sites with system					Total capacity, 000s cubic metres				
Year	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Cages	41	38	38	36	27	351	355	400	357	346
Tanks and Raceways	55	49	49	43	44	65	47	46	55	54
Total	96	87	87	79	71	416	402	446	412	400

The principal types of facility used for the production of smolts in freshwater are cages or tanks and raceways. In 2018, the number of farms using cages decreased by nine and the number of farms using tanks and raceways increased by one. In terms of volume, cage capacity decreased by 11,000 m^3 and tank and raceway capacity decreased by 1,000 m^3. This resulted in a net decrease in volume of 12,000 m^3 available for the production of smolts in Scotland during 2018.

Table 16: Number (000s) of smolts produced and stocking densities by production system during 2014-2018

	Number of smolts produced (000s)					Stocking densities (smolts/m³)				
Year	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Cages	22,816	18,135	15,884	17,207	21,771	65	51	40	48	63
All others	22,188	26,436	27,010	28,945	25,326	341	562	587	526	469
Total	45,004	44,571	42,894	46,152	47,097	-	-	-	-	-

The average stocking densities of cages increased from 48 to 63 smolts per m^3 in 2018 compared to 2017, while densities in tanks and raceways decreased from 526 to 469 smolts per m^3.

Ova Production

Table 17: Number (000s) of salmon ova produced during 2009-2018

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of ova	91,964	91,655	78,208	57,489	56,904	33,450	11,605	13,689	12,631	15,228

In 2018, 15.2 million ova were stripped, an increase of 21% from the number of ova produced in 2017.

Table 18: Source, number (000's), previous year's estimate of ova laid down to hatch during 2009-2018 and projection for 2019

Year	In-house broodstock	Out-sourced GB broodstock	GB wild broodstock	Foreign ova	Total	Previous year's estimate
2009	17,148	20,158	65	30,200	67,571	64,693
2010	13,744	26,220	0	29,657	69,621	61,011
2011	15,664	14,630	0	34,322	64,616	54,526
2012	18,556	9,981	0	34,700	63,237	55,723
2013	16,996	8,263	0	41,315	66,573	49,249
2014	14,418	2,725	10	53,684	70,837	48,149
2015	6,479	223	10	61,463	68,175	65,284
2016	5,884	4	0	58,458	64,346	59,604
2017	6,228	360	0	59,158	65,746	60,673
2018	8,780	200	0	61,499	70,479	67,374
2019						71,571

The number of ova laid down to hatch was 70.5 million, an increase of 4.7 million (7.2%) on the 2017 figure. The majority of the ova (87.3%) were derived from foreign sources, this being an increase of 2.3 million (4.0%) on the 2017 figure. Supplies derived from GB broodstock increased by 2.4 million, a 36.3% increase on the 2017 figure. No ova from GB wild broodstock were laid down in 2018, however, in previous years the ova derived from wild stocks were 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 2009-2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual smolts put to sea	38.5	38.5	42.7	41.1	40.9	48.1	45.5	43.0	46.1	45.4		
Smolts produced	36.9	36.9	43.6	44.3	40.5	45.0	44.6	42.9	46.2	47.1		
Estimated production	32.6	28.7	35.9	31.3	28.1	39.9	43.4	36.6	39.3	46.1	38.6	43.0
Ratio of ova laid down to smolts produced	1.8	1.9	1.5	1.4	1.6	1.6	1.5	1.5	1.4	1.5		

The figure for the number of smolts put to sea includes smolts produced in England and smolts imported from elsewhere, whereas smolt production data relate only to those produced in Scotland. Smolt producers estimate putting 38.6 million smolts to sea in 2019. The ratio of ova laid down to hatch to smolts produced in 2018 was greater than the ratio in 2017.

Scale of Production

Table 20: Smolt-producing sites grouped by numbers (000s) of smolts produced during 2009-2018

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		
2009	0	0	3	7	14	18	10	12	64	36,868
2010	1	0	4	4	16	15	10	14	64	36,872
2011	1	0	4	5	11	14	9	17	61	43,626
2012	0	0	1	3	19	14	11	13	61	44,324
2013	1	0	1	7	14	14	7	14	58	40,457
2014	0	0	2	1	11	9	14	13	50	45,004
2015	1	1	2	4	9	11	16	11	55	44,571
2016	1	1	0	3	7	11	13	12	48	42,894
2017	1	0	0	2	6	11	10	15	45	46,152
2018	0	1	0	0	6	9	14	12	42	47,097

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

The number of sites producing smolts in 2018 was 42. The number of sites producing less than 101,000 smolts has decreased by two and there has also been a decrease of three in the number of sites producing in excess of one million smolts per year. The number of sites producing between 101,000 and one million smolts per year increased by two.

Production of Ova and Smolt by Production Area

Table 21: Staffing in 2018, ova laid down to hatch in 2017-2018, smolt production in 2017-2018 and estimated production in 2019-2020 by region

Region	Number of staff employed in 2018		Ova laid down to hatch (000s)		Smolt production (000s)		Estimated smolt production (000s)	
	F/T	P/T	2017	2018	2017	2018	2019	2020
North West	129	18	34,643	41,362	26,316	28,975	18,931	23,981
Orkney	1	4	159	0	145	108	140	390
Shetland	26	1	7,602	5,708	3,055	3,287	3,300	4,050
West	53	11	16,362	16,673	10,675	10,451	11,100	9,475
Western Isles	24	2	6,980	6,694	4,769	3,514	4,439	4,360
East and South	6	3	0	42	1,192	762	724	733
All Scotland	239	39	65,746	70,479	46,152	47,097	38,634	42,989

In 2018, the North West and the West were the main areas where ova were laid down to hatch. The North West and the West were the main smolt producing areas. The greatest number of staff were employed in the North West region.

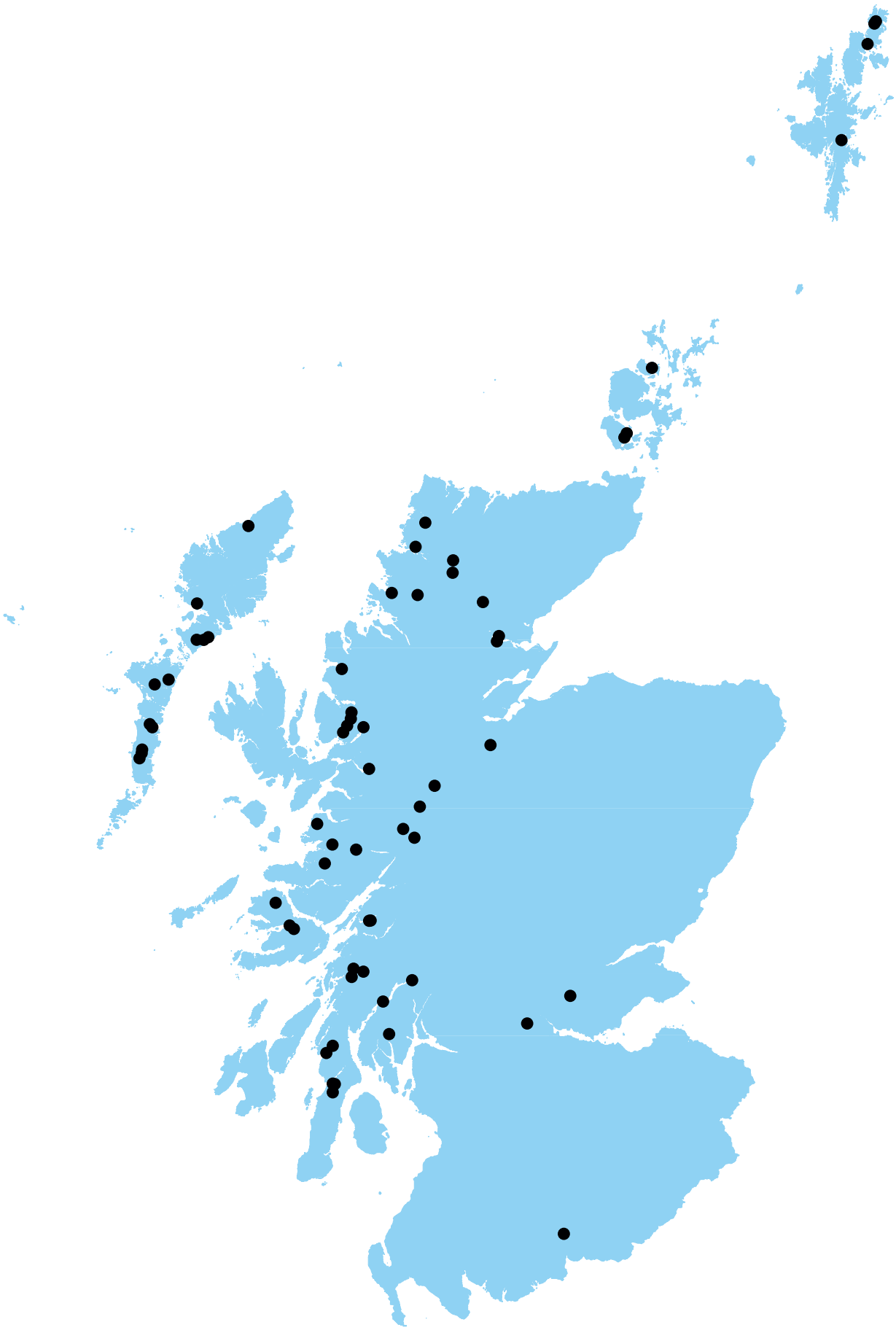


FIGURE 2: THE DISTRIBUTION OF ACTIVE ATLANTIC SALMON SMOLT SITES IN 2018

International Trade in Ova

Since the introduction of the EU single market on 1st 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). Trade is based on the same rules as are established within the EU regarding compartments and zones declared free from listed diseases.

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. Marine Scotland Science advises potential exporters to ascertain with the importing country any specific health testing requirements that may be a condition of import.

Imports and Exports

Table 22a: Source and number (000's) of salmon ova, fry, parr and smolts imported during 2009-2018 derived from health certificates

Import Year	Ova				Fry, Parr and Smolts	
	EU Member States	EFTA		Total	EU Member States	EFTA-Norway
		Iceland	Norway			
2009	5,460	0	29,938	35,398	328	0
2010	2,150	0	26,533	28,683	452	0
2011	3,400	0	35,851	39,251	800	0
2012	10,134	0	23,849	33,983	0	0
2013	10,700	2,719	35,044	48,463	55	0
2014	5,218	3,813	49,831	58,862	1,602	1,748
2015	4,815	8,978	45,926	59,719	2,118	365
2016	5,444	5,324	38,602	49,370	1,956	0
2017	7,000	13,883	37,025	57,908	2,012	0
2018	7,250	10,116	48,430	65,796	1,700	0

The numbers of ova imported increased by 13.6%. The number of fry, parr and smolts imported decreased from that observed in 2017, with just 1.7 million fry, parr and smolts imported from EU member states. There have been no imports from Third Countries such as the USA since 2005.

Table 22b: Destination and number (000's) of salmon ova, fry, parr and smolts exported during 2009-2018 derived from health certificates

Export year	Farmed origin ova				Total	Fry, Parr and Smolts
	Chile	EU	Norway	Others		
2009	7,181	317	0	0	7,498	89
2010	0	189	600	0	789	130
2011	0	0	0	820	820	183
2012	0	0	0	0	0	55
2013	0	650	0	0	650	404
2014	0	0	0	0	0	259
2015	0	93	0	2	95	8
2016	0	335	0	23	358	173
2017	0	16	0	323	339	206
2018	0	23	0	0	23	71

In 2018, 23,000 ova were exported. Fry, parr and smolt exports decreased by 135,000 fish on the 2017 figure.

Vaccines

Table 23: Number of sites using vaccines and number (millions) of fish vaccinated during 2009-2018

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of sites	68	70	67	63	63	56	55	47	46	43
No. of fish (millions) vaccinated	39.6	42.6	49.2	48.1	47.5	44.7	48.0	42.6	58.4	51.0

Vaccines were used to provide protection against furunculosis, infectious pancreatic necrosis (IPN), ERM, vibriosis and salmonid alphavirus (SAV). The majority of fish were vaccinated against furunculosis and IPN, with smaller numbers of fish being vaccinated against ERM, vibriosis and SAV. A total of 51.0 million fish were vaccinated across 43 sites.

Escapes

There were no escape incidents reported from sites rearing freshwater Atlantic salmon during 2018.

// 3.ATLANTIC SALMON – PRODUCTION

Production

Production survey information was collected from all 12 companies actively involved in Atlantic salmon production, farming 221 active sites. This figure represents the entire industry operating in Scotland.

Table 24: Annual production of salmon (tonnes) during 1998-2018 and projected production in 2019

Year	Tonnes	Percentage difference	Year	Tonnes	Percentage difference
1998	110,897	12	2009	144,247	12
1999	126,686	14	2010	154,164	6.9
2000	128,959	2	2011	158,018	2.5
2001	138,519	7	2012	162,223	2.7
2002	144,589	4	2013	163,234	0.6
2003	169,736	17	2014	179,022	9.7
2004	158,099	-7	2015	171,722	-4.1
2005	129,588	-18	2016	162,817	-5.2
2006	131,847	2	2017	189,707	16.5
2007	129,930	-1.4	2018	156,025	-17.8
2008	128,606	-1	2019	190,499*	

*industry estimate of projected tonnage based on stocks currently being on-grown.

The total production of Atlantic salmon during 2018 was 156,025 tonnes, a decrease of 33,682 tonnes (17.8%) on the 2017 total.

Table 25: Number (000s), production (tonnes) of salmon harvested and mean fish weight (kg) per year class during 2009-2018

	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)	2009	2009	81	178	2.2
	2010	2010	128	268	2.1
	2011	2011	109	307	2.8
	2012	2012	127	301	2.4
	2013	2013	0	0	-
	2014	2014	286	720	2.5
	2015	2015	223	626	2.8
	2016	2016	114	333	2.9
	2017	2017	0	0	-
	2018	2018	84	247	2.9
Harvest in year 1	2008	2009	16,338	77,621	4.7
	2009	2010	18,266	85,826	4.7
	2010	2011	18,694	91,105	4.9
	2011	2012	21,502	97,744	4.5
	2012	2013	21,264	106,161	5.0
	2013	2014	20,316	101,997	5.0
	2014	2015	24,038	114,112	4.7
	2015	2016	24,633	111,163	4.5
	2016	2017	25,596	126,445	4.9
	2017	2018	21,825	110,554	5.1
Harvest in year 2	2007	2009	14,132	66,448	4.7
	2008	2010	13,666	68,070	5.0
	2009	2011	13,772	66,606	4.8
	2010	2012	13,053	64,178	4.9
	2011	2013	11,283	57,073	5.1
	2012	2014	13,712	76,305	5.6
	2013	2015	10,910	56,984	5.2
	2014	2016	10,940	51,321	4.7
	2015	2017	11,094	63,262	5.7
	2016	2018	7,165	45,224	6.3

Table 26: Number (000s) and production (tonnes) of grilse and pre-salmon harvested during 2009-2018

Year	Grilse (January-August)			Pre-salmon (September-December)		
	Number	Tonnes	Average weight (kg)	Number	Tonnes	Average weight (kg)
2009	5,631	23,857	4.2	10,707	53,764	5.0
2010	6,877	29,733	4.3	11,389	56,093	4.9
2011	7,604	35,146	4.6	11,090	55,959	5.0
2012	11,337	53,216	4.7	10,165	44,528	4.4
2013	9,618	47,496	4.9	11,646	58,665	5.0
2014	9,048	46,686	5.2	11,268	55,311	4.9
2015	11,243	53,930	4.8	12,795	60,182	4.7
2016	13,463	59,853	4.4	11,170	51,310	4.6
2017	13,523	68,116	5.0	12,073	58,329	4.8
2018	10,815	53,244	4.9	11,010	57,310	5.2

Table 27: Percentage (by weight) of annual production by growth stage harvested during 2009-2018

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Growth stage	-	-	-	-	-	-	-	-	-	-
Input year fish	<1	<1	<1	<1	0	<1	<1	<1	0	<1
Grilse	16	19	22	33	29	26	31	37	36	34
Pre-salmon	37	36	35	27	36	31	35	31	31	36
Year 2 salmon	46	44	42	39	35	42	33	31	33	29

Survival and Production in Smolt Year Classes

Table 28: Survival and production in smolt year classes during 1999-2018

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			
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	0	-	-	0	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	14,133	66,448	4.7	37.3	71.8	121,247	3.20
2008	36,662	116	216	1.9	0.3	16,338	77,621	4.7	44.6	13,666	68,070	5.0	37.3	82.2	145,907	3.98
2009	38,548	81	178	2.2	0.2	18,266	85,826	4.7	47.4	13,772	66,606	4.8	35.7	83.3	152,610	3.96
2010	38,490	128	268	2.1	0.3	18,694	91,105	4.9	48.6	13,053	64,178	4.9	33.9	82.8	155,551	4.04
2011	42,733	109	307	2.8	0.3	21,502	97,744	4.5	50.3	11,283	57,073	5.1	26.4	77.0	155,124	3.63
2012	41,094	127	301	2.4	0.3	21,264	106,161	5.0	51.7	13,712	76,305	5.6	33.4	85.4	182,767	4.45
2013	40,936	0	-	-	0	20,316	101,997	5.0	49.6	10,910	56,984	5.2	26.7	76.3	158,981	3.88
2014	48,112	286	720	2.5	0.6	24,038	114,112	4.7	50.0	10,940	51,321	4.7	22.7	73.3	166,153	3.45
2015	45,465	223	626	2.8	0.5	24,633	111,163	4.5	54.2	11,094	63,262	5.7	24.4	79.1	175,051	3.85
2016	42,957	114	333	2.9	0.3	25,596	126,445	4.9	59.6	7,165	45,224	6.3	16.7	76.6	172,002	4.00
2017	46,116	0	-	-	0	21,825	110,554	5.1	47.3							
2018	45,375	84	247	2.9	0.2											

In 2016, the last year for which survival can be calculated, the survival rate from smolt input to harvest decreased to 76.6%. Of the 2017 year class, 47.3% of the input has been harvested, 12.6% lower than the average harvest of fish one year after input in the 2016 year class. In 2018, there was 0.2% fish harvested from the 2018 input. This was an increase compared with the proportion of fish harvested from the same year class in 2017.

Smolts to Sea

Table 29: Number (000s) and origin of smolts put to sea during 2009-2018

Year	Smolts put to sea (000s)			Total (000s)	Scottish Origin	English Origin		Other Origin	
	S½	S1	S1½		%	(000s)	%	(000s)	%
2009	14,967	23,581	0	38,548	95	1,700	4	105	<1
2010	14,069	24,421	0	38,490	95	1,541	4	120	<1
2011	17,721	25,012	0	42,733	96	1,765	4	0	0
2012	17,334	23,480	280	41,094	96	1,510	4	0	0
2013	19,262	21,534	140	40,936	97	1,169	3	0	0
2014	23,758	24,212	142	48,112	94	893	2	2,072	4
2015	22,886	22,569	10	45,465	96	938	2	1,082	2
2016	22,052	20,905	0	42,957	97	1,048	2	611	1
2017	25,490	20,626	0	46,116	97	976	2	300	<1
2018	21,629	23,746	0	45,375	96	1,318	3	364	1

The total number of smolts put to sea in 2018 was 45.4 million. This smolt input comprised S1s (52.3%) and S½s (47.7%). There were no S1½s put to sea in 2018 and no S2s have been put to sea since 2001. Four percent of the smolts stocked to Scottish salmon farms were sourced from outwith Scotland, 1% of which came from sources outwith GB. This was an increase of just over 1% compared with the proportion observed in 2017.

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 2007-2018

Region	Smolts put to sea (000s)		Harvest in year 0			Harvest in year 1			Harvest in year 2			Total Harvest	
	Year	No	Year	No	%	Year	No	%	Year	No	%	No	%
North West	2007	9,563	2007	23	0.2	2008	5,394	56.4	2009	1,850	19.3	7,267	75.9
	2008	9,099	2008	116	1.3	2009	4,897	53.8	2010	2,687	29.5	7,700	84.6
	2009	9,986	2009	42	0.4	2010	7,045	70.5	2011	2,003	20.1	9,090	91.0
	2010	9,924	2010	117	1.2	2011	6,324	63.7	2012	2,802	28.2	9,243	93.1
	2011	12,605	2011	53	0.4	2012	7,937	63.0	2013	1,744	13.8	9,734	77.2
	2012	11,588	2012	127	1.1	2013	7,179	62.0	2014	2,623	22.6	9,929	85.7
	2013	10,975	2013	0	0	2014	6,549	59.7	2015	1,695	15.4	8,244	75.1
	2014	17,543	2014	191	1.1	2015	9,649	55.0	2016	3,768	21.5	13,608	77.6
	2015	8,646	2015	223	2.6	2016	6,122	70.8	2017	1,695	19.6	8,040	93.0
	2016	14,534	2016	114	0.8	2017	9,711	66.8	2018	1,882	12.9	11,707	80.5
	2017	9,527	2017	0	0	2018	3,809	40.0					
	2018	15,177	2018	84	0.6								
Orkney	2007	1,408	2007	0	0	2008	594	42.2	2009	741	52.6	1,335	94.8
	2008	1,912	2008	0	0	2009	507	26.5	2010	1,120	58.6	1,627	85.1
	2009	1,154	2009	0	0	2010	741	64.2	2011	95	8.2	836	72.4
	2010	2,557	2010	0	0	2011	1,126	44.0	2012	936	36.6	2,062	80.6
	2011	2,718	2011	0	0	2012	1,203	44.3	2013	765	28.1	1,968	72.4
	2012	2,727	2012	0	0	2013	1,422	52.1	2014	1,167	42.8	2,589	94.9
	2013	2,104	2013	0	0	2014	1,023	48.6	2015	512	24.3	1,535	72.9
	2014	2,829	2014	0	0	2015	1,412	49.9	2016	1,244	44.0	2,656	93.9
	2015	3,266	2015	0	0	2016	1,580	48.4	2017	1,521	46.6	3,101	95.0
	2016	3,050	2016	0	0	2017	1,184	38.8	2018	1,571	51.5	2,755	90.3
	2017	3,524	2017	0	0	2018	1,699	48.2					
	2018	3,478	2018	0	0								
Shetland	2007	14,947	2007	0	0	2008	4,610	30.8	2009	4,930	33.0	9,540	63.8
	2008	13,929	2008	0	0	2009	4,992	35.8	2010	4,659	33.4	9,651	69.2
	2009	10,031	2009	29	0.3	2010	4,201	41.9	2011	3,234	32.2	7,464	74.4
	2010	11,573	2010	0	0	2011	4,134	35.7	2012	4,292	37.1	8,426	72.8
	2011	11,206	2011	49	0.4	2012	4,911	43.8	2013	2,709	24.2	7,669	68.4
	2012	11,389	2012	0	0	2013	4,995	43.9	2014	4,022	35.3	9,017	79.2
	2013	9,956	2013	0	0	2014	4,289	43.1	2015	3,034	30.5	7,323	73.6
	2014	11,309	2014	0	0	2015	5,042	44.6	2016	2,663	23.5	7,705	68.1
	2015	9,040	2015	0	0	2016	5,322	58.9	2017	1,592	17.6	6,914	76.5
	2016	10,640	2016	0	0	2017	6,012	56.5	2018	1,723	16.2	7,735	72.7
	2017	8,539	2017	0	0	2018	4,579	53.6					
	2018	11,312	2018	0	0								
South West	2007	6,135	2007	0	0	2008	980	16.0	2009	3,289	53.6	4,269	69.6
	2008	6,507	2008	0	0	2009	4,153	63.8	2010	2,969	45.6	7,122	109.4*
	2009	8,200	2009	10	0.1	2010	2,700	32.9	2011	4,697	57.3	7,407	90.3
	2010	6,565	2010	12	0.2	2011	3,000	45.7	2012	2,648	40.3	5,660	86.2
	2011	7,493	2011	0	0	2012	2,673	35.7	2013	3,706	49.4	6,379	85.1
	2012	7,363	2012	0	0	2013	2,841	38.6	2014	3,863	52.5	6,704	91.1
	2013	7,801	2013	0	0	2014	3,202	41.0	2015	3,564	45.7	6,766	86.7
	2014	6,981	2014	95	1.4	2015	3,771	54.0	2016	2,023	29.0	5,889	84.4
	2015	11,156	2015	0	0	2016	4,944	44.3	2017	3,643	32.7	8,587	77.0
	2016	8,093	2016	0	0	2017	4,643	57.4	2018	1,622	20.0	6,265	77.4
	2017	11,106	2017	0	0	2018	5,330	48.0					
	2018	7,177	2018	0	0								
Western Isles	2007	5,800	2007	0	0	2008	1,433	24.7	2009	3,320	57.2	4,753	81.9
	2008	5,214	2008	0	0	2009	1,789	34.3	2010	2,231	42.8	4,020	77.1
	2009	9,177	2009	0	0	2010	3,579	39.0	2011	3,743	40.8	7,322	79.8
	2010	7,870	2010	0	0	2011	4,110	52.2	2012	2,375	30.2	6,485	82.4
	2011	8,711	2011	7	0.1	2012	4,778	54.9	2013	2,358	27.1	7,143	82.0
	2012	8,027	2012	0	0	2013	4,827	60.1	2014	2,037	25.4	6,864	85.5
	2013	10,100	2013	0	0	2014	5,254	52.0	2015	2,105	20.8	7,359	72.8
	2014	9,451	2014	0	0	2015	4,164	44.1	2016	1,242	13.1	5,406	57.2
	2015	13,357	2015	0	0	2016	6,665	49.9	2017	2,643	19.8	9,308	69.7
	2016	6,640	2016	0	0	2017	4,046	60.9	2018	367	5.5	4,413	66.4
	2017	13,420	2017	0	0	2018	6,408	47.7					
	2018	8,231	2018	0	0								

* The survival of the 2008 smolt input in the South West is over 100% due to the practice of putting smolts to sea in one region and subsequently moving them to another sea water site in another region for harvest.

Staffing

Table 31: Number of staff employed in the production of salmon during 2009-2018

Year	Full-time Male	Full-time Female	Total Full-time	Part-time Male	Part-time Female	Total Part-time	Total Staff	Productivity (tonnes/person)
2009	806	68	874	61	28	89	963	149.8
2010	854	90	944	86	34	120	1,064	144.9
2011	847	76	923	62	28	90	1,013	156.0
2012	870	74	944	80	35	115	1,059	153.2
2013	997	84	1,081	74	25	99	1,180	138.3
2014	1,082	109	1,191	98	36	134	1,325	135.1
2015	1,125	131	1,256	70	37	107	1,363	126.0
2016	1,182	197	1,379	67	40	107	1,486	109.6
2017	1,175	145	1,320	59	10	69	1,389	136.6
2018	1,273	142	1,415	35	16	51	1,466	106.4

In 2018, the total number of staff employed in salmon production was 1,466, an increase of 77 compared with 2017. The staffing figures collected refer specifically to the production of Atlantic salmon and do not include figures for staff involved with processing or marketing activities. Productivity decreased from 136.6 to 106.4 tonnes produced per person.

Production Methods

Table 32: Production methods, capacity, tonnage and average stocking densities (kg/m^3) during 2016-2018

Method	Number of sites			Total capacity (000s cubic metres)			Production (tonnes)		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Seawater tanks	5	4	4	7.4	5.7	7.1	21	26	35
Seawater cages	248	222	217	20,067	19,108	19,922	162,796	189,681	155,990
For cage sites: ratio of production (kg) to cage capacity (m^3)							8.1	9.9	7.8

In 2018, the majority of fish were produced in seawater cages. There were 35 tonnes of production from seawater tank sites in 2018. This reflects the high installation and running costs incurred in operating seawater tank systems. Most seawater tank capacity has been re-deployed for the production of other species of marine finfish or salmon broodstock.

Sea cage capacity increased by 814,000 m^3 during 2018 and the number of sea cage sites in production decreased by five. Production efficiency in sea cages, measured as the ratio of fish weight in kilograms produced per cubic metre, decreased from 9.9kg/m^3 in 2017 to 7.8 kg/m^3 in 2018.

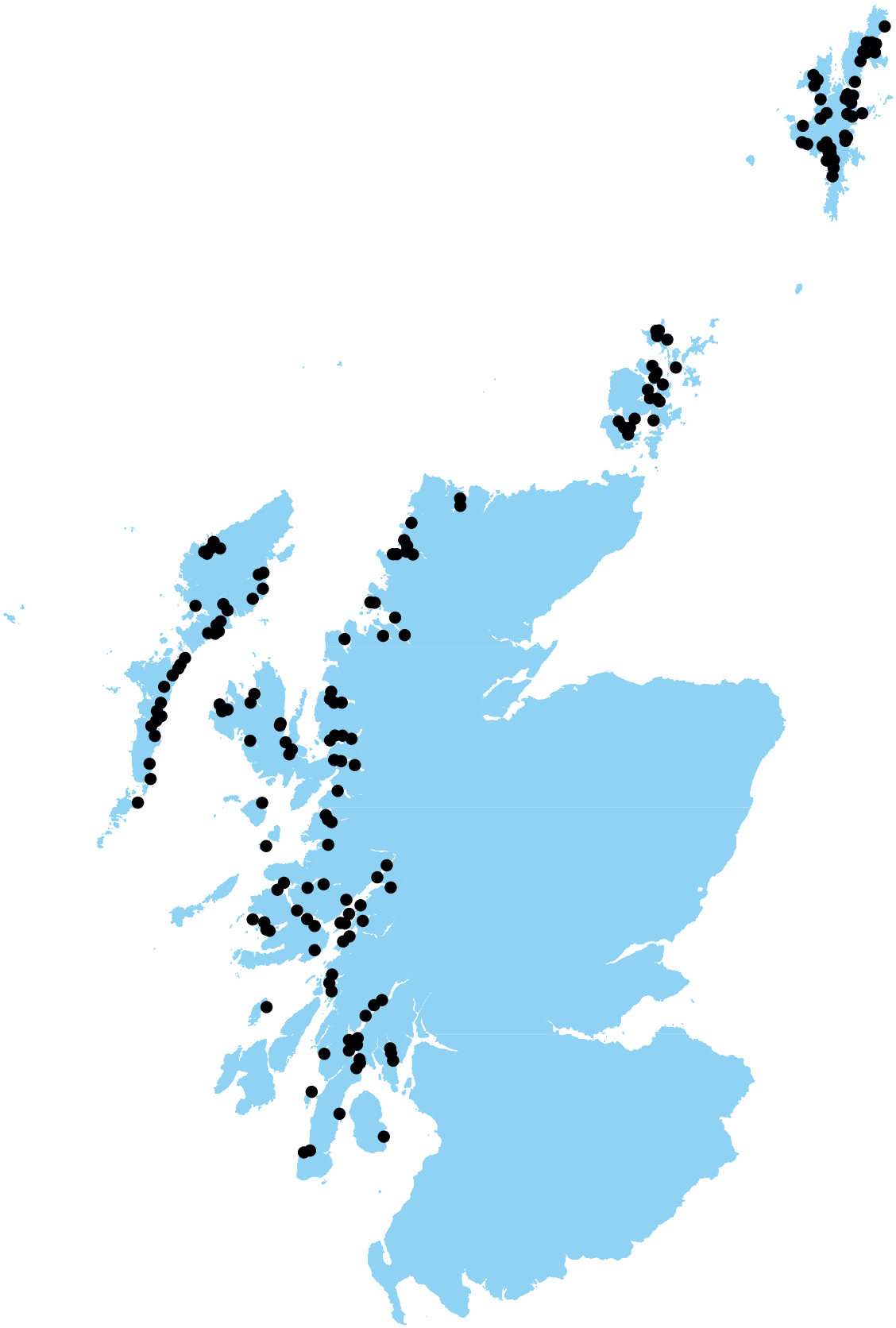


FIGURE 3: THE DISTRIBUTION OF ACTIVE ATLANTIC SALMON PRODUCTION SITES IN 2018

Scale of Production by Site

Table 33: Number of sites shown in relation to their production grouping and percentage share of production 2009-2018

Production grouping (tonnes)	0	1-50	51-100	101-200	201-500	501-1,000	>1,000	Total	
								Sites*	Tonnes
2009	104	12	12	10	33	25	58	254	144,247
2010	109	5	6	10	33	22	64	249	154,164
2011	106	9	7	9	28	29	66	254	158,018
2012	115	3	5	9	25	33	67	257	162,223
2013	112	9	3	12	18	36	67	257	163,234
2014	117	8	1	9	26	29	70	260	179,022
2015	115	2	1	9	26	26	75	254	171,722
2016	117	3	3	9	22	26	73	253	162,817
2017	93	2	0	8	13	33	77	226	189,707
2018	100	6	2	6	17	26	64	221	156,025
2009	0	0.2	0.6	1.0	7.7	13.0	77.5	-	-
2010	0	0.1	0.3	0.9	7.3	10.8	80.6	-	-
2011	0	0.2	0.3	0.8	6.4	13.4	78.9	-	-
2012	0	<0.1	0.2	0.9	5.0	15.0	78.8	-	-
2013	0	0.1	0.1	1.1	4.0	16.7	78.0	-	-
2014	0	0.1	<0.1	0.8	5.0	12.0	82.0	-	-
2015	0	<0.1	<0.1	0.9	5.0	11.6	82.4	-	-
2016	0	<0.1	0.1	0.8	4.6	11.7	82.8	-	-
2017	0	<0.1	0	0.6	3.2	13.9	82.3	-	-
2018	0	<0.1	<0.1	0.6	3.7	13.5	82.0	-	-

*Includes farms stocked but having no production.

In 2018, the number of sites with no production increased by seven and the number producing 1 to 500 tonnes increased by eight. The number of sites producing over 500 tonnes decreased by 20 but there continues to be a trend towards production in larger sites, with 82.0% of production being derived from sites producing over 1000 tonnes.

Company Productivity

Table 34: Number of companies grouped by production (tonnes), staff and productivity (tonnes per person) during 2017-2018

Total Tonnage		0-100	101-200	201-400	401-700	701-1,000	1,001-2,000	>2,000	Total
No. of companies	2017	5	0	0	0	0	1	6	12
	2018	5	0	0	0	1	0	6	12
No. of tonnes	2017	26	0	0	0	0	1,864	187,817	189,707
	2018	35	0	0	0	866	0	155,124	156,025
Staff (total)	2017	10	0	0	0	0	31	1,348	1,389
	2018	7	0	0	0	35	0	1,424	1,466
Productivity (tonnes/person)	2017	3	-	-	-	-	60	139	137
	2018	5	-	-	-	25	-	109	106

The greatest productivity of 109 tonnes per person was achieved in the companies producing over 2000 tonnes. The least productivity of 5 tonnes per person was from the companies producing between 0-100 tonnes. In comparison with 2017, the average company productivity decreased from 137 to 106 tonnes per person. Overall, production was dominated by six companies in 2018 which between them accounted for 99% of Scotland's farmed Atlantic salmon production.

Staff and Production by Production Area

Table 35: Staff and production (tonnes) by area 2009-2018 and projected production in 2019

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	2009	256	32	35,295	122	75	1.8	9,777	4.7	15,860	5.6	9,583	5.2
	2010	294	44	47,353	140	239	2.0	15,895	4.4	17,837	5.1	13,382	5.0
	2011	303	38	41,656	122	174	3.2	13,152	4.3	16,879	5.1	11,451	5.7
	2012	300	40	50,987	150	301	2.4	31,121	4.7	5,842	4.7	13,723	4.9
	2013	350	48	43,320	109	0	-	17,937	4.9	16,417	4.7	8,966	5.1
	2014	348	46	50,873	129	511	2.7	26,440	5.3	8,731	5.5	15,191	5.8
	2015	382	66	54,741	122	626	2.8	18,046	4.8	26,897	4.6	9,172	5.4
	2016	538	30	46,917	83	333	2.9	21,576	4.7	7,515	5.0	17,493	4.6
	2017	437	11	55,690	124	0	-	32,113	5.1	14,920	4.4	8,657	5.1
	2018	453	17	30,948	66	247	2.9	11,899	4.9	7,780	5.6	11,022	5.9
	2019			62,820*									
Orkney	2009	47	2	6,220	127	0	-	754	4.6	1,793	5.2	3,673	4.9
	2010	58	2	9,388	156	0	-	1,221	4.1	2,279	5.1	5,888	5.3
	2011	69	0	6,369	92	0	-	3,508	5.1	2,355	5.4	506	5.3
	2012	65	6	11,694	165	0	-	3,532	5.3	2,720	5.1	5,442	5.8
	2013	86	3	11,479	129	0	-	3,191	5.1	4,491	5.7	3,797	5.0
	2014	90	6	13,029	136	0	-	980	5.5	5,045	6.0	7,004	6.0
	2015	93	1	11,074	118	0	-	1,386	5.0	6,129	5.4	3,559	6.9
	2016	102	8	14,752	134	0	-	3,491	4.6	4,668	5.7	6,593	5.3
	2017	108	9	16,756	143	0	-	3,215	5.3	3,823	6.6	9,718	6.4
	2018	93	0	20,956	225	0	-	2,808	5.2	6,906	6.0	11,242	7.2
	2019			14,661*									
Shetland	2009	188	22	43,785	208	65	2.3	4,873	3.3	16,183	4.6	22,664	4.6
	2010	178	23	45,439	226	0	-	3,624	4.9	17,179	5.0	24,636	5.3
	2011	189	22	35,493	168	118	2.4	4,611	4.7	16,071	5.1	14,693	4.5
	2012	188	16	43,010	211	0	-	6,083	4.3	15,784	4.5	21,143	4.9
	2013	210	14	36,694	164	0	-	5,822	4.5	18,121	4.9	12,751	4.7
	2014	224	24	46,369	187	0	-	6,196	5.7	17,604	5.5	22,569	5.6
	2015	228	19	42,786	173	0	-	11,134	5.4	14,939	5.0	16,713	5.5
	2016	200	23	37,464	168	0	-	11,844	4.4	12,906	4.9	12,714	4.8
	2017	207	12	38,908	178	0	-	14,132	4.6	15,284	5.2	9,492	6.0
	2018	206	3	35,947	172	0	-	12,741	5.4	12,835	5.8	10,371	6.0
	2019			40,460*									
South West	2009	199	23	35,726	161	38	3.5	4,615	4.6	15,988	5.1	15,085	4.6
	2010	231	39	27,751	103	29	2.5	6,032	4.2	7,118	5.7	14,572	4.9
	2011	212	17	37,157	162	0	-	3,618	4.8	10,899	4.8	22,640	4.8
	2012	221	24	26,850	110	0	-	9,315	5.4	4,508	4.8	13,027	4.9
	2013	251	19	34,924	129	0	-	5,847	4.8	9,111	5.6	19,966	5.4
	2014	279	29	34,976	114	209	2.2	4,278	5.1	10,476	4.4	20,013	5.2
	2015	302	12	35,911	114	0	-	10,356	4.7	6,686	4.3	18,869	5.3
	2016	305	26	31,022	94	0	-	12,349	4.3	9,246	4.4	9,427	4.7
	2017	316	18	44,575	133	0	-	11,206	5.7	12,903	4.8	20,466	5.6
	2018	375	14	37,506	96	0	-	9,690	5.1	17,246	5.0	10,570	6.5
	2019			38,760*									
Western Isles	2009	184	10	23,221	120	0	-	3,838	4.1	3,940	4.6	15,443	4.6
	2010	183	12	24,233	124	0	-	2,961	3.7	11,680	4.2	9,592	4.3
	2011	150	13	37,343	229	15	2.1	10,257	4.7	9,755	5.0	17,316	4.6
	2012	170	29	29,682	149	0	-	3,165	3.7	15,674	4.0	10,843	4.6
	2013	184	15	36,817	185	0	-	14,699	5.2	10,525	5.2	11,593	4.9
	2014	250	29	33,775	121	0	-	8,792	4.5	13,455	4.1	11,528	5.7
	2015	251	9	27,210	105	0	-	13,008	4.4	5,531	4.5	8,671	4.1
	2016	234	20	32,662	129	0	-	10,593	4.2	16,975	4.1	5,094	4.1
	2017	252	19	33,778	125	0	-	7,450	4.7	11,399	4.6	14,929	5.6
	2018	288	17	30,668	101	0	-	16,106	4.5	12,543	4.4	2,019	5.5
	2019			33,798*									
Scotland Total	2009	874	89	144,247	150	178	2.2	23,857	4.2	53,764	5.0	66,448	4.7
	2010	944	120	154,164	145	268	2.1	29,733	4.3	56,093	4.9	68,070	5.0
	2011	923	90	158,018	156	307	2.8	35,146	4.6	55,959	5.0	66,606	4.8
	2012	944	115	162,223	153	301	2.4	53,216	4.7	44,528	4.4	64,178	4.9
	2013	1,081	99	163,234	138	0	-	47,496	4.9	58,665	5.0	57,073	5.1
	2014	1,191	134	179,022	135	720	2.5	46,686	5.2	55,311	4.9	76,305	5.6
	2015	1,256	107	171,722	126	626	2.8	53,930	4.8	60,182	4.7	56,984	5.2
	2016	1,379	107	162,817	110	333	2.9	59,853	4.4	51,310	4.6	51,321	4.7
	2017	1,320	69	189,707	137	0	-	68,116	5.0	58,329	4.8	63,262	5.7
	2018	1,415	51	156,025	106	247	2.9	53,244	4.9	57,310	5.2	45,224	6.3
	2019			190,499*									

*Estimated production for 2019.

Company and Site Data

Table 36: Number of companies and sites engaged in the production of Atlantic salmon during 2009-2018

Year	Number of companies			Number of sites		
	Producing	Non-producing	Total	Producing	Non-producing	Total
2009	25	6	31	150	104	254
2010	20	10	30	140	109	249
2011	21	6	27	148	106	254
2012	16	6	22	142	115	257
2013	15	6	21	145	112	257
2014	11	7	18	143	117	260
2015	10	6	16	139	115	254
2016	10	5	15	136	117	253
2017	8	4	12	133	93	226
2018	8	4	12	121	100	221

The number of companies authorised and actively producing Atlantic salmon in 2018 was eight, the same as in 2017. Four companies remained active and authorised, although not producing salmon for harvest in 2018. This continued the trend of Atlantic salmon production becoming concentrated within fewer companies. These 12 companies had 221 registered active sites, although not all these sites produced fish for harvest in 2018.

Fallowing

Table 37: Number of seawater cage sites employing a fallow period during 2009-2018

Year	Fallow Period (weeks)						Total
	0	<4	4-8	9-26	27-51	52	
2009	51	3	30	86	46	37	253
2010	53	8	26	83	41	36	247
2011	60	10	31	85	27	39	252
2012	58	4	31	97	28	37	255
2013	51	4	31	92	35	43	253
2014	48	4	36	89	29	51	257
2015	45	6	41	84	27	47	250
2016	47	5	27	88	32	49	248
2017	40	9	21	88	24	40	222
2018	46	5	32	76	26	32	217

Of the 217 seawater cage sites recorded as being active in 2018, 32 sites were fallow for the entire year whilst 139 sites were fallow for a variable period. There were 46 sites that did not fallow in 2018. The normal production cycle in seawater varies in length between 12 months and two years. A fallow period at the end of production can break the cycle of disease or parasitic infections.

Broodstock Sites

Table 38: Number of sites holding Atlantic salmon broodstock during 2009-2018

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Broodstock sites	11	10	11	7	8	8	4	3	4	4

In 2018, the number of freshwater and seawater sites holding broodstock remained the same with four sites. 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. A total of 2,114 fish were stripped, yielding 15.2 million ova, giving an average yield of 7,190 ova per fish.

Organic Production

Table 39: Organic production of Atlantic salmon during 2010-2018

Year	Number of active cage sites	Number of cage sites certified as organic	Production (tonnes)
2010	247	14	6,122
2011	252	10	3,104
2012	255	7	4,597
2013	253	8	5,207
2014	257	8	3,588
2015	250	5	2,382
2016	248	5	3,903
2017	222	5	4,644
2018	217	5	4,219

Of the 217 active Atlantic salmon seawater cage sites in 2018, five were certified as organic, producing 4,219 tonnes.

Escapes

There were five incidents involving the loss of 47,726 fish from seawater Atlantic salmon sites in 2018. There were eight additional incidents reported where the companies confirmed there was no loss of fish.

// 4.OTHER SPECIES

The Scottish aquaculture industry has continued to farm other species of fish during 2018. The production of brown trout (*Salmo trutta*) showed a decrease, with the majority of production being for the angling restocking market. In 2018 there was production of halibut (*Hippoglossus hippoglossus*) but the figure cannot be published without revealing the production from an individual company. No Arctic charr (*Salvelinus alpinus*) were produced during 2018. Lumpsucker (*Cyclopterus lumpus*) and several species of wrasse (Labridae) were also produced in 2018. The production of lumpsucker and wrasse are targeted at the marine Atlantic salmon industry where they are used as a biological control for parasites.

Company, Site and Production Data

Table 40: Number of companies and sites producing other species in 2018, annual production of other species (tonnes) during 2015-2018 and estimated production in 2019

Species	No. of companies	No. of sites	2015 Production tonnage	2016 Production tonnage	2017 Production tonnage	2018 Production tonnage	2019 Production tonnage*
Arctic charr	0	0	†	0	0	0	0
Brown trout/ Sea trout	9	12	42	41	61	20	25
Halibut	1	3	56	67	†	†	‡
Lumpsucker	2	4	6	10	26	14	12
Wrasse spp.	3	5	3	4	4	6	5

* Industry estimates based on stocks currently being on-grown.

† Production occurred but this cannot be shown without revealing the figure for an individual company.

‡ Estimate provided but cannot be shown without revealing the figure for an individual company.

Staffing

Table 41: Number of staff employed in farming other species during 2009-2018

Year	Full-time	Part-time	Total
2009	23	22	45
2010	19	24	43
2011	24	19	43
2012	25	21	46
2013	29	21	50
2014	29	20	49
2015	35	15	50
2016	43	20	63
2017	45	17	62
2018	45	15	60

In 2018, the overall number of staff employed in the production of other species decreased by two, to 60 staff.

Production of Cleaner fish

Table 42: Number (000s) of cleaner fish produced during 2015-2018

Species	Number of fish produced (000s)			
	2015	2016	2017	2018
Lumpsucker	235	262	925	553
Wrasse spp.	75	118	58	103

In recent years lumpsucker and wrasse spp. have been produced for use as a biological control for parasites in the marine Atlantic salmon industry. Data on the number of fish produced has only been collected since 2015. As data for future years is collected it will show trends in cleaner fish production.

Ova Laid Down to Hatch

Table 43: Source of ova from other species laid down to hatch during 2018

Species	Source of ova laid down to hatch (000s)		
	Own broodstock	Other GB broodstock	Foreign ova
Brown trout/sea trout	499	0	0
Halibut	§	0	0
Lumpsucker	0	0	1,500
Wrasse spp.	37,000	0	0

§ Own broodstock ova was laid down to hatch but this cannot be shown without revealing the figure for an individual company.

Trade in Small Fish

Table 44: Trade in small fish of other species in 2018

Species	Bought (000s)	Sold (000s)
Halibut	0	#
Brown trout/sea trout	55	4
Lumpsucker	2,200	694
Wrasse spp.	0	751

During 2018 there was trade of small halibut but figures cannot be shown without revealing the figure for an individual company.

There was also a small amount of production of: brook charr (*Salvelinus fontinalis*) and tiger trout (*Salmo trutta* x *Salvelinus fontinalis*). However, due to the small number of companies in production, it is not possible to summarise these data without revealing the production of individual companies.

Organic Production

Of the 24 sites recorded as producing other species in 2018, no organic production was reported.

Escapes

There were no reported escapes from sites rearing other species during 2018.

// 5.SCOTTISH MARINE REGIONS

The Marine (Scotland) Act 2010 introduces integrated management of Scotland's seas. The creation of a National Marine Plan, as required by the Act, sets the wider context for planning within Scotland including what should be considered when creating regional marine plans. Eleven Scottish Marine Regions have been created under the Act (see Figure 4) which cover sea areas extending out to 12 nautical miles.

To support the development of Regional Marine Plans by Regional Marine Planning Partnerships, tonnages and financial values of annual finfish production have been calculated for the regions defined under the Act. These regional data are presented in Appendix 3. In order to maintain commercial confidentiality salmon production figures for Argyll & Clyde and the North Coast & West Highlands have been merged. Other finfish species including brown/sea trout, rainbow trout, cod, halibut and cleaner fish were produced, however these figures cannot be attributed to Scottish Marine Regions due to commercial confidentiality.

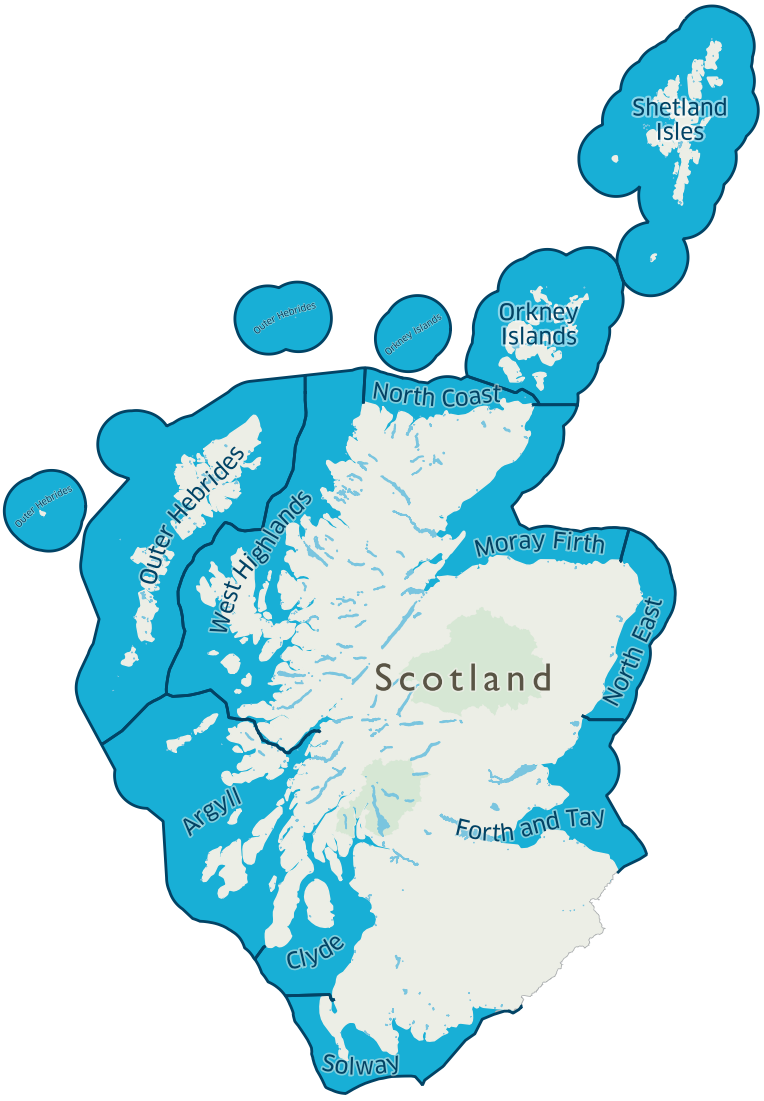


FIGURE 4: SCOTTISH MARINE REGIONS

// 6. SUMMARY

Rainbow trout

The production of rainbow trout decreased by 16% in 2018 to 6,413 tonnes and was directed at the table (92%) and restocking (8%) markets. The total numbers of staff employed by the sector increased by four to 136. There was an overall decrease in the productivity of the industry to 47.2 tonnes per person.

In 2018, the number of eyed ova laid down to hatch (6.3 million) decreased by 0.7 million and was mainly triploid stock (77%). The proportion of ova from GB broodstock remained the same as in 2017 at 8.1%. Denmark was the largest source of imported ova with 65.8% of the total, this was an increase proportionally from 2017. The Scottish rainbow trout industry continues to be highly dependent on imported ova. Additionally, imports of part grown rainbow trout from Northern Ireland continued in 2018.

Atlantic salmon

In 2018, the total production of Atlantic salmon decreased by 33,682 tonnes to 156,025 tonnes, a 17.8% decrease on the 2017 production total. The survey shows decreases in the production of grilse, pre-salmon and salmon. The number of staff directly employed on the farms increased by 77. Overall, there was a decrease in the productivity of tonnes produced per person from 136.6 to 106.4. The estimated harvest forecast for 2018 is 190,499 tonnes. The trend towards concentrating production in larger sites was maintained with 82.0% of production being concentrated in the sites producing over 1,000 tonnes per annum.

During 2018 there was an increase in the number of ova produced to 15.2 million. The number of ova laid down to hatch increased by 7.2% to 70.5 million. This highlights the trend towards using foreign ova sources with 87.3% of the ova laid down to hatch being imported and only 12.7% derived from GB sources. Smolt production increased to 47.1 million, with 51.1% being produced as S½ smolts and the remainder as S1 smolts (48.9%). The number of staff directly employed on freshwater sites decreased by 13 in 2018 to 278 staff while productivity increased to 169,400 fish per person. Projections for 2019 suggest that fewer smolts will be produced than was seen in 2018, followed by an increase in 2020.

Other Species

There was a decrease in the production of brown/sea trout from 61 tonnes in 2017 to 20 tonnes in 2018. Halibut production occurred in 2018 but the figure cannot be shown without revealing the production of an individual company. During 2018, there was no reported production of Arctic charr. Lumpsucker and wrasse were produced for use as biological controls for parasites in the marine Atlantic salmon farming industry. In 2018, the total number of staff employed in the production of other species decreased by two to 60.

// APPENDIX 1

Questionnaires sent to Fish Farmers

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2018
RAINBOW TROUT – DATA
Please complete and return by 31 January 2019 to L A Munro, Marine Scotland Science
375 Victoria Road, Aberdeen, AB11 9DB

Business No:

1	**How many staff were employed in rainbow trout production (company total)**	**Full time male**		**Part time male**	
		Full time female		**Part time female**	

2 **Please detail any accreditation schemes this company is a member of;** _____

3	**How many eyed ova were laid down for hatching in 2018**			
a	from own broodstock			
b	from other GB broodstock			
c	from abroad (Northern Hemisphere)			
d	from abroad (Southern Hemisphere)			
4	**How many of the above ova were**			
a	all female diploid			
b	mixed sex diploid			
c	all triploid			
5	**How many fry/fingerlings were**			
a	bought			
b	sold			
6	**How many bought fry/fingerlings were**			
a	all female diploid			
b	mixed sex diploid			
c	all triploid			
7	**How many of these fish were vaccinated against ERM**			
a	vaccinated on site			
b	bought vaccinated			
8	**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)			
9	**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)			
10	**From the total production what amount in TONNES was certified as organic**			
11	**What is your predicted production in 2019 in TONNES**			
12	**What is the fish holding capacity of the holding units for each site in cubic metres**			
a	Tanks			
b	Ponds			
c	Raceways			
d	Cages			

ANNUAL PRODUCTION SURVEY 2018

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. Accreditation Schemes

Please include membership to trade associations, quality schemes or organic certification schemes.

Q3. 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
Ova from abroad- Northern Hemisphere includes those from Northern Ireland and Isle of Man.

Q8-9. 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**

Q12. 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 2019 to allow the Annual Survey Report for 2018 to be produced.

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2018
ATLANTIC SALMON - SMOLT DATA

Please complete and return by 31 January 2019 to L A Munro, Marine Scotland Science
375 Victoria Road, Aberdeen, AB11 9DB

Business No:

1 **How many staff were employed in smolt production (company total)**
Full time male | **Full time female** | **Part time male** | **Part time female**

2 **Please detail any accreditation schemes this company is a member of;**

3 **How many ova were produced in the winter of 2017-2018 (company total)**

4 **How many eyed ova were laid down for hatching in winter of 2017-2018**

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

5 **How many eyed ova do you expect to hatch this winter (2018-2019)**

6 **How many fry or parr were**

a	Transferred into the site			
b	Transferred out of the site			

7 **How many smolts were produced as**

a	**S1/2s** (ie from 2018 hatch)			
b	**S1s** (ie from 2017 hatch)			
c	**S1 1/2s or S2s** (ie from 2017 or 2016 hatch)			

8 **How many smolts were sold as**

a	**S1s** (incl S1/2s)			
b	**S2s** (incl S1 1/2s)			

9 **How many smolts do you expect to produce for sea winter on-growing in 2019 as**

a	**S1s** (incl S1/2s)			
b	**S2s** (incl S1 1/2s)			

10 **How many smolts do you plan to produce in 2020**

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 **How many fish did you vaccinate**

a	against furunculosis			
b	against ERM			
c	against IPN			
d	against *Vibrio* spp.			
e	against SAV (PD)			

ANNUAL PRODUCTION SURVEY 2018

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. Accreditation Schemes

Please include membership to trade associations, quality schemes or organic certification schemes.

Q3. 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

Q7. How many smolts produced as S½ or S1 etc

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 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

Q8. } **For S1s** - combine numbers of S1/2s with S1s and
Q9. } **For S2s** - combine numbers of S1 1/2s with S2s

Q10. 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 2018 (maximum = 52)

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2019 to allow the Annual Survey Report for 2018 to be produced.

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2018

ATLANTIC SALMON - PRODUCTION DATA

Please complete and return by 31 January 2019 to L A Munro, Marine Scotland Science
375 Victoria Road, Aberdeen, AB11 9DB

Business No:

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

2 **Please detail any accreditation schemes this company is a member of;** _____

3	**How many smolts were put into the site in 2018 as:**			
a	**S1/2s** (ie from 2018 hatch)			
b	**S1s** (ie from 2017 hatch)			
c	**S11/2s** or **S2s** (ie from 2017 or 2016 hatch)			
4	**How many of above came from England**			
5	**Total smolt input proposed in 2019**			
6	**HARVEST of 2018 SMOLT INPUT in 2018**			
a	Number of tonnes (wet weight at harvest)			
b	Number of fish			
7	**HARVEST of 2017 SMOLT INPUT from 1 JANUARY to 31 AUGUST**			
a	Number of tonnes (wet weight at harvest)			
b	Number of fish			
8	**HARVEST of 2017 SMOLT INPUT from 1 SEPTEMBER to 31 DECEMBER**			
a	Number of tonnes (wet weight at harvest)			
b	Number of fish			
9	**HARVEST of 2016 SMOLT INPUT**			
a	Number of tonnes (wet weight at harvest)			
b	Number of fish			
10	**From the total production what amount in TONNES was certified as organic**			
11	**How many tonnes of fish do you expect to harvest in 2019**			
12	**BROODSTOCK PRODUCTION**			
a	**Were brood fish produced in 2018**	**YES/NO**	**YES/NO**	**YES/NO**
b	**How many fish were stripped**			
13	**What is the current fish holding capacity of each site in cubic metres**			
14	**Duration of FALLOW PERIOD in WEEKS (cage sites; MAX = 52)**			

15 **Please enter the conversion factor used in Q6, Q7, Q8 and Q9 to convert gutted weight to wet weight at harvest**

ANNUAL PRODUCTION SURVEY 2018

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. Accreditation Schemes

Please include membership to trade associations, quality schemes or organic certification schemes.

Q3. 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 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

Q12. Broodstock production

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

Q13. 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)

Q14. Fallow period

For cage sites only; please enter any number of weeks a site was fallow in 2018; the total number of fallow weeks should not exceed 52

Q15. Conversion Factor

Please enter the value used to convert gutted weights to wet weight at harvest (i.e. weight of live fish)

It will be appreciated if the questionnaires are returned promptly and not later than 31 January 2019 to allow the Annual Survey Report for 2018 to be produced.

ANNUAL RETURN OF INFORMATION FROM SCOTTISH FISH FARMS
FOR THE PERIOD 1 JANUARY TO 31 DECEMBER 2018
OTHER SPECIES – DATA

Please complete and return by 31 January 2018 to L A Munro, Marine Scotland Science
375 Victoria Road, Aberdeen, AB11 9DB

Business No:

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

Full time male | **Full time female** | **Part time male** | **Part time female**

2 **Please detail any accreditation schemes this company is a member of:** _____

3 **How many eyed ova were laid down for hatching in 2018**

a from own broodstock
b from other GB broodstock
c from foreign sources

4 **How many fry/small fish were**

a bought
b sold

5 **What was your total production for the market**

a Number of tonnes
b Number of fish

6 **From this production what amount in TONNES was certified as organic**

7 **What is your predicted production for the market in 2019**

a Number of tonnes
b Number of fish

8 **What is the holding capacity of the holding units for each site in cubic metres**

a Tanks
b Ponds
c Raceways
d Cages

ANNUAL PRODUCTION SURVEY 2018

GUIDANCE NOTES FOR QUESTIONNAIRE

OTHER SPECIES

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**, or is no longer used to culture the species concerned, please score through the relevant site or species code.

3. When completing the boxes please start from the right, if NONE then enter a **zero** in right hand box eg

					0

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.

Q2. Accreditation Schemes

Please include membership to trade associations, quality schemes or organic certification schemes.

Q5 - 7. 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 2019 to allow the Annual Survey Report for 2018 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.
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.
ERM	Enteric redmouth disease.
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.
Fry	The life stage of a young salmon from independence of the yolk sac as the primary source of nutrition to dispersal from the redd.
Gamete	Reproductive cells.
Grilse	Salmon harvested between 1st January and 31st August after one winter at sea.
Intra-peritoneal	Within the body cavity.
IPN	Infectious pancreatic necrosis.
Non-producing	A site which is active, may be stocked with fish, but has not produced any 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 the daylight regime.
Pre-salmon	Salmon harvested between 1st September and 31st December after one winter at sea.

Raceway	Concrete or brick channels used for farming fish.
SAV	Salmonid alphavirus.
S½	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.
S1½	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 or sea trout ready to be transferred or to migrate to sea.
Third Country	Country outside the EU except Norway and Iceland.
Triploid	Triploid fish are sterile fish which have three sets of chromosomes, unlike a fertile fish that have two sets of chromosomes (diploid).
Year class	Fish hatched or put to sea in a given year.

// APPENDIX 3

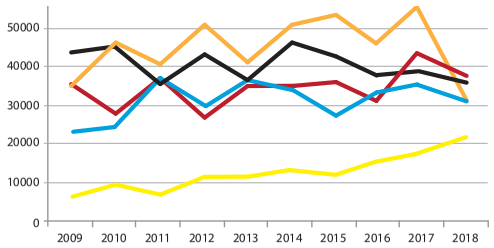
Scottish Marine Regions

Salmon Production by Scottish Marine Region (Tonnage and Value)

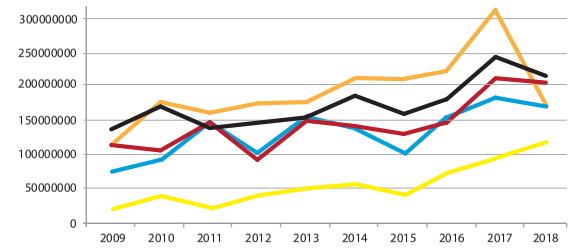
	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
Region	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)	Tonnage	Value (£)
Argyll & Clyde	35,726	118,361,232	27,751	110,921,387	37,157	154,981,430	26,850	98,351,550	34,924	157,227,848	34,976	149,417,472	35,911	140,124,722	31,022	152,131,888	44,575	251,937,900	37,506	211,158,780
Orkney Islands	6,220	20,606,860	9,388	37,523,836	6,369	26,565,099	11,694	42,835,122	11,479	51,678,458	13,029	55,659,888	11,074	43,210,748	14,752	72,343,808	16,756	94,704,912	20,956	117,982,280
Outer Hebrides	23,221	76,931,173	24,233	96,859,301	37,343	155,757,653	29,682	108,726,631	36,817	165,750,134	33,775	144,286,800	27,210	106,173,420	32,662	160,174,448	33,778	190,913,256	30,668	172,660,840
Shetland Isles	43,785	145,059,705	45,439	181,619,683	35,493	148,041,303	43,010	157,545,630	36,694	165,196,388	46,369	198,088,368	42,786	166,950,972	37,464	183,723,456	38,908	219,908,016	35,947	202,381,610
North Coast & West Highlands	35,295	116,932,335	47,353	189,269,941	41,656	173,747,176	50,987	186,765,381	43,320	195,026,640	50,873	217,329,456	54,741	213,599,382	46,917	230,080,968	55,690	314,759,880	30,948	174,237,240
All Scotland	**144,247**	**477,891,305**	**154,164**	**616,194,148**	**158,018**	**659,092,661**	**162,223**	**594,224,314**	**163,234**	**734,879,468**	**179,022**	**764,781,984**	**171,722**	**670,059,244**	**162,817**	**798,454,568**	**189,707**	**1,072,223,964**	**156,025**	**878,420,750**

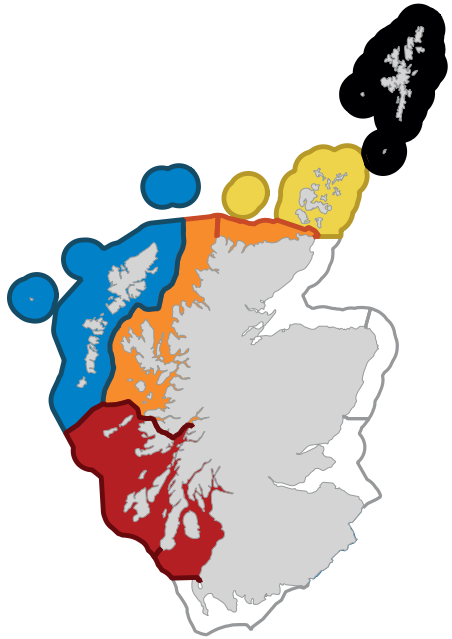
Footnote- Figures for Argyll & Clyde and the North Coast & West Highlands have been merged due to commercial confidentiality. Other finfish species including brown/sea trout, rainbow trout, halibut and cleaner fish were produced but cannot be attributed Scottish Marine Regions due to commercial confidentiality. Average prices (real) have been adjusted for inflation based on 2018 price estimates.

Salmon Tonnes



Value £ real price (inflation adjusted on 2018 Price estimates)





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