

**Report of  
the SOAFD  
Annual  
Survey of  
Fish Farms  
for 1992**





## REPORT OF THE SOAFD ANNUAL SURVEY OF FISH FARMS FOR 1992

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Responses to a Departmental questionnaire from Scottish rainbow trout and salmon farming companies are summarised in the following paragraphs and attached Tables 1-15. The cooperation of the fish farming industry in completing these questionnaires is gratefully acknowledged.

## RAINBOW TROUT

A total of 57 returns were received including four from companies which had no trout production in 1992. Returns received from the remaining 53 companies (52 in 1991) operating 72 farm sites (69 sites in 1991) showed that trout production was 4,161 tonnes (3,334 tonnes in 1991) an increase of 827 tonnes (24.8%) on the previous year. Fish reared for the table market totalled 3,455 tonnes of which 2,666 tonnes (77.2%) weighed less than 1 lb. Fish produced for restocking angling waters totalled 706 tonnes (425 in 1991) the majority (463 tonnes) of which consisted of fish weighing between 1 and 2 lb. Production of restocking and table fish expanded in 1992 by 66 and 18% respectively.

Comparison by system of production showed that ponds and raceways produced 1,536 tonnes (1,125 tonnes in 1991); fresh water tanks produced 773 tonnes (776 in 1991); fresh water cages produced 1,602 tonnes (1,254 in 1991); and sea cages produced 249 tonnes (178 in 1991). Some 33 sites used vaccinated fish mainly for protection against enteric red mouth disease.

Purchases of fry and fingerlings totalled 10.7 million (8.5 in 1991). Of the purchased fish 8.9 million (7.6 in 1991) were all female and 0.6 million (0.5 million in 1991) were triploids. A total of 21.4 million ova were laid down for hatching (25.7 million in 1991). Domestic production comprised 3.1 million from own broodstock and 7.0 million from other UK farms. In 1992 11.2 million ova were imported from abroad (14.8 million in 1991) of which 48% originated from the southern hemisphere. Of all the ova laid down in 1992 18.1 million were all female (17.7 million in 1991) and 0.8 million were triploids (0.5 million in 1991).

Rainbow trout farms in Scotland employed 135 people full time last year (133 in 1991) and 73 people on a part-time basis (51 in 1991).

Analyses of production by region shows that Dumfries and Galloway has most trout production followed by Highland.

Trout production at 4161 tonnes was the greatest yet recorded in Scotland and is somewhat of a surprise in view of reports of depressed market conditions in 1992. The restocking trade requirements contributed significantly possibly indicating a further growth area especially for bigger fish.

## ATLANTIC SALMON - SMOLTS AND OVA

A total of 85 returns were received showing 167 sites (172 in 1991) of which 136 were in operation comprising 55 cage sites and 84 tank sites (57 and 86 respectively in 1991). Production of smolts was down 7% at 20.8 million (22.4 in 1991) of which 20.1 million were S1's and 0.7 million were S2's (21.7 and 0.6 million respectively in 1991). Some 9.9 million (43.7% compared to 49.7 in 1991) were sold. Anticipated production in 1993 is 21.7 million (compared to estimates of 22.3 million last year). Estimates for 1994 are 24.4 million (indicating a possible return to production levels of three years ago). Movements of fry and parr into and out of farms were 32.0 million and 29.4 million respectively.

Numbers of ova laid down for hatching were 56.8 million (50.7 in 1991) of which 0.3 million were of Scottish wild stock (0.5 million in 1991) the rest were from farmed stock. It is estimated 54.4 million ova will hatch in 1993. Numbers of ova stripped were estimated at 137.4 million (5.6% up on last year's figure of 129 million). The majority of these are rejected but a small proportion are exported. The number of sites vaccinating fish was 71 (61 in 1991 and 59 in 1990). A furunculosis vaccines was used at most of these sites indicating how seriously many companies view the disease and that greater faith in such vaccines now prevails.

Comparing smolt production by region shows Highland (10.7 million) well ahead of the nearest rivals Strathclyde (4.1 million) and the Western Isles (2.8 million) followed by Shetland with 1.2 million. Numbers of staff employed were 266 full time and 93 part time (271 and 79 respectively in 1991).

### ATLANTIC SALMON PRODUCTION

A total of 146 companies contributed (163 in 1991), of which six indicated no production. Some 279 sites were in operation and 68 not in use. Production was 36,101 tonnes (40,593 in 1991). The return showed that 21,373 tonnes comprising 8.9 million fish, average weight 2.41 kg, were from the 1991 smolt intake and 14,728 tonnes comprising 4.3 million fish average weight 3.41 kg were from the 1990 smolt intake.

The mean weight of salmon harvested in 1992 was 3.41 kg, a 7% increase on the 1991 figure of 3.19 kg. Grilse and pre-salmon weights were very similar to last year.

Survival of salmon fell by 21% on last year, however grilse and pre-salmon survivals have improved by 6% on the 1990 year class. The overall survival for the 1990 year class of smolts was 61.5% compared to 57.9% for the 1989 year class, and it is estimated that survival in the 1992 year class will be approximately 64%. The combination of the bacterial disease furunculosis and lice infestation are the major causes of losses. Grilse percentages for the 1990 smolt input rose to 27.7%, as predicted, but should fall back next year. The estimated production for 1993 is 35,421 tonnes. Loss of confidence in the market for salmon and fears about the inability to control disease are believed to continue to be major factors for the projected plateau in production.

Production by region shows that Highland is the biggest producer with 38.7% followed by Shetland at 29.5%. Shetland continues to produce the biggest fish in all categories, (grilse, pre-salmon and salmon) suggesting that more northern waters favour salmon growth. Production by tonnage per site shows that sites producing >500 tonnes (16) produced the greatest proportion at 29.6%, with sites producing 100-200 tonnes second at 19.6%. Fallowing of sites to allow year class separation is strongly recommended for disease control purposes, and last year 102 sea cage sites used fallow periods. This represents an encouraging 21% increase on last year's figure of 84 sites, but clearly many more operators have yet to follow this procedure. In fresh water cage culture, of 55 responses, 48 (87%) used fallowing periods.

Some 15 sites produced broodstock (27 in 1991, 35 in 1990) showing a continuation in the decline of broodstock farms in Scotland. This concentration of broodstock production in less sites each year may be related to the increased prevalence of IPN virus.

Staff employed were 985 full time and 275 part time (1,014 and 272 respectively in 1991).

Some 20.5 million smolts were placed in sea water (20.2 million in 1991) of which 0.9 million came from England. Smolt numbers were 19.4 million for S1's (94%) and 1.1 million for S2's (5%).

The data show that both ova and smolt production have remained constant for the last two to three years indicating that production of salmon is likely to remain within the 35-40,000 tonne level for the next two to three years.

Survival of the 1990 year class of smolts at 61.5% is an improvement on the figure for the previous year (57.9% shown in Table 9) but is still well below an acceptable value. The 20.1% recovery of fish as salmon is well below all the previous years and is a major reason for the low estimate of tonnage for 1993. If the recovery percentage for the 1988 and 1989 smolt intake were used (25.7%) in estimating then the tonnage for 1993 would be 39,341.

The reasons for the low percentage recovery of the salmon in 1992 may not be wholly due to disease, escapes etc. The high recovery (rate of harvesting) of grilse and pre-salmon (43.8%) of the same year class for various commercial reasons may be a significant factor here.

It has always been recognised that a possible error in recording total tonnage is that companies must estimate the numbers of fish to be harvested in the last months in order to meet certain time constraints in the preparation of this report. Until retrospective checks are made it is not possible to determine the scale ( $\pm$ ) of any such error but the figures have agreed in the past reasonably well with other collected data.

TABLE 1

Rainbow trout production - 1992 data

No of companies	No of sites*	Staff		
		Full time	Part time	Total
57	76	135	73	208

\* 4 sites not in production

Egg sources and numbers ('000s)

Own broodstock	Other UK farms	Abroad northern hemisphere	Abroad southern hemisphere	Total	All female	Triploids
3077	7044	5830	5456	21,407	18,099	796

Fry and fingerlings ('000s)

Bought	All female	Triploids	Sold
10711	8993	617	10,447

Table trade production (tonnes)

<1 lb	1-2 lbs	2-3 lbs	Total
2,666	143.70	645.36	3,455.06

Restocking trade production (tonnes)

<1 lb	1-2 lbs	>3 lbs	Total
187.26	463.65	55.40	706.31

Total production 1992

Tonnes
4161.37

Use of vaccines
33

TABLE 2

## Rainbow trout production by region

Region code	Staff		Eyed eggs ('000s)			Ova all female & triploids	Total production (tonnes)		Fish >1 lb (tonnes)	Vaccines used
	F/T	P/T	Own	UK	Foreign		Table	Restocking		
Borders	8	5	480	100	-	450	339	26	41	4
Central & Fife	23	17	600	-	-	50	595	101	156	3
Dumfries & Galloway	29	10	922	2,684	3,766	6,949	855	114	65	8
Grampian	5	9	-	20	-	20	17	26	9	1
Highland	17	6	10	-	100	100	577	230	567	3
Lothian	7	4	120	220	-	220	-	54	19	
Strathclyde	32	17	946	650	650	2,066	646	90	290	6
Tayside	14	5	-	3,370	6,770	9,040	426	67	163	8
All Scotland	135	73	3,078	7,044	11,286	18,895	3,455	708	1,310	33

TABLE 3

## Analysis of rainbow trout farms by system and scale of production

System	Production (tonnes)							Totals		
	0*	<10	10-25	26-50	51-100	101-200	>200	Tonnes	No of sites*	% Contribution
FW cages	1	3	4	1	0	2	4	1602.00	15	38
FW ponds and raceways	0	3	4	3	4	4	2	1536.70	20	37
FW tanks	17	5	10	1	1	3	0	773.67	37	19
SW cages	0	1	0	1	1	1	0	249.00	4	6
All methods	18	12	18	6	6	10	6	4161.37	76	100

\* includes sites not in production



TABLE 4

Atlantic salmon ova and smolts 1992 data

No of companies	No of sites*	Staff		
		Full time	Part time	Total
85	168	266	93	358

\* 31 sites not in operation

Method of production

	No of sites	Total capacity (cubic metres)	Smolt production (‘000s)
Hatcheries and tanks	83	46,502	9,286
Cages	55	218,297	11,542

Eggs produced (‘000s)

137,432
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Egg sources and numbers (‘000s) laid down for hatching

Own broodstock	Other UK farms	UK wild	Foreign	Total	Estimate 1992-93
32,824	23,722	310	-	56,857	54,415

Movements of fry and parr (‘000s)

In	Out
32,018	29,444

Use of vaccines

71
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Smolt production (‘000s)

Produced as			Sold as		
S1	S2	Total	S1	S2	Total
20,121	707	20,828	9,751	173	9,925

Estimated production (‘000s) 1993

S1	S2	Total
20,742	1,014	21,756

1994

Total
24,422

TABLE 5

Atlantic salmon - ova and smolt production records and estimates

	1985	1986	1987	1988	1989	1990	1991	1992
<b>Hatching ova ('000s)</b>								
Actual	16,151	38,652	60,107	80,386	75,327	64,559	50,720	56,857
Producers estimate for following year	None	58,573	67,475	85,077	90,839	50,406	60,442	54,415
<b>Smolts ('000s)</b>								
Growers data	5,585	6,595	12,858	20,921	23,839	21,408	20,277	20,527
Producers current data	6,177	7,030	13,294	22,499	25,825	24,874	22,404	20,828
Producers estimate for following year	None	15,119	23,094	28,740	26,242	24,058	21,503	21,756
Producer estimate for two years ahead	None	21,697	28,213	33,621	28,011	26,363	22,290	24,422

TABLE 6

Grouping of smolt sites by the scale of their production

Production (Nos '000s)	0	<10	10-25	26-50	51-100	101-250	251-500	501-1000	>1,000	No of sites*	Annual No of smolts
No of sites in 1992	58	3	8	14	17	41	23	4	0	168	20,828
Same sites estimates for 1993	64	2	3	19	13	39	20	7	1	168	21,756
Some sites estimates for 1994	58	1	3	20	17	36	28	3	2	168	24,422

\*31 sites not in operation

TABLE 7

Atlantic salmon - ova and smolt production by region

Region code	Staff		Eggs ('000s)				Female triploid ova ('000s)	Total eyed eggs ('000s) 1993	1992 Smolts ('000s)				1993 smolts ('000s)		1994 smolts ('000s) estimate
	F/T	P/T	Own farmed	Farmed UK	Wild UK	Foreign source			Produced as		Sold as		Estimates		
									S1	S2	S1	S2	S1	S2	
*Combined regions	14	6	-	3,700	-	-	-	3,350	1,462	33	1,362	33	1,395	150	2,325
Highland	125	24	23,179	13,076	311	-	200	35,395	10,730	2	3,669	2	10,846	121	12,017
Orkney	7	6	330	250	-	-	690	690	363	8	285	8	500	35	650
Shetland	14	10	-	2,460	-	-	30	2,600	1,184	5	1,107	-	1,280	50	1,580
Strathclyde	48	34	4,795	1,500	-	-	100	7,320	3,767	400	2,536	400	3,977	400	4,883
Western Isles	57	13	4,520	2,737	-	-	90	5,060	2,615	260	792	131	2,744	258	2,967
All Scotland	266	93	32,824	23,723	311	-	420	54,415	20,121	707	9,752	174	20,742	1,014	24,422
England	-	-	-	-	-	-	-	-	915	-	-	-	-	-	-

\* Combined regions consist of Central, Dumfries and Galloway and Tayside

TABLE 8

Salmon and grilse production 1992 data

No of companies	No of sites*	Staff		
		Full time	Part time	Total
146	347	985	275	1,260

\* 68 not in use

Method of production

	No of sites	Total capacity (cubic metres)	Production (tonnes)
Sea water tanks	8	55,540	740.8
Sea water cages	271	6,597,812	35,360.25

Smolts to sea ('000s)

S1	S2	Total	From England
19,418	1,109	20,527	921

No of broodstock sites
15

Production - from the 1991 smolt intake harvested in 1992

January-August			September-December			January-December		
Nos ('000s)	Tonnes	Average weight	Nos ('000s)	Tonnes	Average weight	Nos ('000s)	Tonnes	Average weight
3,189	6,723	2.11	5,674	14,649	2.58	8,868	21,373	2.41

Production - from the 1990 smolt intake harvested in 1992

January-December		
Nos ('000s)	Tonnes	Average weight
4,315	14,728	3.41

Total production in 1992

Tonnes
36,101

TABLE 9

## Atlantic salmon - production record and estimates of future production

Year	No of smolts ('000s)	Year harvested	Nos of grilse and pre salmon ('000s)	Weight (tonnes)	Mean fish wt (kg)	% of fish recovered	Year harvested	No of salmon ('000s)	Weight (tonnes)	Mean fish wt (kg)	% of fish recovered	% total recovery	Year class weight (tonnes)	Grilse Nos ('000s)	% grilse	Year	Annual production (tonnes)
1984	3,628	1985	1,970	4,262	2.163	54.3	1986	1,168	4,360	3.723	32.2	86.5	8,612	1,084	34.5	85	6,921
1985	5,586	1986	2,409	5,988	2.486	43.1	1987	1,522	5,521	3.627	27.3	70.4	11,508	1,090	27.7	86	10,333
1986	6,595	1987	3,285	7,200	2.143	49.8	1988	1,750	6,086	3.480	26.5	76.3	13,286	1,526	30.3	87	12,721
1987	12,858	1988	5,167	11,866	2.300	40.2	1989	3,267	10,312	3.156	25.3	65.5	22,178	2,247	26.6	88	17,951
1988	20,921	1989	7,890	18,240	2.312	37.7	1990	5,382	14,891	2.770	25.7	63.4	33,131	2,923	22.0	89	28,553
1989	23,839	1990	7,683	17,459	2.272	32.2	1991	6,123	19,567	3.196	25.7	57.9	37,026	2,913	21.1	90	32,350
1990	21,402	1991	8,877	21,026	2.368	41.4	1992	4,315	14,728	3.41	20.1	61.5	35,754	3,604	27.3	91	40,598
1991	20,227	1992	8,864	21,373	2.410	43.8	1993	4,045	13,754	3.4	20.1	63.9	35,127	3,189	24.7	92	36,101
1992	20,527	1993	8,990	21,667	2.41	43.8	1994	4,125	14,025	3.4	20.1	63.9	35,692			93	35,421*

Figures below the line are estimates

\* This figure does not account for any fish destroyed in Shetland

TABLE 10

Account for the difference between the estimate of production for 1992 and the out-turn of production for 1992

	Tonnes
Estimated tonnage for 1992	37,698
Actual tonnage for 1992	36,101
Difference	1,597

Lost production is accounted as follows

	Tonnes
1. Salmon production estimate was 5,500,000 fish at 3.2 kg	17,600
Salmon production out-turn was 4,315,141 fish at 3.413 kg	14,727
Difference	2,873
2. Grilse and pre-salmon estimate was 8,373,000 fish at 2.4 kg	20,095
Grilse and pre-salmon out-turn was 8,864,177 fish at 2.411 kg	21,371
Difference	-1,276
Sum 1 and 2	1,597

TABLE 11

Production and manpower of sea sites by region

Region	Staff		Annual production (tonnes)	Tonnes produced/man	Grilse			Pre-salmon			Salmon		
	F/T	P/T			Tonnes ('000s)	Mean wt (kg)	Tonnes ('000s)	Mean wt (kg)	Tonnes ('000s)	Mean wt (kg)	Tonnes	Mean wt (kg)	Tonnes ('000s)
Highland	372	63	13,980.1	32	3851.9	1,538	2.17	5,790.8	2,217	2.61	4,837.4	1,447	3.34
Orkney	35	21	1,046.2	19	163.4	67	2.43	412.2	169	2.43	470.6	167	2.81
Shetland	213	96	10,678.9	34	851.2	332	2.56	4,635.7	1,680	2.75	5,192.0	1,335	3.89
Strathclyde	206	46	6,458.3	26	1,154.3	569	2.02	2,108.0	786	2.68	3,196.0	986	3.24
Western Isles	159	49	3,937.5	19	1,202.5	684	1.75	1,703.0	822	2.07	1,032.0	380	2.71
All Scotland	985	275	36,101	-	6,723.3	3,190	-	14,649.7	5,675	-	14,728.0	4,315	-

TABLE 12

Recovery of 1990 and 1991 smolt year classes by region ('000)

Region	Smolts to sea		Grilse and pre-salmon		Salmon		Total recovered	% recovery		
				%		%				
Western Isles	(90)	3,504	(91)	1,673	47.7	(92)	380	101.8	2,053	58.6
	(91)	2,946	(92)	1,506		(92)	167			
Orkney	(90)	747	(91)	220	29.4	(92)	167	22.3	387	51.8
	(91)	746	(92)	236		(92)	1,447			
Highland	(90)	8,302	(91)	3,710	44.6	(92)	1,447	17.4	5,157	62.1
	(91)	1,107	(92)	3,755		(92)	986			
Strathclyde	(90)	4,213	(91)	1,587	37.6	(92)	986	23.4	2,573	61.0
	(91)	4,597	(92)	1,355		(92)	1,335			
Shetland	(90)	4,643	(91)	1,687	36.3	(92)	1,335	28.7	3,022	65.0
	(91)	4,013	(92)	2,012						

TABLE 13

Grilse, pre-salmon and salmon production by number and region for the 1990 smolt intake

Harvested in Region	1991				1992	
	Grilse		Pre-salmon		Salmon	
	Nos ('000s)	%	Nos ('000s)	%	Nos ('000s)	%
Western Isles	517	25.1	1,156	56.3	380	18.5
Orkney	61	15.7	159	41.1	167	43.1
Highland	1,986	38.5	1,724	33.4	1,447	28.0
Strathclyde	751	29.2	236	32.5	986	38.3
Shetland	289	9.5	1,398	46.3	1,335	44.1



TABLE 14

Grouping of Atlantic salmon sea farm sites by the scale of production

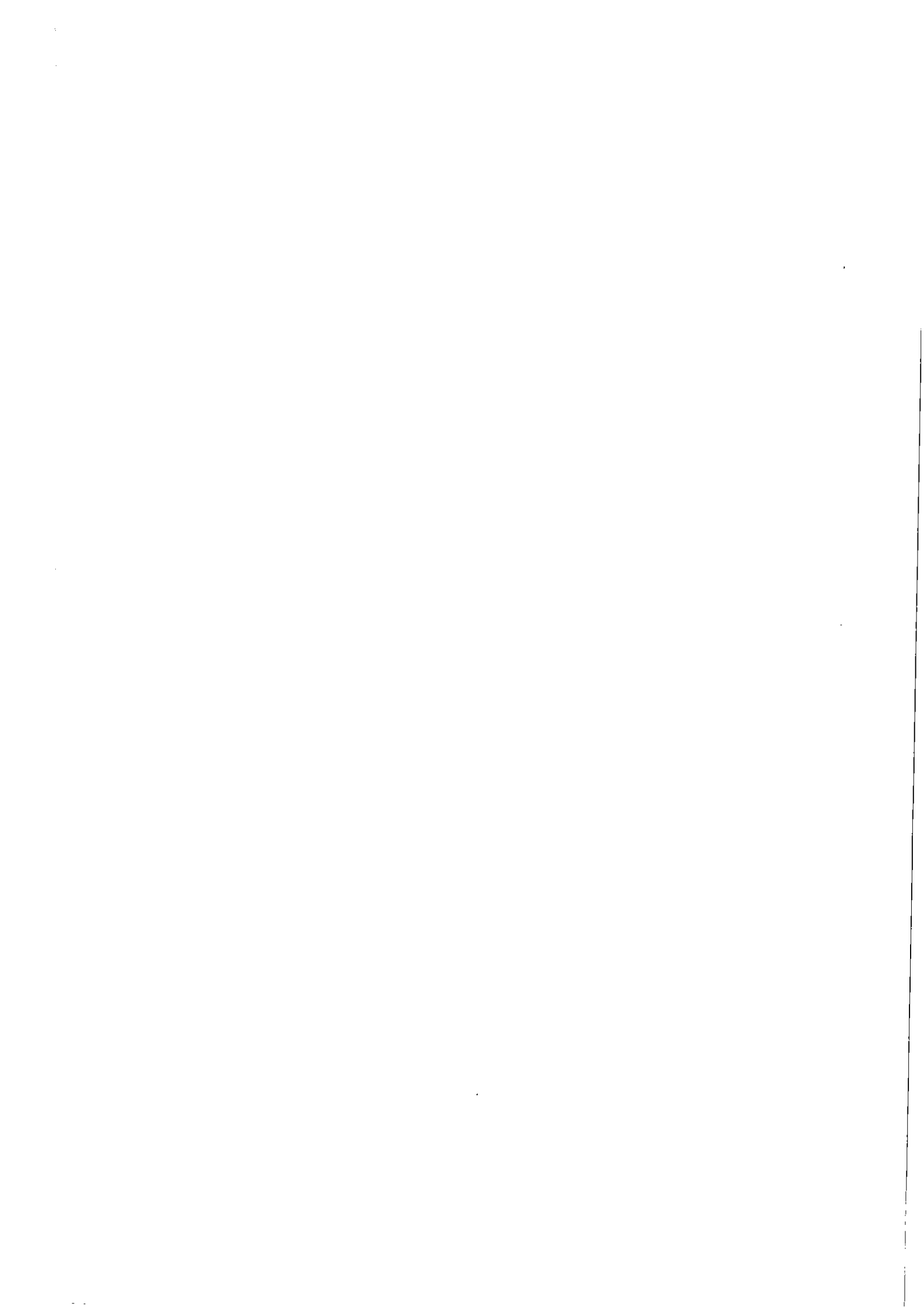
Production	0	<10	10-25	26-50	51-100	101-200	201-300	301-400	401-500	>500	Totals	
											Sites	Tonnes
No of sites in 1991	139	6	21	28	48	46	26	8	9	16	347	36,101
% share of production	0.0	0.1	1.0	3.0	10.1	19.6	17.4	8.3	10.9	29.6		

TABLE 15

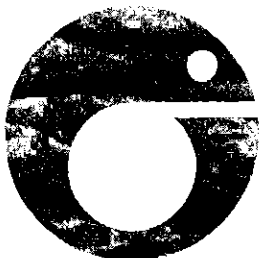
Record of number of cage sites employing fallow periods and the length of the period

Period (weeks)	0	<4	4-8	8-26	26-51	>=52
No of sea water sites	169	2	30	59	7	4
No of fresh water sites	7	13	6	13	14	2





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