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Restormel Fish Counter (River Fowey) Annual Report 2010

Environmental Monitoring Team
Devon and Cornwall Area
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Executive summary

- This report presents the upstream counts of migratory salmonids recorded on the River Fowey at Restormel Weir fish counting station (SX 107 613) over the period March 2010 to February 2011 inclusive.

- Data contained within this report covers the period of the commercial migratory salmonid net buy-back scheme and the National Spring Salmon Byelaws.

- The minimum upstream **salmon estimate** for 2010, over the period July 2010 to February 2011, was **1220**. This is 70 per cent higher than 2009 (717) and 37 per cent higher than the 10-year average (887).

- The minimum upstream **sea trout estimate** for 2010 was **13,648**. Overall, the sea trout run estimate for 2010 was 32 per cent higher than in 2009 (10,301), 47 per cent higher than the 10-year average (9,302) and was the third highest count recorded in the last 16 years. Minimum estimates for large sea trout and small sea trout are as follows:

    - **367 large sea trout** (March to June, deflection size?), which is 17 per cent lower than 2009 (442) and 47 per cent lower than the 10-year average (698). This is the fourth lowest large sea trout estimate recorded at Restormel over the past 16 years.

    - **13,282 small sea trout** (deflections less than 50), which is significantly higher (35 per cent) than the run estimate for 2009 (9,860) and a 54 per cent increase on the 10-year average (8,604).

- The fish counter at Restormel suffered from only one major period of unscheduled downtime during 2010/2011. This was due to a counter fault over the period 21 to 30 August 2010 and equated to 10 days of downtime.

Important: *The salmon and sea trout run estimates in this report were calculated using fish counter data from March 2010 to February 2011, inclusive. As a result the figures may differ from those quoted by ICES who class a run year as January to December, inclusive.*

1 Introduction

The following report presents the upstream salmon and sea trout counts recorded on the River Fowey at Restormel Weir fish counting station (SX 107 613) over the period March 2010 to February 2011 inclusive. The counter data has been considered in relation to:

- daily mean residual flow (cumecs)
- temperature (^{o}C)

The flow data reflects the residual flow at Restormel Weir following abstraction by South West Water (SWW) at Restormel Water Treatment Works (SX 107 613).

The report also includes details of the on-going counter validation work and the annual audit of counter data. This is primarily used to assess counter efficiency and to improve species apportionment.

2 Background

The Restormel fish counter is situated on the River Fowey and is approximately three kilometres upstream of the tidal limit.

The current fish counter is a resistivity-based system (Logie C) manufactured by Aquantic Ltd and covers all three channels of the gauging weir at Restormel. The counter was installed in 1994 and data collection commenced in 1995.

A description detailing the operation of the resistivity fish counter at Restormel is provided in Appendix 1.

3 Net Buy-Back

National byelaws to protect spring salmon were introduced in April 1999 for ten years. On 1 January 2010 they were renewed for a further ten years. These byelaws restrict the salmon-netting season on the River Fowey from the beginning of the season (2 March) until 1 June. However, as the River Fowey does not have a significant run of ‘spring’ salmon, netsmen receive a special dispensation to net for sea trout before the 1 June, provided that any salmon caught before the 1 June are released.

The licensed net fishing season was then closed by a full season net buy-back agreed from 2009 to 2017. This agreement with the netsman was funded by South West Water (SWW) and negotiated by the Environment Agency.

The SWW buy-back and the national spring salmon byelaws close all legal net fishing for salmon and sea trout within the Fowey estuary until 2017. The aim

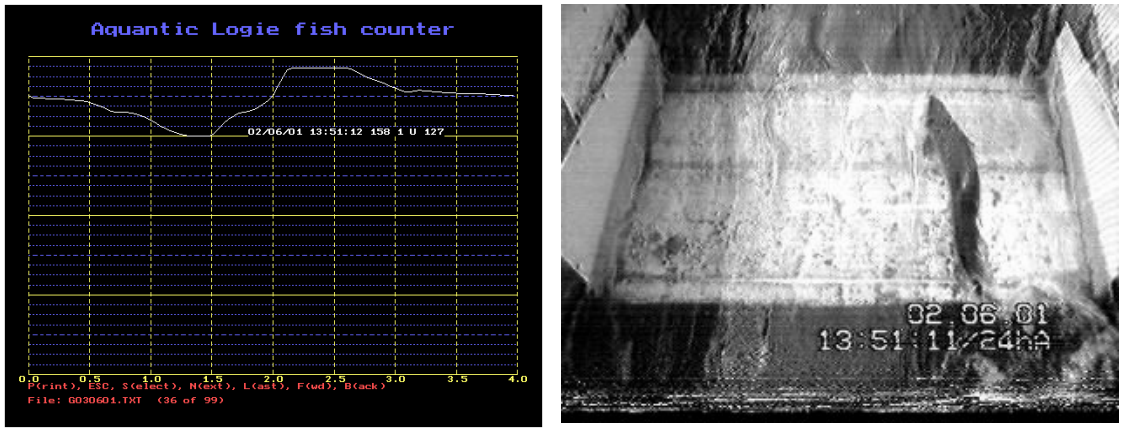
of the buy-back scheme is to mitigate for sea trout and salmon spawning, which was lost due to the construction of Colliford Reservoir.

4 Species apportionment

The counter records electrical changes that are directly proportional to the size of fish that have traversed the counter electrodes. Species apportionment is possible due to the linear relationship that exists between fish length and deflection size. However, it is not possible to distinguish between a salmon and a sea trout of comparable size. It is therefore inevitable that the salmon count may include some large sea trout. A data handling protocol has been developed to minimise this eventuality which is described in Appendix 2.

5 Validation of counter efficiency

Trace information, graphical information produced by the counter when an event occurs, is initially used as a quick way of checking raw fish counter data and identifying any potential problems. Analysis of trace data can also be used to improve count accuracy when video data is unavailable.



Example of trace data for an upstream fish together with associated video data

The counter data is audited, using video footage taken over the weir, on an annual basis. Counter events are matched to the corresponding video events, which can then be used to assess the detection and sizing efficiency of the counter (Appendix 6) and investigate anomalies in the counter data.

Video validation and the annual audit of counter data is a vital part of the fish counter work at Restormel and gives confidence in the accuracy of the data recorded by the fish counter.

Note: a) To aid in interpretation of the data, axis scaling may differ between the monthly summary plots. Care should therefore be taken when interpreting the data within each figure.
b) The flow data presented is the residual flow that exists at Restormel Weir following water abstraction by South West Water.

6 Results

The figures and graphs presented in this report (except where stated) have been adjusted for:

- detection efficiency (1995 – 2005)
- detection and sizing efficiency (2005 to 2010)

Historical trapping and netting data indicated that:

a) very few salmon enter the River Fowey prior to the end of June

b) the upstream migration of large sea trout is almost over by the end of June

Bearing the above in mind, the assumptions for estimating the relative proportions of salmon and large sea trout from the salmon / large sea trout count data are as follows:

- fish with deflections greater than or equal to 70, equivalent to a 70 cm fish, running between March and June are classed as large sea trout (repeat spawners) and can be discounted from the salmon estimate

- fish with deflections greater than or equal to 70 (July and August) and with deflections greater than or equal to 50 (September – February) are classed as salmon

A full breakdown of the analysis and the protocol used can be found in Appendices 2, 3, 4 and 5.

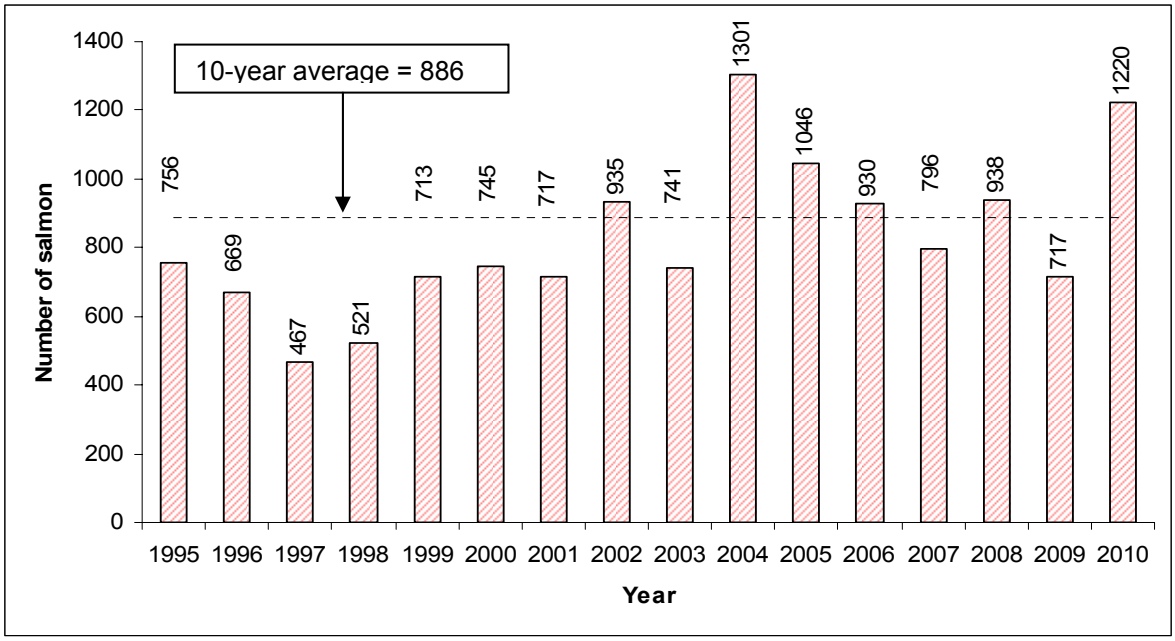
6.1 Upstream salmon counts (minimum estimates)

Historic trapping, netting and rod catch records indicate that a small early run of salmon starts moving into the Fowey from the beginning of July. The main run of salmon enters the river later in the year usually from October to February.

The minimum upstream salmon estimate for 2010, over the period July 2010 to February 2011, was 1220. This is 70 per cent higher than 2009 (717) and 37 per cent higher than the 10-year average (887).

The salmon counts for 2010 were greater than the 10-year monthly averages for the months September, October, November, December and January.

Figure 1 - Annual upstream counts (minimum estimates) for salmon on the River Fowey over the period July to February 1995 – 2010/11



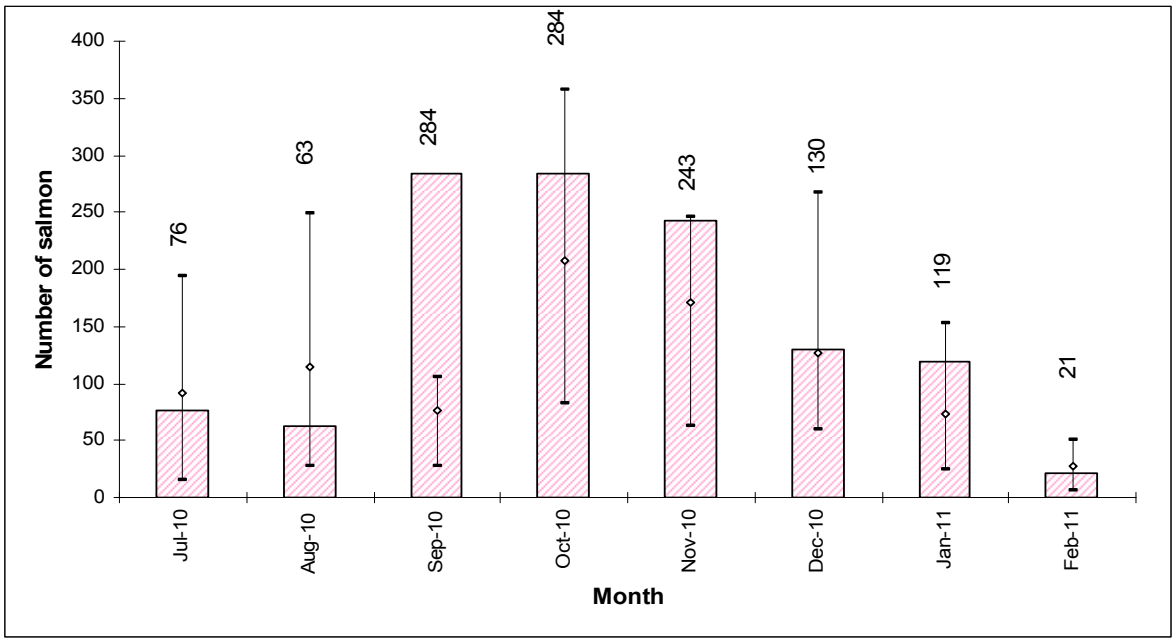
**Dotted line indicates the 10-year average (1999 – 2009)*

Table 1 - Monthly upstream counts (minimum estimates) for salmon on the River Fowey over the period July to February 1995 – 2010/11

Month	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jul	51	70	50	57	71	193	116	80	81	122	86	60	15	15	65	76
Aug	17	48	52	32	66	120	71	107	85	206	132	69	77	77	27	63
Sep	56	59	54	71	53	99	39	53	28	66	106	102	81	81	101	284
Oct	108	177	51	152	82	83	219	300	85	251	357	284	103	103	244	284
Nov	220	112	94	84	210	62	126	211	228	211	79	246	217	217	179	243
Dec	136	61	91	49	145	63	64	116	139	267	166	103	191	191	59	130
Jan	159	69	44	46	47	75	76	39	77	152	101	38	69	69	24	119
Feb	10	73	29	30	39	50	7	28	19	27	19	28	42	42	18	21
Totals	756	669	467	521	713	745	717	935	741	1301	1046	930	796	938	717	1220

**Note: Totals in Table 1 may be subject to rounding errors*

Figure 2 - Monthly salmon counts (minimum estimates) recorded on the River Fowey (July 2010 – February 2011)



**Data labels and coloured bars indicate 2010/11 figures. High-low bars indicate max, min and average from 1999 - 2009.*

Figure 1 indicates a healthy increase in the number of salmon running into the river in 2010. The count estimate (1220) was significantly higher than that recorded in the previous five years and an increase on the 10-year average (887).

The 2010 salmon counts are similar to those recorded in 2004, which were the highest recorded since the counter was installed in 1995.

All of the monthly salmon counts with the exception of (July, August and February) were above the 10-year average.

In all months the counter recorded numbers of salmon that were within the historic range i.e. between the maximum and minimum recorded over the last 10-years, with the exception of September (Figure 2).

The majority (66 per cent) of the 2010 salmon run (811 fish), as in 2009, was concentrated in the months September, October and November. September returned its highest count since counter records began and was significantly higher than the previous maximum (106).
**figure based last 10 years of data i.e. 1999 to 2009.*

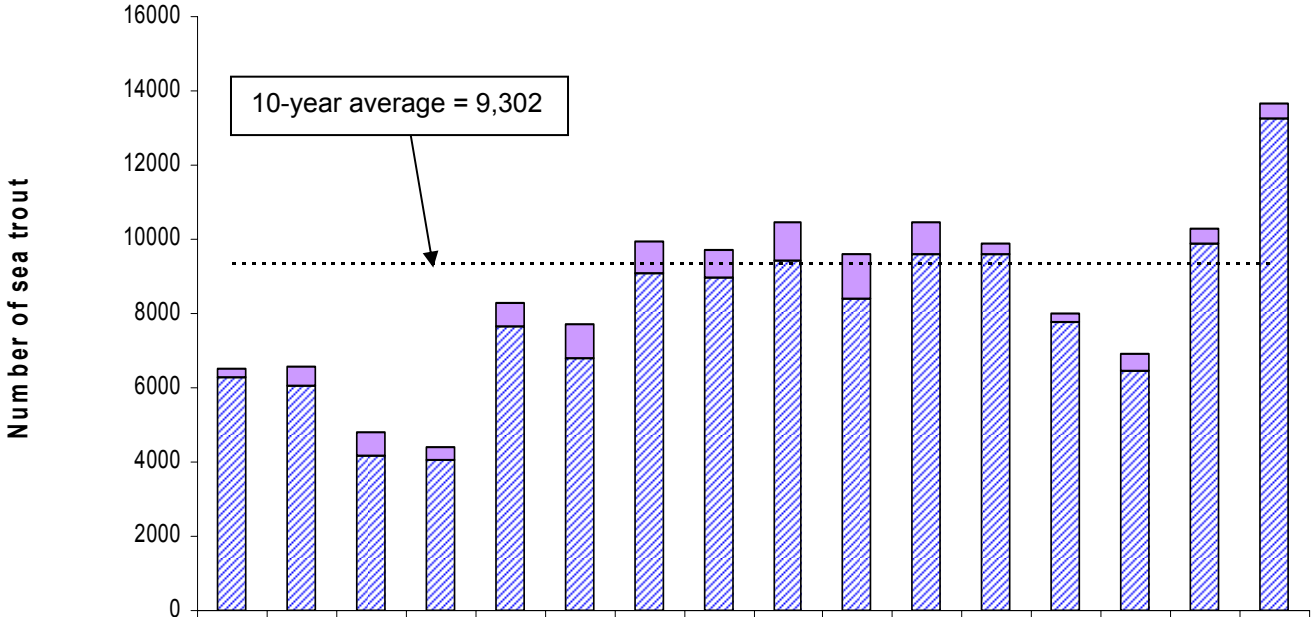
6.2 Upstream sea trout counts

The minimum upstream sea trout estimate for 2010 was 13,648. Overall, the sea trout run estimate for 2010 was 32 per cent higher than in 2009 (10,301) and was the second highest count recorded in the last 16 years.

Overall, the 2010 sea trout counts are 47 per cent up on the 10-year average (9,302).

Figure 3 shows the relative proportions of large and small sea trout within the 2010 sea trout run in relation to the 10-year average.

Figure 3 - Annual upstream counts (minimum estimates) for sea trout on the River Fowey 1995 – 2010/11



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Large ST	191	524	591	377	629	895	880	735	1039	1188	830	246	241	482	442	367
Small ST	6298	6057	4192	4046	7638	6809	9069	8997	9429	8420	9619	9616	7781	6444	9860	13282
Total	6489	6581	4783	4423	8267	7704	9949	9732	10468	9608	10448	9861	8022	6927	10301	13648
10-yr Av.	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302	9302

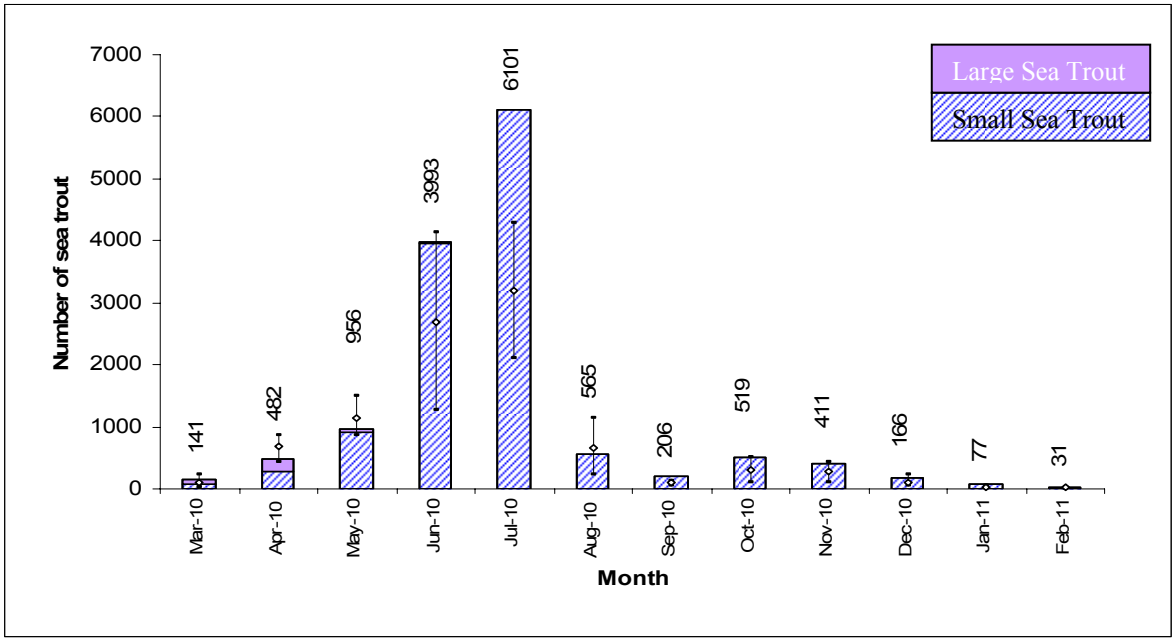
**10-year average (dotted line) indicates average for sea trout count (large sea trout plus small sea trout)*

Table 2 - Monthly upstream counts for sea trout at Restormel 1995 – 2010/11

Month	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mar	66	30	7	48	168	230	128	31	108	128	158	89	45	45	118	141
Apr	357	451	382	347	335	632	791	852	602	770	574	420	711	711	767	482
May	582	867	724	1282	926	1239	1069	1297	1295	1503	971	877	1266	1266	851	956
Jun	1993	1353	1819	1266	3194	2696	2589	2629	4135	2986	3049	3501	1518	1518	2467	3993
Jul	1734	2938	1424	916	2433	2107	3593	3496	2747	2177	4286	3571	3060	3060	3839	6101
Aug	418	569	147	262	491	240	1072	416	858	1137	403	480	645	645	1112	565
Sep	292	102	23	40	130	111	96	62	94	133	84	106	64	64	127	206
Oct	344	139	40	119	138	189	331	390	106	407	497	338	161	161	498	519
Nov	409	93	126	91	296	101	142	419	377	236	225	335	266	266	410	411
Dec	109	20	33	22	126	88	91	99	86	86	162	101	227	227	70	166
Jan	173	14	51	21	16	42	42	34	43	36	27	26	37	37	27	77
Feb	11	4	7	10	13	29	4	8	17	11	13	17	22	22	16	31
Total	**6489**	**6581**	**4783**	**4423**	**8267**	**7704**	**9949**	**9732**	**10468**	**9608**	**10448**	**9861**	**8022**	**6927**	**10301**	**13648**

The sea trout counts for 2010 are up on the 10-year monthly averages for all months, with the exception of April, May and August (Figure 4).

Figure 4 - Monthly upstream sea trout counts recorded on the River Fowey (March 2010 – February 2011)



Note: Data labels indicate the 2010 /11 figures. The high / low bars indicate the 10-year max, min and average (2000 – 2009) for all sea trout age classes. Text on graph should be Arial

6.3 Large sea trout estimate (March – June 2010)

The minimum large sea trout estimate for 2010 was 367. This estimate is 17 per cent lower than 2009 (442) and 47 per cent lower than the 10-year average (698). This is the fourth lowest large sea trout estimate recorded at Restormel over the past 16 years.

The large sea trout count for 2010 was less than all of the 10-year monthly, averages with the exception of March.

As in 2009, there was a very slight drop in the number of returning large sea trout recorded in 2010 (367) when compared to 2009 (442). As mentioned in last years' report the numbers of returning large sea trout have almost doubled in comparison to those recorded in 2006 and 2007. However, large sea trout numbers are still significantly below the figures recorded in 2003 (1039) and 2004 (1188) and have been decreasing year on year since 2004.

6.4 Small sea trout estimate (March 2010 – February 2011)

For the purposes of this report, salmonids that are less than 70cm (March – June inclusive) or 50cm (July – February inclusive) are classified as small sea trout.

The small sea trout estimate for 2010 was 13,282. This figure is significantly higher (35 per cent) than the run estimate for 2009 (9,860).

The 2010 small sea trout count is 54 per cent above the 10-year average (8,604).

As with the overall sea trout count, the monthly counts exceed the 10-year averages for all months with the exception of April and August.

The 2010 count is the largest small sea trout count recorded over the past 16 years of counter operation.

6.5 Video validation and counter efficiency

Video validation data was collected using a PC-based video capture card (Voltek – SuperDVR) and was downloaded onto an archive drive once a week.

The counter detection efficiencies were calculated from the number of fish that were seen on video and recorded by the counter (5 May to 31 August).

Additional video footage was also collected during September, October, November and December but has not been used in the efficiency calculations.

6.5.1 Fish counter detection efficiency

The overall detection efficiency of the counter for upstream salmonids in 2010 was 86 per cent. As in previous years, the slight drop in efficiency was due to the counter missing small sea trout in June and July either, because of multiple events or elevated flows.

The counter detected all of the salmon that were seen during the video reviews.

Detection efficiencies were calculated using data for upstream migrating salmonids (individuals and groups) detected by the counter or seen on video (Appendix 6). Non-target species (otters etc) or spurious events were removed from the data prior to this analysis.

To calculate the detection efficiency of the fish counter 44 hours of the footage collected in 2010 were blind watched. This is around 1.5 per cent of the operational time over the period 5 May to 31 August.

The counts have been adjusted for all months where video validation data was available (actual or historic) to correct for any losses in detection efficiency.

6.5.2 Fish counter sizing efficiency

To determine the counter sizing efficiency all of the footage from the blind and non-blind watched video (671 events) over the period 5 May to 31 August were analysed.

Adjustments for errors in fish sizing have only been applied to those months, for which sizing efficiencies have been calculated i.e. May to August.

Table 4 (Appendix 6) utilises matched counter and video data for upstream migrating salmonids to identify errors in the sizing ability of the counter. The matched counter and video data indicates that the counter was incorrectly classifying fish in all months reviewed (May to August) with a significant proportion of the fish initially being mis-classified as large sea trout or salmon.

The mis-classification of large sea trout and salmon during May and June was a particular problem and is likely to have been due to low flows. Under these conditions medium sized fish in the range 40 to 60 cm can return a larger deflection value as they tend to pass closer to the electrodes. For example, a 50 cm fish could return a deflection of over 70cm which would then be incorrectly classified as a large sea trout or salmon.

Losses in detection and sizing efficiency can usually be attributed to large numbers of sea trout passing over the weir in groups of two or more, unusual flow conditions or a combination of the two. The review of the available video footage allows us to correct for these events. It is this type of information that can be used to fine tune the settings of the fish counter and improve the detection and sizing efficiencies in the long term.

6.6 Rod and net catches

The salmon rod catch for the River Fowey in 2010 was 305, of which 230 were released back to the river i.e. a 75 per cent catch and release rate. The total declared rod catch (retained and released combined) accounts for 25 per cent of the total estimated salmon run in 2010. In 2009 it was 14 per cent.

The rod catch for sea trout in 2010 was 1174 with 792 being released back to the river i.e. a 67 per cent catch and release rate. The 2010 declared rod catch (retained and released combined) accounts for 9 per cent of the total estimated sea trout run (all age classes).

Due to the net buy-backs no salmon or sea trout were caught by the Fowey nets-men in 2010.

6.7 Other species

Otters were regularly seen passing over the weir during the reviews of the 2010 video footage. Some of these events have been identified from analysis of the trace data or from the video footage (where available). All of the fish counter data presented in this report has been adjusted to remove these events from the salmonid count.

We have been investigating the use of downstream count data, video footage and knowledge of when silver eels are likely to be moving out of the river to estimate silver eel escapement (adult eel migration out of the river). If successful this will help us to better protect local eel populations and formulate more effective Eel Management Plans (EMPs)

No other species were identified from video footage.

6.8 Environmental factors

Flow, temperature and water conductivity are routinely measured at Restormel. Flow is generally considered to be the dominant factor controlling the upstream migration of salmonids, but should not be considered in isolation as its effects are often modified by other factors.

6.8.1 Flow

The residual patterns of flow at Restormel in 2010/11 (Appendix 7 - Figures 5 and 6) have been analysed over the period March 2010 to February 2011 (inclusive), which is considered to be a complete run year.

96 per cent of upstream migrating salmonids utilised daily mean flows of 1 to 10 cumecs to move up into freshwater. This flow range accounted for 90 per cent of the total salmon run and 96 per cent of the sea trout run in 2010/2011.

Flow data for 2010/11 indicated that suitable flows for upstream migration on the side channels i.e. greater than or equal to 1.16 cumecs were available for 90 per cent of the year.

Short periods of elevated flows (greater than 10 cumecs) prevailed for 4 per cent of the year and were predominant during November 2010 and January 2011. These periods of flow accounted for 2 per cent of salmonid movements overall.

6.8.2 Water temperature

The average water temperatures over the period March 2010 to February 2010 inclusive (Appendix 8 - Figures 7 and 8) are generally consistent with previous years (based on monthly averages). However, it must be noted that from September through to January temperatures were lower than the historical average.

The average monthly temperatures were below the historical averages (based on temperature data from 2001 to 2009) for all months apart from April, June, July, August and February.

It is generally accepted that salmonids tend to move within an optimum temperature band of between 5^{o}C and 21.5^{o}C (Alabaster, 1970). Daily mean water temperatures over the period March 2010 to February 2011 inclusive, did not exceed 21.5^{o}C and only dropped below 5^{o}C for 7 per cent of the time.

December 2010 was particularly cold with an average monthly temperature of 4.6^{o}C, which is almost 4^{o}C below the historical average. Over the period 1 to 27 December the average daily temperature regularly dropped below 5^{o}C and salmonid counts over this period indicate that this acted as a partial barrier to migration.
**Data for 2002 and 2003 was incomplete so was not included in the comparisons.*

7 Data processing

The data presented in this report represents the final adjusted counts, which takes into account maintenance work on the fish pass and non-target species.

Any data contained within the original monthly summary reports has been superseded by this report.

8 Update

- Continued validation of the counter's performance and efficiency will be carried out in 2011.

- Continued assessment of the presence and abundance of non-target species traversing the fish pass e.g. Otters, eels etc.

- Installation of broadband and telemetry upgrades will be carried out in 2011 and will include power out alarms and automatic shutdown of the side channels under low flows (this will help to reduce interference from the side channels under these conditions and aid data processing).

- Installation of hardware and software in 2011 will allow remote access to a video data collection PC and enable live video to be streamed back to the office.

- Analysis of downstream event data in combination with video to estimate silver eel escapement will take place in 2011 if resources allow.

9 Downtime

The counter was out of operation for 253 hours out of a possible 8,760. This equates to approximately ten days out of a possible total of 365 days. The majority of the downtime can be attributed to a counter fault over the period 21 to 30 August 2010 (245 hours) the remainder (7 hours) was due to routine weir cleaning.

Fish counts were estimated for periods of downtime due to counter faults using the average daily count for the past three years. Counts were not estimated for the periods of downtime due to weir cleaning due to the small number of fish involved.

10 References

01. Alabaster, J.S. (1970). River flow and upstream movement and catch of migratory salmonids. J. Fish. Biol. 2, 1-13.

02. Banks, J.W. (1969). A review of the literature on the upstream migration of adult salmonids. J. Fish Biol. 1, 85-136.

03. Environment Agency (1997). Design and Use of Open Channel Resistivity Fish Counters (Advisory Manual). Fisheries Technical Manual No. 2. Environment Agency North West Region. R & D Technical Report W23.

04. Environment Agency (1997). Salmon and Sea Trout Movements Recorded at Restormel Fish Counting Station on the River Fowey during 1996. Environment Agency. Annual Report 1997.

05. Environment Agency (1998). “A Preliminary Assessment of the Buy-back of licensed Migratory Salmonid Netting Time on the River Fowey in 1997 and 1998. Environment Agency. Restormel Fish Counter Data Report - July 1998.

06. Environment Agency (2009). Restormel Fish Counter. Annual Report 2009 Environment Agency 2010.

07. Environment Agency (2010). Freshwater fisheries statistics for England, Wales and the Border Esk, 2010 (Declared catches of salmon and sea trout by rods, nets and other instruments). Environment Agency 2010.

08. Milner, N. J. (1989). Fish movement in relation to freshwater flow and quality. Workshop proceedings of The Atlantic Salmon Trust 6 April 1989.

11 Appendices

Appendix 1 – Operation of the Logie 2100C resistivity fish counter at Restormel Weir.

To detect fish passing upstream, the Logie 2100A utilises three stainless steel electrodes that are set into the downstream face of each of the three weir channels at Restormel Weir. The construction of the fish pass ensures a smooth laminar flow of water over the electrodes and allows the fish to ascend the weir in close proximity to the electrode array. The electrodes are set into polythene blocks to reduce fluctuations in resistivity due to current “leakage” through the structure and between the electrodes.

The counter operates by applying a low positive/negative voltage (5 volts) at high frequency to the upper (+5 volts) and lower (-5 volts) electrodes. The net voltage at the central electrode is virtually zero as the two voltages effectively cancel each other out. As a fish passes over the bottom electrode it acts as a weak electrical conductor, causing an increase in the negative voltage at the central electrode. As a fish passes over the central and upper electrode it causes an increased positive voltage at the central electrode. The net result of a fish passing over the electrode array is a typical sine wave, the amplitude of the waveform being governed by the size of the fish.

The counter processes the signal received from the electrodes and uses an algorithm, together with pre-set parameters, to assess whether the object is a fish or not. If the positive and negative parts of the waveform are similar the counter recognises the ‘event’ as a fish and logs it as either an ‘upstream’ or a ‘downstream’ fish. The counter also records information connected to the event such as date, time, direction, water conductivity and signal strength (deflection signal size). If the deflection signal does not conform to that of a ‘typical fish’, it is logged as an event or discarded. In this way the counter can distinguish between fish and inanimate objects such as leaves and twigs.

Appendix 2 - Species apportionment and data analysis

Species apportionment is initially made on the basis of the deflection signal size that is generated by the counter when a fish passes over the electrodes on the weir. The validation study conducted by the Environment Agency (1997) using video equipment to identify and measure fish traversing the weir found a linear relationship between fish length and deflection signal size. The study concluded that a deflection signal size of 50 could be used to differentiate between the majority of salmon and sea trout between June and February (88 per cent of all fish greater than 50 cm attained a deflection size greater than 50).

Data from previous years indicated that larger sea trout run into the river from March to May. In order to eliminate these larger sea trout from the salmon count within this period, the deflection signal size used to differentiate salmon from sea trout is increased to 70. An analysis of the historic net and trap data has been made to improve the apportionment of salmon and sea trout (Appendix 3, 4 and 5).

Appendix 3 - Separation of salmon and large sea trout at Restormel using historical Fowey net catch (1990 – 1991) and trap data (1979 – 1984)

The considerable overlap in sizes between salmon and sea trout populations on the River Fowey makes species apportionment based on size harder than for rivers such as the Tamar. The Tamar has a fairly distinct size split between the two species with only a small degree of overlap in size.

Smaller sea trout are relatively easy to distinguish from the overall counts as data has indicated that these tend to produce deflections of less than 50, roughly equivalent to 50cm. Trapping data, rod and net returns all suggest that salmon less than 50cm in length are very rare on the Fowey.

The difficulty arises when trying to separate larger sea trout (greater than 50cm in length) from salmon. The considerable overlap in size between the two species means that fish length or deflection size can not be used to distinguish between the two groups. However, examination of historical Fowey net catch data reveals that the two groups (salmon and large sea trout) exhibit distinct differences in run timing. Small sea trout are effectively removed from the net catch data due to the sampling bias associated with the mesh size of the Fowey nets.

The net catch data suggests that the upstream migration of large sea trout on the River Fowey is almost over by the end of June whilst the upstream migration of salmon does not commence until the beginning of July. The timing of the runs of these two species is also remarkably consistent between years, which gives a high level of confidence in predicting the timing of the upstream migrations in future years.

The timing of the salmon and large sea trout run on the River Fowey inferred from the net catch data is strongly supported by trapping data collected on the Fowey at Restormel from 1979 to 1984, inclusive. The trapping data also shows that the upstream migration of large sea trout on the River Fowey is almost over by the end of June. The upstream migration of salmon does not commence until the beginning of July.

Appendix 4 - Minimum salmon run estimates for July and August

Over recent years attempts have been made to produce a minimum run estimate for salmon on the River Fowey. To ensure that large sea trout are effectively excluded from this count only the salmon / large sea trout data from September to February has been used. Trapping, net and rod catch data suggests that it is highly unlikely that large sea trout would still be running over this period.

Discriminant analysis of salmonid lengths caught in the River Fowey nets during July between 1990 and 1999 indicated that 94 per cent of salmon have a length greater than or equal to 55cm, whilst 87 per cent of sea trout were smaller than 55cm. In July 2001, the counter recorded two-hundred and thirty-eight upstream movements by salmon sized fish (greater than 50 cm). Eighty-seven of these fish were observed on video and their lengths calculated. 62 per cent had a length greater than or equal to 55cm suggesting they were salmon. Applying this rationale to the salmon / large sea trout counts in July and August we can be fairly confident that all fish with a deflection of seventy or greater will be salmon.

Appendix 5 - Minimum large sea trout run estimates for the period March – June

The trapping and net catch data has been used to produce a minimum run estimate for large sea trout (greater than 50cm). The data implies that the **main run of large repeat spawning sea trout is between March and June** with only small numbers moving upstream thereafter. It can therefore be assumed that the majority of the salmon / large sea trout count over the period March – June consists of large sea trout. The figures for large sea trout in this report are based on these assumptions.

Appendix 6 - Video validation protocol and methodology

Overview

- The overall objective of video validation is to assess the:
  - **sizing ability of the counter**
  - **detection efficiency of the counter**
- The following strategy is valid for counter data auditing purposes.
- The strategy provides a robust method of assessing the performance of the fish counter and aims to set realistic and obtainable targets for video reviewing.

Video collection

- Video footage of fish movements is collected over all three channels of the gauging weir at Restormel between May and August inclusive. This is when the greatest numbers of fish are moving upstream and the widest ranges of river flows are available. Additional footage may be taken over the period November to December if conditions allow.

Video reviewing

- The aim is to carry out an initial review of the available video footage within 7 to 14 days of collection.
- The video footage is reviewed twice. Initially the footage is watched 'blind' i.e. without referring to the counter data. The footage is then reviewed a second time using the data from the counter, to highlight fish that may have been missed during the first review. Any fish seen are measured and then the video data is then matched to the corresponding counter data and recorded as one of the following:

  Upstream Fish - Salmon, Sea Trout or other species.
  Downstream Fish - Salmon, Sea Trout or other species.
  Upstream Event
  Downstream Event

- This ensures an unbiased video count and an accurate video record of fish passage.

Sizing efficiency

- Sizing efficiency is used to assess the ability of the counter to correctly classify fish based on their deflection size.

- Fish recorded and measured from the video footage is used to assess the sizing efficiency of the counter.

- Each fish seen on video is measured (mm) on the monitor screen and given a "true" fish size (cm) using a conversion factor. The conversion factor can be determined from the relationship between the inter-electrode spacing on the video image and on the counter structure itself.

- To get a representative sample size the total amount of fish per size class seen on video should ideally be around five per cent of the total monthly count (Table 4) or a lower level of confidence applied to the data. *NB: If the protocol for determining detection efficiency is followed then the required sample size for assessing sizing efficiency should automatically be reached.*

For example:

Table 3 - Monthly sample size per size class required for video validation

	Average monthly salmon count	Average monthly sea trout count	Number of salmon reqd. per month	Number of sea trout reqd. per month	Total number of fish to be reviewed per month
May		1069	0.0	53.5	53.5
June		2519	0.0	126.0	126.0
July	89	2532	4.5	126.6	131.1
August	85	547	4.3	27.4	31.6
November	149	229	7.5	11.5	18.9
December	118	84	5.9	4.2	10.1
Totals	441	6980	**22.1**	**349.0**	**371.1**

**September and October have not been included as they are outside of the main run.*
***Numbers for illustrative purposes only.*

- If the counter has mis-classified 10 per cent or more of the fish measured in any one month then an additional 5 per cent of the count for each size class should be reviewed. To get the required sample size fish should be randomly selected as follows:

  a) periods of video footage containing fish should be identified

  b) one hour per day of footage should be randomly selected, from the footage identified in a), and reviewed until the required sample size is reached per size class.

  c) If the counter has mis-classified ten per cent or more of the fish there is no requirement to blind watch the additional 5 per cent provided that the detection efficiency is greater or equal to 90 per cent.

- To arrive at the sizing efficiencies it is important that the counter and video validation data is matched i.e. the number of counter events is the same as the number of video events.

Table 4 - Fish counter sizing efficiencies (2010)

Month	Species split	Deflection/Screen size	Counter	Video	Multiplying factor
May	Large ST	>=70	79	12	0.15
	Small ST	<70	89	89	1.00
Jun	Large ST	>=70	39	5	0.13
	Small ST	<70	221	220	1.00
Jul	SL	>=70	11	4	0.36
	ST	<70	114	113	0.99
Aug	SL	>=70	16	7	0.44
	ST	<70	37	37	1.00

- To calculate the sizing efficiencies: divide the number of salmon sized on video by the number of salmon sized by the counter to arrive at the multiplication factor for the counter sizing efficiency.

- Multiply the counter figure for each species and month by the multiplication factor that has been calculated for that species and month (Table 4) to arrive at the count adjusted for sizing efficiency.

- It is important that any fish that have been mis-classifed due to a counter sizing error should be reallocated i.e. subtracted from the count for that species and added onto the other species.

For example:

Table 7 shows the July salmon count as 108 fish (Column 3), which after applying the sizing adjustment becomes 39.27 salmon (0.3636 x 108 = 39.27). The remainder (108 – 39.27 = 68.73) must be therefore be sea trout so should be added to the sea trout count (Table 9, Column 7 [4181 + 68.73 = 4250]).

Detection efficiency

- The detection efficiency is used to assess the ability of the counter to detect fish of different sizes. A counter used for the stock discrimination of salmonids should be assessed for its ability to count salmon and sea trout independently.

- To assess the counter detection efficiency a review of around five per cent of the total time that the counter is operational for each month over the period May – August (November and December) should be undertaken.

- As per Table 5, the minimum amount of footage that should be reviewed must be equal to approximately 36.80 hours per month.

Table 5 - Calculation for the amount of blind watch video to be reviewed.

Average days per month (May – December)	**30.67**
Average hrs *(Average days x 24)*	**736.08**
Predicted per cent of time that counter is operational	**100**
Total number of hours per month that need to be blind watched *(5 per cent x predicted operational time)*	**36.80**

- To reach the required numbers of hours per month, two one-hour periods per 24-hour period should be randomly selected for blind watching. Each of the one-hour periods should be reviewed until the given sample size for the month is reached (36.80 hours)).

- As with the sizing efficiency the total amount of fish that should be measured within each size class should be at least 5 per cent of the total monthly count (Table 3).

- If the counter has missed 10 per cent or more of the fish recorded on the video in any one month then an additional 5 per cent of the remaining video for that month should be reviewed. The hours for review should again be randomly selected to provide an un-biased assessment.

- If visibility within any of the randomly selected hours is poor then another hour from the same month should be randomly selected and reviewed.

- Dividing the number of fish detected by the counter by the video count gives the overall detection efficiency. This figure can be further split down into detection efficiencies for salmon and sea trout if the fish species can be identified from video footage or by other means.

Table 6 - Fish counter detection efficiency

Month	Species split	Counter	Video	Adjustment factor
May	Large ST	6	6	1.00
	Small ST	63	64	1.02
Jun	Large ST	4	4	1.00
	Small ST	151	160	1.06
Jul	SL	9	9	1.00
	ST	101	145	1.44
Aug	SL	21	21	1.00
	ST	30	37	1.23

- Multiply the count adjusted for sizing efficiency (Tables 7 and 8, Column 7) by the multiplication factor that has been calculated for detection efficiency for that species and month to arrive at the count figure adjusted for sizing and detection efficiency. This will give the final adjusted count.

Table 7 - Adjustments for sizing and detection efficiencies applied to trace verified (raw) salmon counts

Month	Counter	Raw count minus deflections <70 (July and August only)	Sizing Adjusted	Counter * size adjust	Counter- (counter * size adjust)	Size adjust total for SL	Detection adjusted	Count adjusted for sizing and detection efficiency
Jul	176	108	0.3636364	39.27	68.73	76.27	1.00	76
Aug	153	144	0.4375000	63.00	81.00	63.00	1.00	63
Sep	284		1.00	284.00	0.00	284.00	1.00	284
Oct	284		1.00	284.00	0.00	284.00	1.00	284
Nov	243		1.00	243.00	0.00	243.00	1.00	243
Dec	130		1.00	130.00	0.00	130.00	1.00	130
Jan	119		1.00	119.00	0.00	119.00	1.00	119
Feb	21		1.00	21.00	0.00	21.00	1.00	21
Total								**1220**

Table 8 - Adjustments for sizing and detection efficiencies applied to trace verified (raw) large sea trout counts

Month	Counter	Raw count minus deflections <70 (July and August only)	Sizing Adjusted	Counter * size adjust	Counter- (counter * size adjust)	Size adjust total for SL	Detection adjusted	Count adjusted for sizing and detection efficiency
Mar	59		1.00			59.00	1.00	59
Apr	210		1.00			210.00	1.00	210
May	348		0.15	52.86	295.14	52.86	1.00	53
Jun	224		0.13	28.72	195.28	44.77	1.00	45
Total								**367**

Table 9 - Adjustments for sizing and detection efficiencies applied to trace verified (raw) small sea trout counts

Month	Counter	Raw count plus deflections <70 from SL count (July and August only)	Sizing Adjusted	Counter x size adjust	Counter- (counter x size adjust)	size adjust total for ST	Detection adjusted	Count adjusted for sizing and detection efficiency
Mar	82		1.00			82	1.00	82
Apr	272		1.00			272	1.00	272
May	594		1.00	594.00	0.00	889	1.02	903
Jun	3547		1.00	3530.95	16.05	3726	1.06	3948
Jul	4150	4218	0.99	4181.00	37.00	4250	1.44	6101
Aug	368	377	1.00	377.00	0.00	458	1.23	565
Sep	206		1.00			206	1.00	206
Oct	519		1.00			519	1.00	519
Nov	411		1.00			411	1.00	411
Dec	166		1.00			166	1.00	166
Jan	77		1.00			77	1.00	77
Feb	31		1.00			31	1.00	31
Total								**13282**

Appendix 7 - Daily upstream counts in relation to flow at Restormel Weir 2010.

Figure 5 - Daily upstream counts of salmon in relation to flow (cumecs) at Restormel Weir (July 2010 to February 2011 inclusive)

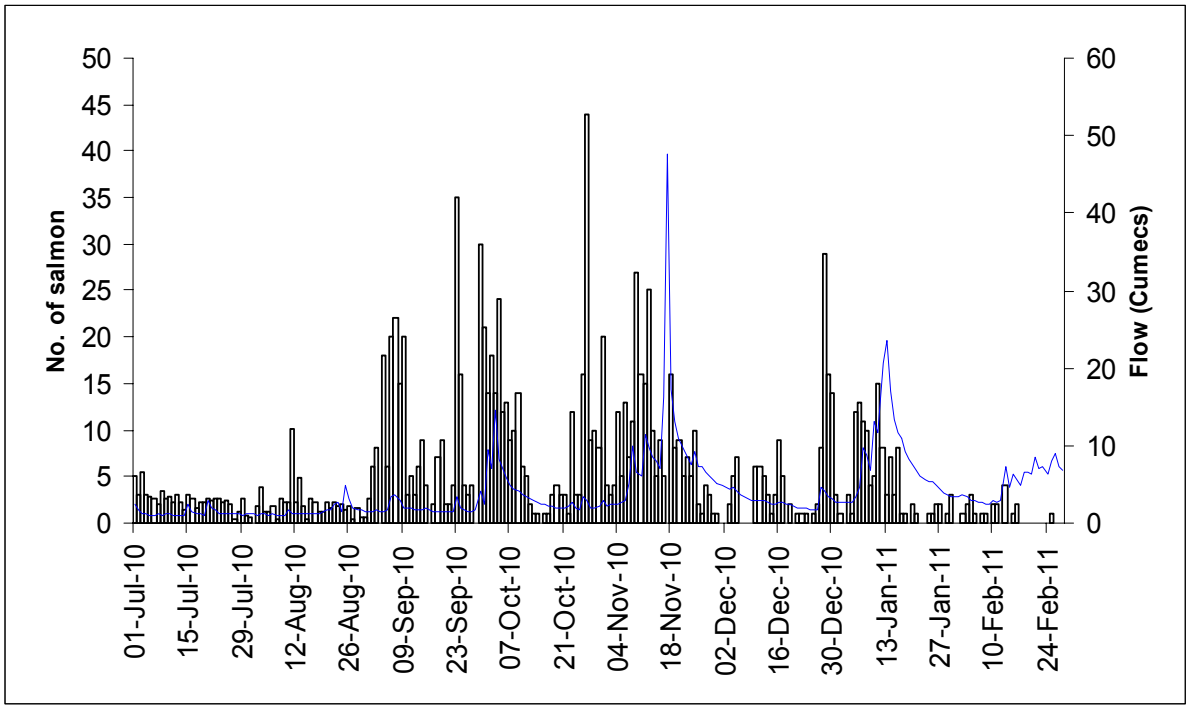
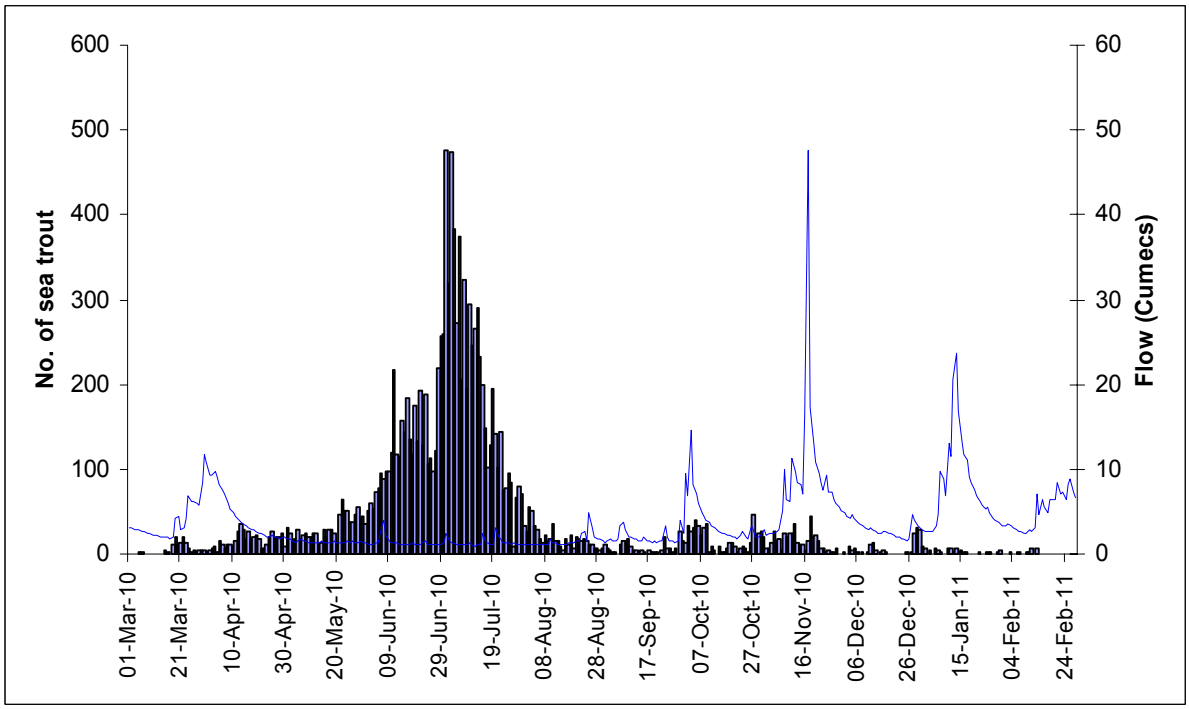


Figure 6 - Daily upstream counts of sea trout in relation to flow (cumecs) at Restormel Weir (March 2010 to February 2011 inclusive)



Appendix 8 - Monthly upstream counts in relation to temperature (°C) at Restormel Weir 2010.

Figure 7 – Monthly upstream counts of salmon in relation to temperature (°C) at Restormel Weir (July 2010 to February 2011 inclusive)

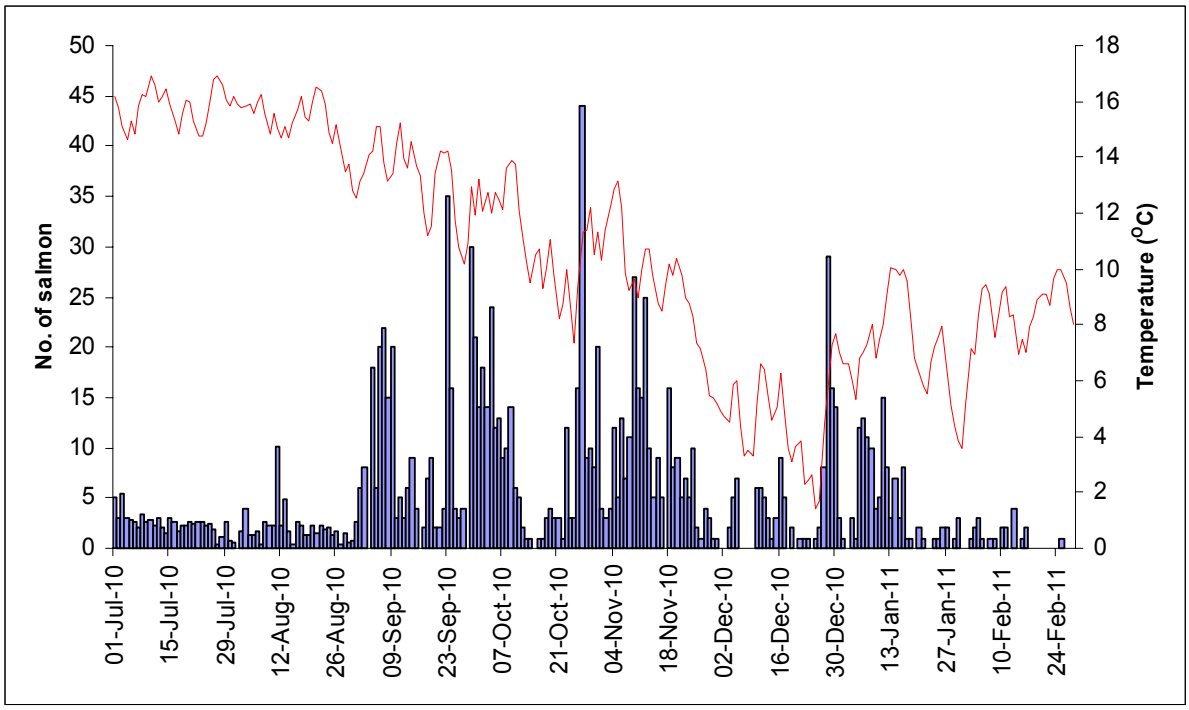
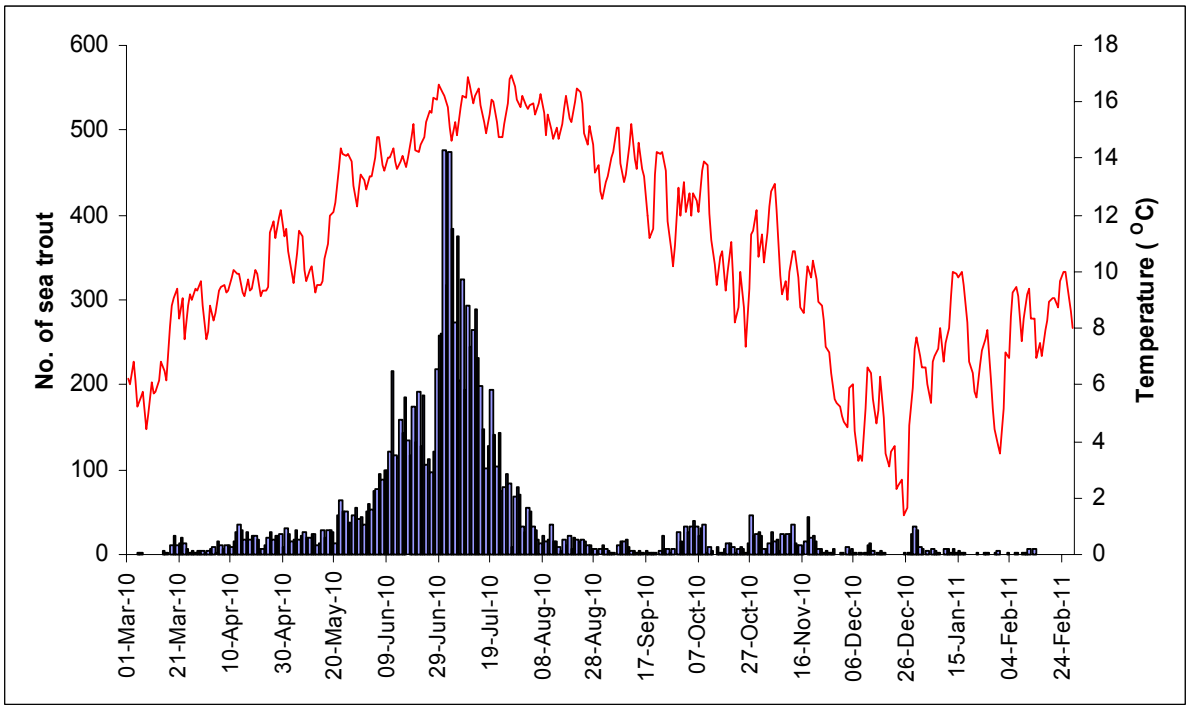


Figure 8 - Monthly upstream counts of sea trout in relation to temperature (°C) at Restormel Weir (March 2010 to February 2011 inclusive)



Appendix 9 - Daily movements of salmon and sea trout recorded at Restormel fish counter in 2010/11

Restormel Fish Counter

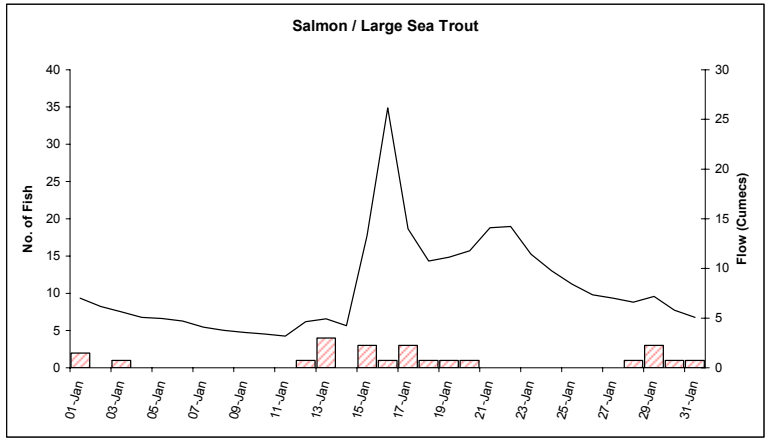
January 2010

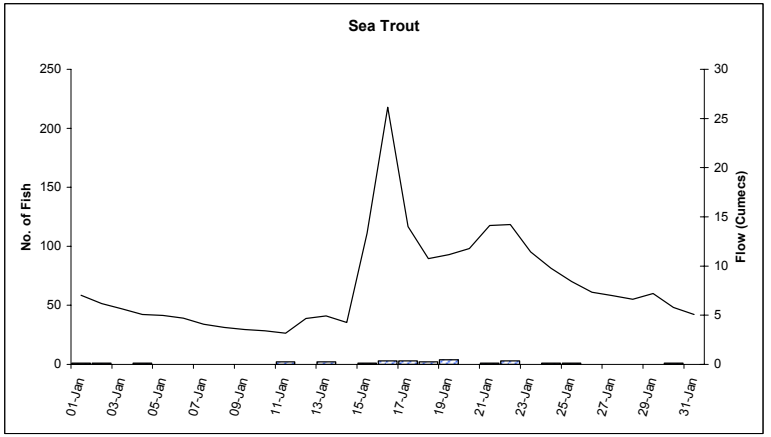
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Jan	2	1	7.01
02-Jan	0	1	6.18
03-Jan	1	0	5.63
04-Jan	0	1	5.07
05-Jan	0	0	4.97
06-Jan	0	0	4.71
07-Jan	0	0	4.09
08-Jan	0	0	3.77
09-Jan	0	0	3.55
10-Jan	0	0	3.41
11-Jan	0	2	3.18
12-Jan	1	0	4.65
13-Jan	4	2	4.93
14-Jan	0	0	4.25
15-Jan	3	1	13.34
16-Jan	1	3	26.16
17-Jan	3	3	13.99
18-Jan	1	2	10.75
19-Jan	1	4	11.14
20-Jan	1	0	11.78
21-Jan	0	1	14.11
22-Jan	0	3	14.22
23-Jan	0	0	11.43
24-Jan	0	1	9.77
25-Jan	0	1	8.42
26-Jan	0	0	7.33
27-Jan	0	0	7.00
28-Jan	1	0	6.60
29-Jan	3	0	7.19
30-Jan	1	1	5.80
31-Jan	1	0	5.08

	Counter	Counter
Monthly Total 2010	24	27
Monthly Total 2009	78	30

Cumulative 2010	24	27
2009	78	30

10 - Year Average	71	30





The fish counter figures provided in this summary are provisional and may be subject to change due to adjustments made for fish counter detection and sizing efficiencies. Final adjusted figures will be released in the annual fish counter report.
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Restormel Fish Counter

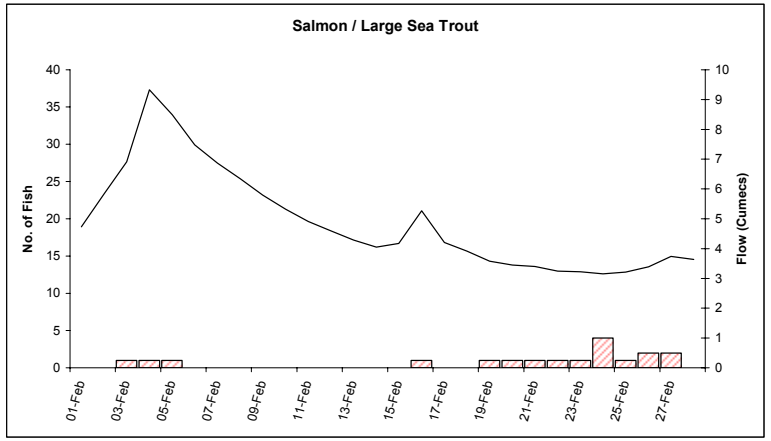
February 2010

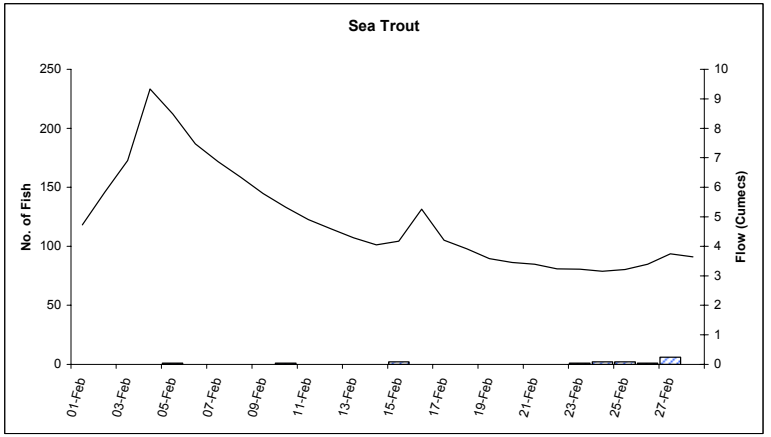
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Feb	0	0	4.73
02-Feb	0	0	5.84
03-Feb	1	0	6.91
04-Feb	1	0	9.33
05-Feb	1	1	8.49
06-Feb	0	0	7.48
07-Feb	0	0	6.87
08-Feb	0	0	6.35
09-Feb	0	0	5.80
10-Feb	0	1	5.32
11-Feb	0	0	4.91
12-Feb	0	0	4.60
13-Feb	0	0	4.29
14-Feb	0	0	4.05
15-Feb	0	2	4.17
16-Feb	1	0	5.26
17-Feb	0	0	4.20
18-Feb	0	0	3.91
19-Feb	1	0	3.58
20-Feb	1	0	3.45
21-Feb	1	0	3.39
22-Feb	1	0	3.24
23-Feb	1	1	3.22
24-Feb	4	2	3.15
25-Feb	1	2	3.21
26-Feb	2	1	3.39
27-Feb	2	6	3.74
28-Feb	0	0	3.64

	Counter	Counter
Monthly Total 2010	18	16
Monthly Total 2009	34	26

Cumulative 2010	42	43
2009	112	56

10 - Year Average	28	15





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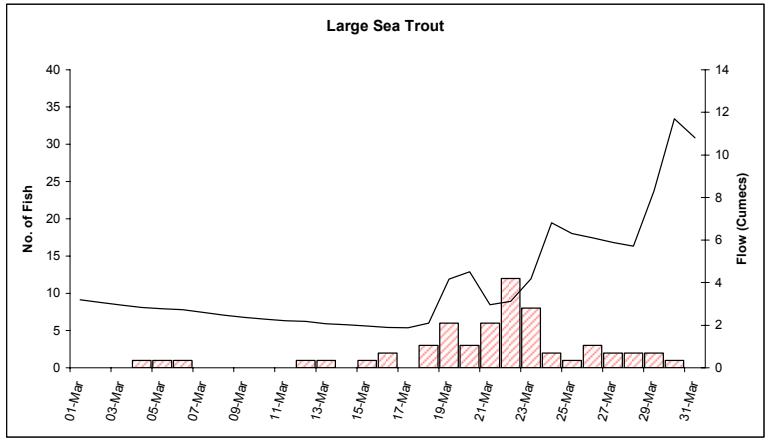
Restormel Fish Counter

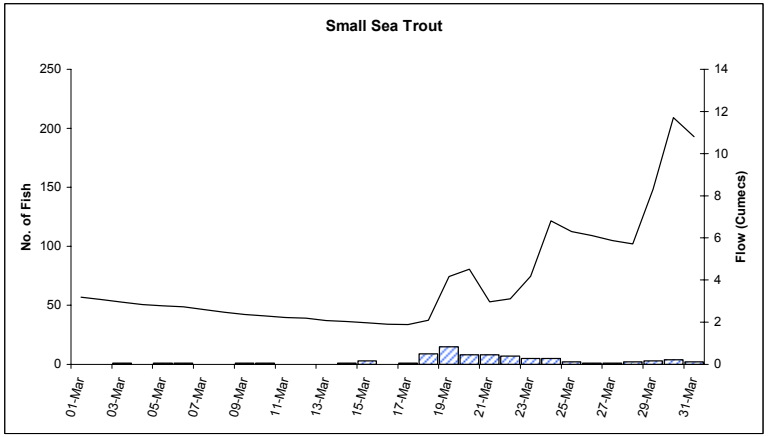
March 2010

Date	Large Sea Trout Deflections > 70	Upstream Sea Trout Deflections < 70	Daily Mean Flow (cumecs)
01-Mar	0	0	3.19
02-Mar	0	0	3.07
03-Mar	0	1	2.95
04-Mar	1	0	2.83
05-Mar	1	1	2.77
06-Mar	1	1	2.74
07-Mar	0	0	2.60
08-Mar	0	0	2.47
09-Mar	0	1	2.37
10-Mar	0	1	2.29
11-Mar	0	0	2.22
12-Mar	1	0	2.19
13-Mar	1	0	2.07
14-Mar	0	1	2.03
15-Mar	1	3	1.97
16-Mar	2	0	1.90
17-Mar	0	1	1.88
18-Mar	3	9	2.09
19-Mar	6	15	4.17
20-Mar	3	8	4.51
21-Mar	6	8	2.97
22-Mar	12	7	3.12
23-Mar	8	5	4.18
24-Mar	2	5	6.81
25-Mar	1	2	6.30
26-Mar	3	1	6.11
27-Mar	2	1	5.88
28-Mar	2	2	5.72
29-Mar	2	3	8.31
30-Mar	1	4	11.70
31-Mar	0	2	10.80

	Counter	Counter
Monthly Total 2010	59	82
Monthly Total 2009	55	63

Cumulative 2010	101	125
2009	167	119
10 - Year Average	36	72





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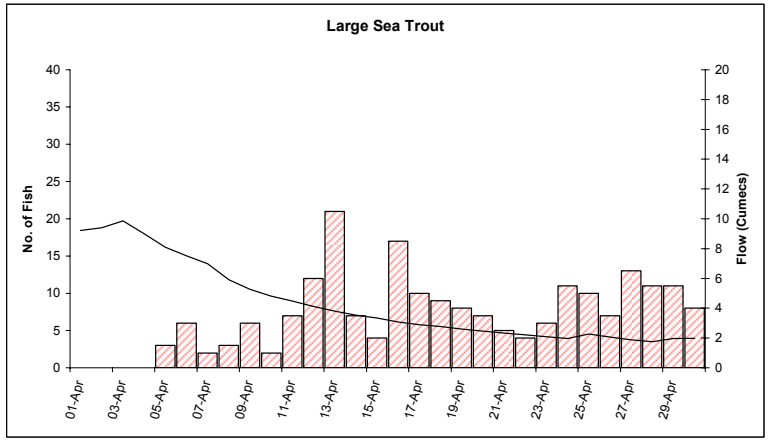
Restormel Fish Counter

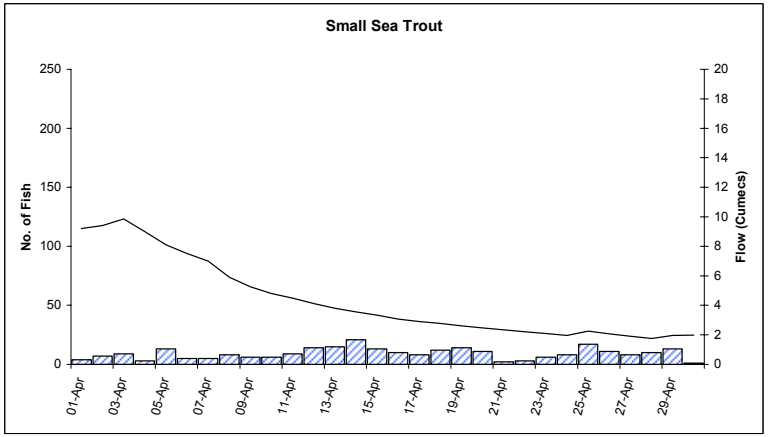
April 2010

Date	Large Sea Trout	Upstream Sea Trout Deflections < 70	Daily Mean Flow (cumecs)
01-Apr	0	4	9.21
02-Apr	0	7	9.41
03-Apr	0	9	9.85
04-Apr	0	3	8.99
05-Apr	3	13	8.09
06-Apr	6	5	7.51
07-Apr	2	5	6.99
08-Apr	3	8	5.90
09-Apr	6	6	5.26
10-Apr	2	6	4.81
11-Apr	7	9	4.48
12-Apr	12	14	4.12
13-Apr	21	15	3.80
14-Apr	7	21	3.54
15-Apr	4	13	3.35
16-Apr	17	10	3.07
17-Apr	10	8	2.90
18-Apr	9	12	2.77
19-Apr	8	14	2.61
20-Apr	7	11	2.46
21-Apr	5	2	2.34
22-Apr	4	3	2.21
23-Apr	6	6	2.08
24-Apr	11	8	1.97
25-Apr	10	17	2.26
26-Apr	7	11	2.08
27-Apr	13	8	1.89
28-Apr	11	10	1.76
29-Apr	11	13	1.96
30-Apr	8	1	1.99

	Counter	Counter
Monthly Total 2010	210	272
Monthly Total 2009	342	425

Cumulative 2010	311	397
2009	509	544
10 - Year Average	229	390





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Restormel Fish Counter

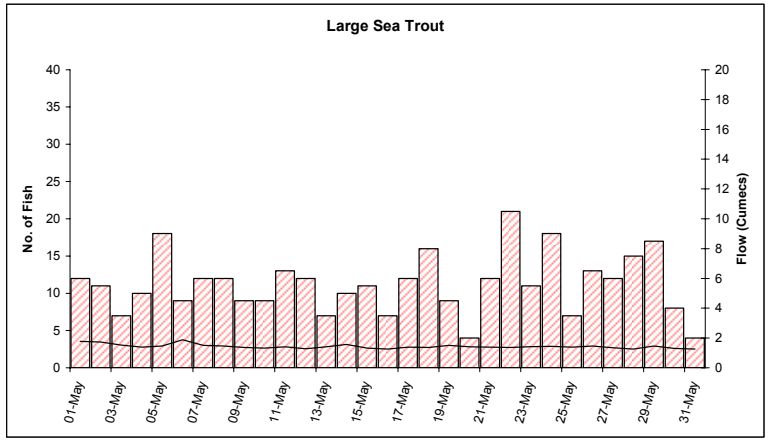
May 2010

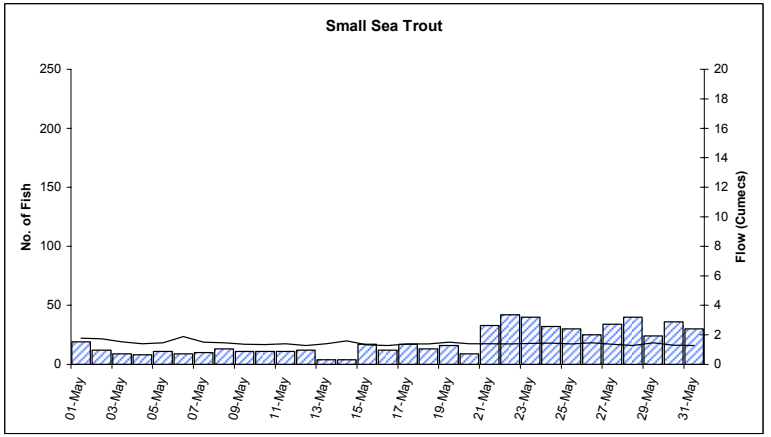
Date	Large Sea Trout	Upstream Small Sea Trout Deflections < 70	Daily Mean Flow (cumecs)
01-May	12	19	1.77
02-May	11	12	1.73
03-May	7	9	1.52
04-May	10	8	1.39
05-May	18	11	1.47
06-May	9	9	1.87
07-May	12	10	1.51
08-May	12	13	1.46
09-May	9	11	1.36
10-May	9	11	1.33
11-May	13	11	1.40
12-May	12	12	1.28
13-May	7	4	1.40
14-May	10	4	1.58
15-May	11	17	1.32
16-May	7	12	1.27
17-May	12	17	1.38
18-May	16	13	1.37
19-May	9	16	1.50
20-May	4	9	1.40
21-May	12	33	1.39
22-May	21	42	1.37
23-May	11	40	1.43
24-May	18	32	1.45
25-May	7	30	1.38
26-May	13	25	1.46
27-May	12	34	1.35
28-May	15	40	1.27
29-May	17	24	1.46
30-May	8	36	1.30
31-May	4	30	1.27

	Counter	Counter
Monthly Total 2010	348	594
Monthly Total 2009	249	602

Cumulative 2010	659	991
2009	758	1146

10 - Year Average	352	712





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Restormel Fish Counter

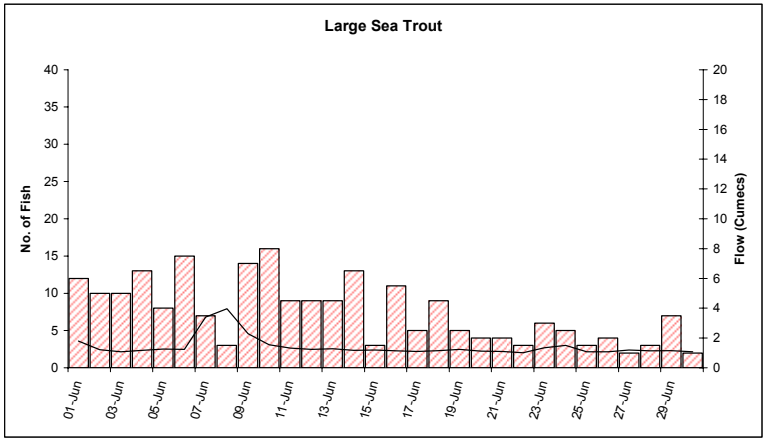
June 2010

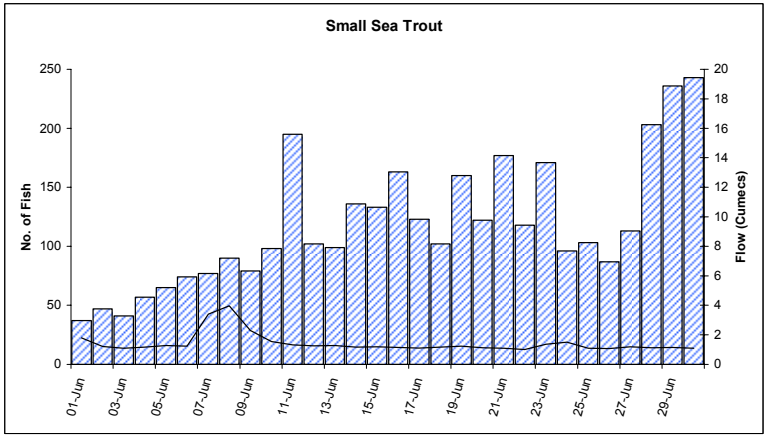
Date	Large Sea Trout	Upstream Small Sea Trout Deflections < 70	Daily Mean Flow (cumecs)
01-Jun	12	37	1.80
02-Jun	10	47	1.21
03-Jun	10	41	1.08
04-Jun	13	57	1.17
05-Jun	8	65	1.27
06-Jun	15	74	1.24
07-Jun	7	77	3.40
08-Jun	3	90	3.96
09-Jun	14	79	2.30
10-Jun	16	98	1.54
11-Jun	9	195	1.32
12-Jun	9	102	1.25
13-Jun	9	99	1.28
14-Jun	13	136	1.17
15-Jun	3	133	1.19
16-Jun	11	163	1.14
17-Jun	5	123	1.10
18-Jun	9	102	1.16
19-Jun	5	160	1.24
20-Jun	4	122	1.12
21-Jun	4	177	1.09
22-Jun	3	118	1.01
23-Jun	6	171	1.35
24-Jun	5	96	1.50
25-Jun	3	103	1.08
26-Jun	4	87	1.07
27-Jun	2	113	1.20
28-Jun	3	203	1.13
29-Jun	7	236	1.15
30-Jun	2	243	1.08

	Counter	Counter
Monthly Total 2010	224	3547
Monthly Total 2009	301	2003

Cumulative 2010	883	4538
2009	1059	3149

10 - Year Average	237	2314





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Restormel Fish Counter

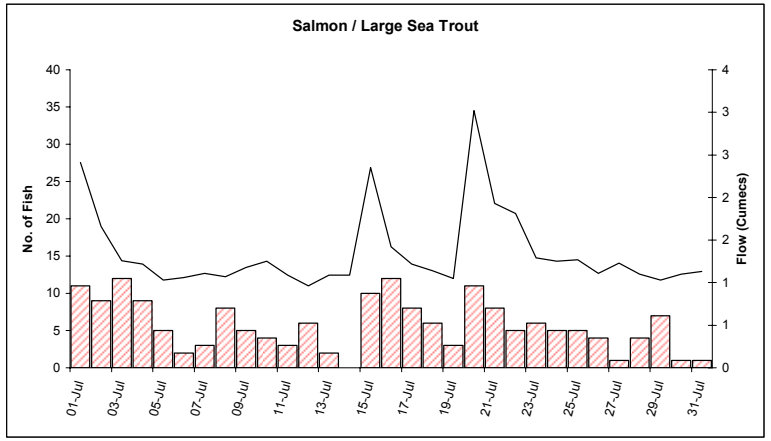
July 2010

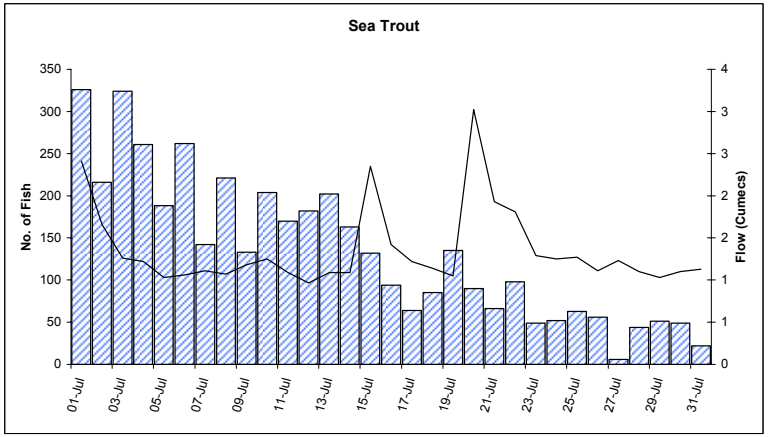
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Jul	11	326	2.41
02-Jul	9	216	1.66
03-Jul	12	324	1.26
04-Jul	9	261	1.22
05-Jul	5	188	1.03
06-Jul	2	262	1.06
07-Jul	3	142	1.11
08-Jul	8	221	1.07
09-Jul	5	133	1.18
10-Jul	4	204	1.25
11-Jul	3	170	1.09
12-Jul	6	182	0.96
13-Jul	2	202	1.09
14-Jul	0	163	1.09
15-Jul	10	132	2.35
16-Jul	12	94	1.42
17-Jul	8	64	1.22
18-Jul	6	85	1.14
19-Jul	3	135	1.05
20-Jul	11	90	3.02
21-Jul	8	66	1.93
22-Jul	5	98	1.81
23-Jul	6	49	1.29
24-Jul	5	52	1.25
25-Jul	5	63	1.27
26-Jul	4	56	1.11
27-Jul	1	6	1.23
28-Jul	4	44	1.10
29-Jul	7	51	1.03
30-Jul	1	49	1.10
31-Jul	1	22	1.13

	Counter	Counter
Monthly Total 2010	176	4150
Monthly Total 2009	77	3063

Cumulative 2010	1059	8688
2009	1136	6212

10 - Year Average	194	2665





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Restormel Fish Counter

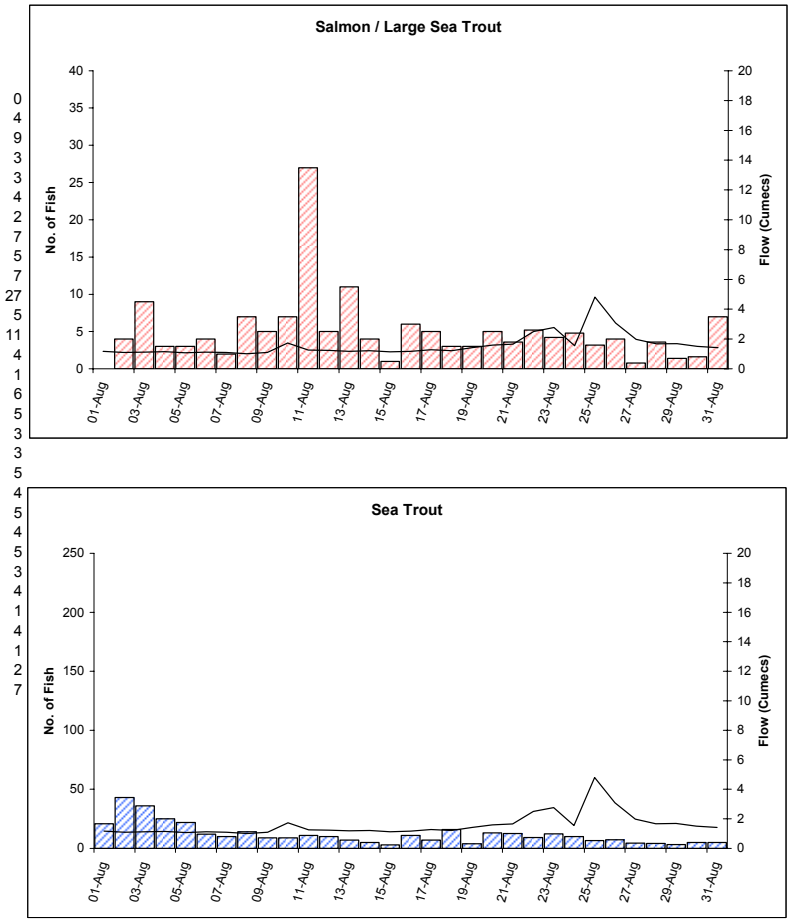
August 2010

Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Aug	0	21	1.17
02-Aug	4	43	1.09
03-Aug	9	36	1.12
04-Aug	3	25	1.15
05-Aug	3	22	1.07
06-Aug	4	12	1.12
07-Aug	2	10	1.09
08-Aug	7	14	1.01
09-Aug	5	9	1.09
10-Aug	7	9	1.74
11-Aug	27	11	1.26
12-Aug	5	10	1.24
13-Aug	11	7	1.18
14-Aug	4	5	1.21
15-Aug	1	3	1.13
16-Aug	6	11	1.17
17-Aug	5	7	1.28
18-Aug	3	16	1.22
19-Aug	3	4	1.43
20-Aug	5	13	1.59
21-Aug	4	13	1.65
22-Aug	5	9	2.51
23-Aug	4	12	2.76
24-Aug	5	10	1.55
25-Aug	3	7	4.81
26-Aug	4	7	3.08
27-Aug	1	4	1.98
28-Aug	4	4	1.68
29-Aug	1	3	1.70
30-Aug	2	5	1.50
31-Aug	7	5	1.43

	Counter	Counter
Monthly Total 2010	153	368
Monthly Total 2009	67	627

Cumulative 2010	1212	9056
2009	1203	6839

10 - Year Average	114	510



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Restormel Fish Counter

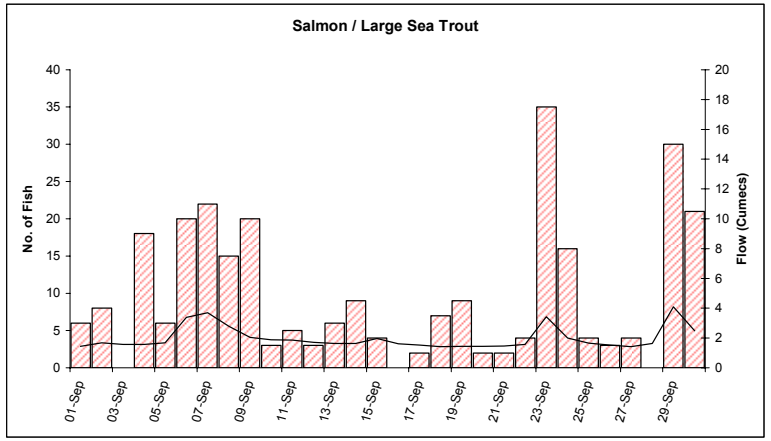
September 2010

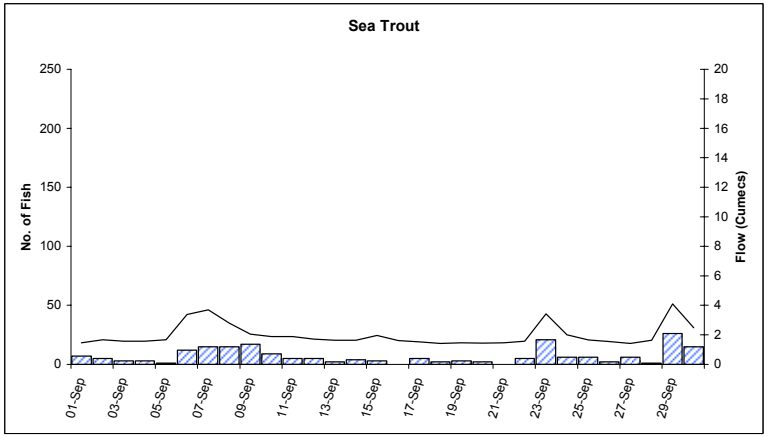
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Sep	6	7	1.45
02-Sep	8	5	1.67
03-Sep	0	3	1.57
04-Sep	18	3	1.57
05-Sep	6	1	1.67
06-Sep	20	12	3.38
07-Sep	22	15	3.70
08-Sep	15	15	2.79
09-Sep	20	17	2.05
10-Sep	3	9	1.89
11-Sep	5	5	1.87
12-Sep	3	5	1.72
13-Sep	6	2	1.63
14-Sep	9	4	1.62
15-Sep	4	3	1.95
16-Sep	0	0	1.61
17-Sep	2	5	1.52
18-Sep	7	2	1.43
19-Sep	9	3	1.46
20-Sep	2	2	1.44
21-Sep	2	0	1.46
22-Sep	4	5	1.57
23-Sep	35	21	3.43
24-Sep	16	6	1.99
25-Sep	4	6	1.64
26-Sep	3	2	1.54
27-Sep	4	6	1.43
28-Sep	0	1	1.64
29-Sep	30	26	4.08
30-Sep	21	15	2.48

	Counter	Counter
Monthly Total 2010	284	206
Monthly Total 2009	101	127

Cumulative 2010	1496	9262
2009	1304	6966

10 - Year Monthly Average	74	95





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Restormel Fish Counter

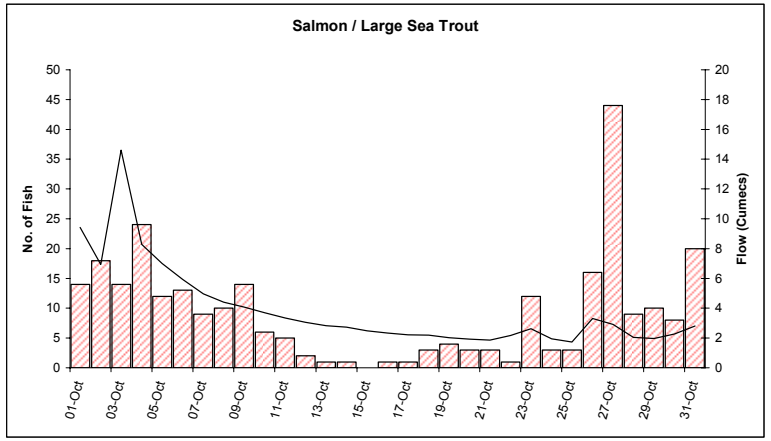
October 2010

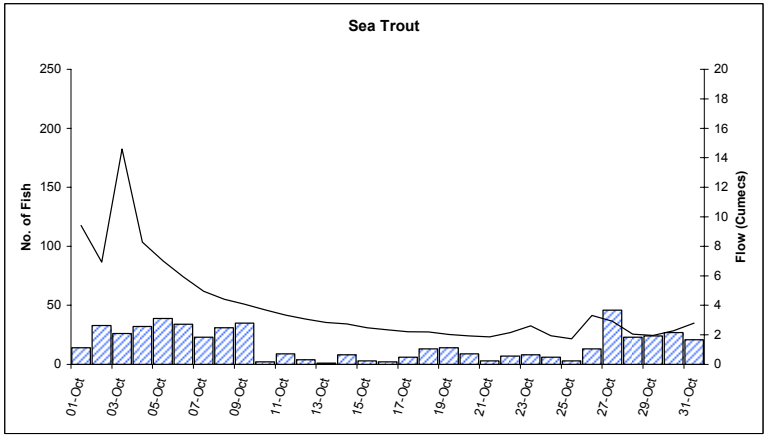
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Oct	14	14	9.42
02-Oct	18	33	6.94
03-Oct	14	26	14.60
04-Oct	24	32	8.29
05-Oct	12	39	7.01
06-Oct	13	34	5.93
07-Oct	9	23	4.95
08-Oct	10	31	4.40
09-Oct	14	35	4.08
10-Oct	6	2	3.69
11-Oct	5	9	3.34
12-Oct	2	4	3.06
13-Oct	1	1	2.83
14-Oct	1	8	2.73
15-Oct	0	3	2.48
16-Oct	1	2	2.34
17-Oct	1	6	2.22
18-Oct	3	13	2.20
19-Oct	4	14	2.03
20-Oct	3	9	1.92
21-Oct	3	3	1.86
22-Oct	1	7	2.16
23-Oct	12	8	2.62
24-Oct	3	6	1.94
25-Oct	3	3	1.73
26-Oct	16	13	3.31
27-Oct	44	46	2.92
28-Oct	9	23	2.04
29-Oct	10	24	1.96
30-Oct	8	27	2.27
31-Oct	20	21	2.80

	Counter	Counter
Monthly Total 2010	284	519
Monthly Total 2009	244	498

Cumulative 2010	1780	9781
2009	1548	7464

10 - Year Average	199	274





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Restormel Fish Counter

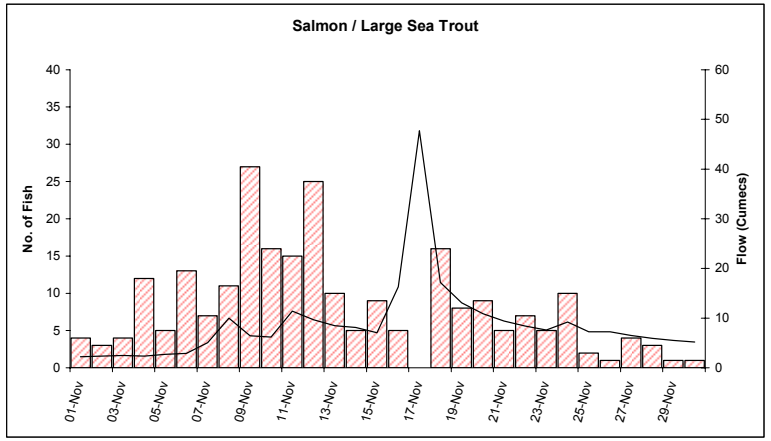
November 2010

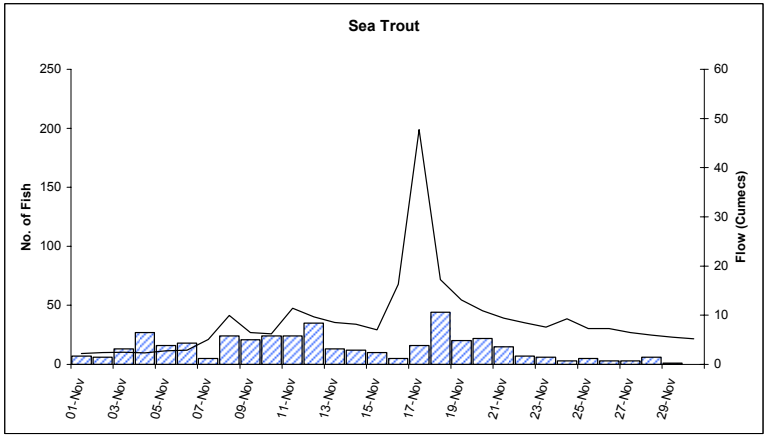
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Nov	4	7	2.22
02-Nov	3	6	2.36
03-Nov	4	13	2.46
04-Nov	12	27	2.33
05-Nov	5	16	2.73
06-Nov	13	18	2.91
07-Nov	7	5	5.06
08-Nov	11	24	9.98
09-Nov	27	21	6.45
10-Nov	16	24	6.17
11-Nov	15	24	11.40
12-Nov	25	35	9.66
13-Nov	10	13	8.52
14-Nov	5	12	8.13
15-Nov	9	10	7.04
16-Nov	5	5	16.30
17-Nov	0	16	47.70
18-Nov	16	44	17.20
19-Nov	8	20	13.10
20-Nov	9	22	10.90
21-Nov	5	15	9.42
22-Nov	7	7	8.44
23-Nov	5	6	7.60
24-Nov	10	3	9.24
25-Nov	2	5	7.27
26-Nov	1	3	7.28
27-Nov	4	3	6.48
28-Nov	3	6	5.98
29-Nov	1	1	5.52
30-Nov	1	0	5.19

	Counter	Counter
Monthly Total 2010	243	411
Monthly Total 2009	179	410

Cumulative 2010	2023	10192
2009	1727	7874

10 - Year Average	169	272





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Restormel Fish Counter

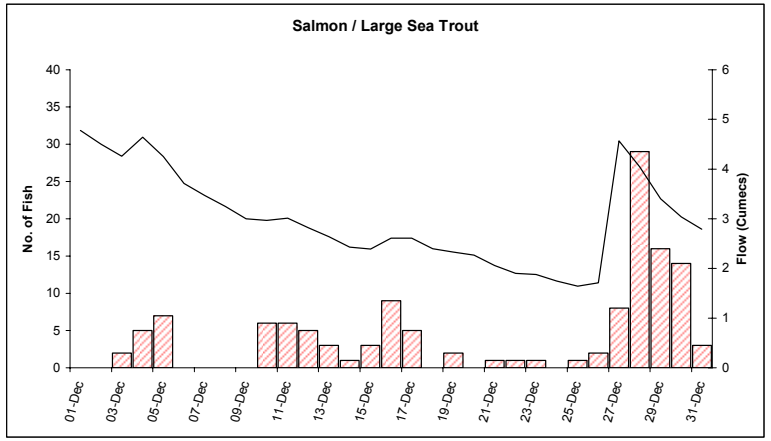
December 2010

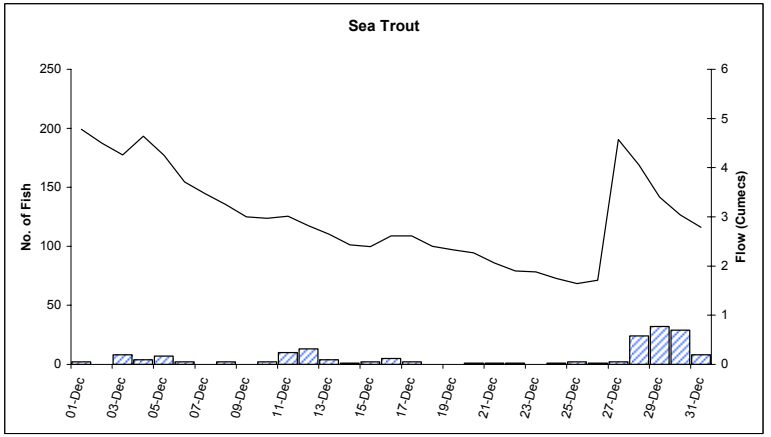
Date	Upstream Salmon / Large Sea Trout Deflections > 50	Upstream Sea Trout Deflections < 50	Daily Mean Flow (cumecs)
01-Dec	0	2	4.78
02-Dec	0	0	4.50
03-Dec	2	8	4.26
04-Dec	5	4	4.64
05-Dec	7	7	4.25
06-Dec	0	2	3.71
07-Dec	0	0	3.47
08-Dec	0	2	3.25
09-Dec	0	0	3.00
10-Dec	6	2	2.97
11-Dec	6	10	3.01
12-Dec	5	13	2.82
13-Dec	3	4	2.64
14-Dec	1	1	2.43
15-Dec	3	2	2.39
16-Dec	9	5	2.61
17-Dec	5	2	2.61
18-Dec	0	0	2.40
19-Dec	2	0	2.33
20-Dec	0	1	2.27
21-Dec	1	1	2.06
22-Dec	1	1	1.90
23-Dec	1	0	1.88
24-Dec	0	1	1.75
25-Dec	1	2	1.64
26-Dec	2	1	1.71
27-Dec	8	2	4.57
28-Dec	29	24	4.05
29-Dec	16	32	3.40
30-Dec	14	29	3.04
31-Dec	3	8	2.79

	Counter	Counter
Monthly Total 2010	130	166
Monthly Total 2009	59	70

Cumulative 2010	2153	10358
2009	1786	7944

10 - Year Average	121	107





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