BEAVERS WORKSHOP :

Cameo : How do spawning trout use their burns ?

A- The Issue : Obstacles in small burns can obstruct trout running up to spawn, especially in a dry Autumn when flows are low . But how do trout use these streams ? Do they all go up at once or over a long period ? What time of year do they run and is it the same in all parts of a catchment ? How long do they spend upstream ? How many go up a small burn and what sizes are they ? What are the effects of a dry Autumn on a spawning run ?

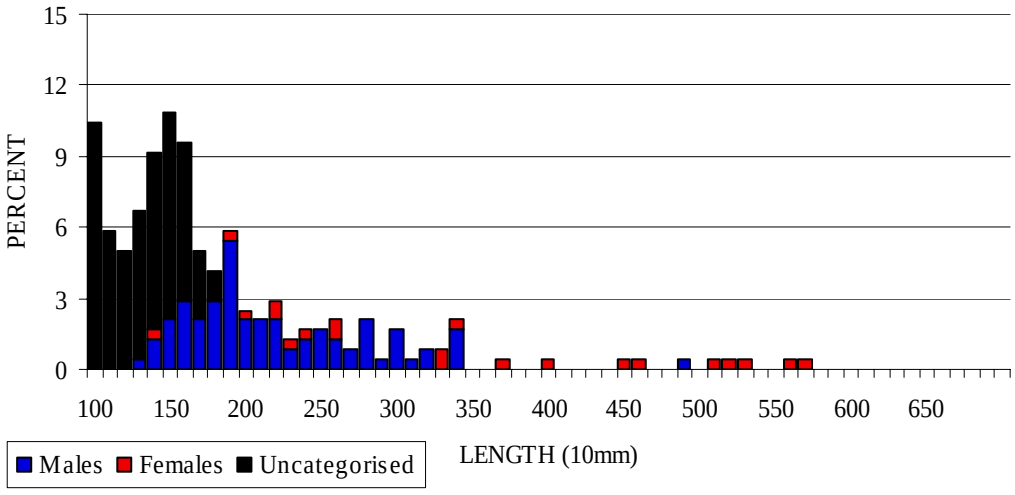
B- What was known before : Despite the obvious importance of knowing about spawning runs, there has been comparatively little work on them. There is, and has been, a huge amount of work based on electric-fishing trout juveniles, but the questions as to what spawned the juveniles – Sea-trout or Brown-trout and how many, which can only really be answered by trapping of spawning runs, has been neglected. Assumptions are made that that low flows make obstacles more difficult yet there is little or no data on this.

C - The Aims of this work : To try and find out basic information on how trout utilised small burns in the Tweed catchment, small, removable, wooden traps have been set up on four small burns (1 to 2 m wide) and two much larger, concrete and metal, permanent traps on larger streams (3 to 4m wide), as shown in Photos 1 & 2. The numbers and sizes of the trout trapped ("Population Profile" ; the date at which 50% of the run was trapped and the concentration of the run (taken as the percentage of the season's total trapped on the two days with the highest individual catches) are being recorded each season.

D-Results & Outcomes : These are given for one small burn trap and one permanent trap on a larger stream.

D1 : The trap near Jedburgh, on a small tributary of the Jed Water

Graph D1.1 : Population Profile of the Jedburgh population (2002 –2006)



Note : Large trout were observed getting over the top of this trap during high flows in 2006

Table D1.1 : Annual Results at the Jedburgh Trap

	LENGTH OF TROUT IN 100mm length Classes:								
	100-199	200-299	300-399	400-499	500-599	600-699	700-799	over 800	ANNUAL
COMBINED %	70.44%	18.61%	5.84%	1.46%	3.65%	0.00%	0.00%	0.00%	TOTAL
2002	74	26	9	0	2	0	0	0	111
2003	1	0	2	2	0	0	0	0	5

2004	19	6	1	1	2	0	0	0	29
2005	80	10	3	1	1	0	0	0	95
2006	19	9	1	0	5	0	0	0	34
2007									
	Under 4"	*to 8"*	*to 12"*	*to 16"*	*to 20"*	*to 23.5"*	*to 27.5"*	*to 31.5"*	*Over 31.5"*

Table D1.2 : Run Timing at the Jedburgh Trap

DATE ON WHICH 50% OF ANNUAL RUN ATTAINED

	Male	Female	Uncategorised	Overall
2002	31st Oct	6th Nov	26th Oct	26th Oct
2003	3rd Dec	3rd Nov	na	3rd Dec
2004	16th Oct	18th Oct	20th Oct	18th Oct
2005	22nd Oct	4th Nov	1st Oct	25th Oct
2006	26th Oct	12th Nov	8th Oct	25th Oct
2007		*Not processed yet*		

Table D1.3 Run Concentration at the Jedburgh Trap

PERCENTAGE OF TOTAL ANNUAL RUN TRAPPED ON THE DAYS WITH THE TWO HIGHEST TOTALS

	Male	Female	Uncategorised	Overall
2002	48%	100%	75%	61%
2003	100%	100%	none	100%
2004	50%	50%	43%	38%
2005	63%	43%	42%	35%
2006	80%	57%	58%	62%
2007		*Not processed yet*		

Again, the smaller "Brown-trout" are mainly males while the larger Sea-trout are all females.

As with the Cardrona trap, most of the fish running this burn are small and male, with only a very few larger female Sea-trout producing the bulk of the eggs. The delay caused by the drought of 2003 was of around one month in the run timing and the concentration of the run was even greater than in 2002, with all the categories of fish running in just two days of the season.

D2 : The Trap near Tweedsmuir

Graph D2.1 : Population Profile of the Tweedsmuir population (runs of 2001 to 2003)

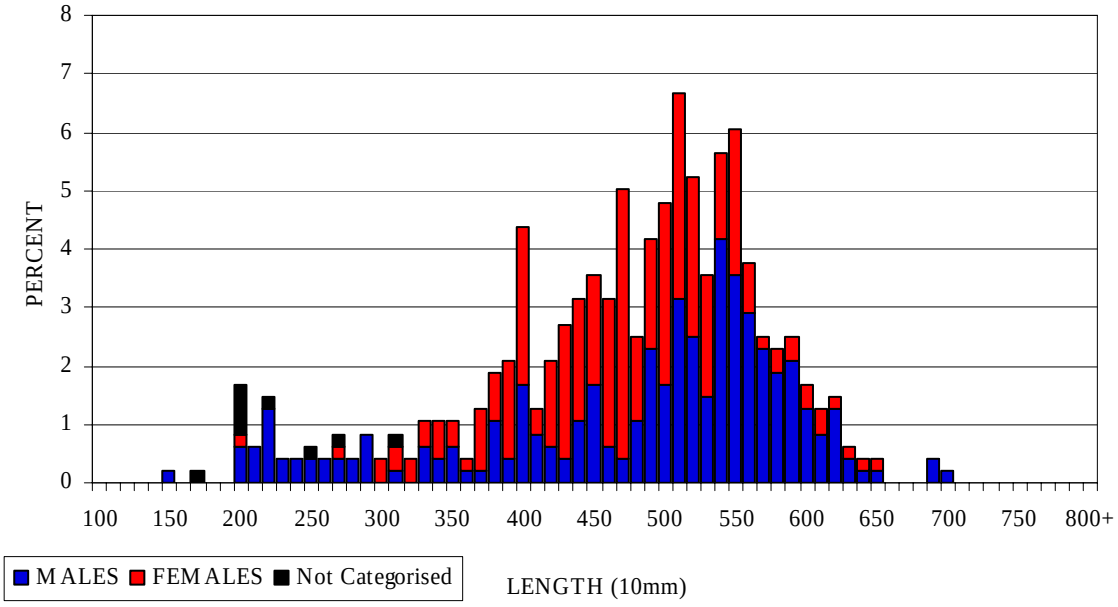


Table D2.1 : Autumn Upstream Results at the Tweedsmuir Trap

COMBINED %	100-199	200-299	300-399	400-499	500-599	600-699	700-799	800+	ANNUAL TOTAL
2001	1	9	8	33	35	4	0	0	90
2002	0	5	3	16	43	5	0	0	72
2003	1	8	11	17	42	2	0	0	81
2004	0	3	6	21	22	8	1	0	61
2005	0	1	7	14	17	3	1	0	46*
2006	Trap flooded – more caught going downstream than upstream								
2007	Trap flooded – more caught going downstream than upstream								

* three mature fish were unmeasured

Lengths in Inches	*to 8"*	*to 12"*	*to 16"*	*to 20"*	*to 23.5"*	*to 27.5"*	*to 31.5"*	*Over 31.5"*

Table D3.2 : Run Timing at the Tweedsmuir Trap

DATE ON WHICH 50% OF ANNUAL RUN ATTAINED

	Male	Female	Uncategorised	Overall
2001	Oct 23rd	Oct 23rd	Nov 25th	Oct 23rd
2002	Nov 3rd	Nov 4th	none	Nov 4th
2003	Nov 5th	Nov 7th	none	Nov 7th
2004	Oct 25th	Oct 25th	none	Oct 25th
2005	Oct 26th	Oct 27th	none	Oct 27th
2006	Trap flooded over – more fish down than up			
2007	Trap flooded over – more fish down than up			

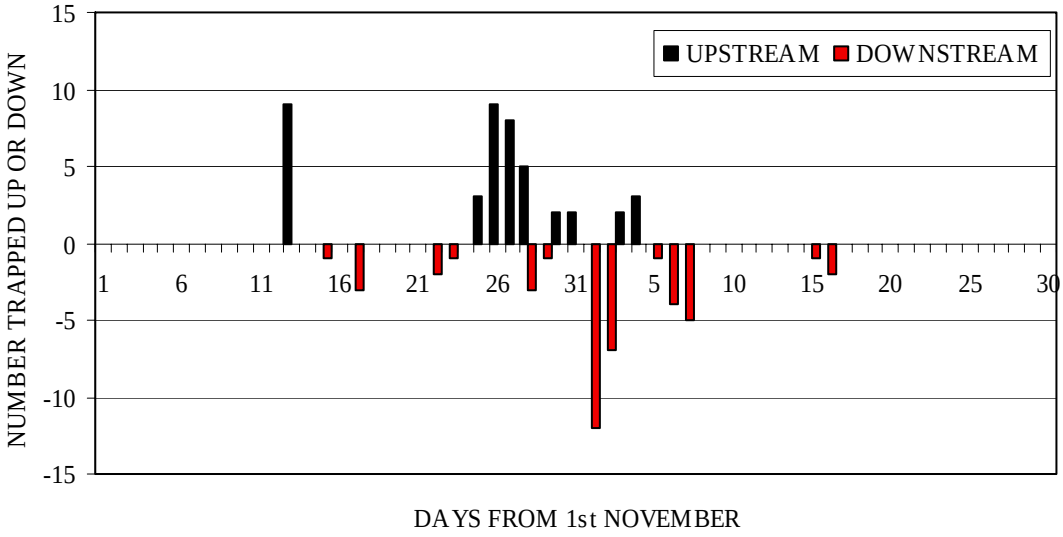
Table D2.3 : Run Concentration at the Tweedsmuir Trap

PERCENTAGE OF TOTAL ANNUAL RUN TRAPPED ON THE DAYS WITH THE TWO HIGHEST TOTALS

	Male	Female	Uncategorised	Overall
Average	33.13%	29.35%		28.55%
2001	37.50%	41.03%	none	36.67%
2002	20.51%	18.18%	none	19.44%
2003	42.11%	27.91%	none	34.57%
2004	40.54%	33.33%	none	31.15%
2005	25.00%	26.32%	none	20.93%
2006	Trap flooded over – more fish down than up			
2007	Trap flooded over – more fish down than up			

This trap also catches the adult spawners on their way back down if there have been no large spates to swamp the trap and wash the fish over, the up and down counts can tally, as they did in 2005. The time spent upstream of the trap can then be seen, though without tagging, précise times for individual fish cannot be worked out. As the graph below shows, the fish are spending 5 to 10 days upstream in the spawning areas before dropping back down.

Graph D2.2 : Upstream and downstream catches of adult trout, 2005



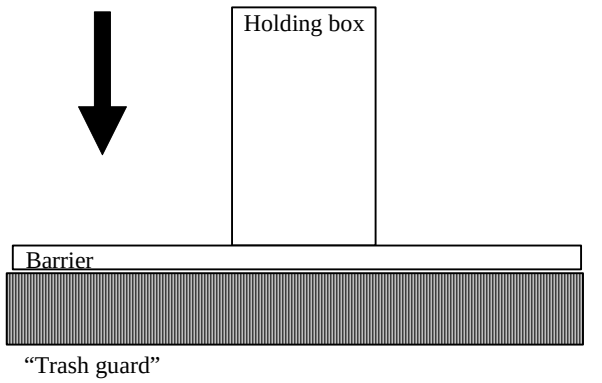
An interesting observation was made at the other trap of this type, at Peebles between 09.00 and 09.30 hrs on the 29th November, 2003 (a very dry Autumn). While the trap was being cleaned in the morning, the water suddenly rose to 15 on the gauge, up from 11, and became discoloured. Within 8 minutes, 5 Sea-trout had entered the trap, showing how quickly they can respond to a rise in the water when needing to get upstream.

The Tweedsmuir trap has only one size group, of larger trout, and no "gap" between smaller Brown-trout and larger Sea-trout and is, almost entirely, maintained by large Brown-trout females. There is little difference in the timing between males and females, which appears to be due to the fact that they are much the same sizes. At the Jedburgh trap, most of the males are small, some very small, and run upstream on small flows before the large Sea-trout females enter on spates. The runs are somewhat less concentrated at this trap, possibly because a bigger stream means water flows are less restrictive for larger fish. It is also uncertain whether the 5 to 10 days spent upstream of the trap would be applicable to much smaller & shallower burns with lesser flows

E - Problems encountered : The main difficulty was in finding a design of trap that would work in small burns with heavy loads of leaves and high spate levels. The standard design (Fig. E1) was used to start with but simply did not work under these conditions. As water flow goes through the holding box and out of its entrance, the holding box acted as a leaf-filter, and in a spate the entire outside of the box would become plastered over with leaves, de-watering the box and stopping the flow of water out of the entrance. Similarly, the "trash guard" which was supposed to stop fish from jumping over the barrier, very quickly became clogged with leaves in a spate (or in windy weather) so that solid water flowed over it, onto which fish could jump and get over the barrier. The design eventually adopted to get round these problems is shown in Fig. E2. In this design, the holding box is below the barrier, and water does not flow through it, so it does not filter out leaves. When fish

reach the barrier, they are diverted sideways and into the trap entrance. The notches in the barrier provide extra water flow over the box entrance and into the box to attract fish in. The barrier is not solid, but has spaces of around 2cms between the timber beams to allow water to pass. As these gaps are horizontal, leaves pass through them better than through vertical slots (leaves tend to float on their broad sides rather than vertically). This reduces the amount of water flowing over the top of the barrier that fish could use to get over with – the main block, however, is not the height of the barrier but the flat surface "platform" downstream of the barrier which prevents there being any depth of water from which fish can jump.

Fig E1 – Standard Design



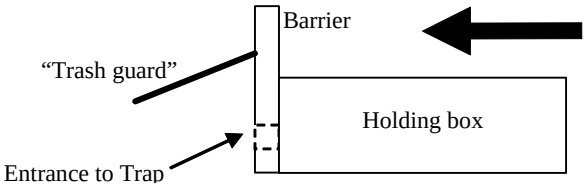
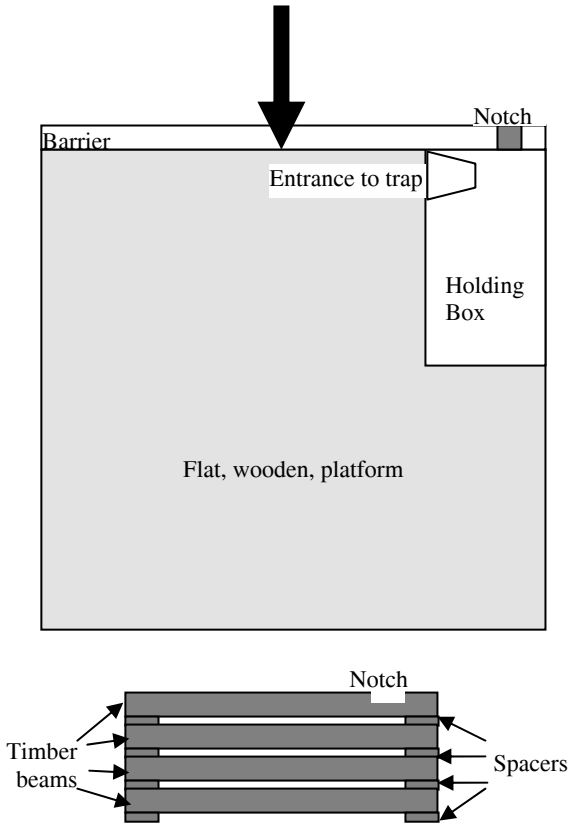


Fig E2 Adapted Design



Even with this altered design however, in some seasons some spates can be just too large, swamping the traps and allowing fish to pass round the sides – this can even happen with the permanent concrete traps. This cannot be prevented and just has to be accepted.

F- Useful Outcomes / Success Indices : The outcome of this work has been that for the first time some picture of the populations of trout using small burns and streams in the Tweed catchment is available. It is also apparent that the numbers of female spawners on which small burns depend for egg deposition can be very small, less than half a dozen and in some years, only one or two, making the success of a spawning season very vulnerable to anything that stops or delays just a very few fish. The concentration of the run can be very severe on small burns, with the bulk running upstream in just a couple of days and in a dry Autumn, the whole population – again demonstrating vulnerability to delay and dependence on good water conditions. This does suggest that the more obstacles on burns, particularly small ones, the more problems for fish, especially in dry Autumns.

G- Manpower and Materials needed : While the permanent concrete traps required professional builders to construct, the small, temporary, wooden traps can be made quickly and easily, though skill is required to find the right sort of site. Angling club members have been trained to run the small traps, which require daily checking during the season – and several times a day during spates.

H- Lessons Learned : A great deal of time and effort was wasted trying to find a design of trap that would work under local conditions. It was not appreciated at the start of this work that the most important factor in succesfully trapping fish is not the fish or the flows but dealing with the leaves being washed downstream.