

**Progress report on fish counting on the
Rivers Itchen and Test**

J.S. WELTON JANUARY 1987

Counters

NSHEB Mark 10 counters are installed at Woodmill on the R. Itchen and Nurseling Mill and Connegar Bridge on the R. Test. All have been running continuously since delivery.

Each counter was initially calibrated with the specific resistance provided (to simulate a fish) and subsequently the sensitivities have been set to count fish of 4 lb and larger. This was done by towing freshly killed fish over the electrodes and altering the settings accordingly. The two counters on the R. Test were calibrated easily as consistent results were obtained during this procedure but problems were experienced at the Woodmill site. Effort has been concentrated at Woodmill to increase counter efficiency.

Woodmill site

Initial tests using the FBA counter and micro-computer system showed that the output wave signal from the electrodes was weak. This was thought to be due to interference from extraneous metal sources. Insulation of the window frame and counter electrodes has significantly improved the strength of the signal and counter efficiency was greatly increased for fish passing close to the electrodes. Fish passing high in the water column were not always counted. The counting of mid-water fish was improved by extending the electrodes up the side of the fish pass. This was not a permanent structure as the electrodes must be immersed at all times and as yet the water level in the fish pass is not finalised.

Independent counter evaluation

1. Video. Installed and running at 2 frames/second in the bunker at Woodmill with IR lights mounted overhead. This has been in operation continuously until recent removal to Nurseling Mill. Picture quality is excellent in clear water but as expected, turbid water conditions allow verification for only 90% of the time. Image analysis of the video tape has been encouraging and progress is being maintained.

2. Still photography. This has been installed and connected to the counter at Woodmill. Photographs are of excellent quality but a system of incorporating time and date on the photograph needs to be examined.

Salmon behaviour

Originally many fish stopped after ascending the Denil fish pass as soon as laminar flow was reached. This was across the bottom electrode causing a change in the electrical field for which the counter compensated. The result of this loitering was poor counting efficiency. Water velocity through the fish pass at this time was 0.7 m sec^{-1} . It is recommended that velocities of $>1 \text{ m sec}^{-1}$ are used to prevent loitering. Removal of one or two pairs of Denils have caused an increase in water velocity to 2.5 m sec^{-1} maximum and this has solved the problem. Fish now move straight through the counting zone. A further result of the increase in velocity has been the decrease in water height. Fish are now forced to swim nearer the electrodes and therefore counter efficiency has again been improved. The increased flow, however, resulted in entrained air and this caused problems on the video. Also a

standing wave over the lower electrode caused false counts at high water. Some further modifications involving the siting of the electrodes, the water velocity and height are needed to maximize the benefits.

Nurseling Mill site

The video was moved to this site in late November and run in daytime only due to lack of facilities for connecting lights. Ten fish were seen on the video. Seven of these were moving upstream and all were recorded on the counter. There were three downstream counts, two were fish and the third coincided with the passage of a large amount of debris. It was not possible to tell if a fish was present at the same time. There were no false upstream counts during the period of operation.

Data logging

Golden River data loggers are connected at all sites recording data from the counters only but are ready for recording environmental parameters.

Future needs

Attached is a list of equipment needed for the efficient running of the project. A few modifications can be made which would not seriously detract from the aims of the project but would involve more manpower in the future eight years to achieve the same objective.

Environmental parameters, temperature, pH, light, water height and turbidity should be logged every 15 minutes and at each record of a salmon movement at each site. However, one set of flow and turbidity data for each river would suffice. The actual parameters at an event (fish counted) would then have to be taken as an average of two logged records.

Three more sets of still photography equipment are needed to continuously cover each site. Still photography is essential for recording each event so that non-salmonid counts, e.g. eels, can be discounted. In practice, only two more sets are required if it is assumed that the proportion of non-salmonid counts up each weir at Nurseling Mill is the same and that no photography is possible in the tube counter at Connegar Bridge. Should video analysis prove otherwise at Nurseling Mill, a further set would be needed.

Another IR lamp is needed at Nurseling Mill to cover the wider area under CCTV surveillance.

It was originally planned to purchase a spare Mk 10 counter in case of failure of a machine at one of the four sites but results so far show that failure is unlikely and it is suggested that no complete spare machine is needed. It would be wise, however, to hold a spare of the processor circuit board for immediate replacement in the event of a failure.

An extra dehumidifier is essential for use on the R. Test as the computer-based image analysis system is now on site for efficient operation. A portable model could be used and moved between the two sites as necessary.

In order for this project to work at all, it is essential that all fish pass over the counting electrodes. The electric screens at Woodmill and those proposed at Gaters Mill must be 100% efficient. An extensive tagging programme will be needed. Some progress was made with sonic tags but this system is not efficient in terms of time or results. Radio tagging offers an alternative with fixed listening stations at Woodmill and Gaters Mill. However, commercially available stations are not ideal for use in this case as the fish are likely to pass through in too short a time to be picked up by the station. Some alteration in the EPROM software may be possible by MAFF but it is suggested that as they developed the system and coordinate its use throughout the UK that they assess the site first to advise on the best system for the R. Itchen. There is a new wave band due for approval for radio tagging (174 MHz) this year. The old wave band is probably not suitable because of continental interference.

Overall, the project is proceeding very well although delays have been caused by services not being installed in time, e.g. electricity at Nurseling Mill, electric screen at Woodmill. I understand that the fish pass at Gaters Mill is behind schedule and this may cause a serious delay in its commissioning.

Further general work is needed at Nurseling Mill (repainting of the weir) and at Connegar Bridge (to allow video verification of the counter).

Delays have occurred with the work at Woodmill due to limited access to Woodmill Pool and the constant threat of further access difficulties should our activities seem to adversely influence the fishery. The need to maintain the owner's cooperation and goodwill for the future is realized but access and works rights are essential to prevent expensive waste of manpower and time. To overcome this problem if these rights of access cannot be negotiated, it is suggested that all the rods for one day are purchased by the Authority which will then allow us access twice a week (access on Tuesday being already agreed). A rod at Gaters Mill would also be useful for right of access during the salmon season.

Environmental parameters		£
Temperature sensors	4 @ £40	160
pH sensors	4 @ £200	800
Light sensors	4 @ £70	280
Turbidity sensors	4 @ £2000	8000
	(compromise 2 @ £1144)	2288
Flow data connections	3 @ £300	900
Still photography	3 @ £900	2700
Miscellaneous		
Badger IR light	1 @ £350	350
Dehumidifier	1	
Cables		300
Sensor meetings		200
General works		
Stilling tube - Woodmill Pool		
Nursling weir - repaint		
Frame and box for Connegar Bridge		