

APPENDIX D

Fisheries Impact Assessment for the Lower Dargle following the Implementation of a Proposed Flood Defence Scheme

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1. Introduction

The topography, hydrology and flood history of this salmonid river have already been described comprehensively (Section 5.5). The rationale for undertaking this proposal and the physical nature of the works involved have also been outlined in detail (Section 5.5). The current status of the channel in question, from a physico-chemical, aquatic floral and macroinvertebrate perspective and a riparian corridor perspective is documented in detail in Section 5.3.2.

The following comment outlines the likely short-term consequences for fish stocks of the physical works scheme and a longer term prognosis assuming that the proposed fishery remedial measures are incorporated into the scheme.

2. Short-Term Impacts

The short-term impacts of physically widening this channel will result in a temporary collapse in the fish stocks within the affected reaches – existing resident fish stocks are likely to migrate out of the zone in question to undisturbed areas. The negative impacts, at works stage would be ameliorated to some extent by:

- Altering the channel as necessary in sub-sections and incorporating the long-term fishery proposals in the first altered reach before moving on to carry-out primary excavations in the next sub-section. If this *modus operandi* were adopted then from a fishery perspective works should be initiated at the most upstream site to be physically altered, and thereafter, proceed systematically in a downstream direction – recolonisation of the altered channel reaches by aquatic plants, macroinvertebrate and fish will take place in a downstream direction.
- The availability of a temporary deep ($\geq 1.0\text{m}$) channel, 2 to 3m wide, at all times during the works stage would also help the passage of migratory fish during the works stage.
- Actual physical works in the channel should be confined to a seasonal period between May and September to avoid killing salmonid eggs deposited in the gravels or, young fish which are too small to swim away from the excavators.

3. Easement of Long-Term Fishery Implications

The author would not regard the long-term impacts of this physical works scheme as being likely to have a serious negative impact on this fishery provided the following works can be accommodated in each of the zones illustrated in Figure 1. These proposals take cognisance of the flood relief proposals in individual reaches.

- A. In all four zones where fishery works are required post-drainage (Figure 1), the river bed material should be excavated to a depth of 30cm and stored for subsequent replacement in the channel following completion of the drainage works.
- B. Any flood relief works in Zone 1 should be followed by the construction of a “two stage channel” with the lower of the two stages having the same wetted summer base width as the existing channel. The nature of design in this case is illustrated in Figure 2 (a and b).

When this secondary channel has been excavated the original river bed material should be replaced in the new channel. The current cascade / pool sequence in this reach should be rebuilt, as far as is possible using the original river bed material.

- C. In Zone 2 (Slang Area) the creation of a narrower summer channel basewidth than currently exists would suit fishery interests. Essentially the maintenance of a summer wetted basewidth through the slang which has the same width as the existing channel reach immediately upstream of this point would suit. A series of boulders (1 tonne) placed in this new narrow channel at *circa* 3m centres would be advantageous from a fisheries viewpoint.
- D. In Zone 3, the current wetted summer channel basewidth should be maintained at the new lower bed level and the original river bed material placed back in the channel following works. Three vortex stone weirs should be constructed at gradient break points as illustrated in Figure 3. A schematic drawing of a suitable vortex weir is illustrated in Figure 5 along with a photograph of same. Pools should be excavated in the central third of the channel immediately downstream of each weir. Maximum depth in each pool should be 1.5m. Overall pool length should be 10m. One large boulder (1 to 1.5 tonnes) should be placed in the centre of each pool (Figure 4).
- E. In Zone 4, following flood relief excavations a central channel, at a lower level should be excavated. This inset channel should be the same basewidth as the existing channel. It should follow a sinuous path through the wider drained channel. The nature of this channel is illustrated schematically in Figure 5 along with photographs of a riverine reach where this technique has been applied.
- G. It is crucial that the Eastern Regional Fisheries Board should have an option, at the works stage, to make minor adjustments to the scheme in the interests of accommodating fishery concerns.

4. Monitoring

The River Dargle, in fishery terms, is primarily a sea trout fishery with a small run of salmon. Sea trout are born in freshwater and remain in the river until 2 or 3 years of age. Thereafter they go to sea to feed returning thereafter, annually, to spawn.

It is essential that the nature and extent of fish stocks be quantified in the reach to be altered at least once prior to works and for at least three years after the completion of the flood relief programme – the Central Fisheries Board have already been commissioned to carry out this task in the summer of 2007. If the flood relief works do not take place until 2009 then another fish stock survey in 2008 would provide additional useful background information. Data compiled on the fish stocks pre- and post-flood relief works would highlight any shortfall in the success of the fishery enhancement programme and enable one to design minor modifications to the channel to ensure its success.

5. An Additional Concern

The author's greatest concern, in relation to the future of this fishery, is with current water quality levels. Section 5.3.2 of this document reports on the findings of an aquatic macroinvertebrate study at four sites within the relevant section of the Dargle. These results

are expressed as Q values – a system developed and used by the Irish Environmental Protection Agency (EPA) (McGarrigle *et al.*, 2002). The EPA Q value system, using macroinvertebrates, rates water quality over a Q value scale of 1 to 5 – a Q1 value represents grossly polluted conditions while, at the other end of the scale a Q5 value reflects pristine conditions. The Q values recorded at the four sites sampled were Q3 in all cases (see Table I, Appendix C relating to Section 5.3.).

A recent EPA funded project relating Q values to salmonid stocks, currently being finalised by Central Fisheries Board personnel (T. Champ, pers. comm.), indicates that:

- a. 1+ year old salmon parr stocks are likely to be depressed once Q values are at Q3/4 or less.
- b. Juvenile trout stocks will fall once Q3 values are reached.
- c. If Q values fall to Q2/3 or lower than stocks of all juvenile salmonids will suffer.

It is critical therefore that a pre- and post-works monitoring of salmonid stocks in the altered zone of the Dargle be carried out in tandem with Q value macroinvertebrate assessments. In the author's opinion a failure of juvenile salmonid stocks to recover in this reach following flood relief works is more likely to be due to ongoing water quality problems than to physical alterations to the channel. The combined fish stock / Q value survey may help to pin-point the source or sources of pollution

References

McGarrigle, M.L., Bowman, J.J., Clabby, K.J., Lucey, J., Cunningham, P., MacCarthaigh, M., Keegan, M., Cantrell, B., Lehane, M., Clenaghan, C., Toner, P.F. (2002) *Water Quality in Ireland 1998-2000*, EPA Publications, Wexford.

O'Grady, M.F. (2006) Channels and Challenges, The Enhancement of salmonid rivers. Irish Freshwater Fisheries Ecology and Management Series; Number 3. Central Fisheries Board, Dublin, Ireland.

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