



Electrofishing survey and Q value analyses for the River Poddle

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Report Approval Sheet

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Introduction

Dublin City Council and South County Dublin County Council commissioned AQUAFACT to carry out an electrofishing survey and Q value study of the River Poddle as part of a Flood Alleviation Scheme that is being devised for the river.

Methodology

An electrofishing survey of sections of the River Poddle in Co. Dublin was carried out by AQUAFACT on August 4th and September 8th, 2020. Weather on both days was fine and sunny. **Figure 1** shows the survey locations and the centre points for each of the four sites are shown in **Table 1** below.

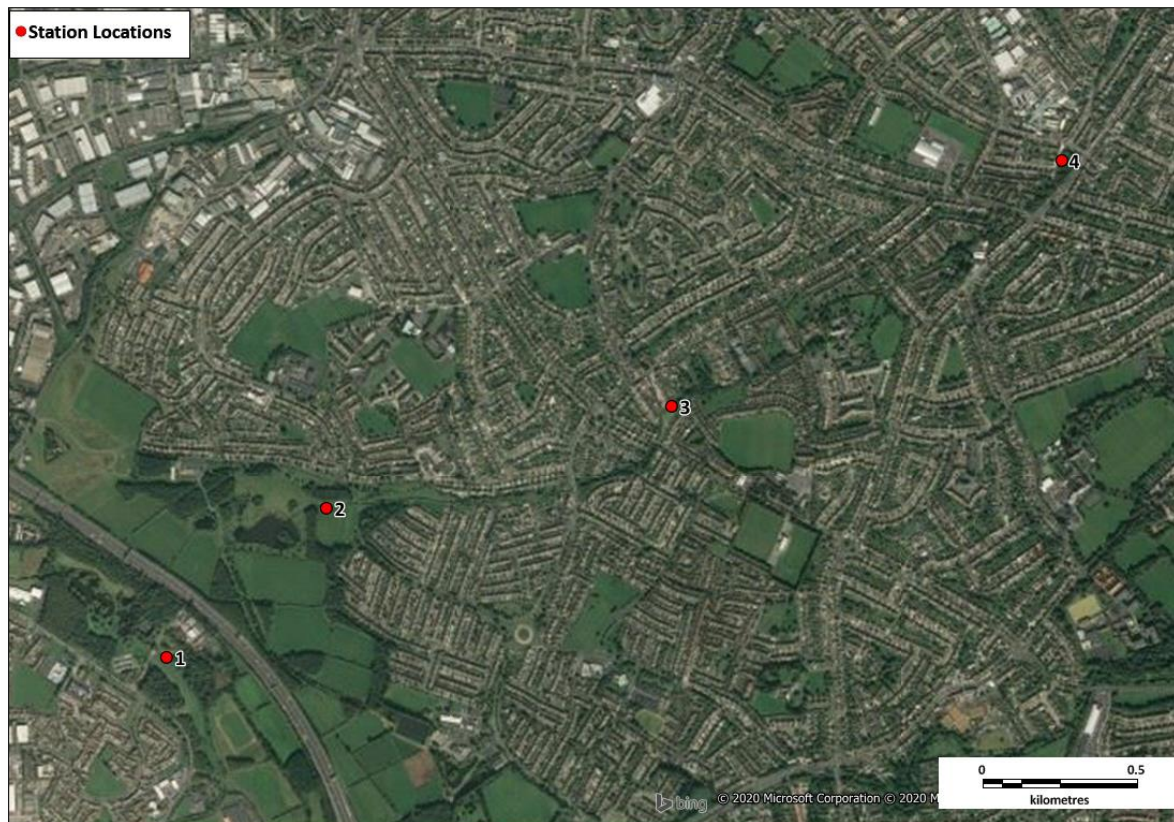


Figure 1. Station locations. 1: Tymon North, 2: Tymon, 3: Whitehall, 4: Ravensdale Park.

1. Tymon North: 53.29943 N 6.34199 W
2. Tymon Park: 53.3076 N 6.33415 W
3. Whitehall: 53.3071 N 6.31738 W
4. Ravensdale Park : 53.31386 N 6.29843 W

Table 1. Centre points for each of the four sites surveyed.

A battery powered backpack electrofisher (ELBP2 manufactured by Electracatch International) was used to sample fish. The ambient water conductivity was measured at 308 $\mu\text{S}/\text{cm}$, water temperature was recorded at 15.8°C and the backpack electrofisher settings adjusted to 300v / 20 pulses per second / 20% pulse width (= 10 msec) giving a duty cycle of 20%. During electrofishing operations, the output current averaged 0.5 amp (peak current of 2.5 amps) and varied in accordance with the depth of water being fished.

Four samples were also taken for Q value analyses. The two-minute kick and one minute stone wash sampling method was employed to collect samples of macroinvertebrates for analysis. This involved placing a standard hand net of pore size 500 μm in the river, facing upstream and disturbing the river bed in front of the net mouth. The surveyor then moved in a diagonal direction upstream to ensure that different micro-habitats were included in the sample. The kick method dislodges macroinvertebrates from the substrates and submerged plant material. This was continued for approximately two minutes and followed by one minute of stone washing. The resulting sample was transferred from the net to a plastic bucket and fixed using a 70% ethanol solution.

The samples were then taken to the AQUAFACT laboratories where the macroinvertebrates were removed and identified using stereoscopic microscopes and the appropriate keys by a qualified freshwater taxonomist. The resulting species list was then used to assign a Biotic Index value (Q-Value) to the sampled streams.

The Biological River Classification System (Q-Scheme)

In aquatic systems, as levels of pollution increase, invertebrates react to this variable. Taxa are either highly intolerant, moderately tolerant or very tolerant to different levels of pollution and those that

fall into the highly intolerant group *e.g.* many May flies and Stone flies, are never found in even moderately polluted water while highly tolerant taxa include such groups as tubificid oligochaetes, asellids and *Chironomus* sp. By taking a sample of the benthic invertebrates and identifying the biological material even to as high a taxonomic level of family, from these results, it is possible to determine the likely quality of the water in terms of pollution. This is known as the Biological River Quality Classification System or Q value (Q-Scheme) and it has been in use in Ireland since 1971. It has undergone a number of modifications since then and has been included in the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998. It is routinely employed by the EPA. For the purpose of this assessment benthic invertebrates have been divided into five indicator groups according to tolerance of pollution, particularly organic pollution.

In order to determine the biological quality of the river, the Q-scheme index is used whereby the analyst assigns a Biotic Index value (Q-Value) based on macroinvertebrate results. The Biotic Index is a quality measurement for freshwater bodies that range from Q1 – Q5 with Q1 being of poorest quality and Q5 being pristine/unpolluted (see **Table 2**).

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4,	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

Table 2: Biotic Index scoring system for the Q-Scheme (Lucey *et al.*, 1999).

Results

Electrofishing

PODDLE RIVER: Tymon North (**Photo 1**).

The dimension of this study site were *ca* 70m long x 2m wide. Shallow riffle with an average depth of 10-20cm predominated. The substrate comprised mainly gravels and stones with some sand. Both banks were grassed parklands.

The only fish species recorded was the 3-spined stickleback (*Gasterosteus aculeatus* L.) and this species occurred at a very low density with about 10 individuals being encountered.



Photo. 1. PODDLE RIVER: Tymon North.

The dimension of this study site were *ca* 80m long x 2m wide. Shallow glide with an average depth of 30-40cm predominated. The substrate comprised mainly of muds with some stones. Both banks were grassed parklands (**Photo 2**). The water appeared grey in colour indicating some level of pollution in the stream.

The only fish species recorded was the 3-spined stickleback (*Gasterosteus aculeatus* L.) and this species occurred at a very low density with about 5 individuals being encountered.



Photo 2. PODDLE RIVER: Tymon Park.

PODDLE RIVER: Whitehall (**Photo 3**).

The dimensions of the study site were 80m long x 2m wide. Shallow glide with an average depth of 20-40cm predominated. The substrate comprised mainly silt with some stones. Looking downstream, the right bank was grassed parkland while the left bank was high and at one location protected by a coffer dam.

The only fish species recorded was the 3-spined stickleback (*Gasterosteus aculeatus* L.) and this species occurred at a very high density with 100s of individuals being encountered.



Photo. 3. River Poddle: Whitehall.

PODDLE RIVER: Ravensdale Park (Photo 4).

The dimensions of the study sites were 80m long x 2m wide. Shallow riffle with an average depth of 10-20cm predominated. The substrate comprised mainly stones. Looking downstream, the right bank was grassed parkland with several willow trees (*Salix* spp) while the left bank was a concrete wall. Photographs were taken from the left bank (looking downstream), moving in an upstream direction.



Photo. 4. River Poddle: Ravensdale Park.

The only fish species recorded was the 3-spined stickleback (*Gasterosteus aculeatus* L.) and this species occurred at a very low density with about 10 individuals being encountered.

Q value

The faunal returns for all 4 kick samples contained no sensitive taxa such as particular genera of Ephemeroptera (May flies) or Plecoptera (Stone flies). They all contained moderately pollution-tolerant taxa such as leeches, chironomids, asellids and hydrobids. For this reason, they all returned scores of Q3 indicating a moderately polluted water quality status.

Discussion

The reaches of the River Poddle that were surveyed in August 2020 contained fish habitat (stream typically 2m wide with sections of riffle, glide and pool with depths varying from 10cm - 30cm, instream macrophytes *Cladophora* sp and *Potamogeton* sp., stream bed of silt / stones) which under normal circumstances might be expected to support a variety of fish species. However, the stream is located in an urban environment and has varying lengths of over ground and culverted sections.

Everything else being equal, such habitat might be expected to support juvenile brown trout (*Salmo trutta*) and European eel (*Anguilla anguilla*). The absence of these species suggests that there are barriers to fish movement on this river and in the case of brown trout, there is also an absence of suitable holding pools for adult fish. The presence of a single fish species (Three-spined stickleback - *Gasterosteus aculeatus*) confers a Q-value of 1 on the river (fish index). The fact that this assessment is not in agreement with the macroinvertebrate Q-value of 3 supports the view that the water quality is relatively good in some sections but that hydromorphology issues on the river have and continue to impact on the number of fish species present in the river.