

Freshwater Pearl Mussel Survey: River Slaney at Enniscorthy



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1. INTRODUCTION

ECOFACT Environmental Consultants Ltd. was commissioned to undertake a survey for Freshwater Pearl Mussel (*Margaritifera margaritifera*) (FPM) in the stretch of the River Slaney affected by the proposed Enniscorthy Flood Relief Scheme. This survey was completed during July and September 2016 under NPWS Licence No. C038 / 2016.

2. REVIEW OF FRESHWATER PEARL MUSSEL

2.1 Overview of the Freshwater Pearl Mussel in Ireland

There are 96 populations of pearl mussel in the Republic of Ireland, some of which include two or more rivers in close enough proximity to make them one single population (NPWS 2008). A total of 27 populations have been designated within 19 Special Areas of Conservation (SAC) which list *Margaritifera margaritifera* as a qualifying interest. Only one of the 96 populations in the country is considered to be in favourable conservation status, where reproduction and juvenile survival in the remaining populations is not matching adult mortality rates and numbers are declining annually. The conservation status of this species has been evaluated as 'Unfavourable Bad' at a national level (NPWS 2008). The Article 17 report (NPWS, 2013) on the conservation status of all habitats and species listed on the annexes of the Habitats Directive included a map showing the current distribution of Freshwater Pearl Mussel *Margaritifera margaritifera* (see Figure 1).

The gradient in freshwater pearl mussel habitats commonly lies in the interval 0.08–0.3 percent (Skinner *et al.*, 2003). FPMs require stable cobble and gravel substrate with very little fine material below pea-sized gravel (DoEHLG, 2010). Skinner *et al.* (2003) also points out that the majority of adult mussels live in dense beds in substrates of mixed cobble, stone and sand at the tail-end of pools or in the moderate flow channels of river bends. The mussel spends its larval, or glochidial, stage attached to the gills of salmonid fishes. The long-term survival of the freshwater pearl mussel depends ultimately upon host availability. The larvae attach themselves during mid- to late-summer and drop-off the following spring to settle in the riverbed gravel where they grow to adulthood i.e., five years old. This species does not reach reproductive maturity until it reaches between 7 and 15 years old, and may live for over 100 years (NRA, 2009).

The decline of FPM populations in Ireland has mostly occurred from the continuous failure to produce new generations of mussels because of the loss of clean gravel beds, which have become infiltrated by fine sediment and/or over-grown by algae or macrophytes. Filamentous algae can lead to the death of juvenile mussels, through blocking oxygen exchange with the sediment (DoEHLG, 2010).

3.2 Legislation

The Freshwater Pearl Mussel *Margaritifera margaritifera* is listed on Annexes II and V of the EU Habitats Directive (1992). Annex II of the Habitats Directive requires that listed species' habitats are maintained or, where appropriate, restored to favourable conservation status. Under Annex V of the Habitats Directive this species is listed as '*a species of community interests whose taking in the wild and exploitation may be subject to management measures*'. The management of this species must be compatible with the maintenance of favourable conservation status. This species is also listed on Appendix III of the Bern Convention which requires that '*any exploitation of wild fauna specified in Appendix III must be regulated in order to keep the populations out of danger (temporary or local prohibition of exploitation, regulation of transport or sale, etc.)*'. The freshwater pearl mussel is listed as '*Critically Endangered*' in the Republic of Ireland according to the '*Ireland Red List No. 2: Non-Marine Molluscs*' (Byrne *et al.*, 2009).

The transposition of the EU Water Framework Directive (2000) into Irish legislation, as the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) and the more recent European Communities Environmental Objectives (Surface Waters) Regulations (S.I. No. 272 of 2009 as amended in 2012 and 2015) require the achievement of 'good ecological status' in Irish waterbodies. Further measures for the protection of Freshwater pearl mussel are set out in the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations (S.I. 296 of 2009). This legislation sets environmental quality objectives for '*the habitats of the freshwater pearl mussel populations that are within the boundaries of a site notified in a candidate list of European sites, or designated as a Special Area of Conservation, under the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94/1997).*'

The FPM is protected under several tiers of national and international legislation:

- The Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000 (The pearl mussel was given protected faunal species status under The Wildlife Act, 1976 (Protection of Wild Animals) Regulations, 1990, S.I. No. 112, 1990);
- The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) as transposed by the European Communities (Natural Habitats) Regulations, S.I. 94/1997, as amended by S.I. 233/1998 and S.I. 378/2005. The pearl mussel is listed on Annex II and Annex V to the Directive; and
- Bern Convention Appendix 3.

2.3 FPM Status in the Slaney Catchment

In Figure 1 the NPWS (2013) Article 17 report shows the current range and distribution of Freshwater Pearl Mussel in Ireland. This indicates the presence of FPMs in the 10km grid square S94 which covers the stretch of the River Slaney affected by the upper extent of the proposed drainage scheme. The southern extent of the proposed scheme is not within the known range/distribution of FPM; the area covered by the 10km grid square S93. The nearest FPM records in the Slaney River catchment are 2004 records from the lower reaches of the River Bann approximately 6km upstream of Enniscorthy within 1.5km upstream of the Slaney confluence. However, during the Spring 2016 FPM shells and live mussels were found at several locations in the River Slaney, including within the stretch of river affected by the proposed drainage scheme, during aquatic ecology surveys for the proposed Enniscorthy flood protection scheme. In response to this the current formal survey was undertaken.

The River Slaney is designated as a Special Area of Conservation, with FPMs listed as a key conservation interest. The Derreen River is a tributary of the Slaney River is the stronghold for FPM in the Slaney catchment. Figure 2 illustrates FPM records and status in the River Slaney catchment and indicates the Slaney River Valley SAC in the environs of the study area. The Slaney River Valley SAC (000781) consists of the freshwater stretch of the Slaney River from its source to the estuary at Ferrycarrig. It also includes a number of tributaries of the Slaney River such as the Bann, Boro, Glasha, Clody, Derry, Douglas and Carrigower Rivers. The river is tidal from Edermine Bridge downstream of Enniscorthy. The site is designated for its importance to including Freshwater Pearl Mussel (1029). According to the site synopsis for the Slaney River Valley SAC (NPWS, 2015), this is a significant population, especially in the context of eastern Ireland.

A survey of the Derreen River in 1995 estimated the population of Freshwater Pearl Mussel at about 3,000 individuals. According to the draft Derreen Sub-Basin Management Plan (DoEHLG, 2009a), the conservation status of the population of pearl mussel in the Derreen River is very poor. Results from a 2006 study of a small portion of the river indicate that FPM numbers and densities present are generally very low in comparison to other Irish FPM rivers with significant populations. A dramatic

decline in the size of the pearl mussel population present in the Derreen River has occurred since 1995 when Moorkens (1995) estimated that 3,000 mussels were present in a 3km stretch upstream of Hacketstown and noted negative impacts arising from agriculture, pearl fishing, industrial effluent (Hacketstown) and sewage effluent. The majority of these mussels had disappeared when the 2002 survey was completed by an NPWS team, who estimated that the entire 12km stretch they surveyed (which included the 3km stretch investigated by Moorkens [1995]) contained only 520 mussels.

The stretch of the River Slaney in the study area is classified as an area where there were previous FPM records but where the current status is unknown.

3. METHODOLOGY

Surveying for FPM was carried out following the NPWS guidance '*Margaritifera margaritifera Stage 1 and Stage 2 survey guidelines. Irish Wildlife Manuals, No. 12*' (Anon, 2004). The stretch of the River between the upper and lower extent of the proposed Enniscorthy drainage scheme was surveyed by snorkelling, and in some areas using batyhsopes. The aim of this survey was to record all FPM in this lower reach of the River, which included part of the river affected by the tide. The survey was carried out during July and September at a time when water levels in the river were low and when bright conditions prevailed. The survey of the lower stretch of the river was timed to coincide with low tide (mid-day).

The survey involved two surveyors counting all FPM in the subject stretch of the river, where FPM were recorded by a bank manager who noted GPS coordinates and position of FPM instream. The bank-person also ensured that the instream surveyors provided complete coverage of the channel. FPM shell locations were also recorded, removed from the river and intact shells were retained. Standard field survey sheets were completed on site. The locations of other large bivalves (*Anodonta sp.*) were also recorded.

3.1 Limitations of the survey

The survey days were selected to coincide with dry and bright weather conditions at a time when water levels were normal/low. However, there were still limitations with regard to water clarity/visibility especially in the southern end of the study area. The tidal reaches of the River Slaney downstream of the town proved to be difficult to survey due to water clarity and siltation issues. However, this area is not considered to have suitable FPM habitat, both in terms of substrate and tidal influence. In addition to these limitations there were also parts of the riverbed that could not be viewed owing to the degree of the following: algal growth (especially in some slow flowing shallow areas); instream vegetation (in some fast flowing shallow areas) and substrate siltation. Though a best effort was made to identify FPM in these areas, it is possible that some FPM present in these areas were not recorded.

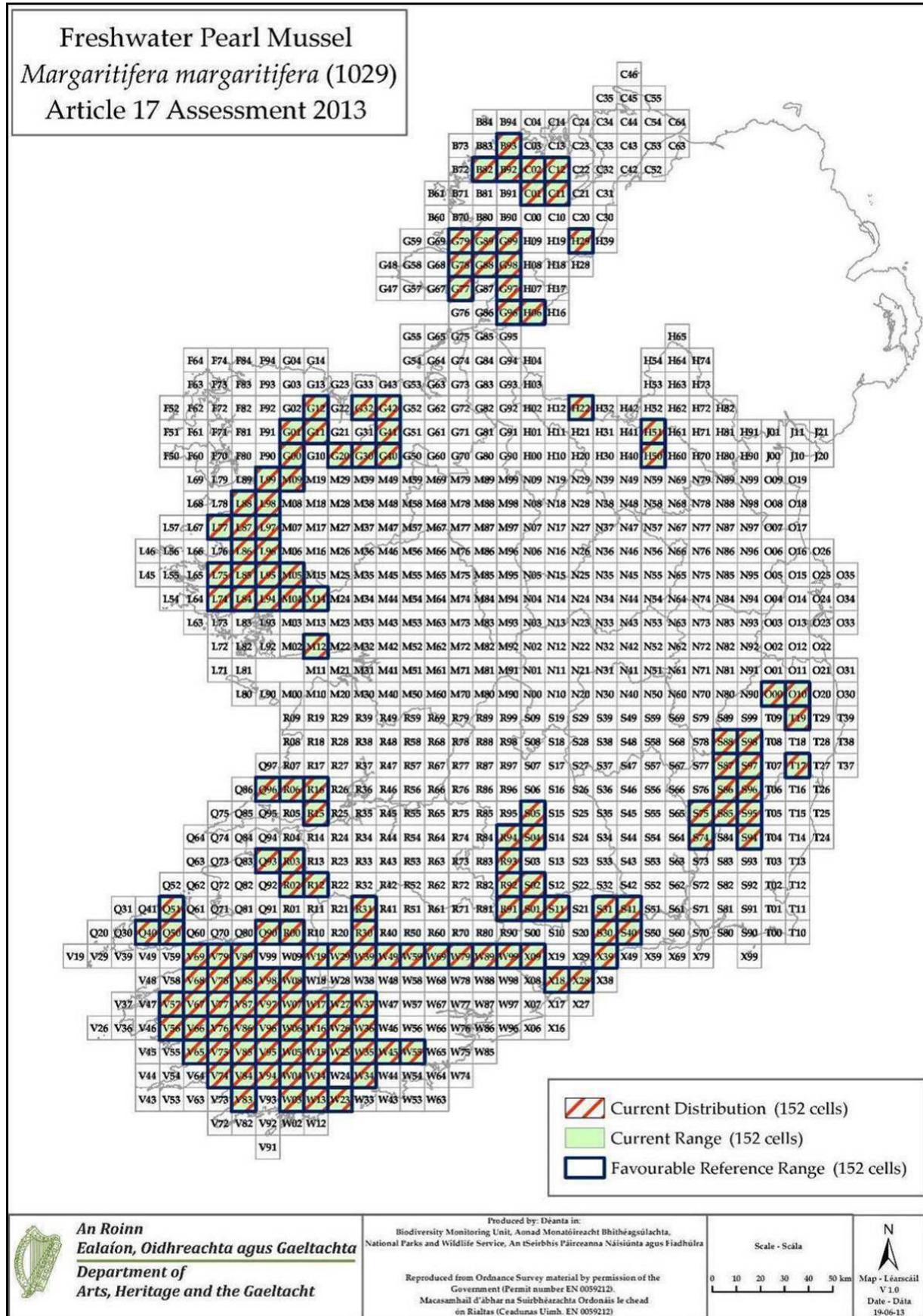


Figure 1 Map taken from the NPWS (2013) Article 17 report showing the current distribution of Freshwater Pearl Mussel *Margaritifera margaritifera*.

4. RESULTS

The results of the FPM survey carried out on the River Slaney at Enniscorthy within the stretch affected by the proposed drainage scheme are illustrated in Figure 3. The locations of live FPM recorded in the surveyed stretch are presented in Table 1. Appendix 1 gives the locations of the FPM as recorded by the banksman on the left bank of the river as well as the instream positions of FPM.

A total of 51 live FPM were recorded in the River Slaney in the surveyed stretch between the upper and lower extent of the surveyed stretch. With the exception of nine individuals, all live FPM were recorded in the uppermost 500m stretch of the river. Within this 500m stretch, the most important area is the short reach between 297531, 140720 (upstream) and 297370, 140633 (downstream) over a distance of 180m. These FPM (n=32) were located between the centre of the channel and the right bank of the river in a substrate of rock/cobble. It is noted that the tidal reaches of the river downstream of the town could not be surveyed effectively. However, it is considered highly unlikely that FPMs are present in this area.

Another large bivalve, *Anodonta* sp. was recorded during the current survey (see Table 2 for locations). Identification of Duck Mussel *A. anatina* was confirmed from a shell removed from the river and examined - this specimen had a shell with thickening near the umbone, a characteristic of the species as in the key for large bivalve molluscs in Ireland by Moorkens (1999). Live *Anodonta* sp. recorded were also considered to be *A. anatina*. *Anodonta* are typically lowland species, being widespread over most of lowland Ireland except the extreme west and north. The habitat in Ireland is lowland lake, slow moving rivers and canals. Microhabitat for this species in Ireland comprises muddy or silty beds in areas of still or slow flow. The IUCN status of *Anodonta* sp. is 'Vulnerable' (Byrne *et al*, 2009) and their threat status is 'Vulnerable' (Moorkens, 2006). It is noted that significant numbers of *Anodonta* sp. mussels do occur in the tidal reaches of the river – even downstream of Edermine Bridge.

The surveyed stretch of the River Slaney was significantly silted and was not considered to be good FPM habitat. This stretch of the river appears to have been subjected to historical river works and the bed material in the river is very unstable. The dominant substrates are gravel and silt/mud which does not provide good FPM habitat. Some of the FPMs recorded were submerged in mud/silt. The stretch of river immediately below the island at the upper end of the scheme provided the best habitat and majority of the mussels recorded were in this stretch. The sizes of the mussels recorded were all large, indicating that these are all old mussels and there was no evidence of recent recruitment. Mussels were found in all depths, ranging from <20cm to >2m depth. Densities of host salmonid fish are relatively low in this stretch of river and no 0+ salmon or trout were seen during the survey or recorded in the electrical fish survey undertaken in July 2016 as part of the ecological assessment of the proposed flood scheme.

A number of spot-checks were also undertaken on the Lower River Slaney at Scarawalsh. FPMs were confirmed to be present at Scarawalsh bridge and also downstream from here at the River Bann confluence. It is noted that dead shells were also found at Clohamon. It is likely that there are significant numbers of FPMs in the Lower River Slaney.

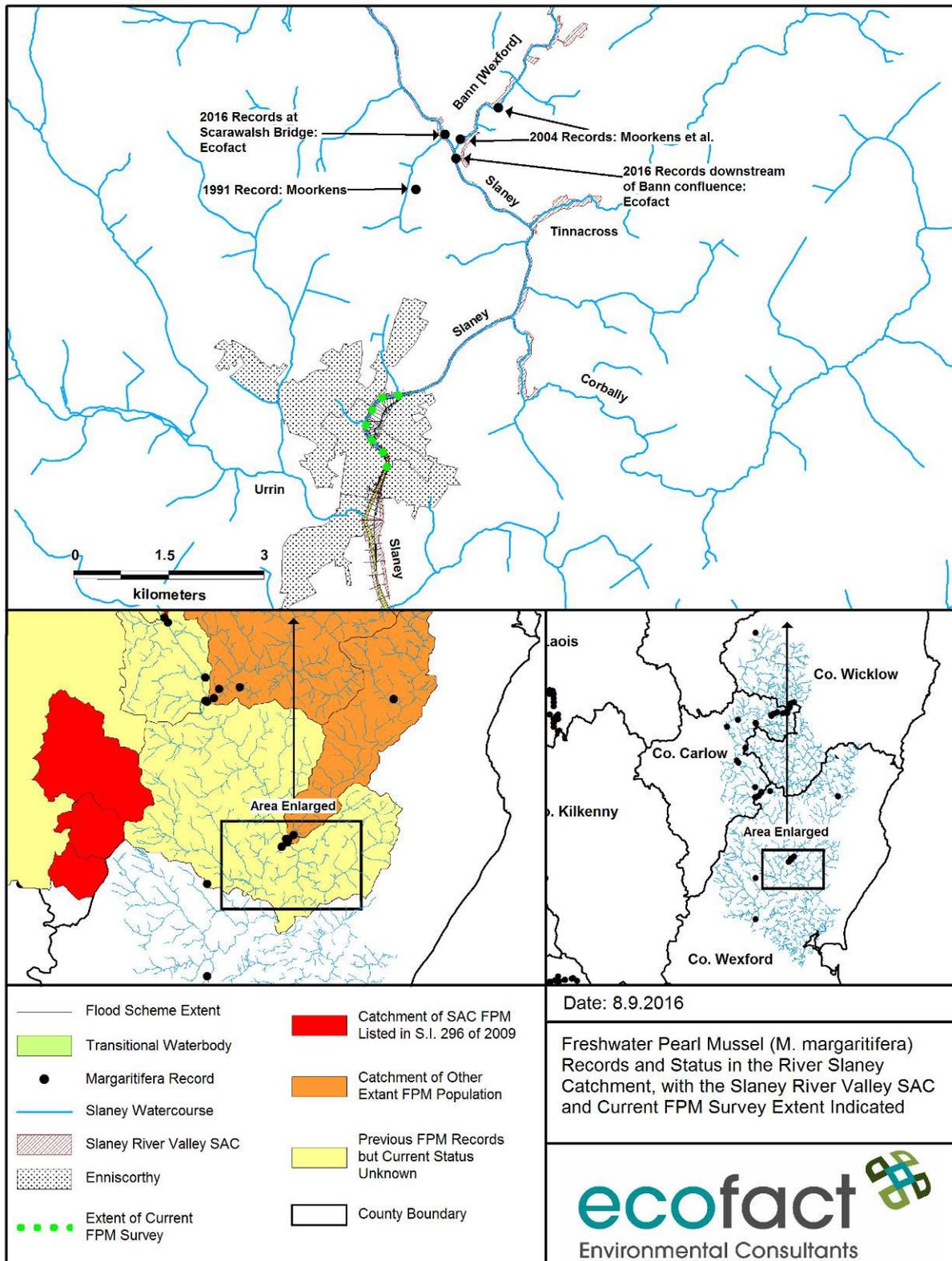


Figure 2 Freshwater Pearl Mussel (*Margaritifera margaritifera*) records and status in the River Slaney catchment with the Slaney River Valley SAC indicated in the environs of the study area.

Table 1 Location of FPM recorded in the surveyed stretch of the River Slaney at Enniscorthy in September 2016.

Irish Grid Co-ordinate		Number of FPM	
X	Y	Live	Shell
29752	14071	1	
29752	14071	3	
29747	13982	1	
29752	13974	1	
29750	14071	1	
29750	14072	1	
29747	14071	1	
29747	14070	2	
29744	14070	1	
29742	14069	1	
29742	14069	1	
29743	14070	1	
29741	14069	1	
29741	14068	1	
29741	14068	1	
29741	14068	2	
29741	14068	1	
29740	14068	1	
29740	14067	1	
29740	14067	1	
29739	14067	1	
29739	14066	1	
29739	14065	1	
29738	14065	1	
29736	14062	1	
29733	14059	1	
29730	14050	1	
29726	14041	1	
29723	14041	1	
29720	14034	1	
29725	14013	2	
29856	14462	1	
29857	14460	1	
29776	14074	1	
29776	14074	1	
29778	14074	1	
29778	14074	1	
29779	14074	1	
29779	14075	1	
29774	14072	1	
29771	14073	1	
29771	14072	1	
29765	14074	1	
29742	14068	1	
29737	14064	2	
29777	14072		1

Table 2 Location of *Anodonta* sp. recorded in the surveyed stretch of the River Slaney at Enniscorthy in September 2016.

Irish Grid Co-ordinate		Number of <i>Anodonta</i> sp.	
X	Y	Live	Shell
29749	13980	1	
29725	14012	1	
29731	14051	1	
29775	14074		1
29778	14072	1	

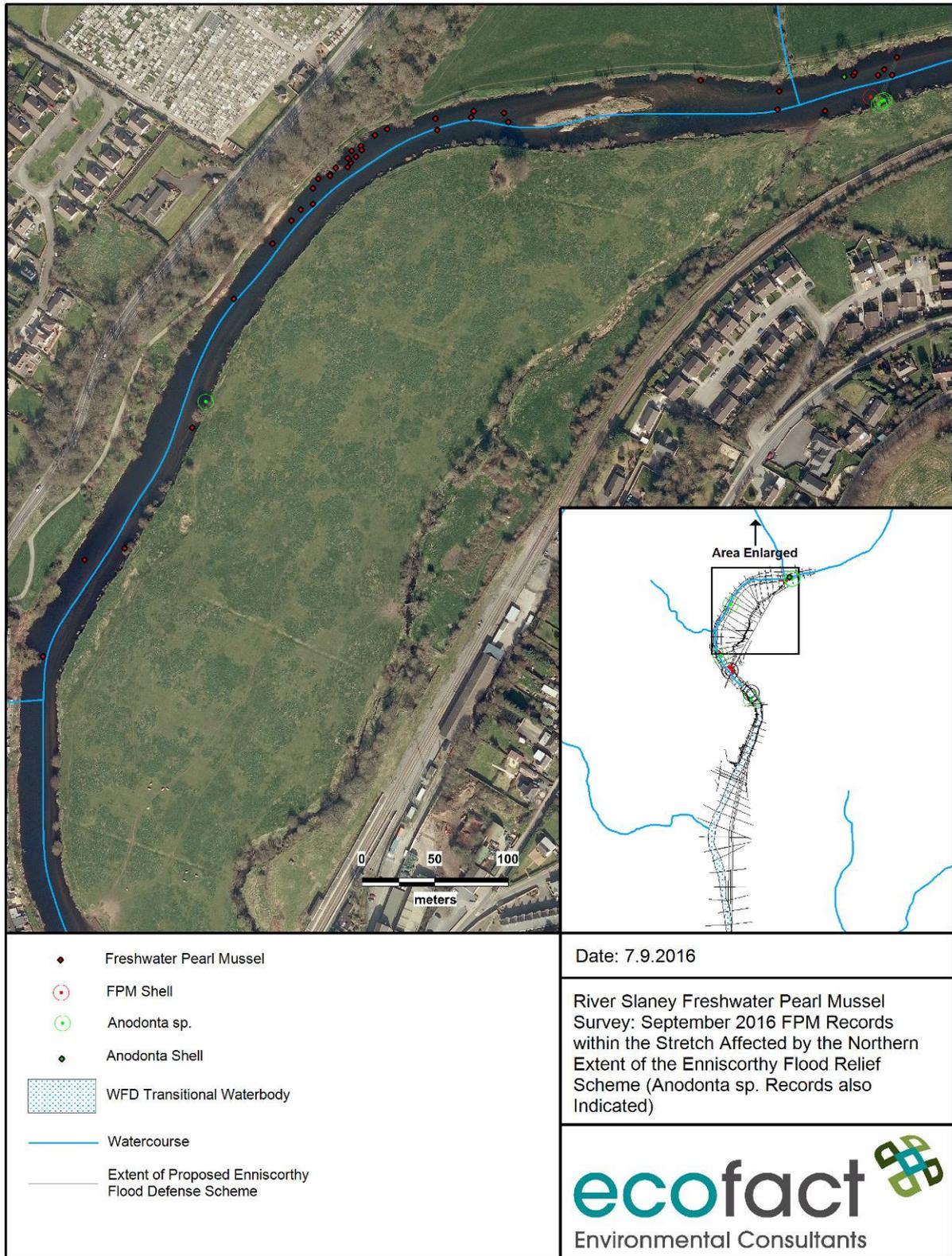


Figure 3a River Slaney FPM Survey: September 2016 FPM records within the stretch affected by the Enniscorthy Flood Relief Scheme with *Anodonta* sp. records also indicated.

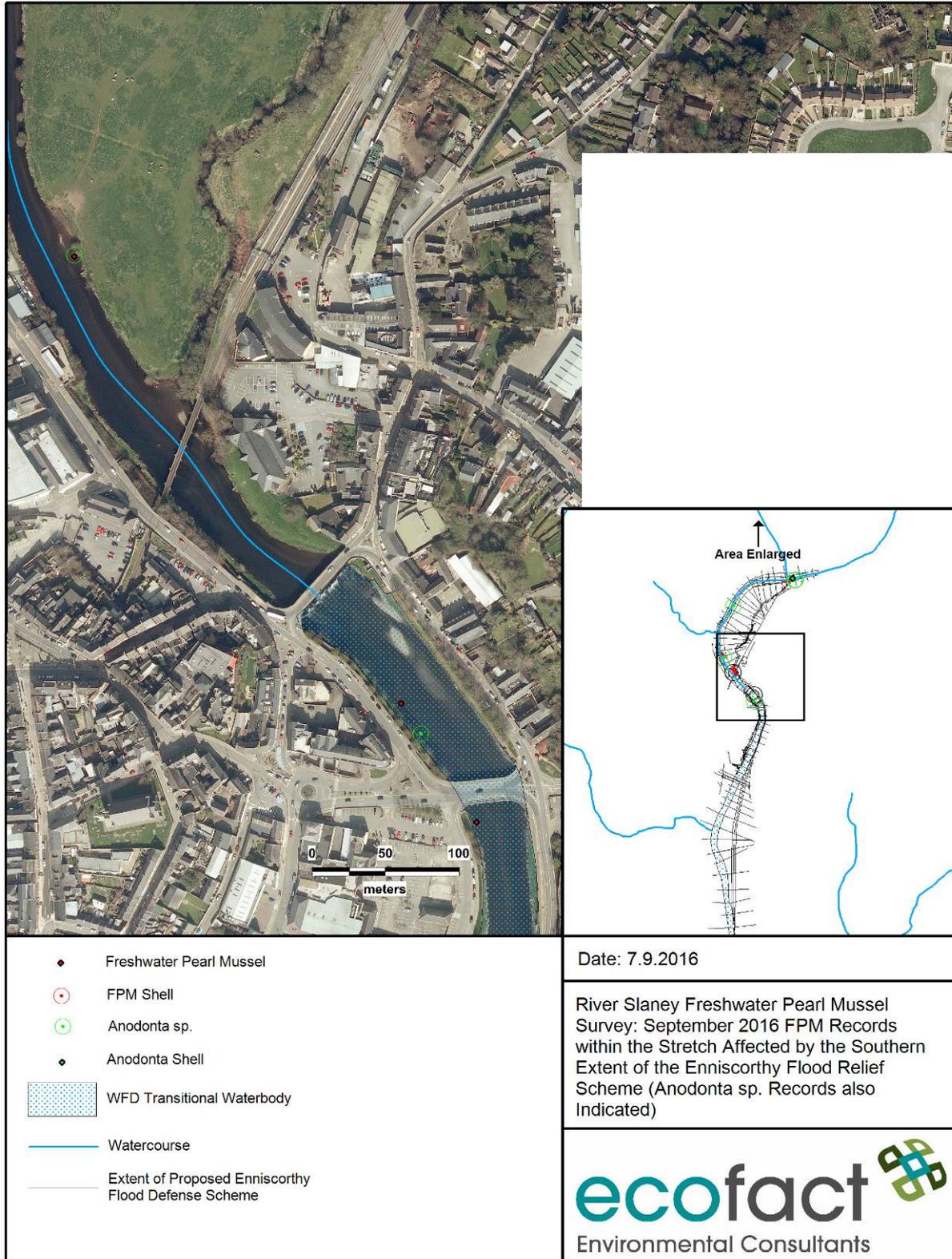


Figure 3b River Slaney FPM Survey: September 2016 FPM records within the stretch affected by the Enniscorthy Flood Relief Scheme with *Anodonta* sp. records also indicated.

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PLATES



Plate 1 Freshwater Pearl Mussel shells found in the River Slaney at Enniscorthy.



Plate 2 Freshwater Pearl Mussel shell recorded in the vicinity of the railway bridge at Enniscorthy.



Plate 3 Adult FPM in the River Slaney at the upper extent of the proposed Enniscorthy Flood Relief Scheme.



Plate 4 FPM near the upper limit of the study area. Detection of FPM can be difficult if not feeding (closed) and substrates have a coat of silt.

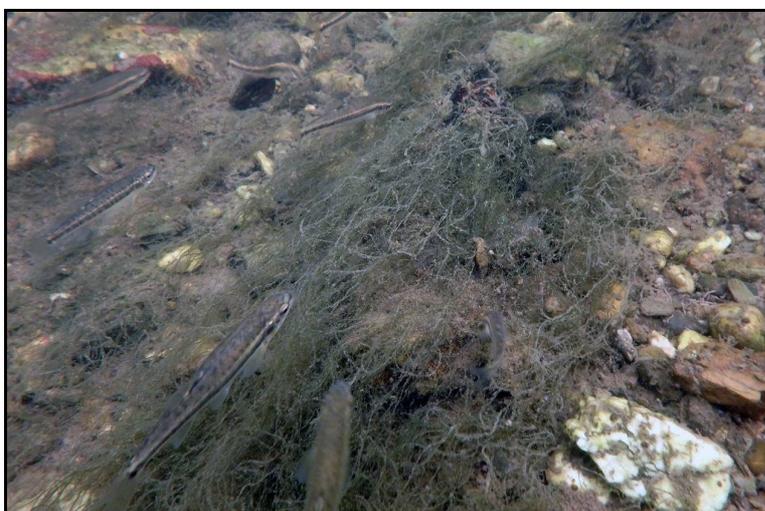


Plate 5 An adult FPM almost concealed by algae within the River Slaney.



Plate 6 An adult FPM almost concealed by algae within the River Slaney.

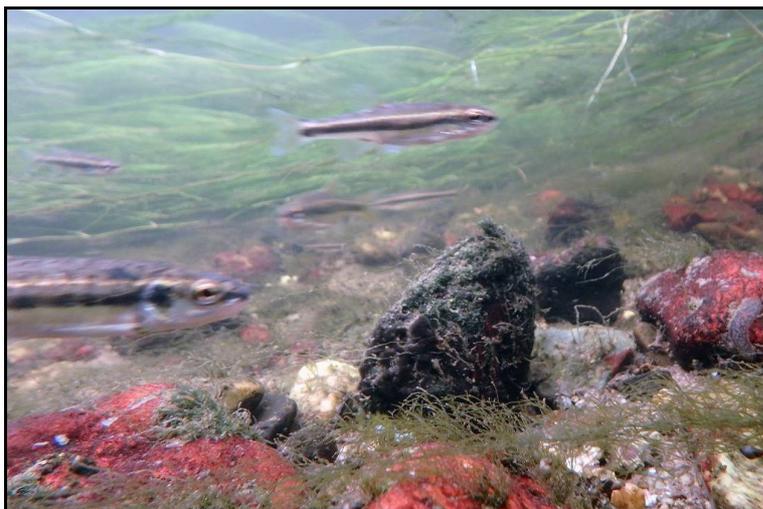


Plate 7 Adult FPM (and minnows) in a shallow riffled part of the River Slaney at the upper extent of the study area.



Plate 8 FPM in cobble/gravel substrate.



Plate 9 Only a single live FPM was recorded in the river within the tidally influenced reach of the River Slaney - within 10m downstream of the lower bridge within the town.



Plate 10 Sub-adult Duck Mussel *Anodonta anatina* in the River Slaney at the upper extent of the Enniscorthy Flood Relief Scheme.



Plate 11 *Anodonta* sp. recorded in the River Slaney between the two bridges in Enniscorthy.



Plate 12 Freshwater Pearl Mussel shell recorded near Scarawalsh Bridge.



Plate 13 Freshwater Pearl Mussel recorded at Scarawalsh Bridge.



Plate 14 Freshwater Pearl Mussel recorded at Scarawalsh Bridge.



Plate 15 Freshwater Pearl Mussel recorded at Clohamon.

APPENDIX 1 Field Records

Table A1.1 Locations of the FPM and *Anodonta* sp. as recorded by the banksman on the left bank of the river and the instream positions of FPM.

Irish Grid Co-ordinate		No. of FPM	Position and notes
X	y		
297766	140722	1	5m LB
297767	140724	1	2m RB beside tyre, 1 <i>Anodonta anatina</i> shell 3m LB
297783	140722		FPM Shell 2m RB, live <i>Anodonta</i> sp.
297786	140725	1	3m RB
297782	140723		<i>Anodonta</i> sp. 1m LB
297787	140726		<i>Anodonta</i> sp. 1m LB
297794	140729	1	Mid channel
297799	140729	1	5m LB
297745	140714	1	5m LB
297715	140711	1	2m RB
297716	140710	1	Mid channel
297715	140711		<i>Anodonta anatina</i> shell, 1m RB
297665	140705	1	1m RB
297525	140697	3	4m RB
297528	140699	1	Mid channel
297501	139808		<i>Anodonta</i> sp. 1.5m RB
297495	139834	1	2m RB
297524	139741	1	3m RB
297503	140708	1	6m RB
297504	140699	1	3m RB
297484	140696	1	7m RB
297482	140695	2	Mid channel
297450	140688	1	3m RB
297429	140688	1	4.5m RB
297432	140679	1	5m RB
297440	140687	1	2.5M RB
297425	140684	2	4m RB, 8m RB
297425	140665	1	8m RB
297424	140667	2	6m RB
297423	140668	1	10m RB
297423	140662	1	8m RB
297415	140663	2	5m RB
297411	140657	1	7m RB
297411	140656	1	10m RB
297405	140653	1	3m RB
297400	140645	1	10m RB
297396	140641	1	4.5m RB
297390	140630	2	3m RB
297377	140616	1	3.5m RB
297361	140576	1	6.5m RB
297322	140518		<i>Anodonta</i> sp. 2M LB
297313	140500	1	3m LB ds alder
297271	140416	1	3m LB
297255	140395	1	7m RB
297230	140342	1	5m RB under edge of willow
297253	140130	2	1 <i>Anodonta</i> sp. also