

APPENDIX G.7

REPORT ON A MARGARITIFERA

MARGARITIFERA (L.) SURVEY OF THE ROUGHTY

RIVER

**Report on a *Margaritifera margaritifera* (L.) survey
of the Roughty River, Co. Kerry,
upstream from Cahergal Bridge.**

Carried out on behalf of:

**ESB Ireland
per BioSphere Environmental Services**

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Summary.

A Stage 2 *Margaritifera margaritifera* (L.) survey was completed on 14.88km of the Roughty River from Cahergal Bridge (Kilgarvan) upstream to the bridge east of Knockanruddig at W 08573 72121 in advance of a proposed wind farm development.

Mussels were found to be widely distributed at relatively low densities along the stretch investigated with abundance decreasing in an upstream direction. A total of 669 mussels was recorded with occasional concentrations occurring in restricted patches of suitable stable substrate.

This survey has extended the known upstream range of *Margaritifera* in the Roughty River by 5.7km to a point approximately 1.27km upstream of Inchee Bridge at W 08699 73508.

Although no juvenile or small mussels were observed in the river sections investigated, the high quality of the habitat, the lack of obvious siltation, the presence of good numbers of salmonids and concentrations of mussels at some points, suggest the possibility that a level of juvenile mussel recruitment might be occurring in the river. It would be prudent to complete a Stage 3 *Margaritifera* survey on the Roughty to ascertain the demographic composition of the population and to assess whether or not juvenile recruitment is, or has recently occurred on the Roughty River.

1. Introduction.

Margaritifera margaritifera, commonly called the freshwater pearl mussel, is one of three species of large Unionacean bivalves found in Irish freshwaters (See Photographs 1 and 2). The species can occur in fast-flowing, oligotrophic, calcium deficient streams and rivers, where it can grow to lengths of 159mm (Jackson 1925) and live to ages well in excess of 100 years (Ross 1984).

Margaritifera has been recorded in most parts of Ireland with the exception of the central limestone plain but several studies have confirmed that a significant decline has occurred in Irish populations, notably in northern and eastern areas (Ross 1988, Moorkens and Costello 1994, Beasley and Roberts 1996).



Photograph 1. A large adult pearl mussel of 155mm.



Photograph 2. A dense concentration of actively filter feeding pearl mussels on a stream substrate

Although very widely distributed across northern Europe, Eurasia and North America, *Margaritifera* has declined throughout its range and is extinct or seriously threatened in many parts of Europe (Wells et al. 1983). The main cause of this decline is deteriorating river habitat quality although a variety of other factors are also implicated (Moorkens 1999). The species is on the IUCN Invertebrate Red Data List and is the species is protected under the Wildlife Acts, 1976 and 2000 and Annex V of the Habitats Directive.

The conservation status of *Margaritifera margaritifera* in Ireland has been determined as bad and declining in the recently published “Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC” (NPWS 2013).

The current survey was undertaken in order to ascertain the size and distribution of the pearl mussel population in the Roughty River upstream of Cahergal Bridge near Kilgarvan, Co. Kerry in advance of a proposed wind farm development project.

Although it was known that a population of *Margaritifera margaritifera* (Photographs 1 and 2) was present in the Roughty river, little data was available on the distribution, size and status of the population particularly upstream of Kilgarvan (Cahergal Bridge). Previous records of the species in the Roughty upstream of Cahergal Bridge include those of Lucey (EPA, pre 1987) who recorded mussels adjacent to Morley's Bridge, and UCC's Aquatic Services Unit (2013) who recorded two mussels in a 300m stretch upstream of Drohidnagower Bridge. The most recent *Margaritifera* survey completed on the Roughty was that by Ecofact in 2013 which covered a stretch downstream of Kilgarvan waste water treatment plant.

2. Methods.

Margaritifera searches were carried out in shallow water by wading while observing the substrate with a bathyscope (Photograph 3), and by snorkelling (Photograph 4) in deeper water. Total counts of mussels were completed in a series of 32 river stretches that comprised the five river sections indicated in Figure 1.

In heavily shaded areas close to the bank, a waterproof diving torch was used to provide additional light if required. Positional and descriptive geo-tagged photographs were taken at each count location with an Olympus TG4 waterproof digital camera. Ten figure grid references were recorded using a hand-held Garmin GPS60C global positioning device at significant locations and where mussel counts were undertaken.

All river field work was conducted in accordance with the weather and visibility guidelines of the Irish Pearl Mussel Standard Methods Survey Techniques (Anon., 2004), under Licence No. C092/2014 issued by the National Parks and Wildlife Service.



Photograph 3. Searching for *Margaritifera* with a bathyscope while wading.



Photograph 4. Searching for *Margaritifera* by snorkelling.

3. Survey Results.

Survey fieldwork was carried out on nine days during the period of August 6th to August 17th, 2015. Weather conditions were good with low water levels and excellent underwater visibility.

Margaritifera searches and counts were completed along 14.88km of the Roughty River from Cahergal Bridge at Kilgarvan upstream to the bridge east of Knockanruddig at W 08573 72121.

3.1. Mussel distribution and density.

Mussels were found to be dispersed along most of the length of river surveyed and were observed from Cahergal Bridge (Kilgarvan) up to a point approximately 1.27km upstream of Inchee Bridge.

Table 1 contains data on the numbers of mussels recorded in the 32 stretches of river that constituted the five river sections investigated (See Figure 1).

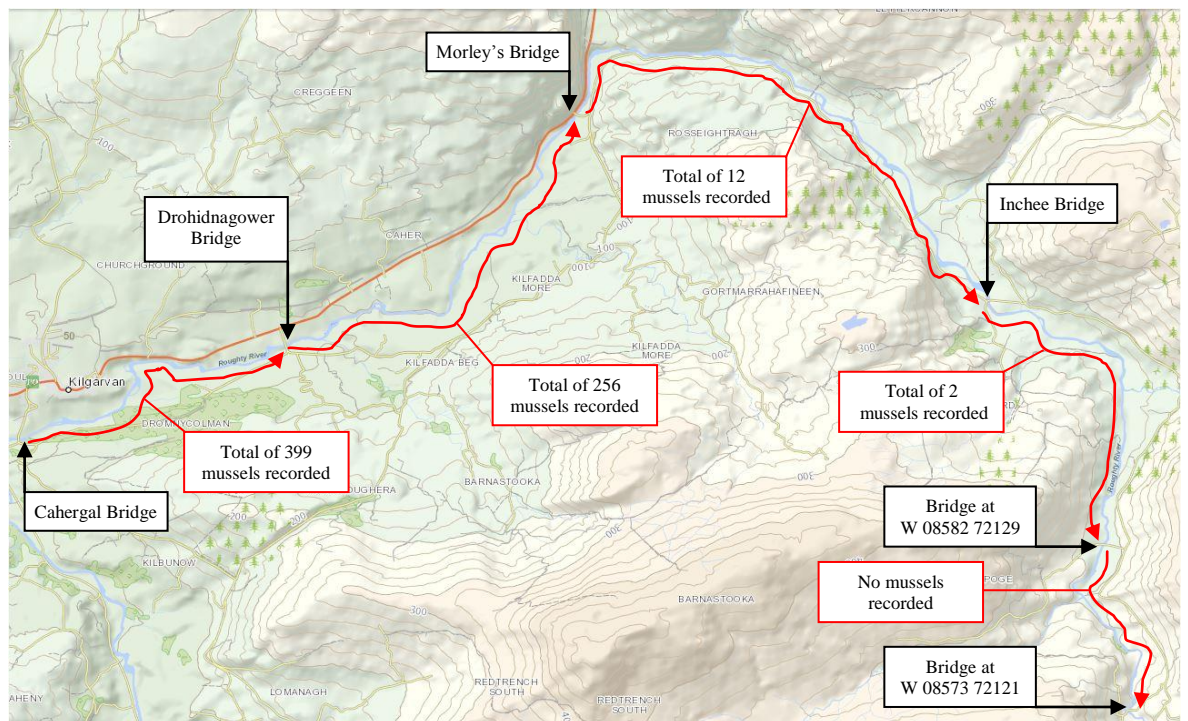


Figure 1. Map showing the five sections of river surveyed on the Roughty and the numbers of *Margaritifera margaritifera* recorded in each of these sections.

A total of 669 mussels was recorded during the survey. Mussels were generally dispersed at relatively low densities, apart from a few locations where significant concentrations of mussels occurred in discrete patches of suitable habitat. Mussels were generally located at the sides of the river channel in relatively shallow water and occasionally along the margins of pools, being generally absent from the deeper central areas of pools.

River Section	Upstream and downstream limits of each river stretch I.N.G.R.	No. of mussels observed	Notes.
Cahergal Bridge upstream to Drohidnagower Bridge	Cahergal Bridge - W 01020 73008	83	Up to upstream end of large island. Mussels located along banks in patches of stable sand and cobble substrate. Substrate in river centre consisted of unstable and mobile gravel/cobble/boulder. No silt plume present.
	W 01020 73008 - W 01070 73008	265	Pool at upstream end of large island. Pool searched by snorkelling and 265 mussels recorded in a 50mx2m strip along the northern bank of the pool in sand/cobble/boulder substrate up to 1.5m deep. Mussels absent from other areas of this pool. Silt absent or minimal in silt plume test.
	W 01070 73008 - W 01466 73199	8	Mostly stretches of mobile gravel/cobble/boulder and exposed bedrock. One dead shell.
	W 01466 73199 - W 01509 73277	3	Up to gravel bank at downstream end of large pool (downstream of Poulcamlan). Japanese knotweed growth on gravel bank.
	W 01509 73277	11	Large pool downstream of Poulcamlan. Pool searched by snorkelling. 11 mussels observed around periphery of pool.
	W 01509 73277 - W 01769 73445	0	Poulcamlan and upstream along straight glide stretch with mobile substrates and exposed bedrock substrate. 0.75-2.0m deep.
	W 01769 73445 - W 02322 73430	29	Mussels distributed mostly along northern bank along this stretch in patches of more stable sand/cobble substrate.
	W 02322 73430 - W 02503 73543	0	Up to downstream end of pool immediately below Drohidnagower Bridge.
	W 02503 73543 - Drohidnagower Bridge	0	No mussels observed in pool immediately downstream of Drohidnagower Bridge.
Drohidnagower Bridge upstream to Morley's Bridge	Drohidnagower Bridge - W 02906 73636	29	Four mussels observed along southern bank in first 30m upstream of Drohidnagower Bridge. A total of 29 mussels recorded, mostly along southern bank between Drohidnagower Bridge and confluence of tributary stream on southern bank at W 02906 73636. Habitat consisted mostly of mobile gravel/cobble/boulder substrate with extensive areas of exposed bedrock. Mussels occurred in small patches of more stable substrate along the banks.
	W 02906 73636 - W 02935 73659	9	Nine mussels observed in a short strip of suitable habitat along southern bank of pool immediately upstream of tributary confluence on southern bank at W 02906 73636. Habitat consisted of stable sand/gravel/cobble/boulder substrate with 50% bryophyte cover.
	W 02935 73659 - W 03016 73737	3	Three mussels in small area of suitable habitat with stable gravel/cobble/boulder substrate with 70% bryophyte cover at Poulgarriff Falls.
	W 03016 73737 - W 03335 73860	40	Two mussels in a small patch of sandy habitat on southern bank downstream of Poullilane, and a further 38 mussels in an area of stable sand/cobble/boulder habitat under the northern bank in a pool at the top of falls at Poullilane.
	W 03335 73860 - W 03624 73808	9	Nine mussels observed along a stretch of glide up to a small falls at W 03624 73808 in habitat with mostly mobile gravel/cobble/boulder and bedrock substrate.
	W 03624 73808 - W 03768 73799	3	Three mussels observed along a straight stretch upstream from small falls at W 03624 73808 up to beginning of large bend at W 03768 73799.
	W 03768 73799	122	122 mussels observed in a restricted area (30mx1.5m) of stable cobble/boulder/sand habitat with 70% bryophyte cover along the southern bank at the start of the river bend 1.3km upstream of Drohidnagower Bridge. Due to the nature of the habitat and the heavy growth of bryophytes this mussel count is conservative and it is likely that many more mussels were present but not visible on the substrate surface.
	W 03768 73799 - W 04236 74433	13	Thirteen mussels recorded along stretch up to upstream end of island at W 04236 74433.
	W 04236 74433 - W 04501 74785	27	From upstream end of island at W 04236 74433 to right-angle bend at W 04501 74785. Stretch of alternating glide-riffle habitat with mobile substrate and bedrock.
	W 04501 74785 - Morley's Bridge	1	Only 1 mussel observed approximately 140m downstream of Morley's bridge. Due to access difficulty, hazardous terrain and poor GPS coverage survey was terminated approximately 130m downstream of Morley's Bridge.
Morley's Bridge upstream to Inchee Bridge	Morley's Bridge - W 04937 75705	2	Due to access difficulty and hazardous terrain, survey activity did not commence until approximately 150m upstream of Morley's Bridge. Visual inspection of the 150m of unsurveyed habitat from Morley's Bridge and R569 road indicated that the habitat was very torrential and unsuitable. Although the habitat was torrential in nature, two mussels were recorded downstream of the large pool directly east of Morley's Bridge School. Although areas of apparently suitable habitat were present in this large pool, no mussels were observed in the pool area.
	W 04937 75705 - W 06482 75419	0	High gradient, torrential stretch of river with predominantly bedrock and boulder substrates which were generally unsuitable for <i>Margaritifera</i> . A limited patch of apparently suitable habitat consisting of bryophyte covered cobbles and boulders was present c.100m downstream of the footbridge (W 06482 75419) at the top of this stretch.
	W 06482 75419 - W 06531 75306	10	Approximately 50m upstream of the footbridge at (W 06482 75419), ten mussels were observed in an area of suitable mussel habitat consisting of bryophyte covered boulder/cobbles/gravel substrate under the northern bank.
	W 06531 75306 - Inchee Bridge	0	No mussels observed in long stretch extending upstream to Inchee Bridge.
Inchee Bridge upstream to bridge at W 08582 72129	Inchee Bridge - W 08008 73829	1	Patches of suitable habitat along banks in riffle-glide stretch with semi-stable cobble/boulder/sand substrates under tree cover. One mussel at W 08008 73829.
	W 08008 73829 - W 08525 73592	0	Mostly stretches of mobile gravel/cobble/boulder and exposed bedrock.
	W 08525 73592 - W 08699 73508	1	One mussel in area of stable boulder/cobble/bedrock/gravel substrate with heavy growth of bryophytes at W 08699 73508. Very difficult access so it is likely that additional mussels are present at this location.
	W 08699 73508 - W 08877 72745	0	Stretch with mobile boulder/cobble/gravel substrates.
	W 08877 72745 - W 08597 72313	0	Extensive bedrock/boulder and series of falls.
	W 08597 72313 - Bridge at W 08582 72129	0	At bridge east of Coolnagoppoge. Series of falls with extensive exposed bedrock and areas of mobile boulder/cobble/gravel substrates.
Bridge at W 08582 72129 upstream to bridge at W 08573 72121	Bridge at 08582 72129 - W 08425 71744	0	Unsuitable habitat.
	W 08425 71744 - W 08802 71153	0	Unsuitable habitat.
	W 08802 71153 - Bridge at W 08750 70910	0	Unsuitable habitat.

Table 1. Results of mussel searches and total mussel counts in 32 river stretches constituting five sections of the Roughty River surveyed during the current investigation.

The largest concentration of mussels recorded was located along the northern bank of a large pool 390m upstream of Cahergal Bridge. A total of 265 mussels was counted in a strip of suitable habitat (50m long and 2m wide) at this location. Another concentration of 122 mussels was recorded in a restricted area of suitable riffle habitat (30m long and 1.5m wide) along the southern bank at a bend in the river 1.3km upstream of Drohidnagower Bridge. Because of the nature of the cobble/boulder substrate at this site, much of which was obscured by a heavy growth of aquatic moss, it is possible that the count there was conservative, and that a significantly larger number of mussels may have been present at this site but was not visible at the substrate surface and consequently remained unrecorded.

All mussels observed appeared to be large adults and no small mussels or juveniles were observed on the substrate surface at any location.

3.2. Habitat characteristics.

Much of the habitat observed was quite torrential in nature with numerous cascades, waterfalls and extensive areas of exposed bedrock. In the less torrential stretches substrates consisted of generally unstable and mobile combinations of boulder, cobble, gravel and some sand.

Habitat quality throughout most of the river stretches investigated appeared to be excellent. Macrophytes were almost completely absent and the predominant instream vegetation consisted of aquatic moss. Growths of filamentous green algae were generally absent or very light, but were more common in the upper stretches, particularly in shallow un-shaded areas between the footbridge at W 06482 75419 and Inchee Bridge. The habitat throughout the stretches examined was notable for the very low levels of siltation, and silt plumes were usually absent or very light if present. Juvenile and small salmonids (<20cm) were common along most of the river stretches investigated.

4. Assessment of survey Results.

The previously known furthest upstream record for *Margaritifera* was at Morley's Bridge. Results of the current survey have extended the known range of the *Margaritifera* population in the Roughty upstream by 5.7km to a point approximately 1.27km upstream of Inchee Bridge at W 08699 73508, and consequently closer to the proposed development. The observed distributional pattern of mussels in the sections of river investigated appears to be determined by the availability of patches of stable substrate suitable for mussels.

The habitat quality observed all along the river sections examined was very high, and since 2004, EPA biological assessment of the three monitoring sites on the Roughty (Ford near Knockanruddig, Inchee Bridge, Ford d/s Slaheny River confluence) has delivered Q Values of 4-5 (High Status),

confirming that habitat conditions in the river are of high quality. The virtual absence of silt plumes throughout the stretches examined is noteworthy and unusual in the context of Irish freshwater pearl mussel rivers, most of which are negatively impacted by siltation and eutrophication, both of which are inimical to the survival of juvenile mussels and effective recruitment (Hastie et al., 2000).

Despite its relatively small size, the Roughty River mussel population is significant because of the torrential nature of the river, its high quality status and clean silt-free substrates. Given the high quality of the habitat, the lack of obvious siltation, the presence of concentrations of mussels at some points, and the presence of good numbers of salmonids, it is possible that a level of juvenile mussel recruitment might be occurring in the river.

Although no small mussels (<60mm) or juveniles (<30mm) were observed on the substrate surface in the river sections examined, it would be prudent to carry out a Stage 3 pearl mussel survey on the Roughty to ascertain the demographic composition of the population and to assess whether or not juvenile recruitment is, or has recently occurred on the Roughty River. If recruitment is occurring in the Roughty River, the population would be regarded as very significant in both a national and international context, and would necessarily be regarded as extremely sensitive in relation to negative impact that might arise from any hydrological change or increased levels of siltation.

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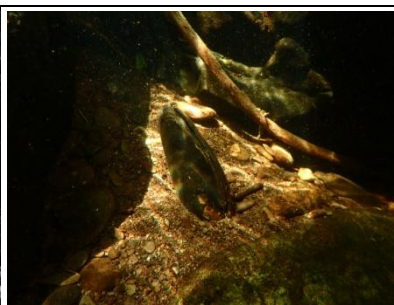
Appendix 1 – Site Photographs.

Cahergal Bridge upstream to Drohidnagower Bridge.		
		
1. Cahergal Bridge at Kilgarvan.	2. View of habitat immediately upstream of Cahergal Bridge.	3. Photograph of mussel in a sand-gravel substrate at Cahergal Bridge.
		
4. View of large pool where dense concentration of mussels was recorded along the northern bank. W 01020 73008 - W 01070 73008	5. View of a group of mussels in a gravel substrate in the large pool south of Kilgarvan at W 01070 73008.	6. View downstream at W 01466 73199. The substrate consisted of areas of exposed bedrock and mobile gravel/cobble/boulder.
		
7. View upstream over large pool, downstream of Poulcamlan at W 01509 73277 where 11 were recorded.	8. View upstream over a long straight glide upstream of Poulcamlan. No mussels were recorded in this stretch.	9. View upstream between W 01769 73445 and W 02322 73430. A total of 29 mussels were recorded in this stretch.
		
10. View upstream over the large pool immediately downstream of Drohidnagower Bridge. No mussels were observed in this pool.	11. View of the extensive gravel bank and main channel draining the large pool immediately downstream of Drohidnagower Bridge.	

Drohidnagower Bridge upstream to Morley's Bridge.



12. View of habitat immediately upstream of Drohidnagower Bridge. Note the predominance of bedrock.



13. View of a mussel in a gravel/boulder substrate immediately upstream of Drohidnagower Bridge. 29 mussels were recorded in the 280m stretch upstream of Drohidnagower Bridge to the stream confluence at W 02906 73636.



14. View of the pool area where 9 mussels were recorded along the southern bank between W 02906 73636 and W 02935 73659, immediately upstream of the stream confluence on the southern bank.



15. View of the rocky nature of the sequence of cascades and falls common along the river section between Drohidnagower and Morley's Bridges.



16. View of Poulgarriff falls where 3 mussels were recorded in a patch of stable sand/cobble/boulder substrate with 70% bryophyte cover.



17. A juvenile salmonid and pearl mussel in close proximity in a patch of suitable substrate at Poulgarriff falls.



18. View of the pool area at the top of falls at Poulilane, where 38 mussels were recorded in an area of suitable habitat.



19. View of small fall at W 03624 73808. 9 mussels were recorded in the stretch upstream from the pool at Poulilane to this location.



20. A concentration of 122 mussels was recorded in a 30m strip along southern bank at river bend at W 03768 73799 in substrate of cobble/boulder/sand with 70% cover of bryophytes.



21. View downstream to top of island at W 04236 74433. 13 mussels recorded in stretch upstream from W 03768 73799.



22. View downstream from river bend at W 04501 74785. 27 mussels recorded in stretch upstream from W 04236 74433.



23. View upstream towards Morley's Bridge from W 04501 74785. River conditions very difficult in this area. 1 mussel recorded circa 150m downstream of Morley's Bridge. Survey activity terminated at this point due to hazardous terrain.

Morley's Bridge upstream to Inchee Bridge.



24. View downstream towards Morley's Bridge from W 04836 75581 where a single mussel was recorded.



25. View of the area of boulder/cobble gravel habitat where a single mussel was recorded at W 04836 75581.



26. View of the mussel recorded at W 04836 75581 positioned in the substrate.



27. View of a second mussel recorded in gravel/cobble/boulder substrate downstream of the large pool east of Morley's Bridge School.



28. View upstream over the large pool at W 04937 75705 east of Morley's Bridge School. Although areas of apparently suitable habitat were present in the pool, no mussels were recorded there.



29. View downstream over the large pool at W 04937 75705. No mussels were recorded in the pool.



30. View upstream along the start of the steep gorge section upstream of the large pool east of Morley's Br. School. No mussels were observed.



31. View of the habitat in the steep gorge section upstream of the large pool east of Morley's Br. School. No mussels were observed.



32. View downstream over a section of the steep gorge upstream of the large pool east of Morley's Br. School. No mussels were observed.



33. One of a series of deep pools along the gorge section upstream of the large pool east of Morley's Br. School. No mussels were observed.



34. View of the habitat typical of the gorge section upstream of the large pool east of Morley's Br. School. No mussels were observed.



35. Searching one of the deep pools along the steep gorge section. No mussels were observed.

		
36. View of the habitat along the gorge section. No mussels were observed.	37. View of the habitat along the gorge section. No mussels were observed.	38. View of the habitat along the gorge section. No mussels were observed.
		
39. View of the habitat approaching the top of the gorge section. No mussels were observed.	40. View upstream from the footbridge at W 06482 75419.	41. View downstream from the footbridge at W 06482 75419.
		
42. View of the area of suitable habitat located along the eastern bank, 50m upstream of the footbridge at W 06482 75419. 10 mussels recorded in a 50m long strip of habitat.	43. View of a mussel in the area of suitable habitat consisting of boulder/cobble/gravel substrate with a heavy growth of bryophytes. 10 mussels recorded in a 50m long strip of habitat.	44. View of a mussel in the area of suitable habitat consisting of boulder/cobble/gravel substrate with a heavy growth of bryophytes. 10 mussels recorded in a 50m long strip of habitat.
		
45. View of habitat downstream of Inchee Bridge. Substrates were generally mobile and unstable. No mussels observed.	46. View of habitat downstream of Inchee Bridge. Substrates were generally mobile and unstable. No mussels observed.	47. Inchee Bridge.

Inchee Bridge upstream to bridge at W 08582 72129.



48. View of habitat upstream of Inchee Bridge. Substrates consisted mainly of mobile and unstable cobble, gravel and boulders.



49. View of habitat upstream of Inchee Bridge. Substrates consisted mainly of mobile and unstable cobble, gravel and boulders.



50. View of mussel in the substrate at W 08008 73829. This mussel was located in a patch of suitable habitat consisting of semi-stable cobble/boulder/sand substrate under a sycamore tree on the eastern



51. View upstream from W 08008 73829 where a single mussel was recorded.



52. View downstream from W 08008 73829 where a single mussel was recorded.



53. View of the location on the eastern bank at W 08008 73829 where a single mussel was recorded.



54. View upstream over habitat at W 08525 73592 where the substrate consisted of mobile and unstable gravel, cobble, boulder and bedrock. No mussels observed.



55. View downstream over habitat at W 08525 73592 where the substrate consisted of mobile and unstable gravel, cobble, boulder and bedrock. No mussels observed.



56. View of the habitat at W 08525 73592 where the substrate consisted of mobile and unstable gravel, cobble, boulder and bedrock. No mussels observed.



57. View upstream at W 08699 73508 where a single mussel was recorded in a patch of suitable habitat between rock benches where the substrate consisted of gravel, cobble and boulder with heavy growths of aquatic moss.






58. View downstream at W 08699 73508 where a single mussel was recorded in a patch of suitable habitat between rock benches where the substrate consisted of gravel, cobble and boulder with heavy growths of aquatic moss.



59. View of the mussel recorded at W 08699 73508 in a patch of suitable substrate between rock benches.

		
60. View upstream at W 08877 72745. Cobble, boulder, gravel substrate was mobile and unstable. No mussels observed.	61. View downstream at W 08877 72745. Cobble, boulder, gravel substrate was mobile and unstable. No mussels observed.	62. View of the stream substrate at W 08877 72745 which was mobile and unstable. No mussels observed.
		
63. View upstream over stretch of falls and bedrock substrate at W 08615 72594. No mussels observed.	64. View of the bedrock substrate in the stretch of falls at W 08615 72594. No mussels observed.	65. View downstream over stretch of falls and bedrock substrate at W 08615 72594. No mussels observed.
		
66. View upstream from W 08597 72313. Substrate mostly bedrock. No mussels observed.	67. View downstream from W 08597 72313. Substrate mostly bedrock. No mussels observed.	68. View of habitat and bedrock substrate at W 08597 72313. No mussels observed.
		
69. View downstream from the bridge at W 08582 72129. No mussels observed.	70. View of the very mobile and unstable cobble and boulder substrate at the bridge at W 08582 72129.	71. View upstream to the bridge at W 08582 72129. No mussels observed.

From bridge at W 08582 72129 upstream to bridge at W 08750 70910.

		
72. View of habitat upstream of bridge at W 08582 72129.	73. View of habitat upstream of bridge at W 08582 72129.	74. View of habitat upstream of bridge at W 08582 72129.
		
75. View of the predominantly bedrock habitat between W 08582 72129 and W 08425 71744. No mussels observed.	76. View upstream over the habitat at W 08425 71744. The point of confluence with a stream flowing in from the western bank is visible in the background. No mussels observed.	77. View downstream over the habitat at W 08425 71744. The substrate at this location consisted of very mobile and unstable gravel, cobble and boulder. No mussels observed.
		
78. Specimen of hawkweed (<i>Hieracium</i> sp.) present at W 08802 71153.	79. View downstream over habitat from W 08802 71153. No mussels observed.	80. View upstream over habitat from W 08802 71153. No mussels observed.
		
81. View downstream from bridge at W 08750 70910. Habitat unsuitable and no mussels observed.	82. View of the bedrock and mobile cobble/boulder substrate at the bridge at W 08750 70910. No mussels observed.	83. View upstream to the bridge at W 08750 70910. No mussels observed.