Rapid Assessment of *Margaritifera margaritifera* (L.) populations in Ireland: Rivers assessed in 2008.

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1. **Introduction.**

The freshwater pearl mussel, *Margaritifera margaritifera* (L.) is one of three species of large Unionacean bivalves found in Irish freshwaters. The species may 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 some Irish populations, notably in northern and eastern areas (Ross 1988, Moorkens and Costello 1994, Beasley and Roberts 1996). Such declining populations are usually characterised by a predominance of older mussels and an absence of juvenile recruitment (Bauer 1983).

Although previously very widely distributed across northern Europe, Eurasia and North America, *Margaritifera* is declining 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 water quality although a variety of other factors are also implicated (Moorkens 1999).

Both *Margaritifera margaritifera* and *Margaritifera durrovensis* are listed on Annex II and Annex V of the Habitats and Species Directive (92/43/EEC), under the modified list published in 1997 (97/62/EEC). *Margaritifera* is protected under Irish Law by the Wildlife Act 1976 and Wildlife (Amendment) Act 2000 (added to fifth schedule under Statutory Instrument No. 112, 1990). The species are also listed as “Protected fauna species” under Appendix III of the Bern Convention (Council of Europe’s Convention on the Conservation of European Wildlife and Natural Habitats, 1979). *Margaritifera margaritifera* is listed on the most recent International Union for Conservation of Nature and Natural Resources (IUCN) Red Data List as "Endangered", while *Margaritifera durrovensis* is listed as “ Critically endangered” (IUCN, 1996).

Ireland contains some of the largest populations of the species remaining in European freshwaters, and currently has stretches of 19 SACs designated for *Margaritifera,* covering 27 sub-basins. Habitats Directive monitoring of *M. margaritifera* populations was initiated by the National Parks and Wildlife Service, and is being used to assess the conservation status of *Margaritifera* populations in individual rivers and nationally.

The 2007 assessment of *Margaritifera margaritifera*, completed for the purposes of Habitats Directive reporting, concluded that the species is in unfavourable – bad conservation status in Ireland. This was based on an examination of the species’ range, population, habitat and future prospects. The viability of a *Margaritifera margaritifera* population was determined by examining eight population structure attributes, such as the percentage of the population < 30 mm in length, mussel density and the numbers of dead shells. Eight habitat attributes, such as the concentration of phosphate in the water and the presence of filamentous algae and macrophytes, were used to assess the status of the species’ habitat in Ireland. The specific conservation status of all known mussel populations could not be fully assessed, however, because of the absence of certain data, particularly mussel population structure attributes for less well studied Irish *Margaritifera* populations.

The aim of this project was to expand the National Parks and Wildlife Service monitoring programme for *Margaritifera margaritifera* in Irish rivers, through rapid assessment of the

conservation status of less well studied populations, and to inform the further development of a species action plan for *Margaritifera margaritifera*.

Field work was initiated during the summer of 2007 and has continued during the summer of 2008. Although the final number of populations assessed will depend upon specific conditions such as weather, flows, population sizes etc, it was intended to assess the conservation status of approximately 40 mussel populations during the course of the project. Principal Investigators are Dr. Evelyn Moorkens and Dr. Eugene Ross, and Dr. Áine O Connor is the Project Co-ordinator.

2. **Methods.**

Rivers known to contain populations of *Margaritifera*, but for which there was insufficient distributional or demographic data, were selected for rapid assessment. A series of sites on each of these rivers was then investigated to determine if *Margaritifera* was present. At every site investigated various parameters relating to Mussel Quality, Substrate Quality, and adjacent Land Use were assessed, and results were compiled in a Rapid Assessment Data Sheet completed for each river (Table 1).

Categories:						
Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence (of mussels)	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Table 1. Categories used to describe mussel quality, substrate quality, and land use attributes at the sites investigated during the current Rapid Assessment exercise.

Methods were adapted from those used in National Parks and Wildlife Service monitoring projects 2004-2006 (Moorkens, 2004 a; 2005 a to d; 2006 a to c; Ross, 2004 a & b; 2005 a & b; 2006 a to e). Mussel searches were normally carried out in an upstream direction using a viewing device while wading in shallow water and snorkelling in deeper waters. All river field work was carried out in accordance with the weather and visibility guidelines of the Irish Pearl Mussel standard methods survey techniques (Anon., 2004).

Using a hand-held Garmin GPS60C global positioning device, ten figure grid references were recorded at the upstream and downstream limits of each stretch investigated. Positional and descriptive photographs were taken at each site investigated.

If mussels were present, a brief assessment was made of the distribution and abundance of *Margaritifera* in the vicinity of each sampling site using the categories included in Table 1. Where sufficient mussel densities occurred, samples of mussels were carefully removed from the substrate, measured to the nearest 0.1mm using a Vernier calliper, and immediately returned to their original position in the substrate. Quadrat searches for juvenile mussels were only undertaken if significant numbers of mussels were present and the substrate habitat appeared to be suitable and in good condition. Population demographics and juvenile searches followed the methods outlined in the National Parks and Wildlife Service monitoring reports cited above.

A brief assessment of the habitat conditions, as well as mussel distribution, abundance, demography, and the conservation status of the mussel population present was completed for every river investigated.

3. Results.

3.1. Rivers Assessed in 2008.

Nine river systems, including a total of fourteen river channels, were investigated in counties Limerick, Kerry and Cork during the 2008 phase of the Rapid Assessment Exercise. Some of these were large systems consisting of several principal channels, while others were smaller, with a single significant main channel.

Three distinct individually named channels were assessed in the Feale system (Limerick, Kerry), two in the Maine system (Kerry), two in the Sneem system (Kerry), and two in the Adrigole system (Cork). A further five individually distinct rivers (two in Kerry, and three in Cork) were also assessed. Results of these assessments are summarised in Tables 2 and Table 3 below. *Margaritifera* was found to be present at 46 (52.3%) of the 88 sites/river stretches investigated.

Rivers investigated are listed in Table 2, along with details of the furthest upstream and downstream locations at which mussels were recorded, the numbers of sites investigated, the numbers of sites at which mussels were recorded, and whether or not juveniles were observed. A rapid assessment of the conservation status of the *Margaritifera* population in each river has also been included in Table 2.

River system	River name	Furthest upstream record 2008	Furthest downstream record 2008	Number of locations assessed	Number of locations where mussels occurred	Number of locations juveniles were recorded	Population Status
Feale	**Feale**	R 09624 23154	R 09661 23073	6	1	0	**Unfavourable**
Feale	**Galey**	None found	None found	6	0	0	**None found**
Feale	**Smearlagh**	None found	None found	4	0	0	**None found**
Maine	**Maine**	Q92991 06147	Q92991 06147	7	1	0	**Unfavourable**
Maine	**Brown Flesk**	Q 99792 03730	Q 92959 06131	8	4	0	**Unfavourable**
Owenascaul	**Owenascaul**	Q 58812 04863	Q 59244 01917	5	3	0	**Unfavourable**
Owreagh	**Owreagh**	V 66298 66666	V 68519 66280	9	7	0	**Unfavourable**
Sneem	**Ardsheelhane**	V 71000 69859	V 69026 67535	6	5	0	**Unfavourable**
Sneem	**Sneem**	V 67287 68709	V 69097 66847	10	9	0	**Unfavourable**
Reen	**Reen**	V 79551 49487	V 79712 49605	5	1	0	**Unfavourable**
Adrigole	**Adrigole**	V 83248 52675	V 81226 50625	7	6	0	**Uncertain**
Adrigole	**Clashduff**	V 81603 51690	V 81603 51690	2	1	0	**Unfavourable**
Trafrask	**Trafrask**	V 86570 50453	V 85421 49895	7	3	0	**Uncertain**
Leamawaddra	**Leamawaddra**	W 02014 38026	W 02171 34299	6	5	0	**Unfavourable**

Table 2. The distributional limits, incidence of adult and juvenile mussels, and estimated conservation status of *Margaritifera margaritifera* populations in the fourteen river channels investigated during the 2008 phase of the Rapid Assessment Exercise.

No juvenile mussels were found in any of the rivers investigated. However, both the Adrigole and Trafrask Rivers have been categorised as having uncertain conservation status. These very small systems were found to contain relatively large populations of *Margaritifera* and habitat conditions were generally good. Although some small mussels were found in the Sneem and Ardsheelhane Rivers, habitat conditions there were not ideal, and along with the remaining rivers investigated, they have been categorised as having unfavourable conservation status.

Data relating to the substrate suitability and habitat quality, together with various descriptors relating to abundance and demography of the mussel populations present in the various rivers, were also recorded, and are summarised in Table 3.

River system	River name	Number of locations investigated	Number of locations where mussels occurred	Substrate quality Number of locations with:						Mussel Quality Number of locations with:					Population Status
				Macrophytes	Filamentous algae	Siltation	Clean but unsuitable	Patches of suitable habitat	Extensive suitable habitat	No evidence of mussels	Scattered adults	Good numbers of adults	Adults and some juveniles	Excellent age profile	
Feale	Feale	6	1		2	3	4	2		5		1			Unfavourable
Feale	Galey	6	0	1	6	6		3		6					None found
Feale	Smearlagh	4	0		1	1	3	1		4					None found
Maine	Maine	7	1	4	5	5	2		1	6	1				Unfavourable
Maine	Brown Flesk	8	4	1	4	7	1	1	4	4	4				Unfavourable
Owenascaul	Owenascaul	5	3	1	1	2	2	2	2	2	2	1			Unfavourable
Owreagh	Owreagh	9	7				2	3	4	2	5	2			Unfavourable
Sneem	Ardsheelhane	6	5	1	4		2	1	3	1	3	2			Unfavourable
Sneem	Sneem	10	9	2	4		1	4	5	1	5	5			Unfavourable
Reen	Reen	5	1	0	5	1		3		4	1				Unfavourable
Adrigole	Adrigole	7	6	2	6		1	2	3	1	3	4			Uncertain
Adrigole	Clashduff	2	1		1		1	1		1	1				Unfavourable
Trafrask	Trafrask	7	3	1	2		2	3	2	4		3			Uncertain
Leamawaddra	Leamawaddra	6	5	5	3		1	2	3	1	3	2			Unfavourable
Totals		88	46	18	44	25	22	28	27	42	28	20	0	0	

Table 3. Summary of data relating to the substrate suitability and habitat quality, together with descriptors relating to abundance and demography of the mussel populations present in the fourteen river channels investigated during the 2008 phase of the Rapid Assessment Exercise.

The results of individual site/stretch investigations, together with descriptive and positional photographs, are presented below in the form of Rapid Assessment Data Forms completed for 13 of the rivers investigated. Comments on mussel distribution and abundance, together with assessments of population demography, habitat conditions and conservation status are also included at the end of each Rapid Assessment Data Form.

3.2. Feale River, Co. Limerick and Co. Kerry.

River: Feale River.	**Catchment:** Feale system.
Number of sites: 6.	**Start/ End GPS:** From R 15939 18414 (above Mountcollins Bridge) downstream to Duagh Bridge.
Date: June 10th, 11th, 2008.	**Weather:** 10th fine, sunny. 11th overcast, cloudy.
Surveyors	E. Ross, T. Clark.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	From Mountcollins Bridge (R 15765 18728) upstream to R 15939 18414. Total length of stretch searched 390m.	1 No evidence of mussels.	4 Clean with patches of suitable habitat away from bedrock (30%). Light growth of filamentous algae.	1(S), 3 Silage production on both banks, cattle grazing with access into river. Access developed for angling club.
2	Clydagh River (Feale R.). Stretch (c.450m) from the Feale confluence (R 13492 20297) upstream to Clydagh Bridge (R 13721 20014) searched.	1 No evidence of mussels.	2, 3, 4 Mostly unsuitable habitat. Siltation with light growth of filamentous algae.	1(S), 3 Silage production and cattle grazing.
3	Feale River. From R 13764 20197 downstream to the confluence of the Feale River (RHS, R 13492 20297) and Clydagh River (LHS). Stretch of c.300m searched.	1 No evidence of mussels.	4 Mostly unsuitable habitat due to unstable, mobile cobble/gravel substrate with some exposed bedrock.	1(S), 3 Silage production and cattle grazing.
4	Feale River. Immediately upstream of Wellesley Bridge (R 09661 23073) for c.100m.	4 Good numbers of mussels. (Restricted to patch along eastern bank).	3, 5 Patches of suitable habitat but heavy siltation in slow flowing areas along banks.	1(S), 3 Silage production and cattle grazing.
5	Feale River. Abbeyfeale. Stretch c.100m in length upstream from Sewage Treatment Plant (R 11167 27269) to R 11251 27238.	1 No evidence of mussels.	5 Patches of suitable habitat, but mostly unstable substrate.	1(O), 3 Mart and Sewage Treatment plant on northern bank, pasture on southern bank.
6	Feale River. Stretch of	1	2, 3, 4	1(S), 3

	c.250m upstream from Duagh Bridge to R 07291 30483.	No evidence of mussels.	Habitat unsuitable due to unstable and mobile substrate. Light covering of filamentous algae and siltation present.	Silage production and cattle grazing.

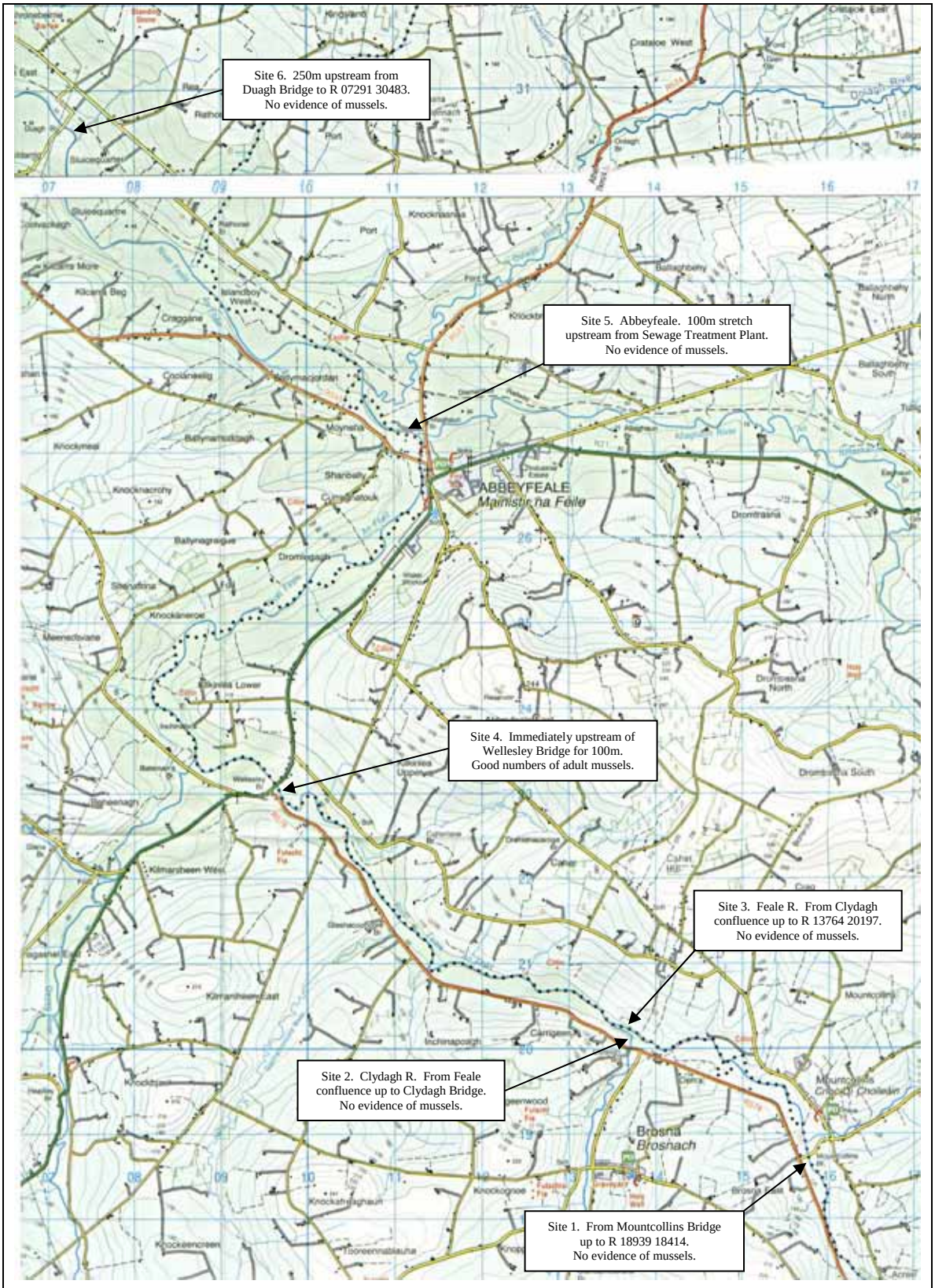
Site 1. Feale River. From Mountcollins Bridge (R15765 18728) upstream to R 15939 18414. Total length of stretch searched 390m. Clean with patches of suitable habitat away from bedrock along banks. No evidence of mussels.

Site 1. Feale River. From Mountcollins Bridge (R15765 18728) upstream to R 15939 18414. Total length of stretch searched 390m. Patches of suitable habitat away from bedrock along banks. View of livestock access to river. No evidence of mussels.

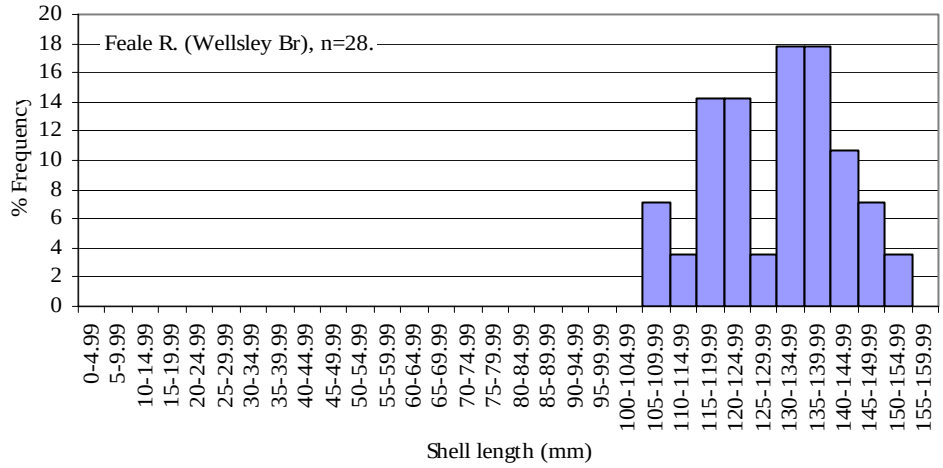
Site 2. Clydagh River (Feale R.). View downstream from Clydagh Bridge. Stretch (c.450m) from the Feale confluence (R 13492 20297) upstream to Clydagh Bridge (R 13721 20014) searched. Mostly unsuitable habitat.
No evidence of mussels.

Site 2. Clydagh River (Feale R.). View upstream from Clydagh Bridge. Stretch (c.450m) from the Feale confluence (R 13492 20297) upstream to Clydagh Bridge (R 13721 20014) searched. Mostly unsuitable habitat.
No evidence of mussels.

Site 3. Feale River. View upstream towards the confluence of the Feale River (RHS, R 13492 20297) and Clydagh River (LHS). Mostly unsuitable habitat due to unstable, mobile cobble/gravel substrate with some exposed bedrock. No evidence of mussels.	Site 3. Feale River. View downstream towards the confluence of the Feale River (RHS, R 13492 20297) and Clydagh River (LHS). Mostly unsuitable habitat due to unstable, mobile cobble/gravel substrate with some exposed bedrock. No evidence of mussels.
	
Site 4. Feale River. Immediately upstream of Wellesley Bridge (R 09661 23073) for c.100m. Good numbers of mussels but restricted to sandy patch along eastern bank. Heavy siltation in slow flowing areas.	Site 4. Feale River. View of mussels in substrate immediately upstream of Wellesley Bridge. Note the heavy siltation covering sandy substrate under bank.
	
Site 5. Feale River. Abbeyfeale. Stretch c.100m in length upstream from Sewage Treatment Plant (R 11167 27269) to R 11251 27238. Patches of suitable habitat. No evidence of mussels observed.	Site 5. Feale River. Abbeyfeale. Stretch c.100m in length upstream from Sewage Treatment Plant (R 11167 27269) to R 11251 27238. Patches of suitable habitat, but no evidence of mussels observed.
	
Site 6. Feale River. Stretch of c.250m upstream from Duagh Bridge to R 07291 30483. Habitat unsuitable due to unstable mobile substrate. Light covering of filamentous algae and siltation present. No evidence of mussels.	Site 6. Feale River. View downstream towards Duagh Bridge to R 07291 30483. Habitat unsuitable due to unstable mobile substrate. Light covering of filamentous algae and siltation present. No evidence of mussels.



Locations and results of *Margaritifera* search sites on the Feale River (Co. Kerry).



Overall Comment on river

***Margaritifera* presence/absence:** Mussels were present in the Feale River.

Abundance: The population of mussels in the Feale river is likely to be small. Although good numbers of mussels were recorded at Site 4 (Wellesley Bridge), the densities observed were relatively low, not exceeding a range of approximately 1-5m^{-2} in the restricted area where they were recorded during the current study.

Distribution in river: *Margaritifera* has not been recorded at any new locations in the Feale River during the current study. The habitat at the locations searched during the current study was found to be mostly unsuitable, with only patches of physically suitable habitat at five of the six sites investigated.

The presence of mussels at Wellesley Bridge (Site 4) had previously been recorded (Lucey pre 1987, Moorkens 1990). In a 2005 survey of a 750m stretch immediately downstream of Wellesley Bridge (Ross 2005), a total of 34 mussels was recorded in restricted patches of suitable habitat, and a further 33 mussels were recorded in a restricted patch immediately upstream of Wellesley Bridge. During the current study, only 28 mussels were found in the same patch upstream of the bridge, however it is not known if this decrease is due to mortality or to the different survey methods used (snorkelling in 2005, wading in 2008).

The presence of mussels in these restricted patches of suitable habitat suggests that mussels may also be present in other parts of the river not investigated during the current study, where substrate conditions are more suitable.

Demography of population: No juveniles or small mussels were observed. All mussels observed were large adults ranging in size from 106.1mm to 153.9mm (slightly over 6 inches).

Habitat conditions: All six sites investigated were either unsuitable or had only restricted patches of suitable habitat. Substrates were generally unstable and/or mobile. Siltation was noted at three sites and growth of filamentous algae at two sites.

Although recent EPA analysis (2005) of biological quality categorises the Feale as satisfactory, not one monitoring site on the river achieved a Q Value above 4 during 2005. These conditions are not adequate for the conservation of a viable *Margaritifera* population. EPA assessment also indicates that most of the main channel of the Feale is at risk of not achieving good status by 2015.

Conservation status in river: Unfavourable.

3.3. Galey River (Feale System), Co. Kerry.

River: Galey River	**Catchment**: Feale system.
Number of sites: 6	**Start/ End GPS:** Upstream of Athea at R 12989 34983, to Galey Bridge at R 06840 37065.
Date: June 10th, 11th, 2008.	**Weather:** Fine, sunny.
Surveyors	E. Ross, T. Clark.

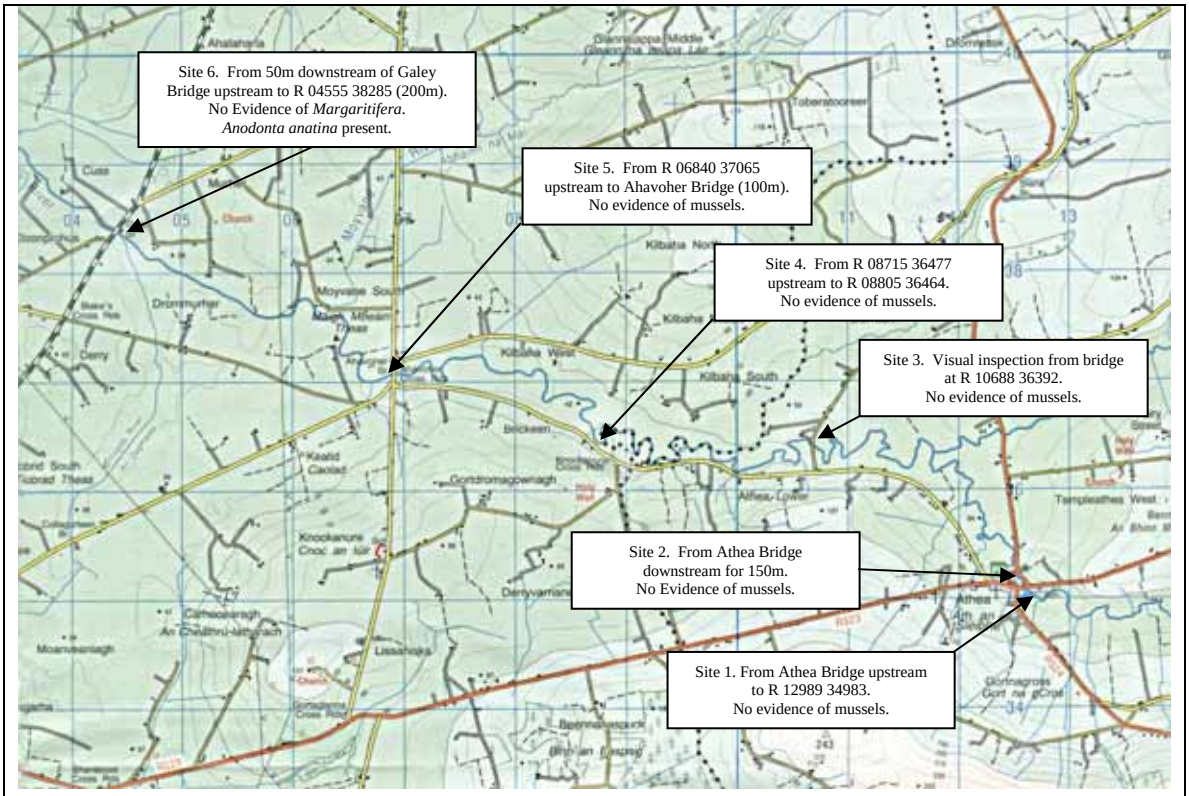
Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	From Athea Bridge upstream for c.600m to R 12989 34983.	1 No evidence of mussels.	2, 3 Heavy growth of filamentous algae (100% in unshaded areas), Habitat not suitable due to heavy siltation and mobile substrates.	1U, 3 Urban (village), with managed grazing (cattle) in large fields upstream. Cattle access facilitated directly into river. Giant hogweed present on bank.
2	From Athea Bridge downstream for c.150m.	1 No evidence of mussels.	2, 3 Filamentous algae in unshaded areas, heavy siltation, raw sewage entering river from pipe 70m downstream of bridge on western bank. Unsuitable habitat.	1U Urban (village), with houses along bank. Raw sewage entering from pipe on western bank 70m downstream of bridge.
3	Bridge at Athea Lower, R 10688 36392. Visual observation from bridge.	1 No evidence of mussels.	Deep, slow flowing section. Not typical *Margaritifera* habitat.	1 (S), 3,4 Silage production, with sheep and cattle grazing.
4	From R 08715 36477 upstream for c. 100m to R 08805 36464.	1 No evidence of mussels.	2, 3, 5 Heavy growth of filamentous algae in unshaded areas, heavy siltation. Patches of suitable habitat.	1(S), 2, 3 Silage production on both banks with cattle grazing. Small coniferous plantation on southern bank.
5	From Ahavoher Bridge at R 06921 37082, for c.100m downstream to R 06840 37065.	1 No evidence of mussels.	2, 3, 5 Heavy growth of filamentous algae in unshaded areas, heavy siltation. Patches of suitable habitat.	1(S) Intensively managed pastureland with silage production on both banks.
6	From 50m downstream of Galey Bridge (R 04403 38411), upstream to R 04555 38285. Total of stretch searched c.200m.	1 No evidence of pearl mussels, but *Anodonta anatina* present.	1, 2, 3, 5 Macrophytes present (20% Crowsfoot), heavy growth of filamentous algae, heavy siltation. Patches of suitable habitat.	1(S) Intensively managed pastureland with silage production on both banks.

	
Site 1. Galey River. From Athea bridge upstream for c.600m to R 12989 34983. Heavy siltation and growth of filamentous algae in unshaded areas. Generally unsuitable habitat due to mobile substrate. View of river access point for livestock. No evidence of mussels.	Site 1. Galey River. From Athea bridge upstream for c.600m to R 12989 34983. Heavy siltation and growth of filamentous algae in unshaded areas. Generally unsuitable habitat due to mobile substrate. View of heavy filamentous algal growth. No evidence of mussels.
	
Site 2. Galey River. Downstream of Athea Bridge for c.150m. Generally unsuitable habitat due to heavy siltation and filamentous algal growth. No evidence of mussels. Raw sewage entering river from pipe.	Site 2. Galey River. Downstream of Athea Bridge for c.150m. Generally unsuitable habitat due to heavy siltation and filamentous algal growth. No evidence of mussels. View of raw sewage entering river from pipe.
	
Site 3. Galey River. View downstream from bridge at Athea Lower, R 10688 36392. River not searched at this location, but deep and slow flowing conditions did not appear suitable for *Margaritifera*.	Site 3. Galey River. View upstream from bridge at Athea Lower, R 10688 36392. River not searched at this location, but deep and slow flowing conditions did not appear suitable for *Margaritifera*.

	
Site 4. Galey River. From R 08715 36477 upstream for c. 100m to R 08805 36464. Patches of suitable habitat in series of riffles and pools. Heavy filamentous algal growth in unshaded areas, and sedimentation. No evidence of mussels.	Site 4. Galey River. From R 08715 36477 upstream for c. 100m to R 08805 36464. Patches of suitable habitat in series of riffles and pools. Heavy filamentous algal growth in unshaded areas (above), and sedimentation. No evidence of mussels.
	
Site 5. Galey River. Ahavoher Bridge at R 06921 37082. View upstream from bridge over long slow-flowing section.	Site 5. Ahavoher Bridge at R 06921 37082. View downstream from bridge over concreted area and fish pass. Patches of suitable habitat with heavy growth of filamentous algae and heavy siltation. No evidence of mussels.
	
Site 6. Galey River. From 50m downstream of Galey Bridge (R 04403 38411), upstream to R 04555 38285. (total of c.200m). Patches of suitable habitat, but very heavy sedimentation and growth of filamentous algae. No evidence of mussels.	Site 6. Galey River. No evidence of *Margaritifera* at this site, but *Anodonta anatina* was present. View of *Anodonta anatina* in the substrate upstream of Galey Bridge.



Locations and results of *Margaritifera* search sites on the Galey River (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were not recorded in the Galey River. **Abundance:** No mussels were recorded at any site investigated on the Galey River. **Distribution in river:** No evidence of mussels was observed at any of the six sites investigated on the Galey River. **Demography of population:** No evidence of mussels was observed at any of the six sites investigated on the Galey River. **Habitat conditions:** Although patches of physically suitable habitat were present at three of the six sites investigated, all six sites were badly affected by heavy siltation and growth of filamentous algae. Conditions were generally inimical to the maintenance of a population of *Margaritifera*. EPA analysis of biological quality categorises the Galey River as mostly satisfactory but continuing slightly polluted at two locations and moderately polluted at one. Only four of the seven monitoring stations achieved a Q Value of 4 in 2005. These conditions are inimical to the maintenance of a *Margaritifera* population. WFD assessment by the EPA also indicates that the main channel of the Galey River is at risk of not achieving good status by 2015. **Conservation status in river**: Unfavourable.

3.4. Smearlagh River (Feale System), Co. Kerry.

River: Smearlagh River.	**Catchment:** Feale System.
Number of sites: 4.	**Start/ End GPS:** Kennelly's Bridge (R 02478 32386) upstream to bridge at R 01330 26634.
Date: June 11th, 2008.	**Weather:** Cloudy, Dry.
Surveyors	E. Ross, T. Clark.

Categories:

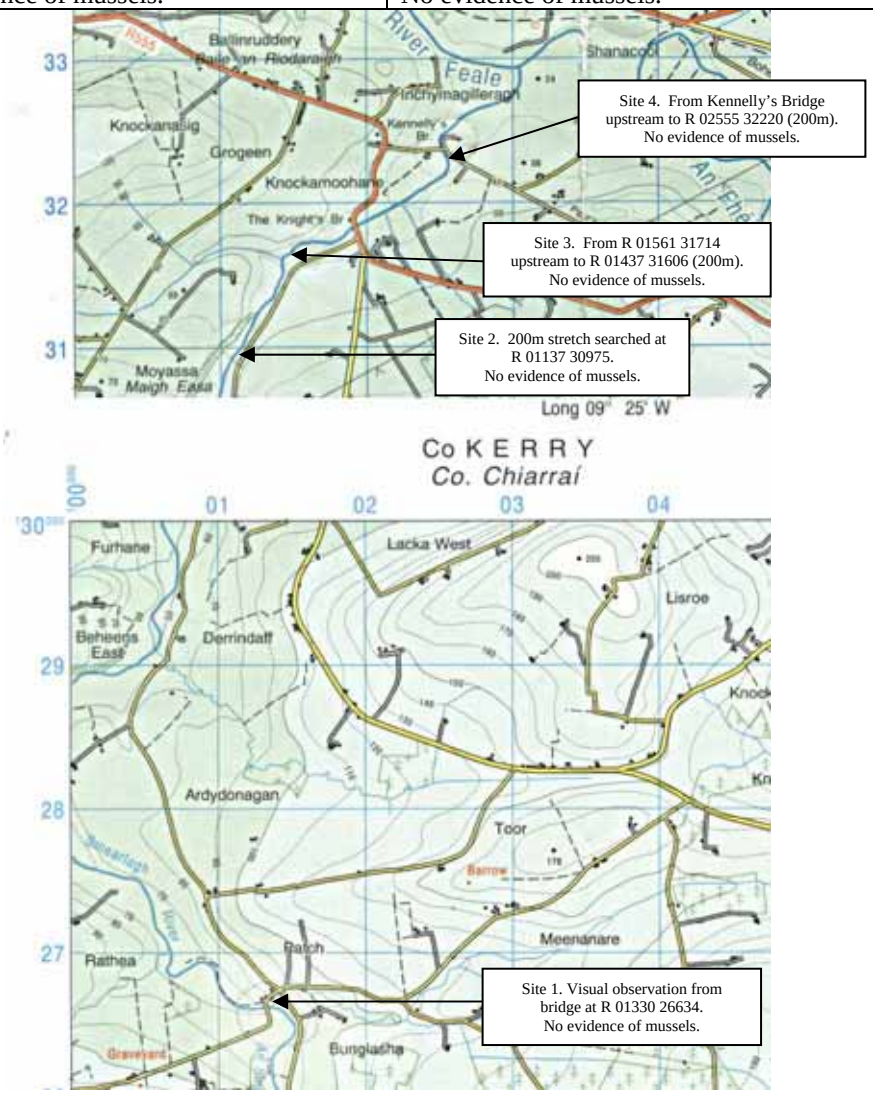
Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Smearlagh River. Visual observation from bridge at R 01330 26634.	1 No evidence of mussels.	4 Habitat unsuitable due to unstable mobile nature of the substrate.	Not determined.
2	Smearlagh River. Stretch of c.200m in length searched at R 01137 30975.	1 No evidence of mussels.	4 Habitat unsuitable due to exposed bedrock and mobile unstable substrate of boulder/cobble.	3 Cattle grazing on eastern bank with deciduous woodland on western bank.
3	Smearlagh River. Stretch of c.200m from R 01561 31714 upstream to R 01437 31606.	1 No evidence of mussels.	4 Habitat unsuitable due to exposed bedrock and unstable mobile boulder/cobble substrate.	1(S),3 Silage production with cattle grazing on eastern bank, deciduous trees on western bank.
4	Smearlagh River. Stretch of c.200m upstream from Kennelly's Bridge (R 02478 32386) to R 02555 32220.	1 No evidence of mussels.	2, 3, 5 Filamentous algae cover 20% of substrate and siltation evident. Patches of suitable habitat.	3, 6 Pasture on western bank, with road adjacent to eastern bank.

	
Site 1. Smearlagh River. View upstream from bridge at R 01330 26634. Habitat unsuitable due to unstable mobile nature of the substrate. No evidence of mussels.	Site 1. Smearlagh River. View downstream from bridge at R 01330 26634. Habitat unsuitable due to unstable mobile nature of the substrate. No evidence of mussels.
	
Site 2. Smearlagh River. View downstream over stretch of c.200m in length searched at R 01137 30975. Habitat unsuitable due to exposed bedrock and mobile unstable substrate of boulder/cobble. No evidence of mussels.	Site 2. Smearlagh River. View upstream over stretch of c.200m in length searched at R 01137 30975. Habitat unsuitable due to exposed bedrock and mobile unstable substrate of boulder/cobble. No evidence of mussels.
	
Site 3. Smearlagh River. View upstream from R 01561 31714. Habitat unsuitable due to exposed bedrock and unstable mobile boulder/cobble substrate. No evidence of mussels.	Site 3. Smearlagh River. View of the river channel consisting predominantly of exposed bedrock c.100m downstream of R 01561 31714. No evidence of mussels.

Site 4. Smearlagh River. Stretch of c.200m upstream from Kennelly's Bridge (R 02478 32386) to R 02555 32220. Filamentous algae cover 20% of substrate and siltation evident. Patches of suitable habitat. No evidence of mussels.

Site 4. Smearlagh River. View upstream from Kennelly's Bridge (R 02478 32386) to R 02555 32220. Filamentous algae cover 20% of substrate and siltation evident. Patches of suitable habitat. No evidence of mussels.



Locations and results of *Margaritifera* search sites on the Smearlagh River (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** No mussels were observed in the Smearlagh River. **Abundance:** No mussels were recorded at any site investigated on the Smearlagh River. **Distribution in river:** No evidence of mussels was observed at any of the four sites

	investigated on the Smearlagh River. **Demography of population:** No evidence of mussels was observed at any of the six sites investigated on the Galey River. **Habitat conditions:** The physical nature of the habitat was unsuitable for *Margaritifera* at three of the four sites investigated on the Smearlagh River. This was due either to the presence of exposed bedrock and/or unstable, mobile substrates. Patches of suitable habitat were present at the furthest downstream site (Kennelly's Bridge), but this site was also affected by growth of filamentous algae and siltation. EPA assessment of biological quality indicates satisfactory conditions with the two furthest downstream monitoring sites achieving Q Values of 4 (2004) and the four upstream monitoring sites achieving Q Values of 4-5 (2004), however EPA assessment of WFD status suggests that the Smearlagh may be at risk of not achieving good status by 2015. A serious bog slide occurred on the upper Smearlagh during 2008 and this would have had a serious negative impact on any *Margaritifera* population that may be present further downstream in the Smearlagh River. **Conservation status in river**: Unfavourable.

3.5. Maine River (Maine System), Co. Kerry.

River: Maine River.	**Catchment:** Maine system.
Number of sites: 7.	**Start/ End GPS:** From R 03950 08868 upstream of Fairfield Bridge to the bridge south of Ballyfinnane (Q 89099 04817).
Date: June 8th, 2008.	**Weather:** Dry, bright.
Surveyors	E. Ross, T. Clark.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Shanowen River (Maine R.). Searched upstream from Fairfield Bridge to R 03950 08868. Total length of stretch searched 280m.	1 No evidence of mussels.	4 Habitat mostly unsuitable due to unstable and mobile nature of the substrate.	3 Light grazing in fields on both banks.
2	Shanowen River (Maine R.). Searched c.145m from bridge near Tullig (R 01354 09083), upstream to R 01458 09010.	1 No evidence of mussels.	4 Habitat unsuitable due to mobile nature of the substrate and exposed limestone bedrock.	1(S) Intensively managed silage and grazing on both banks. Slurry type effluent being piped into river on southern bank c.80m upstream of bridge.
3	Maine River. Searched upstream from bridge at Q 97888 09341 to Q 97990 09297. Total length of stretch searched 115m.	1 No evidence of mussels.	1, 2, 3 Unsuitable habitat, with heavy siltation, heavy filamentous algal growth covering 50% of substrate, and 15% crowsfoot cover.	1(S), 3 Intensively managed grazing and silage on both banks.
4	Little River Maine (Maine R.). Visual observation from bridge at Q 93269 09488.	1 No evidence of mussels.	1, 2, 3 Habitat unsuitable with heavy siltation, and heavy growth of macrophytes.	3 Grazing.
5	River Maine. Searched upstream from Curran's Bridge to Q 93908 06610. Total length of stretch searched 205m.	1 No evidence of mussels.	1, 2, 3 Habitat appeared suitable but heavy macrophyte growth, filamentous algal growth (35%), and	1(S) Silage production on both banks.

			heavy siltation covered substrate.	
6	River Maine. Searched 415m stretch from Maine Bridge upstream to Q 92991 06147, c25m upstream of confluence with Brown Flesk.	3 Scattered adults (1 live and 1 dead shell in 415m stretch.	1, 2, 3, 6 Habitat suitable but very heavy siltation and growth of macrophytes and filamentous algae along banks.	3, 6 Grazing on northern bank and deciduous plantation (ash) on southern bank.
7	River Maine. Upstream from bridge south of Ballyfinnane (Q 89099 04817). Total length of stretch searched was 400m (upstream to Q 89305 05009).	1 No evidence of mussels.	2, 3 Conditions unsuitable for *Margaritifera* with layer of filamentous green algae and silt on substrate.	3 Grazing on both banks.

Site 1. Shanowen River (Maine R.). Searched upstream from Fairfield Bridge to R 03950 08868. Total length of stretch searched 280m. Habitat mostly unsuitable due to unstable and mobile nature of the substrate. No evidence of mussels.

Site 1. Shanowen River (Maine R.). Searched upstream from Fairfield Bridge to R 03950 08868. Total length of stretch searched 280m. Note the unstable and mobile nature of the substrate. Dipper present. No evidence of mussels.

Site 2. Shanowen River (Maine R.). Searched c.145m from bridge near Tullig (R 01354 09083), upstream to R 01458 09010. Habitat unsuitable due to mobile nature of the substrate and exposed limestone bedrock. No evidence of mussels.

Site 2. View of slurry effluent entering the river from a pipe on the southern bank c.80m upstream of the bridge at Tulllig (R 01354 09083). No evidence of mussels.

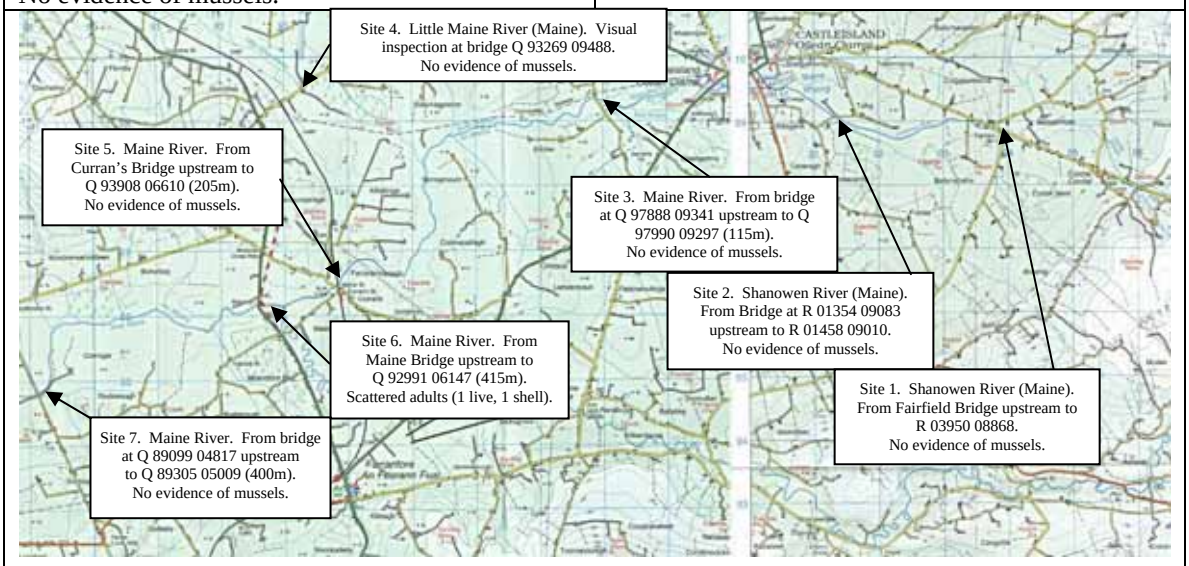
	
Site 3. Maine River. View of heavy siltation on substrate at bridge downstream of Castleisland, at Q 97888 09341. Searched upstream to Q 97990 09297. Total length of stretch searched 115m. No evidence of mussels.	Site 3. View downstream towards the bridge at Q 97888 09341. Unsuitable habitat, with heavy siltation and heavy filamentous algal growth covering 50% of substrate, with 15% crowsfoot cover. No evidence of mussels.
	
Site 4. Little River Maine (Maine R.). View upstream from the bridge at Q 93269 09488. Habitat unsuitable with heavy siltation, heavy macrophyte growth. No evidence of mussels.	Site 4. Little River Maine (Maine R.). View downstream from the bridge at Q 93269 09488. Habitat unsuitable with heavy siltation, heavy macrophyte growth. No evidence of mussels.
	
Site 5. River Maine. View upstream from Currans Bridge. Searched upstream from Curran's Bridge to Q 93908 06610. Total length of stretch searched 205m. Habitat appears suitable but heavy macrophyte growth, filamentous algal growth, and heavy siltation covering substrate. No evidence of mussels.	Site 5. River Maine. View upstream from Q 93908 06610. Heavy growth of macrophytes and filamentous algae as well as heavy siltation. No evidence of mussels.

Site 6. River Maine. View of heavy filamentous algal growth and siltation upstream from Maine Bridge. Searched 415m stretch from Maine Bridge upstream to Q 92991 06147 c25m upstream of confluence with Brown Flesk. Habitat suitable but heavy siltation and growth of macrophytes and filamentous algae along banks. One live mussel observed in 415m stretch.

Site 6. View of heavy growth of macrophytes and filamentous algae just upstream of Maine Bridge. Heavy siltation also evident in areas of slow flow close to banks. One live mussel observed in 415m stretch.

Site 7. River Maine. Upstream from bridge south of Ballyfinnane (Q 89099 04817). Total length of stretch searched was 400m (upstream to Q 89305 05009). Conditions unsuitable with layer of filamentous green algae and silt on substrate.
No evidence of mussels.

Site 7. River Maine. View of cattle access to river at Q 89305 05009.
Conditions unsuitable for *Margaritifera*.
No evidence of mussels.



Locations and results of *Margaritifera* search sites on the River Maine (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Maine River. **Abundance:** Only a single living mussel was observed in the River Maine during the current study. **Distribution in river:** It is unlikely that a significant population of *Margaritifera* still exists in the River Maine. Seven sites, with a combined length of 1.61km, were searched but only a single mussel was observed upstream of Maine Bridge at Q 92922 06113. Although the habitat appeared physically suitable at Sites 5 and 6, the biological quality of these sites was poor. **Demography of population:** No juveniles or small mussels were observed. The single mussel recorded was a large adult. It is possible that this individual mussel may have originated in the Brown Flesk River which joins the River Maine just upstream of where the mussel was located. **Habitat conditions:** Habitat conditions were generally unsuitable for *Margaritifera* in the River Maine. The two sites investigated on the Shanowen River, a tributary in the upper part of the catchment, were generally unsuitable because of unstable and/or mobile substrates. The remaining five sites were in poor biological condition, being badly affected by a combination of macrophyte growth, filamentous algae and heavy siltation. EPA data (2005) categorised the main channel as slightly polluted, with all four monitoring stations recording Q Values of 3-4. The last time a Q Value of 4-5 was achieved on the main channel of the River Maine was 1981. These conditions are inimical to the survival of *Margaritifera*. WFD assessment by the EPA also concludes that most of the main channel is at risk of not achieving good status by 2015. **Conservation status in river**: Unfavourable.

3.6. Brown Flesk (Maine System), Co. Kerry.

River: Brown Flesk.	**Catchment:** Maine system.
Number of sites: 8	**Start/ End GPS:** From R 06000 03124 (above Rice Bridge), downstream to the confluence with the Maine River at Q 92969 06131.
Date: June 7th, 8th, 2008.	**Weather:** Mostly dry and bright.
Surveyors	E. Ross, T Clark.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Brown Flesk River. Searched upstream from Rice Bridge (R 05747 03241) to R 06000 03124. Total length of stretch searched was 290m.	1 No evidence of mussels.	3, 4 Sedimentation in slow flow areas. Habitat mostly unsuitable due to unstable and mobile nature of the gravel pebble, cobble substrate.	3 Cattle grazing on improved grassland with cattle access to the river.
2	Brown Flesk River. Searched 300m stretch from Twiss Bridge upstream to R 04476 03217.	1 No evidence of mussels.	2, 3 Some filamentous algae (5% cover) with some siltation evident. Habitat mostly unsuitable due to unstable and mobile nature of substrate.	1(S), 3 Silage cut on northern bank, cattle grazing on southern bank (improved pasture).
3	Brown Flesk River. Searched 175m stretch upstream from R 01618 02410 to bridge at 01751 02375.	1 No evidence of mussels.	1, 2, 3 Filamentous algal cover of 10% (unshaded areas), with 5% emergent Umbelliferae. Sedimentation in slow flow areas. Extensive suitable habitat.	1(S) Silage cut on both banks.
4	Brown Flesk River. Searched from 50m downstream of bridge at Q 99676 03715 to R 00072 03650. Total length of stretch searched 475m.	3 Scattered adult mussels (2 mussels and 1 dead shell).	3, 6 Extensive suitable habitat, but heavy siltation all along this stretch.	1(S), 3 Intensively managed silage and grazing on both banks.
5	Brown Flesk River.	3	6	1(S), 3

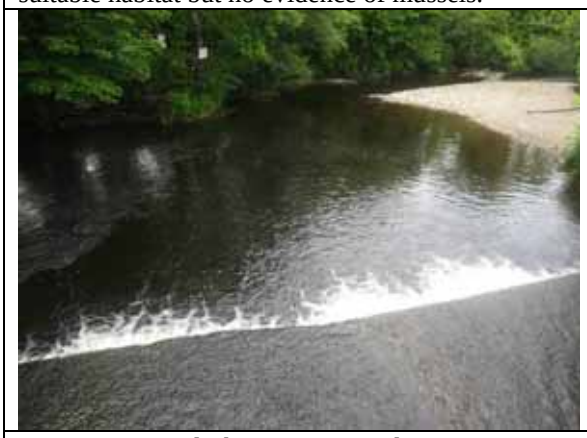
	Searched stretch of 275m upstream from Currow Bridge to Q 97841 04478.	Scattered adult mussels (total of 43 mussels in 275m).	Extensive suitable habitat with some sedimentation in slow flow areas.	Intensively managed silage and grazing on both banks.
6	Brown Flesk River. Searched upstream from Q 97381 04614 to Currow Bridge. Total length of stretch searched 315m.	3 Scattered adult mussels present.	2, 3, 6 Extensive suitable habitat, but substrate covered by layer of silt and filamentous green algae in unshaded slow-flowing areas.	1(S), 3, 6 Intensively managed silage and grazing on both banks, with old creamery on northern bank in Currow village.
7	Brown Flesk River. Searched 435m section from O'Connell Bridge upstream to Q 95427 04581.	1 No evidence of mussels.	3, 5 Patches of suitable habitat, but all heavily silted.	1(s), 1(O) Silage cut on northern bank, house sites and airport on southern bank.
8	Brown Flesk River. Searched 125m upstream from the confluence with the Maine River to Q 92972 06067.	3 Scattered adult mussels (2 in 125m).	2, 3, 6 Extensive suitable habitat, but 5% filamentous algal cover and siltation in slow flow areas.	1(S),3, 6 Intensively managed silage and grazing on eastern bank and deciduous plantation (ash) on western bank.

Site 1. Brown Flesk River. View upstream from R 06000 03124. Searched upstream from Rice Bridge (R 05747 03241) to R 06000 03124. Total length of stretch searched was 290m. Mostly unsuitable habitat with no evidence of mussels.

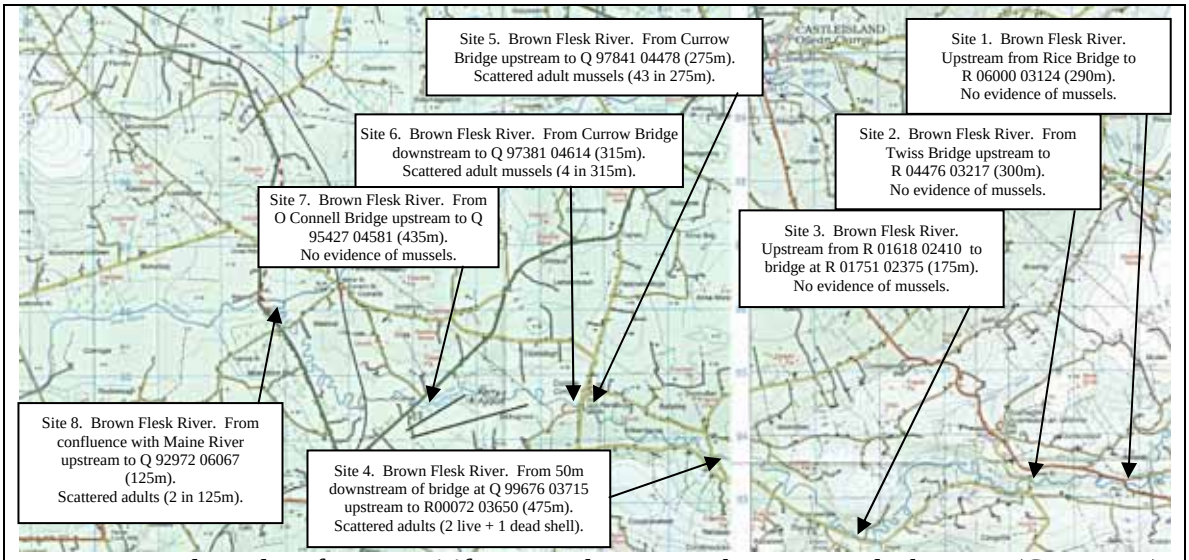
Site 1. Brown Flesk River. View upstream from 100m above Rice Bridge. Note the mobile and unstable nature of the substrate. Habitat mostly unsuitable due to substrate mobility. No evidence of mussels.

Site 2. Brown Flesk River. View upstream from R 04476 03217. Searched 300m stretch from Twiss

Site 2. Brown Flesk River. View downstream from R 04476 03217. Searched 300m stretch from Twiss

Bridge upstream to R 04476 03217. Habitat mostly unsuitable due to unstable and mobile nature of substrate. No evidence of mussels.	Bridge upstream to R 04476 03217. Habitat mostly unsuitable due to unstable and mobile nature of substrate. No evidence of mussels.
	
Site 3. Brown Flesk River. View downstream from R 01618 02410. Banks overgrown with Snowberry. Searched 175m stretch upstream from R 01618 02410 to bridge at R 01751 02375. Extensive suitable habitat but no evidence of mussels.	Site 3. Brown Flesk River. View upstream from bridge at R 01751 02375. Deep slow section upstream of bridge not searched. Sedimentation in slow flow areas and 10% filamentous algal cover in unshaded areas. No evidence of mussels.
	
Site 4. Brown Flesk River. View downstream over pool from bridge at Q 99676 03715. Searched from 50m downstream of bridge at Q 99676 03715 to R 00072 03650. Total length of stretch searched 475m. Extensive suitable habitat with scattered mussels.	Site 4. Brown Flesk River. View downstream from R 00072 03650. Searched from 50m downstream of bridge at Q 99676 03715 to R 00072 03650. Total length of stretch searched 475m. Extensive suitable habitat with scattered mussels. Heavy siltation occurring all along this stretch.
	
Site 5. Brown Flesk River. View of heavily fouled cattle access point at Q 97752 04487 on the southern bank. Searched stretch of 275m upstream from Currow Bridge to Q 97841 04478. Extensive suitable habitat with scattered adult mussels. Total of 43 mussels observed in 275m.	Site 5. Brown Flesk River. View of mussel in the substrate upstream of Currow Bridge. Extensive suitable habitat with scattered adult mussels, including a concentration of 35 mussels at Q 97841 04478.

	
Site 6. Brown Flesk River. View downstream from Q 97381 04614 below Currow. Searched upstream from this point to Currow Bridge (315m). Extensive suitable habitat, but substrate covered by layer of silt and filamentous green algae in unshaded slow-flowing areas. Scattered adults present.	Site 6. Brown Flesk River. View upstream from Q 97381 04614. Searched upstream from this point to Currow Bridge (315m). Intensively managed silage and grazing on both banks, with old creamery on northern bank in Currow village. Scattered adults present.
	
Site 7. Brown Flesk River. View upstream from Q 95427 04581. Searched 435m section from O'Connell Bridge upstream to this point. Patches of suitable habitat, but all heavily silted. No evidence of mussels.	Site 7. Brown Flesk River. View downstream from Q 95427 04581. Alternating riffles, glides and deep pools. Patches of suitable habitat, but all heavily silted. No evidence of mussels.
	
Site 8. Brown Flesk River. The Brown Flesk at Q 92972 06067. Searched 125m upstream (to Q 92972 06067) from the confluence with the Maine River. Extensive suitable habitat with scattered adult mussels (2 in 125m).	Site 8. Brown Flesk River. View of habitat immediately upstream of confluence with the Maine River. Extensive suitable habitat, but siltation in slow flow areas. Filamentous algae covered 5% of substrate surface.



Locations and results of *Margaritifera* search sites on the Brown Flesk River (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Brown Flesk River. **Abundance:** Although mussels are present in the Brown Flesk, it is unlikely that the population is very large. Only scattered mussels were recorded and the greatest concentration observed was at Site 5, upstream from Currow Bridge (43 mussels in 275m). **Distribution in river:** Results of the current study suggest that *Margaritifera* is widely distributed in areas with suitable habitat in the downstream half of the Brown Flesk (Sites 4, 5, 6 and 8). The furthest upstream record of *Margaritifera* in the Brown Flesk was at Q 99792 03730. The furthest downstream record was immediately above the confluence of the Brown Flesk with the River Maine at Q 92959 06131. **Demography of population:** All mussels observed in the Brown Flesk River were large adults. No juveniles or small mussels were observed. The low levels of abundance, and the exclusively large (and therefore old) mussels comprising the population, indicate that the Brown Flesk *Margaritifera* population is senescent. **Habitat conditions:** At the two furthest upstream sites the habitat was predominantly unsuitable because of unstable and/or mobile substrates. Extensive areas of suitable habitat were present at the remaining sites with the exception of Site 7 (upstream from O'Connell Bridge), but biological quality of the habitat at these locations was poor, due principally to a combination of siltation and growth of filamentous algae. Such conditions are inimical to the maintenance of a *Margaritifera* population. Intensive agricultural practices were widespread and large areas of coniferous plantations are present in the upper parts of the catchment. Although EPA biological assessment categorises the Brown Flesk River as satisfactory, only one of seven monitoring sites (just upstream of confluence with Maine River) achieved a Q Value of 4-5 in 2005, and the last Q Values of 5 were recorded in the river in 1986. EPA assessment of WFD status also indicates that most of the main channel downstream of Site 4 may not reach good status by 2015. **Conservation status in river**: Unfavourable.

3.7. Owenascaul River, Co. Kerry.

River: Owenascaul River.	**Catchment:** Owenascaul River.
Number of sites: 5.	**Start/ End GPS:** From Lough Anscaul outflow to the sea at Q 59632 00280.
Date: June 20th, 23rd, 2008.	**Weather:** Dry, sunny.
Surveyors	E. Ross, T. Clark, L. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1a	L. Anscaul outflow, Q 58812 04863.	3 Scattered Adults (1 mussel in 1m transect search).	1, 2 50% filamentous algal cover, 50% macrophytes. Extensive suitable habitat.	2, 5(B) Rough grazing/bog on east bank, coniferous forestry behind west bank.
1b	Q 58894 04743.	3 Scattered Adults (1 mussel in 1m transect search).	6 Extensive suitable habitat.	2, 5(B) Rough grazing/bog on east bank, coniferous forestry behind west bank.
1c	Q 58935 04632.	3 Scattered Adults.	6 Extensive suitable habitat.	4, 5(U,B) Rough grazing/bog on east bank, improved grazing behind riparian willow scrub.
1d	Q59055 04557	4 Good numbers of adult mussels.	6 Extensive suitable habitat.	2, 5(B), 6 Coniferous forestry 30m behind west bank, fern/furze scrub on banks.
1e	Q 59187 04369.	3 Scattered Adults (1 mussel in 1m transect search).	6 Extensive suitable habitat.	2, 5(B), 6 Coniferous forestry 30m behind west bank, fern/furze scrub on banks.
1f	Q 59227 04376.	4 Good numbers of adult mussels.	6 Extensive suitable habitat.	2, 6 Coniferous forestry 30m behind east bank, fern/furze scrub on banks.
1g	Q 59285 04329.	4 Good numbers of adult mussels (7 mussels in 1m transect search).	6 Extensive suitable habitat.	2 Coniferous forestry 10m behind both banks.
1h	Q 59295 04293 down to Q59270 04262.	3 Scattered adults.	6 Extensive suitable habitat.	Heavy riparian ferns and willow scrub.
1i	Q 59306 04206.	4 Good numbers of adult mussels.	6 Extensive suitable habitat.	2 Coniferous forestry 10m behind both

				banks.
1j	Q 59311 04198.	3 Scattered adults.	6 Extensive suitable habitat.	2 Coniferous forestry 10m behind both banks.
1k	Q59362 04139.	4 Good numbers of adult mussels (12 mussels in 2m transect search).	2, 6 Extensive suitable habitat. Very light cover of filamentous algae on 40% of substrate.	2 Furze/willow scrub on both banks with coniferous forestry behind.
2a	Q 59343 04059.	1 No evidence of mussels (search of 10m stretch).	6 Extensive suitable habitat of very high quality.	4, 5(B) Rough grazing (sheep) on both banks. Coniferous forestry ends upstream on west bank.
2b	Q 59357 03931.	3 Scattered adults.	6 Extensive suitable habitat.	2, 4, 5(B) Coniferous forestry 50m back from east bank, rough grazing (sheep) both banks with bog on west bank.
2c	Q59373 03874.	1 No evidence of mussels (search of 10m stretch).	6 Extensive suitable habitat.	4, 5(B) Rough grazing (sheep), bog on both banks.
2d	From Q 59394 03682 upstream to Q 59404 03738.	3 Scattered adults.	6 Extensive suitable habitat.	2, 4, 5(B) Coniferous forestry on eastern bank. Rough grazing (sheep) and bog on western bank.
2e	From Q 59360 03385 upstream to Q 59394 03682.	1 No evidence of mussels in limited patches of suitable habitat.	4 Long and fast flowing eroding section with mobile and unstable substrates.	2, 4 Coniferous forestry on eastern bank. Rough grazing (sheep) and bog on western bank.
2f	Q 59360 03385.	3 Scattered adults.	6 Extensive suitable habitat.	1(S), 3, 4 Silage cut and cattle grazing (intensive) on eastern bank. Rough grazing (sheep) on western bank.
2g	Searched 20m immediately upstream of first road bridge above Anascaul at Q 59399 03285.	4 Good numbers of mussels.	6 Extensive suitable habitat	1(S), 3, 4 Silage cut with cattle grazing (intensive) on eastern bank. Rough grazing on western bank (sheep).
3	From Anascaul Bridge (Q 59241 01882) upstream for c.90m.	3 Scattered adults.	3, 5 Patches of suitable habitat with small amount of siltation.	6 Gardens adjacent to river.
4	Owenascaul River upstream of R561 road bridge at Q 59344 00996 to Q 59202	1 No evidence of mussels.	4 Mostly unsuitable habitat (bedrock and mobile unstable	5, 6 Steep bank up to R561 on west bank. Rough unimproved

	01065. Total length of stretch searched 235m.		substrates).	grazing on east bank
5	Upstream from the sea to Q 59529 00584. Total length of stretch searched was 380m.	1 No evidence of mussels.	3, 5 Patches of suitable habitat. Heavy siltation.	4 Rough grazing (sheep, light).

Site 1a. Q 58812 04863. L. Anscaul outflow, Scattered Adults (1 mussel in 1m transect search).

Site 1a. Q 58812 04863. L. Anscaul outflow, Scattered Adults (1 mussel in 1m transect search).

Site 1b. Q 58894 04743. Scattered Adults (1 mussel in 1m transect search).

Site 1b. Q 58894 04743. View of mussel in substrate.

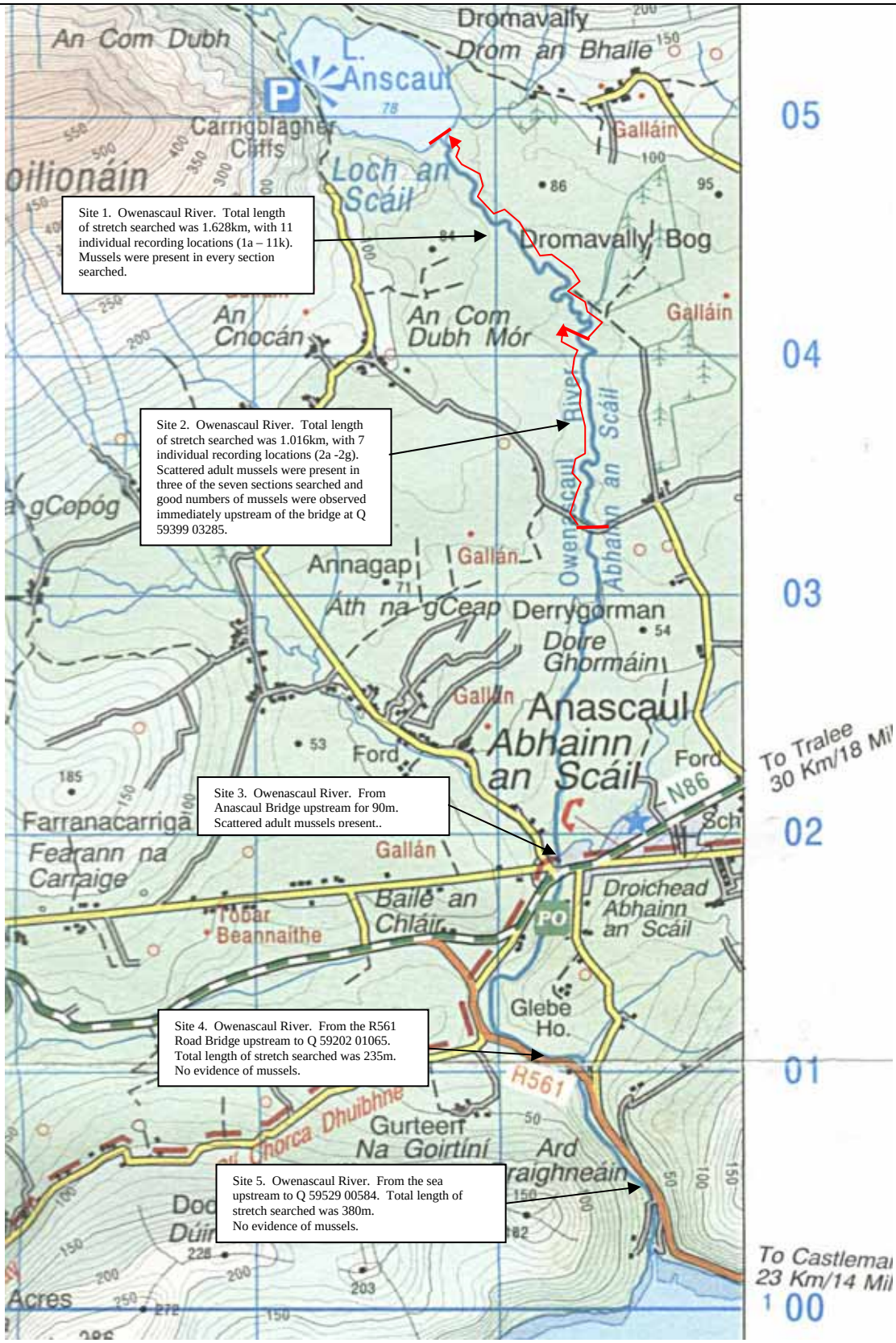
Site 1c. Q 58935 04632. Scattered adults in extensive suitable habitat. View of habitat.

Site 1c. Q 58935 04632. Scattered adults in extensive suitable habitat. View of habitat.

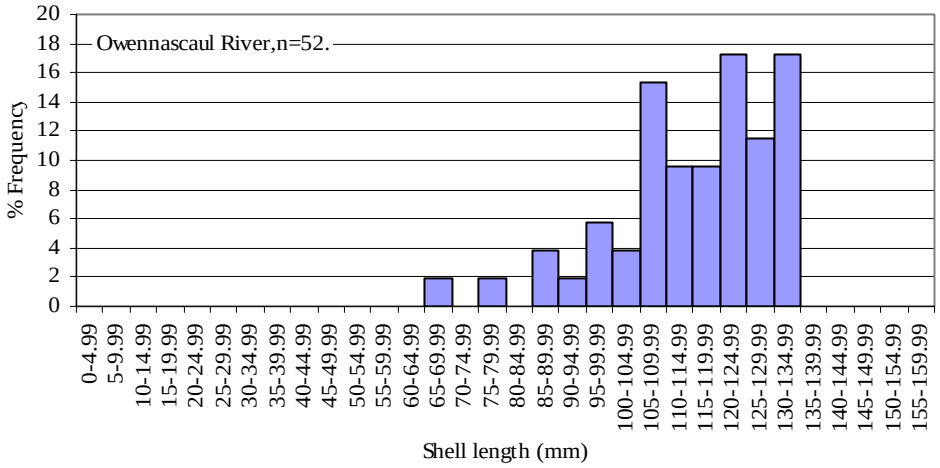
	
Site 1e. Q 59187 04369. View of the habitat. Scattered Adults (1 mussel in 1m transect search). Extensive suitable habitat.	Site 1f. Q 59227 04376. View of mussels in the substrate. Good numbers of adult mussels in extensive suitable habitat.
	
Site 1g. Q 59285 04329. Good numbers of adult mussels in extensive suitable habitat (7 mussels in 1m transect search).	Site 1h. Q 59295 04293 down to Q 59270 04262. Scattered adults in extensive suitable habitat.
	
Site 1h. Q 59295 04293 down to Q 59270 04262. Scattered adults in extensive suitable habitat.	Site 1k. Q 59362 04139. Good numbers of adults in extensive suitable habitat (12 mussels in 2m wide transect).

	
Site 2a. Q 59343 04059. No evidence of mussels in extensive suitable habitat of very high quality. Search of 10m stretch completed.	Site 2b. Q 59357 03931. Scattered adults in extensive suitable habitat.
	
Site 2c. Q 59373 03874. No evidence of mussels in search of 10m stretch.	Site 2d. Q 59394 03682 upstream to Q 59404 03738. Scattered adults in extensive suitable habitat.
	
Site 2e. From Q 59360 03385 upstream to Q 59394 03682. No evidence of mussels in patches of suitable habitat. Fast flowing eroding section with mobile and unstable substrates.	Site 2f. Q 59360 03385. Scattered adults in extensive suitable habitat.

	
Site 2g. Immediately upstream of bridge at Q 59399 03285. Good numbers of mussels in extensive suitable habitat.	Site 3. Owenascaul River immediately upstream of Anascaul Bridge (Q 59241 01882). Scattered adults in patches of suitable habitat.
	
Site 4. Owenascaul River upstream of R561 road bridge at Q 59344 00996. Total length of stretch searched 235m. No evidence of mussels in mostly unsuitable habitat (bedrock and mobile unstable substrates).	Site 4. Owenascaul River upstream of R561 road bridge at Q 59344 00996. Mostly unsuitable exposed bedrock and mobile unstable boulder-cobble substrates. No evidence of mussels.
	
Site 5. Owenascaul River upstream from the sea to Q 59529 00584. View upstream from Q 59529 00584. Total length of stretch searched was 380m. No evidence of mussels in patches of suitable habitat.	Site 5. Owenascaul River upstream from the sea to Q 59529 00584. Total length of stretch searched was 380m. No evidence of mussels in patches of suitable habitat.



Locations and results of *Margaritifera* search sites on the Owenascaul River (Co. Kerry).



Shell length frequency distribution of *Margaritifera margaritifera* in the Owenascaul River.

Overall Comment on river

***Margaritifera* presence/absence:** Mussels were present in the Owenascaul River.

Abundance: A significant population of *Margaritifera* is present in the Owenascaul River. Although mussel densities were generally low, concentrations of mussels were observed at several locations, particularly upstream of the road bridge above Anascaul at Q 59399 03285. The entire stretch upstream from that bridge to Lough Anscaul was intensively searched and data on mussel densities recorded at 18 separate locations. In this stretch, mussels were absent from three sites (2a, 2c and 2e), scattered adults were recorded in a further nine sites, and good numbers of adult mussels were recorded at six sites (1d, 1f, 1g, 1i, 1k, and 2g). The highest density observed was at Q 59285 04329

Distribution in river: No mussels were observed in either of the two furthest downstream sites investigated (Sites 4 and 5). Much of the habitat at these sites was unsuitable due to presence of exposed bedrock or mobile substrates, while heavy siltation was observed at Site 5, where the Owenascaul River flowed into the sea.

Mussels were widely distributed between the bridge at Q 59399 03285 and Lough Anscaul, where extensive areas of suitable habitat were observed at all but one (Site 2e) of the 18 locations investigated. Scattered mussels were also recorded just upstream of the bridge in Anascaul village. It is likely that mussels are also present in those parts of the river upstream and downstream of the village, but these stretches were not investigated during the current study.

A recent EPA report noted that a colony of pearl mussels had disappeared from the upper reach between 1998 and 2002, where adjacent land clearance work and development had taken place (Clabby et al. 2004). Certainly the stretch (2f) upstream from the bridge at Q 59399 03285 to Q 59360 03385 was found to contain only scattered adults and it was evident that the eastern riverbank had been significantly modified in recent years.

Demography of population: No juveniles were observed anywhere in the Owenascaul River and the smallest mussel recorded was 65.0mm in length. This mussel was visually estimated to be approximately 10 years of age.

Habitat conditions: The quality of the habitat observed was generally very good, with the exception of the furthest downstream site, where heavy siltation was observed. Some slight siltation was also observed in the Anascaul village site. Filamentous algae and macrophytes were generally absent apart from a single site at the outflow from Lough Anscaul, where 50% cover of both filamentous algae and macrophytes were recorded. The general absence of filamentous algal growth and macrophytes was surprising given the nature of the agricultural practices in parts of the catchment, and the tracts of forestry located downstream from Lough Anscaul.

	Recent EPA data classifies the biological quality of the Owenascaul River as satisfactory, with Q Values of 4 and 4-5 respectively for the monitoring sites at the bridges upstream and downstream of Anascaul village. However, WFD assessments for the entire main channel and for Lough Anscaul indicate that they are thought to be at risk of not achieving good status by 2015. **Conservation status in river**: Unfavourable.

3.8. Owreagh River, Co. Kerry.

River: Owreagh River.	**Catchment:** Owreagh River.
Number of sites: 9.	**Start/ End GPS:** From tidal area upstream to the bridge south of Gortdromagh at V 63863 65816.
Date: June 6th, 24th, 25th, 30th, July 2nd, 6th, 9th, 12th, August 28th, 2008.	**Weather:** Dry, sunny.
Surveyors	E. Ross, L. Ross, K. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Bridge south of Gortdromagh at V 63863 65816. Searched 50m upstream and 50m downstream.	1 No evidence of mussels.	4 Habitat unsuitable due to mobile unstable substrates.	5(U,B) Rough grazing on northern bank, bog/unimproved grazing on southern bank. Some improved grassland downstream on northern bank
2	Bridge south of Moneyflugh at V 64839 66128. Searched 200m upstream from bridge.	1 No evidence of mussels.	4 Habitat mostly unsuitable due to exposed bedrock and mobile substrate.	2, 5 Coniferous plantation on southern bank. Rough grazing on unimproved boggy ground on northern bank.
3	Upstream from old bridge at V 66334 66580. Total length of stretch searched was 262m.	3 Scattered adults. 1mussel in 262m stretch.	5 Patches of suitable habitat. Mostly mobile substrates and some exposed bedrock	2, 3/4 Narrow band of coniferous plantation along eastern bank. Grazing (light) in small fields along western bank.
4	From V 66632 66602 upstream to bend at V 66367 66431.	3 Scattered adults. 11 mussels in 350m stretch.	5 Limited patches of suitable habitat due to exposed bedrock and unstable mobile substrates.	3, 5 Cattle grazing on rough grazing / unimproved grassland. Cattle access to river at ford at V 66367 66431, and gravel extraction activity at V 66626 66448.
5	From bend at V 67178 66824 upstream to V 67734 66540. Total length of stretch searched was 180m.	3 Scattered adults. 4 mussels in 180m stretch.	6 Extensive suitable habitat.	1(S), 3 Silage cut on northern bank, rough cattle grazing (light) on southern bank.
6	Upstream of N70 Road Bridge, from V 67851 66588 to V 67734 66540. Total length of stretch searched was 180m.	4 Good numbers of adults.	6 Extensive suitable habitat.	3 Rough cattle grazing (light) on both banks.
7	Upstream from V 68288	3	6	3

	66459 to N70 Road Bridge at V 67976 66696. Total length of stretch searched was 522m.	Scattered adults. (1-3 mussels estimated m^{-1} along this 522m stretch).	Extensive suitable habitat.	Rough cattle grazing (light) on both banks.
8	Upstream from Bridge at V 68483 66258 to V 68307 66432.	3 Good numbers of adults.	6 Extensive suitable habitat.	2, 3 Scrub and rough grazing (cattle, light) on both banks. Coniferous plantation on eastern bank for 120m upstream from bridge.
9	Upstream from tidal area to bridge at V 68483 66258.	4 Scattered adults.	5 Patches of suitable habitat away from exposed bedrock and areas of unstable mobile substrate.	6 Willow scrub and overgrown unused land. New Sewage Treatment Plant adjacent to river.

Site 1. Owreagh River. View upstream from bridge south of Gortdromagh at V 63863 65816. Habitat unsuitable due to mobile unstable substrates. No evidence of mussels.

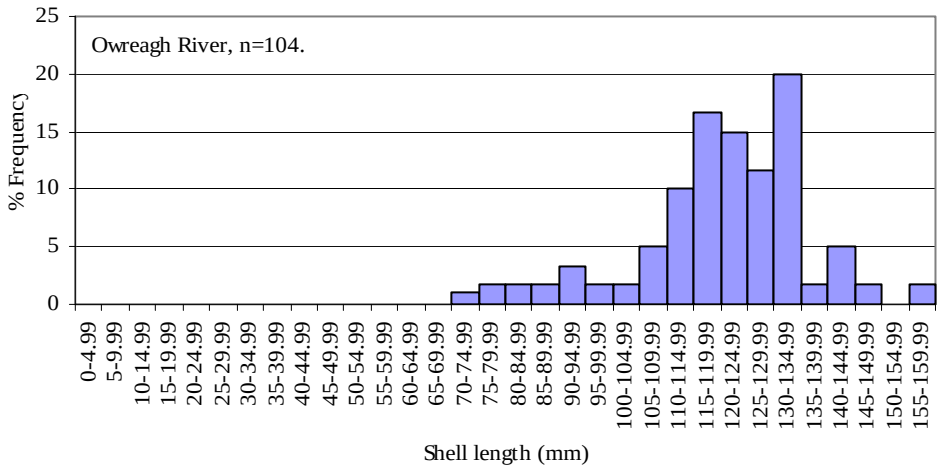
Site 1. Owreagh River. View upstream towards stream confluence and bridge south of Gortdromagh at V 63863 65816. Habitat unsuitable due to mobile unstable substrates. No evidence of mussels.

Site 2. Owreagh River. View downstream from bridge south of Moneyflugh at V 64839 66128. Habitat mostly unsuitable due to exposed bedrock and mobile substrate. No evidence of mussels.

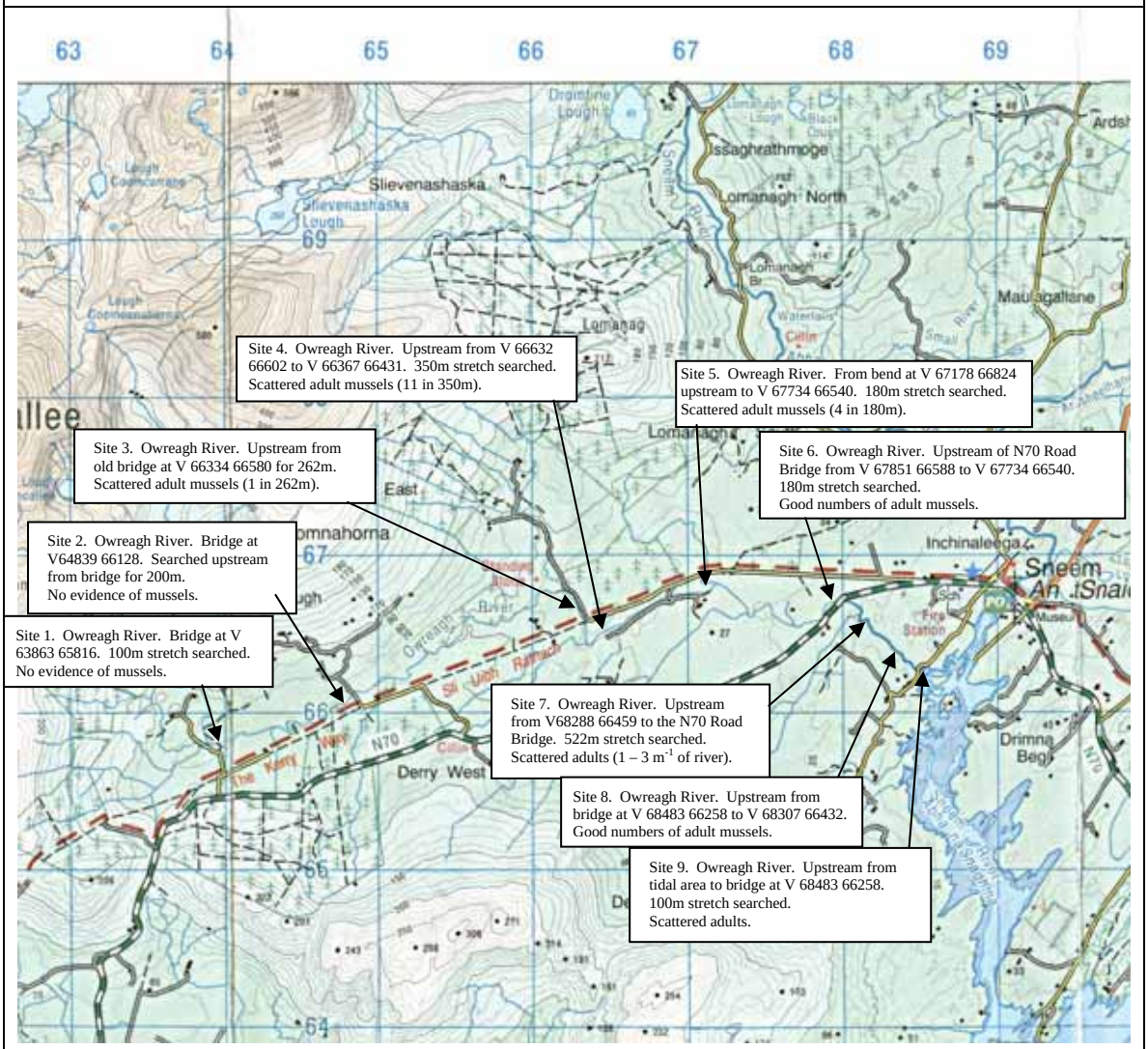
Site 2. Owreagh River. View of habitat upstream of bridge south of Moneyflugh at V 64839 66128. Habitat mostly unsuitable due to exposed bedrock and mobile substrate. No evidence of mussels.

	
Site 3. Owreagh River. View upstream from old bridge at V 66334 66580. Total length of stretch searched was 262m. Patches of suitable habitat. Scattered adults (1mussel observed in 262m stretch).	Site 3. View downstream from a point near the top of the 262m stretch searched. Patches of suitable habitat. Mostly mobile substrates and some exposed bedrock. Scattered adults (1mussel observed in 262m stretch).
No photographs available.	
Site 4. Owreagh River. From V 66632 66602 upstream to bend at V 66367 66431. Limited patches of suitable habitat due to exposed bedrock and unstable mobile substrates. Cattle access to river at ford at V 66367 66431, and gravel extraction activity at V 66626 66448. Scattered adult mussels with group of mussels just below ford/bend at V 66395 66448.	
	
Site 5. Owreagh River. From bend at V 67178 66824 upstream to V 67734 66540. Total length of stretch searched was 180m. Extensive suitable habitat. Scattered adult mussels.	Site 5. View of very large mussel (155.6mm) recorded upstream of V 67178 66824 under southern bank. Extensive suitable habitat. Scattered adults.
	
Site 6. Owreagh River. Upstream of N70 Road Bridge, from V 67851 66588 to V 67734 66540. Total length of stretch searched was 180m. Extensive suitable habitat. Good numbers of adult mussels.	Site 6. Owreagh River. View downstream towards the N70 Road Bridge, from V 67851 66588. Total length of stretch searched was 180m. Extensive suitable habitat. Good numbers of adult mussels.

	
Site 7. Owreagh River. View of habitat 50m downstream of N70 Road Bridge. Searched upstream from V 68288 66459 to N70 Road Bridge at V 67976 66696. Total length of stretch searched was 522m. Extensive suitable habitat. Scattered adult mussels.	Site 7. View of habitat near V 68248 66486. Searched upstream from V 68288 66459 to N70 Road Bridge at V 67976 66696. Total length of stretch searched was 522m. Extensive suitable habitat. Scattered adult mussels.
	
Site 8. Owreagh River. View of habitat in lower part of this stretch. Searched upstream from Bridge at V 68483 66258 to V 68307 66432. Total length of stretch searched was 300m. Extensive suitable habitat. Good numbers of adult mussels.	Site 8. Owreagh River. View of habitat at the upstream limit of this stretch. Searched 300m upstream from Bridge at V 68483 66258 to V 68307 66432. Extensive suitable habitat. Good numbers of adult mussels.
	
Site 9. Owreagh River. Upstream from tidal area to bridge at V 68483 66258. View downstream from falls in middle of stretch towards tidal area. Patches of suitable habitat away from exposed bedrock and areas of unstable mobile substrate. Scattered adults.	Site 9. View downstream towards falls. New Sewage Treatment Plant in background. Heavy filamentous algal growth (100% cover) in slow flow areas. Patches of suitable habitat. Scattered adults.



Shell length frequency distribution of *Margaritifera margaritifera* recorded in the Owennascaul River, Co. Kerry.



Locations and results of *Margaritifera margaritifera* search sites on the Owreagh River (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Owreagh River. **Abundance:** Although mussels were found to occur in seven of the nine stretches searched, densities were relatively low and only two stretches (Sites 6 and 8) were classified as containing good numbers of mussels. Five further sites (3, 4, 5, 7 and 9) were classified as containing scattered adults. **Distribution in river:** Mussels are widespread in the Owreagh River, and were found to occur in all areas of suitable habitat searched. Much of the upper Owreagh River (Sites 1 and 2) consists of habitat unsuitable for *Margaritifera* due to either the presence of exposed bedrock or unstable and mobile substrates. The highest densities observed were at Sites 6 and 8. **Demography of population:** No juveniles or small mussels were observed. The smallest mussel recorded was 77.4mm in length. Mussels in the Owreagh were generally very large and the modal shell length class observed was 130-134.9mm. The largest individual mussel recorded was 155.9mm ($6^{1/4}$inches). **Habitat conditions:** Habitat conditions appeared to be generally good, with little or no growth of filamentous algae or macrophytes, although water conditions had been high for a significant period before sites 1-6 were investigated on July 12th, 2008, and this may have removed significant growths of algae or accumulated silt. Recent EPA data (2003) for two monitoring stations on the Owreagh River indicated satisfactory quality (Q Values of 4), but recorded a drop in ecological quality with increased filamentous algal growth since the previous survey in 2000 (4-5). Despite this deterioration the EPA assessment of WFD status indicated that the Owreagh River is expected to achieve good status in 2015. **Conservation status in river**: Unfavourable.

3.9. Ardsheelhane River (Sneem System), Co. Kerry.

River: Ardsheelhane River	Catchment: Sneem Ardsheelhane.
Number of sites: 6.	**Start/ End GPS:** From the confluence with the Sneem River at V 69026 67535, upstream to Coomyanna Bridge at V 71726 72740.
Dates: June 25th, July 2nd, 13th, 16th, 17th, 29th, 30th, August 11th.	**Weather:** Fine, dry (but misting at Site 1).
Surveyors	E. Ross, L. Ross, K. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Searched upstream from V 71695 72933 to Coomyanna Bridge (V 71726 72740). Mostly unsuitable habitat. Total length of stretch searched was 215m.	1 No evidence of mussels.	4 Habitat mostly unsuitable due to unstable mobile substrate.	1(S), 5(U,B) Silage on both banks but mainly rough grazing and bog downstream of this stretch.
2	Upstream from V 70951 69576 to V 71036 69900. Total length of stretch searched was 500m.	3 Scattered adults. 1 mussel seen at V 71000 69859 in this 500m long stretch.	4 Very small patches of suitable habitat. Mostly unsuitable habitat due to unstable, mobile cobble and gravel substrates.	1(S), 5 Improved grassland with coniferous plantation upstream on western bank. Unimproved grazing with extensive moorland upstream on eastern bank. Gravel extraction activity at V 70899 69614.
3a	Upstream from V 69605 68114 to V 69702 68199. Total length of stretch searched was 150m.	4 Good numbers of adults.	2, 6 Extensive suitable habitat. Filamentous algae covering 70% of the substrate.	2, 5(B) Coniferous plantation on western bank with bog and rough grazing on eastern bank.
3b	Upstream from V 69702 68199 to falls at V 69766 68212. Total length of stretch searched was 50m.	3 Scattered adults.	2, 5 Patches of suitable habitat. Bedrock and mobile boulder substrates. Filamentous algae covering 60% of the substrate.	2, 5(B) Coniferous plantation on western bank with bog and rough grazing on eastern bank.
3c	From V 69848 68192 above falls to V 69912 68250. Total length of stretch searched was 255m.	3 Scattered adults.	2, 6 Extensive suitable habitat, but with light covering of filamentous algae on 80% of the substrate.	4, 5 Unimproved rough grazing on both banks.
4	From confluence with Sneem River at V 69026	4 Good	1, 2, 6 Extensive suitable	4, 5 Small fields on

	67535 upstream to V 69023 67789.	numbers of mussels with good size range. Smallest mussel recorded was 35.5mm.	habitat. 15% filamentous algal cover with 5% macrophyte cover (*Umbelliferae*).	western bank and unimproved grazing on the eastern bank.

Site 1. Ardsheelhane River. View downstream from Coomyanna Bridge (V 71726 72740). Mostly unsuitable habitat. No evidence of mussels observed in 215m stretch searched.

Site 1. Ardsheelhane River. View upstream from start of section (V 71695 72740). Mostly unsuitable habitat. No evidence of mussels observed in 215m stretch searched.

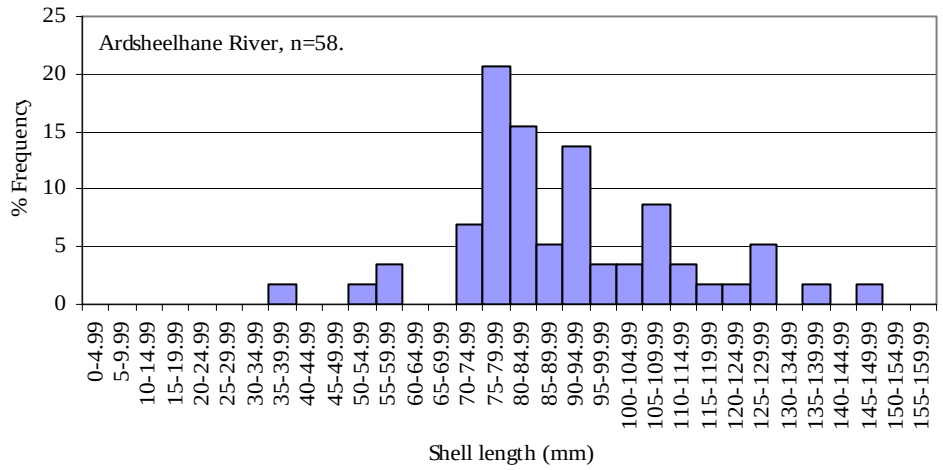
Site 2. Ardsheelhane River. Gravel extraction activity at this location (V 70919 69580). Mostly unsuitable habitat due to mobile gravel substrates.

Site 2. Ardsheelhane River. Upstream from V 70951 69576 to V 71036 69900. Only a single mussel observed (at V 71000 69859) in this 500m long stretch. Patches of suitable habitat along bank.

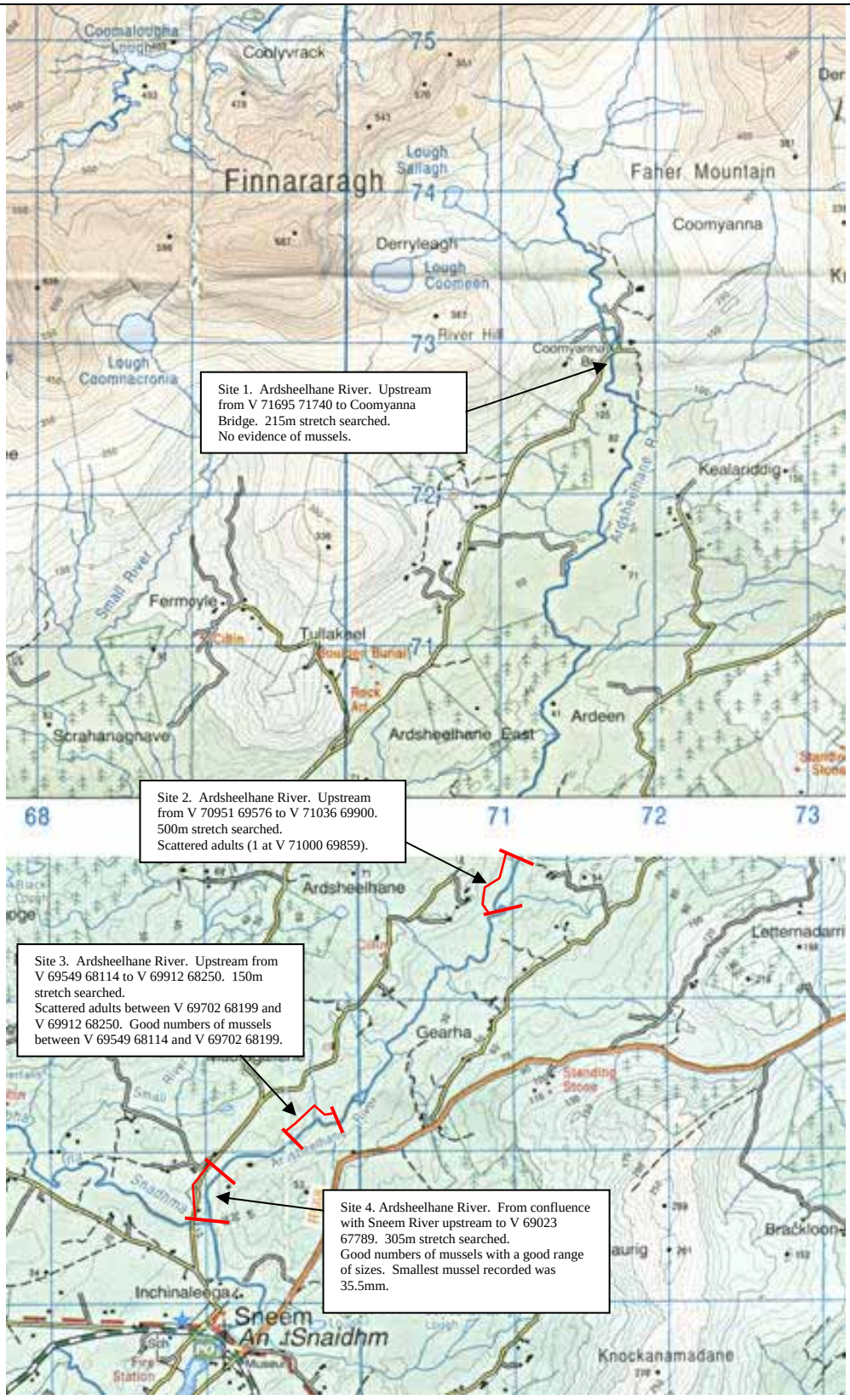
Site 3a. Ardsheelhane River. View downstream from start of this stretch (V 69605 68114). Good numbers of adults and extensive suitable habitat.

Site 3a. Ardsheelhane River. View upstream from start of this stretch (V 69605 68114). Good numbers of adults and extensive suitable habitat.

	
Site 3b. Ardsheelhane river. Upstream from V 69702 68199 to falls at V 69766 68212. Total length of stretch searched was 50m. Patches of suitable habitat.	Site 3b. Ardsheelhane river. View of mussels in the substrate near the falls at V 69766 68212. Note growth of filamentous algae on mussel shells. Total length of stretch searched was 50m. Patches of suitable habitat.
	
Site 3b. Ardsheelhane river. View of part of the falls at V 69766 68212. Scattered adult mussels in patches of suitable habitat.	Site 3c. Ardsheelhane River. View of the extensive suitable habitat at the upstream end of this stretch (upstream of the falls, at V 69912 68250) where only scattered adult mussels were observed.
	
Site 4. Ardsheelhane River. Upstream from confluence with Sneem River at V 69008 67595 to V 68992 67833. Mussels were abundant in extensive suitable habitat along this 280m section.	Site 4. Ardsheelhane River. Upstream from confluence with Sneem River at V 69008 67595 to V 68992 67833. Mussels were abundant with a range of size classes in this 280m section. Smallest mussel recorded was 35.5mm.



Shell length frequency distribution of *Margaritifera margaritifera* recorded in the Ardsheelhane River, Co. Kerry.



Locations and results of *Margaritifera* search sites on the Ardsheelhane River (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Ardsheelhane River. **Abundance:** The Ardsheelhane River contains a large population of *Margaritifera*, with high densities of mussels observed. A density of 15 mussels 0.25m^{-2} (equivalent to 60^{-m2})

	was recorded in the single quadrat searched, but the quadrat location was selected on the basis of the suitability of the substrate for juveniles rather than in an area containing maximum density of adult mussels. Mussels were found to occur in three of the four stretches of river investigated. **Distribution in river:** A total of 1.345km of river channel was searched in the four sites investigated. Mussels were absent from the furthest upstream site (Site 1) investigated where the habitat was unsuitable for *Margaritifera*. Although very small patches of suitable habitat were present at Site 2, only a single mussel was observed throughout the entire 500m stretch searched there. The third stretch searched was 1.45km in length and contained significant areas of suitable habitat but mussel numbers were generally low (scattered mussels) except for a section at the lowermost part of the stretch at V 69605 68114 where there were good numbers of mussels. The final stretch searched extended upstream from the confluence with the Sneem River to V 69023 67789 and it was here that the highest densities observed on the Ardsheelhane River were observed. **Demography of population:** Although no mussels smaller than 30mm were found during the short time available, the lowermost stretch of the Ardsheelhane River contained a good range of mussel sizes and the smallest observed was just 35.5mm, indicating that some level of juvenile recruitment has occurred recently. Further quadrat searches in this area would be necessary to ascertain if an adequate level of juvenile recruitment was occurring. **Habitat conditions:** Although habitat quality was generally good in the two furthest upstream sites investigated (1 and 2), Sites 3 and 4 were affected by significant growths of filamentous algae. The furthest downstream site (4) on the Ardsheelhane River was visited on two separate occasions (July 13th and 17th) and a significant increase in the levels of filamentous algal growth at the site was noted over the intervening four day period. Recent EPA data indicated a significant deterioration to eutrophic conditions (from Q4-5 to Q 3-4) between 2000 and 2003, and also noted moderate-abundant growths of filamentous algae upstream of the confluence with the Sneem River. Such heavy growths of filamentous algae are indicative of conditions inimical to the survival of juvenile *Margaritifera*. Despite this, the EPA assessment is that the entire main channel of the Ardsheelhane River is likely to achieve good status by 2015 in relation to the WFD requirements. Significant tracts of coniferous forestry plantations are present in the Ardsheelhane catchment and harvesting was ongoing during the period of this study. **Conservation status in river**: Unfavourable, but further Stage 2 and Stage 3 surveys are required.

3.10. Sneem River (Sneem System), Co. Kerry.

River: Sneem River	Catchment: Sneem Ardsheelhane.
Number of sites: 10	**Start/ End GPS:** From Sneem Bridge upstream to V 67169 69897.
Date: June 25th, July 2nd, 13th, 16th, 17th, 29th, 30th, August 11th.	**Weather:** Dry, fine.
Surveyors	E. Ross, L. Ross, K. Ross.

Categories:

	1	2	3	4	5	6
Mussel Quality	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Upstream from the bridge at V 67062 69866 for 120m to V 67169 69897.	1 No evidence of mussels.	4 Clean but unsuitable habitat.	3/4 Moorland on the eastern bank and pastures on the western bank.
2	Upstream to falls at V 67257 68827 from Lomanagh Bridge (V 67350 68707). Total length of stretch searched was 145m.	3 Scattered adults. 9 mussels observed in 145m stretch searched (in pool under western bank at V 67287 68709).	5 Patches of suitable habitat. Mostly unstable mobile and torrential.	4 Sheep grazing on western bank, rough grazing on eastern bank.
3	Upstream from large falls at V 67524 68657 to Lomanagh Bridge (V 67350 68707). Total length of stretch searched was 260m.	3 Scattered adults. 13 mussels observed in entire stretch. All but two were located under the bridge on the northern bank.	5 Patches of suitable habitat. Mostly torrential with mobile boulder substrate.	3/4 Rough grazing both banks.
4	Upstream from V 68295 67814 to V 68090 67897. Total length of stretch searched was 463m.	3, 4 Mussel density varied from scattered adults up to V 68315 67900, good numbers up at V 68315 67900, abundant at V 68303	6 Extensive suitable habitat. Generally clean along 463m stretch	3/4 Rough grazing both banks.

		67919 and V 68164 67891.		
5	From bridge at V 68906 67533 upstream for 95m to V 68816 67515.	3 Scattered adults. (4 in 95m).	1, 2, 6 Extensive suitable habitat with moderate growth of filamentous green alga covering 15% of the substrate. Macrophytes cover 15%	1(S), 4 Silage cut on northern bank. Sheep grazing on pasture on southern bank.
6	From the confluence of the Sneem and Ardsheelhane Rivers upstream for 50m to V 68969 67505.	3 Scattered adults.	5 Habitat mostly unsuitable, consisting of exposed bedrock.	3/4 Sheep grazing on southern bank. Meadow fields on northern bank.
7	Downstream for 380m from the confluence of the Sneem and Ardsheelhane Rivers, to bend at Inchinaleega (V 69077 67169).	4 Good numbers of mussels. Small mussel (44.2mm) recorded at V 69071 67292.	2, 6 Extensive suitable habitat. Moderate growth of filamentous green alga covers 90% of substrate.	5, 6 Moorland and rough grazing on eastern bank. Football pitch on western bank.
8	Downstream from bend at Inchinaleega (V 69077 67169) to 60m downstream of Cowper house (V 69169 67168). 80m stretch searched.	4 Good numbers of adult mussels on northern bank away from very deep pools.	2, 6 Extensive suitable habitat. Light covering of filamentous green algae on 60% of the substrate.	1(S), 5 House with silage cut on southern bank. Rough grazing on moorland on northern bank.
9	Quadrat site under the eastern bank at V 69323 66927.	4 Mussels were abundant under the eastern bank at this location. 21 mussels in a $0.25m^2$ quadrat.	1, 2, 5 Patches of suitable habitat along eastern bank. Some unstable cobble and gravel substrates. Moderate growth of filamentous green algae on 25% of the substrate. 35% macrophyte cover.	3/4 Rough grazing both banks (no livestock visible).
10	Upstream from Sneem Bridge for 80m.	4 Mussels abundant along western bank upstream of bridge. A variety of size classes present. The smallest mussel observed was 35mm.	6 Extensive suitable habitat.	1(U) Urban, church on western bank. Small field and house and pub on eastern bank.

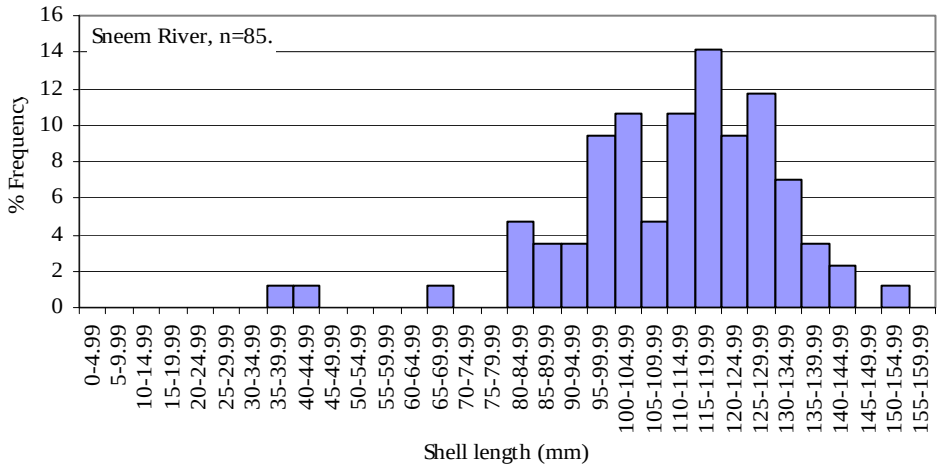
	
Site 1. Sneem River. View downstream over the 120m stretch searched upstream of the bridge at V 67062 69866. No evidence of mussels. Clean but unsuitable habitat.	Site 1. Sneem River. View upstream from the end of the 120m stretch searched upstream of the bridge at V 67062 69866. No evidence of mussels. Clean but unsuitable habitat.
	
Site 2. Sneem River. View of the falls at the upstream limit (V 67257 68827) of the 145m stretch searched upstream from Lomanagh Bridge (V 67350 68707). Mussels present in pool under western bank at V 67287 68709. Scattered adults.	Site 2. Sneem River. View of mussels in the sandy substrate of the pool at V 67287 68709. This stretch was mainly torrential with limited patches of suitable habitat along the banks.
	
Site 3. Sneem River. View of habitat in stretch searched from falls at V 67524 68657 upstream to Lomanagh Bridge (V 67350 68707). Scattered adults observed, total of 13 mussels observed in entire stretch and all but two of these were located under the bridge under the northern bank.	Site 3. Sneem River. View of mussels in the substrate under Lomanagh Bridge. Limited patches of suitable habitat at some locations under the banks. Generally clean habitat.

	
Site 4. Sneem River. View upstream from Quadrat site (V 68303 67919). Stretch 463m in length searched from V 68295 67814 upstream to V 68090 67897. Mussel density varied from scattered adults up to V 68315 67900, good numbers up at V 68315 67900, abundant at V 68303 67919 and V 68164 67891.	Site 4. Sneem River. View downstream from Quadrat site (V 68303 67919). Generally clean with extensive suitable habitat along 463m stretch from V 68295 67814 upstream to V 68090 67897.
	
Site 5. Sneem River. From bridge at V 68906 67533 upstream for 95m to V 68816 67515. Scattered adults (4 in 95m). Extensive suitable habitat with moderate growth of filamentous green alga covering 15% of the substrate.	Site 5. Sneem River. From bridge at V 68906 67533 upstream for 95m to V 68816 67515. Scattered adults (4 in 95m). Sheep grazing on LHB and silage cut on RHB. Salmonids present.
	
Site 6. Sneem River. Stretch from the confluence of the Sneem and Ardsheelhane Rivers upstream for 50m to V 68969 67505. Scattered adults but habitat mostly unsuitable, consisting of exposed bedrock.	Site 6. Sneem River. View downstream along the Sneem River from the confluence with the Ardsheelhane River. Scattered adults.

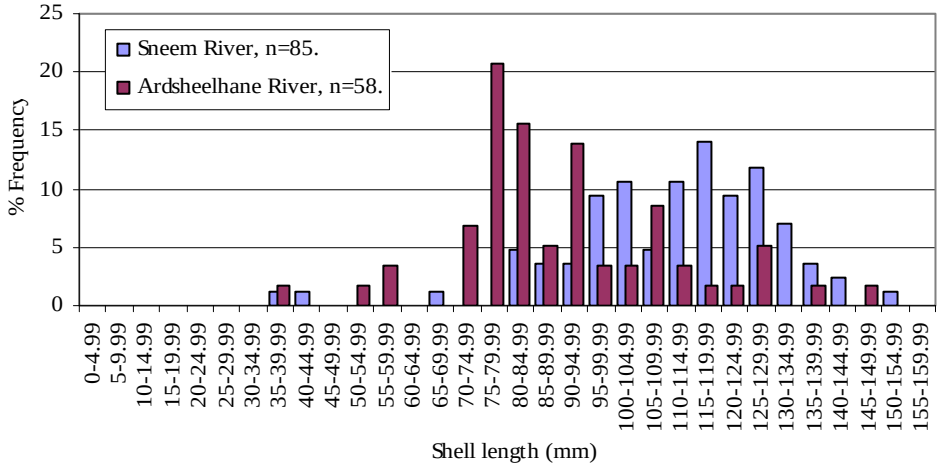
	
Site 7. Sneem River. Downstream for 380m from the confluence of the Sneem and Ardsheelhane River, to bend at Inchinaleega (V 69077 67169). Extensive suitable habitat with good numbers of mussels. Moderate growth of filamentous green alga covers 90% of substrate.	Site 7. Sneem River. Downstream for 380m from the confluence of the Sneem and Ardsheelhane River, to bend at Inchinaleega (V 69077 67169). Quadrat searched under RHB at V 69060 67382. Small mussel (44.2mm) recorded at V 69071 67292.
	
Site 8. Sneem River. Circa 60m downstream of Cowper house (V 69169 67168). Good numbers of adults along northern bank away from very deep pools.	Site 8. Sneem River. Ardsheelhane River. View of mussels in the substrate under the northern bank at V 69169 67168. Extensive suitable habitat at this location. Light covering of filamentous green algae on 60% of the substrate.
	
Site 9. Sneem River. View of Quadrat site under the eastern bank at V 69323 66927. Mussels were abundant under the eastern bank at this location.	Site 9. Sneem River. View upstream from Quadrat site at V 69323 66927. Suitable habitat along Eastern bank. Moderate growth of filamentous green algae on 25% of the substrate.

Site 10. Sneem River. View of falls immediately downstream of Sneem Bridge. The pool at the base of the falls is tidal.

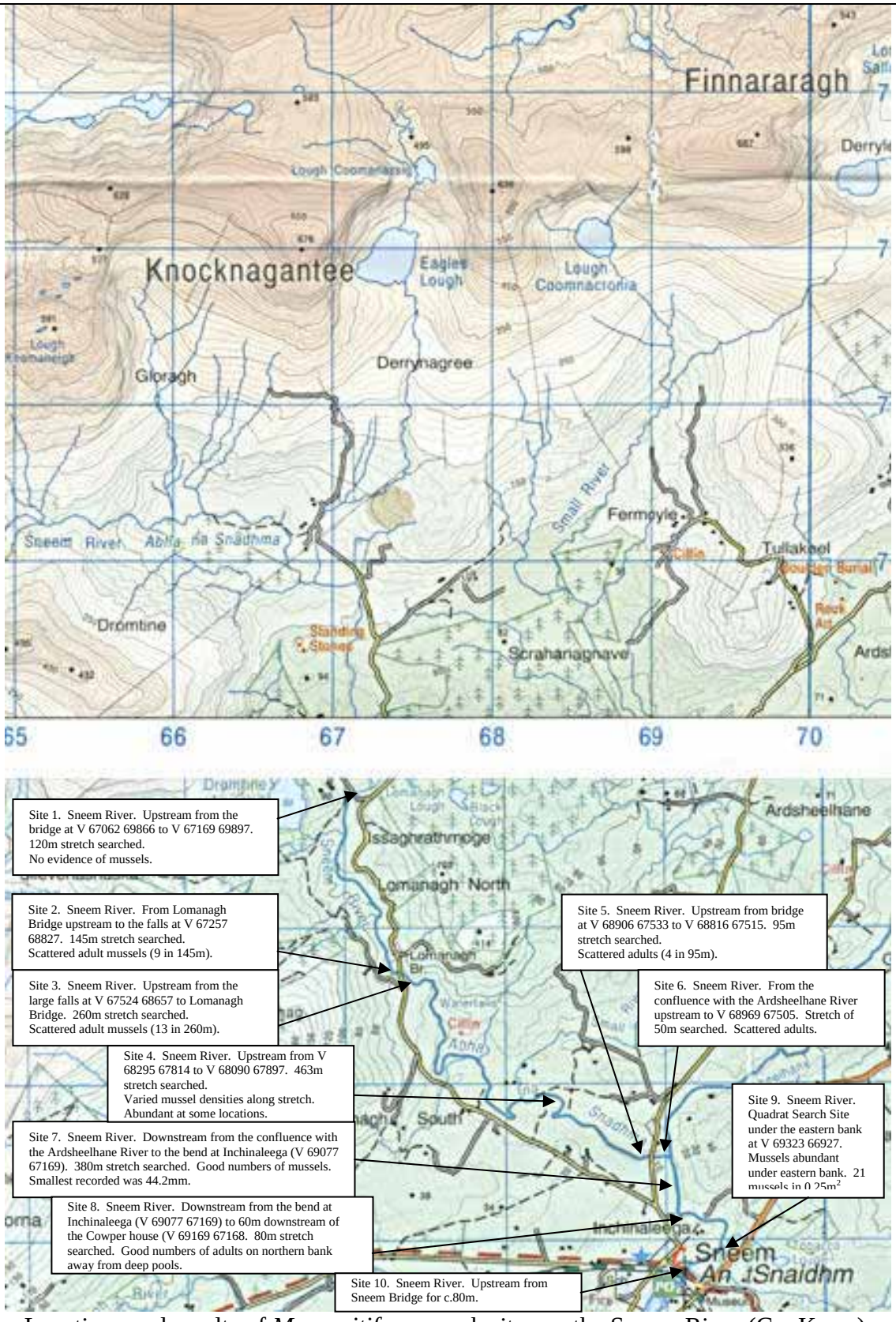
Site 10. Sneem River. View upstream from Sneem Bridge. Extensive suitable habitat, and mussels were abundant along left (western) bank from 30m upstream of bridge. A variety of size classes was present and the smallest mussel observed at this location was 35mm.



Shell length frequency distribution recorded for the Sneem River.



A comparison of the shell length frequency distributions recorded for the Sneem and Ardsheelhane River *Margaritifera* sites.



Locations and results of *Margaritifera* search sites on the Sneem River (Co. Kerry).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Sneem River. **Abundance:** A large population of mussels is present in the Sneem River, with mussels classified as abundant at three of the ten sites investigated (Sites 4, 9 and 10). Three 0.25m^2 quadrats were investigated (Sites 4, 7 and 9) and mussel densities recorded were 12/0.25m^2, 14/0.25m^2, and 21/0.25m^2 respectively. The highest density observed was at Site 10 (immediately upstream of Sneem Bridge) but no quantitative samples were

	investigated at that location. **Distribution in river:** *Margaritifera* is widely distributed in the Sneem River which has approximately 7.2km of main channel below an elevation of 100m. During the current study, ten sites comprising 1.723km of main channel were investigated, and mussels were recorded at nine of these sites. The only site where mussels were not recorded was the furthest upstream (Site 1) where the habitat was clean but generally unsuitable due to mobile and unstable substrate conditions. The furthest upstream location where mussels were recorded was just upstream of Lomanagh Bridge at V 67287 68709, and the furthest downstream site was immediately upstream of Sneem Bridge at V 69097 66847. **Demography of population:** Three 0.25m^2 quadrat searches were completed and although no juveniles (<30mm) were observed, the smallest mussel recorded was 35mm (at Sneem Bridge, Site 10). No specific search for juveniles was carried out at this particular site. Another small mussel of 44.2mm was recorded at Site 7 (just downstream of confluence with Ardsheelhane River). The presence of these small mussels indicates that some level of juvenile recruitment has occurred very recently in the Sneem River, however the size frequency distribution observed (see above) for the river shows a paucity of the smaller size classes, indicating that the level of recruitment occurring is inadequate. The size frequency distributions for the Sneem and Ardsheelhane Rivers (see above) suggest that the Sneem River population contains a greater preponderance of older mussels than the Ardsheelhane River. However, these distributions are based on very small samples and should be viewed as indicative only. **Habitat conditions:** The upstream sites (1, 2, 3 and 4) investigated on the Sneem River were generally clean and in good condition, but the lower part of the river extending downstream from V 68816 67515 (bridge above Sneem) for 1.38km to the sea was affected by growth of filamentous algae and some macrophyte growth. Significant growth of filamentous algae was recorded at Sites 5, 7, 8 and 9, suggesting a degree of eutrophication. EPA assessment of biological quality categorises the Sneem River as "continuing satisfactory", with both EPA sampling stations achieving Q Values of 4-5 in 2003, and assessment of WFD requirements indicates that the main channel of the Sheen River will meet favourable status by 2015. However, in the upper part of the catchment, the Slievenashaska Stream and Dromtine Lough are thought to be at risk of not achieving good status by 2015. Extensive areas of coniferous forestry plantations are present in the upper part of the Sneem River catchment. **Conservation status in river**: Unfavourable, but further Stage 2 and Stage 3 surveys necessary.

3.11. Adrigole River, Co. Cork.

River: Adrigole River.	**Catchment:** Adrigole.
Number of sites: 9	**Start/ End GPS:** V 84018 53120 downstream to Adrigole Bridge at V 81091 50488.
Date: July 17th, 18th, 2008.	**Weather:** Dry, sunny.
Surveyors	E. Ross, K. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Adrigole River. Bridge at (V 84018 53120) upstream of Glen Lough.	1 No evidence of mussels.	2, 4 Light covering of filamentous algae, but habitat unsuitable due to mobile unstable substrates.	1(S), 5 Silage cut both banks downstream of bridge, rough grazing upstream of bridge.
2	Adrigole River. Upstream from bridge at V 83185 52589 to V 83248 52675 for c.141m.	4 Good numbers of adult mussels.	1, 2 40% macrophyte cover, light growth of filamentous algae covers 20% of substrate. Patches of suitable habitat.	5 (U,B) Bog/moorland and rough grazing.
3	Adrigole River. From V 82543 52074 upstream to V 82640 52232. Total length of stretch searched was c.280m.	4 Abundant adult mussels recorded, but no live juveniles. Smallest dead shell recorded was 29.5mm.	1, 2, 6 Macrophyte cover up to 40% with light covering of filamentous algae over 80% of substrate. Extensive suitable habitat.	3, 5(B) Cattle on rough grazing and some bog.
4	Adrigole River. From confluence with Clashduff River, upstream along Adrigole River for c.101m to V 81703 51728	3 Scattered adults.	6 Extensive suitable habitat, but might be too shallow in low flow periods.	3, 4 Cattle grazing (light) and sheep grazing.
5	Adrigole River. Upstream from V 81662 51869 for c.50m. Side channel off main Adrigole River that runs north of Inchintaglin.	4 Good numbers of adult mussels.	6 Extensive suitable habitat (side channel off main Adrigole River that runs north of Inchintaglin.	1, 3 Road along northern bank with cattle grazing in fields along southern bank.
6	Clashduff River, at V 81466 52853. 50m stretch searched.	1 No evidence of mussels.	4 Habitat unsuitable due to torrential nature and extensive exposed	3/4 Rough grazing (moorland) on western bank, small fields on eastern bank.

			bedrock substrate.	
7	Clashduff River. Downstream from bridge at V 81612 51841 to V 81590 51588, downstream of confluence with Adrigole River. Total length of stretch searched 230m.	3 Scattered adults.	2, 5 Heavy growth of filamentous algae cover 80% of unshaded areas. Patches of suitable habitat along banks.	1(S), 3 Silage along western bank, with cattle grazing in fields along eastern bank.
8	Adrigole River. Upstream from bridge at V 81431 51216 to V 81479 51437. Total stretch searched c.275m.	3 Scattered adults.	2, 5 Light covering of filamentous algae on 80% of substrate, patches of suitable habitat along banks.	3/4, 5 Unimproved rough grazing along eastern bank, with rough grazing and small pastures on eastern bank.
9	Adrigole River. Upstream of Adrigole Bridge (V 81110 50487). Mostly unsuitable habitat (bedrock, mobile boulders) up to V 51252 50738. Total length of stretch searched 470m.	3/4 Scattered mussels up to V 81185 50724, with abundant adult mussels under western bank upstream of bend at V 81185 50724 and for 50m upstream, then absent.	2, 5 Light covering of filamentous algae on 100% of unshaded substrate. Patches of suitable habitat along banks.	1(S), 3, 5 Some silage along western bank, mostly unimproved rough grazing along eastern bank. Major bank protection works probably damaged population at V 81183 50658.

Site 1. Adrigole River at bridge (V 84018 53120) upstream of Glen Lough. View upstream. No evidence of mussels.

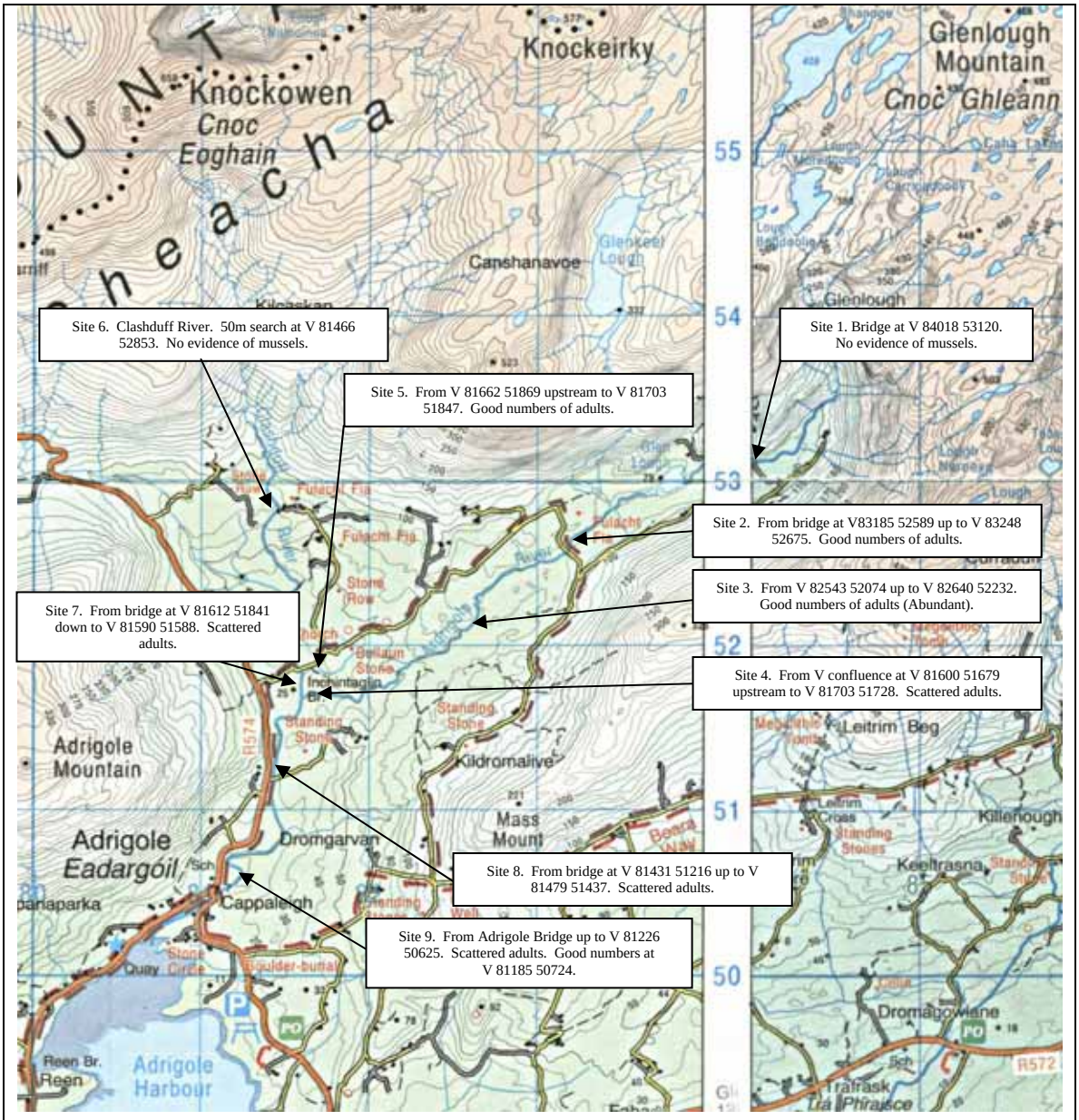
Site 1. Adrigole River at bridge (V 84018 53120) upstream of Glen Lough. View downstream. No evidence of mussels.

Site 2. Adrigole River. Upstream from bridge at V

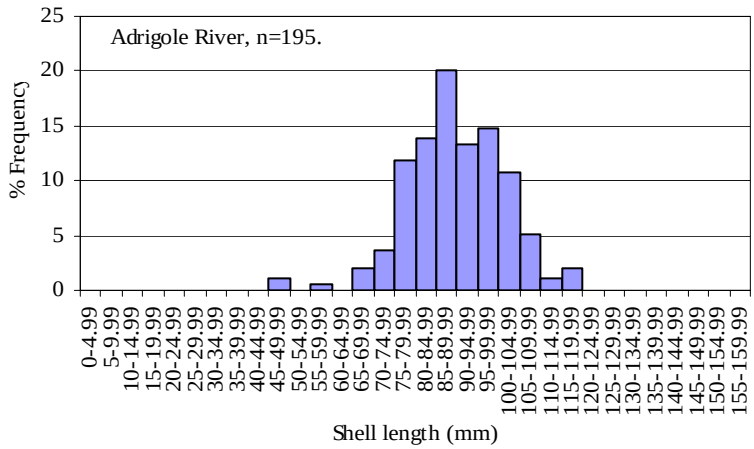
Site 2. Adrigole River. Upstream from bridge at V

83185 52589 to V 83248 52675 for c.141m. Good numbers of adult mussels in patches of suitable habitat.	83185 52589 to V 83248 52675 for c.141m. Good numbers of adult mussels in patches of suitable habitat. View of mussels in the clean substrate.
	
Site 3. Adrigole River. From V 82543 52074 upstream to V 82640 52232. Total length of stretch searched was c.280m. Abundant adult mussels recorded, but no live juveniles. Smallest dead shell recorded was 29.5mm. Extensive suitable habitat.	Site 3. Adrigole River. From V 82543 52074 upstream to V 82640 52232. View of mussels in the substrate. Abundant adult mussels recorded, but no live juveniles. Smallest dead shell recorded was 29.5mm. Extensive suitable habitat.
	
Site 4. Adrigole River. Searched upstream from confluence with Clashduff, for 101m to V 81703 51728. Scattered adults in extensive suitable habitat.	Site 4. Adrigole River. View downstream from V 81703 51728. Scattered adults in extensive suitable habitat.
No photographs available.	No photographs available.
Site 5. Adrigole River. Upstream from V 81662 51869 for c.50m. Good numbers of adult mussels present. Side channel off main Adrigole River that runs around Inchintaglin.	Site 5. Adrigole River. Upstream from V 81662 51869 for c.50m. Good numbers of adult mussels present. Side channel off main Adrigole River that runs around Inchintaglin.
	
Site 6. Site 6. Clashduff River at V 81466 52853. 50m stretch searched. Habitat unsuitable due to torrential nature and exposed bedrock substrate. No evidence of mussels.	Site 6. Clashduff River at V 81466 52853. 50m stretch searched. Habitat unsuitable due to torrential nature and exposed bedrock substrate. No evidence of mussels.

	
Site 7. Clashduff River. Upstream from bridge at V 81612 51841 to V 81590 51588, downstream of confluence with Adrigole River. Total length of stretch searched 230m. Scattered adults present in patches of suitable habitat along banks.	Site 7. Clashduff River. Upstream from bridge at V 81612 51841 to V 81590 51588, downstream of confluence with Adrigole River. Total length of stretch searched 230m. Scattered adults present in patches of suitable habitat along banks.
	
Site 8. Adrigole River. Upstream from bridge at V 81431 51216 to V 81479 51437. Total stretch searched c.275m. Scattered adults in patches of suitable habitat.	Site 8. Adrigole River. Upstream from bridge at V 81431 51216 to V 81479 51437. Total stretch searched c.275m. Scattered adults in patches of suitable habitat.
	
Site 9. Adrigole River. Upstream of Adrigole Bridge. Mostly unsuitable habitat (bedrock, mobile boulders) up to V 81226 50625. Abundant mussels under western bank upstream of bend at V 81185 50724 and for 50m upstream, then absent. Major bank protection works probably damaged population at this location.	Site 9. Adrigole River. Upstream of Adrigole Bridge. Mostly unsuitable habitat (bedrock, mobile boulders) up to V 81226 50625. Abundant mussels under western bank upstream of bend at V 81185 50724 and for 50m upstream, then absent. Major bank protection works probably damaged population at this location.



Locations and results of *Margaritifera* search sites on the Adrigole River (Co. Cork).



Shell length frequency distribution recorded for the Adrigole River.

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Adrigole River. **Abundance:** Good numbers of mussels were observed at locations in four of the nine stretches searched in the Adrigole system. A significant population of mussels is present in the Adrigole River. The highest density observed was at V 82550 52093, where 34 mussels were recorded in a 0.25m^2 quadrat (equivalent to 136 mussels per square meter). **Distribution in river:** Although widely distributed in the Adrigole River, the highest densities of mussels were observed upstream of the confluence with the Clashduff River, in stretches containing extensive areas of suitable stable substrate habitat. Several substantial mountain lakes are present in the headwaters of the Adrigole River. Downstream of the Clashduff River confluence much of the habitat was more torrential in nature, with extensive areas of unstable substrate, and mussel numbers were lower. **Demography of population:** Although no live juvenile mussels were observed in the Adrigole River system, dead shells measuring 29.5mm and 35mm were recorded at V 82550 52093. This indicates that some level of juvenile recruitment has occurred very recently in the Adrigole River. The smallest live mussels observed were 45.3mm and 48.7mm in Sites 8 and 7 respectively. Only a single juvenile search quadrat was investigated on the Adrigole River and further juvenile searches would be required to ascertain the level of juvenile recruitment occurring. **Habitat conditions:** Although the quality of the habitat present in the Adrigole River was generally high, light growth of filamentous algae was observed at five of the nine stretches assessed, and heavy filamentous algal growth was recorded in one stretch (Site 7). In a recent EPA assessment (2003), a Q Value of 4-5 was recorded just upstream of Adrigole Bridge, however, EPA assessment of WFD status (2005) suggests that the main channel of the Adrigole River upstream of the Clashduff confluence is at risk of failing to meet good status in 2015. This is a matter of concern, as the main body of the *Margaritifera* population is located in this part of the Adrigole River. This is a very small catchment with a single intensive forestry plantation (on east bank just upstream of Adrigole Bridge) and relatively small areas of agricultural activity. The main body of the *Margaritifera* population is located in a three-kilometre stretch extending upstream from the confluence with the Clashduff River. Substrate material had apparently been removed from the riverbed at V 82640 52232 using a tracked machine, and *Margaritifera* shells were visible on the heaps of spoil. **Conservation status in river**: Uncertain, but requiring further investigation. Given the small size of the catchment, the low levels of intensive forestry and agriculture, the localisation of the main body of the *Margaritifera* population in a 3.0km stretch, and the relatively high quality of the habitat, it should be possible to successfully conserve the relatively large population of *Margaritifera* present in this river. However, the apparent absence of juveniles and paucity of small mussels is a cause of concern. Further investigation is necessary to accurately quantify the size, and ascertain the reproductive status of this population.

3.12. Trafrask River, Co. Cork.

River: Trafrask River (Co. Cork).	**Catchment:** Trafrask.
Number of sites: 7.	**Start/ End GPS:** From tidal area at V 84945 49355 upstream to V 86622 50481.
Date: July 8th, 21st, 2008.	**Weather:** Dry, sunny.
Surveyors	E. Ross, K. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Lough More outflow, just north of R572 Road at V 86804 50110.	1 No mussels observed, but search not conclusive.	5 Stream only 0.75m wide, 35cm deep with stable substrate.	5(B) Moorland with rough grazing (cattle).
2	Road bridge on tributary joining Trafrask north of Dromagowlane (V 85187 49987). Searched 100m upstream and 30m downstream of this bridge.	1 No evidence of mussels.	4 Habitat clean but unsuitable. Torrential section with unstable boulder/cobble substrate.	3/4 Rough Grazing.
3	Upstream from V 86570 50453 to V 86622 50481.	4 Good numbers of mussels in patches (12 in 20m).	1, 5 Patches of suitable habitat. Macrophyte cover of 80% in unshaded areas.	5(B) Moorland with rough grazing. Some willow scrub. Cattle accessing river.
4	Searched from V 85842 50109 upstream to V 86155 50267. Total length of stretch searched was 470m.	4 Mussels abundant, but no small mussels or juveniles observed.	6 Extensive suitable habitat. No filamentous algae or macrophytes in generally heavily shaded stretch.	3 River runs through strip of deciduous woodland (Oak, holly, willow). Rough grazing (cattle, light) on small fields behind woodland on northern bank. Moorland behind woodland on southern bank.
5	Searched from V 85421 49895 upstream to V 85638 50039. Total length of stretch searched was 330m.	4 Good numbers of mussel (abundant in patches).	6 Extensive suitable habitat. Mostly heavily shaded.	1(S), 3 Silage cut along northern bank. Some silage cut on southern bank but upper part had moorland.
6	River from R572 Road Bridge at V 85162 49614 upstream to V 85421 49895. Total length of stretch searched was 480m.	1 No evidence of mussels.	2, 4 Mostly clean but unsuitable habitat. Exposed bedrock and unstable mobile	3/4, 6 Rough grazing on eastern bank. Narrow strip of deciduous woodland

			substrate. Light cover of filamentous algae on 30% of substrate.	between river and road on western bank.
7	From tidal area upstream to R572 Road bridge at V 85162 49614. Total length of stretch searched was 360m.	1 No evidence of mussels. Road bridge.	2, 5 Very limited patches of suitable habitat. Mostly mobile boulder/cobble or gravel substrates with some exposed bedrock. Heavy filamentous algal growths cover 50% of substrate in unshaded areas.	3/4 Rough grazing on both banks.

Site 1. Trafrask River. Lough More outflow, just north of R572 Road at V 86804 50110. Stream only 0.75m wide, 35cm deep with stable substrate. No mussels observed, but search not conclusive.

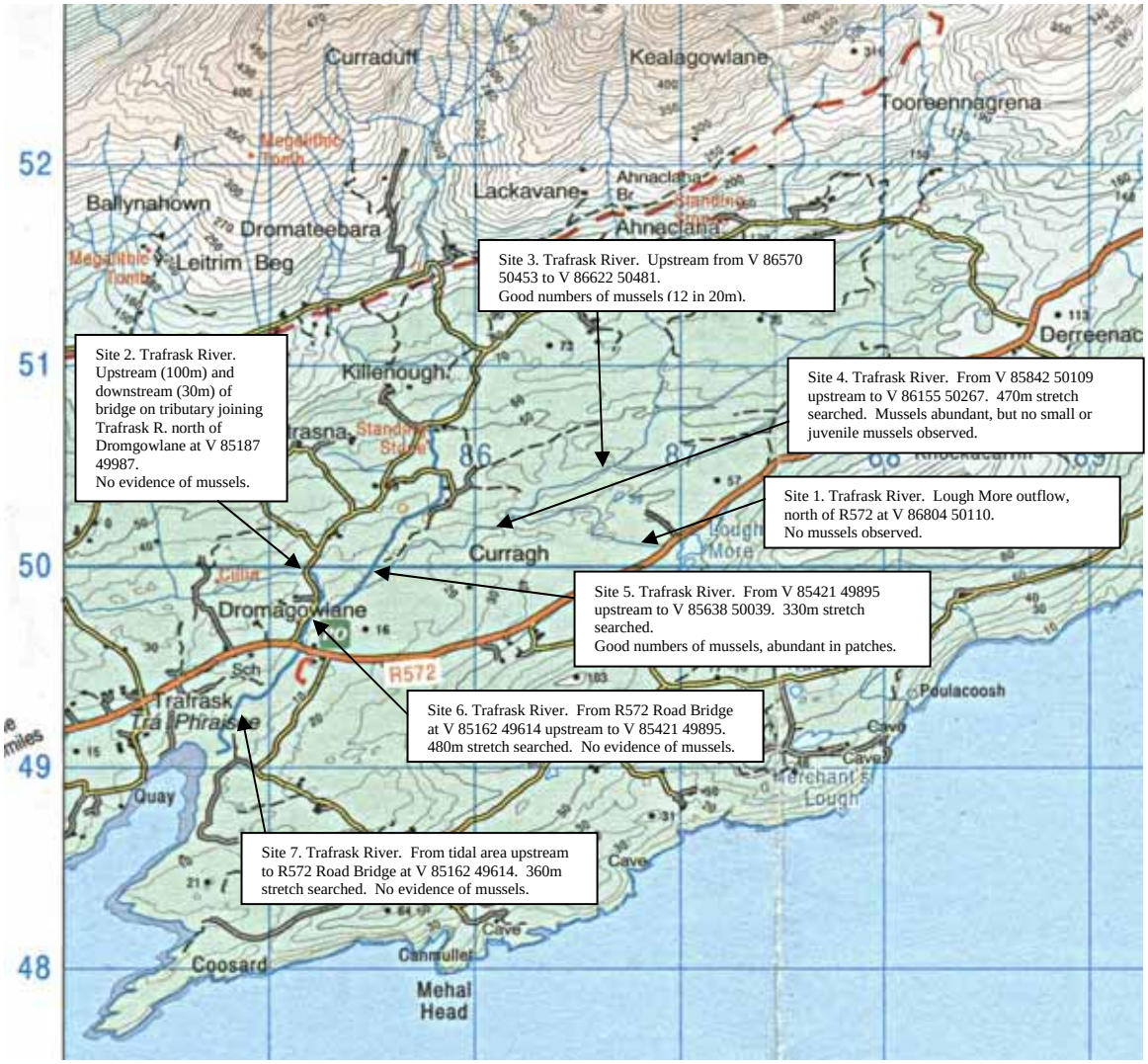
Site 1. Trafrask River. Lough More outflow, just north of R572 Road at V 86804 50110. Stream only 0.75m wide, 35cm deep with stable substrate. No mussels observed, but search not conclusive.

Site 2. Trafrask River. Road bridge on tributary entering north of Dromagowlane (V 85187 49987). No evidence of mussels for 100m upstream and 30m downstream of this bridge. Habitat unsuitable.

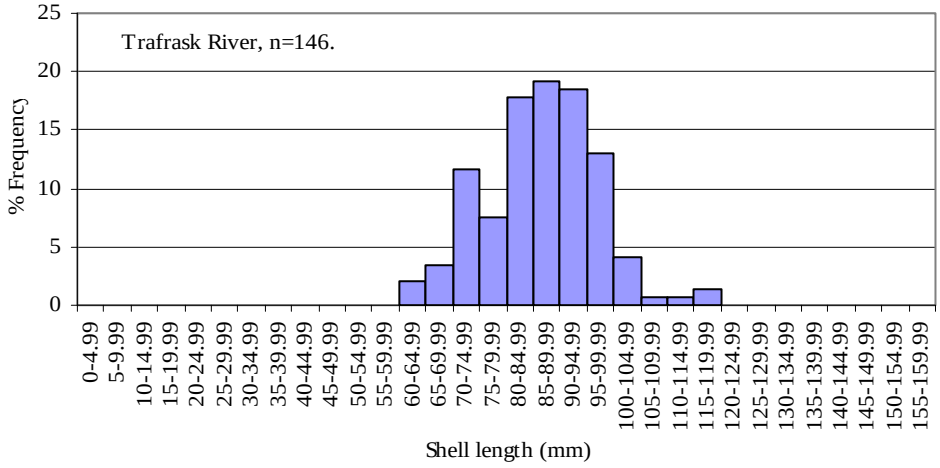
Site 2. Trafrask River. Road bridge on tributary entering north of Dromagowlane (V 85187 49987). No evidence of mussels for 100m upstream and 30m downstream of this bridge. Habitat unsuitable.

	
Site 3. Trafrask River. Upstream from V 86570 50453 to V 86622 50481. View of riparian habitat.	Site 3. Trafrask River. Upstream from V 86570 50453 to V 86622 50481. Good numbers of mussels in patches (12 in 20m). Rough grazing with mainly willow scrub, cattle access to river.
	
Site 4. Trafrask River. View of Quadrat site located c.60m downstream of cattle crossing point at V 86155 50267, in northern channel around island. Searched from V 85842 50109 upstream to V 86155 50267. Mussels abundant, but no small mussels or juveniles observed.	Site 4. Trafrask River. View of substrate containing high densities of mussels in the vicinity of the quadrat site. No small mussels or juveniles observed at this location.
	
Site 5. Trafrask River from V 85421 49895 upstream to V 85638 50039. Good numbers of mussel (abundant in patches). Extensive suitable habitat.	Site 5. Trafrask River from V 85421 49895 upstream to V85638 50039. View of mussels in substrate. Good numbers of mussel (abundant in patches). Extensive suitable habitat.

	
Site 6. Trafrask River, view upstream from R572 Road bridge. No evidence of mussels observed in this section. Mostly unsuitable habitat due to bedrock or unstable substrates.	Site 6. Trafrask River, section immediately upstream of R572 Road bridge. Upstream limit of this section at confluence V 85421 49895. No evidence of mussels observed in this section.
	
Site 7. Trafrask River, view upstream towards R572 Road Bridge. No mussels or shells observed downstream of R572 Road Bridge. Limited patches of suitable habitat.	Site 7. Trafrask River, view of river just upstream of tidal area (V 84945 49355). No mussels or shells observed downstream of R572 Road Bridge. Limited patches of suitable habitat along banks.



Locations and results of *Margaritifera* search sites on the Trafrask River (Co. Cork).



Shell length frequency distribution recorded for the Trafrask River.

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Trafrask River. **Abundance:** Given the very small size of the Trafrask River (5.0km below 100m elevation), a relatively large population of *Margaritifera* is present, with very high densities of mussels observed. Good numbers of mussels were observed in three adjacent

	sites (3, 4 and 5), and mussels were recorded as abundant in parts of Sites 4 and 5. Only a single quadrat search was carried out (at approximately V 86094 50195 – poor GPS coverage under trees), but mussel density was extremely high at that location, with 64 mussels recorded in a 0.25m^2 quadrat (equivalent to 256 mussels per square meter). **Distribution in river:** The Trafrask River is very small system, with only 5km of the main channel below 100m in elevation. Significant densities of mussels were observed in a 1.5km section of the river (consisting of Sites 3, 4 and 5) extending downstream from V 86622 50481 to the confluence at V 85421 49895. Downstream of this point no mussels were observed. **Demography of population:** Only a single quadrat search was undertaken for juveniles. Although adult density was extremely high at the quadrat location, no juvenile mussels were observed and the smallest mussel recorded in the Trafrask River was 60.4mm in length (Site 4). **Habitat conditions:** Habitat conditions were generally good with the exception of the stretch downstream from the R572 Road Bridge at V 85162 49614, where heavy growths of filamentous algae were present in unshaded areas. Light growth of filamentous algae was recorded in Site 6 (immediately upstream of R572 Road Bridge) and significant growths of macrophytes (up to 80% cover) were observed in unshaded areas of Site 3. Locations with high mussel densities were generally heavily shaded. The catchment had little in the way of intensive forestry or intensive agriculture, particularly on the southern side of the catchment, where land use consisted mainly of rough grazing on moorland. EPA data for 2003 indicates continuing satisfactory water quality with a Q Value of 4-5 recorded at the R572 Road Bridge, and in relation to WFD assessment, the Trafrask River is expected to achieve good status by 2015. **Conservation status in river**: Uncertain, but requiring further investigation. Given the small size of the catchment, the low levels of intensive forestry and agriculture, the localisation of the main body of the *Margaritifera* population in a 1.5km stretch, and the relatively high quality of the habitat, it should be possible to successfully conserve the relatively large population of *Margaritifera* present in this river. However, the apparent absence of juveniles and small mussels is a cause of concern. Further investigation is necessary to accurately quantify the size, and ascertain the reproductive status of this population.

3.13. Reen River, Co. Cork.

River: Reen (Cork).	**Catchment:** Reen.
Number of sites: 5	**Start/ End GPS:** From tidal area at Reen Bridge, upstream to V 77898 49626
Date: July 23rd, 24th, 2008.	**Weather:** Dry, sunny.
Surveyors	E. Ross, K. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Upstream from V 78378 49606 to the confluence at V 77898 49626. Total length of stretch searched was 650m.	1 No evidence of mussels.	2 Habitat generally unsuitable due to unstable torrential substrate. Heavy growth of filamentous algae covers 100% of the substrate.	1(S), 3/4 Intensively managed silage production on southern bank. Fields adjacent to river spread with slurry. Rough unimproved (mountain) grazing on northern bank
2	Upstream from V 79405 49486 to V 78651 49418. Total length of stretch searched was 950m.	1 No evidence of mussels.	2 Habitat was generally unsuitable due to the unstable and torrential nature of the substrate. Filamentous green algal cover ranged from 0% to 20% (heavy).	1(S), 3 Silage cut on southern bank with some rough cattle grazing (light) at upper end of stretch. Mostly grazing in small fields on northern bank.
3	Upstream from V 79768 49643 to V 79551 49487. Total length of stretch searched was 480m	3 Scattered adults. 3 mussels observed in this 480m stretch.	2, 5 Limited patches of suitable habitat under banks. Heavy growth of filamentous green algae on 50% of substrate, particularly in unshaded areas.	1(S), 4 Silage cut on both banks, with sheep grazing on southern bank.
4	Upstream along northern tributary to V 79515 79684. Total length of stretch searched was 100m.	1 No evidence of mussels.	2, 3, 5 Patches of suitable habitat present but very heavy growth of filamentous green algae (100%) and heavy siltation observed.	1(S), 4 Silage cut on southern bank, rough grazing on northern bank.
5	From tidal area at Reen Bridge upstream to V 79768 49643. Total length of stretch searched was 345m.	1 No evidence of mussels.	2, 5 Patches of suitable habitat along banks in this 345m stretch. Only 5% cover of filamentous green algae under generally	1(S), 3,4 Silage cut on northern bank with sheep grazing. Cattle grazing in fields on southern bank.

			heavy shade from deciduous trees. Salmonids >10cm abundant.	

Site 1. Reen River. Upstream from V 78378 49606 to the confluence at V 77898 49626. Total length of stretch searched was 650m. View (above) of intensive silage production in fields adjoining river. No evidence of mussels. Habitat generally unsuitable due to unstable torrential substrate. Heavy growth of filamentous green algae covers 100% of the substrate.

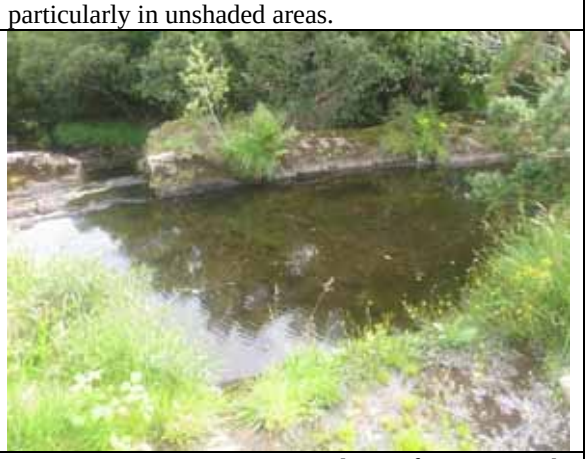
Site 1. Reen River. View of land use adjacent to the Reen River at Site 1. Silage cut and fields adjoining river spread with slurry. Heavy growth of filamentous green algae covered 100% of the substrate. Habitat torrential and unsuitable for *Margaritifera*.

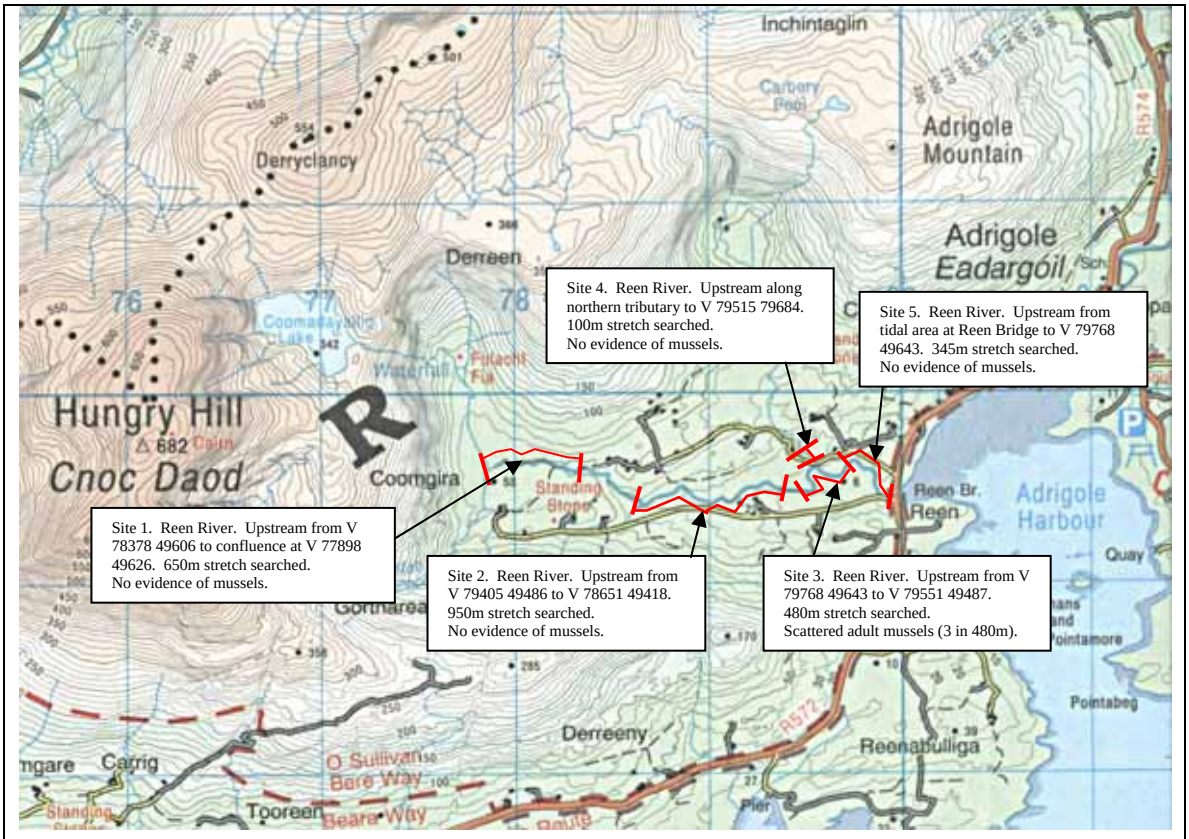
Site 2. Reen River. View of the habitat at V 79405 49486, the downstream limit of this search stretch. No evidence of mussels observed in this 950m long stretch which extended upstream to V 78651 49418.

Site 2. Reen River. View of the habitat at V 78651 49418, the upstream limit of this search stretch. Habitat was generally unsuitable due to the unstable and torrential nature of the substrate. Filamentous green algal cover ranged from 0% to 20% (heavy).

Site 3. Reen River. View upstream at V 79729 49627. Site 3 extended from V 79768 49643 upstream for 480m to V 79551 49487. Total of 3 mussels observed in this stretch. Limited patches of

Site 3. Reen River. View of the substrate at V 79551 49487. Patches of suitable habitat with scattered adults (only 3 in 480m). Heavy growth of filamentous green algae on 50% of substrate,

suitable habitat under banks.	particularly in unshaded areas.
	
Site 4. Reen River. Upstream limit of 100m stretch searched on northern tributary stream at V 79515 79684. Patches of suitable habitat present but very heavy growth of filamentous green algae and heavy siltation observed. No evidence of mussels.	Site 4. Reen River. Upstream limit of 100m stretch searched on northern tributary stream at V 79515 79684. Bedrock, falls and pools above confluence with Reen river. Some suitable habitat but heavy siltation and heavy growth of filamentous algae.
	
Site 5. Reen River. From tidal area at Reen Bridge upstream to V 79768 49643. Patches of suitable habitat along banks in this 345m stretch. No evidence of mussels. Only 5% cover of filamentous green algae under generally heavy shade from deciduous trees. Salmonids >10cm abundant.	Site 5. Reen River. View of habitat upstream of Reen Bridge. Heavily shaded series of riffles and glides with 20% bryophyte cover and patches of suitable habitat under banks. No evidence of mussels.



Locations and results of *Margaritifera* search sites on the Reen River (Co. Cork).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Reen River. **Abundance:** Although mussels were found to be present in the Reen River, the population present is extremely small, consisting only of a handful of individuals. Only three individual mussels were observed throughout the river. **Distribution in river:** All three individual mussels recorded were found in the 480m stretch comprising Site 3. The locations of these mussels were V 79712 49605, V 79519 49540, and V 79551 49487. Although some suitable habitat was present in the river, it was generally restricted to patches under the banks. Much of the habitat in the river was unsuitable because of its unstable torrential nature. **Demography of population:** All three mussels observed were large adults. No dead shells were observed. **Habitat conditions:** Heavy growths of filamentous algae were present along the length of the river with the exception of the most downstream stretch (Site 5) which was heavily shaded. Although siltation was absent from most of the river, the northern tributary joining the Reen River at V79558 49616 was heavily silted. Intensive agricultural practices were evident along the river with large areas of silage harvesting, and slurry being spread on lands adjacent to the river at the furthest upstream site (Site 1, see photograph above). Although EPA assessment of WFD status states that the Reen River is expected to achieve good status by 2015, the presence of heavy filamentous algal growths suggests that the river is being affected by a significant degree of eutrophication. **Conservation status in river**: Unfavourable.

3.14. Leamawaddra River, Co. Cork.

River: Leamawaddra River.	**Catchment:** Leamawaddra River.
Number of sites: 6.	**Start/ End GPS:** From W 02762 39690 down to Bealaclare Bridge at W 02171 34299.
Date: August 6th, 2008.	**Weather:** Dry, sunny.
Surveyors	E. Ross, K. Ross.

Categories:

Mussel Quality	**1**	**2**	**3**	**4**	**5**	**6**
	No evidence	Dead shells only	Scattered adults	Good numbers adults, no juveniles	Adults and some juveniles	Excellent age profile
Substrate quality	**1**	**2**	**3**	**4**	**5**	**6**
	Macrophytes	Fil. algae	Siltation	Clean but unsuitable habitat	Patches of suitable habitat	Extensive suitable habitat
Land use	**1**	**2**	**3**	**4**	**5**	**6**
	T= tillage S = silage U = urban O = other	Coniferous forestry	Cattle grazing Severe / light	Sheep grazing Severe / light	U = unimproved grassland B = bog N = native woodland	Other (make notes)

Site number	GPS start / end	Mussel quality	Substrate quality	Land use
1	Leamawaddra River. From bridge south of Scarteenakillin at W 02762 39690 upstream to W 02775 39735. Total length of stretch searched c.160m.	1 No evidence of mussels.	4 Clean but unsuitable habitat, due to mobile unstable substrate.	1(S), 5 Unimproved grazing on western bank, silage cut on eastern bank. Cattle accessing river just upstream of bridge.
2	Leamawaddra River. From W 01933 37964 downstream of bridge near Derreenard (W 01983 37931), to W 02014 38026. Total length of stretch searched was c.150m.	3 Scattered adult mussels.	1, 2, 5 Small but heavy patches of filamentous algal growth (5%) in unshaded areas. 20% crowsfoot cover. Patches of suitable habitat away from areas of exposed bedrock.	2, 3 Coniferous forestry on both banks downstream of bridge. Improved grazing on both banks upstream of bridge. Cattle accessing river along entire stretch.
3	Leamawaddra River. Searched upstream from Glannakilleenagh Bridge to W 01847 37520. Total length of stretch searched upstream was c.60m.	3 Scattered adult mussels.	1, 2, 6 Some filamentous algae (5% cover) in unshaded areas. 10% crowsfoot. Extensive suitable habitat, but substrate may be mobile.	1(S), 3 Silage cut on eastern bank, intensive cattle grazing on western bank. River heavily overgrown with fallen trees.
4	Leamawaddra River. Searched upstream from bridge at Lisheenacrehig (W 01853 36296) to W 01715 36472. Length of stretch searched c. 210m.	3 Scattered adult mussels.	1, 2, 5 20% macrophyte cover (Umbelliferae, crowsfoot), 40% filamentous algae (light). Patches of suitable habitat away from bedrock. Substrate may	1(S), 3 Silage cut on both banks with cattle grazing. Intensively managed grazing.

			be mobile.	
5	Leamawaddra River. Searched upstream from Crooked Bridge at W 02285 34845 to W 02251 34997. Total length of stretch searched c.160m.	4 Good numbers of adult mussels, abundant in small patches.	1, 6 Heavy growth of macrophytes (40% Umbelliferae and crowsfoot) upstream of initial bedrock section.	3, 6 Cattle grazing on western bank with cattle accessing river at W 02251 34997. Rough grazing (willow and ferns) on eastern bank.
6	Leamawaddra River. Searched upstream from Bealaclare Bridge (W 02171 34299) to W 02158 34395. Total length of stretch searched c.100m.	4 Good numbers of adult mussels, abundant in patches. Mussels generally old and relatively small.	1, 6 Some unshaded areas with heavy macrophyte cover. Extensive suitable habitat.	6 Road borders western riverbank, land use on eastern bank not recorded.

Site 1. Leamawaddra River. From bridge south of Scarteenakillin at W 02762 39690, upstream to W 02775 39735. Total length of stretch searched c.160m.
No evidence of mussels.

Site 1. Leamawaddra River. From bridge south of Scarteenakillin at W 02762 39690 upstream, to W 02775 39735. Total length of stretch searched c.160m. Unstable mobile substrate mostly.
No evidence of mussels.

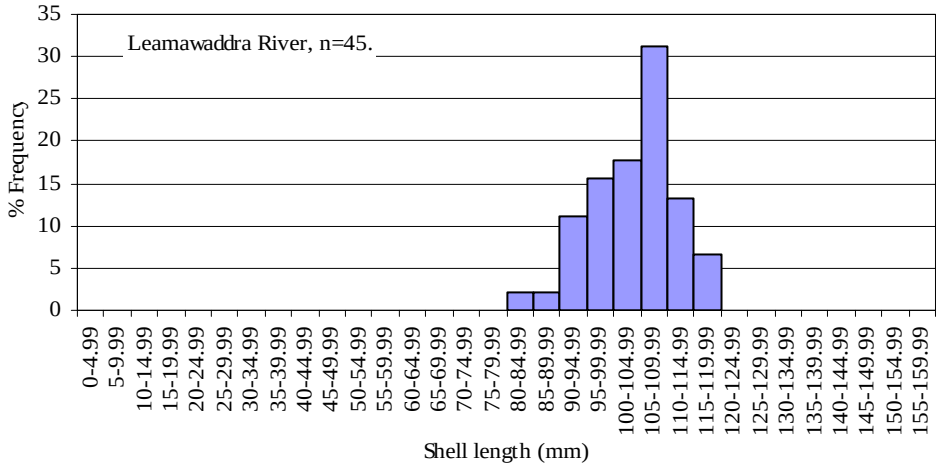
Site 2. Leamawaddra River. From W 01933 37964 downstream of bridge near Derreenard (W 01983 37931), to W 02014 38026. Total length of stretch searched was c.150m. Patches of suitable habitat away from areas of exposed bedrock.
Scattered adult mussels present.

Site 2. Leamawaddra River. From W 01933 37964 downstream of bridge near Derreenard (W 01983 37931), to W 02014 38026. Total length of stretch searched was c.150m. Patches of suitable habitat away from areas of exposed bedrock.
Scattered adult mussels present.

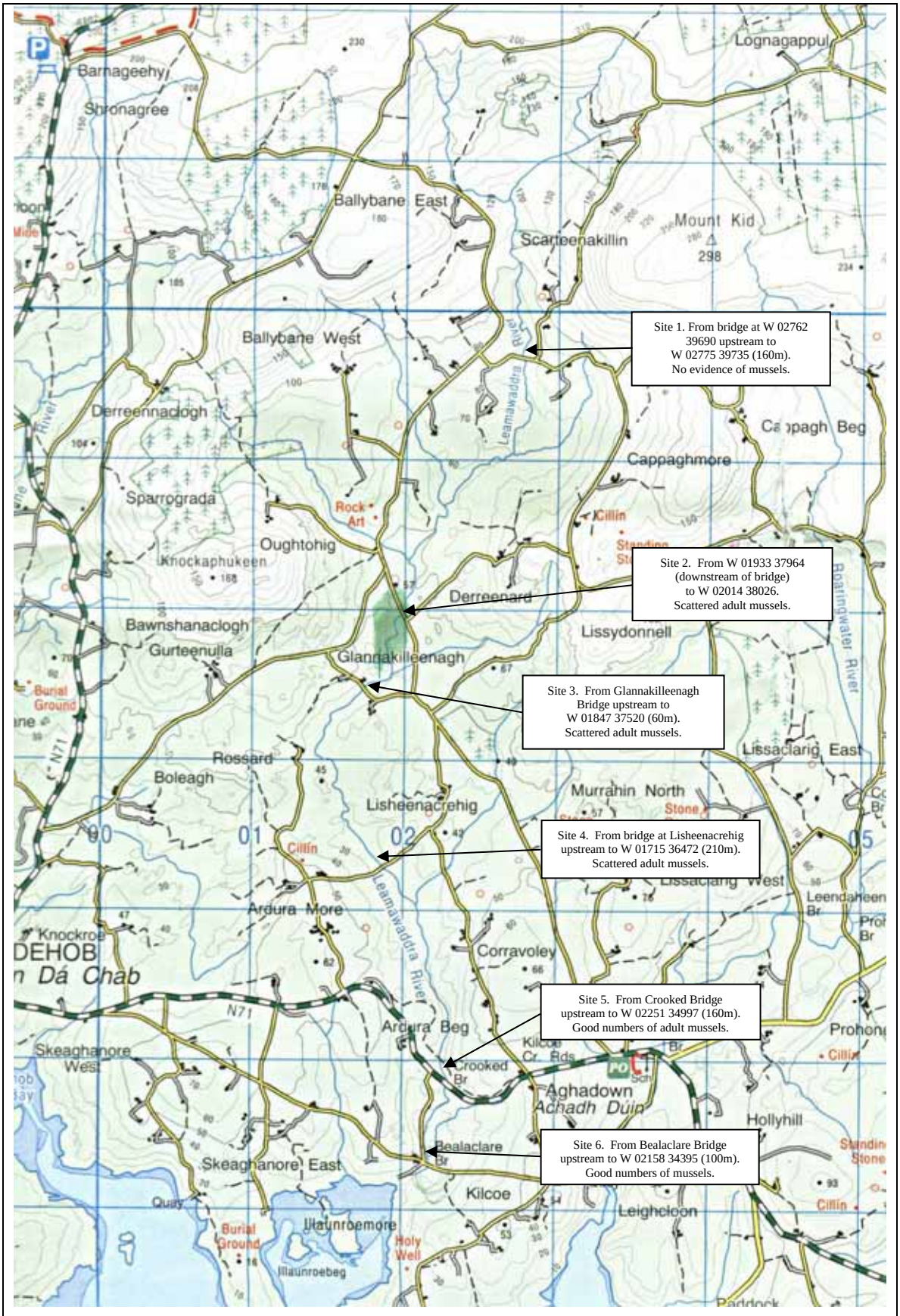
	
Site 3. Leamawaddra River. View downstream from Glannakilleenagh. Total length of stretch searched upstream of bridge was c.60m. Extensive suitable habitat with scattered adult mussels.	Site 3. Leamawaddra River. View upstream from Glannakilleenagh Bridge. Total length of stretch searched upstream to W 01847 37520was c.60m. Extensive suitable habitat with scattered adult mussels.
	
Site 4. Leamawaddra River. View of a mussel in the substrate upstream of bridge at Lisheenacrehig (W 01853 36296). Searched upstream to W 01715 36472. Length of stretch searched c. 210m. Patches of suitable habitat away from bedrock. Scattered adult mussels present.	Site 4. Leamawaddra River. View of river upstream of bridge at W 01853 36296. Patches of suitable habitat, but substrate probably mobile. Scattered adult mussels present.
	
Site 5. Leamawaddra River. Searched upstream from Crooked Bridge at W 02285 34845 to W 02251 34997. Heavy growth of macrophytes upstream of initial bedrock section (above). Good numbers of mussels generally, and abundant in patches away from bedrock substrate.	Site 5. Leamawaddra River. Searched upstream from Crooked Bridge at W 02285 34845 to W 02251 34997. Heavy growth of macrophytes upstream of initial bedrock section (above). Good numbers of mussels generally, and abundant in patches away from bedrock substrate.

Site 6. Leamawaddra River. Searched upstream from Bealaclare Bridge (W 02171 34299) to W 02158 34395. Total length of stretch searched c.100m. Extensive suitable habitat with abundant mussels in patches. Mussels generally old (above) and relatively small.

Site 6. Leamawaddra River. Searched upstream from Bealaclare Bridge (W 02171 34299) to W 02158 34395. Total length of stretch searched c.100m. Extensive suitable habitat with abundant mussels in patches. Mussels generally small and old (above). Photograph of salmon at Bealaclare Bridge.



Shell length frequency distribution of *Margaritifera margaritifera* recorded in the Leamawaddra River, Co. Cork.



Locations and results of *Margaritifera* search sites on the Leamawaddra River (Co. Cork).

Overall Comment on river	***Margaritifera* presence/absence:** Mussels were present in the Leamawaddra River. **Abundance:** Mussels were observed at five of the six sites investigated on the Leamawaddra River. Densities were generally low, with scattered mussels recorded at three sites, and good numbers of mussels observed at the remaining two sites, where mussels were recorded as abundant in patches. **Distribution in river:** Mussels were widely distributed along the Leamawaddra River, and the only site not found to contain mussels was the furthest upstream at Site 1 (W 02762 39690). Highest densities were recorded at the two furthest downstream sites at Bealaclare Bridge (Site 6, W 02171 34299) and Crooked Bridge (Site 5, W 02285 34845). **Demography of population:** No juveniles or small mussels were observed and the smallest mussel recorded was 84.6mm in length, suggesting that no significant recruitment has occurred in recent years. Mussels were relatively small with an observed modal length class of 105-110mm, and the largest observed was just 116.5mm. **Habitat conditions:** Although growth of filamentous algae was observed at three sites (2, 3 and 4), growth of macrophytes was recorded at five of the six sites investigated. Heaviest macrophyte growth was observed at the furthest downstream sites (5 and 6). EPA data indicates that the Leamawaddra River has continued in satisfactory condition with Q Values of 4-5 at both EPA sampling stations since 1994, and WFD Assessment indicates that the entire main channel of the Leamawaddra River will achieve good status by 2015. However, the presence of filamentous algae and significant macrophyte growth along the river suggests a degree of eutrophication has occurred, probably associated with the relatively intensive nature of the agriculture throughout much of the catchment. **Conservation status in river**: Unfavourable.

4. Discussion.

During the 2008 phase of this two-year Rapid Assessment exercise, 14 rivers in 9 river systems have been investigated. As mussels were recorded in all 9 of these systems, results confirm that *Margaritifera* is still widely distributed in the areas of Counties Limerick, Kerry and Cork covered by this exercise.

Although based only on rapid assessments, most of the rivers examined are estimated to have relatively small populations. However, relatively large numbers and high densities of mussels were found at locations on several rivers, and these contain populations that are significant in a national and possibly international context.

4.1. Recommendations for further investigations.

Adrigole River: This is a very small river flowing off the southern side of the Caha Mountains into Bantry Bay. Although only approximately 9.5km in length, this river was found to contain a significant population of *Margaritifera*. Some small mussels were located there and dead shells of 29.5mm and 35mm were also recovered, indicating that some level of juvenile recruitment had occurred very recently. Only a single juvenile quadrat search was completed and further searches would be required to ascertain the level of juvenile recruitment occurring. Given the substantial area of mountain lakes present in the headwaters of the catchment, the large and localised population of adults, the low levels of intensive agriculture, and the virtual absence of intensive coniferous forestry plantations, the *Margaritifera* population in this river should be further investigated. Additional Stage 2 and Stage 3 Survey data is required to ascertain if the *Margaritifera* population present is in favourable conservation status.

Trafrask River: This is the adjacent catchment to the east of the Adrigole River system. The Trafrask River is another very small system with approximately 5km of river channel below the 100m elevation contour. The relatively large *Margaritifera* population present is concentrated in a stretch of 1.5km around Sites 3, 4 and 5, and like the adjacent Adrigole system, the catchment has low levels of intensive agriculture and forestry. Although no juveniles were observed and small mussels were rare, only a single juvenile quadrat search was undertaken, and consequently, further Stage 2 and Stage 3 survey data is required to ascertain if the *Margaritifera* population present is in favourable conservation status.

Sneem Ardsheelhane River System: This system contains the largest *Margaritifera* population encountered during the 2008 Rapid Assessment exercise. Although no juvenile mussels (<30mm) were observed in either the Sneem or Ardsheelhane rivers, some very small mussels were recorded, and both channels contain some dense concentrations of mussels. Full scale Stage 2 and Stage 3 surveys should be carried out in these river channels to accurately determine the size, demography and extent of juvenile recruitment to the *Margaritifera* population present.

Other rivers: Significant numbers of mussels were recorded in the Owenascaul and Owreagh Rivers and consideration should be given to undertaking further Stage 2 Surveys to confirm that no localised large concentrations of mussels have remained undiscovered.

4.2. Conditions observed in the rivers investigated.

Growth of instream macrophytes and filamentous algae was recorded at 18(20.5%) and 44(50%) sites respectively, and significant siltation was observed at 25(28.4%) sites on 4

of the river systems (7 river channels) investigated. Such widespread growth of filamentous algae and macrophytes indicates a degree of eutrophication inimical to adequate survival and recruitment levels of juvenile *Margaritifera* in the rivers concerned.

Six of the nine river systems investigated during the current study have been categorised by the EPA as being in "Satisfactory" biological condition (Owenascaul, Owreagh, Reen, Adrigole, Trafrask, Leamawaddra). The main channel of the Feale and the Smearlagh were satisfactory, but the Galey was found to be slightly polluted (EPA 2004, 2005). Although the main Sneem River channel was classed as satisfactory, it was noted that a significant deterioration associated with growth of filamentous algae had occurred in the lower part Ardsheelhane channel (EPA 2003). Deterioration was also noted throughout the main channel of the River Maine, but the Brown Flesk was found to be satisfactory, with the exception of one site where large amounts of filamentous algae were recorded (EPA 2005).

The observed absence of many age/size classes from all the *Margaritifera* populations investigated during the current study indicates that habitat conditions in the rivers concerned are not satisfactory and are not of sufficiently high quality to allow maintenance of the resident *Margaritifera* populations. A mechanism to incorporate increased significance for *Margaritifera* into the estimation of biological quality indices of rivers is essential, so that rivers where the biological quality is insufficient to support a fully functional and normally recruiting *Margaritifera* population are not classified as "satisfactory".

5. Conclusions.

1. A rapid assessment of the *Margaritifera margaritifera* populations in 14 rivers constituting 9 river systems in counties Limerick, Kerry and Cork has been completed.

2. Mussels were widely distributed in 12 of the rivers investigated, constituting all 9 of the river systems investigated.

3. While most of the rivers assessed had relatively small populations of *Margaritifera*, several were found to contain large populations that may be significant in a national or international context.

4. The most significant populations identified during this rapid assessment exercise were those in the Adrigole, Trafrask, Sneem and Ardsheelhane Rivers. Further Stage 2 and Stage 3 surveys should be completed in these rivers.

5. Significant numbers of mussels were recorded in the Owenascaul and Owreagh Rivers and consideration should be given to undertaking further Stage 2 Surveys to confirm that no localised large concentrations of mussels have remained undiscovered.

6. Siltation was observed at 25(28.4%) sites, and the growth of filamentous algae and macrophytes was widespread in the rivers investigated, indicating a degree of eutrophication inimical to the survival and recruitment of juvenile *Margaritifera*.

7. A mechanism to incorporate increased significance for *Margaritifera* into the estimation of biological quality indices of rivers is essential, so that rivers where the biological quality is insufficient to support a fully functional and normally recruiting *Margaritifera* population are not classified as “satisfactory”.

6. References.

Anonymous (2004). *Margaritifera margaritifera*: Stage 1 and Stage 2 survey guidelines. Irish Wildlife Manuals No. 12. Series Editor: F. Marnell.

Anonymous (2008). The status of EU protected habitats and species in Ireland: 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. www.npws.ie

Bauer, G. (1983). "Age structure, age specific mortality rates and population trend of the freshwater pearl mussel (*Margaritifera margaritifera*) in North Bavaria." *Archiv fur Hydrobiologie* **98**, 523-532.

Beasley, C.R., Roberts. D. (1996). "The current distribution of the freshwater pearl mussel *Margaritifera margaritifera* L. 1758 in north-west Ireland." *Aquatic Conservation: Marine and Freshwater Ecosystems* **6**, 169-177.

Hastie, L.C., Young, M.R., Boon, P.J., Cosgrove, P.J. and Henninger, B. (2000a). "Sizes, densities and age structures of Scottish *Margaritifera margaritifera* (L.) populations." *Aquatic Conservation: Marine and Freshwater Ecosystems* **10**, 229-247.

Jackson, J.W. (1925) "The distribution of *Margaritifera margaritifera* in the British Isles." *Journal of Conchology* **17**, 195-211.

Moorkens, E.A. and Costello, M.J. (1994). Imminent extinction of the Nore freshwater pearl mussel *Margaritifera durrovensis* Phillips: a species unique to Ireland. *Aquatic Conservation: Marine and Freshwater Ecosystems* **4**, 363-365.

Moorkens, E. A. (1996). Studies on the Biology and Ecology of *Margaritifera* in Ireland. Unpublished Ph.D. Thesis, Trinity College, Dublin.

Moorkens, E.A. (1999). "Conservation Management of the Freshwater Pearl Mussel *Margaritifera margaritifera.* Part 1: Biology of the species and its present situation in Ireland". Irish Wildlife Manuals No. 8. Series Editor: F. Marnell.

Moorkens, E. A. (2004). Pilot Project for Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Owenriff River SAC, County Galway. Unpublished report for NPWS.

Moorkens, E. A. (2005a). Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Newport River cSAC, County Mayo. Unpublished report for NPWS.

Moorkens, E. A. (2005b). Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Bundorragha River cSAC, County Mayo. Unpublished report for NPWS.

Moorkens, E. A. (2005c). Monitoring Populations of the Freshwater Pearl Mussel. Repeat survey of the Owenriff River SAC, County Galway. Unpublished report for NPWS.

Moorkens, E. A. (2005d). *Margaritifera margaritifera* survey of the River Owenea in the vicinity of Glenties, County Donegal. Unpublished report for Donegal County Council.

Moorkens, E. A. (2006a). Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Eske River cSAC, County Donegal. Unpublished report for the National Parks and Wildlife Service.

Moorkens, E. A. (2006b). Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Clady River cSAC, County Donegal. Unpublished report for the National Parks and Wildlife Service.

Moorkens, E. A. (2006c). Monitoring Populations of the Freshwater Pearl Mussel. 2006 repeat survey of the Owenriff River cSAC, County Mayo. Unpublished report for the National Parks and Wildlife Service.

Ross, E.D. (1984). Studies on the biology of freshwater mussels (Lamellibranchia: Unionacea) in Ireland. M.Sc. Thesis, UCG, National University of Ireland.

Ross, E.D. (1988). The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography. Ph.D. Thesis, UCG, National University of Ireland.

Ross, E.D. (2004a) A Pilot Project to Develop a Monitoring Protocol for the Freshwater Pearl Mussel *Margaritifera margaritifera* (L.) in the Blackwater River, County Kerry, Ireland. Internal National Parks and Wildlife Service Report.

Ross, E.D. (2004b). A Pilot Project to Develop a Monitoring Protocol for the Freshwater Pearl Mussel *Margaritifera margaritifera* (L.) in the Caragh River, County Kerry, Ireland. Internal National Parks and Wildlife Service Report.

Ross, E.D. (2005a). Initiation of a monitoring program for the freshwater pearl mussel, *Margaritifera margaritifera* (L.) in the Licky River. Internal National Parks and Wildlife Service Report.

Ross, E.D. (2005b). Initiation of a monitoring program for the freshwater pearl mussel, *Margaritifera margaritifera* (L.) in the Ownagappul River. Internal National Parks and Wildlife Service Report.

Ross, E. (2006a) Initiation of a monitoring program for the freshwater pearl mussel, *Margaritifera margaritifera* (L.) in the Clodiagh River (Suir). Report to the National Parks and Wildlife Service.

Ross, E. (2006b) Initiation of a monitoring program for the freshwater pearl mussel, *Margaritifera margaritifera* (L.) in the Mountain River (Barrow). Internal National Parks and Wildlife Service Report.

Ross, E.D. (2006c). Report on searches for juvenile *Margaritifera margaritifera* (L.) in the Blackwater River (Co. Kerry). Internal National Parks and Wildlife Service Report.

Ross, E.D. (2006d) Report on searches for juvenile *Margaritifera margaritifera* (L.) in the Caragh River, Co. Kerry. Internal National Parks and Wildlife Service Report.

Ross, E.D. (2006e). Report on searches for juvenile *Margaritifera margaritifera* (L.) in the Dereen River (Co. Carlow). Internal National Parks and Wildlife Service Report.

Wells, S.M., Pyle, R.M. and Collins, N.M. (1983).. The IUCN Invertebrate red data book. International Union for the Conservation of Nature and Natural Resources, Gland (Switzerland), pp145-156.

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