



'Sustainable land use management for the conservation of the freshwater pearl mussel'



AfterLIFE Conservation Plan



An Roinn Tithíochta,  
Rialtais Áitiúil agus Oidhreachta  
Department of Housing,  
Local Government and Heritage



Forest Service



An Roinn Talmhaíochta,  
Bia agus Mara  
Department of Agriculture,  
Food and the Marine



SOUTH KERRY DEVELOPMENT  
PARTNERSHIP CLG.



government supporting communities



AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

## AfterLIFE Conservation Plan for the KerryLIFE Project.

KerryLIFE

*Sustainable land use management for the conservation of the freshwater pearl mussel*  
LIFE13 NAT/IE/000144

Project location	Southwest Ireland
Project start date	16/06/2014
Project end date	31/08/2020
Total project duration	66 months
Total budget	€5,010,581
Total eligible budget	€4,301,698
EU contribution	€2,150,849
(%) of total costs	43%
(%) of eligible costs	50%

### Coordinating Beneficiary

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### Associated Beneficiaries

Name(s)	Department of Agriculture, Food and the Marine (Nitrates, Engineering and Biodiversity Division and Forest Service Division)
	Teagasc – Agricultural and Food Authority
	Coillte Teoranta – Irish State Forestry Board
	South Kerry Development Partnership CLG
	Pobal

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## Preface

This After-LIFE conservation plan represents the final output of the KerryLIFE project “Sustainable land use for the conservation of the freshwater pearl mussel”. The purpose of this document is to outline how the project’s actions will be carried forward, both within the project area and beyond. An overview is presented of the pressures and threats that are affecting the freshwater pearl mussel in the Caragh and Blackwater (Kerry) catchments and summary of the projects main achievements and outcomes.

## Introduction

The freshwater pearl mussel (*Margaritifera margaritifera*) is one of the most critically endangered species in Europe. Individuals can grow to more than 15 cm in length, slowly building up thick calcareous shells in rivers with relatively soft water and low levels of calcium. The freshwater pearl mussel has a complex life cycle producing free-living glochidial larvae that require an intermediary fish host, typically Atlantic salmon (*Salmo salar*) and sea trout (*S. trutta*) in Ireland, to complete their life cycle. After 9 months, the larvae develop into juvenile mussels and drop off their hosts where they bury into gravel and sand substrate of the river bed, feeding, breathing and growing for the first five years. Once large enough to withstand the flows they settle part-buried in the river bed where they filter-feed and can live for over 100 years.



Fig. 1 Freshwater pearl mussel and host salmonid fish

In many rivers, riverbeds have become too clogged with silt, algae and rooted plants for young mussels to survive, while in others adult mussels have become stressed and are prematurely dying owing to habitat deterioration. The pressures affecting the mussels' habitat come from a wide variety of point or diffuse sources throughout the catchment. The role of pollution (e.g. excess sediment and plant nutrients) associated with the farming and forestry sectors, together with changes in flow caused by land drainage, have been highlighted as important contributors to the species' demise, affecting in particular where juvenile mussel live in the bed of the river.

Commencing in 2014, the 'Sustainable land use for the conservation of the freshwater pearl mussel' (KerryLIFE) project was a partnership project between the National Parks and Wildlife Service of the then Department of Culture, Heritage and the Gaeltacht (now in the Department of Housing, Local Government, and Heritage), Department of Agriculture, Food and the Marine (the Nitrates, Biodiversity and Engineering Division and the Forest Service), Teagasc, Coillte, South Kerry Development Partnership and Pobal. These key stakeholders with backgrounds in nature conservation, agriculture, forestry, and rural and social development, worked together with the two local communities, Glencar<sup>1</sup> and Blackwater, to demonstrate practical conservation measures designed to address the principal pressures and threats affecting freshwater pearl mussels. This complemented ongoing work at a national, European and international level to address pressures and threats to freshwater pearl mussels throughout their range.

The project operated in the Blackwater and Caragh river catchments situated on the Iveragh Peninsula in southwest Ireland. These rivers and their catchments are designated under the Habitats Directive (92/43/EEC) as Special Areas of Conservation (SAC) for freshwater pearl mussel, *Margaritifera margaritifera* (L.) amongst other species and habitats. The Caragh and the northern part of the Blackwater (Kerry) catchments are part of the Killarney National Park, MacGillycuddy Reeks, and Caragh Catchment SAC (Site Code IE000365) and southern part of the Blackwater lies within the Blackwater (Kerry) SAC (Site Code IE002173).

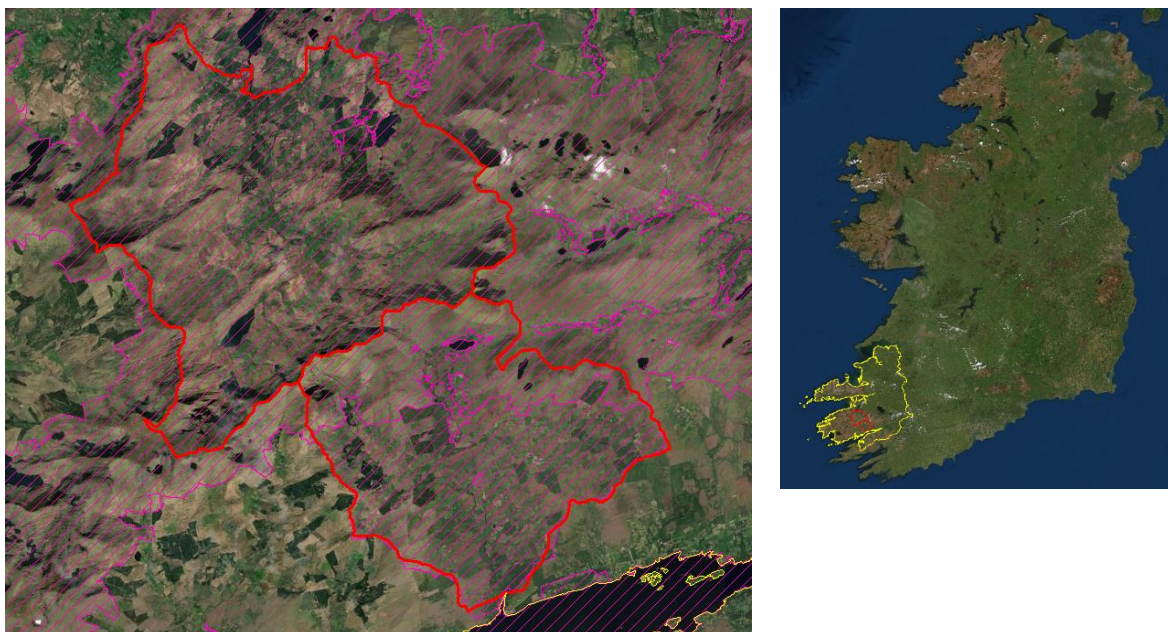


Fig. 2 Map of KerryLIFE project area

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<sup>1</sup> Glencar is the name of the area the Caragh river flows through.

The objectives of the project were as follows:

- To demonstrate effective conservation measures that will restore the freshwater pearl mussel to favourable conservation condition in the Caragh and Blackwater catchments.
- To enhance awareness and understanding of the freshwater pearl mussel amongst local stakeholders.
- To demonstrate sustainable management techniques for farming and forestry in freshwater pearl mussel catchments.
- To provide guidance for farming and forestry practices that support the conservation of freshwater pearl mussels.

## The main achievements of KerryLIFE

The project worked closely with farmers and forest-owners within these two SACs. The original target area was 2,500 ha of farmland and 515 ha of forestry (in both public and private ownership) was exceeded with 5,038 ha of farmland and 542 ha of forest involved. By project end at 31<sup>st</sup> August 2020, the key deliverables and outputs achieved were:



Improved freshwater pearl mussel habitat condition



Worked with 42 participants (farmers and/or forest-owners)



Blocked 122 drains



Created 5.9 km of buffers



Re-vegetated 76 km of drains

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Blocked 122 drains

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Planted 2.6 km of hedgerow



Created 5.9 km of buffers

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Reduced sediment losses by improving the condition of 427 ha of critical source area



Enhanced livestock management facilities



Reduced nutrient inputs on farms across 501 ha



Installation of 262 alternative livestock drinking facilities





Surveyed 542 ha of forestry



Established 27 ha of native woodland



Conserved 14.1 ha of existing woodland



Restructured 178 ha of conifer plantation to long-term retention woodland or open peatland habitat



Converted 50.2 ha of conifer plantation to long-term retention native woodland

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Trialled novel mitigation measures e.g. grass over-sowing with *Holcus lanatus* and *Agrostris capillaris*

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Trialled novel firebreak methods e.g. birch planting, grazed firebreak and controlled burning.

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Collected and collated extensive baseline information on the condition of the freshwater pearl mussel populations and associated habitats.



Up skilled and trained farmers and forest-owners



Created 7.6 km of looped walkways



Raised awareness of freshwater pearl mussels and the importance of the SACs among farmers, forest-owners and local communities

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## SWOT analysis

Following the completion of the project's actions, a structured planning method called SWOT analysis was used to evaluate the strengths, weaknesses, opportunities and threats remaining after the end of LIFE funding (Table 1). The analysis facilitated the identification of factors that may be favourable or unfavourable to furthering the objectives of the project.

The overall goal of the KerryLIFE project was to demonstrate sustainable land use for the conservation of the freshwater pearl mussel in the Caragh and Blackwater River catchments and their sustainable coexistence with humans. The AfterLIFE plan aims to advance actions that will result in positive outcomes for freshwater pearl mussel, both in these catchments and beyond.

**Table 1 SWOT analysis at the end of the KerryLIFE project**

<p><b><u>STRENGTHS</u></b></p> <ul style="list-style-type: none"> <li>◇ Improved conservation condition of project sites.</li> <li>◇ Community-based project.</li> <li>◇ Strong willingness of farmers to take conservation measures.</li> <li>◇ Dedicated project team with relevant qualifications.</li> <li>◇ Knowledge and skills gained by partners and participants.</li> <li>◇ Extensive baseline monitoring programme established and research refined technical knowledge.</li> <li>◇ Networking with other projects/institutions disseminated project results.</li> <li>◇ Awareness raising activities raised profile of freshwater pearl mussel.</li> </ul>	<p><b><u>WEAKNESSES</u></b></p> <ul style="list-style-type: none"> <li>◇ Limited suitability of current agri-environment programmes and forest policy for species conservation.</li> <li>◇ Agri-environmental programmes dependent on voluntary participation, where full participation required for catchment management uncertainty regarding longer term continuity.</li> <li>◇ Activities occurring on land outside participating project sites (e.g. farmland, forests, and infrastructural works) posed a threat.</li> <li>◇ Perceived gaps in regulation, enforcement and consequences of competing policy drivers.</li> <li>◇ Inadequate development and implementation of measures for other sectors (e.g. infrastructural).</li> <li>◇ Loss of knowledge through staff turnover.</li> <li>◇ Short-term monitoring programmes.</li> </ul>
<p><b><u>OPPORTUNITIES</u></b></p> <ul style="list-style-type: none"> <li>◇ Promote importance of high value nature farmland.</li> <li>◇ Potential to expand conservation measures to other areas.</li> <li>◇ Enhance involvement of farmers and forest-owners in developing and implementing conservation measures.</li> <li>◇ Restructuring high risk forests to open peatland habitats to improve hydrological function and restoring peatland and heathland habitats will deliver other benefits such as carbon sequestration and biodiversity.</li> <li>◇ Partners in position to continue cooperation.</li> <li>◇ Continuation of project’s monitoring of freshwater pearl mussel to form long-term monitoring programming.</li> <li>◇ Potential to build on the strong relationships with key stakeholders communities to implement additional conservation measures.</li> </ul>	<p><b><u>THREATS</u></b></p> <ul style="list-style-type: none"> <li>◇ Underlying economic and social factors in rural areas.</li> <li>◇ Land use change and intensification.</li> <li>◇ Hydro-morphological pressures (e.g. drainage).</li> <li>◇ Absence of integrated catchment management.</li> <li>◇ Continuation of unsustainable farming and forest management practices.</li> <li>◇ Adverse effects of climate change on hydrological regimes of rivers.</li> </ul>

## Continuing the objectives of KerryLIFE

Having delivered the project actions in the six years of the KerryLIFE project, with the support of the LIFE programme, the project must consider how to ensure that the project's achievements are maintained and that further conservation outcomes are possible. The knowledge gained by the partners during the project will facilitate informed and appropriate decisions regarding current and future activities in these catchments freshwater pearl mussel catchments.

The KerryLIFE project comprised actions required to deliver the aims and objectives of the LIFE programme. As detailed in the original application, actions under the KerryLIFE project consisted of: one-off demonstration actions specific to the delivery of the project and which did not require continuation, and; actions where continuation will be needed. One-off actions include the preparatory actions, the project monitoring of actions, some of the public awareness and dissemination actions and the overall project management actions.

Relevant project partners will continue to support the conservation of the freshwater pearl mussel and monitor the effectiveness of the KerryLIFE project actions on the Caragh and Blackwater (Kerry) rivers through the actions outlined in the following sections.

## Agricultural Actions

The Department of Agriculture, Food and the Marine (DAFM), supported by the National Parks and Wildlife Service (NPWS) and the KerryLIFE Project developed a follow-on project to continue the implementation of conservation measures on farms. This resulted in the Pearl Mussel Project (PMP), a €10 million programme funded through the European Innovation Partnership (EIP) Fund within the Rural Development Programme (RDP) 2014-2020. The project commenced in 2018 and continues through to the end of 2023.

The PMP builds on the work undertaken by the KerryLIFE project, with many of the measures demonstrated by KerryLIFE incorporated into the new project's supporting actions. The PMP is based on a results-based approach, in which the quality of peatland, grassland and woodland habitats are used as indicators of catchment condition and farmers are rewarded for delivering environmental services, principally, water quality improvements but also biodiversity, carbon storage, aesthetic and cultural services.



Following on from the success of KerryLIFE, the PMP has continued to engage positively with the farming community at a local level. Farmer and advisor training on the requirements of freshwater pearl mussel continues through a programme of annual farmer and farm advisor training.

The PMP operates in the KerryLIFE project area, the Blackwater and Caragh catchments, with 95% of KerryLIFE participants transitioning across to the project in 2020 once their KerryLIFE contract expired. The two project teams worked closely to give participants continuity between programmes. The PMP has also increased the overall participation in the project area from 20% to 75% strongly demonstrating the strong willingness of farmers to undertake conservation measures. The PMP also operates in the six other priority freshwater pearl mussel catchments, in counties Donegal, Mayo, Galway, Kerry and Cork which together with the KerryLIFE catchments host 80% of the national population of freshwater pearl mussels. Table 2 illustrates how agricultural actions will be taken forward:

Table 2: Summary of agricultural actions

Project action	AfterLIFE action	Who
Farmer participation (A.2)	Promote continued participation of farmers in targeted agri-environment programmes	All project partners
Drain management (C.1)	Appropriate management of drains and watercourses is required across all project sites to ensure that sediment and nutrients are prevented from reaching the pearl mussel habitat and to restore the hydrological functioning required to support pearl mussels	PMP conducts a whole farm assessment of watercourses. Farmers who manage their drains and watercourses appropriately are rewarded.
Hedgerows (C.3)	Maintain established hedgerows and associated stock proof fencing.	KerryLIFE participants are maintaining newly established hedgerows and associated fencing with oversight by PMP
Livestock and grazing management (C.4)	Optimal livestock management (e.g. grazing) to reduce and avoid soil disturbance in critical source and transport areas on farms.	The PMP scores each management unit using customised peatland, grassland and woodland score cards to assess the habitat quality. Farmers are rewarded for maintaining or improving habitat condition (and associated risk to sediment / nutrient losses). Good habitat quality requires optimal livestock management practices.
Nutrient management planning (C.5)	Excess nutrient losses to rivers continue to pose a risk to pearl mussels that is exacerbated by hydrological impairment	KerryLIFE participants nutrient management of their farms improved through the advice provided by the project team in the form of nutrient management plans. The PMP and farm advisors continue to support / advise farmers on the appropriate management of nutrients on their farms. Farmers continue to be encouraged to install buffer zones and reduce nutrient inputs as was developed by the KerryLIFE project.
Livestock drinking facilities (C.6)	Provision of alternative drinking water facilities has been very effective at reducing risks and impacts to watercourses (drains and rivers) connected to FPM habitat.	KerryLIFE participants will continue to maintain alternative drinking water facilities. PMP continues to financially support the installation and maintenance of alternative drinking facilities where there is a perceived risk to water quality. The project team and farm advisors assess these risks through a whole-farm assessment and supports / advises the farmers in appropriate solutions including the provision of drinking facilities.

## Forestry Actions

The Forest Service of the DAFM will continue to oversee the implementation of woodland initiatives under the Native Woodland Scheme (NWS). This involves the monitoring of woodland sites four years after the completion of initial works. The landowner and their forester are responsible for such works. Participants involved in the NWS will benefit from premiums of €665 per ha for 15 years for establishment sites and €350 per ha for seven years for conservation or conversion sites. The efficacy of the techniques demonstrated as part of the NWS requires ongoing evaluation and the learnings from the KerryLIFE project will inform future forestry programmes. Tables 3 and 4 illustrate how forestry actions will be taken forward:

Table 3: Summary of forestry actions on privately-owned land

Project action	AfterLIFE action	Who
Native Woodland Projects (C.2)	Inspection of native woodland projects four years after the completion of works	Forest Service will oversee the inspection of the native woodland project sites four years after the completion of initial afforestation or conservation works by the forest-advisor. Any works e.g. drain blocking, fence repair, supplementary fencing will be identified and reported to the forest-owner.
Native Woodland Projects (C.2)	Native woodland projects typically require follow-up environment and/or silvicultural works to be carried during the early years of the project life..	The forest-owner (or their forest advisor) will undertake any works identified in the year 4 inspection.
Drain management (C.1)	Appropriate management of drains and watercourses is required across all project sites to ensure that sediment and nutrients are prevented from reaching the pearl mussel habitat and to restore the hydrological functioning required to support pearl mussels	The forest-owner will maintain drain measures, as appropriate
Control Rhododendron (C.2)	The growth of <i>Rhododendron ponticum</i> can disrupt the development of native woodland by outcompeting other plants.	The forest-owner will control <i>Rhododendron</i> , as appropriate





Coillte will continue to oversee the implementation of restructuring techniques implemented on its forest properties. Many of the trials implemented are viewed as the initial phase(s) of restructuring as these techniques alone are not likely to be sufficient to achieve habitat improvements necessary for the conservation of the freshwater pearl mussel. The efficacy of the techniques demonstrated were mixed. Measures were found to reduce but not eliminate losses of sediment and nutrients during operations nor did they fully restore the hydrological function required to conserve the freshwater pearl mussel. These measures should only be taken within sites where it can be demonstrated that they supports the recovery of nutrient, sediment, water table, hydrological connectivity, fringing habitats and fish host levels as required by the Conservation Objectives for the relevant SAC.

Table 4: Summary of forestry actions on publicly-owned land

Project action	AfterLIFE action	Who
Drain management (C.1)	Appropriate management of drains and watercourses is required across all project sites to ensure that sediment and nutrients are prevented from reaching the pearl mussel habitat and to restore the hydrological functioning required to support pearl mussels at all treated sites.	Coillte will carry out inspections and will undertake maintenance of drain measures, as appropriate.
Restructured conifer plantation (C.7)	178 ha of conifer plantation was restructured using a range of techniques into long-term retention native woodlands or open peatland habitats.	Coillte will incorporate the sites into their biodiversity programme and manage them in a sensitive way.
Halo-thinning trials (C.7)	Sites halo-thinned during the KerryLIFE project will need repeat interventions to complete the restructuring from conifer to native woodland or open peatland habitats with some tree cover.	Coillte will carry out repeat halo-thinning every 3-5 years in order to complete the gradual restructuring of the treated sites.
Native Woodland Projects (C.7)	Native woodland projects implemented at Slievaduff, Gearha North and Tooreenafersha will require periodic monitoring to identify necessary works to maintain the woodland, fences and access points.	Coillte will carry out necessary environmental and silvicultural works as required.
Control of invasive/regenerating non-native conifer species (C.7)	The integrity of native woodland and open peatland habitats can be impaired by the growth of invasive species (e.g. <i>Rhododendron ponticum</i> ) and regenerating non-native conifers and broadleaved seedlings/shrubs (e.g. Sitka spruce) and will need to be controlled/ eradicated.	Coillte will control the growth of invasive and alien species on treated sites.
Continuous cover forestry trial (C.8)	The conversion of even-aged plantation into a continuous cover forest requires repeat interventions. The trial site at Bohaculia needs to be thinned every 3-5 years until a mixed age, native broadleaved woodland is achieved.	Coillte will carry out thinning every 3-5 years to complete the gradual conversion to a continuous cover woodland.
Firebreaks (C.9)	Maintain and monitor grazed and willow firebreak trials	Coillte

## Outreach Actions

All project partners will continue to disseminate the results of the project and promote the conservation of the freshwater pearl mussel and the Natura 2000 network. This will be achieved through the following AfterLIFE actions.

Table 5: Summary of outreach actions

Project action	AfterLIFE action	Who
Website (E.2)/ Information sheets (E.8)	A webpage will be maintained for 5 years after the completion of the project.	NPWS will maintain a webpage making the project deliverables available for download. O'Rourke and Finn. 2020. Farming for Nature: the Role of Results-Based Payments. Teagasc and NPWS. Free download at: <a href="http://www.teagasc.ie/farmingfornature">www.teagasc.ie/farmingfornature</a>
Walkway (E.4)	The walkways at Lickeen will require regular inspection and maintenance to ensure that they are kept in good condition.	Coillte, Lickeen Development Field Group and South Kerry Development Partnership have put in place a Memorandum of Understanding to jointly manage the walkways at Lickeen. The Lickeen Field Development Group will carry out regular inspections; the South Kerry Development Partnership will carry out maintenance and Coillte will carry out repairs, as required.
Dark Sky Reserve (E.4)	Monitor light levels to ensure the Dark Sky Reserve standards are achieved.	Kerry County Council
Pearl shield	The Pearl Shield football challenge was an effective way of engaging with the wider community and there has been considerable interest from the communities in continuing this annual event.	PMP will organise an annual competition between the KerryLIFE project catchments and two other nearby catchments involved in their project.
Publications		



## Monitoring Actions

Continuing monitoring actions after project end is vital, and must continue for many years in order to determine the success of the project actions. Monitoring results will also assist with prioritisation of future actions, such as prioritising areas for habitat restoration to restore hydrological functioning on farms and forests, for fencing and grazing management, and areas for nutrient management areas. NPWS will continue to monitor the freshwater pearl mussel populations and their habitat in the Blackwater and Caragh catchments. The monitoring programme will continue to align with EPA and Kerry County Council’s biological and water chemistry monitoring programmes; and the PMP’s condition scores and whole farm assessments. Together these will aid the interpretation of the longer-term outcomes of the project and will determine the need for, and suitability of, future management actions.

Table 6: Summary of monitoring actions

Action	AfterLIFE Action	Who
Monitoring of freshwater pearl mussel habitat (D.1-D.2)	Freshwater pearl mussel populations and their habitat will continue to be monitored as part of the national monitoring programme. While the measures demonstrated on project sites resulted in a reduction of sediment and nutrient losses there is a lag period until their full effect of can be seen in the pearl mussel’s habitat.	NPWS will undertake surveillance monitoring as part of its Habitat’s Directive monitoring.
Biological monitoring (D.2)	Routine monitoring of macroinvertebrate and macrophytes will be conducted in the Caragh and Blackwater catchment as part of the River Basin Management Plans.	Environmental Protection Agency will carry out monitoring as part of its Water Framework Directive monitoring
Flow and turbidity (D.3)	Monitoring of flow and turbidity will be continued in the project area as part of long-term monitoring station. By, this will provide important insights into the condition of pearl mussels’ habitat condition.	NPWS will continue the monitoring of flow and turbidity at selected site(s).
Water chemistry (D.4)	Routine monitoring of water chemistry will be conducted in the Caragh and Blackwater catchment as part of routine monitoring programmes under the WFD.  A dedicated round of water-chemistry sampling of a sub-set of KerryLIFE monitoring sites will be carried out in 2022.	Environmental Protection Agency / Kerry County Council.  NPWS
Farm habitat condition (E.6)	Annual monitoring of the habitat condition and whole farm water course assessments of participating farms will be carried out annual in the Caragh and Blackwater catchments	PMP
Data analysis (D.1-D.6)	Data collected during the lifetime of the project and as part of the AfterLIFE project will be used to report on the condition of the Blackwater and Caragh freshwater pearl mussel populations as part of the 2019-2024 Article 17 reporting cycle.	NPWS



## Conclusion

KerryLIFE was an ambitious project which was successful in achieving its objectives of demonstrating sustainable land use management practices for the conservation of the freshwater pearl mussel. The actions implemented to reduce sediment and nutrients have had an immediate direct benefit to the freshwater pearl mussel and to the wider environment. While measures to restore the hydrological conditions are expected to take longer as there is a lag between the implementation of the measure and the achievement of the desired effect for the freshwater pearl mussel population. It must also be recognised that not all measures and land use management practices demonstrated by the project were fully effective and that the partners involved in the KerryLIFE project remain committed to further developing the work completed by KerryLIFE in restoring and conserving the important populations of freshwater pearl mussels found in the Blackwater and Caragh catchments.



